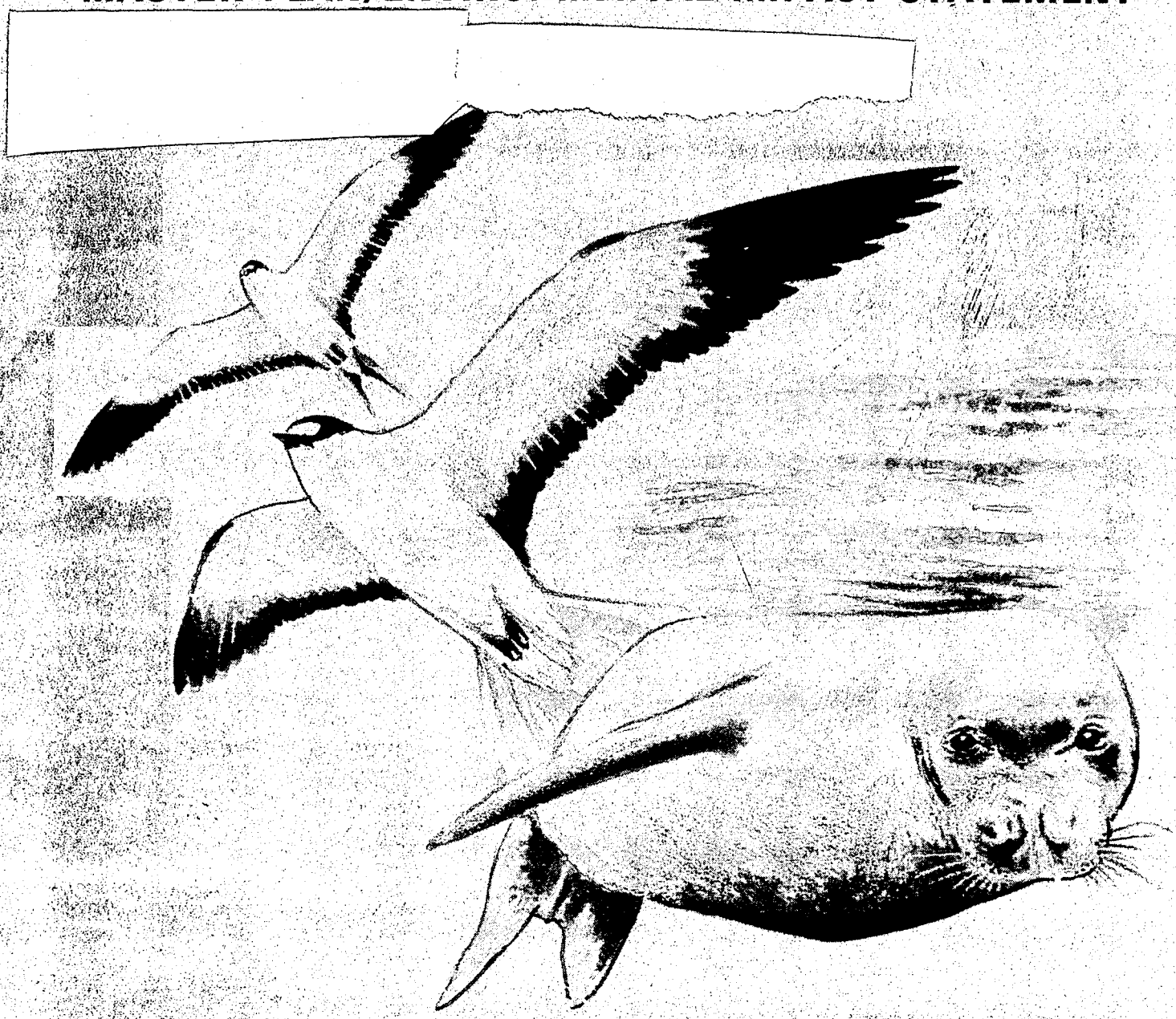
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE

MASTER PLAN/ENVIRONMENTAL IMPACT STATEMENT



Department of the Interior
U.S. Fish and Wildlife Service Region One

HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
COUNTY OF HONOLULU

Final

MASTER PLAN/ENVIRONMENTAL IMPACT STATEMENT

FES #86/11

May 1986

Department of the Interior
U.S. Fish and Wildlife Service
Region One

APPROVAL/CONCURRENCE:

Pacific Islands Administrator: _____

Date: 29 April 1986

Assistant Regional Director–Wildlife Resources: _____

Date: 5-6-86

Acting Regional Director: _____

Date: 5/22/86

HAWAIIAN ISLANDS

NATIONAL WILDLIFE REFUGE

MASTER PLAN/ENVIRONMENTAL IMPACT STATEMENT

Abstract

Proposed is a management plan for the Hawaiian Islands National Wildlife Refuge. The plan places primary emphasis on protecting and enhancing refuge wildlife resources, particularly threatened and endangered species. The plan would also accommodate limited forms of public use such as wildlife interpretation and environmental education. Additionally the plan would support various compatible public and economic uses throughout the Northwestern Hawaiian Islands archipelago (e.g. commercial fishing outside the refuge boundary). Five alternatives were considered, each composed of different mixes of conservation and public use strategies. The proposed action is a hybrid that would optimally satisfy all refuge objectives.

It is the opinion of the U.S. Fish and Wildlife Service, following a January 10, 1985 internal consultation under Section 7 of the Endangered Species Act of 1973, that adoption and implementation of any of the alternatives considered would promote conservation of the six species of endangered or threatened wildlife addressed in this document. Furthermore, on April 8, 1986 the National Marine Fisheries Service (NMFS) completed a separate biological consultation under Section 7 of the Endangered Species Act (NMFS shares responsibility for the management of threatened green sea turtle and endangered Hawaiian monk seal populations with the U.S. Fish and Wildlife Service) and has concluded that implementation of the revised, final Master Plan/EIS Preferred Alternative is not likely to jeopardize the continued existence of the Hawaiian monk seal or the Hawaiian green sea turtle.

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Department of the Interior

U.S. Fish and Wildlife Service Region One

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TECHNICAL APPENDICES CONSISTING OF LOCATIONAL CRITERIA AND OUTPUT SUMMARIES ARE UNDER SEPARATE COVER.

GLOSSARY OF KEY PLANNING TERMS

Locational Criteria: Information which describes the resource conditions necessary for production or maintenance of a given output. This information includes locational factors, resource descriptions, and quality ratings of the resources.

Objective: A narrative statement concerning an output which represents the long-range goal the U.S. Fish and Wildlife Service (FWS) intends to achieve in producing or maintaining that output. (Production of species refers to numbers of young raised; maintenance of species refers to the number of days of use of the refuge.)

Output: Something that is produced, provided for, or maintained on a National Wildlife Refuge.

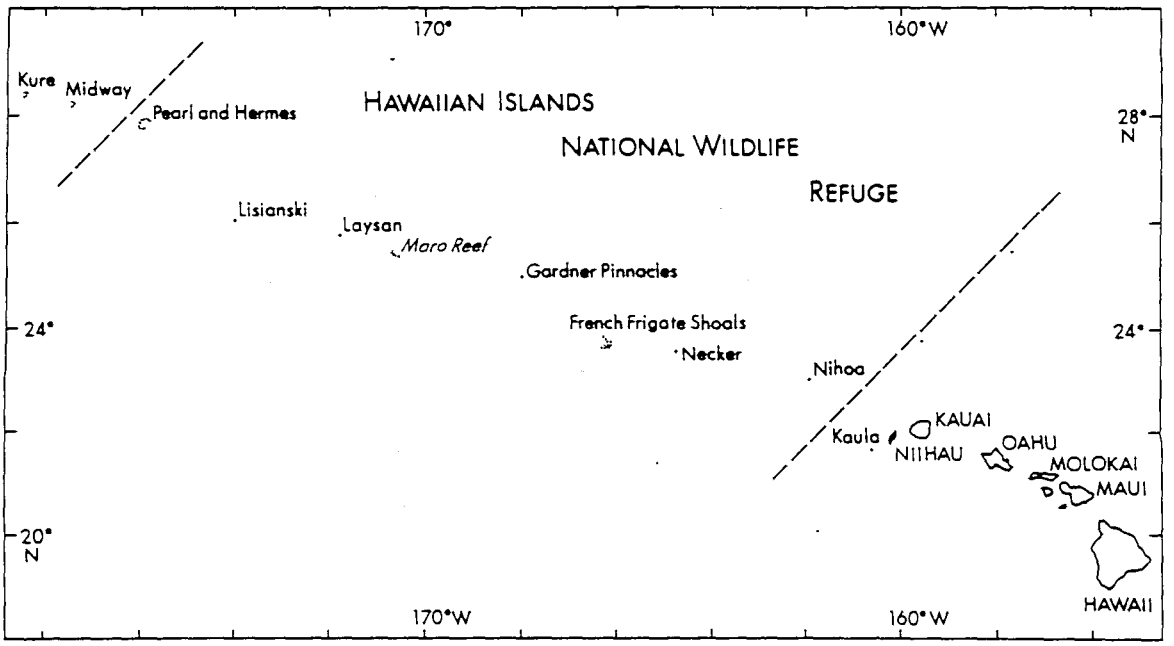
Output List: A prioritized listing of all outputs for the refuge, either currently produced/maintained or proposed for production/maintenance on the refuge. Priorities are established based on legal mandates, specific legislation, FWS policy, and other relevant guidance.

Output Summaries: Information concerning the background, potential, demand, and degree of conflict for a specific output. The information contained in an Output Summary often represents a condensation of a much greater volume of information and facts.

A. The Resource

The Hawaiian Islands National Wildlife Refuge (HINWR) consists of a chain of islands, reefs and atolls extending about 800 miles in a northwesterly direction from the main Hawaiian Islands. The Refuge was established in 1909 by President Theodore Roosevelt to protect seabirds which were then being slaughtered for the millinery trade.

Map 1



HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE
North Pacific Ocean

Because of their geographic isolation, the islands have provided a unique "window" on biological evolution. Many of the endemic floral and faunal species found on the Refuge exist nowhere else in the world. The Refuge is home to the endangered Hawaiian monk seal, which was nearly exterminated by seal hunters in the late 1800's. Under Refuge protection, the population recovered in the late 1950's, but over the last 25 years, surveys indicate that the population has declined again about 50%. The threatened green sea turtle once nested on beaches throughout the main Hawaiian Islands but now nesting is restricted primarily to beaches at French Frigate Shoals within the HINWR. The decline in the population has been caused primarily by overharvest and human disturbance in breeding areas. The Refuge is also home to four endangered land birds - the Laysan duck, Laysan finch, Nihoa finch and Nihoa millerbird. Their future depends upon keeping the island environments free from detrimental changes.

