

GOAL 6: **REDUCE ADVERSE IMPACTS OF FISHING AND OTHER EXTRACTIVE USES**

KEY THREATS ADDRESSED:

Reducing the adverse impacts of fishing and other extractive uses is critical to reducing key threats to coral reef ecosystems. The figure below is a general summary of the relative importance (H = high, M = medium, L = low) of this goal in addressing the impacts from these threats. A higher ranking suggests that activities under this goal are considered more important to addressing the threat. Lower rankings suggest that although activities under this goal may make significant contributions, they may currently be less important to addressing the threat. The rankings are a summary of input shown in Table 2. The actual importance of this goal to addressing threats to reefs will depend on location and other factors (see Tables 3 and 4 for regional comparisons).

GOAL	Global Warming/ Climate Change	Diseases	Hurricanes/ Typhoons	Extreme Biotic Events	Overfishing	Destructive Fishing Practices	Habitat Destruction	Invasive Species	Coastal Development	Coastal Pollution	Sedimentation & Runoff	Marine Debris	Overuse from Tourism	Vessel Groundings	Vessel Discharges
Reduce Extractive Impacts	L	M	L	L	H	H	L	L	L	L	L	H	M	L	L

RATIONALE FOR ACTION:

Coral reefs and associated habitats provide important commercial, recreational and subsistence fishery resources in the U.S. and around the world, and represent a critical source of food for many developing countries. Fishing plays a central social and cultural role in many island communities. The rich biodiversity of reefs also supports a valuable marine aquarium industry and promises rich genetic resources for pharmaceuticals or other natural products. However, these fishery resources and the ecosystems that support them are under increasing threat from overfishing and fishing-associated impacts on habitats and ecosystems. Potential threats of fishing include: 1) direct over-exploitation of fish, invertebrates and algae for food and the

aquarium trade; 2) physical impacts to reef environments associated with fishing techniques and fishing gear; 3) impacts that occur over a wide range of trophic levels as a result of the removal of a species or group of species; and 4) by-catch of non-target species.

Overfishing of high value species, resources such as groupers, snappers, sharks, and certain crustaceans and mollusks, has been documented on nearly all U.S. inshore reefs near populated islands (*Health of U.S. Coral reef Ecosystems 2001*). These species are becoming depleted in more remote offshore reefs and in deep reef environments, and fisheries catches are shifting to smaller and less desirable species. Giant clams and large groupers have become commercially extinct in several areas. In the western Atlantic, four species of groupers are now listed as candidates for protection under the Endangered Species Act (ESA). Furthermore, the abundance of the top ten aquarium fish in Hawaii decreased by 59 percent over two decades at Honaunau, Hawaii (Clark & Gulko 1999).

In addition to changes in the abundance, composition and demography of targeted reef fish populations, dramatic changes in the structure of coral reefs have also been documented. For instance, the removal of predatory fishes may result in accelerated bioerosion of corals by the invertebrate prey that these fishes formerly held in check, while overfishing of herbivorous fishes has resulted in overgrowth of coral reefs by algae. Certain fishing techniques and gear are causing considerable habitat damage and/or entanglement of benthic reef flora and fauna. Fish traps and large gill nets are of particular concern in Florida, Puerto Rico, USVI and coral banks in the Gulf of Mexico. Other impacts associated with fisheries include anchor damage, trawling in deep reef environments, and grounding of fishing vessels.

Fishing pressure and fisheries impacts represent one of the largest, most widespread, and most difficult to address threats to coral reef ecosystems. Most reef fisheries in U.S. waters are small-scale, multispecies, and inadequately monitored, managed, and enforced. Improved management of coral reef fisheries requires 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.

STRATEGY TO REDUCE ADVERSE IMPACTS

The goal of this strategy is reduce the adverse impacts of coral reef fisheries in order to ensure their sustainable management and the conservation of the ecosystems on which they depend to benefit local communities and the Nation. The strategy is outlined in the U.S. National Action Plan to Conserve Coral Reefs and related documents of the Coastal Uses working group of the U.S. Coral Reef Task Force. For more detailed information see <http://coralreef.gov/>. This strategy outlines seven key objectives to achieve this goal:

