STATE FISHERY REGULATIONS IN THE NORTHWESTERN HAWAIIAN ISLANDS

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ABSTRACT

Use of the fisheries and aquatic resources of the Northwestern Hawaiian Islands is regulated by numerous federal and state laws, rules, regulations, and policies. Certain federal acts protect fish and wildlife species by prohibiting unauthorized harvest; other acts promote conservation through control of different activities. For implementation, these acts generally require cooperation, coordination, and in some cases concurrence with state agencies. In Hawaii, aquatic resources are managed through statutes and rules. The Hawaii Legislature enacts fisheries-related state statutory provisions; others are effected through administrative rules promulgated by the Department of Land and Natural Resources through the state's administrative procedures process. Statutes and administrative rules embody the state's management and control of fishery resources, including those occurring in waters of the Northwestern Hawaiian Islands.

INTRODUCTION

The purpose of the tripartite agreement between state and federal agencies was to implement a cooperative, intensive 5-year survey to assess the living terrestrial and aquatic resources and their habitats in the Northwestern Hawaiian Islands (NWHI) and formulate a basis for resource management decisions. The cooperative nature of the agreement, and of many of the field studies conducted thereunder, is appropriate in view of the overlapping character of federal and state laws and policies that currently regulate the use of resources in this vast and remote area.
An example of a federal law emphasizing state and federal cooperation is the Coastal Zone Management Act of 1972 which, among other things, provides that federally proposed actions should be consistent with that of the state's program implemented for such matters as resource management. The Endangered Species Act of 1973 also emphasizes cooperative effort between state and federal agencies, especially in managing endangered and threatened species.

There also exist federal policies intended to clarify relationships between state and federal authorities responsible for fish and wildlife management. The Department of the Interior, for example, has established a policy, with attendant rules and regulations, "... to reaffirm the basic role of the States in fish and wildlife management, especially where States have primary authority and responsibility, and to foster improved conservation of fish and wildlife" (Federal Register, 1983). The National Wildlife Refuge System Administration Act of 1966 provides that "... The regulation permitting hunting and fishing of resident fish and wildlife within the system shall be, to the extent practicable, consistent with State fish and wildlife laws and regulations..." (Committee on Merchant Marine and Fisheries, 1975). In state law, provisions of Sections 187-6 and 187-7, Hawaii Revised Statutes, encourage the Department of Land and Natural Resources to cooperate with other agencies for enhancing aquatic life and wildlife values through mutually agreeable means, and to utilize federal aid funds as may be available for cooperative fish and wildlife restoration and management programs.

The philosophical basis for governmental management of fish and wildlife resources is that these resources are held in trust by the government for the people to enjoy, appreciate, and gain social, economic, and scientific benefits. Since such a function is not reserved to the federal government by the Constitution, the individual states generally exercise primary responsibility and authority for managing and protecting fish and wildlife within their territorial boundaries. Many states view the right to regulate use of fish and wildlife to be independent of ownership of particular parcels of land or waters, inasmuch as the resources themselves do not respond to human delineations of real property ownership. Just as the Magnuson Fishery Conservation and Management Act of 1976 allows federal jurisdiction of regional management councils to extend into state waters when resources under management are known to migrate freely between state and federally controlled areas, so, too, can states regulate use of resources in extraterritorial waters when those resources contribute to stocks within state jurisdictions. Also, this principle forms the basis for "landing laws" since it enables enforcement of state regulations at the point of landing, especially when the precise origin of the catch is often impossible to determine.
State fishery regulations are established procedurally in Hawaii through two mechanisms: enactment of statutes by the legislature and adoption of administrative rules by the Department of Land and Natural Resources. Generally, statutory provisions are broad and provide authority for administration action; administrative rules implement the statutes more precisely for establishment of regulating use of fishery resources through size and bag limits, open and closed seasons, gear restrictions, and other limitations which may apply statewide or within specific geographical limits.

With the exception of statutes and administrative rules that apply only to specific geographical areas, most of Hawaii's fishery regulations have statewide application. State controls over the fishery resources applicable within the NWHI include the following statutory and administrative provisions, below abstracted from Chapters 187 through 195D, Hawaii Revised Statutes and Department of Land and Natural Resources rules Chapters 13-28 through 13-124:

**General permit and license** requirements apply to commercial harvests and allow monitoring of the resources from the NWHI

First, each person taking marine life for commercial purpose must obtain a commercial marine license. Also required of each licensee is a monthly fish catch report used by fishery resource managers to monitor trends in commercial fishery harvests.

Second, in order to fish in the NWHI by methods otherwise prohibited statewide, a licensed commercial fisherman may obtain from the Department of Land and Natural Resources a NWHI fishing permit. Such a permit may exempt the fisherman from provisions such as closed seasons, size limits, and prohibited gear, subject to conditions imposed on a case-by-case basis to safeguard against depletion of NWHI resources.

**Bag limit** provisions serve to limit the rates at which resources are harvested, including

An individual may take a maximum of 50 moilii, 50 oama, and 15 moi per day.

Except for commercial use with a commercial marine license, no more than 20 ulua, papio, or omilu, in aggregate, may be taken by an individual per day.

**Size limit** provisions generally protect pre-reproductive organisms and direct effort to individual sizes that will provide appropriate benefits.

First, a fisherman may take an ulua, papio, or omilu only if it is at least 7 inches long.
Second, if taken for commercial purpose, each slipper lobster must weigh at least 1 pound, and each kuahonu and kona crab must measure at least 4 inches across or along its back.

Third, a spiny lobster may be taken only if it measures at least 3-1/4 inches in carapace length and may not be mutilated or de-tailed in the main Hawaiian Islands. For the NWHI, the minimum size established for taking is 3 inches in carapace length, or if de-tailed, 2 inches in width across the first segment of the tail.

Fourth, an opihī may be taken only if it measures at least 1-1/2 inches in shell diameter or 1/2 inch in meat diameter.

Fifth, taken for sale, aholehole and manini must be each at least 5 inches long; mullet, moi, weke, moana, and kumu must be each at least 7 inches long; awa, oio, kala, and opelu kala must be each at least 9 inches long; and opakapaka, ulaula, uku, ulua, papio, uhu, and squid must individually weigh at least 1 pound.

**Gear restriction** is used to prevent the indiscriminate killing of resources, or the wasteful taking of small or undersized specimens, including

Spears may be used to take any of the finfish or octopus just mentioned only if the resource meet the standards indicated for sale; under no circumstances may sea turtles, crustaceans, or aquatic mammals be speared, or taken with firearms.

Nets and traps may be used for fishing only if made of netting with stretched meshes measuring at least 2 inches, and if the traps are both portable and each measures at most, 10 feet by 6 feet by 6 feet. However, persons fishing for sport may use throw nets with stretched mesh of at least 1-1/2 inches, and any fisherman may use nets of at least 1-1/2 inches in mesh size to take akule or halalu. Baitfishermen with an appropriate license may also use smaller mesh nets to take certain bait fish species. Trap fishermen taking lobsters in the NWHI must additionally use trap openings no larger than 10-1/2 inches in greatest diagonal or diameter at the larger end, and no larger than 6-1/2 inches in greatest diagonal or diameter at the smaller end.

Electrofishing devices, explosives, and poisonous substances may not be used for fishing anywhere in state waters.
Gill nets which have been deployed in the water for fishing must be checked at least every 12 hours.

Certain crustaceans, while carrying eggs externally, are prohibited from being taken in the NWHI. These include the spiny lobster, slipper lobster, kuhonu crab, and kona crab that should be immediately released if observed to be bearing eggs on their abdomen.

"Threatened" and "endangered" species on the federal list are also afforded protection by state statutes and administrative rules. In NWHI waters, three species of sea turtles, the Hawaiian monk seal, and three species of whales are protected through state provisions that include their prohibited taking.

Seasonal closures are invoked to protect fishery stocks during predictable periods of particular vulnerability such as spawning or mass recruitment.

Kona crabs, spiny lobsters, and slipper lobsters, are protected against any harvest from state waters during the months of June, July, and August.

Mullet are protected during the months of December, January, and February.

Halalu and akule, if smaller than 8-1/2 inches long, are protected from netting during the months of July, August, September, and October.

