4.2. Coral Reef Ecosystems

The Western Pacific Council's 2001 Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region is the first ever ecosystem-based plan for fisheries developed in the United States. It incorporates many of the principles and policies recommended by the National Marine Fisheries Service's Ecosystem Principles Advisory Panel. The goal of the FMP is to establish a management regime for the entire Western Pacific Region that will maintain sustainable coral reef fisheries while preventing adverse impacts to stocks, habitat, protected species or the ecosystem. To achieve this goal, the FMP implements several management measures, including (a) the designation of zoned Marine Protected Areas (MPAs) for coral; (b) permit and reporting requirements to fish in designated low-use MPAs (reporting of fisheries information in non-MPA areas will continue to be collected through locally administered monitoring systems), and if needed, a general permit program for all EEZ reef fisheries and; (c) a prohibition on non-selective/destructive fishing gears and conditions on the types and uses of allowable gears.

The central feature of the Coral Reef Ecosystems FMP is adaptive management, which recognizes the uncertainty, changing conditions and resilience associated with coral reef ecosystems. Pacific island management systems for coral reef ecosystems have allowed Pacific islanders to survive for millennia by coexisting with coral reef resources and are best viewed as adaptive responses that have evolved over time, not as mere traditions.

Coral reef habitat covers an estimated 6,120 sq. miles of the shallow ocean bottom around US Pacific Island areas served by the Council. Nearshore fisheries of the Western Pacific Region include a wide variety of reef and lagoon species and large and small pelagics fishes found within lagoons or near reef margins. A variety of methods are employed in coral reef fisheries including hand harvesting, hook-and-line, spears and a variety of nets and traps. The monitoring and regulation of nearshore fisheries is mainly the responsibility of State or territorial fisheries administration, although there are some 4,200 sq. miles of lightly fished coral reef habitat that lies within the federal waters of the Council's jurisdiction. Table 7 lists the 2002 volume of estimated domestic coral reef fish landings in the US Pacific islands by area.

Nearshore resources are caught for recreation and subsistence purposes and for commercial sales. Categorizing fishing activity into one of these different activities is extremely difficult in the Western Pacific Region, where people may have regular employment but increase their earnings by occasional sales of fish when recreational or subsistence catches are more than required. In the Pacific islands, nearly every person is a potential fisherman and every village is a potential landing site. Even in Hawaii, a significant volume of the recreational catch is sold to the public along the roadside. This is another essential difference between the Western Pacific Region and other US locations, where commercial and recreational fishermen are strongly polarized and the commercial fishing community actively discourages fish sales by recreational fishermen.

Table 7.
Estimated Western Pacific coral reef fish landings, 2002

Island Area	Landings (pounds)
American Samoa	19,750
Guam	177,030
Hawaii	866,860
Northern Marina Islands	179,090
TOTAL	**1,242,730**

Throughout the Western Pacific Region, fishery administrators at the State, territorial and commonwealth level are actively developing management strategies to minimize the potential for resource depletion and habitat degradation. The Territory of Guam recently established over 20% of its nearshore waters as no-take MPAs. The Territory of American Samoa has now banned the use of fishing with SCUBA, while the Commonwealth of the Northern Mariana Islands has banned the use of all types of lay gill nets. The State of Hawaii has increased the minimum size for many reef fish and is also developing new conditions for the use of lay gill nets. However, recent attempts to establish expanded MPAs were unsuccessful.

With the assistance of federal partners, local fisheries administrations are also increasing fisheries research and monitoring programs to evaluate the effectiveness of existing regulations and management decisions. Fisheries administrations in the Western Pacific Region possess some of the longest coral reef fisheries data sets and continue to improve the collection of fisheries information, including catch and effort data from recreational and subsistence sectors. MPA effectiveness studies are now being conducted throughout the region, and ecosystem assessment programs have recently been initiated to monitor the long-term health of coral reefs and reef associated communities. Collectively, these new programs aim to evaluate the effectiveness of existing fisheries management measures and provide scientific data to support and establish new management initiatives.

4.3. Crustacean Fisheries

Lobster was a traditional source of food for Native Hawaiians and was sometimes used in early religious ceremonies. After the arrival of Europeans in Hawaii, the lobster fishery became the most productive of Hawaii's commercial shellfish fisheries. The commercial lobster catch in 1901 was reported to be 131,200 lbs. The majority of catch at that time was probably composed of the green spiny lobster (*Panulirus penicillatus*), a nearshore species.

Lobster was taken with nets set around rocks, snared with a pole to which a noose was attached or captured by hand. A rapid and substantial increase in Hawaii's population during the first decades of the twentieth century resulted in heavy fishing pressure and depletion of lobster resources adjacent to the more populated areas of the MHI. By the early 1950s the commercial catch of green spiny lobsters around the MHI had dropped by 75% to 85%. The depletion of the fishery resources in nearshore areas of the MHI encouraged Hawaii's fishermen to search for alternative grounds.

