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FISHERY MANAGEMENT PLAN FOR CORAL REEF ECOSYSTEMS OF THE WESTERN PACIFIC REGION

Summary

November 2000

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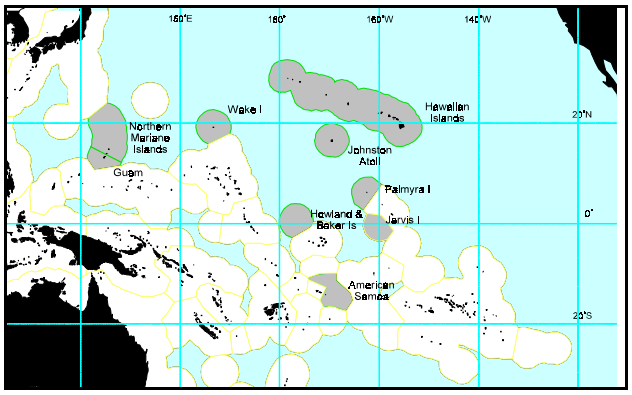
EXECUTIVE SUMMARY

The Fishery Management Plan (FMP) for Coral Reef Ecosystems of the Western Pacific Region was developed by the Western Pacific Regional Fishery Management Council based on the ecosystem-based approach. A recent report to Congress by the Ecosystem Principals Advisory Board recommends that FMPs be developed as "Fisheries Ecosystem Plans" covering the ecosystems under Council jurisdiction. This FMP represents the first fishery ecosystem plan developed in the United States.

About 70% of the world's coral reefs and 94% of the coral reefs under US jurisdiction are located in the Pacific Ocean. Coral reefs cover an estimated 15,852 km^2 of the shallow ocean bottom around US Pacific island areas served by the Council, which includes the State of Hawaii, the Territories of American Samoa and Guam, the Commonwealth of the Northern Mariana Islands, and the unincorporated remote areas of Johnston Atoll, Kingman Reef, Palmyra, Midway Atolls, and Jarvis, Howland, Baker, Midway and Wake Islands. Some 90 % of coral reefs in the region's exclusive economic zone (EEZ; the 200-mile limit) are found in remote areas, away from fishing communities.



Location of the US EEZ (grey shading) in the Pacific Ocean.

Coral reefs are very diverse ecosystems that provide many benefits to mankind. They build atolls, protect island shores from coastal erosion and wave damage, support fisheries of cultural and economic value, provide a natural medicine cabinet for traditional healing and biomedical research, and serve as museums of the world's tropical marine biodiversity.

Pacific islands were settled long ago and these indigenous people represent an important part of US Pacific island populations today. Their cultures historically depended on coral reefs to meet varied social-subsistence, economic and spiritual needs. These needs and values continue to shape and support these distinct cultures in the present. Resident and tourism-related recreation, important parts of contemporary island economies, also depends on healthy nearshore coral reef resources.

This FMP implements the precautionary approach in that it addresses potential problems before they can occur and establishes a management regime that can quickly adapt to changes. Local regulations control most of the impacts of resource exploitation on nearshore coral reefs in settled areas. This FMP provides the conservation needed for coral reef ecosystems in EEZ. Although these areas have been minimally exploited to date, there is potential for fisheries to expand in these areas. These potential expansions include current nearshore fisheries for coral reef species, new fisheries for the live fish markets in Southeast Asia, expanded fisheries for coral and "live rock" for the US aquarium trade, and developing fisheries for pharmaceutical uses. In addition, a holistic plan provides for better understanding of impacts due to natural environmental changes, other FMP managed fisheries, and non-fishing anthropogenic impacts such as dredging.

Objectives of the FMP

The Council established eight objectives for the Coral Reef Ecosystems FMP, which are consistent with an ecosystem-based management approach. The objectives promote sustainable use of coral reef resources, especially by fishing communities and indigenous fishermen in the region, an adaptive management approach based on fishery-dependent and fishery-independent research, marine protected areas and habitat conservation, cooperative and coordinated management by the various agencies concerned with the conservation of coral reef resources and education to foster public support for management.

Management Measures

To achieve the objectives of the FMP, the following management measures are established.

