

United States Coral Reef Task Force

**Coastal Uses
Working Group
Summary Report**

November 1999

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List of Acronyms

AIS	Automatic Identification System
ARC	Aquatic Restoration and Conservation
ATBA	Area To Be Avoided
BFI	Browning-Ferris Industries Incorporated
BNP	Biscayne National Park
CERCLA	Comprehensive Environmental Recovery, Compensation, and Liability
Act	
CEST	Control of Erosion and Sedimentation
C.F.R.	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species
CNMI	Commonwealth of the Northern Marianas Islands
CRTF	Coral Reef Task Force
CSO	Combined Sewerage Overflows
CWA	Clean Water Act
CUWG	Coastal Uses Working Group
CZMA	Coastal Zone Management Act
DEP	Department of Environmental Protection (Florida)
DNLR	Division of Lands and Natural Resources (Hawai'i)
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DOJ	Department of Justice
DOT	Department of Transportation

EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FKNMS	Florida Keys National Marine Sanctuary
FKNMSPA	Florida Keys National Marine Sanctuary Protection Act
FL	Florida
FMPs	Fishery Management Plans
FMRI	Florida Marine Research Institute
FOSC	Federal On-Scene Coordinators
FWCA	Fish and Wildlife Coordination Act
FWS	Fish and Wildlife Service
FY	Fiscal Year
G.C.A.	Guam Code Annotated
GPS	Global Positioning System
HI	Hawai'i
H.R.S.	Hawai'i Revised Statutes
ICRI	International Coral Reef Initiative
IMO	International Maritime Organization
IUCN	International Union for the Conservation of Nature
MARAD	Maritime Administration

MARPOL	Convention for the Prevention of Pollution from Ships
MMS	Minerals Management Service
MPAs	Marine Protected Areas
MPRSA	Marine Protection, Research and Sanctuaries Act
NC	North Carolina
NEPA	National Environmental Policy Act
NERR	National Estuarine Research Reserve
NESDIS	National Environmental Satellite, Data, and Information Service
NGOs	Nongovernmental Organizations
NM	National Monument
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NMSA	National Marine Sanctuaries Act
NHP	National Historical Park and Heritage Area
NP	National Park
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NOAA	National Oceanic and Atmospheric Administration
NURP	National Undersea Research Program
NWHI	Northwest Hawai'ian Islands
NWR	National Wildlife Refuge
OCRM	Office of Ocean and Coastal Resource Management
OPA	Oil Pollution Act
OPAs	Otherwise Protected Areas
OMB	Office of Management and Budget

P.R.	Puerto Rico
RHA	Rivers and Harbors Act
RNA	Regulated Navigational Areas
SCUBA	Self Contained Underwater Breathing Apparatus
TSS	Traffic Separation Scheme
TX	Texas
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environmental Programme
U.S.	United States
U.S.C.	United States Code
USCG	United States Coast Guard
USCRI	United States Coral Reef Initiative
USCRTF	United States Coral Reef Task Force
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS/BRD	United States Geologic Survey/Biological Resource Division
USVI	United States Virgin Islands
V.I.C.	Virgin Islands Code
WRDA	Water Resources Development Act

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U . S . C o r a l R e e f T a s k F o r c e

Introduction

Reefs at Risk

Tropical and subtropical coral reefs cover less than one percent of the world's surface yet are the ocean's richest source of biodiversity, providing habitat for hundreds of thousands of marine species. These ecosystems are also vital to the millions of human beings who live and work around them. They and related coastal ecosystems such as mangroves and seagrass beds benefit mankind by providing materials for new medicines, generating income from tourism, buffering coastal cities from storm damage, and providing a range of ecological services such as nutrient recycling. According to one estimate, reef habitats provide humans with living resources and services worth about \$375 billion each year (Costanza et al. 1997).

Despite these benefits, the first systematic and data-driven global assessment of coral reef ecosystems confirmed that 58% of the world's reefs are potentially threatened by human activity including physical destruction due to coastal development, marine-based sources of pollution, and over-exploitation of resources, destructive fishing practices, and runoff from inland deforestation and farming (Bryant et al. 1998). The root stressors to coral reef ecosystems are not going away. Two-thirds of the people in the world live within 80 km of the coast (Letson, Suman, and Shivlani 1998) and that population growth rates in the coastal zone are currently estimated to be five to six percent annually in many regions (Serageldin 1995).

Global climate change is also among the highest risk factors for coral reefs worldwide. Among the climatic factors expected to add stress to reefs are: increased sea-surface temperature, sea-level rise, rainfall variability and associated salinity swings, photo-synthetically active and UV radiation levels, storm surge heights, tropical cyclone intensity and frequency, turbidity of water, elevated nutrient levels due to increased runoff, etc. (Pittock 1999). New studies preliminarily indicate that elevated levels of carbon dioxide in the atmosphere, a by-product fossil fuel emissions such as automobile exhaust and power generating facilities, will cause significant changes in seawater chemistry, thereby causing significant coral mortality throughout the world at rates never before witnessed (Gattuso 1999).

A National Call to Action

Recognizing the national significance of coral reef ecosystems, President Clinton

signed Executive Order 13089 (64 Fed. Reg. 232701) at the National Oceans Conference in June, 1998. The Order builds off the success of the International Coral Reef Initiative (ICRI) and U.S. Coral Reef Initiative (USCRI) and directs all federal agencies whose actions may affect U.S. coral reefs to take steps to insure that such actions will not harm these valuable, and vulnerable marine ecosystems and also established the U.S. Coral Reef Task Force (CRTF). Under the leadership of the Secretaries of Departments of Commerce and Interior and consisting of the Secretaries and Administrators of 11 federal agencies, and the Governors of seven states and territories with coral reef resources (Guam, American Samoa, Commonwealth of the Northern Mariana Islands, Hawaii, Florida, Puerto Rico, and the U.S. Virgin Islands) the CRTF was charged with developing comprehensive national strategies to protect, conserve, restore and sustainably manage U.S. coral reef resources.

Charge of the Coastal Uses Working Group

As one of five interagency CRTF working groups, the Coastal Uses Working Group (CUWG) is charged with developing strategies to mitigate anthropogenic stressors on coral reef ecosystems throughout the United States. Primarily, these stressors can be defined as impacts from population increase, development, and commerce, in the coastal zone. Distilled further, three main anthropogenic threats to U.S. coral reefs emerge¹:

- ***Fishing Pressures*** – Coral reefs and associated sea grass, algal plain, and mangrove habitats provide fishery resources that represent a critical source of food, both commercial and subsistence, for the US and world populations. Reefs contain over 4,000 species of fishes as well as crustaceans, molluscs, and other edible invertebrates. Major threats from fishing pressures identified in this report include the following (not in order of priority): (1) *Overfishing*, (2) *Destructive Fishing Techniques*, (3) *Bycatch*, (4) *Aquarium Species Collection*, and (5) *Aquaculture*.
- ***Coastal Development and Shoreline Modification*** – Shoreline modification, coastal development and their associated effects on coral reef health are the unwanted result of modernization and an increasing population in the coastal zone. Major threats from shoreline modification and coastal development identified in this report include the following (not in order of priority): (1) *Dredging*, (2) *Port and Harbor Development*, (3) *Undersea Energy Extraction and Utility Siting*, (4)

¹Other anthropogenic stressors such as land based polluted runoff and sedimentation, and marine pollution are covered under the auspices of the Air and Water Quality Working Group of the CRTF.

Undersea Cable and Pipeline Siting, and (5) Shoreline Modification.

- **Vessel Traffic** – Daily life, especially in island environments, is dependent on vessels of differing size and shapes. Near coastal and coastal vessel traffic range from commercial tankers, cruise ships and containerships to personal watercraft to longline fishing boats, all of which have the potential to significantly impact coral environments. Increased development pressures in these areas exacerbates the problem. Major threats from vessel traffic identified in this report include the following (not in order of priority): (1) *Direct Vessel Impacts*, (2) *Recently Abandoned Ships*, and (3) *Vessel Pollution*.

Many of the aforementioned threats vary in intensity throughout U.S. coral reef ecosystems. Coastal development in the Commonwealth of the Northern Mariana Islands, for example, is at a significantly decreased scale in contrast to development on the Island of Puerto Rico. Likewise, vessel traffic impacts in the remote Northwest Hawaiian Islands do not compare in intensity to the Florida Keys. However, throughout the United States, one threat is consistently cited as acting as the catalyst for intensifying fishing pressures, increasing coastal development, and causing significant vessel impacts to coral reefs, namely, tourism.

Tourism – A Catalyst for Pressure

Increased tourism and its associated effects on coral reefs has been identified as one of the major threats to the health of coral reefs in the United States. Deleterious impacts on coral reefs from tourism come not just from direct recreational impacts by divers and snorkelers on the reef, but more significantly from the indirect impacts of the tourism industry. These impacts include increased runoff and sedimentation from resort development, increased recreational boat groundings and anchor damage, damage to benthic habitat from personal water craft and increased recreational and commercial fishing pressure.

In 1997, tourism accounted for approximately 11% of global GDP, consumer spending, and capital investment. Although the relative percentages will remain the same, the industry is expected to double in absolute terms over the next 10 years (Hawkins 1998, Hill 1998). In some reef containing areas such as the Caribbean, tourism generates up to 30% of investment and GDP (Dixon 1993, Hill 1998). In Hawai'i, travel and tourism is the largest industry, employer and revenue earner in the state, attracting over seven million tourists annually. Over three million of these visitors participate in ocean recreation activities, and those activities generate gross revenues projected at over \$700 million annually. In the Florida Keys four million tourists visit every year, contributing over \$1.2 billion dollars to tourism-related services (English 1996). In Guam and the Northern Marianas, 90 percent of economic development is related to coastal

tourism (NOAA 1998). The increase in tourist activity has often been dramatic. Between 1985 and 1995, visitor numbers on Guam rose from 300,000 to 1,300,000 per year. The hotel industry is now the single largest private sector employer on Guam.

Tourism impacts have been documented to have a number of direct adverse effects on reef health. For example, in Puerto Rico shell and coral collecting for the tourist curio trade have been cited as being among the major human disturbances to the reefs there (Wells 1988a). Reef contact by divers' fins and reef walking by tourists are listed among tourism impacts to the reefs of the U.S. Virgin Islands (Rogers 1985). Similarly, shell collecting by and for tourists have depleted the populations of certain popular reef mollusc species on the reefs of Guam (Wells 1998b). The negative aspects of tourism regarding reef health are not isolated to U. S. reefs alone. Only one Central American country has not experienced adverse effects on its reefs attributable to tourist facilities development, anchor damage, and diver damage (Cortés 1997).

Other direct physical impacts to reefs caused by tourism pressures result from increased large vessel activity such as cruise ship transits in nearshore waters, and increased commercial shipping of supplies to coastal states and islands. Anchor damage to coral reefs caused by these large vessels has been consistently cited as one of the significant threats to coral reefs in certain areas of the U.S. Smaller, recreational vessels also impact nearshore reefs and associated reef ecosystems such as seagrass beds. More tourists mean more fishing, diving, glass-bottomed, sailing excursion, skiing, dinner cruise, and para-sailing boats. The boom in the personal watercraft industry has significantly stressed coral reefs in places such as the Florida Keys, Guam, Puerto Rico and the Northern Marianas. The damage caused by this increased level of boating activity can take several forms including: anchor damage, propeller scarring, and groundings.

Increased tourism also plays a role in placing elevated pressure on the fishery resources of the visited area, often resulting in overfishing of commercially valuable species. Pressure emanates from increased impacts to fisheries habitat by both commercial and recreational gear and from targeting of valuable reef species such as grouper, snapper and spiny lobster populations. In the Caribbean, for example, fisheries biologists documented that during a spurt in tourism growth in the 1980s, the size of lobster caught in local waters steadily diminished, to the point that many lobster are currently in "pre-reproductive capacity" status (King 1997).

Increases to the tourism base require an increase in the infrastructure and support facilities such as restaurants, bars, stores, souvenir shops, museums and other points of interest, fast-food outlets, piers and docks, parking lots, airports, power and water supply, etc. Providing these types of facilities generally requires new construction in the coastal zone. In Guam for instance, since 1985 there have been 26 new tourist hotels

completed, and six of the 14 pre-existing hotels completed substantial expansions. Within this period, the number of hotel rooms more than tripled, and more than 90% of the hotels were built to provide ocean/beach access.

Increased coastal development also increases polluted runoff from the coastal watershed basin due to a greater percentage of the land in the area being “hard surfaced,” i.e., paved or concreted over. Almost invariably this results in a more substantial sediment load being transported out to sea, eventually to be deposited onto reef surfaces. Additionally, this runoff usually contains a fairly high level of oil, grease, and other hydrocarbon based road surface deposits.

Increased tourist populations stress civil infrastructure such as sewage treatment facilities and solid waste disposal systems. Very few of the U.S. Island states and territories provide tertiary or even secondary sewerage treatment of human waste, preferring primary treatment and ocean outfall disposal of treated waste. Even where some level of treatment is provided, increased sewerage means an increase in nutrient enrichment (elevated levels of phosphorous and nitrogen) resulting in eutrophication of area waters and declines in coral reef health. Studies have indicated that this increased level of nutrient enrichment can persist for substantial distances offshore from populated islands, as in the Florida Keys (Lapointe 1992, Mendes et al. 1997).

Anthropogenic stresses to coral reef ecosystems have been well documented. Dredging, excessive sediment loads, pollution by agricultural and industrial wastes, sewerage, oil pollution, over-exploitation, destructive fishing techniques, anchor damage, construction of infrastructure near reefs and stresses from tourism (Eakin et al. 1997) all contribute to global declines in coral reef health. It is clear that action must be taken, yet government response to anthropogenic threats to coral reef health is varied and complex. Numerous federal and state and territorial statutes attempt to mitigate these threats by (among other things) regulating the take and use of coral species, establishing special management areas to protect coral ecosystems and pursuing civil and criminal penalties for damage to coral reefs. Members of nongovernmental organizations and marine conservation organizations have engaged in public education campaigns to influence user behaviors towards the reef. Despite these efforts, impediments remain to effective management and mitigation of coastal use threats to coral reefs.

Balancing Human Uses and Coral Ecosystem Protection

Resource managers do not manage the resource, per se. They manage humans. Mitigation of anthropogenic threats to coral reef health requires managing human behaviors and uses. Overcoming the impediments to management requires that short and long term actions bridge jurisdictional boundaries at the federal and local level. Actions must be supported by a broad range of interests and constituent bases and must balance the competing uses of environmental protection, economic development and

meeting the demands of an increasing population base in the coastal zone. Most importantly, actions must achieve measurable environmental benefits.

The Coastal Uses Working Group Summary Report concentrates on identifying issues, impediments and recommended high priority actions to protect coral reef ecosystems from threats by our Nation's coastal uses. The Report is meant to be complementary to the other CRTF Working Group reports as well as the U.S. All Island Coral Reef Initiative Strategy. All actions are meant to embody the core conservation principles detailed in the ***National Action Plan to Conserve Coral Reefs***.

Many of the proposed actions to mitigate anthropogenic threats to coral ecosystems that are included in this Report revolve around management actions such as prevention, enforcement, education, and regulation. They represent the highest priority actions as determined by federal and state/territorial agency working group members, and numerous scientists, academics, and resource managers throughout the U.S. The actions have been developed and refined through a collaborative, multi-agency, multi-jurisdictional process. Numerous coral reef experts were consulted in the development of this report and their recommendations, priorities, and expertise is included herein.

The following report is divided into three main sections; Fishing Pressures, Coastal Development and Shoreline Modification, and Vessel Impacts. Each section provides a detailed overview of the key, national threats to coral reef ecosystems, current actions by federal and state governmental agencies to address those threats and impediments to effective action. In addition, each section contains detailed high priority recommendations for action by the member agencies of the U.S. Coral Reef Task Force. Appendices summarizing federal (and in some cases state/territorial) statutory/regulatory authorities to address threats to coral reefs are located within each respective section.

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Fishing Pressures

Key Threats to U.S. Coral Reef Fisheries

The Coastal Uses Working Group identified the following fishing-related activities on U.S. reefs that require additional management efforts in order to sustain the benefits of fishery resources.

Overfishing

Overfishing of high value species, especially higher level predators and important herbivores, has been documented on nearly all U.S. inshore reefs on populated islands. For example, in the western Atlantic, Nassau grouper, jewfish, speckled hind and Warsaw grouper are severely depleted and are candidates for U.S. Endangered Species listing. Reef sharks, with the exception of hammerheads, have been extensively depleted around the high Hawai'ian Islands. American Samoa and Guam have reported overfishing of surgeonfishes and parrotfishes. Herbivorous fishes now constitute the primary catch in USVI and Puerto Rico. Overfishing of both apex predators and of important herbivores has been implicated in degradation of reef ecosystems. Dramatic changes on coral reefs have been documented when herbivores are overharvested, allowing seaweeds to largely exclude corals from entire habitats. Nearshore fisheries using gill nets have likewise been implicated in overfishing of a number of species. Overfishing is generally not limited to any particular gear type; however, certain gear and fishing methods can very efficiently overfish certain species (e.g., night spearing of parrotfishes). Both commercial and recreational fisheries contribute to overfishing.

Habitat impacts of fishing operations

Certain fishing techniques have negative impacts on coral reefs and associated habitats. These include techniques that may be applied in an inappropriate manner or those where increased usage requires additional attention. *Appendix I-B* provides a summary of different fishing techniques on or near coral reefs, regional importance, and their impacts. Particular concerns were raised with regard to the impacts of the following techniques:

- *Trap fishing*. Traps set for grouper or other species can cause physical damage to corals and result in bycatch and ghost fishing if they are

lost or not regularly checked. Lobster and fish trap deployment and retrieval can cause damage when grapnels are dragged across the reef bottom. This is of particular concern in Florida, Puerto Rico, USVI, and Gulf of Mexico dome banks.

- Gill nets set by boat. This technique is being increasingly used in Hawai'i. Large gill nets are set on reefs and their lead-lines can cause extensive damage when the nets are hauled into the boats.

Destructive fishing techniques

In addition to the above techniques, several illegal reef-destructive fishing techniques continue to occur. Use of bleach, dynamite, and cyanide are outlawed everywhere in the U.S. and are not prevalent on most U.S. reefs (see *Appendix I-A*). There have been occasional reports of dynamite fishing in more remote areas of CNMI and American Samoa, including several incidences in Fagatele Bay National Marine Sanctuary. Fishing with bleach is still reported in Hawai'i and the CNMI.

Impact of nets and other fishing debris on coral reefs

Initial NMFS surveys in the Northwest Hawaiian Islands (NWHI) encountered a density of 4230 kg of marine debris/km². Projections of the total derelict fishing gear grounded on the coral reefs of the NWHI exceed 6000 metric tons. An increased incidence of nets on reefs surrounding the main Hawaiian Islands has also been observed. Although the most publicized impacts of derelict gear are Hawai'i monk seal and sea turtle entanglements, derelict fishing gear threatens the ecological balance of the entire reef community by destroying habitat and entangling benthic reef flora and fauna. The surveys indicate that substantial areas of habitat are dredged and damaged in the wake of the derelict fishing gear's movement across the atoll. In addition to the

Coral Fisheries A U.S. Economic Resource

Coral reefs and associated sea grass, algal plain, and mangrove habitats support important recreational and commercial fishery resources for the United States and the world. Reefs contain over **4,000 species of fishes** as well as crustaceans, molluscs, and other edible invertebrates. Coral reefs are located off the coasts of more than 100 countries and **contribute about one quarter of the total marine catch in developing countries**. Nearly one billion people in Asia alone depend on these resources for food. The **annual values of U.S. reef fisheries** off the Florida Keys, Caribbean, Puerto Rico and Hawai'i are estimated at **\$48.4 million, \$15 million, \$19.3 million and \$20 million**, respectively. The rich biodiversity of reefs also supports a marine aquarium industry and represents genetic resources with promise of future food, pharmaceuticals, and other products derived through mariculture or biotechnology.

physical damage to the coral reefs by marine debris, there are recent concerns about accelerated introduction of alien species by marine debris and eventual replacement of endemic species. There is considerable evidence that the harmful effects of marine debris extend along the entire Hawai`ian Archipelago from Hawai`i to Kure Atoll. Problems associated with marine debris have only manifested in the past 10-20 years, with the nets and trawls apparently originating in the North Pacific.

Other indirect impacts associated with fisheries

- Anchor damage: Anchor damage from fishing boats has been identified as a problem in Florida and the U.S. Caribbean. Ways to address the problem include bans on anchoring in certain areas and installation of mooring buoys.
- Trawling damage to coral areas. This has been identified as a problem in deeper coral areas in the Gulf of Mexico. It was also a major cause of destruction of the deep water *Oculina* coral banks off the east coast of Florida before the development of the *Oculina* reserve. In general, such damage is inadvertent rather than due to directed fishing, but trawls can cause tremendous damage when hauled over hard bottoms with coral.
- Grounding of fishing vessels. This has had a major, albeit localized, impact on certain reefs (e.g., recent fishing vessel groundings in the main and Northwest Hawai`ian Islands).
- Lobster traps: Lobster traps, lines and buoys can be thrown up on reefs during storms (e.g., in the Florida Keys) during tropical storm Gordon in 1994 and Hurricane Georges in 1998) and exacerbate storm damage. We are not aware of any quantitative assessment of this sort of damage. It appears that many lobster boats probably have out 4 or 5 days worth of traps. That is, even if they wanted to get all the traps in before a big storm and had somewhere to put them, they would not have enough time in the expected hurricane preparation window.
- Artificial reefs: Badly designed artificial reefs can also be damaged by storms, throwing debris up onto reefs. The number of artificial reefs permitted in Florida rose from 28 in 1970 to over 470 in the early 1990s.

Bycatch of fishes, seabirds and protected species

A number of protected species, such as hawksbill and green sea turtles as well as certain seabirds and perhaps certain seabirds, are associated with or dependent on coral reefs and subject to mortality in fishery bycatch - especially in longline and shrimp trawls. A number of fishing techniques, especially traps and gill nets, result in mortality

of non-target fish species.

Collection of aquarium fishes, corals, and other organisms

The aquarium hobby is among the fastest growing in the U.S. Obtaining sound figures for the economic impact of the marine aquarium trade is difficult given its numerous participants and players; differentiating marine and freshwater economic components further complicates matters.

Nonetheless, one five-year old economic estimate places the wholesale value of trade in aquarium fish and equipment (i.e., aquaria, filters, food, lighting, etc.) in excess of \$400 million in the U.S. and the retail value at as much as \$7 billion value globally. The

In the Philippines, an estimated 400 metric tons of cyanide is sprayed onto the reef annually for fishing purposes.

(Russel 1998)

worldwide market for marine ornamentals is estimated at more than \$100 million.

A System Out of Balance

Overfishing and destructive fishing threaten coral resources in the U.S. and throughout the world. Reef fisheries have already been greatly diminished by overfishing and habitat destruction. **Overfishing is widespread**, occurring on most of the world's reefs. Many reef fishes have relatively slow growth rates, late maturity, and irregular recruitment; characteristics that make overexploitation more likely. In several areas, **commercially important species such as giant clams and groupers have become locally extinct**. The trend is for high-value resources to be removed first, progressing to overfishing of lower and lower value fishes. **Over-fishing can cause a change in the ecological balance of the reef**. For example, removal of predatory fishes has accelerated bioerosion of corals by the invertebrate prey that these fishes formerly held in check, while **overfishing of herbivorous fishes has been implicated in the overgrowth of corals by algae**. The first global survey of human impacts on the world's coral reefs, Reef Check, surveyed 300 coral reefs in 30 countries and territories during the summer of 1997. This survey revealed overfishing of high value lobsters, sea cucumbers, groupers, and other fishes at even the most remote sites.

Originally dominated by tropical reef fishes, new technologies have made it easier to keep a wider variety of fish species as well as corals and other invertebrates. This has increased the market for collection of coral reef organisms. Hawai'i has reported significant concerns in overharvesting of reef fishes, increasing conflicts between aquarium collectors and commercial dive operators. Damage to corals during collection of fish or feather duster worms for the aquarium trade has also been reported. New technologies and increased demand have led to collection from greater depths, where there is currently no monitoring of potential impacts.