In summary, fish and wildlife resources depend for their existence on habitats which may include private lands, public property, or both, and may pass freely from one to the other. Accordingly, to be effective, management provisions intended to protect, maintain, enhance, and control use of fish and wildlife resources often must cut across jurisdictional limitations of laws, rules and regulations, and personal desires of private landowners. It is therefore essential that involved parties cooperate in recognition of mutual interests and with mutual respect for divergent concerns, in order to coordinate effective management of fish and wildlife resources. Moreover, obtaining the full cooperation of resource harvesters in abiding with regulatory provisions as discussed, must be accomplished for the protection and conservation of living renewable resources.

REFERENCES

43(54)FRL1642(1983)

MANAGEMENT PLANS FOR FISHERY RESOURCES
IN THE NORTHWESTERN HAWAIIAN ISLANDS

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ABSTRACT

Five fishery management plans have been prepared since the Magnuson Fishery Conservation and Management Act (FCMA) of 1976 became operational. Each of these plans cover a variety of species that are grouped into management units on the basis of habitat similarities and on their susceptibility to capture with certain fishing gears. This paper describes the fisheries on each management unit and the management measures that are incorporated in the plans. In addition, this paper indicates how the plans are related to the NWHI and the degree of the relationship.

NWHI fisheries
federal fishery management plans
multi-species fisheries

INTRODUCTION

Five fishery management plans (FMPs) have been prepared for the western Pacific region since the Magnuson Fishery Conservation and Management Act of 1976 became operational. These plans cover a variety of species that are grouped into management units on the basis of habitat similarities and susceptibility to capture with certain fishing gears. The five units differ widely in the number of fishermen that participate in the fishery, in the type of gear employed by the fishermen to catch the management unit species, in the habitats where the management unit species live, and in the annual size and value of the catch.

A brief perspective of Hawaii's fisheries is presented below. Following this, each of the five fishery management plans that have been prepared by the Western Pacific Regional Fishery
Management Council (WPRFMC) and the National Marine Fisheries Service (NMFS) is outlined. In addition, how the plans are related to the NWHI is discussed.

There is always the temptation to compare the annual volume and value of fish landings made in Hawaii with those of mainland states, and then to compare the present contribution of fisheries with the state’s income. Such comparative imagery tends to discount the national significance of Hawaii’s fisheries. If such imagery is extended by limiting the state’s fishery to catches currently made by domestic fishermen only in NWHI waters, then the relative “significance” of the NWHI fisheries would border on trivia by, say, Californian of Alaskan standards.¹ In a way, it’s like dealing with apples and oranges when trying to compare the fisheries of Hawaii with those of mainland states. This is so because there is no good common denominator between oceanic islands and continental states to form a basis for comparison.

It is safe to say that many people would agree that there is value in the fisheries of the NWHI when weighed on an island’s scale. Otherwise, why would there have been a 5-year study?

PELAGIC SPECIES OTHER THAN TUNA

On the average, about 85 to 90 percent of the volume of commercial fish landings made in Hawaii are pelagic species. Of this relative amount, skipjack tuna (aku) roughly makes up about 50 percent of the annual commercial landings. Blue marlin, striped marlin, mahimahi, and wahoo (ono) are among the top 10 species in terms of the volume and value of annual commercial fish landings made in Hawaii, following the top three species -- skipjack, yellowfin, and bigeye tunas.

The prominence of skipjack tuna in the state’s commercial catch has diminished in recent years. Landings have steadily declined and continue well below the long-term average for 1964-79. Cumulative landings of the larger pelagic species (e.g., yellowfin and bigeye tunas, billfish, mahimahi, and ono), on the other hand, have increased significantly due to the growth of the small-boat handline and troll fisheries and the expansion of the state’s fish aggregation program.

In 1960, blue marlin contributed the largest percentage of the commercial troll landings followed by skipjack tuna, yellowfin tuna, ono, mahimahi, and striped marlin. Two decades later (in 1981) commercial troll-caught landings were led by yellowfin

¹Some world and continental fisheries are measured in hundreds of thousands of metric tons whereas the fisheries of Hawaii and many other Pacific islands are measured in hundreds or few thousands of metric tons.
tuna, followed by blue marlin, ono, mahimahi, albacore, skipjack tuna, and striped marlin. The fact that yellowfin tuna has displaced blue marlin as the top commercial species caught using trolling gear can be partially explained by the price increase of sashimi-quality tunas that can command $5 per pound in the round. It can perhaps also be explained by the apparent decline in the abundance of blue marlin in the Pacific. Catch rates of blue marlin taken on foreign longline gear in the fishery conservation zone (FCZ) surrounding Hawaii have declined significantly since the early and mid-1960s.

The commercial fishing license forms issued by the Division of Conservation and Resources Enforcement of the Hawaii Department of Land and Natural Resources indicate that roughly about 200 vessels and 240 fishermen trolled commercially during fiscal year 1981-82 and that about 1,000 vessels and 1,000 fishermen fished commercially at least sometime combining trolling with other types of fishing. Very little commercial trolling is done in the NWHI. Much of the fishing is done within 20 to 25 miles of the main islands. However, in recent years, albacore trollers have also trolled for ono, mahimahi, and yellowfin tuna in the NWHI prior to landing their catches in Hawaii. Also, an increasing number of bottomfishing vessels have been trolling the bank areas for ono, mahimahi, and yellowfin tuna on their run back from the NWHI to deliver their catches for sale in Honolulu's growing fresh-fish market.

The domestic tuna longline fishery captures the larger species of pelagic fish. Occupying a prominent position in Hawaii's fishery in the early 1950s, the fleet steadily declined in the 1960s and 1970s to about 15 to 20 vessels. However, the fleet has made a strong rebound during the past 2 years. At present there are about 30 vessels that longline on a regular basis. A few of the boats that are new to the fleet are quite large, about 70 to 80 feet long. Most of the domestic longline fishing is done within 100 miles of the main islands, but some of the newer, larger vessels venture out to 200 miles or farther from Honolulu. The catches made by this fishery bring in exceptionally good prices. The fish are sold fresh mostly to the sashimi markets in Hawaii, the mainland, and even Japan. The price incentives have lured an increasing number of albacore boats to outfit themselves with longline gear and fish for sashimi-grade tuna during the off season for albacore.

The pattern of domestic fishing nearer to the main Hawaiian islands contrasts sharply to the pattern of foreign longlining in the NWHI in the recent past. For the average of the 5-year period, 1973-77, about twice as much fish was taken by the foreign longline fleet in the NWHI than in the FCZ waters of the main Hawaiian islands. This was to be expected since the NWHI are nearer to the home ports of the foreign fleets, since the FCZ waters in the NWHI are significantly larger than those surrounding the main Hawaiian islands, and especially since one of the world's best fishing grounds for bigeye tuna, a premium market
species in the sashimi trade, is within the FCZ of the NWHI and just north of it.

Seventy-five percent of the foreign longline catch made in the U.S. FCZ surrounding the Hawaiian islands during the winter is taken in the NWHI portion of the zone. Striped marlin and swordfish account for over 90 percent of the billfish catch, whereas bigeye and albacore tuna dominate the winter catch of tuna. However, during the summer when the domestic fisheries are most active, the foreign longline fishery directs its focus away from the waters of the NWHI to the waters of the main Hawaiian islands.

Historical foreign longline statistics reveal an apparent marked seasonal variation in abundance among the billfish, with striped marlin generally occurring in greater numbers during the winter and blue marlin during the summer. The seasonal variations in species composition are dependent upon the movements and local abundance of the fish. Both of these factors may be influenced by a number of environmental factors such as sea surface temperatures and the relative availability of prey. It appears, in general, that striped marlin and bigeye tuna (winter fish) may be responding to a different set of environmental factors than the blue marlin and yellowfin tuna which are mostly summer fish.

The foreign longline fishery has been inactive in Hawaiian waters since April 1980. Foreign fishermen claim that onboard observer requirements, check-in and check-out procedures, and other "onerous" requirements of the Preliminary Management Plan (PMP), which was implemented then, prevent them from economically fishing in the FCZ. Picking up an observer, according to foreign longline fishermen, does not make much economic sense when length of fishing of the average Japanese longliner in the FCZ was only 5 days in 1979. Foreign longline fishermen dip in and out of the FCZ to follow the fish.