The most abundant wildlife forms occurring in the HINWR are seabirds. The Refuge is a breeding ground for 18 different species including albatross, petrels, shearwaters, storm petrels, tropicbirds, boobies, frigatebirds and terns. The resident seabird population in the Northwestern Hawaiian Islands (NWHI) numbers 12-14 million birds. While no seabird species are endemic to the NWHI, these islands provide breeding habitat for a substantial portion of the worldwide population of at least four species - the black-footed albatross, Laysan albatross, Bonin petrel and the sooty storm-petrel.

The waters surrounding the HINWR harbor a rich abundance of living resources, many of which have considerable economic importance. The nearshore marine community includes about 700 species of fish, of which about 20% are endemic to Hawaii. Several commercially important baitfish species occur in shallow atoll lagoons. They were the focus of a short-lived fishery at French Frigate Shoals in the 1950's and are still of interest to the commercial fishing industry today. A number of other commercially important fish and shellfish species occur in offshore waters. Among the most sought-after are bottom fish, spiny lobsters, shrimp and kona crabs. Additionally, deep water precious corals have been harvested at depths of 200-300 fathoms.

Pelagic fishes in the NWHI are of commercial interest to both U.S. and foreign fishing boats. Species of particular interest include big eye and yellowfin tuna, albacore, skipjack tuna (aku), mahimahi and various billfishes and sharks. While most of the commercially important fish and shellfish species of the NWHI do not occur within Refuge boundaries, they have been considered in the planning process because commercial harvest could have potential consequences (both beneficial and adverse) for Refuge wildlife resources.

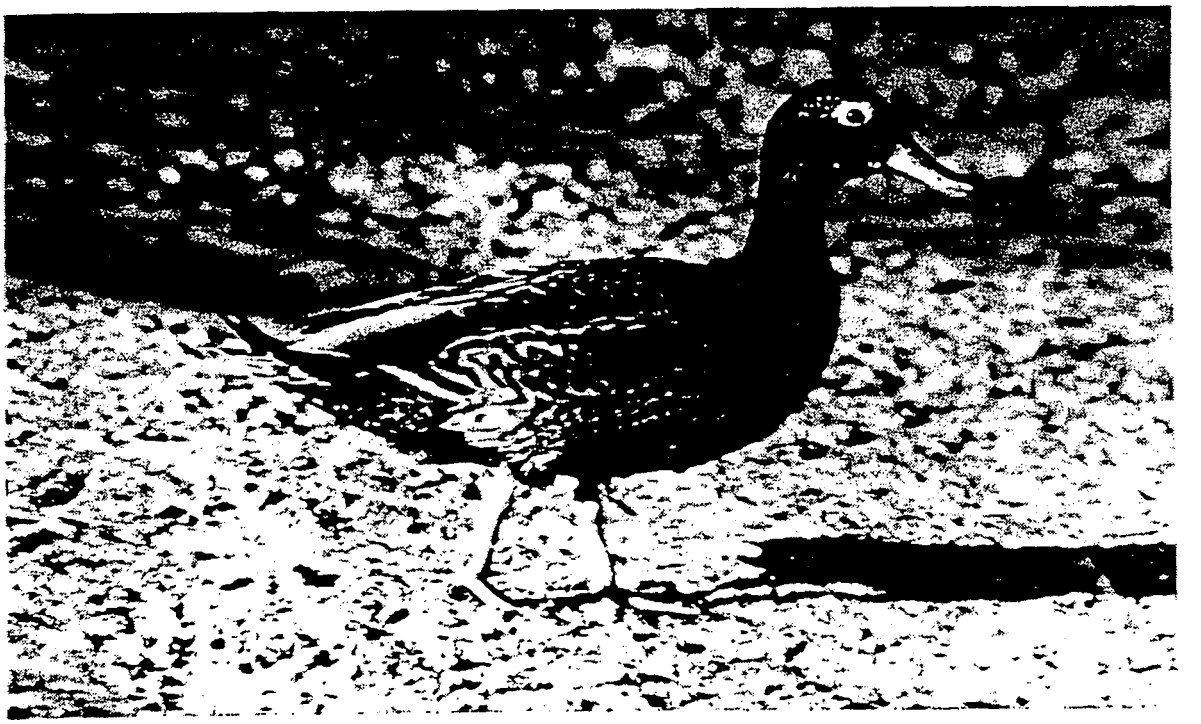
Finally, the HINWR is the site of some significant archaeological resources. Ruins consisting of house terraces, ceremonial structures, burial caves, shelters and agricultural terraces are located on Nihoa and Necker Islands. It is suspected that colonizers arrived on the islands about 900 A.D. and built a culture similar to the one they left behind in the Tuamotu Islands, 1600 miles to the southeast.

B. Federal Responsibilities for the Resource

The HINWR is part of a system of national wildlife refuges that now numbers over 420 units and includes more than 90 million acres of land and water. This system is the only such network of lands and waters in the world that is managed principally for the perpetuation and enhancement of fish and wildlife resources.

As part of that system, the HINWR is managed in accordance with a number of basic legal authorities and legislative mandates. Among the most

significant are the Migratory Bird Treaty Act of 1918, which establishes a federal responsibility for protection of the international migratory bird resource; the Endangered Species Act of 1973, which provides for the conservation of endangered species of fish, wildlife and plants; the Marine Mammal Protection Act of 1972, which establishes a federal responsibility for conservation of marine mammals; and the National Wildlife Refuge System Administration Act of 1966, under which the Secretary of the Interior is authorized to permit uses on national wildlife refuges provided such uses are compatible with the major purposes for which the Refuge was established. The legal authority which established the Refuge is Executive Order 1019, signed by President Theodore Roosevelt on February 3, 1909, which set aside the islands and reefs extending from Nihōa to Kure, excepting Midway Atoll, " . . . for use . . . as a preserve and breeding ground for native birds."



Laysan duck (Anas Laysanensis)—endemic to Laysan Island. Population may number as high as 600 birds.

While these basic authorities and mandates establish a clear resource conservation responsibility for the U.S. Fish and Wildlife Service (FWS), the agency's mission statement also makes it clear that the FWS' role is not one of conservation alone, but rather conservation for public benefit. The mission of the FWS is to "provide the federal leadership to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of people."

Public benefits derive from various human "uses" of Refuge resources. Examples of such uses considered in the Master Plan/Environmental Impact Statement (EIS) include environmental education, wildlife interpretation, wildlife photography and commercial and recreational fishing. Thus, an assumption made throughout the planning process is that the FWS has basic responsibilities for meeting wildlife needs and the needs and desires of the public to derive benefits from those wildlife resources.

Refuge objectives developed through the planning process capture both the wildlife preservation aspects and the public benefit aspects inherent in FWS responsibilities for the HINWR. In order of priority, objectives have been written (and where possible quantified) for vulnerable wildlife species such as the monk seal and green sea turtle; environmental values such as cultural resources and wilderness; marine birds; endemic terrestrial and marine species; research and monitoring; education and interpretation; and other public uses including commercial fishing. Objectives are the key ingredient of this Master Plan/EIS. Every recommendation contained in the document is influenced by the objectives. Management strategies, development proposals and recommendations for public use have all been tailored to meet these objectives.

C. Resource Needs Versus Resource Demands

Wildlife preservation needs and human demands for utilization of wildlife resources in the Northwestern Hawaiian Islands have resulted in serious conflicts, frequently with disastrous results for wildlife. Such conflicts have historic roots, as the resources of the NWHI have been exploited to varying degrees over the past 200 years.

European sailing ships made the earliest commercial excursions into the NWHI in the late 18th and 19th centuries, taking seals, whales, fish, turtles, sharks, birds, pearl oysters and sea cucumbers. In the mid-1800's discoveries of large guano deposits led to leasing of several islands to the North Pacific Phosphate and Fertilizer Company. Guano was commercially removed from Laysan Island between 1891-1910. Rabbits were introduced to the island to supply the workers with a food source. Unfortunately, without natural population checks, the rabbits multiplied until they had consumed most of the island's vegetation. Without the food cover provided by the plants, three bird species - the Laysan rail, Laysan honeycreeper and Laysan millerbird - became extinct.

Over this same period Japanese vessels began a series of trips into the NWHI to harvest bird skins and feathers for the booming millinery trade. Thousands of birds were slaughtered in the process, leading President Roosevelt to designate the islands as a preserve for native birds in 1909.

Commercial fishing in the NWHI has more recent historic roots. The remoteness of the islands with their great distances from markets and a lack of fishery support facilities have limited expansion of the industry. With the disestablishment of the Tern Island Naval Station in 1945, fishermen began to use the facility. However, commercial fishing ventures were short-lived and no commercial harvest has occurred within the boundaries of the HINWR since 1959.

Recognizing the need to broaden and diversify its economic base beyond tourism, the State of Hawaii expressed growing interest in the 1970's to develop a commercial fishery throughout state, including the NWHI. This interest culminated in the publication of the Hawaii Fisheries Development Plan in 1979. That plan identifies the NWHI as the most promising area for future expansion of the commercial fishing industry. Estimates of fishery harvest potential, if realized, would boost total commercial fish landings from about 13 million pounds (1978) to an estimated 74-118 million pounds, with most of the potential (47-71 million pounds) occurring in open ocean tunas. Approximately 90% of Hawaii's current landings are represented by a handful of species - skipjack tuna (aku), yellowfin tuna, big eye tuna, albacore, akule and opelu (mackerel).

Commercial fishing in the NWHI poses a number of potential conflicts with Refuge wildlife resources, despite the fact that almost all of the fishery resources with commercial value would be harvested outside Refuge boundaries. Most seabirds seek food outside Refuge boundaries, in some cases feeding 500 miles or more from their breeding colonies. For the most part seabirds are opportunistic feeders, taking species of small fish that school near the surface. Commercial harvest of tunas and albacore could indirectly affect seabird prey species, because the larger fish are known to drive schools of small fish to the surface, where they become accessible to the birds (Ashmole and Ashmole, 1967). Alternately, a commercial harvest could benefit seabirds in that the removal of tuna would reduce competition for the same prey species.