Coral is physically removed

from reef structures for introduction into the trade stream as dead ornamental coral, live coral, or live rock which is used to form the colorful and biologically productive substrate of home reef aquariums. While selective removal of individual coral outcrops may be sustainable if properly managed, wholesale market driven removal of all promising specimens and of reef substrate can lead to severe local and regional damage to reef ecosystems. The US is by far the largest market for live and dead coral, with imports primarily from Indonesia, Fiji, Solomon Islands and Tonga. Collection of corals and “live rock” for aquaria is prohibited in most state and territory waters and W. Atlantic federal waters (*see Appendix I-A*), but is nevertheless a particular concern in those areas where it is not yet prohibited.

Mariculture

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

Current Efforts in U.S. Coral Species Management

In the United States, both federal and state/territorial governments have management responsibilities for coral reef fisheries. In most cases, the legislative and regulatory mechanisms are in place to address fishing problems on U.S. coral reefs. Certain indirect impacts are also manageable - e.g. Regional Fishery Management Plans (FMPs) can ban anchoring of fishing vessels under authority of the Magnuson-Stevens Act - which along with installation of mooring buoys can help minimize anchor damage. However many problems remain unaddressed due to the complexity of coral reef ecosystems and because: a) few coral reef fisheries are actively managed, even though the state or federal legislation would allow it; b) when management occurs it is generally on a species-by-species basis rather than an ecosystem approach; c) management is often not well coordinated across jurisdictional boundaries; and d) enforcement of existing regulations is difficult and often underfunded. Successful management, however, will require increased enforcement of existing regulations, as well as new approaches that protect biodiversity and ecosystem functions while regulating fishing.

Appendix I-A provides a draft summary of laws and regulations governing the harvest of coral reef organisms in federal and state waters. ***Appendix I-B*** summarizes

major fishing techniques used on U.S. reefs, as well as some of the known impacts of these methods. A summary of input from the U.S. island states, territories, and commonwealths on problems, current action, and priorities is provided in the *All Islands Coral Reef Action Plan*.

Impediments to Effective Management

- < **Coral reef areas have not been zoned for appropriate uses, including fishing and aquarium collecting:** Despite increasing pressures on coral reef resources, planning efforts have generally not extended to zoning reef areas for specific uses, and where they do, have generally not taken into account the carrying capacity of the ecosystem. Most marine protected areas do not provide protection from fishing. *(Addressed by Action 1; also in other U.S. Coral Reef Task Force actions).*

- < **Areas of essential fish habitat for exploited species have not been mapped or protected:** Identification of essential fish habitat (e.g., spawning aggregation sites, juvenile habitat, etc.) is the first step toward conserving the productivity upon which fisheries depend. Identification of such habitats is particularly important in order to develop effective fishery reserves that contribute to fishery management. *(Addressed by Actions 1 & 2; U.S. Coral Reef Task Force mapping efforts).*

500 federally managed species depend on coral reefs for part of their life cycle

<

Enforcement of existing fishery regulations is insufficient: In many cases, coral reef fisheries and aquarium collection are conducted by numerous small scale commercial, recreational, and subsistence fishers harvesting many different species using a variety of techniques over large areas of reef. Even when effective regulations have been instituted, their enforcement is generally difficult and staff-intensive. *(Addressed by Action 3)*

- < **Regulations have not kept up with increasing impacts of fishing gear on habitat:** Many traditional gear types, such as fish traps, may have produced only localized damage when there were fewer fishers in the fishery. As fishing effort has increased, cumulative impacts have begun to strain reef resources. At the same time new technologies, such as mechanized gill nets or deep water collection gear, have come into use, further expanding harvesting impacts on reefs. (*Addressed by Actions 4 & 5*)

- < **Inconsistencies exist among federal and state/territorial regulations on collection and trade of ornamental coral reef species:** Hawai`i and Guam have both reported on cases of coral or “live rock” being transported through their territories but being attributed to collection in federal waters. Lack of regulations prohibiting collection of coral and “live rock” in federal waters in the Pacific also may open the U.S. to challenges in the World Trade Organization if limitations on coral imports are instituted. (*Addressed by Action 6*).

- < **Sources and impacts of fishing debris on Pacific coral reefs have not been addressed:** The recent increase in nets, trawls and other debris observed on Hawai`ian reefs appears to originate in North Pacific fisheries. This geographic separation of the source and problem has slowed identification and response to this problem. (*Addressed by Action 5*)

- < **Our understanding of fishery resources and the ecosystem effects of harvesting is insufficient for management purposes.** (*Addressed by Actions 2,6 & 7; and explicitly in the Ecosystem Science, Monitoring, and Mapping efforts under the U.S. Coral Reef Task Force*).

 - C *The status of most reef fishes and harvested invertebrates is not known:* With the exception of certain high value species, it will likely be counterproductive to try to define overfishing on species by species basis. However, there is a need to improve stock analysis of selected species - especially species that have been proposed as candidates for endangered species listing (e.g., several Caribbean groupers or sharks), or high value fisheries (e.g., lobsters, precious corals) or for the aquarium trade. There is a particular need for fishery-independent monitoring of selected coral reef fishery species. Several monitoring approaches incorporate indicator species (e.g., large groupers, snappers, or lobsters).
 - C *Information on harvesting activity is lacking:* There is a need for improved means of data collection from harvesting activity for both target and non-target species. Mechanisms to address such data gaps may include socio-economic monitoring of nearshore fisheries and

reporting requirements or mandatory use of observers for at-risk habitats in offshore fisheries.

C *The ecosystem effects of removing apex predators and herbivores is poorly understood:* Studies that have been conducted suggest that the impacts on coral reef ecosystems can be severe. Research that includes monitoring the effects of no-take fishery/ecological reserves may be the best opportunity to address this question.

C *We know very little about deep water resources:* Although harvesting is rapidly expanding to deeper waters, our understanding of these reefs lags far behind. There is a particular need for monitoring of impacts of collection of deep water black, gold, pink and bamboo corals. Monitoring of deep water species requires special equipment and can be quite expensive.

C *Development of mariculture alternatives to wild harvests is limited by our abilities at successful captive breeding:* Although mariculture of certain commercial fishes and aquarium species (e.g., small polyp corals) has been successful, captive breeding of the majority of reef fish and invertebrate species requires more basic and applied research.

< **Lack of authority to address certain impacts on fishery resources in federal waters:** NOAA has identified the need for additional legal authority in two areas relating to coral reef fisheries management. (*Proposed to be addressed in reauthorization of Magnuson-Stevens Fishery Management and Conservation Act*).

1. *Coral Reef Protection:* Currently the Magnuson Act allows Regional Fishery Management Councils to limit anchoring and other actions by fishing vessels, but the Councils cannot prescribe other management measures that would enhance protection for coral reefs and associated ecosystems, e.g., no anchoring by any vessel (not just fishing vessels) on coral reefs.

2. *Caribbean Council Jurisdiction:* The current description of the Caribbean Council limits its jurisdiction to the EEZ off Puerto Rico and the U.S. Virgin Islands. This means that the Council's conservation regulations for coral, reef fish, queen conch, and spiny lobster do not apply in the EEZ around Navassa Island or any other U.S. possession in the Caribbean.

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Recommendations to Address Fisheries Threats

Improved management of coral reef fisheries will require better scientific information, increased coordination, better enforcement of existing regulations, and new management approaches that protect biodiversity and ecosystem functions while regulating fishing and other extractive uses. This requires increased funding at local, state, and federal levels. Specific actions and strategies include:

- < **Expand and Monitor Coral Reef No-take Fishery/Ecological Reserves**
- < **Identify and Conserve Essential Fish Habitat**
- < **Enhance Fisheries Enforcement Capacity**
- < **Apply Additional Fishing Gear Limitations**
- < **Restore Hawai`ian and Other Pacific Island Reefs Through Assessment and Removal of Marine Fishing Debris**
- < **Ban Collection of Coral and “Live Rock”, Monitor and if Necessary Limit Collection of Other Species for Aquarium Trade**

The following Action Strategies are meant to lay the groundwork for future actions at the federal and state/territorial levels to address fisheries impacts to coral reefs. While general in nature, they represent CUWG priorities at the current time and are based on best available knowledge of the major threats to the resource.

Action 1 -- Expand and Monitor Coral Reef No-Take Fishery/Ecological Reserves

Summary

The U.S. Coral Reef Task Force commits to working with fishers, Fisheries Management Councils and other stakeholders to identify and protect coral reefs in a network of permanent no-take fishery/ecological reserves. The Task Force recommends an initial goal of protecting at least 5 percent of U.S. coral reef area (outside of the Northwest Hawaii'an Islands - which currently represent the largest coral reef no-fishing zone in the U.S.) by 2002. The ultimate goal is to have developed by 2010 a representative network of no-take fishery/ecological reserves that will protect a percentage of each coral reef habitat (and associated ecosystems, i.e., seagrasses and mangroves) in U.S. waters sufficient to ensure replenishment of areas where fishing is allowed.

“No-take” fishery reserves, also known as ecological reserves, marine wilderness areas, replenishment zones, recovery zones, or harvest refugia, are permanent marine protected areas (MPAs) that are open to non-extractive use only, i.e., areas in which fishing and collection of organisms is prohibited. On coral reefs, ecological reserves have proven effective in both the Caribbean and Pacific as extraordinary mechanisms to protect both fisheries and associated essential fish habitat and biodiversity. They can play a critical role in the recovery of fisheries and associated habitats. A recent survey of Caribbean sites in the CARICOMP network showed that sites where control of fishing access was the only management tactic were the only sites where coral cover was stable or had increased over the last 10 years. Such areas can often serve as important tourist draws as well (e.g., Hanauma Bay in Hawai'i). If large enough, they can provide spawning populations to repopulate regionally depleted fisheries. Such areas should be developed in full participation with the affected fisheries.

Recently, states, territories and Regional Fishery Management Councils have taken significant steps to expand the use of no-take fishery/ecological reserves.

- Guam has recently approved the establishment of a number of

no-fishing areas.

- In 1998, the Hawai`i State Legislature passed Act 306 that established a “West Hawai`i Regional Fishery Management Area” along the west coast of the Big Island, with a minimum of 30% of nearshore waters designated as “Fish Replenishment Areas” in which aquarium fish collection is prohibited. A portion of these “Fish Replenishment Areas” are supposed to be additionally designated as no-fishing areas.
- Puerto Rico has designated one marine ecological reserve between Culebra Island and Luis Peña cayo and is considering two others. A new fisheries law facilitates these efforts by empowering the Secretary of the Department of Natural and Environmental Resources to close areas to fishing.
- In 1998, the Caribbean Fishery Management Council voted unanimously to recommend establishing its first coral reserve under the Magnuson-Stevens Fishery Conservation and Management Act, a 13 square nautical mile area called "Hind Bank" southwest of St. Thomas, U.S. Virgin Islands. The reserve, where fishing and anchoring are prohibited, was identified in close partnership with fishers, and is designed to protect coral habitat and preserve declining reef fish stocks.
- In March 1999, the Gulf of Mexico Fishery Management Council approved a gag/black grouper regulatory amendment, which proposed a 423 nautical square mile area off the west coast of Florida (Florida Middlegrounds) that would be closed area to all reef fish fishing. Based on a strong negative reaction to the proposed measures by members of both the commercial and charter/headboat sectors, the Council is currently reconsidering the closed area and other actions.
- In June, 1999, the Western Pacific Fishery Management Council reviewed the draft Coral Reef Fishery Management Plan, which may include new marine protected areas with no fishing zones..
- The American Samoa Coral Reef Task Force recommended, *inter alia*, that a full recovery plan for fisheries should include a network of marine protected areas to allow fish to recover, reproduce and reseed overfished areas. (May 14, 1999)

Scope

NATIONAL -- Initial activities would concentrate on ensuring monitoring of existing or newly designated no-take fishery/ecological reserves in the U.S. states and territories. Activities would then be expanded to the designation of new areas on all U.S. coral reefs. Analytical activities and outreach would extend to the Freely Associated States of Palau, Federated States of Micronesia, and the Marshall Islands, and coordinated with regional efforts in the Caribbean.

Participants

Lead participants will be the states and territories on reefs within their jurisdictions. Key partners in the identification and implementation of new no-take fishery/ecological reserves will be the local communities themselves, including fishers and aquarium collectors (whose buy-in is critical to success) other reef users such as the diving industry; environmental NGOs, and many others. Special attention must be given to traditional resource users. National Marine Fisheries Service and Regional Fishery Management Councils will be a key implementing mechanism for activities in federal waters in accordance with the Magnuson-Stevens Act. Other federal partners include the US Fish and Wildlife Service, National Park Service, and National Marine Sanctuaries Program, which plan to increase the area of "marine wilderness" within their protected areas, and identify new Marine Protected Areas.

Implementation Plan

FY1999	Begin review of existing sites.
FY2000	Begin baselines and monitoring for existing and newly established no-take fishery/ecological reserves.
FY2000	Begin identification and designation of high priority new no-take fishery/ecological reserves -- with priority given to areas of known grouper or snapper spawning aggregation sites or important nursery habitat -- in close coordination with fishers, other stakeholders, and the USCRTF Marine Protected Area sub-group.
FY2000	Begin gap analysis of Western Atlantic U.S. reefs and associated ecosystems to identify additional

	areas for the larger no-take fishery/ecological reserve and MPA network.
FY2001	Begin gap analysis of U.S. Pacific Island reefs and associated ecosystems to identify additional areas for the larger no-take fishery/ecological reserve and MPA network.
FY2002	Complete initial designation of high priority no-take fishery/ecological reserves representing at least 5 percent of U.S. coral reefs outside of the Northwest Hawai`ian Islands. End of calendar.
FY2006	Complete gap analysis of U.S. coral reefs.
FY2010	Complete designation of a national, biogeographically representative network of no-take fishery/ecological reserves.

Performance Measures

FY2001	Existing reserves will be monitored, and gap analysis for new areas will have begun.
FY2002	Five percent of U.S. coral reefs outside of the Northwest Hawai`ian Islands are included in designated no-take fishery/ecological reserves, with special emphasis given to areas of essential fish habitat, such as grouper spawning sites.
FY2010	Representative system of no-take fishery/ecological reserves is completed.

Funding

Total Funding needed: FY-2000 - FY 2005: \$10 M

Additional resources are needed in FY2000 to develop baselines and monitor existing or planned no-take fishery/ecological reserves. Existing no-take fishery/ecological reserves are not adequately monitored, and a great increase in sites is expected over the next year. Designation and enforcement of new sites beginning in FY-2001 will require significant new resources.

Effect if No Action Taken

Coral reefs and associated habitats support important recreational and

commercial fishery resources for the United States. The current annual values of U.S. reef fisheries off the Florida Keys, Caribbean, Puerto Rico, and Hawaii are estimated at \$48.4 million, \$15 million, \$19.3 million, and \$20 million, respectively. These fishery resources and the ecosystems that sustains them are increasingly at risk. Overfishing of numerous species occurs on many U.S. reefs and has been implicated in changes in the ecological balance of reefs that threaten the integrity of the ecosystem. Certain fishing gear and anchoring directly harms the reef. Reefs cannot remain productive, much less regain their already lost productivity, without a significant percentage of reef areas being set aside as no-fishing replenishment zones.

Action 2 -- Identify and Conserve Essential Fish Habitat

Summary

The health of fishery resources depends on the health of their habitat. Fishing is one of the most widespread human impacts to coral reefs. The removal of fish by humans not only affects target species populations, but also associated habitats and communities. This action is closely tied to the mapping goals developed by the Mapping Working Group, and will help set the framework for federal and state activities in other areas as well, such as protecting these habitats from land-based pollution. Identification of essential fish habitat (EFH) will require scientifically valid ground truthing. This activity contributes to the “gap analysis” of current marine protected areas proposed by the Ecosystem Science & Conservation Working Group.

Actions needed are:

- Map reef habitat, identifying essential habitat for fishery resources assess the condition of the habitat, and determine the spatial extent of fishing induced disturbance.
- Determine the effects of specific gear types, along a gradient of effort, on specific habitat types.
- Incorporate essential fish habitat into gap analysis to allow resource managers to prioritize new areas for protection, restoration, or other forms of management. Gap analysis is a science based program for identifying the degree to which native animal species and natural communities are represented in our present day mix of conservation areas. Those species and communities not adequately represented in the existing network of conservation areas constitute conservation "gaps." Gap analysis provides broad geographic information on the status of species and their habitats in order to provide managers, planners, scientists, and policy makers with the information they need to make better informed decisions.

Scope

NATIONAL -- The scope of the strategy will be national, but its greatest benefits will be felt at the regional and local levels.

Participants

States and territories, federal, state and local/tribal coastal zone, protected area and fishery management authorities, fishery commissions and regional management councils, fishers, divers, aquarium collectors, and local communities. Gap analysis activities will build on the *Aquatic Restoration and Conservation (ARC) Partnership for Marine, Estuarine and Freshwater Living Resources*. ARC is a partnership of NOAA, USGS/BRD, USFWS, states, NGOs, and professional societies. Implementation will be coordinated with the U.S. Coral Reef Task Force

Implementation Plan

Mapping
Implementation would be coordinated with the CRTF Mapping and Information Synthesis Working Group. Depending on the availability of funds, EFH mapping would begin in FY-2000. Implementation will be an iterative process -- beginning with available low resolution maps and improving as higher resolution products become available.

Funding

Total Funding Needed -- \$4.5 million over five years.

Portions of this investment are included in the Mapping Implementation Plan

Performance Measures

FY2000	Development of a consistent classification framework for coral reef habitats. Habitat mapping begun.
FY2004	Initial draft sets of habitat maps and comparisons to gear impact intensities.
FY2005	Initial EFH determinations for mapped U.S. coral reef areas completed.

Effect if No Action Taken

Identification and mapping of essential fish habitat is required by the Magnuson-Stevens Fishery Conservation Act. Without a concerted effort to accomplish these tasks, siting of no-take fishery/ecological reserves and other marine protected areas, as well as determinations of additional gear restrictions, will be based on anecdotal information. This risks further degradation and loss of key fisheries habitat, perhaps before its importance is even realized.

Action 3 -- Enhance Fisheries Enforcement Capacity

Summary

Many of the fishery problems identified, and for which management measures have been implemented, may continue to be a problem due to insufficient enforcement capacity. There is a clear need to strengthen this capacity. Enhancing enforcement will require the addition of human, financial, and educational resources at the federal, state, local and tribal levels. Enforcement at the state and local level is often hampered by the nature of multispecies coral reef fisheries, involving many small scale fishers using a wide variety of gear types. Enforcement in federal waters is often constrained by the ability of enforcement officers to monitor remote reefs, especially in the Pacific. This action was identified as the highest priority by Puerto Rico. Enhancing enforcement activities was also identified as a priority for each of the islands in the All Islands Coral Reef Initiative.

Scope

LOCAL, STATE AND NATIONAL -- The scope of the Strategy will be at the federal, state, local, and tribal levels, but is most critical at the state/territory levels where the greatest fishing impacts on reefs occur.

Participants

State and territorial agencies responsible for fisheries enforcement, NMFS and US Coast Guard enforcement officers and National Park Service personnel. Effective enforcement depends also on an informed public and fishing community.

Implementation Plan

To be developed. States and territories have identified minimum additional resources needed to begin to better inform the public about existing rules and to improve enforcement. The highest priority for enhanced federal enforcement should be enforcement of new no-take fishery/ecological reserves.

Performance Measures

Funding

Total Funding Needed -- \$9 million over 5 years

It is estimated that the majority of resources will go directly to states and territories. By 2005, effectiveness of enforcement of existing regulations should have increased by 50%.

Effect if No Action Taken

Current resources are inadequate to prevent overfishing and illegal fishing activities. Continued unenforced fishing regulations will result in further degradation of already threatened reefs.

Action 4 -- Apply Additional Fishing Gear Limitations

Summary

Where specific gear types have been identified as a problem, Fishery Management Councils, states, and territories may institute additional restrictions, e.g., banning the use of fish traps or large gill nets set from boats. The Caribbean Fishery Management Council is considering a trap reduction program for waters off Puerto Rico and the U.S. Virgin Islands. The Council also intends to further limit fishing gear that impacts reefs, such as gill nets (used in combination with divers who herd whole schools of fish into the nets) and longlines. Puerto Rico is developing comprehensive new fishing regulations for territorial waters, based on a new fishing law compatible with Council FMPs. American Samoa has identified spear fishing using scuba, as a particular problem, and recommended that it be banned. The Western Pacific Fishery Management Council may identify additional gear restrictions in its new Coral Reef Ecosystem Fishery Management Plan.

Scope

STATE AND NATIONAL - The scope of the Strategy will be at the federal, state, local, and tribal levels, but is most critical at the state/territory levels where the greatest fishing impacts on reefs occur.

Participants

States and territories; federal, state and local/tribal fishery management authorities, fishery commissions and regional management councils, fishers, aquarium collectors, and local communities.

Implementation Plan

To be developed. In certain cases gear types of concern have already been identified by state agencies of Fishery Management Councils. An initial priority is to begin collating this information and sharing it among jurisdictions.

Funding

Costs for developing and instituting new regulations are minimal, consisting primarily of analysis of habitat impacts and outreach to the fishing community. Enforcement costs may be greater and are covered in the preceding section.

Performance Measures

- | | |
|--------|---|
| FY2000 | Compilation of gear impact studies and experience in coordination with states. |
| FY2001 | Completion of federal review of gear impact concerns for federal coral reef Fishery Management Plans. |

Effect if No Action Taken

Several fishery gear types contribute to habitat destruction, overfishing, and significant damage to non-target species through bycatch. Continued unregulated use of these gear types will further degrade already threatened reefs.

Action 5 -- Restore Hawai`ian and Other Pacific Island Reefs Through Assessment and Removal of Marine Fishing Debris

Summary

Reef ecosystems in Hawai`i and the Northwestern Hawai`ian Islands (NWHI), have suffered significant anthropogenic damage due to grounding of an estimated 6000 metric tons of marine debris. This marine debris causes extensive physical damage to corals and essential fish habitat, entangles endangered and threatened species, and poses a threat to endemic reef flora and fauna by introducing invasive species. To address these concerns, a comprehensive multiagency assessment, monitoring, restoration, and damage prevention program is proposed to: 1) improve management of existing marine protected areas (National Wildlife Refuges, National Marine Sanctuaries, and National Parks); 2) foster planning for additional marine protected areas; 3) enhance coral reef fisheries management, including implementation of a Coral Reef Ecosystem Fishery Management Plan; and 4) remove harmful marine debris from coral reefs of the U.S. Pacific Islands.

Scope

REGIONAL - Initial activities would concentrate on the Main and Northwest Hawai`ian Islands where the problem appears to be most pronounced. Assessment of needs elsewhere in the Pacific will guide expansion of activities beyond Hawai`i.

Participants

- The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) will co-sponsor the program and collaborate in assessment and monitoring. NMFS and USFWS have statutory authority in federal waters and National Wildlife Refuges respectively.
- The State of Hawai`i, Territories of Guam and American Samoa, and Commonwealth of Northern Marianas (CNMI) will collaborate in assessment, monitoring, restoration, and damage prevention in their

- waters.
- U.S. Coast Guard, U.S. Navy, USFWS, Center for Marine Conservation, NOAA Corps, Univ. of Hawai`i Sea Grant Program, Hawai`i Coastal Zone Management Program, Univ. of Alaska Marine Advisory Program, University of Hawai`i, City and County of Honolulu, Hawai`i Wildlife Fund, Natural Resources Consultants, BFI Inc., and NET Systems will continue collaborating to remove marine debris in the NWHI.
- Activities will be coordinated with USCRTF mapping and monitoring initiatives.
- National Environmental Satellite Data Information Service (NESDIS) and Hawai`i Coastwatch will collaborate in oceanographic analyses for monitoring coral reefs and mapping marine debris.

Implementation Plan

FY2000 Convene International workshop on Derelict Fishing Gear, Vessels and Operational Waste.

Conduct baseline assessment of the distribution of marine debris and condition and health of coral reefs of the U.S. Pacific Islands in conjunction with other federal (USFWS), state (HI), and territorial agencies.