Having discussed the fishery and fishermen, attention will now be turned to the WPRFMCS fishery management plan for billfish and other pelagic species. The PMP that the WPRFMCS has prepared for pelagic species is relatively uncomplicated. The management program proposed would establish areas and season in which foreign longlining would not be permitted. Under the proposal for Hawaii, foreign longliners would be allowed to fish up to 100 miles of the NWHI year-round and up to 100 miles of the main Hawaiian islands during the winter months, November through February. During summer months, foreign longliners would be prohibited from fishing in the FCZ around the main islands. Foreign longline vessels would also have to obtain permits, submit catch and effort data as under the PMP, and carry observers when so directed by the regional director of the National Marine Fisheries Service acting under the advice and counsel of the WPRFMCS. There would be no catch or effort restrictions on domestic fishermen, but they would be encouraged to keep records and their
catch would be sampled periodically to monitor catch levels and rates.

The underlying rationale for the area closures to foreign longline fishing around the main Hawaiian islands is to protect domestic fishermen by increasing the probability of transfers of billfish, mahimahi, ono, and inevitably tunas to domestic fishermen. There is a wide-held belief that catch competition or catch interaction effects exist between the domestic and foreign fisheries that capture billfish. Keeping foreign longlining out of the FCZ of the main Hawaiian islands during the months when the domestic fisheries are most active makes a lot of sense. Foreign fishing would be allowed up to 100 miles of the main Hawaiian islands during the "off season" for domestic trollers and hand-line fishermen. Foreign longlining up to 100 miles of the NWHI would be allowed year-round, thus making a good portion of the traditional fishing grounds for bigeye tuna also available to foreign fishermen.

There has been major difficulty in trying to balance the needs of various domestic and foreign participants in the fisheries for highly migratory pelagic species. Both the PMP and the proposed FMP, out of legal necessity, are based on an artificial distinction between one set of migratory fish in the management unit and a second set of "highly migratory species" legally defined as all tunas. This is the root of the problem. Trying to manage the pelagic fisheries by ignoring its largest component (the tunas) is unproductive and self-defeating in the long run.

The WPRFMC would like to see U.S. policy changed to include the tunas within the management planning purview of the regional councils. It recognizes that the area and season closures for foreign longlining proposed for species of billfish, mahimahi, ono, and oceanic sharks have a bearing on the U.S. posture when negotiating with nations in the eastern Pacific and elsewhere with respect to tuna fishing. It has considered both the positive impacts on the domestic fishery for pelagic species stemming from the proposed management scheme and possible ancillary impacts on distant-water tuna fisheries, both foreign and U.S. alike. A balancing of national interests is being sought.

**SPINY LOBSTER**

In contrast with its fisheries for pelagic species, the Hawaii spiny lobster commercial fishery is much smaller in terms of harvests, the number of fishermen that participate, and where the fishery is conducted. By far the most significant emphasis in commercial fishing for spiny lobster has been directed at the NWHI. Although for many years commercial catches have been made around the main Hawaiian islands by fishermen using tangle-nets as well as by trap fishermen capturing a wide variety of fish species, they generally do not specifically target spiny lobsters. Commercial lobster trapping operations have increased in
the main Hawaiian islands in recent years, but the levels of present and potential harvests there are and will continue to be way below the harvest levels of the NWHI. This is because there are fewer spiny lobster habitats in the main Hawaiian islands compared with the NWHI.

The distant-water commercial fishery for spiny lobsters expanded rapidly soon after research cruises by NMFS during 1975 demonstrated the presence of commercial concentrations around Necker Island and a few other locations in the NWHI. In 1977, 72,000 pounds were taken in the NWHI. The live, whole lobster market in Hawaii could not absorb this quantity, thus the fishing operations shifted to at-sea de-tailing and freezing of lobster tails for export. In 1979, 100,000 pounds of lobsters (round weight) were landed. In 1980, total landings shot up to 400,000 pounds (round weight). Landings continued to increase in 1981, when 10 vessels participated in the fishery, including three large vessels which entered the fishery in 1980. Landings were reduced to about 300,000 pounds (round weight) in 1982 when the larger boats left the fishery. Today, there are fewer boats in the fishery than in 1981. They are smaller, carry fewer traps, and make fishing trips of shorter duration than previously. From the beginning, the fishery has been characterized by a high turnover of participants probably because it has not produced income up to the expectations of the entrants. The simple fact is that the lobster resources are limited. Even the most optimistic projections of yield do not foresee the NWHI's spiny lobster fishery becoming very large compared with many of the world's other lobster fisheries. The potential annual average harvest of between 200,000 and 400,000 individuals simply will not support many vessels.

Any single-species fishery which involves travel to distant waters, and in which areas of proven concentrations are few, is economically risky. One of the major objectives of the Spiny Lobster Fishery Management Plan is to provide a stable fishery in which vessels can earn an income while exploring other fishery opportunities that are needed to diversify the resource base. This pattern is becoming more common now with a few boats combining lobster fishing with other fisheries. Economic projections in the WPRFMC's plan suggest that after initially high catch rates in the "virgin" lobster fishery are reduced, the relatively low density of NWHI's lobster populations will make it difficult, if not impossible, to achieve the scale of production large vessels need to recover operating costs, particularly with rising fuel prices and large quantities of fuel needed to travel long distances. This is why the larger boats have left the fishery and why more and more smaller boats are diversifying their operations into multi-species fisheries. Although there probably are some unexploited lobster stocks in the northern reaches of the NWHI, fishermen are currently harvesting lobsters in the southern and middle areas to keep operating costs down.

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The population density of spiny lobsters in the NWHI is low in comparison with that of similar fisheries in areas of the world having continental shelves. The marked increase in lobster trappings in the early 1980s caused concern that the NWHI's lobster resources could be reduced to a level which would no longer support commercial fishing. Sustained biological damage to the lobster resource was, however, considered unlikely because declining catch rates would bring an end to the lobster fishery for economic reasons long before irreversible depletion of the lobster stock could take place.

The WPRFMC initiated research and planning for a spiny lobster FMP in 1977, but it took 3 years to reach agreement on the management measures for the fishery. The final plan was submitted for approval in 1981, but questions raised by NMFS about the interactions between the spiny lobster fishery and the monk seals delayed the plan's approval. Questions raised by the Hawaii Coastal Zone Management Program about the consistency of federal and state lobster fishing regulations also delayed implementation of the plan. The result has been a delay of a complete compilation of catches made in the fishery in recent years.

The CZM consistency problems will probably be solved soon through an amendment to the plan that extends the state's regulations for spiny lobsters to cover U.S. FCZ waters surrounding the main Hawaiian islands. Without the proposed amendment, the state would have difficulty prosecuting fishermen caught with undersized lobsters if the fishermen claimed that the catch was made in the FCZ surrounding the main Hawaiian islands rather than in state waters. The amendment to the plan closes this loophole.

The Spiny Lobster FMP for NWHI FCZ waters is now a reality. It was officially adopted on March 9, 1983. The regulations require a lobster fishing permit for federal waters and catch reports from fishermen. The regulations establish a minimum carapace length of 7.7 cm, gear restrictions on commercial fishing, and closures to lobster fishing in areas shallower than 10 fathoms and within 20 miles of Laysan Island. The areas closed to fishing will act as reserves from which recruitment to the lobster population can occur and also as buffer zones between the fishery and populations of "endangered" monk seals and "threatened" green sea turtles. Lobster trap opening dimensions are restricted to reduce the risks of monk seal entrapment. The state of Hawaii is currently amending its NWHI spiny lobster regulations to conform to the federal regulations.

Since much of the present spiny lobster catch goes to the frozen tail market, the FMP incorporates a tail width minimum size of 5 cm which statistically corresponds to the 7.7-cm carapace length measure, but a 15 percent tolerance factor is allowed. As with the state's regulations, the retention of egg-bearing lobsters is prohibited.
The FMP establishes an "optimal yield" or a potential annual harvest of spiny lobsters of between 200,000 and 400,000 "legal" animals. The range is not a quota, nor is it a harvest target or a harvest guarantee. The range is simply the best estimate of harvests that can be sustained in the long-run with other existing management measures. The potential harvest of between 200,000 and 400,000 lobsters is WPRFMC's best estimate of the "equilibrium yield" after the virgin stock is reduced. Simply put, the absolute level of harvest is immaterial, if reproductive capacity is protected through the conservation measures outlined above. To make it complete, the plan recommends a research program to collect data to better define the life history parameters of the spiny lobster and to better monitor the status of lobster stocks, as well as to assess the effectiveness of the regulations in conserving lobster stocks. The rules are designed to keep the new industry from depleting the lobster population.