In addition, harvest of baitfishes in NWHI waters for the aku fishery could place fishermen in direct competition with seabirds, which consume an estimated 900 million pounds of small fish annually. The State of Hawaii has also expressed interest in harvesting lagoon baitfishes at French Frigate Shoals within the HINWR boundary. This would provide commercial fishing boats with a more convenient source of baitfish located much nearer to the fishing grounds. At present, baitfish are primarily harvested in Kaneohe Bay and Pearl Harbor Lagoon on the island of Oahu. Baitfish availability has been a limiting factor in the expansion of the aku fishery.

Baitfishing in atoll lagoons and nearshore waters within the Refuge boundary would disturb monk seals and increase the potential for inadvertent introduction of harmful exotic organisms to the fragile island ecology. Even minor changes could be disastrous. Rats coming

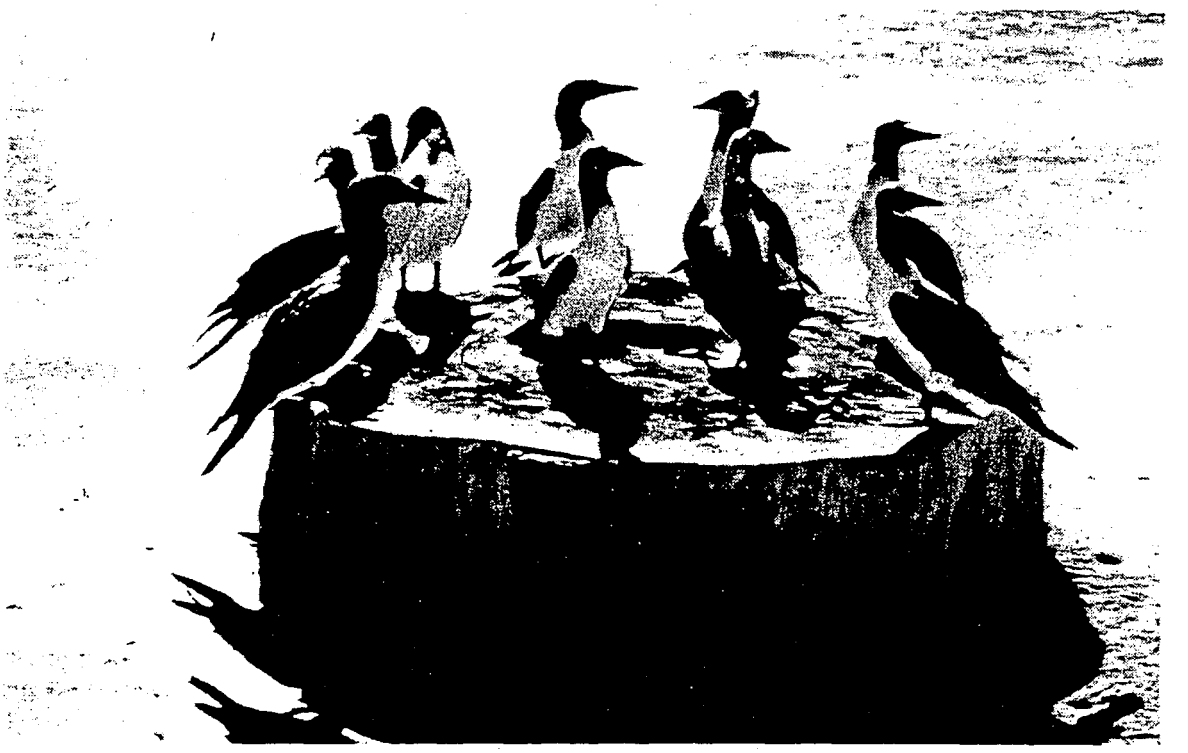
ashore from a boat, a wildfire, a few weed seeds, destructive insects or their eggs in someone's clothing or equipment, could result in the eventual loss of a species already in danger of extinction.

To assess such potential conflicts and to develop crucial baseline population data on the fish and wildlife resources of the NWHI, the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the State of Hawaii Department of Land and Natural Resources, signed a Tripartite Cooperative Research Agreement in May, 1978. (The University of Hawaii Sea Grant College became a fourth party to the Agreement a year later.) The Agreement initiated a comprehensive 5-year research effort.

In addition to addressing potential conflicts between commercial fishing and wildlife, Tripartite study results are also applicable to other human activities within the HINWR. One major area of activity in which FWS has been a direct participant is research. The FWS has operated a biological field station on Tern Island since July, 1979, when the U.S. Coast Guard decommissioned its LORAN navigational station. Operation of the Tern Island station has been essential to carrying out high priority objectives for threatened and endangered species, seabirds and other wildlife resources. However, wildlife research and monitoring efforts have required additional, non-FWS personnel to be stationed on Tern Island often for weeks on end. The continuous presence of researchers with ready access to seabird nesting colonies, monk seal pupping beaches or green turtle breeding areas carries with it the ever-present danger of direct disturbance to wildlife or introduction of exotic pest organisms. The issue is one of human access, and the increased probability of disruption to fragile ecosystems with increased access.

The human access issue is also raised in addressing demands for on-site wildlife photography, interpretive activities and environmental education. Given the clear need to enhance public awareness of the resources and the resource issues of the NWHI, it is perhaps ironic that "bringing the public to the resource" has the potential to jeopardize the future existence of that resource.

While human presence in the NWHI has been viewed in light of potential conflicts with wildlife needs, that presence has also benefitted wildlife. The operation of the FWS biological field station on Tern Island contributes directly to the accomplishment of recovery objectives for threatened and endangered species, and plays an integral role in the implementation of key wildlife preservation strategies in the HINWR. Over the last five years the Tern Island facility has also played an incidental but vital role in providing emergency logistical support to the fishing industry in the form of aircraft transport of parts and people, emergency medical evacuation and equipment repairs and radio communications, all of which have facilitated the economic growth of the



Juvenile masked boobies (Sula dactylatra).

NWHI fishery. The relationship has been reciprocal, as fishing vessels have also provided substantial assistance to the FWS in the transport of supplies and staff/research personnel to and from Tern Island.

Thus, in developing management alternatives, the FWS has been required to consider a broad range of demands for human utilization of the resources, while planning for the protection and preservation of those same resources. The result is an array of management alternatives that attempts to strike an objective balance between resource needs and resource demands.

D. Alternatives and Their Consequences

Management alternatives were developed by first describing management of the HINWR as it presently exists in order to provide a reference point to compare and evaluate other alternatives under consideration. This description is referred to as the No Action Alternative ("No Action" being defined as "no change"). Recognizing that current management falls short of meeting desired Refuge objectives (due primarily to insufficient human and financial resources) the next task consisted of establishing minimum requirements or "must do" management strategies which address each of the Refuge objectives at what is

considered the minimum level necessary to fulfill legal and policy mandates. Collectively, this set of "must do" strategies became known as the "Baseline Alternative" (BA).

The BA provides a "ground floor" from which other "enhancement level" alternatives were developed. Enhancement level alternatives were created by defining additional strategies over and above those included in the BA, which would go beyond the minimum level in addressing each of the objectives. These enhancement alternatives emphasized either resource preservation strategies or resource utilization strategies, and were designated respectively as the Resource Preservation Alternative (RPA) and the Resource Utilization Alternative (RUA). The RPA contains strategies directed toward a greater degree of fish and wildlife protection. The RUA directs emphasis toward achieving educational, recreational, commercial and other public use objectives. The RPA and RUA incorporate, by definition, all of the strategies contained in the BA. Thus all three represent multiple-use alternatives that are intended to strike three different balance points between resource preservation and resource utilization needs, within identified legal and policy constraints. The FWS' Preferred Alternative (PA) consists of the must-do strategies in the BA plus a hybrid of strategies drawn from the RPA and RUA. It represents what the FWS considers the optimal mix of strategies for meeting statutory requirements for wildlife conservation while at the same time meeting demands for a reasonable level of public use. The alternatives are summarized in the chart on pages 0.10 and 0.11 according to the major categories of objectives discussed above.

The Preferred Alternative places strong emphasis on protecting and enhancing fish and wildlife values of the HINWR. Continuing efforts would go into research and management efforts intended to recover endangered and threatened species. Monitoring of wildlife populations and their habitats would continue to receive high priority. In addition to endangered and threatened species, seabirds would be the primary focus of attention, but endemic marine and terrestrial species would not be ignored, as changes in distribution and abundance of these species are key biological indicators of ecosystem perturbations.

While access to the Refuge would continue to be restricted through a permit system, human activity levels on and around the Refuge would likely increase beyond current levels. The continuing high priority efforts devoted to wildlife research and monitoring activities will mean the influx of greater numbers of researchers and agency staff personnel to Tern Island. Archaeologists and historians will be included in this influx, but their activities will be directed at studying the cultural resources on Nihoa and Necker Islands. Public use on the Refuge will also likely see increases over the next 10-20 years, as demand increases for directly experiencing the unique resources of the Refuge. While the Preferred Alternative would seek to enhance public awareness of Refuge

resources primarily through off-site activities, limited, supervised on-site opportunities would also be provided as feasible to accommodate wildlife photographers, wildlife journalists or wildlife enthusiasts interested in nature tours.

Nihoa Island, a 900′ high island at the southeast end of the Refuge.

The PA would support the State's current proposal to moor a mothership at French Frigate Shoals, just outside the Refuge boundary. The mothership would provide a support base for a fleet of ten catcher vessels which would fish for several commercially important fish and shellfish species. Under the PA, the FWS would continue to provide emergency logistical support to the multi-species fishery, at a level similar to the support currently provided by the refuge staff.

With the increases in levels of human activity in and around the HINWR, the risks to wildlife resources will also increase. To reduce those risks to an acceptable level, the FWS will place increased emphasis on ensuring that all research and staff personnel take adequate precautions to ensure they are not unwitting carriers of exotic organisms which could devastate native floral and faunal communities. Increased efforts will also be directed toward regulating and monitoring nearshore vessel traffic to minimize the risks of accidental groundings, oil spills or spills of hazardous materials. Finally, the PA calls for the FWS to develop procedures for carefully monitoring research activities, the commercial fishing industry, nature tours and other human activities for possible adverse effects on wildlife.