FY2001 Expand multiagency partnerships to establish long term monitoring and remove marine debris from coral reefs of Hawai`i and the NWHI and other U.S. Pacific Islands.

Identify threats and propose mitigation plans for coral reefs of the U.S. Pacific Islands, especially those related to fishing activities.

Establish a multiagency, multinational coral reef damage prevention and public education program for coral reef ecosystems of the U.S. Pacific Islands.

FY2003 Expand multi-agency partnerships to establish long term monitoring and remove marine debris from other U.S. Pacific Islands.

Performance Measures

- Conduct baseline *in situ* assessments of U.S. Pacific Island coral reef ecosystems (measured by percent of major reef systems with baseline surveys to identify monitoring & restoration needs).

- Implement monitoring programs for U.S. Pacific Island coral reef ecosystems (measured by percent of major reef systems with representative sample habitats monitored using national standard methodologies).
- Marine debris removal from NWHI (measured by percent of reef area where removal activities have been conducted).
- Marine debris removal from other U.S. Pacific reefs (measured by percent of major reef systems with active debris removal programs).
- Implement damage prevention programs (measured percent of reef systems with remote sensing and prevention programs).

Funding

Total Funding needed: FY2000 - FY2005: \$20 million

Initial activities in FY-2000 will be conducted using existing funds -- in partnership with other USCRTF mapping and monitoring efforts. A significant portion of the funding requested for marine debris removal in FY2001 and FY2002 is to charter a tug and barge or small freighter (~\$2M per year) for 6-8 months. NMFS and USFWS have prepared companion proposals requesting funding beginning in FY-2001.

Effect if No Action Taken

Coral reef ecosystems of the U.S. Pacific Islands contribute to local and national economies through fisheries for food, materials for medicines, income from tourism and recreation, as well as protection of coastal communities from storms. Although species richness is less, Hawai'i accounts for 84% of U.S. coral reefs and contains the highest proportion of endemic marine species of any island group in the world. The NWHI represent the largest and most pristine U.S. reefs. Marine debris is currently the major threat to these unique reefs. They are also a major threat to threatened and endangered species of the region -- especially the endangered Hawai'ian monk seal.

Action 6 -- Ban Domestic Collection of Coral and “Live Rock,” and Monitor and if Necessary Limit Collection of Other Species for Aquarium Trade.

Summary

The objectives of this initiative are twofold: 1) To address current inconsistencies in regulations governing the harvest of coral and wild “live rock”; and 2) to ensure the environmental sustainability of the harvest of ornamental reef species and develop marine ornamental mariculture alternatives to reduce wild harvests.

The U.S. Coral Reef Task Force should endorse the following additional restrictions on the collection of coral and live rock:

Prohibited Acts: *Ban the possession or collection for commercial purposes of wild “live rock” and coral in U.S. territorial waters.*

Exceptions: *The commercial collection or possession of live rock or live coral would be allowed for:*

- *scientific and research purposes, zoological breeding or display, with a permit.*
- *collection of small amounts of live coral as brood-stock for captive breeding/mariculture with a permit.*
- *precious corals covered by a valid state or federal management plan.*
- *items accompanied by a document certifying that the coral or live rock either (1) has been harvested in the jurisdiction of a foreign country and imported in accordance to the Convention on the International Trade of Endangered Species (CITES) regulations; (2) has been obtained from a cooperative breeding or coral husbandry program certified by NMFS or a state; or (3) has been obtained from mariculture or mariculture sources certified by NMFS or a state.*

This management measure reflects current best practices. The harvest and possession of live rock, and certain coral is prohibited, with limited exceptions for maricultured live rock or by permit for scientific or educational purposes, in Florida, Hawai‘i, California, North Carolina, and in the federal waters of the Gulf

of Mexico, South Atlantic, and the Caribbean EEZs. Other jurisdictions, such as Guam, allow the harvest of live rock and coral only with permits. This action by states and Atlantic FMCs recognizes the destruction which has been caused in the past by coral and live rock collection. Both Hawai`i and Guam have recently faced cases where live rock or coral was being transported out of the state or territory, but prosecution was impeded by claims that the collection took place in the EEZ. Given the distances to EEZ areas and the current low level of legal collection of coral and live rock in the EEZ, this management measure would have little immediate adverse impact on fishers. It would, however, close an important loophole before demand becomes unmanageable.

Implementation could be either through new legislation or through minor modifications of state and territorial regulations and inclusion of these requirements in the new Western Pacific Council's planned Coral Ecosystem Fishery Management Plan.

Addressing other aspects of the sustainability of the marine aquarium industry will require:

- Enforcement of existing regulations;
- Improved reporting of harvests of aquarium species monitoring of existing harvest impacts - including comparisons with areas where harvests are not allowed;
- Research into the sustainability of harvests and impacts of harvest methods; and
- Research into alternatives, including the mariculture of ornamental species.

The National Sea Grant College program is funding a workshop in this area in November 1999 in Hawai`i and it is continuing to fund a few projects in the culture of marine ornamental species in its base program. Extension agents in the Pacific and Caribbean (Puerto Rico and Virgin Islands) work consistently with the existing industry to explain and implement sustainable collection techniques and marketing approaches. However, if we are to maximize the opportunity in this area, we suggest a coordinated program across the Sea Grant and NOAA network on the conservation and culture of marine ornamental fishes and invertebrates.

Scope

NATIONAL - Legislation or regulation regarding corals and live rock needs to be consistent across U.S. jurisdictions. The clearest current loophole is in federal waters in the Western Pacific. Hawai`i has the largest aquarium collection

industry in the U.S. and is taking innovative steps to address overharvesting and conflicts with other reef users.

Participants

States and territories; federal, state and local/tribal fishery management authorities; fishery commissions and regional management councils; fishers, aquarium collectors, and local communities. Academic researchers to determine and monitor impacts and develop mariculture alternatives. Partners in the development of mariculture alternatives would include the academic institutions supported by the National Sea Grant College Program, the existing ornamental industry, USDA Agricultural Research Service, Non-government Organizations and Institutions.

Implementation Plan

Schedule: Near to medium term. The National Sea Grant College program is funding a workshop in this area in November 1999 in Hawai'i. There is an immediate need to enforce existing restrictions, close loopholes in coral and live rock collection, monitor the existing level of collection of all ornamental species and begin to determine its impact on the ecosystem. Over the longer term, development of mariculture alternatives to collection from the wild offers the best opportunity for a sustainable ornamental industry.

Funding

Total Funding Needed – \$2.4 million (broken down below)

Implementing new regulations: Funding needed FY-2000 - FY 2001: \$0.1 million. Additional funding might be required for permit issuance under exemptions, examination of management plans, investigation and enforcement, and seizure/care/holding/storage expenditures

Research & monitoring: The National Sea Grant College Program is presently funding a few projects in Florida, Hawai'i, Maryland, and Texas in this subject area and good progress has been made. This base funding needs to be expanded in order to reach the potential of this new industry and to reduce pressure on the wild populations of these species and the coral ecosystem itself. Additional funding for the research component through Sea Grant beginning in FY-2001:

Component	FY2001	FY2002	FY2003	FY2004	FY2005
Research on culture and	\$260	\$260	\$260	\$260	\$260

conservation practices.

Extension Programs in Pacific	\$100	\$100	\$100	\$100	\$100
Education Programs in Pacific	\$100	\$100	\$100	\$100	\$100
TOTAL	\$460	\$460	\$460	\$460	\$460

Effect if No Action Taken

The collection of coral reef species for the aquarium trade is increasing at a tremendous rate. It is causing conflicts with other users in Hawai`i and elsewhere, and driving reef destruction overseas. Without management or mariculture alternatives, this lucrative trade will exacerbate other stresses on the reef and contribute to the local extirpation of certain species. Without coordinated domestic and international regulation of trade, the U.S. may face challenges in the World Trade Organization of import restrictions on coral reef products. Both Hawai`i and Guam have recently faced cases where live rock or coral was being transported out of the state or territory, but prosecution was impeded by claims that the collection took place in the EEZ.

Action 7 -- Address Fishery Impacts on Deeper Reefs

Summary

Until very recently, most attention has been paid to the better known coral reef resources of tropical shallow-water coral reefs. Increasingly, however, we are becoming aware of coral resources in deeper waters that grow much more slowly, but may play similar ecological roles to shallow-water reefs, especially as essential habitat for fisheries species. Important deep coral banks known to provide essential fish habitat have been identified in the *Oculina* Banks off the East Coast, in the Florida Middlegrounds, and elsewhere. Recent submersible studies have indicated that precious coral beds in Hawai`i may be critical habitat for fishes fed on by endangered Hawai`ian monk seals.

New technologies and increased consumer demand are driving fisheries and aquarium collection into deeper waters, where there are few baseline studies and little monitoring of harvest impacts. The ability to monitor and manage such fisheries will become increasingly important. In addition to direct harvesting, there is particular concern that non-selective gear, such as bottom trawls, may be devastating key deepwater coral resources.

To address these threats, federal agencies will survey deep reef resources, identify fishing impacts, and develop a strategy to conserve the most important representatives of these resources.

Scope

NATIONAL -- Deeper water coral resources occur in both state and federal waters, but generally only the federal government, especially NOAA's National Undersea Research Program (NURP) has the research expertise and equipment to assess resources and fishing impacts. It is important to note, that unlike shallow-water reefs, certain deep-water coral banks are not limited to tropical waters, but can occur as far north as the Aleutian Islands.

Participants

In partnership with state, territorial and other federal agencies, NOAA's National Undersea Research Program (NURP), utilizing *in situ* submersible platforms and advanced technologies, will characterize, understand, and compare healthy and impacted coral reefs and their ecosystems that cannot be studied using surface based sampling alone.

Implementation Plan

- | | |
|-----------|--|
| FY99 | NMFS to begin compiling existing information on deep coral resources. |
| FY99-2000 | NMFS expected to approve amendments to Fishery Management Plans, several dealing with deeper reefs. The Western Pacific Regional Fishery Management Council has proposed additional regulations to ban the use of non-selective gear in precious coral collection. |
| FY2000 | NOAA/NURP to expand deep-sea submersible and diving operations specifically designed to identify key EFH and potential impacts of fishing gear. |

Funding

Total Funding Needed -- Estimated at \$4 million over 5 years
(Most for NURP operations)

Performance Measures

- | | |
|--------|--|
| FY2003 | NOAA to identify key deep-water coral resource types that should be included in conservation efforts. |
| FY2005 | NOAA to produce maps and a strategy to conserve the most important representatives of these resources. |

Effect if No Action Taken

Without an assessment of gear and harvesting impacts on deep reefs, the U.S. will continue to lose these resources, often without even knowing the economic cost to fisheries production.

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**APPENDIX I-A
UNITED STATES FEDERAL, STATE, AND TERRITORY LAWS
RELATING TO CORAL HARVEST, TRADE AND FISHERIES**

I. General Federal Laws

Area of Jurisdiction	Law/ Prohibition	Cite
United States	<p>Prohibits trade in any species subject to CITES in contravention of CITES, including prohibiting imports of Appendix II species in violation of requirements.</p> <p><u>Lacey Act</u> prohibits import, export, sale, receipt, possession or transportation of wildlife taken in violation of state, federal, tribal or foreign wildlife related law or regulation.</p>	<p>16 U.S.C. § 1538(c)</p> <p>16 U.S.C. § 3372</p>
National Marine Sanctuaries	<p>Prohibits the destruction, injury or possession of any sanctuary resources (defined as any living or nonliving resource of a national marine sanctuary that contributes to the conservation, recreational, ecological, historical, research, educational, or aesthetic value of the sanctuary) in a national marine sanctuary.</p>	<p>16 U.S.C. § 1436</p>
National Parks	<p>Prohibits destruction or injury of any park system resource (defined as any living or nonliving resource that is located within or is a living part of a marine regimen or a Great Lakes aquatic regimen . . . within the boundaries of a unit of the National Park System, except for resources owned by a non-federal entity) in a national park.</p> <p>Specific parks have additional restrictions and regulations.</p>	<p>16 U.S.C. § 1911-1</p>
National Wildlife Refuges	<p>Prohibits take or possession any fish, bird, mammal, or other wild vertebrate or invertebrate animals or part or nest or egg within any National Wildlife Refuge area, unless activities are performed by authorized managers or under permit.</p>	<p>16 U.S.C. § 668d(c)</p>

II. Regional Laws/ Regulations: Western Atlantic, Gulf of Mexico and the Caribbean

A. Federal Waters (Caribbean, South Atlantic, Gulf of Mexico)

Federal Waters: S. Atlantic, Gulf, and the Caribbean	Law/ Prohibition	Cite
<p>FMPs for Coral and Coral Reefs of the Gulf of Mexico and South-Atlantic, April 1982, with Amendment 2 & 3 (1994-1995)</p> <p>FMP for Corals and Reef Associated Plants and Invertebrates of Puerto Rico and the U.S. Virgin Islands, July 1994</p> <p><i>Implemented at 50 C.F.R. Part 622</i></p>	<p>Regulations Relating to Coral/ Live Rock</p> <p><u>Gulf of Mexico and South Atlantic EEZ</u></p> <p>Prohibits harvest or possession of wild live rock in the Gulf or South Atlantic EEZ after 1997, with an exception for maricultured live rock if taken under permit.</p> <p>Prohibits harvest of Gulf and South Atlantic or Caribbean prohibited coral (listed in appendix, includes all corals in the Class Hydrozoa and Class Anthozoa), with an exception for scientific and educational purposes by permit.</p> <p>Foreign fishing of corals is prohibited. The direct take of stony corals and sea fans and the destruction of corals is prohibited. Corals taken incidentally in association with other fisheries must be returned to area of capture.</p> <p><u>Caribbean EEZ</u></p> <p>Prohibits take or possession of Caribbean prohibited coral (listed in Appendix) from the Caribbean EEZ Harvest and possession of stony corals, octocorals, and live rock, whether dead or alive, are prohibited, except for the purpose of scientific research, education, and restoration.</p> <p>Prohibits sale or purchase of Caribbean prohibited coral harvested in the Caribbean EEZ. Items will be presumed to be harvested in the Caribbean EEZ unless accompanied by documentation showing it was harvested elsewhere.</p> <p>Harvest and possession of any species, if attached to live rock, is prohibited.</p> <p>Harvest or possession of reef-associated invertebrates requires a permit</p>	<p>50 C.F.R. §§ 622.42(b); 622.43(a)(2)(ii); 622.33(b)(4)(iv)</p> <p>50 C.F.R. § 622.4(a)(1),(3)</p> <p>50 C.F.R. § 622.32(b)(2)</p> <p>50 C.F.R. § 632.32(b)(1)</p> <p>50 C.F.R. § 622.45(a)</p>

Federal Waters: S. Atlantic, Gulf, and the Caribbean	Law/ Prohibition	Cite
<p>FMPs for South Atlantic, Gulf and Caribbean EEZs</p> <p>(Cont'd)</p>	<p>Regulations relating to Aquarium Marine Fish</p> <p><u>Caribbean EEZ</u></p> <p>Prohibits fishing or possession of Caribbean prohibited coral (listed in appendix) and certain fish (four-eye, banded, and longsnout butterfly fish; jewfish; Nassau grouper; and seahorses).</p> <p>Authorizes harvest of marine aquarium fish in the Caribbean EEZ only by a hand-held dip net or a hand-held slurp gun</p> <p>Destructive Fishing Practices</p> <p><u>Caribbean, Gulf or South Atlantic EEZ</u></p> <p>Prohibits use of explosive, poison or toxic chemicals for fishing in the Caribbean, Gulf, or South Atlantic EEZ</p>	<p>50 C.F.R. § 622.32(b)</p> <p>50 C.F.R. § 622.41(b)</p> <p>50 C.F.R. § 622.31(a),(b), (e)</p>

B. State and Territorial Waters (Caribbean, South Atlantic, Gulf of Mexico)

State/ Territorial Waters: W. Atlantic, Gulf of Mexico, Caribbean	Law/ Prohibition	Cite
<p>Puerto Rico</p>	<p>Laws/ Regulations relating to Coral</p> <p>Prohibits harvest or take of corals or live rock for commercial purposes, except under permit.</p> <p>Laws/Regulations relating to Marine Fish</p> <p>Prohibits fishing by means of explosives in the maritime waters of Puerto Rico and adjacent islands, or in the lakes, lagoons, rivers, and other bodies of water, or to sell or possess fish caught by means of any kind of explosive</p> <p>Harvest of other invertebrates and fish is not regulated. Harvesters and exporters of invertebrates for the marine aquarium trade are not licensed, and their activities are not regulated; collectors are not recognized as commercial fishermen.</p> <p>Destructive Fishing Practices</p> <p>Prohibits the use of poisonous substances in Puerto Rican waters.</p>	<p>P.R. Law No. 83, Law No. 132</p> <p>12 L.P.R.A. § 57</p> <p>P.R. Law No. 83</p>

State/ Territorial Waters: W. Atlantic, Gulf of Mexico, Caribbean	Law/ Prohibition	Cite
<p>Florida</p>	<p>Laws and Regulations Relating to Coral/ Live Rock</p> <p>Prohibits taking, destruction, or sale of sea fans and certain corals (stony coral, fire coral), or possession of any fresh, uncleaned or uncured specimen . Exceptions are provided for specimens legally harvested outside of state waters or federal EEZ waters adjacent to state waters (but burden is on person possessing species to show legality), harvested under permit for scientific or educational purposes, or pursuant to permit for maricultured live rock.</p> <p>Prohibits harvest or sale of live rock from any state waters.</p> <p>Prohibits transport, destruction, damage, removal, defacing, or take of any coral or other material from the subsoil or seabed of the John Pennekamp Coral Reef State Park which has been taken in violation of any law or regulation of the federal government.</p> <p>Laws/ Regs Relating to Aquarium Marine Fish</p> <p>Designates certain marine fish, corals, and invertebrates as "restricted species." It is unlawful to sell restricted species to a licensed wholesale dealer; or for a licensed wholesale dealer to buy restricted species, unless there is a restricted species endorsement on the seller's saltwater products license.</p> <p>Requires persons harvesting any tropical ornamental marine life species and plants to land such organisms alive and to have systems aboard the vessel to maintain such organisms in a healthy condition.</p> <p>Sets forth size limits for certain marine fish (angelfish, butterflyfishes, gobies, jawfishes, hogfish).</p> <p>Sets forth bag limits for tropical ornamental marine life and plants (e.g., 20 individuals per day; 5 angelfish per day; 6 colonies of octorals). Sets forth commercial harvest limits (e.g. 75 angelfish per person per day or 150 angelfish per vessel per day, whichever is less; 75 butterflyfishes per vessel per day)</p>	<p>Fl. Admin. Code Ann. R. 46-42.009 [formerly Fl. Stat. Ann. § 370.114]</p> <p>Fl. Admin. Code Ann. r.46-42.008</p> <p>Fla. Stat. Ann. § 258.083</p> <p>Fla. Stat. Ann. § 370.01(20), § 370.06 Fl. Admin. Code Ann. r. 46-42.001(b)</p> <p>Fl. Admin. Code Ann. r. 46-42.0035</p> <p>Fl. Admin. Code Ann. r. 46-42.004</p> <p>Fl. Admin. Code Ann. r. 46-42.005, 46-42.006</p>

State/ Territorial Waters: W. Atlantic, Gulf of Mexico, Caribbean	Law/ Prohibition	Cite
<p>U.S. Virgin Islands</p>	<p>Laws Relating to Coral/ Live Rock</p> <p>Unlawful to take, catch, possess, injure, harass, kill, or attempt to take, catch, possess, injure, harass or kill, or sell or offer for sale, or transport or export, whether or not for sale, any indigenous species, including live rock; exception for valid fishing or hunting licenses, scientific or aquarium collecting permits, or indigenous species retention permits.</p> <p>Harvest of live rock and all corals for commercial and recreational purposes is prohibited without a permit. Permits to collect specimens of marine life forms, including live rock, whether or not for sale, and whether or not intended for shipment or export, are authorized for:</p> <p>(A) A private aquarist collecting for a personal aquarium of not more than fifty (50) gallons capacity;</p> <p>(B) A person maintaining an aquarium of any size for a commercial purpose; and</p> <p>(C) A collector for shipment, export, and sale.</p> <p>Permits for coral and live rock are provided on a one-time, case-by-case basis, and require submission of species name and number, location of activity, capture methods, and holding facilities.</p> <p>A permit is required for the harvest and export of other invertebrates for the marine aquaria trade; 53 permits were issued between 1990-1994.</p> <p>Prohibits taking of sand, rock, mineral, marine growth and coral (including black coral), natural materials, or other natural products of the sea, excepting fish and wildlife, from the shorelines without first obtaining a coastal zone permit.</p>	<p>12 V.I.C. § 105 (a)</p> <p>12 V.I.C. § 106(c)(1)</p> <p>12 V.I.C. § 906(a)(7)</p>
<p>North Carolina</p>	<p>Laws Relating to Coral/ Live Rock</p> <p>Prohibits harvest or possession aboard a vessel of coral or live rock. Requires that live rock and coral shall be returned immediately to the waters where taken.</p>	<p>N.C. Admin. Code tit. 15A, r. 31.0116</p>

II. Regional Laws/ Regulations: Indo Pacific Region

A. Federal Waters (Indo Pacific Region)

FMPs for Federal Waters (Indo Pacific)	Law/ Prohibition	Cite
<p>Fishery Management Plans (FMP) for the Western Pacific</p> <p><i>Implemented at 50 C.F.R. Part 660</i></p>	<p>Regulations Relating to Coral/Live Rock</p> <p>Managed species in the Western Pacific region include commercially important fish (bottomfish and pelagic fish) and crustaceans and precious corals.</p> <p>Precious coral beds are treated as distinct management units because of their widely separated and patchy distribution. The beds are classified as Established, Conditional, Refugia, or Exploratory. Quotas are established for pink, gold, and bamboo coral in the one Established bed and in the Conditional beds. Use of selective and nonselective gear (tangle net dredges) is permitted at Conditional beds of Brooks Bank and the Exploratory beds. A minimum height of 10 inches is set for pink coral. No harvest is permitted at Refugia beds.</p> <p>Regulations relating to Aquarium Marine Fish</p> <p>Coral reef species for the aquaria trade are not regulated, however federal waters are unlikely to be a source of these types of animals due to their considerable depth</p>	<p>50 C.F.R. § 660</p> <p>50 C.F.R. § 660.82</p>

B. State/ Territorial Waters (Pacific/ Indo Pacific Region)

State Waters (Pacific and IndoPacific region)	Law/ Prohibition	Cite
California	Law Relating to Coral/ Live Rock Prohibits take or possession for commercial purposes of sea fans, all species of coral and anemone, and live rock (exception for maricultured live rock). Prohibits collection under marine aquarium collectors permits for certain specified areas.	Cal. Fish & G. Code § 8598

State Waters (Pacific and IndoPacific region)	Law/ Prohibition	Cite
Hawai`i	<p>Laws relating to Coral/ Live Rock</p> <p>Prohibits taking, breaking or damaging of live stony corals from waters of Hawai`i, including any live reef or mushroom coral (exception for scientific collection under permit). Prohibits taking any rock to which marine life of any kind is visibly attached or affixed.</p> <p>Collection of soft corals is allowed only when not attached to reef substrate.</p> <p>Prohibits sale of any stony coral as souvenirs (including rice coral, mushroom coral, lace coral, cauliflower coral, elkhorn coral, finger coral, lobe coral, and orange flower coral; does not include coral rubble pieces or fragments imported for the manufacture and sale of coral jewelry or obtained through dredging operations in Hawai`i for agricultural or other industrial uses).</p> <p>Prohibits removal of sand, dead coral, or coral rubble seaward from shoreline with certain exceptions (one gallon per person per day for personal, noncommercial uses; for replenishment of public shoreline areas or construction of state-approved projects with permit, and cleaning activities).</p> <p>Laws relating to Marine Aquarium Fish</p> <p>Collectors must have an aquarium fish catch permit, and commercial collectors must obtain a commercial fishing permit to sell their catch. Permits, issued by DLNR's Div. of Aquatic Resources, allow take of live fish with nets and traps (plan to change regulations & limit net size) – DLNR has no authority to limit the #s of permits; #s increased from 167 to 274 between 1995 and 1998 – DLNR required to report monthly count of the quantities taken of each individual species of aquarium fish exported.</p> <p>Created a West Hawai`i Regional Fishery Management Area that will designate 30% of West Hawai`i's coastal waters (51.8 miles) as Fish Replenishment Areas in which aquarium fish collection is prohibited.</p> <p>Destructive Fishing Practices</p> <p>Possession or use of explosives, electrofishing devices, and poisonous substances is prohibited in state waters.</p>	<p>H.R.S. § 188-68(a)</p> <p>H.R.S. § 188-68(b)</p> <p>H.R.S. § 171-58.5</p> <p>H.R.S. § 188-31</p> <p>H.R.S. § 188-31.5</p> <p>H.R.S. § 188F-4</p>