BOTTOMFISH SPECIES

Hawaii's multi-resource fisheries -- the fishery for bottomfish species, including snappers, groupers, and jacks (or ulusas) -- form the basis for a small but locally important fishery in Hawaii. Some of these bottomfish are among the most valuable species in Hawaii. Some elements of the small-boat and medium-sized boat fisheries in Hawaii rely heavily upon sustained catches and incomes derived from harvesting bottomfish as a component of multi-species, multi-gear operations. The fishery includes commercial as well as substantial recreational components.

Traditional deepsea handline gear accounts for over 80 percent of the reported commercial catch of bottomfish species. Trap and bottom longline catches make up the remaining commercial catches. A few commercial bottomfish fishermen have found bottom longlining to be productive. Deep-water longlining and trapping are almost exclusively commercial undertakings because of the costly investment in gear.

About 33 percent of the 2,000 or so commercially licensed fishermen in Hawaii report using handline gear. Most of this group are made up of part-time fishermen who fish fewer than 50 days per year and who use other gear combinations like trolling in addition to deepsea handline gear. A small fleet of commercial fishing vessels (about 20 boats) which regularly fish for bottomfish operates out of Kewalo Basin on Oahu and Maui ports. They generally use larger, more seaworthy vessels than those operated by part-time commercial and recreational fishermen, and they have the capability to fish during periods of rough seas which severely restrict the operations of the smaller boats.

In the small-boat fishery for bottomfish around the main Hawaiian islands there is a tendency for nearby stocks to be fished much more intensively than distant-water stocks, and the past history of the bottomfish fishery in Hawaii has shown that
as each nearby location is subjected to heavy fishing, the catch rates decline and the boats move into other, more productive grounds. The long-lived, slow-growing species which characterize the bottomfish assemblage are more susceptible to stock reductions than are shorter-lived, faster-growing pelagic species. The potential habitat satisfying the depth requirements of bottomfish is very limited in Hawaii due to the narrowness of the shelf areas around the islands because the steep-sloping submerged portions of volcanic islands and atolls are close to shore.

The capacity for self-regulation of fishing pressure in the bottomfish fishery is rapidly diminishing. Fishing pressure is increasing as a consequence of (1) rising demand and prices for select bottomfish species which have gained great popularity in the tourist industry; (2) expanding export markets for fresh island-caught bottomfish; (3) an increasing number of recreational and part-time fishermen who have acquired the gear and skill to compete with commercial bottomfish fishermen; and (4) increasing use of large vessels (by Hawaii standards) to gain access to distant-water bottomfishing grounds, and re-outfitting of albacore vessels with bottomfishing gear to give them a fishing opportunity during the off-season for albacore.

Overall the bottomfish stocks near the main Hawaiian islands are thought to be fully exploited or near fully exploited, and some nearby stocks of opakapaka and possibly onaga are considered to be overfished. In direct contrast, the bottomfish stocks in the NWHI are considered to be underfished with a sustainable annual yield estimated to be worth a few million dollars. Without development of a multi-purpose, distant-water fishery, the fishing industry in Hawaii will lose commercial fishermen. The quantity of bottomfish marketed in Hawaii will decline sharply, bringing about extremely high prices for the limited quantities harvested around the main Hawaiian islands. The high price would then induce more part-time fishermen to put further pressure on already reduced stocks in the main Hawaiian islands, making the present-day management problems worse.

Although the immediate risk of overfishing bottomfish stocks in the NWHI depends on future developments, primarily in marketing, there could be a future economic incentive to overfish these resources. The WPRFMC is taking the framework approach in drawing up its fishery management plan for bottomfish. This approach essentially establishes a procedure in which certain conditions in the fishery would trigger a WPRFMC decision to reduce harvest levels of particular species, while increasing the monitoring and assessment of stock conditions for commercially important bottomfish species according to a previously developed program in the FMP. The snapper-grouper-jack complex is considered a management unit because there is overlap in the habitat of individual species, but there is no evidence of strong biological interdependence among individual species. Bottomfish species are generally not harvested together by commercial fishermen, but rather are
targeted by specific localities, bottom habit, depth, seasonality resulting from spawning aggregations, current conditions, and price discrimination by species. It is believed that individual species can be targeted by commercial fishermen with little incidental catch, thus a species-by-species approach may be the least complex form of management.

Whenever the size structure of the catch indicates that a species is in or nearing the range of biological stress, the WPRFMC will decide if continuation of overfishing is justified on social and economic grounds and may restrict the harvest of that species by whatever method it selects provided that the method meets the national standards test embodied in the FCMA. Whenever monitoring of the size composition of the catch indicates that a species is not in or not approaching the range of biological stress, the species will be placed in a no action category until an in-depth analysis of overfishing can be performed. The remaining species in the bottomfish complex would be nonpriority species, and no individual species regulation would be necessary.

SEAMOUNT GROUNDFISH

The seamount fishery is carried out entirely by foreign trawlers and longline vessels. At various times, vessels of the USSR, Japan, Korea, and Taiwan have fished inside the FCZ north of Kure Atoll. The USSR was the first nation to commercially exploit the resources of this area. In November 1967, a Soviet commercial trawler discovered large concentrations of pelagic armorhead on the Emperor Seamount chain, and a large-scale fishery was initiated. Japanese trawlers of 1,500 to 4,000 gross tons entered the fishery in 1969. Their initial effort was mostly exploratory, but they set the stage for full-scale commercial operations by 1972. To assist in the development of the fishery, Japanese research vessels conducted extensive surveys in the 1972-74 period to determine the distribution of pelagic armorhead and alfonsin and their potential for development. They explored the central North Pacific for uncharted seamounts, described the topography and profile of known seamounts, and collected oceanographic data in the vicinity of the seamounts. The results of these surveys showed that the only seamounts suitable for trawling are located at the southern end of the Emperor Seamount chain, beginning with Kinmei Seamount and extending south-southeast to Hancock Seamounts in the U.S. FCZ.

In January 1977, the National Marine Fisheries Service put into effect a preliminary fishery management plan which regulates foreign fishing for groundfish on the Hancock Seamounts, which are located inside the U.S. fishery conservation zone. The regulations temporarily restrict the foreign fishery to a 2,000-MT annual catch quota by trawling or bottom longlining and to 60 vessel days of total effort. In addition, they establish a licensing procedure for foreign vessels and require the submission of detailed catch and effort data and the placement of U.S. observers on any foreign fishing vessel.
Under the plan, Japan and the USSR were each allocated 1,000 MT of seamount groundfish for 1977. In May 1977, a Soviet trawler was apprehended and cited by the U.S. Coast Guard for trawling in the Hancock area in violation of regulations defined in the plan. In recent years, Japan and Taiwan have each been allocated 1,000 MT. The Japanese allocation of seamount groundfish has never been fully taken, and the Soviet and Taiwanese vessels are not known to have fished inside the FCZ since implementation of the plan.

The plan does not prevent domestic vessels from harvesting seamount resources. No U.S. fishing vessels currently harvest or have ever harvested seamount groundfish in the central North Pacific, although the NOAA vessel *Townsend Cromwell* has conducted exploratory trawl and handline surveys there as part of the tripartite-Sea Grant Northwestern Hawaiian Islands investigations.

Considering the limited summit areas of the Hancock Seamounts, the number of domestic vessels which can be supported by the armorhead-alfonsin resources of the FCZ would be small. Although the foreign quota for armorhead-alfonsin resources inside the U.S. fishery conservation zone has been small, the data collected by U.S. observers in the 1978-81 period indicate that the catch rate of the Japanese trawler which fished there earliest in each year was invariably higher than that of the second vessel. Should domestic vessels enter the fishery, it would be advisable to reduce the annual Japanese allocation from 1,000 MT to a lower level in order to protect the first opportunity to the resource for U.S. fishermen. Available data suggest that the annual harvest quota imposed by the preliminary fishery management plan has been somewhat successful in allowing the Hancock Seamount stocks of armorhead and alfonsin to recover from heavy fishing prior to 1977. Catch rates at the Hancock Seamounts have generally improved since 1978, despite sustained heavy fishing outside the FCZ.