THE FOLLOWING IS A SUMMARY OF THE STRATEGIES ASSOCIATED WITH THE NO ACTION ALTERNATIVE (NAA) AND BASELINE ALTERNATIVE (BA). BY DEFINITION THE NAA REPRESENTS REFUGE MANAGEMENT AS IT PRESENTLY EXISTS. THE BA, WHICH BUILDS UPON AND FULLY INCORPORATES THE NAA REPRESENTS A LEVEL OF ACTIVITY NECESSARY TO MINIMALLY SATISFY REFUGE OBJECTIVES. TOGETHER THE NAA AND BA PROVIDE A FOUNDATION FOR THE ENHANCEMENT STRATEGIES ON THE NEXT PAGE. ALL OF THE STRATEGIES LISTED BELOW ARE INCLUDED IN THE NAA EXCEPT WHERE FOOTNOTED.

NO ACTION ALTERNATIVE AND BASELINE ALTERNATIVE

VULNERABLE SPECIES:

- Implement high priority research and management tasks in recovery plans.[1]
- Monitor populations and habitats.[1]
- Prevent/monitor/control harmful exotics.[1]
- Restrict access to islands/atolls.
- Enhance public awareness.
- Identify/protect candidate and sensitive species.

ENVIRONMENT:

- Conduct archaelogical survey; nominate sites to State and National registers.
- Nominate emergent lands for wilderness status.[2]
- Evaluate Marine Sanctuary status for HINWR.[2]
- Provide research opportunity consistent with Research Natural Area (RNA) criteria.
- Seek resolution of boundary dispute.
- Pursue overlay NWR status for Midway Atoll.

OTHER FISH AND WILDLIFE:

- Monitor seabird/other migratory bird populations.
- Restrict access to seabird colonies.
- Develop/implement oil spill contingency plans.
- Prevent/monitor/control harmful exotics.[1]
- Enhance public awareness.

SCIENTIFIC AND PROFFESSIONAL SERVICES:

- Utilize field camps/annual boat surveys to monitor populations and habitat.
- Produce/distribute research publications.
- Monitor human activities and effects.
- Provide logistical support for monitoring activities at Tern Island and throughout the Refuge.

EDUCATION/INTERPRETATION:

- Develop off-refuge exhibits and programs, particularily at Kilauea Point on Kauai.
- Develop/assist in publications and audio-visual materials.
- Develop curriculum materials for school system.[2]
- Encourage off-site photography, journalism and art (P/J/A) activities.[2]
- Develop educational/interpretive materials for Midway and Kure personnel.[2]

OTHER PUBLIC USES:

- Provide recreational opportunity for authorized personnel at Tern Island.
- Provide logistical support for NWHI commercial fishery operations (including use of existing emergency mooring buoy).
- Monitor logistical support activities for effect on fish and wildlife.

1 Strategy included in NAA and expanded or enhanced in BA.

2 Strategy not included in NAA but included in BA.

Summary

EACH OF THE THREE ALTERNATIVES LISTED BELOW BUILDS UPON THE NO ACTION AND BASELINE ALTERNATIVES DESCRIBED ON THE PRECEEDING PAGE. THE RESOURCE PRESERVATION ALTERNATIVE (RPA) CONTAINS STRATEGIES DIRECTED TOWARDS A GREATER DEGREE OF FISH AND WILDLIFE PROTECTION. THE RESOURCE UTILIZATION ALTERNATIVE (RUA) DIRECTS EMPHASIS TOWARD ACHIEVING EDUCATIONAL, RECREATIONAL, COMMERCIAL AND OTHER PUBLIC USE OBJECTIVES. THE PREFERRED ALTERNATIVE (PA) IS A HYBRID OF STRATEGIES DRAWN FROM THE RPA AND RUA AND REPRESENTS THE FWS' RECOMMENDED ACTION.

RESOURCE PRESERVATION ALTERNATIVE (RPA)	PREFERRED ALTERNATIVE (PA)	RESOURCE UTILIZATION ALTERNATIVE (RUA)
Regulate and monitor nearshore vessel traffic. Conduct lower priority research and management action in recovery plans. Evaluate/establish additional populations of endemic land birds.		Monitor nearshore vessel traffic. Conduct limited additional research as in recovery plans.
	Monitor impacts of commercial fishery on listed species.	
Designate/support designation of critical habitat for threatened/endangered species. Evaluate/nominate HINWR as World Heritage Site / Biosphere Reserve / Natural Landmark.		
Nominate HINWR lands/waters to Wilderness System.	Nominate HINWR lands. Evaluate and, if appropriate, nominate waters.	
Conduct historical survey; nominate sites to State/National registers.		
	Permit limited access to cultural sites for religious purposes.	
Monitor and control disease in resident seabird populations. Regulate and monitor nearshore vessel traffic. Monitor distribution and abundance of native terrestrial species. Map and ground truth terrestrial and marine ecosystems.		
	Monitor the effects of the commercial fishery and other human activities on "other fish and wildlife."	
Conduct annual aerial photo survey.	Conduct biannual aerial photo surveys of HINWR islands and atolls.	
Conduct extended field camps and/or semi-annual boat surveys. Conduct comparative monitoring studies on Midway and Kure.		
	Conduct limited nature tours/environmental education at Tern Island. Facilitate limited, supervised photography, journalism and art visits to the HINWR.	
Regulate and monitor nearshore vessel traffic. Cooperate/assist in installation of a mooring buoy outside HINWR boundary at French Frigate Shoals.		Monitor nearshore vessel traffic. Permit use of existing emergency mooring buoy within HINWR boundary for multi-species fishery. Provide recreation, storage and emergency use of Tern Island in support of a multi-species fishery.

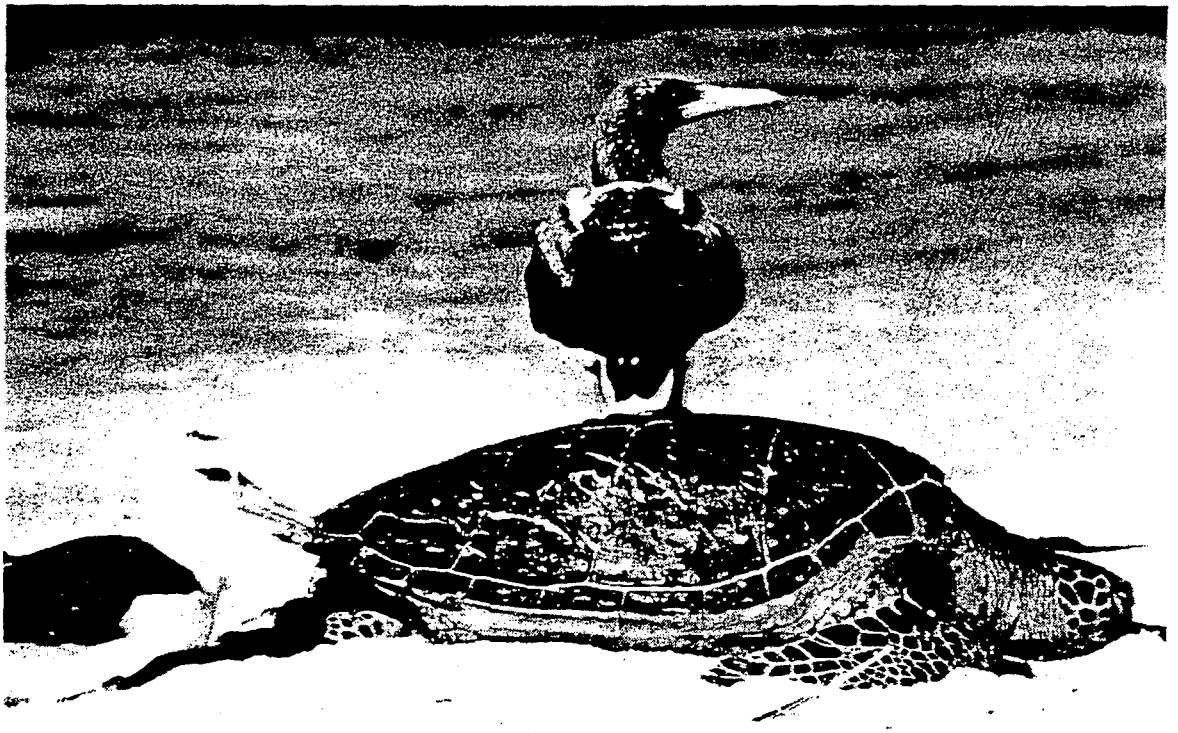
The basic concept would involve the development of monitoring systems sufficiently sensitive to detect at an early stage any harmful disruptions to the ecosystem. Corrective actions would be implemented quickly through the full cooperation of federal and state government agencies and private parties. The PA would seek to create a level of public and private sector cooperation to successfully implement this alternative.

Implementation of the PA will not be realized without a significant price tag. It is estimated that annual operation and maintenance costs of the PA could double current O&M costs of $305,000. The cost increase reflects primarily the increased research and education initiatives contained in the PA. Cost-sharing arrangements for the operation of the Tern Island facility can reduce the government expense, as can the role of mothership-supported fishing vessels willing to facilitate Refuge research projects. The FWS has concluded that the PA is, on the whole, superior to any of the other alternatives considered. The PA is therefore the recommended course of action which the FWS will seek to implement over the 10-20 year time frame of this Master Plan/EIS.

I

PURPOSE AND NEED

The Hawaiian Islands National Wildlife Refuge (HINWR) is faced today with a number of complex challenges - closer public scrutiny of management philosophies; the desire for citizen participation in the decision-making process; the need for increased citizen understanding of wildlife resources; and potential conflicts between wildlife needs and other resource demands. These challenges, along with new compliance regulations, legal mandates, changes in U.S. Fish and Wildlife Service (FWS) policies and a growing concern for the environment, have served to make the HINWR increasingly visible, and management of the Refuge increasingly controversial.



Sharing the habitat at French Frigate Shoals (Laysan albatross, masked booby, and green sea turtle).

In view of these challenges, there is clearly a need for a consistent and documentable method of determining how the resources of the HINWR can best be used and managed over time. Master planning provides that method. Master planning is a comprehensive system of land use planning that provides long-range guidance for the management, utilization, growth and development of the HINWR and its resources.

Integral to that process is full public involvement in the development of management options (alternatives) to address Refuge objectives. The alternatives, and their associated consequences on the physical, biological and social environment, are disclosed in this document in

compliance with the National Environmental Policy Act (NEPA) of 1969. Therefore, the resulting document has been designated a Master Plan/Environmental Impact Statement (EIS).