Permits and Monitoring

If needed, a general permit could be developed and implemented for EEZ reef fisheries, using the framework process. For unpopulated areas, where coral reefs would be designated as marine protected areas, special permits would regulate fishing and other types of fishing-related resource use. Under this permit regime the harvesting of live rock and coral would be specifically prohibited. However, the Council identified four exemptions to this permit regime. Permit holders in other FMP-managed fisheries would not have to obtain an additional permit for incidental catch of coral reef taxa. Indigenous people, aquaculture operations, and scientific management activities would be exempted from the prohibition on the harvest of coral and live rock. But these three activities would require a special permit and the allowable take would be limited.

Objectives of the Coral Reef Ecosystems FMP.

Objective 1: To foster sustainable use of multi-species resources in an ecologically and culturally sensitive manner, through the use of the precautionary approach and ecosystem-based resource management.

Objective 2: To provide a flexible and responsive management system for coral reef resources, which can rapidly adapt to changes in resource abundance, new scientific information and changes in fishing patterns among user groups or by area.

Objective 3: To establish integrated resource data collection and permitting systems, a research and monitoring program to collect fishery and other ecological information, and to develop scientific data necessary to make informed management decisions about coral reef ecosystems in the EEZ.

Objective 4: To minimize adverse human impacts on coral reef resources by establishing new and improving existing marine protected areas, managing fishing pressure, controlling wasteful harvest practices, reducing other anthropogenic stressors directly affecting them, and allowing the recovery of naturally-balanced reef systems. This objective includes the conservation and protection of essential fish habitats.

Objective 5: To improve public and government awareness and understanding of coral reef ecosystems and their vulnerability and resource potential in order to reduce adverse human impacts and foster support for management.

Objective 6: To collaborate with other agencies and organizations concerned with the conservation of coral reefs, in order to share in decision-making and to obtain and share data and resources needed to effectively monitor these vast and complex ecosystems.

Objective 7: To encourage and promote improved surveillance and enforcement of the plan.

Objective 8: To provide for sustainable participation of fishing communities in coral reef fisheries and, to the extent practicable, minimize the adverse economic impacts on such communities.

Fishing Gears and Methods

Three conditions on gear use, in order to minimize habitat impacts, are incorporated into this FMP. The Council also developed a list of allowable gear types, which includes the following: hand harvest, spear, slurp gun, hand/dip net, hoop net for Kona crab, throw net, barrier net for aquarium fish, surround/purse set net for targeted schooling fish (e.g., akule, baitfish, weke) with a minimum of bycatch, hook-and-line (powered and unpowered handlines, rod and reel, and trolling), traps (with conditions), and remote operating vehicles/submersibles. The following gears are specifically prohibited for coral reef species: gillnets, trawls, dredges, tanglenets, longlines, explosives, and poisons. Finally, SCUBA assisted fishing is prohibited in the Pacific remote island areas and the northwestern Hawaiian Islands.

Marine Protected Areas (MPAs)

EEZ coral reefs in unpopulated areas are designated MPAs (that is, the Pacific remote island areas, the Northwestern Hawaiian Islands, Guam's Southern Banks and Rose Atoll in American Samoa). The outer boundary for these MPAs is the 50-fm isobath. A zone-based management approach is applied to MPA design and designation. The two types of MPAs are: no-take and low-use. No fishing is allowed at no-take MPAs, including that by existing FMP fisheries. No-take MPAs are delineated by the 10-fm isobath except for certain ecologically sensitive areas where the boundary is extended to the 50-fm isobath. These areas are French Frigate Shoals, Laysan Island, the north half of Midway Atoll, Jarvis Island, Howland Island, Baker Island, Kingman Reef, Palmyra Atoll, and Rose Atoll. All other areas within the 50-fm isobath would by default become low-use MPAs, where fishing is tightly controlled by a special permit requirement and other conditions for fishing.

All extractive activities would be prohibited in no-take MPAs, except for small harvests related to scientific research and resource management. In low-use MPAs existing fishing activities and recreational fisheries by residents on certain remote islands would be allowed under special permits. New fisheries and fishing by indigenous people could be allowed under special permits. Existing FMP fisheries in low-use MPAs would follow permit and reporting requirements already established in their FMPs.