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- Objective 1: Identify, monitor and protect critically important U.S. coral reef fisheries habitats and spawning populations through an expanded network of no-take ecological reserves.⁵ Ensure effective enforcement of existing no-take fishery reserves, monitor reef fish stocks in no-take marine reserves and reference sites to evaluate the effectiveness of reserves, and identify and protect new areas necessary to ensure the integrity of fisheries and ecosystems.
- Objective 2: Reduce overfishing by monitoring coral reef fisheries, assessing the adequacy of current fishing regulations, revising regulations as needed (in the case of Federal regulations this will be conducted utilizing existing statutory processes), and providing enhanced enforcement and education.
- Objective 3: Enhance coordination on coral reef fishery issues with the U.S. territories in the Caribbean and Western Pacific.
- Objective 4: Reduce adverse environmental impacts of fishing⁶ by assessing essential fish habitat; identifying effects of fishing and fishing gear, and implementing actions or additional gear and fishing vessel anchoring restrictions to reduce habitat damage; eliminating destructive fishing practices; and assessing and mapping deeper coral reefs, banks and beds, and developing strategies to conserve these deeper ecosystems.
- Objective 5: Incorporate ecosystem-scale considerations into coral reef fishery management. This will require targeted research, including the development of models, to understand ecosystem effects of fishing and socioeconomic studies on the impacts of different options. It will require work with state and territory resource management agencies, Fishery Management Councils and other interested entities

⁵ No-take reserves are areas protected from all fishing and other extractive use. As a habitat and ecosystem-based protection measure, such reserves potentially offer a high level of protection for coral reef structure, and ecosystem function and complement other fishery management tools such as gear restrictions or seasonal closures. An explanation of the scientific basis for the U.S. Coral Reef Task Force's goals for no-take reserves on U.S. coral reef ecosystems is found in the Report of the CRT Working Group on Ecosystem Science and Conservation: "*Building a National System of Marine Protected Areas for Coral Reefs*" (<http://coralreef.gov/>) and in Bohnsack *et al.* (in press). Work to achieve this objective related to federally managed fisheries will be one through existing statutory processes.

⁶ The *National Action Plan to Conserve Coral Reefs* also included removal of derelict fishing gear from this item as well as in "Reduce Pollution." As the great concentrations of derelict fishing gear found on Pacific reefs come from distant water fisheries rather than coral reef fisheries, this item is dealt with under the "pollution" section.

to incorporate this understanding into ecosystem-level local fishery management and Federal Fishery Management Plans for coral reef areas.

Objective 6: Reduce the overexploitation of reef organisms for the aquarium trade ⁷ by: banning the commercial domestic collection of coral and “live rock” and monitoring the collection of other species; developing new management measures or ecologically sound alternatives to wild collection; evaluating the effectiveness of existing legal authorities and policies governing the collection and importation of coral and other reef-dwelling species; and addressing inconsistencies among federal and state/territorial regulations on collection and trade of ornamental coral reef species.

Objective 7: Develop a process to evaluate issues and possibly develop guidance related to coral reef aquaculture in conjunction with stakeholders and relevant interagency groups including the Aquatic Nuisance Species Task Force and the Invasive Species Council.

SUMMARY OF ACCOMPLISHMENTS (2001)

The following is a partial summary of recent accomplishments by federal and non-federal members of the U.S. Coral Reef Task Force to achieve the goal and objectives. For more detailed information see <http://coralreef.gov/>.

Objective 1 Accomplishments: ⁸

- Began enforcement of Guam’s five new no-take reserves, which include more than 20 percent of the island’s coral reef ecosystems. (Guam)
- Designated two reserves on the West Florida Shelf – Madison-Swanson and Steamboat Lumps Marine Protected Areas with the Gulf of Mexico Fishery Management Council and began assessing their resources and contribution to fisheries. (NOAA)
- Established the Tortugas Ecological Reserve and conducted baseline fish stock assessments showing that 40 percent of the stocks analyzed in the Dry Tortugas National Park were overfished. NOAA began expanding the surveillance radar coverage to enhance enforcement in the Reserve. (NOAA, DOI, Florida)

⁷ The *National Action Plan* also recommended taking appropriate actions to ensure that international trade in coral reef species for use in U.S. aquariums does not threaten the sustainability of coral reef species and ecosystems. This issue is dealt with in the section on trade in coral reef species.

⁸ See also Marine Protected Area goal.

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- Worked with partners to develop vessel management systems to help improve enforcement capabilities in coral reef areas. (USCG, NOAA)
- Purchased Vessel Monitoring Systems for installation on commercial bottomfishing vessels operating in the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve to enhance fishery enforcement. (NOAA and partners).