State Waters (Pacific and IndoPacific region)	Law/ Prohibition	Cite
Guam	<p align="center">Laws Relating to Coral/ Live Rock</p> <p>Bans harvest of live coral except with under a license from the Director of Agriculture.</p> <p>Permits commercial taking of coral by permit issued from the Director of Agriculture. Permit may limit amount of coral to be taken, taking into account the location from which the coral is to be taken, the amount of living coral remaining and the likelihood of damage caused to the reef area by the taking of the coral.</p> <p>Bans willful destruction of coral growth for purposes of flushing fish from their habitat or for clearing an area for net fishing.</p> <p>Authorizes the Department of Public Works to distribute for non-commercial use government-owned coral mined from government-owned coral pits at the request and certification of need of the village commissioner or the assistant commissioner of the village where the coral is to be delivered.</p> <p align="center">Destructive Fishing Practices</p> <p>Authorizes issuance of permits for the use of poison, electrical devices or small mesh nets for the purpose of bona fide scientific research.</p>	<p>5 G.C.A. § 63602</p> <p>5 G.C.A. § 63603</p> <p>5 G.C.A. § 63113</p> <p>5 G.C.A. § 54201</p> <p>5 U.S.C. § 63609</p>

Note: this is a work in progress. Please provide any corrections or edits to Sylvia Liu, DOJ, at (202) 305-0639; fax (202) 514-4231; email: sylvia.liu@usdoj.gov

**APPENDIX I-B
SUMMARY OF MAJOR FISHING TECHNIQUES USED ON U.S. REEFS**

Fishing Technique	Description	Use	Location	Problem	Benefit
gill nets-mechanized	larger gill nets set by boat and hauled in using winches	commercial fishery	Hawaii other reefs?	bycatch: nonselective; catches all fish larger than mesh size habitat destruction: damages coral and other benthic organisms as it is hauled in	none; can reduce bycatch by increasing mesh size
gill nets – hand set and retrieved	monofilament net, weighted set on or near reef, before ebb tide; fish escaping from shallows are gilled in nets; used day and night, often left for hours	subsistence fishery; commercial fishery	Hawaii Puerto Rico; USVI; Guam	bycatch: non-selective harvest of all fish larger than mesh size habitat destruction: damages attached organisms (corals) as net drags across bottom	Can decrease catch of juveniles by increasing mesh size; less destructive than large, mechanized gill nets
longline	heavy monofilament, with weights and hooks towed behind fishing vessels; hauled in using winches.	commercial catch of pelagics, sharks and other species	on and adjacent to many reef areas	bycatch: sharks, sea turtles and seabirds habitat destruction: lost gear (monofilament) entangles reef structures overfishing: may impact deepwater grouper populations	selective harvest

Fishing Technique	Description	Use	Location	Problem	Benefit
hook and line hand troll, handline	undertaken on shore and from fishing vessels; monofilament line with lures or bait; may be towed behind moving vessel.	subsistence, recreational, and commercial fishery	most reefs	<p>bycatch: sharks, turtles, non targeted fish; high mortality of deep water fish</p> <p>habitat destruction: loss of line, leaders, hooks, sinkers etc; injure corals when dragged across bottom or becomes entangled in reef</p>	selective harvest, non destructive; alternative to cyanide fishing; may use special hooks that minimize "deep setting" allowing release of non target species
trawling and purse seining	nets towed behind a boat across soft bottom habitats such as grass beds.	shrimp, small fish	Florida	<p>bycatch: non-selective; high mortality of non-targeted juvenile fish and invertebrates</p> <p>habitat destruction: scours the bottom</p>	highly effective method for shrimp and small fish; can reduce bycatch with TEDs and BRDs
trap fishing (fish traps or fish pots)	Antillean Z-trap, or other designs; metal or wood frame with mesh wire and one or more openings; may be baited. Placed on or next to coral reef areas.	commercial and subsistence fishery for grouper, squirrel fish, grunts, parrotfish	USVI; Puerto Rico; Pacific Islands?	<p>bycatch: non-selective- targets juveniles and adults and captures all reef fish;</p> <p>overfishing: contributed to decline of groupers, snappers and important herbivores</p> <p>habitat destruction: damage corals through physical impact; ghost traps continue to harvest fish; traps washed onto reefs during storms</p>	cost-effective; can reduce bycatch by increasing mesh size

Fishing Technique	Description	Use	Location	Problem	Benefit
lobster trap fishing	wooden or metal pots with mesh wire and various size openings set in benthic habitats near reefs	commercial lobster fishery ¹	U.S. VI; WHI; Florida	<p>bycatch: small crustaceans, reef fish.</p> <p>habitat destruction: damage to reef during recovery of trap; lost ghost traps.</p>	alternative to spearing; allows release of small individuals and females
SCUBA Diving	selective harvest of conch, lobsters and food fish; gorgonians and antipatharians for jewelry, aquaria invertebrates and fish; may involve spearfishing	commercial and recreational; food fish and invertebrates; ornamental fish, corals and invertebrates	All U.S. reefs	<p>overfishing: extraction of previously unexploited deepwater areas using mixed gas; exploit breeding populations of conch and other invertebrates.</p> <p>habitat destruction: physical damage to reef through diver fin contact; divers may break apart coral to capture lobster and fishes.</p>	selective harvest
free diving	combined with spearfishing or harvest of invertebrates; target different species than SCUBA	recreational, subsistence fishery; shallow water conch; large fish	Most U.S. reefs	<p>overfishing: selectively removes largest fish.</p>	selective harvest

Fishing Technique	Description	Use	Location	Problem	Benefit
night diving	SCUBA and spearfishing are utilized at night to catch diurnal fish that sleep on the reef, and crustaceans that come out of hiding at night.	recreational and subsistence fishery; diurnal herbivores and predators; nocturnal invertebrates	All U.S. reefs; concern in HI, Am. Samoa, and CNMI	<p>overfishing: causing site specific depletion of commercially important parrotfish and wrasses and certain molluscs and crustaceans</p> <p>habitat destruction: divers damage coral to extract invertebrates and fish; diver fin contact.</p>	selective harvest; ease of collection
spearfishing "bang-stick"	Use of harpoon, gun, sling or bang-stick to impail individual fish or invertebrates; combined with SCUBA and free diving	sport fishing, subsistence fisheries, artisanal fishery, reef lobster	Puerto Rico; Florida; CNMI; Guam; American Samoa; Hawai'i	<p>overfishing: selective harvest of large fish and rare species</p> <p>habitat destruction: damage corals when fired into reef; bang-stick causes collateral reef damage when exploded;</p>	none; conflicts with other fisheries
slurp guns	hand-held device that captures fish by rapidly drawing water into a chamber; combined with SCUBA or free diving	aquaria fish	Puerto Rico; Hawai'i	may injure fish	relatively low impact; selective harvest; non-destructive to habitat;

Fish ing Technique	Description	Use	Lo cation	Problem	Benefit
Blast fishing (dynamite, ammonium nitrate)	dynamite dropped from boat into shallow water coral reef habitats; fish float to surface or die on bottom	subsistence fishery	A merican Samoa ² ; C NMI; Gu am	overfishing: kills fish non-selectively; shock waves ruptures fish swim bladders. bycatch: up to 90% of fish remain on bottom and are not harvested. habitat destruction: dislodges coral and reduces reef to rubble.	none (illegal in most countries, widespread use, especially in remote areas)
Quin aldine	mixed with alcohol or acetone, placed in plastic squirt bottles; sprayed into holes and reef outcrops	aquaria fish and invertebrates	Pu erto Rico; Hawai`i; U SVI?	habitat destruction: may kill reef invertebrates including coral. Causes coral bleaching.	none; illegal in U.S. waters without permit
Chlo rine bleach	placed in plastic squirt bottles; sprayed into holes and reef outcrops	lobsters and fish	Pu erto Rico; CNMI; Gu am ⁴ ; Ha wai`i	habitat destruction: kills all coral reef organisms.	none; use is declining due to increased cost
plan t-derived poisons ³ (<i>Derris elliptica</i> , <i>Barringtonia asiatica</i>);	extracted from root and bark of plant, diluted and dispensed from squirt bottles	subsistence fishery	A merican Samoa; Gu am ³	habitat destruction: toxic to other organisms	none (illegal in most countries, still in limited use)

Fish ing Technique	Description	Use	Lo cation	Problem	Benefit
cyan ide fishing (Sodium cyanide or potassium cyanide)	NaCN dissolved in water in plastic squirt bottles; fish swim into coral head, diver squirts cyanide onto coral. Cyanide tablets are placed inside bait, which are eaten by the fish; cyanide is also pumped from drums on boats onto the reef.	aquari a trade; live food fish	Ind o-Pacific	overfishing: target spawning aggregations; damages internal organs of fish; non-selective: bycatch: kills non-target fish, coral and invertebrates; causes coral bleaching at low concentrations. habitat destruction: collateral damage; break apart reef to extract stunned fish	none (illegal in most countries, but still in use)
clov e oil (<i>Eugenia caryophyllata</i>)	clove oil dissolved in ethanol, dispensed from squirt bottles	live food fish	Ind onesia	currently unknown; may be less harmful than other poisons; habitat destruction: collateral reef damage to extract stunned fish	alternative to cyanide
mur o-ami (cha mber net fishing)	nets set near reef, 6-25 m deep; line of fishers (often children) using weighted lines to pound on reef to scare fish into nets	subsi stence fishery	Pa cific Islands; Asia	overfishing: targets schooling herbivores and planktivores; habitat destruction: destroys living coral	none
kaya kas fishing	swimmers form line, drives fish toward nets by smashing corals with poles; similar to muro-ami, but occurs in shallower water	subsi stence fishery	Pa cific islands; Asia	overfishing: targets scarids, acanthurids, labrids and synganids. habitat destruction: damages coral	none

Fishing Technique	Description	Use	Location	Problem	Benefit
gleaning	wading through the shallows to collect organisms	invertebrates, especially molluscs; algae	most U.S. islands	habitat destruction: trampling on grassbeds, and reef areas overfishing: may remove juveniles	selective harvest
throw nets (cast nets)	fishers cast small nets into shallow water to trap small fish.	juvenile "bait fish", mullet	U.S. Pacific islands	overfishing: removes mostly juveniles	relatively low impact
hammers/crow bars	used to break apart reef to obtain fish from crevices or to remove live rock and corals	live rock, attached invertebrates	Puerto Rico Pacific islands	habitat destruction: damages reef substrate, causes erosion, increased sedimentation	none
small-mesh hand nets	divers collect juvenile fishes by chasing fish into dip nets	Aqua fish ⁵	All U.S. reefs	conflicts with non-consumptive dive tourism. overfishing: depletion of target species.. habitat destruction: divers damage corals through fin contact when chasing fish.	relatively low impact; alternative to cyanide use
barrier net	short nets are set on and around coral heads and fish are chased into net	aquaria fish	Hawaii	overfishing: depletion of target species. habitat destruction: entangle on reefs, damaging branching corals when removed.	relatively low impact; alternative to cyanide use

Fishing Technique	Description	Use	Location	Problem	Benefit
Tangle-net dredges	Towed behind vessels on deep water coral banks in federal waters.	Precious corals	Western Pacific EEZ	<p>bycatch: non-selective; removes small as well as large corals.</p> <p>overfishing: low recovery of dislodged corals (40%).</p> <p>habitat destruction: dislodges all sessile organisms.</p>	cost-effective?
Manned and unmanned submersibles	Operated from surface vessels or self-contained; selectively cut individual precious coral colonies	Precious corals	Western Pacific EEZ	<p>overfishing: selective removal of large breeding individuals most important to population.</p>	very selective; alternative to tangle-net dredges

Endnotes:

¹Lobster fishery:

- Lobster traps in NWHI have eight escape vents to facilitate escape of juvenile lobsters and non-target species.
- In Guam, American Samoa, and CNMI fishers target reef lobster (*Panulirus penicillatus*) that do not enter traps; lobster are caught by spearing or by hand; highly selective, little bycatch.

² In American Samoa this is restricted to remote locations (e.g. Fagatele Bay National Marine Sanctuary).

³ local name in American Samoa: avi niu kini (*Derris elliptica*) and futu (*Barringtonia asiatica*; root extract).

⁴ A decline in destructive fishing is reported for Guam due to local regulation, enforcement of regulation and expense to purchase bleach.

⁵ Aquarium fish trade - may exacerbate effects of overfishing for food fishes when juveniles of commercially important food fishes are a prime target of aquarium fish trade (Johannes and Riepen, 1995).

U . S . C o r a l R e e f T a s k F o r c e

Coastal Development and Shoreline Modification

Key Threats Effecting Coral Reef Ecosystems

Section Two of the President's Executive Order on Coral Reef Protection offers a federal policy for coral reefs: to the extent permitted by law, federal agencies are to "ensure that any actions they authorize, fund, or complete will not degrade the condition of [coral reef] ecosystems." Given the dependence of island and coastal communities on navigation and trade and other pressures associated with coastal development, this policy requires the careful consideration of federal agencies, states, and territories. The challenge of the Task Force is to protect coral reefs while meeting the growing demands on coastal resources. The Coastal Uses Working Group identified the following coastal development and shoreline modification activities on U.S. reefs that require additional efforts at mitigating the deleterious effects on coral reef ecosystems

Dredging

Throughout the country, the U.S. Army Corps of Engineers (Corps) dredges and disposes of about 300 million cubic yards of dredged material annually for congressionally authorized navigation improvement and maintenance projects. In addition, permit applicants (e.g., port authorities, terminal owners, industries, and private individuals) dredge an additional 100 million cubic yards annually for navigation projects (e.g., ports, berths, and marinas).

On an average annual basis, only a small fraction of the total amount of material dredged each year is at or in the vicinity of coral reefs. Once a harbor is constructed through a coral reef there is virtually no need to maintenance dredge. The dredging required maintains inner harbors and berthing areas. Material is disposed in ocean waters at sites approved by the Environmental Protection Agency pursuant to Section 404 of the Clean Water Act, placed in upland environments, or used for beneficial purposes.

Port and Harbor Development

In October 1998, the U.S. Department of Transportation published *A Report to*

Congress on the Status of the Public Ports in the United States. The report outlines dredging and dredged material disposal, other environmental regulations, and the need for expanding ports and harbors to meet growing demands. The report suggests that, “With foreign trade expected to double by 2010, ports must continue to expand terminal facilities and related infrastructure.” In addition, there is also the possibility of developing new harbors because urban growth around existing ports may preclude continued expansion.

Port and harbor development occurs for a variety of reasons. Examples include deep draft commercial ports; recreational small boat harbor ports; protected landings and shelter-type harbors; military harbors; and sole ports, or ports of entry to small islands. The weight of the public interest may be a factor in determining whether or not to proceed with the development.

The vast majority of port expansion will occur at deep-draft harbors on the Atlantic, Gulf, and Pacific coasts. Some smaller scale port development may be needed in locations near coral reefs.

Undersea Cable Siting

Undersea cables are a major source of communications between islands and territories. Off the Florida coast, underwater fiberoptic cable for communications has recently been sited on the ocean floor. In Hawai`i, undersea cables may be used to transfer geothermal energy in the future. Past sitings of undersea cable in Hawai`i have adversely affected reefs.

The siting of underwater cables can impact coral reefs. Steps can be taken through federal permit process to minimize negative impacts; one possible example is attempting to centrally locate cables in the near-shore environment, thereby minimizing the physical impacts to reefs.

Shoreline Modification

Shoreline development often accelerates coastal erosion. Many states and territories face growing threats from erosion, which can adversely affect coral reefs (e.g., sedimentation, alteration of currents, changes in turbidity). For example, from 1989 to 1993, the miles of critically eroding shoreline in Florida increased from 217.6 to 232.9 (Florida Center for Public Management, 1997). The amount of development along the coastline is expected to

Hardening (e.g., seawalls and groins) of shoreline and beaches to protect private property has resulted in the loss of nearly 25 miles of beaches on O`ahu, 9 miles of beaches on Maui and 3-5 miles of beaches on Kaua`i.

increase in the future.

In a number of areas, eroding beaches are resupplied with sand from offshore bars coastal inlets and, in some instances, inland navigation projects. Beach renourishment is an iterative process that replenishes sand after it is depleted from beaches. In 1996, Florida had 108.4 miles of beach that had been restored and were under a maintenance program (Florida Center for Public Management 1997).

Seawalls, bulkheads, sheet pilings, groins, and moles are all structural mechanisms used to control erosion in particular areas. These techniques typically cause the accretion of sediment in one location, and the erosion of sediment in another.

Erosion control measures, if not properly designed, can negatively affect coral reefs. Evidence indicates that offshore dredging for beach renourishment, in some cases, adversely affects coral reefs (Blair et al. 1990). Examples of injuries to coral reefs that may occur from beach renourishment are physical impacts from dredging equipment and sediment deposition from beach erosion. Impacts may also occur by the migration of turbidity plumes from the dredged material disposal operation to coral reefs. Similarly, if not properly designed, hard erosion control mechanisms can cause as many shoreline problems as they solve, and can degrade coral reefs (Maragos 1993). Existing legislative authorities can help guide erosion control projects to avoid or minimize negative effects on corals.

Oil/Mineral/Gas Extraction

The primary impacts that natural resource extraction can have on nearshore environments are physical. The processes of locating the extraction hardware and physically extracting the natural resources can disturb the nearshore ecosystem. In addition, the possibility of spilling extracted resources is a concern, as organisms in the vicinity of the accident could be affected. A moratorium is in place on leasing off the Florida coast. In the U.S., the possible impacts from offshore resource extraction are limited to other parts of the Gulf of Mexico. Working with the National Oceanic and Atmospheric Administration (NOAA), the Minerals Management Service (MMS) implemented measures to protect coral reefs and their associated species. Outside of the U.S., offshore resource extraction could become more prevalent, possibly affecting coral reefs. NOAA and MMS may be able to share their lessons learned with other countries that are considering extracting natural resources in areas with coral reefs.

Worldwide mariculture production is presently valued at \$40 billion according to the Food and Agriculture Organization of the United

Mariculture

Coral reef communities can be severely disrupted by commercial fishing efforts, and coral reef fisheries have been shown to be not sustainable when fished for export purposes. Mariculture is a growing industry that offers an alternative to exploitive commercial fishing. The industry may have beneficial or harmful effects on coral reefs depending upon how it is

designed and implemented.

Improperly placed mariculture can cause physical damage to coral reefs through anchoring systems, sedimentation from feces and uneaten food, eutrophication from additional nutrients and related reductions in water clarity and light transmittance, and possibly serve as Fish Aggregation Devices, pulling fish away from natural areas and subjecting them to higher predation. mariculture has introduced nonnative species in some areas and has served as a reservoir for disease because of the high density of organisms being cultured. The use of antibiotics in mariculture feed is considered a problem in natural systems.

If conducted properly, mariculture can have many positive effects. Mariculture can provide jobs and economic development to island nations and at the same time provide an alternative to harmful commercial fishing methods. New technologies in offshore mariculture and land based marine recirculating systems can provide valuable food and ornamental species for island economies without subjecting coral reefs to further degradation because of commercial fishing or the effects of poorly designed and placed mariculture operations. Offshore operations can be placed in deep water away from the reefs and in locations with known hydrographic characteristics to minimize eutrophication. Most of the negative impacts of mariculture can be avoided through technology, use of native species, development of vaccines to reduce the use of medicated feeds, and proper placement.

Artificial Reefs

Artificial reefs are commonly placed in nearshore waters to facilitate diving and provide habitat for fish and substrate for sessile organisms. Depending on design and composition some artificial reefs may not provide the same protective cover as coral reefs, making fish more vulnerable to predation. Artificial reefs are constructed from a variety of substances and objects. Surplus vessels, used tires and concrete debris are common in reef construction. Surplus army tanks, offshore oil and gas rigs, and scrap metal are less

known but occasionally used to construct reefs. Such artificial structures can contain residual contaminants such as heavy metals, polyaromatic hydrocarbons, residual oils and greases, toxic paints, and floatable debris. Moreover, storm events can dislodge and move artificial reefs onto sensitive reef ecosystems.

Artificial reefs may benefit coral reefs by attracting the diving industry, thus decreasing pressures on coral reefs, and by providing additional habitat for fish and hard substrate for sessile species, including corals. The degree to which artificial reefs increase fish populations is unknown; but there is evidence that shows artificial reefs both aggregate existing fish populations and increase fish populations and biomass. Artificial reefs can be designed to serve as nursery grounds for coral reef fish species for eventual recruitment to the natural reef.

Pipeline Siting and Outfalls

Pipelines and outfalls are located in the coastal zone for a variety of reasons. Pipelines can be for water supply, oil and gas transport, or dredged material disposal. Outfalls carry combined sewer overflows (CSO), sewage, parking lot and roadway runoff, and storm water discharge from urbanized areas. Outfalls carry a variety of contaminants including oils and greases, PAH's, heavy metals, and treated and untreated sewage.

Pipelines have the potential to crush coral, and siting techniques can break coral. As pipes move, physical damage on hard bottom systems can occur. Depending upon the substance discharged, outfalls have the potential to cause the most significant adverse impact on coral reefs in U.S. waters and waters of territories. The Florida Keys are a prime example where untreated sewage has had adverse impacts on local coral reef populations.

Current Efforts to Mitigate the Effects of Coastal Development and Shoreline Modification on Coral Reefs

Environmental Review

The previously mentioned activities are regulated by existing federal and state statutes and regulatory programs. However, there is no comprehensive regulatory

30% of the world's coral reefs are threatened by coastal development impacts alone

(Reefs at Risk, Bryant et al. 1998)

program focused on the single issue of coral reef protection. According to the Coral Reef Protection Executive Order, federal agencies are required to use programs and authorities to carry out coral reef protection initiatives. It is the aim of the Coastal Uses Working Group to identify and describe how existing authorities can be used to establish the comprehensive program while insuring that important national public interest port and navigation projects are completed in the least intrusive manner possible. A few legislative authorities are briefly described below; a more complete list and description of relevant federal legislative authorities is presented in **Appendix II-A**.

Structures: Virtually every activity in the coastal zone that affects coral reefs is regulated or controlled by either federal or state authorities. All structures and activities in navigable waters are regulated by the Corps of Engineers under Section 10 of the Rivers and Harbors Act.

Discharges: Discharges of dredged or fill material in navigable waters and waters of the U.S. are regulated by the Corps under Section 404 of the Clean Water Act (CWA). Under the CWA Section 404(b)(1) guidelines, coral reefs are considered special aquatic sites and as such are accorded the highest level of protection. Moreover, CWA Section 404 permitted activities must be certified by the state or territory water quality certification agency as complying with applicable water quality standards.

Activities: Any activity in the jurisdictional coastal zone must be determined consistent to the maximum extent practicable with the federally approved coastal zone management program by the state or territory coastal zone management agency. Importantly, federally licensed, approved or conducted activities must present to the federal permitting agency a determination of consistency from the local coastal program.

Outfalls: Effluent discharges in coastal zones and other waters of the U.S. are required to obtain a CWA Section 402 permit from the state or territory. Such structures, if located in navigable waters, must also be permitted by the Corps under Section 10 of the Rivers and Harbors Act and receive the same coastal zone consistency determination required of other activities.