A NWHI lobster fishery was developed in the late 1970s. By then several commercial vessels, relocated from areas such as the US Pacific Northwest where crustacean overfishing was occurring, began full-scale lobster trapping in the NWHI. A number of smaller, multi-purpose boats also began fishing for spiny lobsters in the NWHI, combining that operation with bottomfish fishing. By the mid-1980s the NWHI lobster fishery was Hawaii's most lucrative fishery. Changing gear from wire to plastic traps led to significant catches of slipper lobster and an increase in fishing efficiency. From 1985 to 1987 the fishery targeted and largely depleted the population of slipper lobsters. In 1990 lobster catch rates dramatically declined, likely due to a climate-induced change in oceanic productivity throughout the NWHI, which also affected the abundance of reef fish, seabirds and Hawaiian monk seals. The decrease in lobster catch prompted the Western Pacific Council to establish a limited access program and fleet wide seasonal harvest quotas that significantly altered fishing operations. Vessels concentrated on trapping lobsters on the banks around Necker Island, Gardner Pinnacles and Maro Reef during the derby-style fishing season. From 1992 to 1997 Necker Island accounted for 48% to 64% of the total effort. In 1998 the quota was allocated among four fishing areas to prevent localized depletion of the lobster population at the most heavily fished banks and to encourage fishers to broaden the geographical distribution of their effort.

The NWHI lobster trap fishery is unique in the Western Pacific Region where other common spiny lobster species normally will not readily enter fish traps. Under the Western Pacific Council's Crustacean Fishery Management Plan, implemented in 1983, traps deployed in the NWHI lobster fishery must have escapement panels to allow the exit of juvenile lobsters. In the same year, the Council also amended the Crustacean FMP to specify the maximum dimensions of the trap funnel entrance, to minimize the risk the traps posed to protected monk seals in the NWHI. There were concerns that the traps may elicit the curiosity of monks seals, especially the pups, who might place their heads in the trap funnel, become trapped and drown.

The lobster harvest guideline is an example of implementation of the precautionary approach to fisheries management, as it uses an accepted level of overfishing risk to set the total exploitable population and then allocates 13% of that as the harvest guideline. Initially a minimum size limit of 5 cm tail width for spiny lobsters and 5.6 cm for slipper lobsters was established for the lobster fishery, along with a ban on the retention of berried females. However, observations on the gross mortality of discarded lobsters, both on deck and through predation, led to a Council decision in 1996 to permit a "take all" fishery in which all lobsters retained are counted against the annual quota. The Hawaii lobster fishery landed 261,000 pounds with an ex-vessel revenue of $1.2 million in 1999, which was the last year the fishery was active (Table 2).

The majority of the vessels participating in this fishery voluntarily deployed satellite VMS through which their location could be tracked and their daily catches reported. This allowed managers to monitor the progress of the fishery through "real time"reporting of catches and give immediate notice when the annual quota was reached.

While calculating the year 2000 estimates of exploitable population of lobsters in the NWHI, using the same analytical procedures used to estimate exploitable populations in 1998 and 1999, NMFS scientists expressed alarm at the increasing level of uncertainty in their computations. The scientists also noted a lack of appreciable rebuilding of lobster populations despite significant reductions in fishing effort throughout the NWHI. Given the shortcomings in understanding the dynamics of the NWHI lobster populations, the increasing uncertainty in model parameter estimates and the lack of appreciable rebuilding of the lobster population, in 2000 the Council recommended that NMFS close the NWHI lobster fishery as a precautionary measure.

The NWHI Coral Reef Ecosystem Reserve was established by Executive Order 13178 of December 4, 2000, and Executive Order 13196 of January 18, 2001. The NWHI Reserve boundary extends 3-50 nm around the NWHI except at Midway Atoll where the NWHI Reserve boundary starts at the outer boundary of the Midway Atoll National Wildlife Refuge and extends to 50 nm. The process to establish a proposed NWHI Sanctuary is underway and will consider a range of reasonable management alternatives related to the crustacean fishery.

4.4. Bottomfish and Seamount Fisheries

Bottomfishing is conducted in Hawaii and the three U.S. territories but is only of major significance in Hawaii, where it represents a fraction of total landed value of all catches (Table 2). Most bottomfish grounds in American Samoa, Guam, the Northern Mariana Islands and the MHI are within the 0-3 nm zone, although there are banks and seamounts such as Penguin Bank in the MHI that lie within or extend into federal waters. In addition, the NWHI represents a substantial area of bottomfishing grounds within Council's jurisdiction.

The Hawaii bottomfish fishery is a hook-and-line fishery that targets a range of snappers and groupers that live on the outer reef slopes, seamounts and banks of the MHI and NWHI at depths of between 50 to 200 fm. Bottomfish fishing was a part of the economy and culture of Native Hawaiians long before European visitors arrived. Native Hawaiians harvested the same deep-sea bottomfish species as the modern fishery and used some of the same specialized gear and techniques employed today. European colonization of the Hawaiian Islands during the early 19th century and the introduction of a cash economy led to the development of