Using the framework process, vessel anchoring areas may be designated in MPAs at a future date. The only immediate restriction in this FMP applies to large fishing vessels (i.e., > 50 feet) at Guam's Southern Banks, which would be prohibited from anchoring at that low-use MPA. Vessels transiting MPAs would be required to carry insurance in order to pay for the costs of vessel removal and habitat damage mitigation in the event of a grounding. The Council felt that prohibiting large non-fishing vessels, and in particular cruise ships, from entering MPAs would be beneficial. However, the Council does not have the authority to regulate these vessels. Several longer term, cooperative efforts are proposed to manage the potential impacts of these vessels.

Other Management Measures

ADAPTIVE MANAGEMENT: A framework process, providing an administratively simplified procedure for FMP modification, is an important component of the FMP.

NON-REGULATORY MEASURES: A set of measures, consistent with FMP objectives, will be implemented by the Council outside of the regulatory regime. This includes the process and criteria for essential fish habitat consultations, formal plan team coordination, and research and education efforts.

FREQUENTLY ASKED QUESTIONS

What are the jurisdictional boundaries for the proposed fishery management plan # (FMP) for coral reef ecosystems? The area of authority for all FMPs prepared by the Western Pacific Regional Fishery Management Council (the Council) is clearly defined by the Magnuson-Stevens Fishery Conservation and Management Act as the Exclusive Economic Zone (EEZ) around US Pacific islands. The EEZ extends 200 nautical miles offshore from the seaward boundary of the territorial sea (around the State of Hawaii and territories of American Samoa and Guam and the Commonwealth of the Northern Mariana Islands). Around other US Pacific islands, under the jurisdiction of various federal agencies, the EEZ extends to the shoreline. In some areas, the EEZ overlaps with areas where other agencies claims management of natural resources, including coral reefs. The recommendations of the proposed FMP recognize and reinforce existing resource management efforts and establish consultative procedures that would improve inter-agency coordination.

Were diverse stakeholders and users of coral reefs considered during FMP preparation? FMP preparation is based on a consensual management approach, with decisions made by the Council after receiving recommendations from various advisory bodies comprised of scientists, government resource managers, resource users, and the general public. The process encourages participation by stakeholders representing different views and cultures, facilitating dialogue even in an adversarial environment of competing demands for resource use. The principal groups that advised in the preparation of the FMP for Coral Reef Ecosystems (CRE) are the CRE plan team, which is comprised of non-fishing representatives; the Ecosystem and Habitat Advisory Panel, which is comprised of diverse stakeholders representing consumptive and non-consumptive interests in coral reef resources; and the Scientific and Statistical Committee.

What fisheries resources would be managed by the proposed FMP for Coral Reef Ecosystems? Coral reefs and reef-building organisms are confined to the shallow, upper photic zone and are normally restricted to depths less than 50-100 meters (25-50 fathoms). Maximum reef growth and productivity occurs between 5-15 m, whereas maximum diversity of reef organisms occurs between 10-30 m. Coral reefs represent some of the most biologically diverse ecosystems on Earth, and only a small percentage of species are presently harvested in the EEZ around the US Pacific islands. Most of the targeted resources (i.e. lobster in the Northwestern Hawaiian Islands (NWHI), bottomfish) are already managed under other FMPs or by island government regulations. Because coral reef ecosystems are comprised of multi-species resources that share a long co-evolutionary history, removal of some species can have undesirable secondary effects on others through food web or other types of interactions. Adverse effects on the ecosystem cannot necessarily be prevented through existing FMP and island government regulations that aim to maintain optimum yield, while preventing overfishing of target stocks. The FMP for Coral Reef Ecosystems is needed to incorporate additional ecosystem principles into the regulatory structure already established.

How would the proposed FMP affect existing coral reef-related fisheries? Fishing for currently harvested coral reef resources in the EEZ around the islands of Tutuila, Swains and Manua group in American Samoa would continue with catch and effort information obtained by coordination with the local fishery agency. Fishing activities for currently harvested coral reef resources in the EEZ

around Guam, the main Hawaiian Islands and the Commonwealth of the Northern Marianas Islands would be reported similarly. Temporary workers who engage in recreational and subsistence fishing for coral reef resources at Midway, Johnston and Wake Atolls could continue these activities by applying for special Federal permits and making reports. No off-island use of their catches would be allowed. Tourists who visit Midway (or more likely their tour agency) to engage in sportfishing would be subject to the same requirements. Waters bordering the north half of Midway Atoll would be designated as a "no take" marine protected area (MPA) extending 0-50 fm and would closed to all fishing.