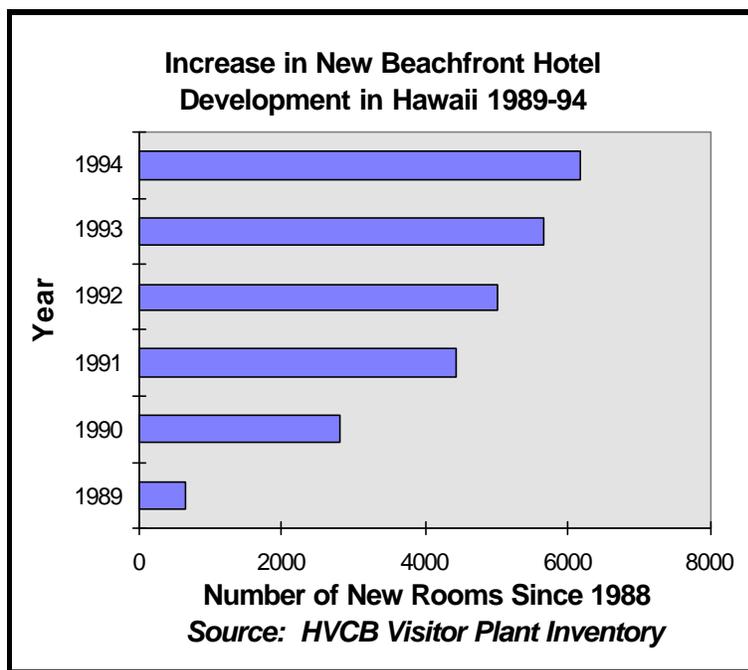
Impediments to Effective Management and Mitigation Of Coastal Development and Shoreline Modification

Lack of Clear Guidance for Federal Agencies

A number of laws protect coral reefs, however, comprehensive guidance for federal agency policies regarding coral reefs does not exist. The Executive Order lists a new standard for coral reef related projects; clear guidance for issuing permits that may affect coral reefs should be provided to appropriate federal agencies. *(Addressed in Action 8)*

Lack of Clear Guidance for Applicants

Most often, applicants are well in the project development stage before submitting applications for federal and state permits. Applicants need clear and concise guidance in advance of developing project plans to insure that appropriate measures are incorporated early in the project development stage to protect, conserve and, if all else fails, mitigate for adverse coral reef impacts. Inclusive in this recommendation is the need to establish mitigation ratios in advance of project evaluation by the regulatory agency. *(Addressed in Action 9)*



Lack of Clear Guidance for Avoidance and Mitigation:

In project review, the goal should be to avoid negative impacts on coral reefs. If coral reefs are affected by coastal development and shoreline modification, appropriate mitigation will be

required. federal agencies must develop consistent mitigation standards for actions that adversely affect coral reefs. *(Addressed in Action 10)*

Lack of Understanding of the Economic Value of Coral Reefs

Few economic valuations of coral reefs have been completed. Because of this lack of information, it is difficult to weigh the true costs and benefits of individual projects, and

determine the appropriate level of mitigation. (*Addressed in Action 11*)

U . S . C o r a l R e e f T a s k F o r c e

**Recommendations to Address
Coastal Development and Shoreline Modification
Threats**

Effective management of coastal development and shoreline modification threats to coral reefs is dependent on the full utilization of existing regulatory, permitting and resource management authorities at the federal, state/territorial, and local levels. This requires an emphasis on interagency coordination and adherence to guidance regarding the issuance of development permits in the coastal zone. The following actions were developed to achieve appropriate balance between environmental protection the needs of coastal states and territories to meet the demands of an increasing population base. Specific actions and strategies include:

- < **Develop Guidance for Federal Agencies to Address Coastal Development Project Affecting Coral Ecosystems.**
- < **Develop Guidance for Coastal Development Permit Applicants.**
- < **Develop Mitigation Guidelines for Coastal Development Projects.**
- < **Complete Economic Valuations of Coral Reefs in the Pacific, Gulf of Mexico and Carribean.**

The following Action Strategies are meant to lay the groundwork for future actions at the federal and state/territorial levels to address coastal development and shoreline modification impacts to coral reefs. While general in nature, they represent CUWG priorities at the current time and are based on best available knowledge of the major threats to the resource.

Action 8 -- Develop Guidance for Federal Agencies to Address Coastal Development Projects Affecting Coral Ecosystems

Summary

America's coasts face tremendous growth pressures. Coastal areas with coral reefs are no different; they are challenged with handling expanding economies while protecting unique and sensitive coral reef ecosystems. Islands particularly rely on ports and harbors, which help sustain their import and export economies. In addition, healthy coral reef ecosystems are critical parts of the economy. They provide the foundation of tourism and commercial and subsistence fishing in tropical states and territories. Ensuring that development along the coast does not further impact coral reefs is a primary interest of the Coral Reef Task Force and its stakeholders.

The President's Executive Order provides new policy for federal agencies that play a role in coastal development and resource protection: federal actions shall not adversely affect coral reefs. Federal, state, and territorial agencies provide permits or authorizations for a number of activities on the coast that can affect coral reefs. These activities include:

- C dredging projects for ports, harbors, and shipping channels;
- C expansion of large and small ports, harbors, and marinas;
- C siting of undersea cables;
- C shoreline modification for erosion control, including hard structures and beach renourishment;
- C construction of both nearshore and off shore mariculture projects;
- C location and composition of artificial reefs; and
- C siting of sewage outfalls and pipelines.

Federal agencies have existing legislative authorities that could protect coral reefs from negative effects associated with coastal development projects. To date, however, these legislative authorities have not optimally been used

to minimize or prevent adverse impacts. This shortcoming can be addressed by developing clear guidance that lists the steps federal agencies must take when considering projects that may affect coral reefs. The policy of avoiding negative effects is paramount, and guidance should also list recommended best management practices to provide federal agencies with tools that will facilitate implementation of the non degradation policy.

Scope

NATIONAL -- Federal agencies permit coastal development projects in all states and territories, including those with coral reefs. Clear guidance and best management practices will affect all federally permitted coastal development projects near coral reefs.

Participants

Participant	Role	Relevant Legislative Authorities
Army Corps of Engineers	Action Lead -- Help guide action through existing permitting programs	Rivers and Harbors Act; Clean Water Act; National Environmental Policy Act; Marine Protection, Research and Sanctuaries Act (Title I)
State and Territory Management Agencies	Action Lead -- Help develop guidance through its permitting programs	Clean Water Act 401 water quality certification; 402 permits; and Coastal Zone Management Act consistency determinations
Environmental Protection Agency	Action Team Member -- Help develop guidance through its assistance with permitting programs	Clean Water Act Sections 404, 401, and Section 402 oversight; National Environmental Policy Act; Marine Protection, Research and Sanctuaries Act (Title I)

Fish and Wildlife Service	Action Team Member -- Help develop guidance through its assistance with permitting programs	Fish and Wildlife Coordination Act; National Environmental Policy Act; Endangered Species Act; Coastal Barrier Resources Act
National Oceanic and Atmospheric Administration	Action Team Member -- Help develop guidance through its assistance with permitting programs	Coastal Zone Management Act; National Environmental Policy Act; Endangered Species Act; Marine Protection, Research and Sanctuaries Act (Title III, NMSA)

Implementation Plan

Within 1 year after implementation of the coral reef action strategy, the interagency team will draft guidance for the following coastal development activities:

- C dredging projects for ports, harbors, and shipping channels;
- C expansion of large and small ports, harbors, and marinas;
- C siting of undersea cables;
- C shoreline modification for erosion control, including hard structures and beach renourishment;
- C construction of both nearshore and off shore mariculture projects;
- C location and composition of artificial reefs; and
- C siting of sewage outfalls and pipelines.

Guidance will include the policy of avoidance and a description of best management practices to minimize negative impacts from federally permitted coastal development projects.

Funding

Total Funding Needed: \$0

The action will require the time of agency staff and dollars to publish and disseminate stakeholder information. **Each participating agency must devote .25 full time employees** to the action and a modest budget to develop materials in order to ensure completion of this action on schedule.

Performance Measures

FY2000 Interagency team to compile the guidance and submit a report to the Coral Reef Task Force.

Effect if No Action Taken

The action can be addressed through existing legislative authorities. Today, however, federally permitted coastal development projects are not consistently applying the level of review and protection needed to implement the Executive Order. The action will help ensure that coastal development projects take steps needed to minimize negative effects on coral reefs. The result of no action will be a continuation of the current level of review provided by federal agencies. While this is often sufficient, in some cases it may not comply with the Executive Order.

Action 9 -- Develop Guidance for Coastal Development Permit Applicants

Summary

Given the increasing pressures on America's coasts, we can expect states, territories, local governments, and private stakeholders to develop more of the coastal zone in the future. Often, the frustrating factors for individuals or governments seeking permits are unanticipated, time-consuming, and expensive requirements mandated late in the review process. Review of projects that may affect coral reefs will be less cumbersome if guidance is provided to stakeholders early in project development.

Federal agencies provide permits for a number of activities on the coast that can affect coral reefs. These activities include:

- C dredging projects for ports, harbors, and shipping channels;
- C expansion of large and small ports, harbors, and marinas;
- C siting of undersea cables;
- C shoreline modification for erosion control, including hard structures and beach renourishment;
- C construction of both nearshore and off shore mariculture projects;
- C location and composition of artificial reefs; and
- C siting of sewage outfalls and pipelines.

This action parallels the action to develop federal guidance for projects that may effect coral reefs. When the parallel action is completed, implementation of this action will follow. Federal, state, and territory agencies will develop clear guidance for stakeholders explaining the review process and the actions expected for successful permit applications. This information will be provided to permit applicants and other stakeholders (e.g., ports and harbor authorities, county and city governments).

Scope

NATIONAL -- Federal agencies permit coastal development projects in all states and territories, including those with coral reefs. Clear guidance and best management practices will affect all federally permitted coastal development projects that may affect coral reefs. This action will disseminate the guidance to stakeholders, allowing them to fully understand the permit review process.

Participants

Participant	Role	Relevant Legislative Authority
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Army Corps of Engineers	Action Lead -- Help guide action through existing permitting programs	Rivers and Harbors Act; Clean Water Act; National Environmental Policy Act; Marine Protection, Research and Sanctuaries Act (Title I)
State and Territory Management Agencies	Action Lead -- Help develop guidance through its permitting programs	Clean Water Act 401 water quality certification; 402 permits; and Coastal Zone Management Act consistency determinations
Environmental Protection Agency	Action Team Member -- Help develop guidance through its assistance with permitting programs	Clean Water Act Sections 404, 401, and Section 402 oversight; National Environmental Policy Act; Marine Protection, Research and Sanctuaries Act (Title I)
Fish and Wildlife Service	Action Team Member -- Help develop guidance through its assistance with permitting programs	Fish and Wildlife Coordination Act; National Environmental Policy Act; Endangered Species Act; Coastal Barrier Resources Act
National Oceanic and Atmospheric Administration	Action Team Member -- Help develop guidance through its assistance with permitting programs	Coastal Zone Management Act; National Environmental Policy Act; Endangered Species Act; Marine Protection, Research and Sanctuaries Act (Title III, NMSA)

Implementation Plan

Within 18 months after implementation of the coral reef action strategy, the interagency team will publish information for stakeholders concerning the following federally permitted activities that may affect coral reefs:

- C dredging projects for ports, harbors, and shipping channels;
- C expansion of large and small ports, harbors, and marinas;
- C siting of undersea cables;
- C shoreline modification for erosion control, including hard structures and beach renourishment;
- C construction of both nearshore and off shore mariculture projects;
- C location and composition of artificial reefs; and
- C siting of sewage outfalls and pipelines.

Funding

Total Funding Needed -- \$0

The action will require the time of agency staff and dollars to publish and disseminate stakeholder information. **Each participating agency must devote .25 full time employees** to the action and a modest budget to develop materials in order to ensure completion of this action on schedule.

Performance Measures

FY2000-2001 Interagency team to submit the stakeholder information to the Coral Reef Task Force.

Effect if No Action Taken

This action will make the project permitting requirements of federal, state, and territory agencies clear to stakeholders. Its goal is to minimize the frustration felt by permit applicants when unforeseen requirements are added late in the project development process. The result of no action may be frustrated stakeholders and eroding relationships between regulators and applicants.

Action 10 -- Develop Mitigation Guidelines For Coastal Development Projects

Summary

Some coastal development projects may be deemed essential by federal, state, and territory agencies. In some cases, these projects may adversely affect coral reefs. The National Environmental Policy Act mandates avoidance of negative effects; however, when an overwhelming public interest is apparent, the amount and type of mitigation needed to compensate for adverse effects must be determined. What level of restoration is acceptable mitigation? Should mitigation focus on providing permanent protection of healthy coral reef ecosystems rather than transplanting and restoration?

An interagency team will develop guidelines for mitigation in cases when degradation of coral reefs is associated with coastal development projects. This will help ensure consistent mitigation requirements throughout the country, with a focus on protecting distinct coral reef ecosystems in the Pacific, south Atlantic, and the Caribbean.

Scope

NATIONAL -- Federal agencies permit coastal development projects in all states and territories, including those with coral reefs. Some future coastal development projects in states and territories with coral reefs will undoubtedly be needed. When all adverse effects on coral reefs cannot be avoided, the mitigation guidelines will help ensure long-term protection of distinct coral reef ecosystems.

Funding

Total Funding Needed – \$0

The action will require the time of agency staff and dollars to publish and disseminate stakeholder information. **Each participating agency must devote .25 full time employees** to the action and a modest budget to develop materials in order to ensure completion of this action on schedule.

Participants

Participant	Role	Relevant Legislative Authority
Army Corps of Engineers	Action Lead -- Help guide action through existing permitting programs	Rivers and Harbors Act; Clean Water Act; National Environmental Policy Act; Marine Protection, Research and Sanctuaries Act
State and territory Management Agencies	Action Lead -- Help develop guidance through its permitting programs	Clean Water Act 401 water quality certification; 402 permits; and Coastal Zone Management Act consistency determinations
Environmental Protection Agency	Action Team Member -- Help develop guidance through its assistance with permitting programs	Clean Water Act Sections 404, 401, and Section 402 oversight; National Environmental Policy Act; Marine Protection, Research and Sanctuaries Act
Fish and Wildlife Service	Action Team Member -- Help develop guidance through its assistance with permitting programs	Fish and Wildlife Coordination Act; National Environmental Policy Act; Endangered Species Act; Coastal Barrier Resources Act
National Oceanic and Atmospheric Administration	Action Team Member -- Help develop guidance through its assistance with permitting programs	Coastal Zone Management Act; National Environmental Policy Act; Endangered Species Act; Marine Protection, Research and Sanctuaries Act

Implementation Plan

- FY2000-2001 Interagency team to draft mitigation guidelines for the following federal projects:
- C dredging projects for ports, harbors, and shipping channels;
 - C expansion of large and small ports, harbors, and marinas;
 - C siting of undersea cables;
 - C shoreline modification for erosion control, including hard structures and beach renourishment;
 - C construction of both nearshore and off shore mariculture projects;
 - C location and composition of artificial reefs; and
 - C siting of sewage outfalls and pipelines.

Funding

Total Funding Needed -- \$0

The action will require the time of agency staff and dollars to publish and disseminate stakeholder information. **Each participating agency must devote .25 full time employees** to the action and a modest budget to develop materials in order to ensure completion of this action on schedule.

Performance Measures

Not more than 18 months after implementation, the interagency team will submit mitigation guidelines to the Coral Reef Task Force.

Effect if No Action Taken

It is likely that all negative effects from projects considered essential cannot be avoided. When degradation occurs, what will be considered acceptable mitigation? The action will help answer this question, and help ensure that the variability of coral reef ecosystems in the Pacific, south Atlantic, and Caribbean is considered when decisions are made. The result of no action will be a continuation of the current mitigation policy that may not best

consider distinct coral reef ecosystems or facilitate long-term protection.

Action 11 -- Complete Economic Valuations of Coral Reefs in the Pacific, Gulf of Mexico, and Caribbean

Summary

Coral reefs are tremendously valuable natural resources. Forming the foundation of commercial and subsistence fisheries and lucrative tourism industries, coral reefs support regional economies in a number of ways. Few studies have considered the economic value of coral reefs, particularly beyond obvious extractive or destructive uses. Valuations of coral reefs are necessary for a number of reasons.

1. Resource managers and permitting agencies and policy makers are required through various federal environmental statutes to conduct cost-benefit analyses to assist in the environmental impact decision making process.
2. Natural resource damage assessment requires that both use and non-use value be determined in order to assess appropriate monetary damages to the responsible party for damage to the resource.
3. Policy makers and resource managers must convey the value of natural resources to public in order to build consensus and agreement for environmental protection decisions.

One valuation of coral reefs in the Florida Keys National Marine Sanctuary has been completed, which resulted in a value assessed at \$2,833/m². This valuation is often referenced for all coral reefs throughout the U.S., although this figure represents coral reefs in the Florida Keys. Coral reefs in the Gulf of Mexico, Caribbean and Pacific likely have different values. Federal agencies could provide grants to assess the economic value of coral reefs in the Gulf of Mexico, Caribbean, and Pacific. These regional studies would better characterize the value of coral reefs in other parts of the country, serving as information tools for public education.

Scope

NATIONAL, REGIONAL -- Grants will be awarded to academic institutions to conduct economic analyses of coral reefs in the Gulf of Mexico, Caribbean, and Pacific. Grantees will complete regional studies that assess the value of reefs to the local, state, and national economies.

Participants

Participant	Role	Legislative Authority
National Oceanic and Atmospheric Administration	Action Lead -- Lead grant process	Coastal Zone Management Act
Environmental Protection Agency	Action Team Member -- Help select grantees	
Fish and Wildlife Service	Action Team Member -- Help select grantees	

Implementation Plan

FY2001

Interagency team to select academic institutions to complete economic valuations.

Within 18 months of the grant award, grantees will submit economic valuations to the National Oceanic and Atmospheric Administration.

Funding

Total Funding Needed -- \$1.0M

The action will require grant awards to at least two academic institutions. In

addition, each participant agency must devote nominal staff time to solicit requests for proposal, select grantees, and oversee the projects. New funding will be required to ensure completion of this action on schedule.

Performance Measures

FY2002

The National Oceanic and Atmospheric Administration will deliver the economic valuations to the Coral Reef Task Force.

Effect if No Action Taken

Without completion of this action, the current information will continue to serve as the best representation of the economic value of coral reefs. Region-specific information will consider the variation found in Pacific, south Atlantic, Gulf, and Caribbean coral reefs, and will thus be more reliable. This information will help coral reef managers convey the importance of these resources to the local, state, and national economies.

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Appendix II-A Resources to Address Coastal Development and Shoreline Modification

Federal Statutes Governing Coastal Development and Shoreline Modification

There are a number of legislative authorities that allow federal and state, and territory agencies to regulate port and harbor development affecting coral reefs. Those statutes apply based upon the type of activity (e.g., discharges of dredged or fill material in waters of the U.S. within the baseline and three miles into the territorial sea are regulated by the Corps under Section 404 of the CWA, and by the state under Section 401 of the CWA).

1. Rivers and Harbors Act (RHA)

The RHA was established in 1899 to prohibit the alteration of the course, capacity or condition of navigable waters without a permit from the Corps. This regulatory authority is all inclusive and covers virtually any physical or navigation altering activity in navigable waters. RHA review triggers review under NEPA discussed below.

2. National Environmental Policy Act (NEPA)

NEPA is the basic national charter for protecting the environment and provides that the decision making process for any federal agency decision be fully disclosed and that all practicable and available alternatives be fully considered and disclosed to the public. NEPA also requires that the environmental consequences of any federal agency decision be carefully considered through either an Environmental Impact Statement (EIS) or and Environmental Assessment (EA). EA's are generally prepared for routine noncontroversial projects where there are no irretrievable commitments of resources and the impacts of the proposed project will not result in significant impacts on the quality of the human environment. Mooring dolphins, certain maintenance activities and small dredging projects are typical port and harbor development projects that might routinely require preparation of an EA. An EIS is usually required in those cases where irretrievable commitment of resources might occur and generally include port and harbor expansion, channel harbor deepening and widening. EA's are generally prepared in a few weeks and EIS's take one and a half a years or longer.

3. Clean Water Act (CWA)

Two provisions of the CWA act apply to port and harbor development. All discharges into waters of the U.S., including the territorial sea require a CWA Section 404 permit from the Corps and a state water quality certification from the appropriate state certifying that the proposed discharge will not violate applicable water quality standards. Under Section 404 the Corps is required to specify all dredged material disposal sites through application of the 404(b)(1) guidelines developed by the EPA in conjunction with the Corps. Under Subpart E, 40 CFR 230.44, of the Section 404(b)(1) guidelines coral reefs

are considered special aquatic sites and are accorded the highest level of environmental protection. In order to demonstrate compliance with the guidelines where the activity associated with the discharge which is proposed for a special aquatic site does not require access or proximity to the siting within the special aquatic site to fulfill its basic purpose, i.e., is not water dependent, practicable alternatives that do not involve the special aquatic site are presumed to be available. Importantly, “where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge into the special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.” Thus, there is a compelling presumption against all discharges that might adversely impact special aquatic sites, in this case, coral reefs.

Under Section 404(c), the EPA can prohibit or withdraw the specification a defined area as a disposal site, or to deny restrict or withdraw the use of any defined area for the discharge of dredged or fill material.

Under Section 401 of the CWA, states must certify that all discharges of dredged or fill material permitted by the Corps under Section 404 comply with applicable narrative and numeric state water quality standards. Most states and territories, in addition to specific numeric water quality standards, have broad anti-degradation policies that preclude activities that might impair designated uses. A state water quality certification is a prerequisite to issuance of a Corps permit.

4. Marine Protection, Research and Sanctuaries Act (MPRSA, Title I)

Section 103 of the MPRSA provides a permitting authority to the Corps for the transportation for disposal for dredged material in ocean waters. This also includes those instances where the “disposal” occurs within and seaward of the baseline extending to the limit of the territorial sea. In those cases where the purpose of the dredged material “discharge” activity is to fill, e.g., beach nourishment, construction of underwater berms in the territorial sea, etc., Section 404 of the CWA applies. Ocean disposal sites are designated by the EPA using the ocean discharge criteria developed by the EPA in consultation with the Corps. Other than a fish waste disposal site off the coast of American Samoa and an inactive construction debris site, only dredged material is ocean disposed. Ocean disposal activities are also subject to the provisions of the London Convention, an international treaty banning all but a specific list of substances from ocean disposal and requiring that all regulated disposal be evaluated using the Waste Assessment Guidelines that are very similar to the EPA ocean discharge criteria at 40 CFR Part 227. The environmental criteria at Part 227.4, require that discharges not have unacceptable adverse effects on the marine ecosystem and no unacceptable adverse persistent or permanent effects. Part 227.18, provides that factors such as the presence of any constituents which might significantly affect living marine resources of recreational or commercial value be considered when making a decision regarding compliance with the criteria. Part 227.22, requires an assessment of the impact on other uses of the ocean that includes temporary and long-range

effects within the state of the art with particular emphasis on any irreversible or irretrievable commitment of resources that would result from the proposed dumping.

A number of technical documents including a decision making framework and ocean testing manual were developed to insure that ocean discharge activities meet evaluation and testing provisions of the regulations and will not result in unacceptable adverse effects to ocean amenities.

5. Coastal Zone Management Act (CZMA)

The CZMA establishes a federal-state partnership to provide for the comprehensive management of coastal resources. States develop management programs based on enforceable policies and mechanisms to balance resource protection and coastal development needs. The federal consistency provisions require that all federal activities (including direct federal actions, private activities requiring federal licenses or permits, and federal financial assistance to state and local governments) be consistent with the enforceable policies of a state's federally approved coastal management program. At the federal level, the CZMA is administered by the OCRM within NOAA's National Ocean Service.

Coastal zone management should take some of the strongest steps to protect coral reefs. The most serious impacts in Puerto Rico appear to be from land-based activities (point and non-point source). The Virgin Islands have relatively stringent measures for control of erosion and sedimentation (CEST) Plans for construction. Puerto Rico requires a CEST plan for construction, but does not stipulate the practices. Best Management Practices are almost nonexistent, and what practices are used (hay bales, silt fences) are generally poorly installed and not maintained. Agriculture has been exempt until recently.