The underlying purpose for preparing a Master Plan/EIS for the HINWR is to facilitate efficient management of refuge wildlife resources so that those resources are protected and enhanced for the public benefit. Consistent with that purpose, the alternatives presented in this document are aimed at promoting management of refuge resources in a manner that will allow for both their wise utilization and perpetuation.

Great frigate bird (fregata minor) and red footed booby (Sula sula).

While this Master Plan/EIS is responsive to the challenges outlined above, perhaps the one area where the master planning process is most beneficial is in conflict resolution. The Northwestern Hawaiian Islands (NWHI) have been the scene of varying conflicts between resource preservation and resource utilization over at least the past 200 years. European sailing ships made the earliest commercial excursions into the NWHI in the late 18th and 19th centuries, taking seals, whales, fish, turtles, sharks, birds, pearl oysters and sea cucumbers. Guano deposits, discovered in the mid-1800's, led to commercial mining of guano. In the early 1900's Japanese vessels entered the NWHI to harvest bird skins and feathers. It was this activity which ultimately led to designation of the Hawaiian Island Reservation in 1909 as a ". . . preserve and breeding ground for native birds . . ." making it ". . . unlawful for any person to hunt, trap, capture, willfully disturb or kill any bird of any kind whatever, or take the eggs of such birds . . . ."

More recently, potential wildlife conflicts have arisen as demands have increased to harvest the fishery resources of the NWHI. The drive to diversify the Hawaiian economy - thereby lessening the State's dependence on tourism - has stimulated strong interest in expanding the commercial fishing industry. With fishery stocks off the main Hawaiian Islands already sustaining heavy fishing pressure, the State has looked to the NWHI as the most promising area for expansion. Unharvested stocks of tuna, bottom fish, lobster, shrimp, and baitfish are believed to offer potential for significantly boosting commercial fish landings.

However, commercial fishing also has the potential for conflicting with wildlife needs. For example, commercial harvest of baitfish could put fishermen in direct competition with seabirds, which utilize surface shoaling fishes as a primary food source. Additionally, commercial fishing could attract more boats to the NWHI, thereby increasing the potential of inadvertent introduction of harmful exotics to the fragile ecosystem as well as increasing the probability of disturbance and harassment to wildlife.

To assess the scope and magnitude of such potential conflicts, the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the State of Hawaii Department of Land and Natural Resources, signed a Tripartite Cooperative Research Agreement in May, 1978. (The University of Hawaii Sea Grant College became a fourth party to the Agreement a year later.) The Agreement initiated a 5-year research effort which has generated a tremendous amount of baseline population data on the wildlife resources of the NWHI. These data have been instrumental in assisting the FWS in exploring various alternatives that strike an objective balance between resource preservation needs and utilization of Refuge resources, including commercial fishing.

Commercial fishing is not the only activity which presents potential conflicts with resource preservation. Wildlife research and monitoring efforts often require researchers to be present on site for extended periods with associated hazards of wildlife disturbance. The increasing demand for interpretive and educational tours to the HINWR presents a similar danger. Because any human activity has the potential for adversely impacting wildlife, the FWS has been deliberately conservative over the years in restricting access to the HINWR. The issue of access was in fact a primary consideration throughout the master planning process and is directly reflected in the make-up of the alternatives.

Commercial fishing, research and monitoring activities, and interpretive and educational tours are but a few examples of the activities assessed in this document. The sections which follow cover the full range of current and potential public demands on Refuge resources. The material is intended to provide the reader with an informed basis for evaluating

Monk seal (Monachus schauinslandi) lying in net fragments at Kure Island.

the array of management alternatives presented in the document. It is also intended to provide insight to the thought processes used to address some extremely complex resource management issues, where conflict resolution is essential if the resource base is to be perpetuated for the use and enjoyment of the public. The planning process presented in this Master Plan/EIS attempts to establish a rational framework for an objective examination of the underlying issues.

II

PLANNING PROCESS

A. Introduction

The Tripartite Cooperative Agreement identified the need for rational management of fish and wildlife resources of the Northwestern Hawaiian Islands (NWHI), based upon the best available scientific data. Mutual efforts of various agencies and institutions participating in this Agreement made available a wealth of new information, building upon a base of data gathered over the last half century. While the study was ongoing 1) state and industry representatives were developing plans and proposals for commercial utilization of fishery resources; 2) agencies were proposing additional measures to protect threatened and endangered species; 3) plans for future research were developing; and 4) the U.S. Fish and Wildlife Service (FWS) which continued to occupy Tern Island, initiated short-term planning for operation of the facility.

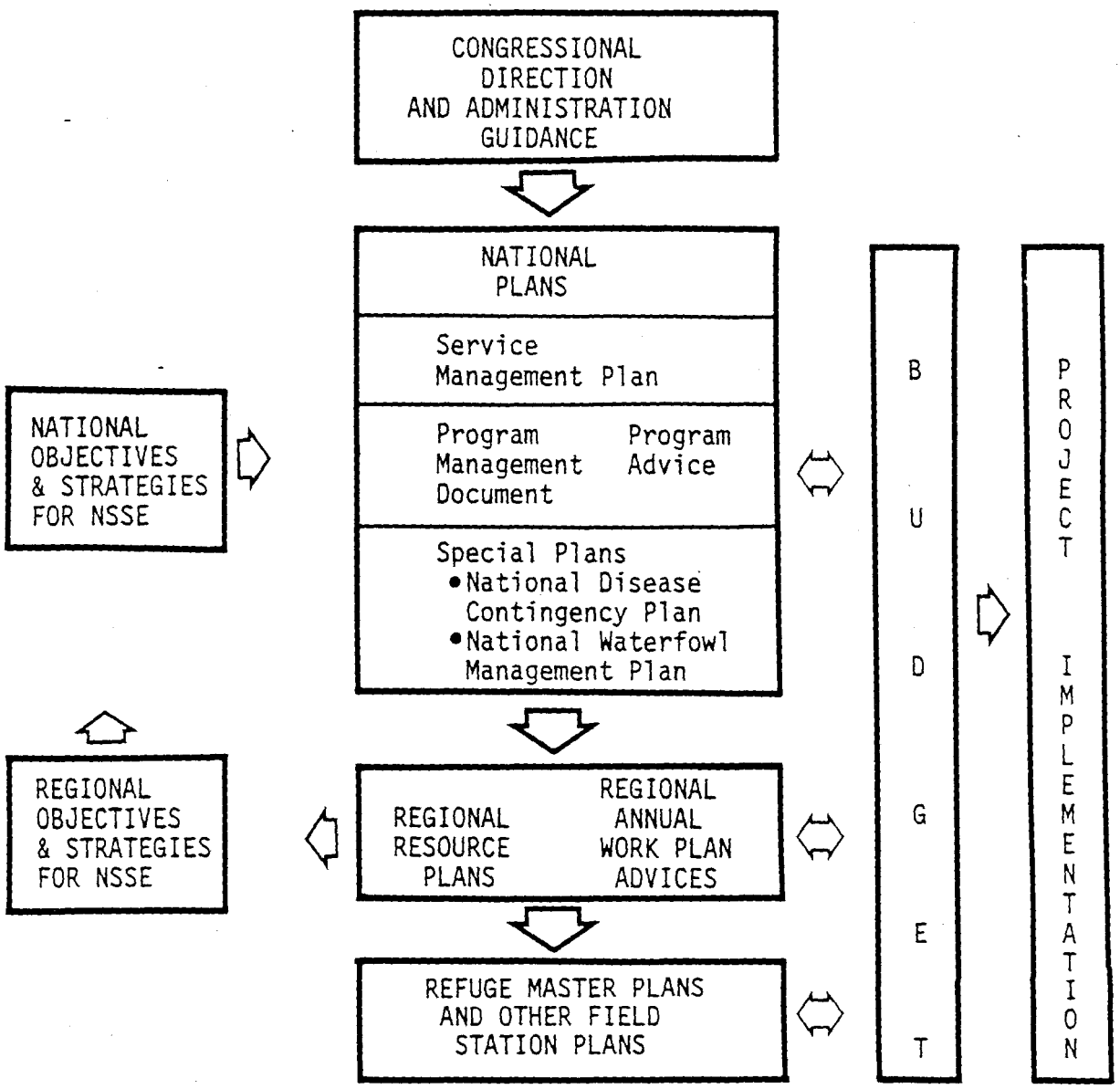
Collectively, this flurry of planning activity underlined the need to develop consistent long-term direction for the management of lands, waters and wildlife resources under FWS jurisdiction. The multiplicity of interests, the conflicting demands of involved parties and the large body of resource information upon which to draw, made it appropriate for the FWS to utilize a planning process that would be directly relevant to a national wildlife refuge, geared to maximize public involvement and based upon a method proven in the real world.

The FWS Refuge Master Planning Program was developed in response to a growing number of challenges facing the National Wildlife Refuge System including: 1) the demand for citizen participation in decisions concerning wildlife resources; 2) potential conflicts between wildlife needs and the need for resources such as minerals, oil and gas; and 3) the critical need for refuges to be part of broader efforts to protect wildlife, including private and other public lands and waters. It was the intent of the FWS to develop a process, appropriate at the field station level, that was consistent with and a logical outgrowth of more generalized planning at both national and regional levels. The FWS' planning framework is illustrated graphically in Figure 1 on page 2.2.

The Service Management Plan and Program Management Documents provide general overall guidance for FWS programs. Beginning in 1981, each of the seven geographic regions of the FWS began the process of stepping down national guidance to the Regional level. Region One (Oregon, Washington, Idaho, California, Nevada, Hawaii and the other Pacific Islands) completed its Regional Resource Plan (RRP) in 1983. In that plan is a section devoted specifically to Hawaii and the Pacific Islands under U.S. jurisdiction. This plan provides guidance oriented specifically to fish and wildlife resource needs, problems and opportunities in the Pacific.

Figure 1

U.S. FISH AND WILDLIFE SERVICE PLANNING FRAMEWORK



Within the vast geographic area covered by the Pacific section of the Region One RRP are a dozen national wildlife refuges, all included within the Hawaiian and Pacific Islands NWR Complex. This Complex, managed from manned facilities on Oahu, Kauai and Tern Island, includes five wetland NWRs, an interpretive site in the main Hawaiian Islands and six remote island NWRs. Within the latter group is the oldest and largest of the NWRs in the Complex, the Hawaiian Islands NWR. When added together, all units in the Complex include approximately 5,435 acres of exposed land and 350,783 acres of submerged lands. Of this total, the Hawaiian Islands NWR accounts for about 71% (1,740 acres exposed land, 252,678 acres submerged lands).