How would the proposed FMP affect existing FMP fisheries? FMP-managed fisheries for bottomfish and lobster in the NWHI would be displaced from no-take MPAs extending from the seaward boundary of the territorial sea to a depth of 50-fm offshore of French Frigate Shoals and Laysan. Fishing for bottomfish and lobster could continue in low-use MPAs extending from 10-50 fm around all other NWHI under existing permits and management programs, as provided in the FMPs for Bottomfish and Crustaceans. Both plans provide for protected species zones, where no fishing is allowed. Vessels operating in MPAs would be required to have insurance to cover wreck removal and pollution liability in the event of grounding.

Fishing by Hawaii handline vessels for bottomfish and shark that has occurred irregularly off Palmyra and Kingman Reef would be displaced from no-take MPAs extending 0-50 fm around the latter islands. Sporadic fishing activities at Rose Atoll would be displaced from the no-take MPA extending from 0-50 fm.

How would the proposed FMP affect new coral reef fisheries? Coral reef resources in the EEZ around the US Pacific islands are likely targets for the rapidly expanding live reef fish and ornamental industry and the emerging industries for pharmaceutical and natural products. These fisheries have the potential to collect organisms about which little or nothing is known, whether about resource potential or possible ecosystem effects from harvesting. To initiate a new fishery for any potentially harvested coral reef taxa anywhere in the EEZ would require application for a special permit. This mechanism would allow harvest of new target resources to be kept at a safe level while information is acquired through detailed reporting about resource potential and possible ecosystem effects. Special permits would include restrictions on all facets of the proposed activity, including vessel operation. The permits would be conditional, subject to being renewed or revoked based on fishery monitoring as well as consideration of unforeseen changes, such as a coral bleaching event or an oceanographic regime shift. Special permits (or permits operating under FMPs for Bottomfish or Crustaceans) would be required for all fishing activities in low-use MPAs. In the NWHI, low-use MPAs extend seaward from the outer boundaries of no-take MPAs, providing a buffer zone where all fishing activities would be carefully scrutinized and monitored. No permits would be issued to allow fishing in no-take MPAs. Scientific research could be conducted in no-take MPAs under special permits, however.

Does the proposed FMP address non-fishing impacts? Historical and contemporary impacts on coral reef habitats and ecosystems by non-fishing activities are reviewed in the proposed FMP. The most severe impacts have occurred on nearshore reefs under island government jurisdiction rather than in the EEZ. Few reefs in the EEZ are close enough to inhabited land areas to be significantly

affected by tourism, shoreside development, upland runoff, beach erosion and other terrestrial impacts. However, reefs in the EEZ at Midway, Johnston, Wake and Palmyra Atolls and off Farallon de Medinilla in the Commonwealth of the Northern Marianas Islands have been degraded as a result of past and on-going military use. The Magnuson Act does not provide the authority for FMPs to directly manage non-fishing activities. By designating essential fish habitat (EFH) and habitat areas of particular concern, the proposed FMP would guide EFH consultations on proposed Federal actions that could adversely affect coral reefs anywhere in the US Pacific, whether in or outside the EEZ.

How does the proposed FMP demonstrate an ecosystem-based approach to coral reef management? There is poor understanding of the basics, much less the intricacies, of coral reef ecosystems. Ecosystem-based management, therefore, can only be completely achieved over time as new information allows management to improve. It should be recognized that the technical data available for management decisions are almost always uncertain and incomplete. Hence, the proposed FMP applies the precautionary approach by designating and zoning MPAs, requiring special permits and detailed reporting for low-use zones and for potentially-harvested resources for which no information has been generated by previous fishing, prohibiting the commercial collection of live rock and allowing only non-destructive, selective fishing methods. The proposed CRE-FMP would also establish a procedure for interface between different FMPs to monitor and resolve possible ecosystem effects of reef-related fisheries) and a procedure which incorporates feedback from detailed fishery monitoring of special permit activities, fishery-independent research and unforeseen environmental impacts (e.g., coral bleaching, oceanographic climate shift, hurricane damage to living coral) into an adaptive management process. Through this process, informed and timely regulatory changes could be made in the future, including such possibilities as expanding existing MPAs, designating new MPAs, setting limits on the number of special permits available, evaluating new and innovative methods of harvest or adjusting reef-related fisheries managed under other FMPs if undesirable ecosystem effects are detected.