6. Endangered Species Act (ESA)

The ESA states that all federal departments and agencies shall seek to conserve threatened and endangered species and shall use their authorities to further the purposes of the ESA. In addition, all federal departments and agencies must ensure that activities they fund, authorize, or carry out do not jeopardize the continued existence of threatened or endangered species or adversely modify or destroy designated critical habitat. The act is administered by the FWS and the NMFS and requires the agencies to formally evaluate proposals for federal actions, including the issuance of permits for port dredging and dredged material disposal, that may affect species listed as threatened or endangered.

7. Fish and Wildlife Coordination Act (FWCA)

The purpose of the FWCA is to recognize the "vital contribution of our wildlife resources to the Nation." Under this act, federal agencies proposing actions, including issuance of permits, which will affect any body of water, must consult with the FWS, the NMFS, and the affected State's fish and wildlife management agency. Review agencies determine the possible damage to fish and wildlife resources by the proposed activity, and develop means and measures that should be adopted to prevent the loss or damage to fish and wildlife resources. The Corps is required to give full consideration to the review agency and public viewpoints before making permit decisions.

8. Water Resources Development Acts (WRDA)

Dredging projects are authorized by Congress through the WRDAs, which are reauthorized biennially. WRDA 86 introduced cost sharing for construction projects whereby the local sponsor pays between 20 and 60 percent of the construction cost based on the depth of the navigation channel. For projects over 45 feet in depth, the local sponsor must also pay 50 percent of the incremental cost of maintenance. Maintenance dredging of channels is federally funded, with Corps' expenditures reimbursable through the Harbor Maintenance Tax. Cost-sharing in these situations generally takes the form of the non-Federal sponsor providing lands, easements, right-of-way and disposal areas (other than open water) for the maintenance dredging. WRDAs also contain provisions for beneficial use of dredged material such as beach nourishment (WRDA 86) and the protection, restoration and creation of aquatic habitat (WRDA 92) and for environmental dredging to remove, as part of operation and maintenance of a navigation project, contaminated sediments outside the boundaries of and adjacent to the navigation channel (WRDA 90).

9. Coastal Barrier Resources Act

Coastal barriers are land forms that shield the mainland from the full force of wind, wave, and tidal forces. They can take on a variety of forms including islands, spits, or mangroves. These unique barriers also provide valuable habitat for migratory birds and help produce conditions favorable for shellfish and other species.

To protect these valuable land forms, Congress passed the Coastal Barrier Resources Act in 1982. Three important goals of the Act are to: (1) minimize loss of human life by discouraging development in high risk areas; (2) reduce wasteful expenditure of federal resources; and (3) protect the natural resources associated with coastal barriers. The Act established the Coastal Barrier Resources System. The System includes privately owned, undeveloped coastal barriers along the Atlantic, Gulf, Caribbean, and Great Lakes coasts. Most federal spending for development and disaster relief is prohibited in the System.

In 1990, Congress expanded the System and designated "otherwise protected areas," (OPAs) which are undeveloped coastal barriers held in protected status by some government

or non-government entity. Only federal flood insurance is prohibited in OPAs. The System includes 584 units with over 1,275,000 acres. In addition, another 270 OPAs with nearly 1,840,000 acres were designated by the Act.

A number of System units and OPAs are found in south Florida, the Virgin Islands, and Puerto Rico. The Service determines if proposed federal projects in the System and OPAs are consistent with the purposes of the Act. In addition, the Service is responsible for the following activities:

- C Maintaining the official maps of the Coastal Barrier Resources System;
- C Working with land owners to determine whether property is within the System;
- C Updating System maps every 5 years to reflect changes from natural processes;
- C Consulting with federal agencies that propose spending federal funds within the System;
- C Ensuring that federal flood insurance rate maps accurately depict unit boundaries; and
- C Developing aerial photographic atlases of the System.

National Dredging Team

Initiated in 1994, the National Dredging Team includes the Department of the Army, United States Army Corps of Engineers (Corps); the Department of Commerce, National Oceanographic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), and Office of Ocean and Coastal Resource Management (OCRM); the Department of the Interior, FWS; the Department of Transportation (DOT), Maritime Administration (MARAD); and, the Environmental Protection Agency (EPA). Liaisons from the Office of Management and Budget (OMB), the Office of the Secretary of Transportation, the U.S. Navy; the U.S. Coast Guard, and the White House Office on Environmental Policy also participate.

An aspect of the dredging issue is addressed by the National Dredging Team in its guidance document "Local Planning Groups & Development of Dredged Material Management Plans," which was published in June, 1998. This guidance focuses on how to engage local groups in developing implementable dredged material management plans. While it does not specifically mention coral reefs, it does talk about environmentally sound management of the dredging process. One critical point about the National Dredging Team and other national groups is that the conditions on islands often require different approaches to problems. Strategies that are effective in the conterminous may not produce the same results on islands. Another source of information is the Maritime Administration. MARAD is heading up an effort to analyze port and harbor modernization needs for the 21st century. This item was a Year of the Ocean deliverable, and was announced by President Clinton at the National Oceans Conference last year in Monterey. It's called the "Ports for the 21st Century" initiative, and it

would raise \$800 million over the next 5 years to deepen and maintain shipping channels, improve navigational safety and undertake other port projects.

Vessel Impacts

Key Threats from Vessels on Coral Reef Ecosystems

The Coastal Uses Working Group has identified impacts associated with vessel activities, both commercial and recreational, as a source of threats to U.S. coral reefs. These vessel related threats include: (1) vessel groundings that affect coral reefs and related ecosystems, (2) other direct impacts from vessels, such as propeller scarring, anchor damage, and other physical injuries; (3) grounded vessels that have become abandoned on coral reefs; and (4) vessel based sources of marine pollution such as operational discharges or disposal of waste at sea.

Vessel Groundings (both large and small)

The National Park Service, NOAA, the U.S. Coast Guard, the States of Hawai'i and Florida, and the Commonwealth of Puerto Rico annually report a significant number of vessel groundings affecting coral reefs and related ecosystems. When ships ground on coral, the impact can dislodge, fracture, or destroy corals and related structures. If a vessel's hull ruptures, oil spills may further damage corals. Salvage operations or attempts to dislodge a vessel from a reef or seagrass bed, if done improperly, may also exacerbate damages. Information about vessel groundings in various U.S. jurisdictions follows: See also *Appendix III-A* for a representative sampling of major vessel groundings.

National Marine Sanctuaries/National Estuarine Research Reserves (NOAA).

National marine sanctuaries with coral reef habitat include Florida Keys National Marine Sanctuary (FL); Flower Garden Banks National Marine Sanctuary (TX); Hawai'ian Islands Humpback Whale National Marine Sanctuary (HI); Fagetele Bay National Marine Sanctuary (American Samoa); and Puerto Rico's National Estuarine Research Reserve (Jobos Bay NERR) and six Natural Reserves. In the Florida Keys National Marine Sanctuary, there are over 500 reported vessel groundings per year. These figures include both commercial

and recreational vessel groundings, though most of groundings are recreational. Of the over 1,000 groundings that occurred in 1997 and 1998, approximately half affected coral and half affected seagrass. Sanctuary staff estimate a significant number of groundings go unreported. When an incident occurs within the boundaries of the Florida Keys National Marine Sanctuary, the state and NOAA take joint action against the responsible parties.

Figure 1: Reported Groundings in the Florida Keys National Marine Sanctuary

FY98-99 Florida Keys National Marine Sanctuary						
F97-98			FY98-99			
507 Groundings Reported	Coral	Seagrass	549 Groundings Reported		Coral	Seagrass
NMSA Sec. 312 Natural Resource Damage Action	9	10	NMSA Sec. 312 Natural Resource Damage Action	8	14	
NMSA Sec. 307 Notice of Violation			NMSA Sec. 307 Notice of Violation			
Summary Settlements (under 10 sq. m. coral or under 10 sq. yds. seagrass)	7	8	Summary Settlements (under 10 sq. m. coral or under 10 sq. yds. seagrass)	3	18	
Written Warnings	1	3	Written Warnings	4	66	
	5	9		4		

National Parks (DOI/NPS)

National Parks with tropical coral reef resources include the Biscayne Bay NP and Dry Tortugas NP in Florida; the Virgin Islands NP, Buck Island Reef NM, and Salt River Bay NHP in the U.S. Virgin Islands; Kaloko-Honokohau NP and Kalaupapa NHP in the Hawaiian islands (the Hawaiian reefs are under state management authorities), and the American Samoa NP and War-in-the Pacific NP (Guam) in the Indo-Pacific region. In Biscayne National Park, a recent aerial survey revealed that many of Biscayne Bay's seagrass flats have already had as much as 20% of the seagrass destroyed by propeller scarring and vessel groundings (BNP report, citing Sargent et al. 1995). In Biscayne NP, seagrass grounding numbers are considered to be only 20% of all groundings.

Groundings on coral reefs go unreported because rarely do vessels become stranded as a result of grounding on a reef. As a result, damages to coral reefs caused by vessel groundings may remain undiscovered and unrestored.

Fish and Wildlife Service (DOI/FWS)

National Wildlife Refuges with tropical coral reef resources include Great Heron NWR, Key West NWR in South Florida, and Hawai`ian Islands NWR, Midway Atoll NWR, Johnston Atoll NWR, Howland Island NWR, Baker Island NWR, Rose Atoll NWR, Jarvis Island NWR, and Guam NWR in the Pacific. A partial list of shipwrecks that have occurred since 1970 in the Pacific Remote Islands National Wildlife Refuge and Midway Atoll NWR is found at *Appendix III-A*.

Florida Keys/ Monroe County

The Florida Department of Environmental Protection (DEP) estimates that approximately 500 small vessel (< 30 meters) groundings are reported annually in the Keys. (see above table on the Florida Keys National Marine Sanctuary (FKNMS)--most grounding within Monroe County occur within FKNMS). The researchers at the Florida Marine Research Institute (FMRI), estimate that at least two to three times that number go unreported each year. The State of Florida has settled or litigated a large number of small vessel and several large vessel groundings: *Mavro Vetricnic*, U.S. Navy submarine *Memphis*, *Firat*, *Pacific Mako*, and *Hind*. Florida generally has followed a policy of allowing the responsible party the opportunity to pay for on site restoration, replacement of lost resources, trustee operation costs and monitoring. If the responsible party is uncooperative, the general counsels office takes appropriate legal action. When an incident occurs within the boundaries of the Florida Keys National Marine Sanctuary, the state and NOAA take joint action against the responsible parties.

Hawai`ian Islands

The majority of coastal waters within the State of Hawai`i consist of coral reefs, which represent approximately 85% of all U.S. coral reefs (estimate by Miller & Crosby 1998). Between 1993 and 1997, the U.S. Coast Guard received 49 reports of commercial ship groundings, involving 31 commercial passenger vessels (63%), 13 fishing vessels (25%), 2 freighters (4%), 1 towboat (2%), 1 industrial vessel (2%), and 1 offshore supply vessel (2%). In that same period, there were 17 commercial ship sinkings (10 fishing vessels, 6 passenger vessels, 1 towboat).

In 1998, the Hawai'i Department of Land and Natural Resources received reports of 9 recreational vessel groundings and 5 recreational vessel sinkings. (Source: Hawai'i DAR)

U.S. Territories & Commonwealths

The U.S. Coast Guard Marine Safety Information System casualty database contains reports of commercial vessel groundings. Reported groundings in U.S. territories and commonwealths can be found at *Appendix III-A*.

Propeller Scarring, Anchor Damage, Turbidity and Other Physical Impacts

Because coral reefs and seagrass beds often grow in shallow water, they are susceptible to a variety of direct impacts from vessels that may not result in actual groundings. These impacts include damage from the propeller, hull, engine and keel of both commercial and recreational vessels. They also include damage caused by anchors, anchor chains and cables, unmanned barges, dredge lines and dredge cutter heads, and cables used to tow barges and dredges. Anchor damage, propeller scarring (caused when a propeller cuts seagrass while a vessel motors over a shallow flat), and other vessel impacts occur with frequency and may cause damage such that the reef and grass beds do not have time to recover. Some examples of this type of damage include:

Flower Garden Banks National Marine Sanctuary

Anchor damage has been documented in the Flower Garden Banks National Marine Sanctuary by researchers and sanctuary staff. For example, on the shallowest portion of the bank there is at least one extensive area of damage by a large vessel anchoring measuring approximately 50 m in diameter, with hundreds of abraded, fractured, and toppled coral colonies and chain scars. In 1983, a tug and tow barge anchored on the East Bank at 21 m depth, causing

substantial damage to the coral reef measuring approximately 3 m wide and 60 m long. Over 200 coral colonies were impacted by the anchor and the attached anchor chain and cable. In addition, intermittent damage was detected along a narrow strip approximately 1.5 m wide and over 120 m long, apparently caused by dragging and bouncing by the anchor as it was hauled in by the vessel operators (Gittings and Bright, 1986). Damage to a small area of the East Bank was also documented in 1996 following anchoring by a fishing vessel. And in 1997, an area nearly 200 m in length was damaged by an apparent tow cable that dragged across the summit of the West Flower Garden Bank. NOAA is exploring options for addressing ongoing anchor damage on this site.

Florida

The Florida DEP does not have specific data on anchor damage, though in response to investigation of anecdotal reports, the state and federal managing partners prohibited anchoring for large vessels in a coral reef area off the Tortugas that is nicknamed “Sherwood Forest.” That restriction went into place in 1998, a follow-up to an emergency rule that was

The Grounding of the Containership Houston: *One Step Back, Two Steps Forward*

On February 8, 1997, the 613-foot containership Houston ran aground on an ancient spur and groove coral reef formation near Key West within the Florida Keys National Marine Sanctuary. The vessel carved a path approximately 400 meters long and 30 meters wide shattering, fracturing, and overturning corals and other benthic organisms. To compensate the public for damage to a protected coral reef, the responsible party paid for: emergency restoration measures to minimize the threat of additional harm; stabilization of the reef substrate; and a navigation system for the Florida Keys to reduce the potential for future vessel groundings.

The responsible party undertook emergency restoration measures to minimize the threat of additional harm. Over 3,000 injured pieces of coral were reattached to the reef substrate, and pieces of reef rubble were removed or stabilized with epoxy to prevent ongoing injury to the reef and resident organisms. In addition, restoration measures to directly repair the injury and accelerate recovery of the reef included the placement of flexible concrete mats and large boulders to stabilize the substrate, provide three-dimensional relief, and provide habitat for resident organisms.

The most innovative part of this restoration is the purchase of a long range (radio) navigational beacon system to be placed along the Florida Keys reef tract. The Racon system will provide vessels with location information relative to specific fixed structures and should help reduce future groundings. This system compensates the public for their losses until the coral reef recovers. The U.S. Coast Guard agreed to accept, install, and maintain this navigational system.

initiated by NOAA. Currently, NOAA is considering whether this action was sufficient to protect the resources within the Florida Keys National Marine Sanctuary. Florida DEP conducted an assessment on propeller scarring in 1992-93 to confirm the location of propeller scarring in Florida waters using aerial photography. The FMRI's report concluded that more than 173,000 acres of the state's 1.9 million acres of seagrass acreage are scarred although most of it lightly. This is a conservative estimate because the researchers mapped groups of scars rather than individual propeller scars (Sargent et al. 1995).

Shallow Water Turbidity

Another vessel impact of concern is massive sediment suspension and displacement from large ship propellers, which results in reef habitat being chronically stressed and eventually buried. This is of particular concern in CNMI, USVI, and Guam, as well as in areas with increasing cruiseship traffic.

Recently Abandoned Ships

Grounded and abandoned vessels can have significant impacts on coral reefs and adjacent sea grass beds. Impacts include damage from the propeller, hull, engine, keel, and anchor. In addition, if a boat's hull ruptures, releases of oil or other hazardous substances may cause further damage. Where a ship grounds on a coral reef and the wreckage is not removed, damage to the reef continues and recovery may be slowed. For example, the U.S. Fish and Wildlife Service in Hawai'i has documented the long-term effects of one vessel grounding where parts of the vessel were not removed. In that case, the reef showed only limited recovery even three years after the grounding event.¹ Another instance of a recently abandoned vessel is the fishing longliner that ran aground on the Kure Atoll in Hawai'i, in October 1998. While the vessel insurer was able to pay for some salvage, the vessel remains grounded on the reef. Other known abandoned ships include the nine foreign owned fishing vessels that were washed up on the reefs in Pago Pago Harbor in the American Samoa by Typhoon Val in December 1991. During July of 1999, a NOAA team assessed the harm to the reef flat from the groundings and the expected harm from the then pending second response from the United States Coast Guard. In August, the United States Coast Guard

¹. In October 1993, a Taiwanese longliner *Jin Shiang Fa* ran aground at Rose Atoll National Wildlife Refuge, spilling 100,000 gallons of diesel fuel and other contaminants onto the reef. The vessel grounding gouged large grooves in the atoll and reduced parts of the reef into rubble; killed many invertebrates such as reef-boring sea urchins, giant clams and corals; killed the dominant algal species (crustose coralline algae) causing a bloom of opportunistic algal species; and changed the distribution of herbivorous fishes and sea urchins. Salvage operations removed most of the larger pieces of wreckage and debris, but the salvage crew did not move the stern and its associated debris, or the engine block. Three years after the event, the reef show only limited recovery. Of most concern, the opportunistic algal species continue to dominate the wreck site, and the crustose coralline algae, which are primarily responsible for maintaining the structure of the atoll, show little sign of recovery. Preliminary studies show that iron corroding from the wreckage may be contributing to the maintenance of the algae bloom. (Green et al. 1997).

initiated a second response to remove oil and other hazardous materials remaining on the vessels. NOAA received authority in September to spend up to 6.6 million from the Oil Spill Liability Trust Fund. This will cover vessel removal, scrap disposal, coral transplant, monitoring, and trustee oversight.

The primary impediment to removing grounded ships on coral reefs is the lack of resources to fund the costs of salvage, which can be high, particularly where abandoned ships are in remote areas of the Pacific. For instance, it has been estimated that removing the *Paradise Queen II* from the Kure Atoll would cost \$1.5 million. A secondary impediment is the potential lack of a liability mechanism for federal or state agencies to seek recovery of the costs and damages from a responsible party in situations where a ship runs aground in a nonprotected area, is not an obstruction to navigation, and does not pose a threat of oil pollution or hazardous waste discharge. Alternatively, agencies may have the authority to seek damages, but often the responsible party has declared bankruptcy or is otherwise unable to pay.

Vessel Pollution

Vessel pollution includes, among other things, discharges of oil from vessels, disposal of wastes, the release of nuisance species into coral reef and seagrass habitats (e.g., through dumping of bilge contents) and fishing gear debris (addressed earlier in this report) and other marine debris. Vessel pollution encompasses both chronic pollution of smaller vessels and one-time major pollution events. This report does not focus on this issue, as the Air and Water Working Group of the Coral Reef Task Force is addressing both land based sources of pollution as well as vessel based pollution.

Current Efforts To Address Vessel Impacts

Vessel Groundings

Agencies have taken a number of steps to address threats to coral reefs from direct vessel impacts. These efforts include installation of navigational aids, management plans, navigational measures, educational outreach, and enforcement. Some specific activities are described below.

National Marine Sanctuaries.
The Florida Keys National

**The physical restoration of the
grounding site of the R/V
Columbus
Iselin in the Florida Keys
National Marine Sanctuary
required
384.5 tons of limestone**

Marine Sanctuary (FKNMS) Management Plan has ten action plans, several of which apply to vessel related impacts (Channel/Reef Marking, Education and Outreach, Enforcement, Mooring Buoy, and Regulations). The FKNMS also has authority to recover costs and natural resource damages (under Section 312 of the National Marine Sanctuaries Act) and to assess civil penalties (under Section 307) for any vessel injury to coral reef resources. NOAA recently completed a summary settlement schedule for violations within the FKNMS which facilitates and streamlines the administrative civil penalty process. The FKNMS has response protocols for vessel groundings, and responds to a high number of both coral and seagrass groundings. Currently, FKNMS is working with the USCG to address a number of areas where additional short range aids to navigation may be placed.

National Park Service.

The Biscayne National Park has developed a vessel grounding response protocol. It has also developed a Marker Plan for the Park to determine where additional markers are needed to reduce vessel groundings. Monroe County just completed such a plan and will soon be implementing it. The Park also installed 9 new “Danger Shoal” markers around one of the most heavily hit seagrass shoals. The Biscayne NP has identified one major hot spot for smaller vessel groundings, where the markers in the area are too far apart and vessels have a tendency to get off course. Biscayne also has a very active educational program, which includes offsite grounding presentations, “Boating and Navigating in Biscayne NP” classes, grounding stickers that are handed out to boaters, and presentations dedicated to groundings at boat shows.

United States Coast Guard Activities.

While the U.S. Coast Guard (USCG) has no activities aimed directly at coral reef protection per se, it does perform a number of functions with significant benefit to coral reefs, including activities that can prevent vessel groundings: (1) Aids to navigation -- The USCG establishes and maintains both short and long (radio) range aids to navigation to assist both recreational and commercial vessels; (2) Commercial vessel safety -- The USCG enforces a wide range of domestic and international requirements on both US and foreign flag vessels. Starting in approximately 1995, Port State control boardings of foreign freight vessels were strengthened considerably and smaller Caribbean freight vessels, in particular, were brought under much stricter scrutiny; (3) Recreational boating safety -- The USCG Auxiliary along with the US Power Squadrons is a major factor in insuring recreational boating

safety in US waters. The USCG Auxiliary includes regionally specific environmental information in its basic boating safety courses; (4) Waterways management – At the federal level, the USCG is the principal regulatory authority for navigational operations in US territorial waters. Measures under the Ports and Waterways Safety Act include; (a) Regulated Navigational Areas (RNA), (b) establishment of Traffic Separation Schemes (TSS); (c) Areas to be Avoided (ATBA); and (d) establishment of anchorages. Some of these measures (TSS, ATBA) are also approved through the International Maritime Organization due to the implications to the Law of the Sea Convention.

Department of Justice Activities.

The Department of Justice, through the Environment and Natural Resources Division, the Civil Division, and U.S. Attorneys' Offices, bring enforcement actions in federal courts against those who cause coral reef and reef ecosystem injuries. The Department represents agencies such as NOAA, the U.S. Coast Guard, EPA, and the National Park Services to bring civil and criminal enforcement actions to collect damages for, and accomplish restoration of, reefs and reef ecosystems injured by vessels, hazardous substances, or petroleum, and to seek injunctive relief prohibiting or restricting activities that damage or injure coral reefs. Some of the federal statutory authorities that authorize agencies to address damages to coral reefs caused by vessel groundings are listed in *Appendix III-B*.

State of Hawai'i.

The State, in concert with Hawai'i based federal agencies, is proposing to create a rapid response team of field biologists, enforcement and regulatory officials to quickly assess and direct response to a wide range of short-term anthropogenic events impacting coral reefs throughout the State, including vessel groundings.

State of Florida.

The State of Florida has developed preliminary response guidelines for vessel groundings.

Propeller Scarring, Anchoring, and other Physical Impacts

Some agency responses to the problems posed by anchoring and other physical impacts include:

Nearly 7% of Florida's 1.9 million acres of seagrass beds have been scarred by boat propellers.

National Marine Sanctuaries

In 1992, with the designation of the Flower Garden Banks National Marine Sanctuary, vessels larger than 100 feet in length are prohibited from anchoring on the banks. Vessels less than 100 feet in length were required to use mooring buoys, if available. If none were available, such vessels can anchor, but can not damage sanctuary resources, and were required to use ground tackle with no more than 15 feet of chain or wire rope, a practice that would limit resource destruction by the ground tackle itself. The regulations further require that the anchor line be of soft fiber such as nylon, or polypropylene, or some similar material.

National Park Service.

Biscayne, Buck Islands, Dry Tortugas and Virgin Islands National Parks all have designated anchorage areas for certain types of vessels and/or mooring buoy requirements in one of more of the popular reef areas.

State of Hawai'i

The State of Hawai'i has been implementing a mooring buoy project and a day use mooring system, though funding for maintenance continues to be a difficulty.

Recently Abandoned Vessels

The U.S. Coast Guard and the Army Corps of Engineers have the ability to remove abandoned and grounded vessels affecting coral reefs under certain circumstances, including where the vessel is a hazard to navigation or its presence poses a threat of oil or hazardous waste pollution. Where vessels are grounded in federally protected areas such as national marine sanctuaries or national parks, the federal agencies charged with resource protection have legal tools to recover costs and damages associated with salvaging the vessels and restoring the coral reefs when there is financially solvent responsible party.