B. Master Planning Process

It is the intent of the FWS that general direction found in the Service Management Plan and various RRPs be further stepped down to master plans developed for specific FWS lands and waters. The major objectives of refuge master planning are to:

1) ensure that national policy direction is incorporated into the management and development of individual refuges;

2) provide continuity to the management programs of individual refuges;

3) provide a systematic process for making and documenting decisions, including the rationale supporting those decisions;

4) determine the capability of individual refuges to assist in meeting the goals, objectives and long-range plans of the FWS on a regional, flyway or national basis;

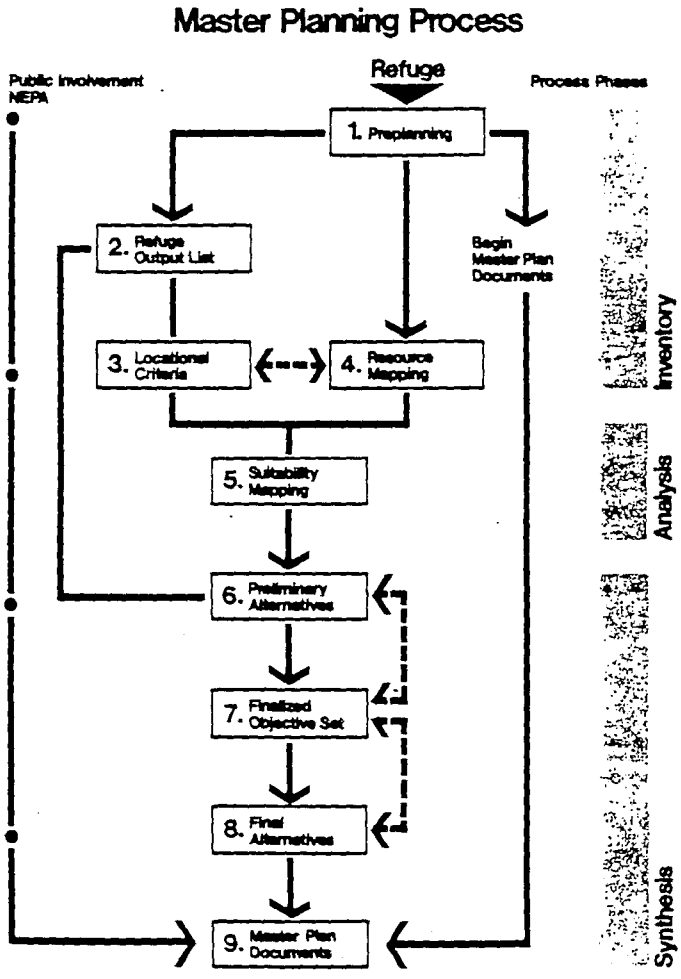
5) produce information and decisions as a basis for the development of budget documents; and

6) provide guidance to refuge managers in the formulation of short-term and mid-term management plans leading toward the attainment of refuge objectives.

The master planning process has been standardized through the development of a Master Planning Workbook and through subsequent review and refinement of procedures at national and regional levels. The process incorporates a series of nine separate steps, grouped into three planning phases. The process begins with an inventory of existing resources. The second phase is an analysis of the capability of the resources to support future land uses. The final phase is a synthesis of data and objectives into a plan to meet present and future needs. For each individual refuge, the process must be adapted somewhat to meet the

specific requirements of the location and resources involved. The process, as adapted for use in the HINWR, is described in more detail within Section V of this report. The national master planning process is illustrated below in Figure 2.

Figure 2



C. Public Involvement/NEPA Compliance

As illustrated in Figure 2, the master planning process incorporates both public involvement and environmental review components, designed to ensure that the final products are responsive to public concerns and to ensure compliance with the National Environmental Policy Act of 1969. The decision whether to proceed directly to the preparation of an

Environmental Impact Statement (EIS) or to first prepare an Environmental Assessment (EA) is made early in the master planning process and is dependent upon the degree of controversy and the anticipated significance of planning decisions. In the case of the HINWR Master Plan, the FWS elected to produce an EIS in view of the long history of public and interagency involvement in NWHI issues and because of the significant influence that master planning decisions would have on the conservation and utilization of this controversial Refuge. The EIS process is designed to provide an opportunity for public scrutiny and to solicit comments from the public, including those other government agencies having expertise and responsibilities in the areas of concern. Most importantly, the EIS process concentrates attention on the issues that are most significant.

In the case of the HINWR Master Plan, the FWS also decided to "hybridize" the plan and associated EIS into one document. This decision has made it possible to consolidate a large volume of information into one document, with appendices, that minimizes redundancy while addressing the most significant issues. The Master Plan/EIS has been organized and formatted in a way that fully satisfies the requirements of the Master Planning Workbook while complying with legal standards for preparation of a federal EIS. In sum, this document is both a master plan for the HINWR and an EIS concerning the implementation of the recommendations in the plan. The purpose of the document, therefore, is to 1) provide guidance for the management, development and use of the HINWR; and 2) incorporate public involvement in decisions concerning the HINWR, as required by federal law and FWS policy.

Public involvement in the HINWR master planning process has taken many forms. Beginning with formal announcement of the master plan at the Tripartite Symposium in May, 1983, the FWS has embarked on a program of public involvement designed to reach the broad spectrum of interests who share in their concern regarding the wise management of HINWR resources. The program has sought to obtain meaningful input and guidance from the public through a variety of methods. To date, this process has included the following:

1) News releases (beginning June 1983)

2) Notice of Intent to prepare an EIS on the HINWR Master Plan (Federal Register, August 2, 1983)

3) Newsletters called "Planning Updates" with requests for input (July and October of 1983 and March and August of 1984)

4) Newspaper announcements and treatment of issues (Honolulu Star-Bulletin, Hawaii Fishing News, West Hawaii Today, Los Angeles Times)

5) Radio spots

6) Presentations for and/or coordination with special interest groups or involved agencies (Western Pacific Regional Fishery Management Council, Hawaii Fisheries Coordinating Council, Honolulu City Council, Hawaii Department of Land and Natural Resources, Hawaii Audubon Society, Sierra Club, National Audubon Society)

7) State Clearinghouse Review process

8) Public Workshop concerning preliminary alternatives (March 20, 1984 - Honolulu)

9) Distribution of the Draft Master Plan/EIS (August 1984)

10) Public workshop concerning the Draft Master Plan/EIS (September 12, 1984)

11) Distribution of the Final Master Plan/EIS (May 30, 1986)

Of the various forms of public involvement undertaken to date, the newsletters and workshop have yielded the information most relevant to the planning process. The first Planning Update was distributed in July 1983 to a mailing list of 357 individuals, agencies and organizations. An additional 113 newsletters were distributed upon request. Of this total of 470 recipients, 111 (23.6%) responded. The second Planning Update, distributed in October 1983, reached a mailing list of 498, but produced only 53 (10.6%) responses. The third Planning Update, distributed in March 1984, reached 484 on the mailing list. More than 75 additional copies were distributed at various meetings and in response to written requests. As of May 15, 1984, a total of 38 (7%) information request forms in the third Planning Update had been returned to the FWS. The fourth Planning Update which was distributed in August 1984 described the various management alternatives under consideration by the FWS; directed reviewers to locations where the Draft Master Plan/EIS was available for review; and publicized the September workshop. Collectively, the public response to the four Planning Updates has proven extremely useful in identifying issues of concern and in developing and refining planning outputs, objectives and management alternatives.

Turnout at a public workshop, held on March 20, 1984, was relatively small, despite considerable effort to publicize the workshop through the third Planning Update, newspapers, radio and posted announcements. Yet, we found the input provided by workshop participants to be extremely

useful in planning and refinement of management objectives and alternatives. Preliminary strategies were critically evaluated and rationale was presented to validate the process. In the process of developing the array of alternatives presented in this report, we drew heavily upon the transcript of this workshop. The second public workshop held on September 12, 1984 was attended by 41 participants, including commercial fishermen, environmentalists, members of the academic and research community, environmental educators, resource management students, and representatives from various state and federal resource management agencies. Overall the group as a whole was in basic agreement with strategies outlined in the Preferred Alternative. Numerous suggestions were made to refine, broaden, or clarify certain strategies within the FWS' proposal.

D. Report Format

The HINWR Master Plan/EIS provides guidance for the management, development and use of this Refuge through a 10-20 year planning period. It was formulated utilizing a wealth of historic information, the results of recent studies and planning efforts, and considerable public input. It conforms to national policy and legislative mandates affecting the management of units of the National Wildlife Refuge System. The Preferred Alternative within the Master Plan/EIS is built upon a mix of strategies that are subject to change in response to new information. It is designed to be adaptable as conditions require.

The Master Plan/EIS includes a description of the Refuge's physical, biological and social environment, a discussion of the authorities and policies affecting planning, objectives for wildlife and public use activities, an analysis of management alternatives considered, including the Preferred Alternative, and a comparative review of the environmental consequences associated with the alternatives.

To reduce the bulk and improve the readability of this document, some of the information developed in this planning process was organized in a Technical Appendix, (bound separately), which includes:

Locational Criteria - information which describes the resource conditions necessary for the production or maintenance of a given output (output defined as "things" produced on the refuge).

Output Summaries - information which provides the background and rationale for development of planning objectives.

E. Operational/Management Planning

It is the policy of the FWS to prepare management plans for refuges with approved master plans. As an extension of master planning, management planning is the process by which specific operational activities leading to achievement of refuge objectives are identified and described. Examples of management plans likely to be prepared for the HINWR include predator control, research, oil spill response, disease contingency, etc. Based on realistic expectations of station funding levels over a multi-year period, management planning defines specifically how objectives will be met and to what extent. By identifying in detail that part or parts of the master plan that can be reasonably implemented, the management plan forms the basis for annual work planning and annual budgeting. Management planning for the HINWR is expected to occur over a multi-year period following approval of the Master Plan/EIS.