The proposed CRE-FMP includes several types of "ecosystem insurance," as recommended by the Ecosystem Principles Advisory Panel (EPAP 1999). Requiring insurance for vessels operating in areas of particular concern to cover the cost of vessel removal and pollution liability, in the event of a grounding, can provide incentive for more responsible operations. Another form of "insurance" is provided by zoning of MPAs for alternative uses. For example, no-take MPAs prohibit consumptive uses in areas highly sensitive to impacts and in biogeographically diverse ecosystem types representing a substantial reservoir of spawning biomass and biodiversity. Low-use zones allow fishing but only under a special permit that tightly controls activity. Zones can also be established for indigenous fishing and research.

Which places in the US Pacific islands constitute "fishing communities"? A community results from webs of social interaction that people create by taking advantage of shared cultural understandings and identities, geographical or otherwise. Fishing communities in the US Pacific islands are not based on geographic residence but on shared participation in fishing-related activities that occur over larger geographical scales than single villages or towns. At least one-third of the resident population of the US Pacific islands participates in some level of fishing, and all populated areas include some residents who are at least part-time fishermen. Fishermen from one area travel

to other parts of the island and between islands to visit family and friends. Fishing is one of the most commonly shared activities at such gatherings. Fishermen frequently trailer small boats from one side of an island to the other to take advantage of seasonal fish availability and weather conditions. Fishing cooperatives in the US Pacific islands have island-wide membership and seafood markets are supplied by a widespread network of harvesters. The technology, customs, terminology, attitudes, and values related to fishing are thus shared on an island-wide and inter-island scale, and the web of social relationships that define communities are not confined to local enclaves living near harbors.

The US Pacific islands vary significantly in land area, population levels and the size of their associated EEZs. They have had significantly different courses of political development and historical relationships with the US but they share a common economic and social dependence on marine fisheries, especially coral reef resources. This dependence traces back several thousands of years, when the islands were first settled by sea-faring peoples. Their dependence on fishing for food security shaped the social organization, cultural values, and spiritual beliefs of the indigenous cultures. Contemporary island societies are pluralistic in population and culture, and few people depend solely on fish catches for protein. Most residents still have daily interactions with the ocean to obtain food, recreation, income, and other benefits that contribute to the high quality of island life. Given the importance of fishery resources, particularly coral reef resources, to all of the populated US Pacific island groups and taking into account the islands' distinctive geographic, demographic, and cultural attributes, the Territories of American Samoa and Guam and the Commonwealth of the Northern Mariana Islands are each characterized as "fishing communities." Each inhabited island of the main Hawaiian Islands – Niihau, Kauai, Oahu, Maui, Molokai, Lanai and Hawaii – has been divided, where possible, into distinct geographic fishing communities based on their potential to utilize and benefit from the harvest of coral reef resources. Defining the boundaries of the fishing communities broadly helps ensure that the analysis of social and economic impacts considers all segments of island populations that are substantially dependent on, or engaged in, coral reef fishing-related activities.

Why are marine protected areas (MPAs) an attractive option for coral reef management? MPAs do not require detailed knowledge of each managed species, while being holistic in conserving multi-species resources and the functional attributes of coral reef ecosystems. They can also provide "insurance" against periods of poor recruitment of individual stocks.

Do MPAs have to be "no take"? MPAs can vary in scope and extent. They can be areas designated for limited use or seasonal use or areas completely restricted from consumptive use (no take). Although no-take areas are thought to provide the highest degree of protection to coral reef ecosystems, less restrictive areas also provide some protection with fewer economic and social impacts. Some argue for complete protection from fishing, whereas others believe MPAs are more valuable when they can serve as natural laboratories for fishing experiments and testing of adaptive management strategies while providing for food, medicine, recreation and other benefits.