The economically more desirable alfonsin are a minor constituent of trawl catches. The large alfonsin inhabit rough bottoms which are not suitable for trawling, even with advanced techniques and gear. The principal fishing method for alfonsin is bottom longlining, and in 1972 or 1973, the Japanese initiated this type of fishery on Milwaukee Banks and other central North Pacific seamounts. Since that time, vessels from Korea and possibly from Taiwan have reportedly joined the bottom longline fishery. The vessels, ranging in size from 180 to 340 tons, make trips of up to 4 months duration to the central North Pacific grounds.

Catching alfonsin rather than less valuable species is said to require some degree of experience, which the Japanese have gained through fishing in home waters for over 30 years. Although alfonsin are widely distributed in the central North Pacific seamount chain, fishing is productive only in selected

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areas. Alfonsoni which has been quick-frozen onboard Japanese stern trawlers' and bottom longline vessels is sold as sashimi in Tokyo's Tsukiji fish market. They are sold in size-segregated lots, and the Tokyo buyers apparently prefer large fish.

Armorhead and alfonsoni taken in the Japanese seamount trawl fishery are headed, gutted, and frozen onboard the larger stern trawlers (1,500 to 4,000 ton class) which operate in the central North Pacific and Bering Sea. The heads and viscera are processed in fish meal factories onboard vessels. Those vessels lacking a fish meal plant discard all non-commercial species, as well as small alfonsoni which have been damaged by long trawls.

As with other pelagic species it is unrealistic to attempt assessments for the Hancock Seamount stock of groundfish in isolation from the remainder of the central North Pacific seamount fishery resources. A cooperative effort between Japanese and U.S. fishery scientists will be necessary to determine stock recruitment relationships and maximum sustainable yields of the regionwide stocks. It is likely that truly effective resource management will be achieved only through an international agreement.

The impact of the foreign groundfish fishery on the precious coral stock at Hancock Seamounts is being adequately monitored by U.S. observers which accompany Japanese trawlers.

PRECIOUS CORALS

The management plan for precious corals covers domestic and foreign fishing in the FCZ. Six beds of precious corals have been located in the Hawaiian island chain, three of which are in the NWHI: (1) the 180 fathom bank, north of Kure Atoll; (2) Brooks Bank, near La Perouse Pinnacle; and (3) the WES PAC bed between Nihoa and Necker. The estimated area of these three beds of precious corals is less than 4 km².

The plan and regulations define areas around beds within which selective harvesting gear is required. These are the "established" beds, all in the main Hawaiian islands, which have been surveyed and for which estimates of maximum sustainable yield are reasonably precise. Only selective gear (submersibles or remote-controlled harvestor vehicles) is permitted in established beds. The known beds in the NWHI are labeled "conditional" beds. These are beds for which yields have been estimated by comparing their relative size to established beds and prorating yields on the assumption that ecological conditions at established beds are representative of all other beds. Unexplored portions of the FCZ in which coral beds are almost certain to exist are called "exploratory permit areas." Both selective and nonselective gear are permitted at the conditional beds and exploratory permit areas subject to a quota limitation on harvests. An exploratory area quota of 1,000 kg has been established to encourage the exploration and discovery of new
beds and to preserve an opportunity for low-investment dredge equipment in the fishery. A new bed located by exploratory fishing will become a "conditional" one when sufficient data have been collected to estimate the size and yield from the bed. A single "refugia" bed, the WESPAC bed, has been set aside to serve as a baseline study area and possible reproductive reserve. No coral harvesting is permitted in the refugia.

No domestic fishermen are known to have ever fished for precious corals in the NWHL. In 1965, Japanese coral draggers discovered a very large bed of precious corals in international water on the Milwaukee Banks of the Emperor Seamounts some 750 km northwest of Midway. And the race was on. In 1980, the "Midway" area produced 94 percent of the world's population of precious coral, but only about 10 percent of the grounds lie inside the U.S. 200-mile zone in the Hancock Seamount area. In 1981, there were 21 violations of the U.S. fishery conservation zone by Japanese and Taiwanese vessels. The U.S. State Department formally protested these incidents to the governments of Japan and Taiwan. No violations of the FCZ were recorded by the U.S. Coast Guard in 1982 although some fishing apparently did occur in the Hancock Seamount area according to Taiwanese fishermen. At the present time a quota of 1,000 kg exists for all species of precious corals in each of the FCZ exploratory areas of the different islands served by the WPRFMC. U.S. law requires that the surplus be made available to foreign fishermen. Approximately 40 to 50 vessels might be expected to fish on the high seas on the Midway grounds in 1983. To date, several foreign firms and one domestic firm have expressed interest in obtaining permits to fish the Hancock Seamount area where good quality coral is still found. Several foreign firms are interested in establishing a base in Honolulu in order to save fuel and crew costs for the long transit between Midway and Japan. The WPRFMC will explore the possibility of establishing a joint venture between a Japanese or Taiwanese firm and the domestic precious coral industry.

Management of the precious coral fisheries in the Pacific is a difficult problem because much of the resource exists in international waters. Conservation and management of precious corals could be handled through bilateral or multilateral approaches involving the WPRFMC, Taiwan, and Japan. The U.S. could seek to preserve the Midway-Emperor Seamount precious coral resources by entering into a multilateral treaty for their management under the common heritage principle. Articles of the Law of the Sea treaty urge agreement on measures for the conservation of living resources that occur both within the 200-mile exclusive economic zones and in areas beyond. In June 1982, the WPRFMC requested that the U.S. State Department look into the possibility of multilateral arrangements for managing precious coral fisheries in the Pacific. The WPRFMC is waiting for the State Department's thoughts and impressions on the need and workability of regional fishery management agreements for precious corals in the areas served by the WPRFMC and the adjacent high seas.
The abundance of precious corals on the Milwaukee Banks just northwest of the U.S. FCZ of the Hawaiian islands suggests that NWHI waters harbor more precious coral aggregations than the waters surrounding the main islands.

SUMMARY

The immediate role of the WPRFMC with respect to the fisheries of the NWHI, whether for precious corals, lobsters, bottomfish, seamount groundfish, or migratory pelagic species, is to promote development within the sustainable limits of the resources. The importance of the NWHI for fisheries development is paramount. Simple geography tells us that. One cannot expect to develop a fishery based in Honolulu when major stocks of albacore tuna, seamount groundfish, bigeye tuna, and smaller stocks of bottomfish, precious corals, and spiny lobster are 1,000 miles or more away from Honolulu. Opening portions of the NWHI for fisheries support purposes would appear to be essential for developing multi-species fisheries opportunities for domestic fishermen in the central and western end of the Hawaiian Archipelago, while at the same time decreasing the pressure on some overfished stocks in the main Hawaiian islands.
MANAGEMENT OF THE HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE

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ABSTRACT

Management of natural resources on federal lands demands accountability to the public. Yet, public "opinion" is not easily defined nor are differing opinions easily reconciled. Management decisions are further complicated when predictive capability is limited by the absence of relevant scientific data. Tripartite-Sea Grant studies in the Northwestern Hawaiian Islands (NWHI) provided data indicating the potential harvestability of various fishery resources, the anticipated direct and indirect effects of fishery development on fish and wildlife, the unique values of NWHI ecosystems, and the interrelationships of terrestrial and marine species and their habitats. These studies also demonstrated the need to apply an ecosystem approach to resource management acknowledging that fish and wildlife and the human activities that affect them have little regard for institutional boundaries.