III

AFFECTED ENVIRONMENT

A. Physical Environment

1. Geology

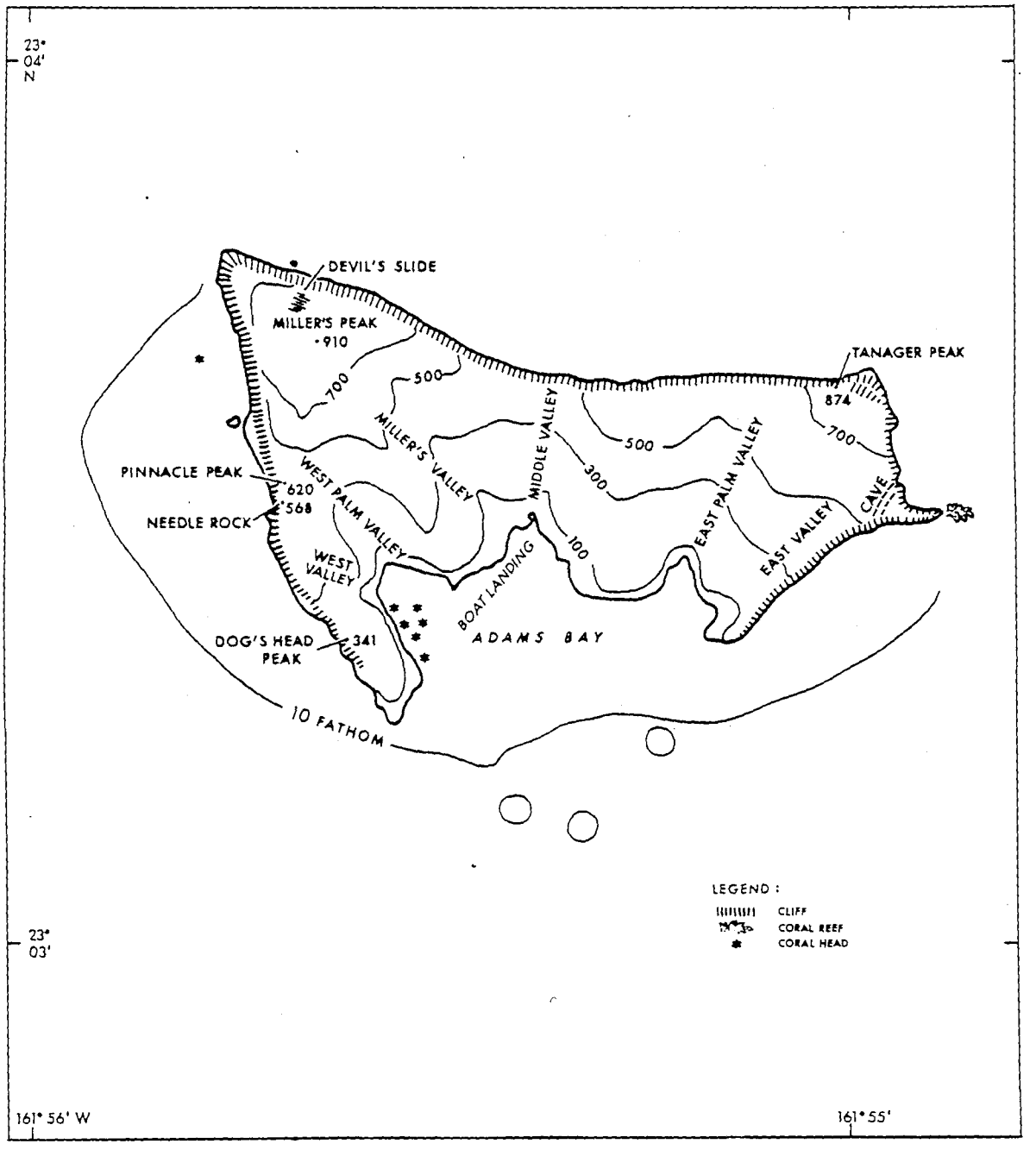
Current theory holds that a stationary "hot spot" below the Pacific tectonic plate is responsible for the origin of the volcanic Hawaiian and adjacent Emperor chain which together, extend more than 2,000 miles across the north-central Pacific Ocean. Islands formed at this hot spot are moving northwestward on the Pacific plate. Erosion and island subsidence gradually transformed the high islands to small pinnacles as they moved further to the northwest. As these basaltic islands submerged, fringing coral reefs formed atolls. At a point in the archipelago between 27-31 degrees North ("Darwin Point"), coral growth fails to keep up with the continued submergence/erosion of volcanic islands and the atolls "drown" to form guyots.

The emergent main Hawaiian Islands reveal various stages of the volcano formation, erosion and subsidence process. Nihoa and Necker are the first two islands of the portion of the Hawaiian archipelago known as the Northwestern Hawaiian Islands (NWHI) or "Leeward Islands". Nihoa rises approximately 900' above sea level. Its steep topography and crater shape reveal its volcanic origin. Necker Island, less than 300' in elevation and 46 acres in area, consists of thin-layered weathered lava flows. La Perouse Pinnacles at French Frigate Shoals and Gardner Pinnacles are the last exposed volcanic remnants in the archipelago. French Frigate Shoals is a crescent shaped atoll nearly 18 miles across. More than a dozen small sandy islands dot the fringes of this atoll. Maro Reef is a largely submerged area marked by breakers and a few pieces of coral that intermittently protrude above the waterline. Laysan Island is nearly two square miles in size and is fringed by a reef. A 200-acre hypersaline lagoon is located in the center of Laysan Island. Lisianski Island is 364 acres in size, but is bounded to the north by an extensive reef system. A central lagoon once found on Lisianski Island has filled with sand. The last atoll in the HINWR is Pearl and Hermes Reef. This inundated atoll includes nearly 100,000 acres of submerged reef and seven small sandy islets totaling less than 85 acres.

Midway Atoll, a U.S. Naval air facility, is similar in characteristics to atolls within the Hawaiian Islands National Wildlife Refuge (HINWR). Four islands, totaling some 1,100 acres, are found within the atoll. The two largest of these, Sand and Eastern islands, are highly altered by man.

Kure Atoll is the northernmost exposed land in the Hawaiian archipelago. Two islands, Green and Sand, are found on the southern edge of the atoll and are included in the Hawaii State Seabird Sanctuary System. Green Island has been altered considerably to also function as a Coast Guard LORAN station.

Map 2



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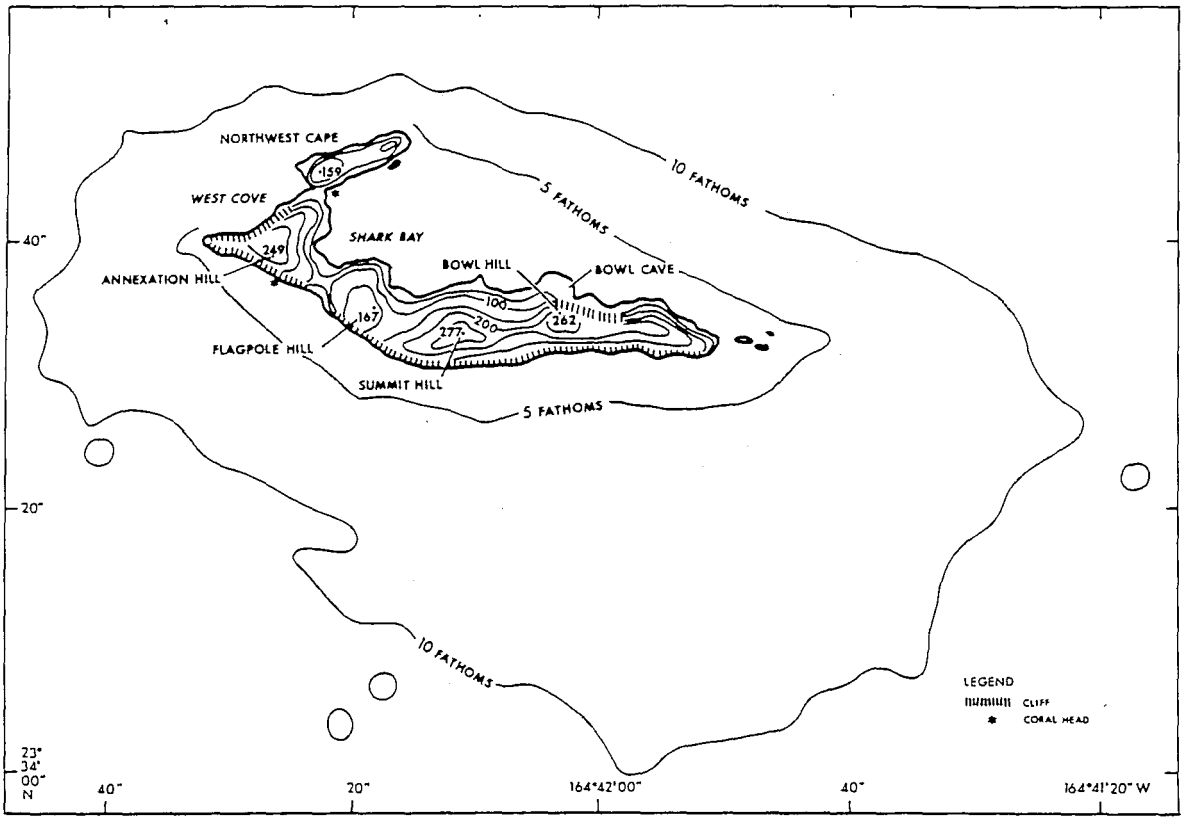
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
NIHOA ISLAND
North Pacific Ocean