What is the optimum size of a MPA? The optimum size depends on many factors, including the resources managed, management goals, enforcement capabilities, and social and economic constraints. Researchers do not yet fully understand the relationship between the area designated as

MPA and resulting benefits in the form of ecologically complete coral reef ecosystem protection. Previous MPAs established by the island governments for some nearshore reefs are small and fragmented. They have been criticized for not encompassing sufficient depth range and high quality habitat to provide broad ecosystem protection or stock recruitment benefits. The US Coral Reef Task Force has established a 10-year target to designate 20 percent of US coral reefs as no-take MPAs, and that goal is incorporated in the proposed CRE-FMP.

If MPAs are closed to fishing, will they restock areas that remain open to fishing? To be useful to fisheries and to promote the conservation of coral reef resources on a broad scale, MPAs should serve as sources of reproductive output to replenish larger surrounding areas. It has been suggested that linking populations among MPAs over a broad area is necessary to assure restocking. Individual sub-populations of larger stocks of reef species may increase, decrease, or cease to exist locally without adversely affecting the overall population. The condition of the overall populations of particular species is linked to variations among sub-populations: the ratio of sources and sinks, their degrees of recruitment connection, and the proportion of the sub-populations with high variability in reproductive capacity. Recruitment depends largely on the pathways of larval dispersal and whether down-current connections are sufficient to actually enhance distant sub-populations or only enough to maintain a homogenous genetic stock.

What criteria were used to select the MPA locations proposed in the CRE-FMP? The Council considered the following criteria in determining the MPA locations in the proposed CRE-FMP:

- Natural resource values: biogeographical representation, biodiversity, ecosystem integrity, ecological significance, species maintenance, habitat structure/features, and special elements protection;

- Human use and historical values: renewable resources of importance for sustainable uses, recreational resources, research and monitoring, educational and interpretive opportunity, historical and cultural resources, and aesthetic resources;

- Impacts of human activities: observed environmental impacts and projected impacts; and

- Management concerns: coordination with other programs, size and boundary considerations, accessibility, surveillance and enforcement, economic considerations, network-wide activities, and urgency of threats.

As new information is acquired through resource monitoring, the initial MPA designations could be adjusted and additional MPAs added in the future through the adaptive management process.

Why doesn't the CRE-FMP propose designation of MPAs in the EEZ adjacent to the inhabited islands of American Samoa, Guam, Hawaii, and the Commonwealth of the Northern Marianas Islands? Immediate designation of no-take MPAs in these areas without considerably more consultation with local stakeholders and island governments would likely cause significant adverse social and economic impacts. Compliance with no-take zones can be improved by involving fishing

communities in site selection and self-policing. Local initiatives by all island governments are underway to develop proposals for MPAs in nearshore reef areas. Immediate designation of MPAs in the EEZ alone would not be as effective as coordination with island governments to establish MPAs that cross jurisdictional boundaries. This would best be accomplished by future adjustments through the process for adaptive management.

Why is 50 fathoms, rather than 100 fathoms, the depth limit of the proposed MPAs? Coral reefs and reef-building organisms are confined to the shallow upper photic zone and are normally restricted to depths less than 50-100 meters (25-50 fathoms). Maximum reef growth and productivity occurs between 5-15 m, whereas maximum diversity of reef organisms occurs between 10-30 m. At depths below 50 fm, there is a transition to a deep slope benthic ecosystem and then to the sub-photic zone (> 300m). Hawaiian monk seal adults from the French Frigate Shoals (NWHI) population are believed to forage around colonies of gold corals in the sub-photic zone (> 300 m deep). Because of the poor nutritional condition of young monk seals at French Frigate Shoals (FFS), the future harvest of gold coral at nearby banks might have an adverse impact on this endangered species. The potential conflict is being addressed through a regulatory adjustment to the precious corals FMP that would suspend the harvest quota for gold coral in the NWHI until additional scientific evidence becomes available about the impact of harvesting on monk seal foraging habitat. These type of larger ecosystem issues will continue to be addressed through formal coordination among all Western Pacific FMPs in the EEZ, as prescribed in the CRE-FMP.