With this in mind, the U.S. Fish and Wildlife Service's (FWS) future role in the NWHI will address management needs both within and outside refuge boundaries, through the continuing cooperation of other agencies. Outside refuge boundaries, FWS will continue it's efforts to influence activities that jeopardize fish and wildlife and their habitats. Cooperative work on migratory birds and endangered species on Midway Islands and Kure Atoll will continue. Within refuge boundaries, wildlife populations will be closely monitored to document natural fluctuations and to assess the effects of fishery development. Methods to detect the presence and prevent the establishment of exotic pest species will be developed and tested. Access to refuge lands and waters will be controlled to minimize unnecessary disturbance to wildlife. Cooperative research programs will focus on species in jeopardy.
FWS's educational program will expand. The scheduling, ranking, and development of details for these and other programs will be a major focus of FWS's refuge master planning project, scheduled to begin immediately. Master planning for the Hawaiian Islands National Wildlife Refuge will ensure application of national policy, provide a basis for future budgeting, establish long-range management strategies, and provide continuity in refuge management. Public input will be assured throughout the planning process.

ecosystem  National Wildlife Refuge
master planning  resource management
endangered species  Northwestern Hawaiian Islands

INTRODUCTION

I have a distinct advantage over other speakers in that I have had the opportunity to hear all the presentations before my turn to participate in the tripartite-Sea Grant symposium. We've all heard some fascinating information about this unique part of the world we call the Northwestern Hawaiian Islands. We've heard about the terrestrial ecosystems that support unique assemblages of land birds, insects, and plants; diverse and abundant seabird populations; and monk seals and turtles that congregate to breed on small spits of land, but range widely in search of food. In the marine environment area, we've heard about the evolution of coral reefs and the Darwin Point, variation in reef fish and coral diversity and abundance along the archipelago, and the trophic relationships within the atoll ecosystem. Overall, we've learned through our combined efforts that the NWHI present unique potential for even greater understanding, a baseline or barometer against which to assess similar ecosystems around the world. Finally, we've also learned that only through continued study can we develop the tools to correct or reverse the disturbing trends in population and habitat condition that reflect former abuses.

In reflecting on what we have learned, I find it interesting to speculate on how we might interpret this information differently had the impetus for the tripartite-Sea Grant study been different. The driving force for the study was the desire to exploit: to determine if there was an economically harvestable fishery resource and, secondarily, to evaluate the possible effects of that harvest on other resources. What if the driving force had been the desire to seek a greater level of protection and recognition for the unique fish and wildlife resources of the NWHI, and only secondarily to determine how this protection might affect the development of commercial fisheries? Although this sounds like a semantics exercise, it's actually easy to see how this might have come about, perhaps during consideration of research natural area, wilderness area, or critical habitat designation. The important point to recognize is that the interpretation of scientific data cannot be entirely independent of
the perspective from which it is viewed. Both of the perspectives I have described are legitimate in their own right and should be fully considered in resource management planning.

Management of natural resources is an awesome responsibility. I find myself accountable to the public, to the resource, and to my own conscience. I am lucky enough to work for an agency with whom I share resource management philosophies, so my conscience can be satisfied relatively easily. It's also easy to convince myself that I am doing right by the resource, based upon the application of proven management methods. Only my accountability to the public is difficult to reconcile. Just who is this "public" that I'm accountable to? The "public," in fact, manifests itself in the form of a diverse body of opinion on how I should be doing my job. This opinion is not static in time nor is it always predictable. What is predictable is the fact that most often opinion is expressed as criticism, perhaps because those who are satisfied with the way things are going have other more pressing issues to worry about. My life on the job became easier when I accepted the fact that I could not satisfy all the varied desires and objectives of the public and still make amends to my conscience and the wildlife resource I am obligated to manage. It also helped to realize that public "opinion" is also manifested in the laws and regulations passed by elected officials, in spite of the fact that these mandates often seem to be in conflict with the most vocal constituency.

In making resource management decisions, it is also a given fact that one is inevitably forced to deal with less information than might be wanted or perceived to be needed. Stated another way, the outcome of future events is always predicted with uncertainty, sometimes far more than others. The purpose of the tripartite-Sea Grant study was to reduce uncertainty but it was clearly not feasible to eliminate that uncertainty altogether. In spite of the vast amount of data collected in this study, there still remains enough uncertainty to fuel a debate regarding the abundance and harvestability of certain fisheries, the anticipated impacts of expanded fishery development on various wildlife resources, and the effect of potential management actions, such as critical habitat designation, on fishery development.

SUMMARY OF STUDY RESULTS PERTAINING TO REFUGE MANAGEMENT

With that introduction behind us, let's review the study results without consideration of the original study objectives and see what we have learned. If I generalize I can summarize the results that are most relevant to refuge management in eight separate statements:

1. Certain fisheries outside refuge boundaries appear to have substantial potential for expanded commercial development, while others appear to hold less promise than anticipated.
2. The condition of refuge fish and wildlife and their habitats still reflects the direct and indirect effects of historical commercial resource utilization and other human activities in the NWHI.

3. Several of the proposed fisheries in the NWHI are unlikely to directly affect refuge wildlife. Yet, some conflict resulting from fishery development through the food web and through indirect habitat alteration is inevitable. The degree of conflict will likely vary when different wildlife species and their habitats are compared. In the case of seabirds, effects are anticipated to be localized and focused on a few species, depending upon which fisheries are developed. Effects on turtles and seals will likely be indirect, given appropriate fishery management measures, but certain subpopulations are particularly vulnerable through subtle effects of disturbance and habitat alteration. Terrestrial ecosystems are highly vulnerable to rapid and irreversible alteration, but risks associated with fishery development appear to be manageable, given sufficient user cooperation.

4. Terrestrial and marine ecosystems of the NWHI present unique opportunities for study, both as undisturbed areas and as sites whose history of human intrusion is well documented.

5. Terrestrial and marine ecosystems of the NWHI are inextricably linked without regard for refuge boundaries or other institutional considerations. Thus, security and well-being of refuge fish and wildlife cannot be ensured if waters and resources outside the refuge boundary are not properly managed.

6. Refuge fish and wildlife populations and their habitats are subject to natural fluctuations independent of fishery-related activities, both for reasons that have been documented and for reasons unknown. Some populations are increasing while others have experienced substantial declines.

7. Fishery-related impacts and problems unrelated to fishery development that affect refuge wildlife are additive, and potentially synergistic, in their effects.

8. Anticipated fishery-related impacts and the unrelated refuge resource problems can, to varying degrees, be monitored and mitigated.
REFUGE MANAGEMENT CONSIDERATIONS

Reflecting on this oversimplified summary of results, one can begin to see the complexity of the resource management issues surrounding the Hawaiian Islands National Wildlife Refuge (HINWR). This is not your everyday refuge. In fact, there are very few like it in the National Wildlife Refuge System (NWFS), and virtually all of those few that are at all similar are found in the Hawaiian and Pacific islands NWR complex. This refuge supports more threatened or endangered species (6) than most others and it is the only one in which the entire range of one or more listed species is confined to the refuge. The HINWR also has the dubious distinction of being the only refuge in the NWRS in which the extinction of wildlife species has been documented, and this refuge lost three. Together with the Aleutian Islands NWR, this refuge also supports a larger and more diverse nesting seabird population than all others in the NWRS.

So what has all of this got to do with the management of refuge fish and wildlife resources? Quite a lot, actually. The unique characteristics or attributes of the HINWR, as reflected in the results of the tripartite-Sea Grant studies, must be fully considered. I'll address a few of these characteristics and how they affect the evolution of site-specific management plans. Both biological characteristics and other more practical considerations are involved.

Endangered Species

The fact that six listed species inhabit refuge lands and/or waters is a significant factor in resource management. Among the interrelated characteristics of most listed species that inhibit recovery are the restricted or fragmented distribution, the unbalanced sex and age composition of subpopulations, and specialization in habitat requirements. These factors contribute to vulnerability and may prevent rapid recovery even in the absence of adverse human influence. Management actions to reverse population trends are complicated by limitations in relevant data. Often the very regulations enforced to protect the species make research to gather management data more difficult to accomplish than is the case for unprotected species. In the HINWR, logistical considerations inhibit our ability to detect and to react to problems in a timely way and add considerably to the cost of research and management programs. In the case of species which spend a large portion of their life at sea, such as the monk seal and green turtle, practical limitations on research itself inhibit development of management strategies. Of course, low populations to begin with provide less room for error and more urgency in action than other species. Finally, the legal mandates which are designed to protect these species provide relatively little flexibility in the consideration of otherwise legitimate resource utilization programs.
Migratory Birds

Although legislative mandates protecting migratory birds are less restrictive than those affecting endangered species, they are nevertheless a real factor in HINWR management programs. These mandates stem from international treaties; hence, involvement in management planning goes well beyond state or even national boundaries. It is important to note that the HINWR provides only a part, albeit a significant one, of the habitat required by NWHI seabirds. Most prey is taken outside refuge boundaries and, for some species, outside waters under U.S. jurisdiction. Historical evidence in the NWHI and elsewhere makes it clear that the apparent abundance of seabirds in their breeding colonies can be misleading. Seemingly insignificant alterations of habitat can and have led to population declines from which full recovery may require decades or may not be possible at all. Finally, we have also learned that seabird populations are subject to substantial natural fluctuations in productivity. These fluctuations are not easily detected in their earliest stages and the natural causes are not easily elucidated.