Objective 2 Accomplishments:

- America Samoa prohibited fishing with scuba, hired two new fishery biologists, and worked with two villages that created short-term community MPAs. (AS)
- CNMI prohibited fishing using scuba or hookah within the lagoon or reef and 1000 feet outside the lagoon or reef. (CNMI)

Objective 3 Accomplishments:

- Established a coral reef officer and office in Puerto Rico to enhance coordination with Puerto Rico, USVI and the Caribbean Fishery Management Council. (NOAA)

Objective 4 Accomplishments:

- Conducted submersible dives to investigate fishing impacts on selected deep banks in the NWHI. (NOAA)
- Provided baselines and documented significant habitat destruction and reduced reef fish abundance for previously unexplored areas in the Florida Keys. (NOAA)
- Examined biological impacts of fisheries in the (NWHI) by investigating trophic interactions using ECOSIM food web model simulations and targeted field studies. (NOAA)
- Passed laws prohibiting destructive fishing techniques. (CNMI)

Objective 5 Accomplishments:

- Examined biological impacts of fisheries in the (NWHI) by investigating trophic interactions using ECOSIM food web model simulations and targeted field studies. (NOAA)

Objective 6 Accomplishments:

- Began an evaluation of the ornamental reef fisheries in Puerto Rico and Hawaii and enhanced trade management in Hawaii. (NOAA, Hawaii)

IMPLEMENTATION PLAN 2002-2003

Successful implementation of the strategy is contingent on funding and other factors, including effort by a variety of federal and non-federal organizations. The fisheries subgroup (Coastal Uses Working Group) of the U.S. Coral Reef Task Force, working with many partners, provided the following partial summary of key actions needed from government and non-governmental entities in 2002-2003 to help fulfill the objectives. More detailed information is available from the subgroup and member organizations of the U.S. Coral Reef Task Force (<http://coralreef.gov/>).

To Address Objective 1:

- Continue monitoring and evaluation of the effectiveness of the marine reserves in protecting and conserving reef fish populations, and expand assessments to recently established no-take areas using traditional visual censuses and innovative techniques.
- Assess the role of existing marine reserves as a source of reef fish larvae to repopulate other reef habitats.
- Identify, in concert with Regional Fishery Management Councils and stakeholders, under-represented habitats and geographic areas that may be candidates for new no-take areas.
- Provide education and enhanced enforcement for existing coral reef reserves, particularly in remote areas (e.g., Tortugas Ecological Reserve, (NWHI) Coral Reef Ecosystem Reserve, and others).

To Address Objective 2:

- Enhance the reef fisheries management capacity of states and territories through a series of regional workshops and capacity-building grants through the Coral Reef Conservation Program.

To Address Objective 3:

Continue to enhance fisheries outreach through the new National Marine Fisheries Service (NMFS) regional presence in Puerto Rico and increase federal coral reef fisheries outreach in the Pacific.

To Address Objective 4:

- Expand efforts to identify and reduce the adverse impacts of fishing on coral reefs, especially the effects of specific gear types and inappropriate fishing techniques, and assess the need for

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additional gear restrictions. In the case of Federal regulations this will be conducted utilizing existing statutory processes.

- Test the feasibility of using artificial refugia to shift fishing impacts away from natural coral reef areas.
- Map grouper spawning aggregation sites in the Western Atlantic and the distribution and status of fish biomass in deep reef environments.

To Address Objective 5:

- Complete development of the Western Pacific Regional Fishery Management Council *Coral Reef Ecosystem Fishery Management Plan* in a manner consistent with existing authorities and regulations. Begin to apply ecosystem management principles in Fishery Management Plans (FMPs) in coral reefs found in the U.S. Exclusive Economic Zone (EEZ) of the Gulf, Atlantic and Caribbean.
- Expand and refine ECOPATH and ECOSIM modeling to evaluate specific management implications of Fishery Management Plans, and test the model using information on exploited bottomfish species and other reef fish to predict the magnitude and timing of changes in abundance and size of reef fish within no-take marine reserves.

To Address Objective 6:

- Complete an evaluation of the ornamental reef fishery in U.S. territorial waters, and develop recommendations for sustainable collection.
- Explore the potential use of artificial reefs for sustainable collection of ornamental fish species in pilot studies.

To Address Objective 7:

- Develop guidance beginning in 2003.