Vessel Pollution

Agency responses to vessel pollution include:

USCG Pollution Response

Under the Oil Pollution Act (1990) and the Navigational Contingency Plan, the USCG federal On-scene Coordinators (FOSC) prepare area contingency plans and direct

response operations for incidents which pose significant oil or hazardous materials threats to the environment. USCGs FOSCs are assisted by NOAA scientific support coordinators as well as other agencies which insure that pertinent ecosystem factors are considered in developing and executing response operations. If the vessel owner/operator can not or will not respond properly, the USCG can activate the Oil Spill Liability Trust Fund to fund appropriate response actions.

National Park Service

The National Parks have developed Oil Spill Contingency Plans, prohibiting certain types of boating activity such as water skiing, and limiting the number of commercial dive boats, and limiting the size of boats using the area.

State of Florida

The State of Florida has rapid response teams for vessel pollution.

Enforcement Actions

The Department of Justice has brought civil and criminal enforcement actions against polluting vessels. In a recent criminal prosecution, the United States secured from the violator a commitment to fund coral reef projects. In U.S. v. Royal Caribbean Cruises, Ltd. (D.P.R.) (S.D.Fla.), the Department took action against cruise ship discharges of oily bilge water that threatened water quality in U.S. waters and in the Caribbean. The United States obtained \$ 9 million in penalties, \$1 million of which was suspended to fund coral reef projects in the territorial seas of Puerto Rico and South Florida. The statutory authorities upon which enforcement actions are based are included in *Appendix III-B*.

Impediments to Effective Management of Vessel Impacts

Knowledge Gaps

In order for agencies to more effectively address vessel-related impacts, it is necessary to know where “hot spots” of vessel activities and vessel-related injuries occur, which will allow agencies to examine the main causes of vessel-related injuries specific areas (*Addressed by Action 13*).

Navigator Inexperience/ Error

Many, if not most, vessel related injuries to coral reefs are human caused, whether they are due to navigator inattention, error or inexperience; ignorance of how vessels, anchors and other parts of vessels can damage reefs; or unfamiliarity with a particular area. Navigator inexperience or error may include, among other things, misuse of electronic navigational equipment, misreading navigational aids and charts, not having charts, and not knowing how to respond once a ship has been grounded -- sometimes much more damage is caused by vessels trying to power off a coral reef or seagrass bed (*addressed by Action 15, 16, 17*).

Need for Vessel Traffic Management Measures

Better navigational aids (such as charts delineating coral reefs, marine protected areas, or buoys marking restricted areas and text in the Coast Pilot) will help vessels avoid coral reef areas. Additionally, uniform and universal chart symbology and standards for corals needs to be developed for portrayal on both domestic and international navigational charts. Installing and maintaining permanent anchoring buoys in areas of high recreational use can avoid anchor damage. Another technology that could potentially improve navigating in and around coral environments is electronic navigational charts and Global Positioning System (GPS) aided navigational software. Through this technology, vessels could be alerted when they enter high hazard areas such as shallow coral environments. Automatic Identification System (AIS) marine transponders currently under development, will permit cost effective monitoring of high(er) threat commercial shipping in areas such as the Florida Straits. While it is unknown what effect this emerging technology will have in improving navigation and the ability to monitor shipping around coral reefs, inroads for protection should be fully exploited. Global Implementation of this technology is several years distant (*Addressed by Action 17*). Installation of additional short range aids to navigation such as day marks and bouys, and long range (radio) aids (such as racon beacon systems) are critical to addressing local and regional injuries to coral reefs. In some cases, domestic measures for vessel traffic management may not be adequate. The International Maritime Organization (IMO) approves all international measures that would address traffic seperation schemes, anchoring/no-anchoring areas, and other vessel management practices. The USCG and NOAA could approach IMO with proposals.

Lack of Resources to Address Vessel Impacts

Resources are needed across the board (to fill in knowledge gaps, to improve navigational aid, public education, and to enforce existing laws). Federal and local marine law enforcement personnel are extremely scarce in the Pacific territories. Funds are necessary to allow trustees to do restoration activities without having to wait for years for a judicial ruling and collection. Existing resources should be better leveraged. For example, NOAA's

revolving fund used for response costs should be maintained in interest bearing accounts. Additional funding for periodic surveys of coral reef habitats would allow the National Parks and Marine Sanctuaries to assess, if not repair, the injuries caused by unreported groundings and grounding where there is not a financially solvent responsible party (*addressed by Actions 12, 18*).

Need for Interagency Coordination and Standard Response to Vessel Groundings

As a growing number of groundings are taken forward for some type of enforcement action, it is becoming apparent that enforcement, damage assessments vary widely. While there are differences in the resources damaged, much of the divergence in damage claims is due to ad hoc assessments by staff that may or may not be adequately trained. Quick agency responses are necessary where groundings or other injuries occur to avoid additional degradation and collateral damage. A number of agencies have response guidelines, however a consistent and cooperative approach to response, assessment, and collection of evidence for consistent and high quality enforcement actions is critical to facilitating recovery of damages from responsible parties (*addressed by Action 14*).

Lack of Resources to Address Groundings and Abandoned Ships

Protection of coral reef ecosystems requires rapid assessment and response to groundings as well as the ability to remove abandoned vessels impacting reefs. Responders must have the statutory authority and financial and technical resources available to appropriately respond to incidents and remove abandoned vessels that physically injure coral. Other concerns include the costs of removing abandoned ships which can be expensive, particularly because many of the known recently abandoned ships are in remote areas of the Pacific (*addressed by Action 12*).

Need for General Liability and Compensation Statute for All Reefs

If an abandoned or grounded ship is a hazard to navigation, the Army Corps of Engineers is responsible for mitigating the hazard and can seek reimbursement from the ship's owners. Unfortunately, most coral reefs and seagrass beds are in shallow areas. As a result, vessels that remain aground on coral reefs or seagrass beds are unlikely to be considered hazards to navigation, and the Corps is therefore unlikely to conclude that it has authority to remove the vessel. If a ship poses a threat of oil pollution or hazardous waste discharge, the U.S. Coast Guard has authority to remove or address the threat. As the recent grounding of the longliner on Kure Atoll demonstrates, the Coast Guard's response to the threatened or actual discharge of oil does not necessarily include removal of the vessel from a coral reef or seagrass bed. If a ship is abandoned or grounded in a nonprotected area, the federal agencies have little authority to seek damages and costs from a responsible party. Even where agencies do have authority to recover costs and damages, the owner of the vessel may be insolvent and unable to pay (*addressed by Actions 12, 14*).

U . S . C o r a l R e e f T a s k F o r c e

Recommendations to Address Vessel Impacts

Appropriate protection of coral reef ecosystems from vessel impacts embodies a suite of broad management themes including prevention, education, enforcement and restoration. The following actions and strategies, while independent in nature, are meant to provide a holistic response to preventing further degradation to coral reef ecosystems by vessel groundings, anchor damage, propeller scarring, abandoned vessels and marine pollution. Many of these actions require increased funding at federal, state and local levels. Others require collaboration between many organizations and agencies charged with resources protection, navigation management and education. Specific actions and strategies include measures to:

- < **Establish a Coral Trust Fund and Liability Mechanism to Address Vessel Groundings and Abandoned Ships**
- < **Identify Vessel Impact “Hot Spots”**
- < **Develop Standard Vessel Grounding Response, Enforcement and Injury Assessment Guidance**
- < **Enhance Navigational Charts**
- < **Target Education to Prevent Vessel Related Damages**
- < **Improve Vessel Traffic Management**
- < **Improve Restoration of Injured Resources**

The following Action Strategies are meant to lay the groundwork for future actions at the federal and state/territorial levels to address coastal development and shoreline modification impacts to coral reefs. While general in nature, they represent CUWG priorities at the current time and are based on best available knowledge of the major threats to the resource.

Action 12 -- Establish Coral Reef Trust Fund and Liability Mechanism to Address Vessel Groundings and Abandoned Ships

Summary

Recently abandoned and grounded ships in U.S. territorial waters can impact coral reef resources. When a vessel grounds on a coral reef and the wreckage is not removed, damage to reef continues and recovery is compromised due to the continuing movement of the debris. The U.S. Fish and Wildlife Service in Hawai'i has documented the long-term effects of one vessel grounding where parts of the vessel were not removed. In that case, the reef showed only limited recovery three years after the grounding event (Green et al. 1997). When a vessel goes aground, the best way to minimize overall injury is through rapid response. Unfortunately, except when a vessel retains significant commercial value or the owner has sufficient financial resources or adequate insurance, ground vessel are frequently abandoned. Further, optimal government responses have been precluded in number of incidents due to the lack of a readily available funding source to support quick responses for removal, the injury assessment and any development of an appropriate restoration plan. This environmental threat which, unlike oil and hazardous substances, is not already covered by an adequate response regime. A particular concern is the potential cost of removing abandoned vessels, especially those abandoned in remote areas of the Pacific. The Coastal Uses Working Group proposes that an interagency work group be established on an expedited basis to: (1) explore existing mechanisms (statutory, regulatory, or other) that could provide funding for response to vessel groundings on environmentally sensitive areas such as coral reefs; (2) if necessary, recommend legislation to create a funding mechanism that could be patterned after the Oil Spill Liability Trust Fund established in 1990, and named the Coral Reef Trust Fund, with the fund used to finance the response and salvage of grounded and recently abandoned ships and associated restoration costs; and (3) recommend legislation creating a cost recovery liability mechanism that allows the federal government to recover costs and damages.

Scope

NATIONAL, REGIONAL, LOCAL -- The proposed legislation and access to the fund

would be federal, with application protection at the local and regional level.

Participants

The participants would include all relevant federal agencies, including NOAA, USCG, DOI, DOJ, and EPA, to name a few. FEMA should also be included for those groundings which occur in disasters declared under the Stafford Act.

Implementation Plan

Step 1 of this action strategy could be implemented immediately upon approval by the Coral Reef Task Force. Individual agencies have already begun exploring this issue. Steps 2 and 3 would follow, if necessary, on completion of the Step 1 inquiry.

Funding

Total Funding Needed: \$100K + Establishment of a Trust Fund, if necessary.

The inquiry into the need for legislative options would rely on existing resources. However, the establishment of the Trust Fund and the programs to implement a liability authority would take some funding. 100K over a two year period should cover most costs. Overall cost impacts would depend on the mechanism(s) established for funding wreck removal, and any additional damage assessment or restoration work at grounding sites where there is not a financially viable responsible party.

FY 2001	FY 2002
\$50K	\$50K

Performance Measures

- A. Successful removal of known abandoned vessels on coral reefs
- B. Expeditious removal of future grounded vessels.
- C. Expeditious injury assessment and restoration of grounding sites.
- D. The ability of the federal government to recover costs and damages associated with vessel groundings that affect coral reefs.

Effect if No Action Taken

Without a proactive action, resource managers will remain unable to respond to grounding events and vessel abandonment. Hence, significant and chronic injury from these impacts will continue.

Action 13 -- Identify Vessel Impact “Hot Spots”

Summary

The Coastal Uses workgroup proposes to develop a database of “hot spots,” or coral reef areas highly impacted by commercial and recreational vessel activity, in order to provide a diagnostic tool to help develop responsive strategies to address the risks vessel activities pose to the reefs. The purpose of this action strategy is to develop the information that will support effective decision making by those agencies that have jurisdiction over particular vessel activities.

Agencies have a variety of management tools available to address specific vessel threats, such as navigational aids, targeted education and outreach, improved navigational charts, enforcement, and other measures, but without the underlying data of where and why groundings and other impacts occur, it is difficult to determine the appropriate response in any given situation. The workgroup recommends hiring a consultant or contractor to synthesize all existing data on vessel groundings and impacts from various sources (federal and state agencies) and to develop an analysis of these impacts that can be input into a GIS system from which a set of recommendations can be developed.

Scope

This project can be implemented at any level, however, the intent is that location specific information will assist in establishing regional and national priorities for vessel management measures.

Participants

The safety and enforcement agencies and the resource trustees at the federal, state, and

local levels would be the sources of information for the hot spots database. An consultant or contractor would be hired to work with the agencies to gather and analyze the information.

Implementation Plan

The workgroup recommends hiring an outside consultant or contractor to gather the necessary information. The contractor would be expected to consult with resource management staff to correlate GIS information as needed to correlate vessel impacts with coral reef areas. The contractor would be asked to analyze the information available and develop recommendations for further data needs and for ways to institutionalize and continue monitoring of vessel impacts on coral reefs.

Funding

Total Funding Needed: \$200K for FY2001-2005

It is recommended that \$200,000 be requested in FY01 for either NOAA or DOI to hire a contractor to investigate what data is available, to determine how much confirmation of the data (hard copy vs. electronic) will be necessary, and to initiate the data conversion and synthesis into a functional database that correlates with a GIS system.

FY 2001	2002	2003	2004	2005
\$50K	\$50K	\$50K	\$50K	\$50K

Performance Measures

FY2001	Implementation of first regional, geospatial database
FY2002	Implementation of second and third regional, geospatial database
FY2003	Implementation of effective grounding management measures

Effect if No Action Taken

If no action is taken, information about vessel groundings, anchor impacts, and other vessel impacts will not be available in a format that facilitates cost effective resource management decisions to decrease impacts to reefs.

Action 14 -- Develop Standard Vessel Grounding Response, Enforcement and Injury Assessment Guidance

Summary

The Coastal Uses Workgroup proposes to develop suggested standardized procedures for U.S. agencies to respond to investigate and assess damages that arise from vessel groundings affecting coral reefs and related ecosystems. These suggested procedures are designed to ensure that response agencies address the range of threats to life, safety and the environment that occur in any vessel grounding, while providing specific advice on protecting coral reefs and collecting admissible and credible evidence for enforcement cases to recover costs and natural resource damages. The coral reef specific guidance will supplement existing response and investigation protocols (such as Area Contingency Plans, International Maritime Organization codes, and jurisdiction specific plans) and will not replace them. The Action Strategy proposes a two-phased approach: a response and investigation guidance will be developed first, followed by a damage assessment guidance.

Scope

NATIONAL -- The guidance will be appropriate for any agency (federal, state, territorial, or other) that has statutory authority to respond to and enforce against a vessel grounding. Therefore, the scope of the action strategy will be national.

Participants

All members of the Coral Reef Task Force are invited to participate and provide expertise in developing the guidance. The Department of Justice will take the lead in coordinating the development of the guidance on response and enforcement, and NOAA will take the lead in coordinating the development of the guidance on coral reef injury assessment. Other key agencies or participants include the U.S. Coast Guard, Department of the Interior, EPA, the States of Hawai'i and Florida, and the territories, Puerto Rico, and the

U.S. Virgin Islands.

Implementation Plan

A draft guidance on vessel grounding response and enforcement will be presented to the Coral Reef Task Force at its October 1999 meeting. The enforcement protocol guides resource managers, enforcement personnel and litigators as to the type of information that it is necessary to determine after a grounding event. It provides guidance that is applicable both for litigation and resource management purposes.

A draft guidance on injury assessment will begin development in October 1999 and the target completion date is January 2000. The development of the assessment guidance will include: guidance on how to assess small through large scale vessel groundings accurately both for litigation and resource management purposes, suggestions on how to develop an appropriate restoration strategy, and monitoring protocols.

Funding

Total Funding Needed: \$40K for FY2001-2002

Development of the response and enforcement guidance is underway using existing resources of the relevant agencies. Development of an assessment guidance will be done initially with existing assets, some funding may be necessary to develop any habitat equivalency tables deemed necessary.

FY 2001	FY2002
\$20K	\$20K

Performance Measures

Development of a guidance document that is supported and used by all federal/state/territorial resource management enforcement agencies.

An increase in successful enforcement actions for groundings on coral reefs.

Effect if No Action Taken

Without consistent actions, claims are unlikely to go forward or are likely to founder during negotiation due to variations in the assessment techniques and information collection. If no action is taken, agencies may spend time and resources reinventing the process at each vessel grounding, or may not have the benefit of the best collective thinking of all of the relevant agencies. Some responding agencies may not be attuned to special considerations that arise when coral reefs are affected by vessel groundings, and response actions to those groundings may exacerbate injuries to the reefs. We also are unable to best present our claims, and therefore may not recover all the funds necessary to restore or replace the lost resource.

Action 15 -- Enhance Navigational Charts

Summary

NOAA's Office of Coast Survey proposes to develop new nautical charts of coral reef areas that provide safe navigation near and through these sensitive areas and provide a visible, viable product for protecting coral areas by portraying their locations and by increasing awareness of the consequences of intruding upon these areas. The charts will depict coral areas at large scales to enhance the navigator's positioning ability and awareness of the proximity of protected reefs. Regulations and restrictions applicable to transiting, anchoring, etc. would be presented on the charts as informational material portrayed textually and/or with cartographic feature symbology or thematically. New cartographic feature symbols specific to coral areas could be developed and proposed for international acceptance in nautical charting to further enhance protection of coral reefs. Chart products would be published in paper and digital formats.

Scope

NATIONAL, LOCAL -- United States coral reefs are located near Puerto Rico, Florida, in the Gulf of Mexico, Hawai'i, and the Pacific island territories, possessions, and commonwealths. Coral reefs are currently portrayed on navigational charts as sanctuaries, if so defined, and possibly as a descriptive term indicating the nature of the sea bottom in areas outside defined sanctuaries, if known.

Participants

To effectively chart coral areas requires coordination with areas of NOAA with jurisdiction over coral areas. Communications would be established with states that have coral reefs within their boundaries or jurisdictions for data collection and sharing.

Nontraditional sources of data such as universities and private organizations would be pursued, data for navigational purposes does not have to be at the same resolution proposed for the academic mapping project. Other federal agencies such as the U.S. Geological Survey and National Park Service would also be queried for their data holdings. Any new U.S. charting symbology would be coordinated with the U.S. Coast Guard and National Imagery and Mapping Agency and proposed for international

acceptance through the International Hydrographic—Organization. Regulations pertaining to coral areas would be coordinated with Department of Justice and Department of State.

Implementation Plan

The proposed project is long term in nature requiring planning, data accumulation from any existing sources, acquisition of new data, and actual chart construction. The project is expected to span several fiscal years. An initial request of \$500K for FY 2000 is requested. These funds would be used to:

- 1) Plan a series of new/reschemed charts of the areas listed under product scope
- 2) Locate existing sources of data that support the required charting plan
- 3) Propose data collection where existing data is inadequate or none exist
- 4) Develop nautical chart construction standards for coral portrayal
- 5) Construct and publish a nautical chart to be used as the model for charts in the plan

The Office of Coast Survey proposes to manage this enhanced nautical chart project in the following manner:

- 1) Construct a series of large scale nautical charts of the national marine sanctuaries, national parks and other protected areas with coral reef resources;
- 1) Construct a series of large scale nautical charts of coral reef areas outside the established marine sanctuaries, national parks or other protected areas;
- 2) Construct a series of large scale nautical charts of coral reefs adjacent to the Hawai`ian Islands to prototype a model for chart construction in the Pacific islands.

The series of charts in this proposal would have a uniform appearance with regard to portrayal of data for safe navigation such as water depths, navigational lights, and buoys and also in portrayal of coral reefs. New charts would be constructed of areas, such as the Flower Gardens, where existing nautical

charting scales can not portray environmental features adequately to meet the concerns contained in this proposal. Where nautical charts exist at scales sufficiently large enough to portray these concerns, these charts would be reschemed to publish the information.

This project is not designed to replace generalized mapping of coral reefs for academic and educational purposes. Rather, it is designed to produce a new navigational tool emphasizing protection and safe navigation. Where possible, data supporting each of these endeavors should be shared.

Funding

Funding to continue the project is requested as follows:

FY 2001	2002	2003	2004	2005
\$750K	\$750K	\$750K	\$750K	\$750K

These funds would be used to procure data and construct charts. A nautical chart is a living document that is continually updated as new information is acquired. Therefore, portions of the funding will be used for maintenance of the charts after publication.

Performance Measures

The success of the strategy can be measured by the percent of coral reef areas covered with modern charts, the number of nautical charts enhanced with data pertaining to coral reefs distributed to users(both mandatory and non-mandatory user groups) and correlated with the number of groundings reported by the "Hot Spots" database.

FY2000	Initial prototype charts to be evaluated for effectiveness
FY2002	Complete development of new charting series

Effect if No Action Taken

If no action is taken the proposed information to be added to new and existing nautical charts will not be collected and made available to navigational users. Without this information the damage done to coral reefs through ignorance of positioning or of

consequences to the reef of grounding or anchoring will continue to grow.

Action 16 -- Targeted Education to Prevent Vessel Related Damages

Summary

Many, if not most, vessel-related injuries to coral reefs are human-caused, whether they are due to navigator inattention, error or inexperience; ignorance of how vessels and anchors can damage reefs; or unfamiliarity with a particular area. Navigator inexperience or error may include, among other things, misuse of electronic navigational equipment, misreading navigational aids and charts, not having charts, and not knowing how to respond once a ship has become grounded (and therefore causing more damage trying to power off a coral reef). Education and public outreach is a critical component to addressing and preventing groundings, improper anchoring, and other vessel-related damages. The Coastal Uses workgroup recommends that the Task Force undertake a multimedia, multi-targeted education and outreach campaign designed to educate targeted groups of mariners and associated marine industry groups about the need to protect coral reefs and proper boating procedures. Different groups would be reached differently and with appropriate messages.

Scope

REGIONAL, LOCAL -- This action strategy would be national in scope, but targeted campaigns may be conducted at a regional or local level. Additionally, there are some elements that may be applicable for international use.

Participants

The CRTF recommends that Sea Grant would be the appropriate entity to take the lead in this effort, and it would work with other agencies as appropriate (USCG, NOAA, DOI, DOJ, etc.).

Implementation Plan

- 1) Review existing federal/state/NGO educational materials and strategies for

- effectiveness and outreach
- 2) Assess and identify high priority user group targets.
 - 3) Develop new materials where appropriate, utilize existing materials where appropriate and target specific user groups with educational materials on how to avoid impacts to coral reefs through best management practices, avoidance, etc.
 - 4) Evaluate/survey user populations for educational material effectiveness.

Funding

Total Funding Needed: \$125K

It is estimated that this strategy would use existing educational programs and consortiums (Sea Grant, National Marine Sanctuaries Program, National Park Service, US Fish and Wildlife). New funding would be necessary for the development and dissemination of new materials and survey instruments.

Performance Measures

Performance measures for this strategy would be closely tied into other performance measures such as the Hotspot database (CUWG C2). Performance would be based on determining the actual effect of education campaigns through evaluation and survey of specific target groups as well as by any decrease/increase in incidents to coral by those target groups.

Effect if No Action Taken

If no action is taken, navigator error and inexperience will likely continue to be a major cause of vessel-related injuries to coral reefs.

Action 17 -- Improve Vessel Traffic Management

Summary

Vessels of all sizes present a threat to the health of coral reefs and in turn, coral reefs are significant hazards for safe navigation and ship operation. As the large number of ship groundings in marine protected areas, collisions, anchor damage to sensitive areas, large amounts of marine debris, and discharge and the large number of abandoned ships would indicate, there is insufficient information for navigators to operate safely. The Coastal Uses working group recommends that a number of passive and active vessel traffic management measures be implemented by the Task Force. These are measures that would be implemented in addition to the charting measures. These include augmenting as necessary both short and long range (radio) aids to navigation, working with the USCG and with the International Maritime Organization (IMO) when necessary to obtain the establishment of traffic separation schemes, areas to be avoided and designation of anchoring/no-anchoring areas.

1. Short range navigational aids--initiate placement of additional buoys and daymarks in coordination with assessments from "hotspots" database and GIS. (This could initially be done on a regional basis, as information and analysis becomes available.)
2. Long range (radio) navigational aids--determine whether long range aids such as racon beacons can decrease vessel traffic groundings in large areas (such as the racon beacon network recently implemented in the Florida Keys)
3. Establishment of anchoring/no-anchoring and designated moorage areas is critical to minimize the impacts of recreational and small commercial/charter vessels on heavily visited areas of the reef tract.
4. Work with the USCG to establish domestic vessel traffic management measures such as traffic lanes and designated anchorages/no-anchoring for coral reef areas.
5. Work through the International Maritime Organization to establish traffic separation schemes, areas to be avoided and designation of anchoring/no-anchoring areas for coral reefs when the need can be adequately demonstrated.