Small Insular Ecosystems

The vulnerability of terrestrial habitats in the HINWR to rapid alteration is intimately tied to their small size, isolation, and other biological characteristics. The seemingly insignificant introduction of an exotic insect, plant, or rodent can radically alter the terrestrial ecology of these islands, irreversibly in some situations. The value of these unique ecosystems as habitat of endangered land birds is at risk when any authorized or unauthorized human intrusion occurs.

Atoll Ecosystems

Atoll ecosystems are widely distributed in the Pacific so this cannot be considered an aspect of resource management unique to the NWHI. Yet, atoll ecosystems in the NWRS are virtually restricted to Pacific refuges, and the HINWR is the most endowed in this regard. Furthermore, tripartite-Sea Grant data confirmed the unique opportunity that NWHI atolls of variable age along a latitudinal gradient present for research. NWHI atolls are also distinct in comparison with most other Pacific atolls where the effects of centuries of resource exploitation are evident. Resource management within atolls, such as those in the HINWR, is a discipline lacking in the benefits of past experience that characterizes the terrestrial and wetland habitats found in most national wildlife refuges.

Protected Areas

Mechanisms for recognizing and protecting the unique attributes of areas which are relatively free from past human abuse and are extremely valuable for wildlife are found in specific
forms of authorizing legislation. National Wildlife Refuge designation, in itself, is one such form of area recognition that brings with it a host of implementing regulations designed to avoid adverse impacts on fish and wildlife resources and their habitat. The research natural area designation is an additional form of recognition that acknowledges the unique "natural" value of specific areas where research on essentially undisturbed ecosystems should be encouraged. Such contiguous research natural area designation for lands and waters of the HINWR in 1967 provides additional direction in resource management that is uncommon in the NWRS. Wilderness area status, pursuant to the Wilderness Act of 1964, specifically addresses the congressional mandate to identify those federal lands that should be maintained in perpetuity in their natural state. The HINWR was proposed for wilderness area status a decade ago. No action was taken on the proposal, not because it lacked merit, but as a result of opposing interests fearing that the action would prevent commercial fishery development. Similar concern was voiced in response to a 1978 proposal by the National Marine Fisheries Service (NMFS) to designate the area a critical habitat for the monk seal, pursuant to the Endangered Species Act. The issue of wilderness area or critical habitat designation is virtually certain to resurface in the future. Other forms of area designation, including potentially international recognition, are likely to be considered in the future as well. All of this adds up to a situation in which the management strategies for the HINWR must take into account the significance of existing or potential layers of formal recognition.

Shared Jurisdiction

Shared jurisdiction for fish and wildlife resources and their habitats in the NWHI is an issue directly affecting the Fish and Wildlife Service's resource management strategy, both within and outside the HINWR. Lands and waters of the HINWR, as defined by FWS, are also included within a State Wildlife Refuge. State statutes also protect migratory birds, endangered species, and other fish and wildlife in the HINWR, and state fishery regulations affect the taking of fishery resources in state waters immediately adjacent to the HINWR. NMFS and FWS share jurisdiction over marine turtles, depending upon whether they are on land (FWS) or in the water (NMFS). By interagency agreement, pursuant to the Marine Mammal Protection Act, NMFS was assigned primary jurisdiction for the monk seal. Yet, refuge regulations (50 CFR) provide FWS with shared enforcement and management authority for both seals and turtles within the HINWR. The FWS enforcement role, pursuant to the Migratory Bird Treaty Act, extends throughout U.S. lands and waters, and project review authority, pursuant to the Fish and Wildlife Coordination Act, affects all proposed projects in navigable waters. In the past, all of the shared jurisdictional responsibilities in the NWHI have led to some confusion and complication in the planning and implementation of management strategies. Conversely, they have also provided opportunities for additional expertise, manpower, program
funding, enforcement capability, and logistical support. Broader legislative authorities, even when duplicative to some degree, also provide additional safeguards in the management of species in jeopardy.

Geographic Area

One final practical consideration affecting the HINWR management program is worthy of note. In the NWRS, only the Aleutian Island NWR is more widely distributed geographically than the HINWR. More than 1,000 miles separate the western extreme of the HINWR at Pearl and Hermes Atoll from Nihoa, the eastern end of the refuge. Hundreds of miles of open ocean isolate the rocky islands and atolls of the refuge from each other. While this presents unique opportunities for study, it also creates unique logistical problems that are difficult to overcome. Enforcement of refuge regulations, early detection and control of introduced pests or environmental contaminants, and wildlife population monitoring are all made more difficult simply by the distances and logistical support costs involved.

THE HINWR IN PERSPECTIVE

All of this is a preface to the real purpose of this paper -- to review management strategies for the HINWR and adjacent waters. It is important to clearly distinguish the refuge itself from surrounding waters. To put it in perspective, one should consider that the lagoon waters within the refuge (as defined by FWS) amount in area to less than 1/10 of 1 percent of the waters included within the fishery conservation zone. They also include less than 10 percent of the water within the 100-fathom contour. Yet, in spite of the small fraction of area involved, the refuge is clearly the focal point of management controversy because of the potential role of refuge land for logistic support, the possibility of lagoon fisheries, and the potential direct and indirect impacts of fishery activities in adjacent waters.

It is my opinion that FWS has a legitimate interest in the management of habitat and fishery resources both within the outside refuge boundaries. But the expression of that interest and management concern will take different forms. In the past, interest in the management of waters outside the HINWR has manifested itself in participation in the development of fishery management plans for the fishery conservation zone, in the support of shipping regulations to minimize the risks of hazardous cargo or oil spills and in the cooperative management of seabird and other wildlife resources on Midway and Kure atolls.

MANAGEMENT STRATEGIES OUTSIDE REFUGE BOUNDARIES

In the future, FWS participation in management planning outside the HINWR is anticipated to take several forms. Where data warrant restrictive fishery regulations to mitigate impacts to fish and wildlife species, such measures will be advocated by
FWS. Among the measures which will be considered are regulatory provisions with fishery management plans that would enable enforcement of short-term restrictions on specific commercial fisheries when the combined effects of natural factors and fishery-related factors would severely impact wildlife inhabiting the refuge. The very real growing risk of vessel groundings associated with fishery development and increasing shipping activity, in my opinion, justifies serious consideration of measures to monitor and, where appropriate, limit this vessel activity. Vessel monitoring could be accomplished through observers and reporting programs, but a system of satellite monitoring may prove more economical and effective. Such a system would also reduce safety hazards associated with groundings that would not otherwise be immediately detected. The sinking incident of the Keola at French Frigate Shoals in 1981 is an example where satellite monitoring of vessel position could have led to timely rescue of the crew. Rapid detection of groundings would also permit timely response to mitigate effects of oil spills and to avert the successful introduction of rodents to NWHI. Similarly, a program of boat inspections and required rodent control actions for vessels fishing in the NWHI may help to prevent exotic mammal introduction. FWS will also continue to work with the state of Hawaii, the Coast Guard, the Environmental Protection Agency, and the shipping industry to minimize risks of groundings and oil spills. Where current licensing regulations do not adequately insure competency of operators in hazardous waters, then modification of those regulations quite likely will be an FWS objective.

FWS will continue to play an educational role where such effort can help to avoid potential conflicts with shippers and fishermen. Effort is currently being made to meet with boat owners and captains unfamiliar with NWHI waters both to inform them of refuge boundaries and regulations and to make them aware of the FWS field station at Tern Island in case our support is needed.

In cooperation with other agencies, FWS will also continue to investigate the hazards posed by fishing and shipping activities well beyond the limits of U.S. jurisdiction. One such hazard, the discarding of trawl nets from North Pacific fisheries, is believed responsible for entanglement of seals and turtles in the refuge. Resolution of this problem may require State Department intervention.