Scope

NATIONAL, REGIONAL, LOCAL -- The scope of these issues involves efforts at the local, regional, national and international levels, depending on the project.

Participants

The participants will include all of the relevant state, territorial, federal agencies and international organizations that have authority to implement these measures. Additionally, any vessels operating in coral reef environments would be critical to the success of these initiatives.

Implementation Plan

FY2001	Review existing vessel traffic management measures on a regional basis. Correlate existing management measure information with information from hotspots database
FY2002	Make recommendations to appropriate federal/state resource management and vessel management agencies based on analysis of data.

Funding

Total Funding Needed -- \$300K

The workgroup recognizes that there are a series of on-going activities and base funding that address some of these issues. If there are significant needs for additional navigational aids, funds will be necessary, 60K per year may be sufficient for limited upgrades to short range navigational aids, if implemented on a regional basis.

FY 2001	2002	2003	2004	2005
\$60K	\$60K	\$60K	\$60K	\$60K

Performance Measures

Performance will be based on an overall assessment in vessel traffic trends around identified navigational “hotspots”, i.e., decreases in groundings, physical impacts to reefs from anchor damage, etc. in specific locations.

Performance will also be based, in part, on the success of identifying and demarcating traffic separation schemes, areas to be avoided, and designation of anchoring/no-anchoring areas in U.S. coastal waters.

Effects if No Action Taken

If no action is taken, vessel impacts will continue to be a significant source of localized impact.

Action 18 – Improve Restoration of Injured Resources

Summary

Coral reef ecosystems are the result of thousands of years of growth. Vessel groundings and other events injure coral reefs. Recovery from injury may not be possible without intervention because coral growth rates are slow, unstable debris on reefs can cause further damage, and the topography of the area may be significantly changed. Restoration can help prevent the decline of coral reef ecosystems and corresponding impacts to surrounding environments and economies. Coral reef restoration is a young science however; most of the experience gained over the past ten years has been the result of large damage assessment actions. The Coral Reef Task Force therefore recommends that a series of activities be undertaken to improve the Nation's ability to restore these valuable ecosystems.

Scope

REGIONAL, LOCAL - Initial activities would focus on implementing restoration-related activities in national protected areas (National Marine Sanctuaries, National Parks etc.). These activities would involve local and State entities. Knowledge gained and tools developed through these activities would be transferred to a wide variety of local, State, and International resource managers and restoration practitioners.

Participants

Participants would include representatives from all levels of government as well as academia and other entities conducting related research and conducting on-the-ground restoration.

Implementation Plan

FY2000 Review and evaluate existing restoration projects and legislative authorities

FY2001 Conduct a workshop of coral reef scientists, managers and restoration experts to identify high-priority restoration needs and publish a corresponding 5-year research and development agenda to meet them.

Establish coral nurseries to provide temporary habitat for fragments of coral generated by vessel groundings and other physical impacts.

FY2002 Develop and implement a consistent, scientifically-based monitoring program at restoration sites to assess both ecological recovery as well as the physical performance of restored habitats.

Develop regional restoration plans that identify significant coral habitat restoration alternatives.

FY2003 Develop and test innovative methods and techniques to expedite restoration.

Create a "clearing house" for coral restoration information to facilitate the exchange of information and support local and regional projects.

FY2004 Develop models for estimating the recovery trajectories.

ONGOING Transfer restoration tools, techniques and lessons learned to domestic and international partners. (FY2001-2005)

ONGOING Provide financial and technical resources to State and local agencies to undertake restoration projects as part of larger management strategies. (FY2002-2005)

Performance Measures

- Number of technologies and tools developed to enhance restoration.
- Number of regional restoration plans developed.
- Number of projects carried out in support of the developed 5yr research and development agenda.
- Number of local and regional restoration projects supported through technical and/or financial assistance.

Funding

Total Funding needed: \$5M for *FY2000 - FY2005*

Additional resources as well as significant coordination between Federal, State, and local agencies are needed to implement these activities. Funds appropriated in FY2000 would help jump-start several of these activities.

Effect if No Action Taken

- 1) Restoration will continue to occur primarily as part of large damage assessment cases, only a small subset of areas where restoration can expedite recovery of injured resources;
- 2) Trustees will not have the legal authority or resources necessary to restore injuries to coral resources outside of protected areas; and
- 3) More efficient and effective restoration techniques will not be developed and transferred to the user community.

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APPENDIX III-A
Representative Sampling of
Major Vessel Groundings in Various U.S. Jurisdictions

Florida Keys National Marine Sanctuary

Vessel Name	Date of Injury	Location	Vessel Size	Resource/Habitat	Scope of Injury	Funds Recovered
<i>Wellwood</i>	8/4/84	Key Largo NMS	122 m	coral reef	1500 m ² extensive biological and structural injury	\$5,654,228
<i>Mini Laurel</i>	12/11/86	Key Largo NMS	65 m	coral reef	biological & structural injury	\$30,000
<i>Alec Own Maitland</i>	10/25/89	Key Largo NMS	47 m	coral and flat rock	930 m ² partial destruction; 680.5 m ² total destruction	\$1,450,000
<i>Elpis</i>	11/1/89	Key Largo NMS	143 m	coral reef	482 m ² partial destruction; 2604.7 m ² total destruction	\$2,275,000
<i>Jacquelyn L</i>	7/7/91	FKNMS	54 m	coral reef	123.1 m ² total injury; .5 m ² partial injury	\$251,554
<i>Salvors, Inc.</i>	Prior to 5/22/92	Coffins Patch; Hawks Channel		seagrass beds	100' blowholes, 30' x 9' deep caused by propwash deflectors (used in treasure hunting)	\$589,331
<i>Miss Beholden</i>	3/13/93	W. Sambo Reef	45 m	coral reef	1025.6 m ² biological destruction and physical injury	\$1,873,741 (judgment awarded but no collection)
<i>Columbus Iselin</i>	8/10/94	Looe Key NMS	52 m	coral reef	345 m ² total destruction	\$3,760,488
<i>Great Lakes</i>	5/26/93	Great White Heron NWR	large barge and tug	seagrass and coral meadows	25776.1 m ² extensive physical and biological injury	Settlement pending
<i>Petty Cache</i>	4/1/94	W. Sambo Reef	15.25 m	coral reef	17.25 m ² total destruction	in litigation
<i>Contship Houston</i>	2/2/97	Maryland Shoal	187 m	coral Reef	2333 m ² of crushed coral reef substrate; over 3000 broken pieces of coral	ER/DA costs paid. RP did restoration work. 1.4 M for monitoring and mid course corrections
<i>Golden Lady</i>	2/15/97	W. Sambo Reef	21.66 m	coral Reef	approximately 42 m ² living coral destroyed, additional sanctuary resources injured	\$54,716
<i>Flyaway</i>	1/15/98	Carysfort Reef	14.6 m sailing vessel	coral Reef	9.3 m ² coral reef injury	RP did restoration work

(Source: NOAA, Marine Sanctuaries Division; Office of General Counsel).

Biscayne National Park Grounding Figures

Year	Seagrass groundings	Coral Groundings (vessel < 100 ft)	Coral Groundings (vessel > 100 ft.)
1995	120	1	
1996	217		2
1997	177	4	
1998*	155	9	1

(Source: Biscayne National Park Report, 1996; National Park Service) * One mangrove grounding. The data for 1998 is not complete.

Hawaiian Islands National Wildlife Refuge

Vessel	Date	Location	V. Size	Impacts
<i>Kaiyo Maru</i>	2/7/70	Laysan	110'	Parts still on island
<i>Good Friends</i>	12/13/76	Pearl and Hermes Reef	51' sailing boat	
<i>Irenes Challenge</i>	1977	50 mi. N. Lisianski		10.4 million gallons crude oil spilled
<i>Santa Ines</i>	3/10/80	French Frigate Shoals	80 ft. Steel hull	
<i>Anangel Liberty</i>	4/27/80	French Frigate Shoals	538 ft.	2200 lbs. kaolin clay dumped
<i>Keola</i>	1/18/81	Little Gin Island, FFS		
<i>Carolyn K</i>	2/5/85	1.5 mi S. of Tern Island, FFS		200 gallons diesel fuel spilled
<i>Mimi</i>	6/26/89	Pearl and Hermes Reef	35'	Salvage effort failed, vessel broke up on reef
<i>Hawaiian Patriot</i>	2/24/97	S. of Necker Island 370 mi. W of Honolulu		

Midway Atoll National Wildlife Refuge and Rose Atoll National Wildlife Refuge

Vessel	Date	Location	V. Size	Impacts
<i>Omi Yukon</i>	10/28/86	300 mi. SE of Midway Atoll NWR		Oil tanker burned and sank
<i>Rabba Abba</i>	10/3/92	Rose Atoll NWR	50' fiberglass sailboat	Parts still there
<i>F/V Jin Shiang Fa</i>	10/14/93	Rose Atoll NWR	120' longliner	Parts still there.

(Source: FWS)

U.S. Territories (as reported to U.S. Coast Guard)

Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
ASOD					1	2	1	2	1	7
GUAMS	3	2	4	3	4	3	4	16	3	42
HONMS	23	25	14	16	19	12	14	19	10	152
SJPMS	16	22	7	17	11	3	17	8	16	117
STTD		1	2	3	7	5	5	2	3	28
Total	42	50	27	39	42	26	41	47	33	347

ASOD= MSD American Samoa. GUAMS=MSO Guam (probably includes Saipan/CNMI). HONMS= MSO Hononulu, Hawai'i. SJPMS=MSO San Juan, Puerto Rico. STTD=MSD St. Thomas, USVI (Source: U.S. Coast Guard, Office of Vessel Traffic Management) (Note: the numbers may not be entirely accurate due to the way the areas of responsibility are delineated. For example, St. Croix in the U.S.V.I. will be included under the San Juan PR numbers rather than under the St. Thomas (U.S.V.I.) numbers. Also, it is possible that groundings in some of these areas were reported to, or investigated by, other units. There are also gaps in the database where CG units were closed due to budget reasons (St. Croix in the early 1990s, Samoa before 1994). This database also does not show what percent of these groundings resulted in coral reef impacts.)

Puerto Rico

Vessel name	Date	length/ gross tonnage	Affected Resources	Grounding Area
<i>M/V Author</i>	9/8/98	202 m/ 1979.95	coral reef, seagrass	Ponce Bay
<i>M/V Kapitan Egorov</i>	6/20/98	678.5 ft./ 32,516	coral reef, seagrass	Guayanilla Bay
<i>M/V Fortuna Reefer</i>	7/24/97	305.72/ 3493	coral reef	Mona Island
<i>M/V Morris J Berman</i>	1/7/94		coral reef, seagrass, sand beach	El Escambron, San Juan

(Source: NOAA contact in PR)

APPENDIX III-B

Existing Federal Statutory Authorities Applicable to Vessel Activities

Agencies have a number of statutory authorities to address vessel injuries to coral reefs and vessel pollution. More robust authorities are found within protected areas, such as the National Marine Sanctuaries and the National Parks. Other authorities are available if a ship threatens to discharge oil or hazardous wastes. A brief sampling of some legislative authorities include:

National Marine Sanctuaries Act (NMSA), 16 U.S.C. 1431 et seq.

Authorizes NOAA to designate areas as national marine sanctuary and promulgates regulations for the conservation and management of those areas. §1433.

Prohibits the destruction, injury or possession of any sanctuary resources. §1436.

NOAA must issue permits for any prohibited activities conducted in sanctuary areas. §1441.

Authorizes NOAA to take any action as needed to prevent or minimize the destruction or imminent risk of destruction of sanctuary resources. §1443.

Imposes civil penalties of up to \$109,000 per violation of any regulation or permit issued under the Act. §1437(c)(1).

Authorizes U.S. to recover response costs and damages resulting from destruction, loss, or injury of any sanctuary resource. §1443.

Any vessel used to destroy, cause the loss of, or injure a sanctuary resource shall be liable in rem to the U.S. 16 U.S.C. §1443(a)(2).

NOAA may use response costs and damages recovered to finance response actions and damage assessments; to restore, replace or acquire equivalent resources; and to manage and improve national marine sanctuaries. §1443(d).

Florida Keys National Marine Sanctuary Protection Act (FKNMSPA). Pub. L. 101-605, 6(a) (1990)

Prohibits operation of tank vessels or large vessels within the “Area to be Avoided.”

Prohibits anchoring of vessels greater than 50m on the Dry Totugas Bank

Park System Resource Protection Act, 16 U.S.C. 19jj

Imposes liability on any person who destroys, causes loss of, or injury to National Park System resources for response costs and damages. §19jj-1.

Authorizes Attorney General to recover for response costs and damages to National Park System resources through a civil suit. §19jj-2.

Authorizes DOI to use any amounts recovered to reimburse response costs and damages; to restore, replace or acquire equivalent resources; and to monitor and study such resources. §19jj-3.

National Wildlife Refuge Improvement Act of 1997, 16 U.S.C. 3101 et seq.

Requires that a Comprehensive Conservation Management Plan be completed within 15 years.

Recognizes that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible, are legitimate and appropriate public uses of the Refuge System.

Requires that the Secretary of the Interior maintain the biological integrity, diversity and environmental health of the Refuge System

Rivers and Harbors Act, 33 U.S.C. 401, et. seq.

Prohibits the creation of any obstruction, not authorized by Congress, to the navigable capacity of any waters of the United States

Provides criminal penalties, including a fine not exceeding \$2,500 nor less than \$500 for violation of sections 401, 403 and 404 of Act.

Prohibits discharge, out of any ship, barge or other floating craft, or from the shore, any refuse matter of any kind or description into any navigable water of the United States

Prevents the securing or anchoring of vessels or other craft in navigable channels in such a manner as to prevent or obstruct navigation

Prevents sinking of vessels or other craft in navigable channels in such a manner as to obstruct or impede navigation; requires owner of sunken craft to immediately mark craft, and to commence immediate removal of same; failure to do so is considered an abandonment of the craft which subjects the same to removal by the United States. (The United States may file suit to collect removal expenses, pursuant to Wyandotte Transportation Co. v. United States, 389 U.S. 191 (1967))

Oil Pollution Act, 33 U.S.C. 2701 et seq.

Imposes removal costs and natural resource damages liability on vessels or facilities for discharge or substantial threat of discharge of oil upon navigable waters, adjoining shorelines or exclusive economic zone of U.S. §2702.

Recovered amounts can be used to cover removal costs incurred by U.S., state or other persons, and to restore, replace, or acquire equivalent natural resources which were damaged by oil discharge. §2702 & §2706.

Establishes an Oil Spill Liability Trust Fund for payment of removal costs by federal or state authorities, for initiation of assessment of natural resource damages, and for restoration, replacement or acquisition of natural resources determined to be consistent with the National Contingency Plan. §2712.

CERCLA, 42 U.S.C. 9601 et seq.

Owner or operator of vessel, or generator or transporter of hazardous wastes is liable for response costs and damages for hazardous substance releases. §9607.

EPA/Coast Guard may perform removal actions to address pollutant or contaminant releases.

Creates liability to U.S, states, or tribes for natural resource damage from hazardous substance releases, with any recovered sums to be used for restoration, replacement or acquisition of natural resources by federal, state, or tribal trustees. Federal trustees include NOAA, DOI, USDA, DOD, and DOE.

Authorizes the President to clean up hazardous substances, pollutants, or contaminants in order to protect public health or the environment. §9604(a).

Empowers NOAA and FWS to investigate spills of hazardous substances on coral reefs, assess the biological damage of accidents, and restore reefs.

Clean Water Act, 33 U.S.C. 1251 et seq.

Requires National Pollutant Discharge Elimination System (NPDES) permit from either EPA or an authorized state for the discharge of any pollutant from a point source into U.S. waters. §1342.

Requires permits from Army Corps of Engineers for the discharge of dredged or fill material into the waters of the U.S. that lie inside the territorial seas within three miles of shore. Authorizes EPA to review and comment on the impact of proposed dredge and

fill activities, and to prohibit discharges that would have an unacceptable impact on municipal water supplies, shellfish beds and fishery areas, wildlife and recreational areas. §1344.

Authorizes EPA to establish criteria recommendations for water quality that states may adopt. §1314(a).

Requires states to establish water quality standards (consisting of designated uses, criteria and an antidegradation policy) to preserve designated uses of waters in state waters (out to three miles beyond the inner boundary of the territorial). §1313.

Authorizes civil penalties of up to \$25,000 per day per violation and criminal penalties of up to \$25,000 per day per violation and/or one year in prison or \$50,000 per day of violation and/or up to 3 years in prison for a first conviction, with higher amounts for subsequent convictions. §1319.

Authorizes U.S. to recover removal costs and damages for discharge of hazardous substances or oil into water [overlapping authority provided by CERCLA and OPA. §1321.

Allows establishment of “No Discharge Zones” in state waters where discharge of sewage from vessels is completely prohibited. §1322(f).

Authorizes EPA and DOD to develop uniform national discharge standards for discharges, other than sewage, incidental to the normal operation of vessels of the

armed forces. §1322(n).

Requires marine sanitation devices for vessel sewage, pursuant to regulations promulgated by EPA. Requirements also apply to United States vessels except if national security concerns dictate otherwise. §1322.

Authorizes requirement for marine pollution control devices to mitigate adverse impacts on marine environment for discharges incidental to the normal operations of armed forces vessels and establishment of performance standards for such devices where required.

Hazardous Materials Transportation and Uniform Safety Act and Hazardous Materials Transportation Act, P.L. 101-615 & P.L. 93-633.

DOT regulates transportation of hazardous materials through uniform federal standards. Such standards preempt state regulations.

Imposes standards on states for selling hazardous materials transportation routes

Civil penalties include fines up to \$25,000 and criminal penalties include fines and/or up to 5 years in prison.

Authorizes training of local officials on response to hazardous materials transportation incidents.

Intervention on the High Seas Act, 33 U.S.C. 1471 et seq.

Authorizes the Coast Guard to take actions to prevent or eliminate danger to the U.S. coastline from pollution due to a casualty on the high seas, including authority to remove or destroy a vessel and its cargo.

Refuse Act, 33 U.S.C. 407

Prohibits the discharge, deposit, dumping, or pumping of any refuse matter into the navigable waters of the United States or tributaries thereof.

Shore Protection Act, 33 U.S.C. 1401 et seq.

Requires EPA to promulgate regulations on waste-handling practices by waste sources, vessels, and receiving facilities to minimize deposition of waste into coastal waters.

Requires DOT permit for transport of wastes in coastal waters. §1402.

Sanctions for violations include: suspension of permit; injunction; civil penalties of up to \$25,000 per day; and criminal penalties including fines and/or up to 3 years in prison.

Requires EPA, in consultation with DOT, to conduct a study on the need for and effectiveness of additional tracking systems for vessels to ensure that waste is not being deposited in coastal waters.

Convention for the Prevention of Pollution from Ships, as amended (MARPOL 73/78)

Annex I limits the discharge of oil and prescribes equipment that certain vessels are required to use and procedures which they are required to follow in order to limit the discharge of oil into the ocean.

Annex II governs the discharge of noxious liquid substances in bulk. Substances are divided into “categories” and specific regulations governing the release or non-release of the substances in a particular category are provided for. Special rules are provided for the handling of the substances in a particular category in special areas.

Annex III governs the carriage, packaging, marking and stowage of substances identified in the International Maritime Dangerous Goods Code. Discharge of these substances is prohibited except where necessary to secure the safety of the ship or save a life at sea.

Annex IV, which provides regulations on sewage, is not in force.

Annex V addresses the discharge of garbage at sea. It prohibits the discharge of plastic into the sea, and regulates the discharge of other garbage. It also prohibits the disposal of all garbage, except for food wastes, in “special areas.” Even food waste that is discharged in a special area must be discarded at least 12 miles from shore. Annex V has been implemented through the Act to Prevent Pollution from Ships, 33 U.S.C. 1901 et seq. This act requires U.S. public vessels, including warships, to comply with Annex V requirements by established deadlines; also provides for criminal penalties for dumping garbage from vessel operations (i.e., not garbage transported from shore) in the water; applies to all waters as well as to all vessels over which the U.S. has jurisdiction.

The U.S. recently signed Annex VI of MARPOL which regulates air pollution. It has not been ratified yet.

Act to Prevent Pollution from Ships, 33 U.S.C. 1901 et seq.

Implements the MARPOL Convention (Annexes I, II and V) in U.S. law and authorizes the development of implementing regulations. Annex I covers discharges of petroleum; Annex II regulates discharges of noxious liquid substances; and Annex V prohibits dumping of plastic trash anywhere in the ocean or in navigable waters of the United States.

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention), 1972

Countries ratifying the London Convention have agreed to prohibit the dumping of certain wastes (listed Annex I), including mercury, cadmium, organohalogens, oil, persistent plastics, and high-level radioactive wastes.

Special permits are required for ocean disposal of other wastes (listed in Annex II), such as arsenic, copper, lead, cyanides, pesticides, scrap metal, and low-level radioactive wastes. All other substances require a general permit for ocean disposal.

The United States implements the London Convention through the Ocean Dumping Act, 33 U.S.C. 1411 et seq. (See description under Pollution Control Authorities.)

Ocean Dumping Act, 33 U.S.C. 1411 et seq.

Implements the London Convention

Prohibits U.S. flag ships or citizens from departing from the U.S. to dump without a permit anything into the U.S. territorial seas or a zone contiguous to such seas if it may effect the U.S. territorial seas (12 nautical miles).

Provides for permits for dumping of dredged materials to be issued by Army Corps of Engineers with EPA review/concurrence. EPA issues dumping permits after determining the potential effects on the marine ecosystem and resources. 1411. EPA also must designate time periods and sites for dumping and develop a site management plan. §1412.

Prohibits issuing permit for dumping of radiological, chemical, biological warfare agents, high level radioactive waste and medical waste. §1412.

Provides for civil penalties of \$50,000 per violation (\$125,000 for medical waste), §1415(a); criminal penalties (up to 5 years imprisonment), §1415(b); and

injunctive relief, §1415(d).

United Nations Convention on the Law of the Sea (UNCLOS), 1982 (not yet ratified)

Provides a comprehensive framework for the rights and obligations of nation states with respect to the uses of the oceans. It provides nation states with control of economic activities off of their coasts and governs their ability to protect the maritime environment. It also preserves and reinforces the freedoms of navigation and overflight. Some provisions include:

Recognizes the right of coastal countries to claim a twelve-mile territorial sea, and a 24- mile contiguous zone to prevent infringement of health, customs, and immigration law. (The U.S. is bound to the terms of the 1958 Territorial Sea Convention which limit the extent of the contiguous zone to twelve miles)

A coastal nation has the same sovereign rights over its territorial sea, its waters, seabed, and air space, as it has over its land territory and inland waters, subject to the right of innocent passage. A coastal nation may regulate foreign vessels with respect to navigational safety, maritime traffic and protection of navigational aids; protection of offshore facilities and installations, cables and pipelines; marine research; environmental protection and pollution control; and prevention of infringement of customs, fiscal, immigration and sanitary laws. Art. 21(1).

Recognizes coastal nation jurisdiction over economic and resource exploitation to 200 miles offshore (exclusive economic zone, or EEZ). Art. 57. Coastal countries have jurisdiction with regard to marine scientific research and marine environmental protection and preservation

Recognizes the inherent and exclusive nature of a coastal nation's rights to explore and exploit the natural resources on its continental shelf. Sedentary living resources are considered continental shelf resources. The continental shelf comprises the sea-bed and subsoil of the submarine areas that extend beyond the territorial sea to the outer edge of the shelf (continental margin) or to a distance of 200 nautical miles from the baseline from which the territorial sea is measured, whichever is greater (but no more than 350 nautical miles). In some areas, the U.S. continental shelf extends more than 200 miles offshore, so the continental shelf is not coextensive with the EEZ. Art. 76, 77.

The United States has signed the Agreement and submitted it to the Senate for advice and consent. As a general matter, UNCLOS is considered to have codified customary international law.