FWS will also continue to share interest in the management of lagoon waters and islands at Kure and Midway with the agencies having primary jurisdiction. At Midway, FWS currently assists in wildlife management under a memorandum of agreement with the Navy. Ongoing programs to reduce predation on seabirds, to control avian disease, and to minimize bird-aircraft strike hazards are anticipated to continue. FWS is also reviewing other shared management alternatives at Midway that would protect and enhance wildlife populations, including endangered monk seals.
Midway will also continue to be an important site for seabird population monitoring due to the opportunities for year-round study. The FWS role at Kure Atoll will continue to be minor, compared with their role at Midway. However, it is anticipated that assistance in wildlife population monitoring using methodology developed in tripartite-Sea Grant research will occur.

MANAGEMENT WITHIN THE HINWR

Unquestionably, the management role of FWS within the HINWR will substantially differ from its role outside its area of primary jurisdiction. Despite the very real involvement of other agencies, FWS is ultimately the accountable agency when the success or failure of management programs is reviewed. The buck stops here. In my perspective, the HINWR is a trust fund and in my role as refuge manager, I act as a trustee. I look upon the refuge as an investment in the future which can prosper if properly managed or can falter is poorly managed.

Historically, management of the HINWR has been directed towards the maintenance of a "healthy ecosystem." Manipulation of habitat has been limited to that considered necessary to restore conditions which have changed through the direct or indirect effects of human use of the area. This approach is in direct contrast to the manipulative, intensive management of habitat that characterizes most wetland refuges in the system. Under the "healthy ecosystem" approach, directed work with wildlife has been focused on research to document and monitor population status and habitat condition.

Public use policy in the HINWR has been substantially more restrictive than in most other refuges in the NWRS, recognizing both the uniqueness and vulnerability of the area. As is the case on all national wildlife refuges, public use has been and will continue to be secondary to the primary objective of the refuge. Public use consistent with the wildlife management objectives has been permitted and even encouraged. The refuge was designated research natural area in 1967 in recognition of its unique value for legitimate scientific research. Extensive use of the Tern Island field station for tripartite-Sea Grant research has been another appropriate, but well controlled, use. Other public uses, including commercial fishery support, have been carefully scrutinized and, where appropriate, have been accommodated.

With the conclusion of tripartite-Sea Grant studies, we now embark on a new phase of resource management, hopefully with no less cooperation and mutual assistance than characterized the study period. Management actions on refuge lands and waters will reflect the results of the research and the plans of other agencies, including the prospect of expanded commercial fisheries in adjacent waters. Some historic management practices will surely continue, but our minds are open to consider virtually all
options that recognize primary refuge goals. Among the management actions underway or under consideration are the following:

1. Development and implementation of seabird and landbird populations and productivity monitoring programs

2. Development and testing of methods to detect and control, if necessary, introduced rodents, insects, and pest plants on refuge islands

3. Assessment and control, where appropriate, of disease among HINWR seabird and landbird species

4. Enforcement of restrictions on access to refuge lands and waters supporting particularly vulnerable or sensitive wildlife populations

5. Consideration of additional forms of recognition or resource protection, where appropriate, for individual species or geographical areas of the refuge

6. Development of protocol for avoidance, detection, and response to oil spills and other major pollutant sources

7. Completion and implementation of recovery plans for threatened and endangered species in the HINWR. Research on these species will focus on factors inhibiting recovery. Management actions to arrest and reverse downward population trends will be implemented.

8. Planning and implementation of both on-site and off-site environmental education programs

9. Documentation and study of cultural resources in the HINWR and implementation of necessary measures to ensure their protection

10. Involvement of FWS in the operation of the Tern Island facility, including the continued assistance to commercial fishermen. Review of alternative management strategies will also continue.

FUTURE PLANNING DIRECTIONS

Appropriately, the logical vehicle for making reasoned management decisions is the formal planning process. The involvement of the affected public and other agencies can only be assured through adherence to a well-conceived and structured planning process. As was anticipated, progress on various planning initiatives relating to the NWHI did not cease during the tripartite-Sea Grant study. The period was characterized by a flurry of planning activity, including the Tern Island study;
the state of Hawaii's fishery development plan; the monk seal critical habitat proposal; recovery plans for endangered land birds and the monk seal; fishery management plans for lobster, precious coral, bottomfish, and billfish; and planning studies for fishery support facilities at Tern Island and Midway. During this period, FWS also completed its regional resource plan, which included a focus on migratory birds, endangered species, and fishery resources in the Pacific area. The plan provides a general framework of objectives and strategies stepped down from the FWS mission statement, the FWS management plan, and the program management documents for individual FWS programs.

Given the backlog of previous paperwork in recent years, why then does it make good sense to initiate, as yet, another planning process? From the FWS perspective, additional planning for the refuge will provide a needed site-specific focus and will provide additional opportunity for public involvement. The vehicle for planning at the refuge level is the refuge master plan. Through this process, specific objectives of the refuge are clearly established and the type of management and development necessary to meet those objectives are identified. The process will help to:

1. Ensure that national policy direction is incorporated into management of individual refuges
2. Determine the capability of individual refuges to further FWS goals, objectives, and long-range plans
3. Provide a basis for developing budgets to implement appropriate management programs
4. Provide a systematic process for making and documenting refuge decisions
5. Establish broad management strategies to guide refuge management programs and activities
6. Provide continuity in the management of individual refuges and the refuge system as a whole

To achieve these objectives, FWS has developed a comprehensive planning process which includes three phases of inventory, analysis, and evaluation of alternatives or synthesis. During the inventory phase, priorities are set, data are collected and resource information is mapped, where appropriate. Results of tripartite-Sea Grant studies are fundamental to completion of this phase for the HINWR. In the analysis phase, the capability of the refuge to accommodate existing and potential uses is determined. In the synthesis phase, objectives are set, alternatives to achieve the objectives are developed and evaluated, and a final plan is completed. The steps of the planning process, shown in Figure 1, each involve specific tasks
Figure 1. Master Planning Process
and products. Paralleling this process is the development and circulation of a draft and final environmental impact statement.

Products of the master planning process include (1) a resource inventory, (2) an output list (those things to be produced on the refuge) in priority order with numerical objectives where appropriate, (3) an objective documentation record, and (4) a long-range management strategy. This strategy is a description, in general terms, of refuge resources and management actions required to produce outputs in the quantities identified in the planning process.

In recognition of the concerns surrounding the management of the HINWR and the eagerness of the interested public and cooperating agencies to resolve lingering management issues, FWS has opted to schedule the HINWR for master planning during the 16-month period immediately following the NWI symposium (Figure 2). This rapid schedule is feasible because of the related scoping effort initiated with the Tern Island study in 1979 and because the results of the tripartite-Sea Grant research provide a resource data base not usually available at the start of refuge master planning projects. Also, in contrast to many intensively manipulated wetland refuges, the range of potential active management options in the HINWR will be necessarily limited, reducing somewhat the complexity of the planning process.

Opportunity for public involvement will be provided in the planning schedule during scoping, in the development and review of outputs and preliminary alternatives, and in the review of the draft and final environmental impact statement. I strongly urge you to participate in this planning process, but at the same time I caution you to take your role seriously. With the privilege of public participation also goes a share in the responsibility for the results of the decisions made.

Victor Scheffer once defined wildlife management as "a process by which the closely related needs of wild animals and people are evaluated, reconciled and met." I see this as a desirable target towards which to shoot. Our tripartite-Sea Grant data provide a starting point for defining resource needs. Public involvement in planning will carry the process of defining human needs a step further. Together, these processes will not defuse or eliminate resource management controversy in the NWI, but they will help to clarify and identify precisely which issues are in dispute and which are not. They will increase the likelihood that management decisions will be based upon the best available data and the informed consent of the interested public.
FISCAL YEAR 1983

MAY
  * Tripartite Symposium
JUN
  * Master Plan and EIS Initiated
JUL
AUG
SEP
OCT
  * Master Plan Inventory and Analysis Phases Complete
NOV
DEC
JAN
FEB
MAR
  * Draft EIS Complete
A PR
MAY
JUN
  * Master Plan Synthesis Phase Complete
JUL
  * Final EIS Complete
AUG
SEP
  * Master Plan Complete
  * File Record of Decision

Figure 2. Master Plan Schedule