Map 3



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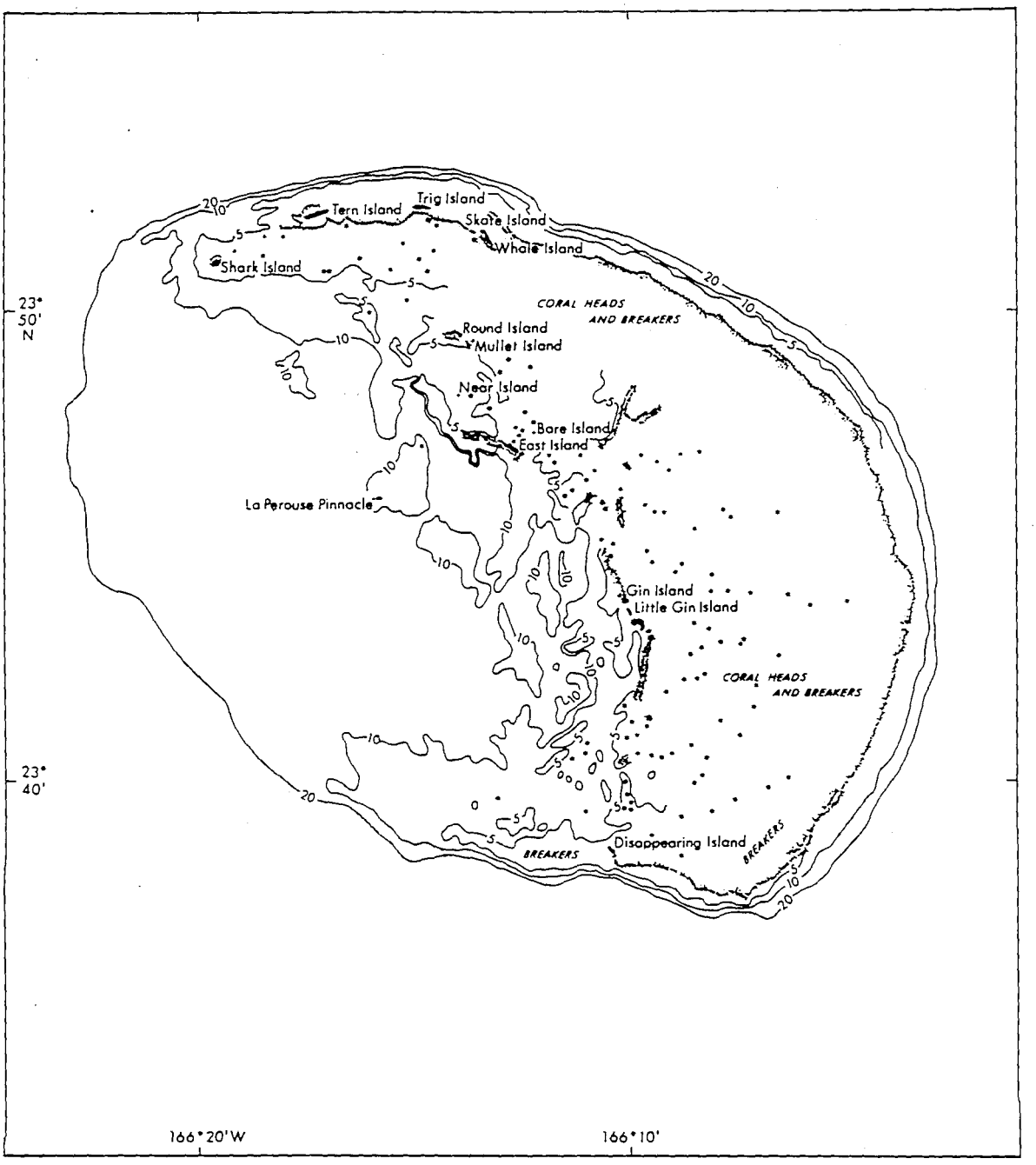
HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE
NECKER ISLAND
North Pacific Ocean

Map 4



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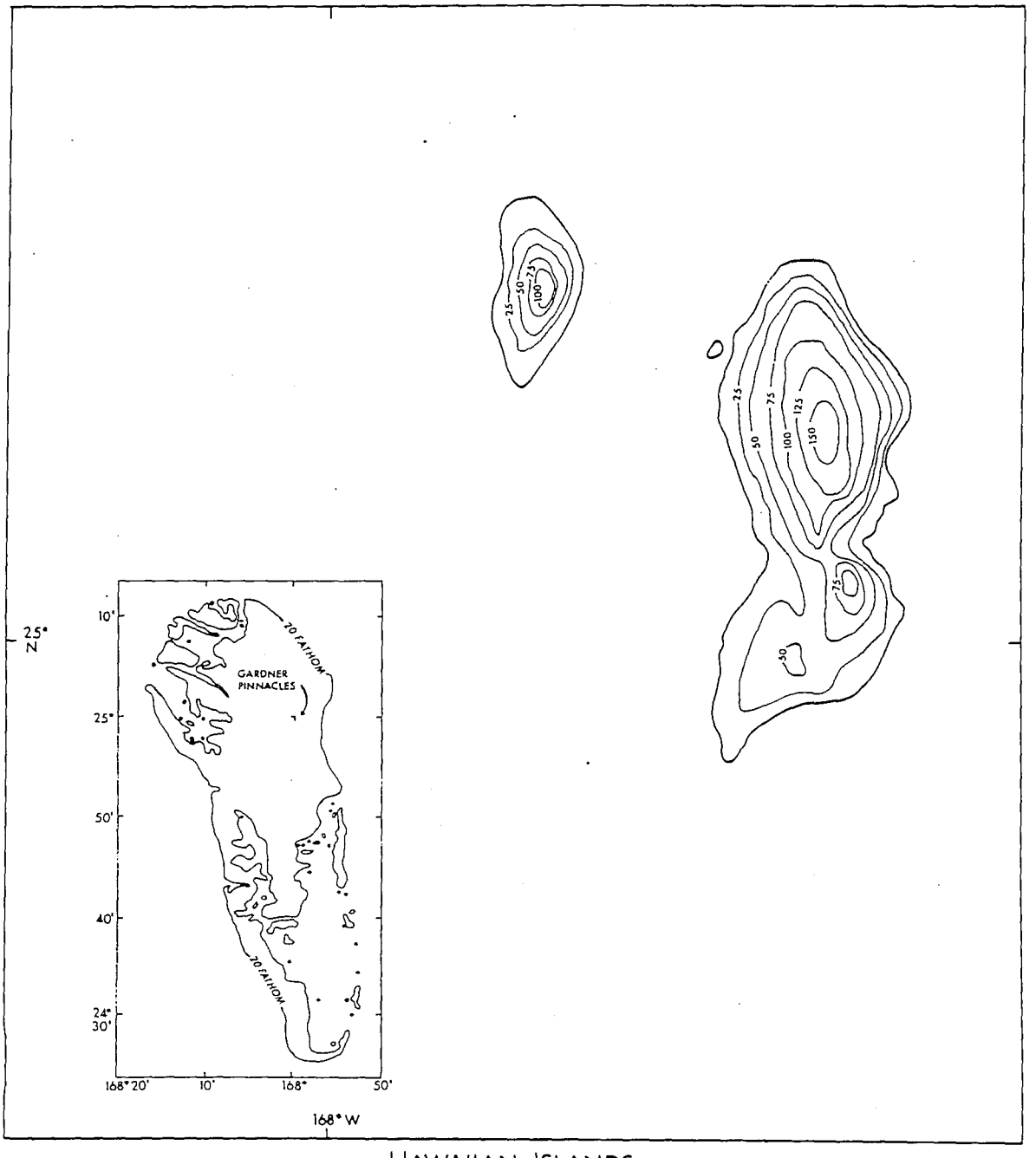
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
FRENCH FRIGATE SHOALS
North Pacific Ocean

Map 5



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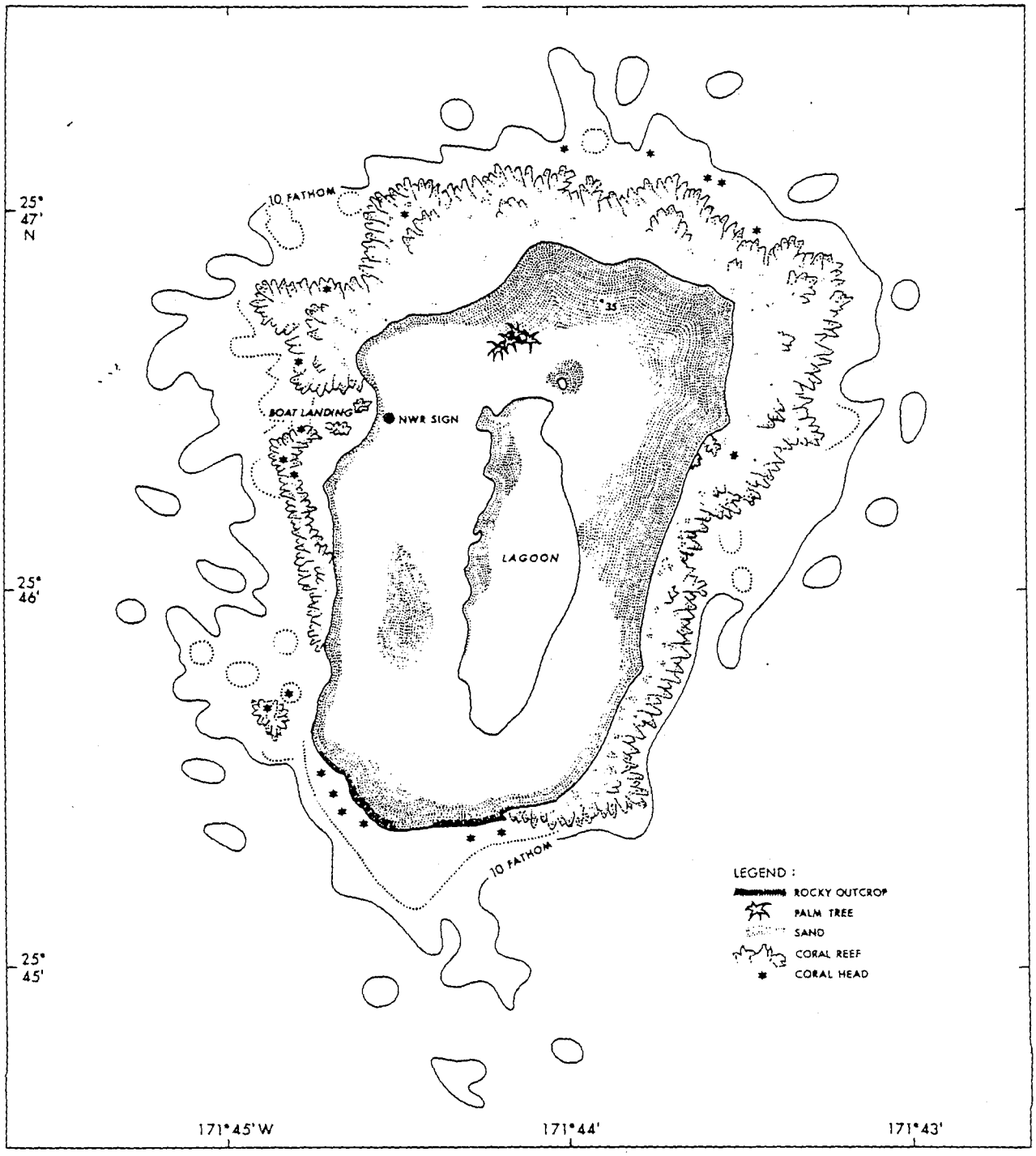
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
GARDNER PINNACLES
North Pacific Ocean

Map 6



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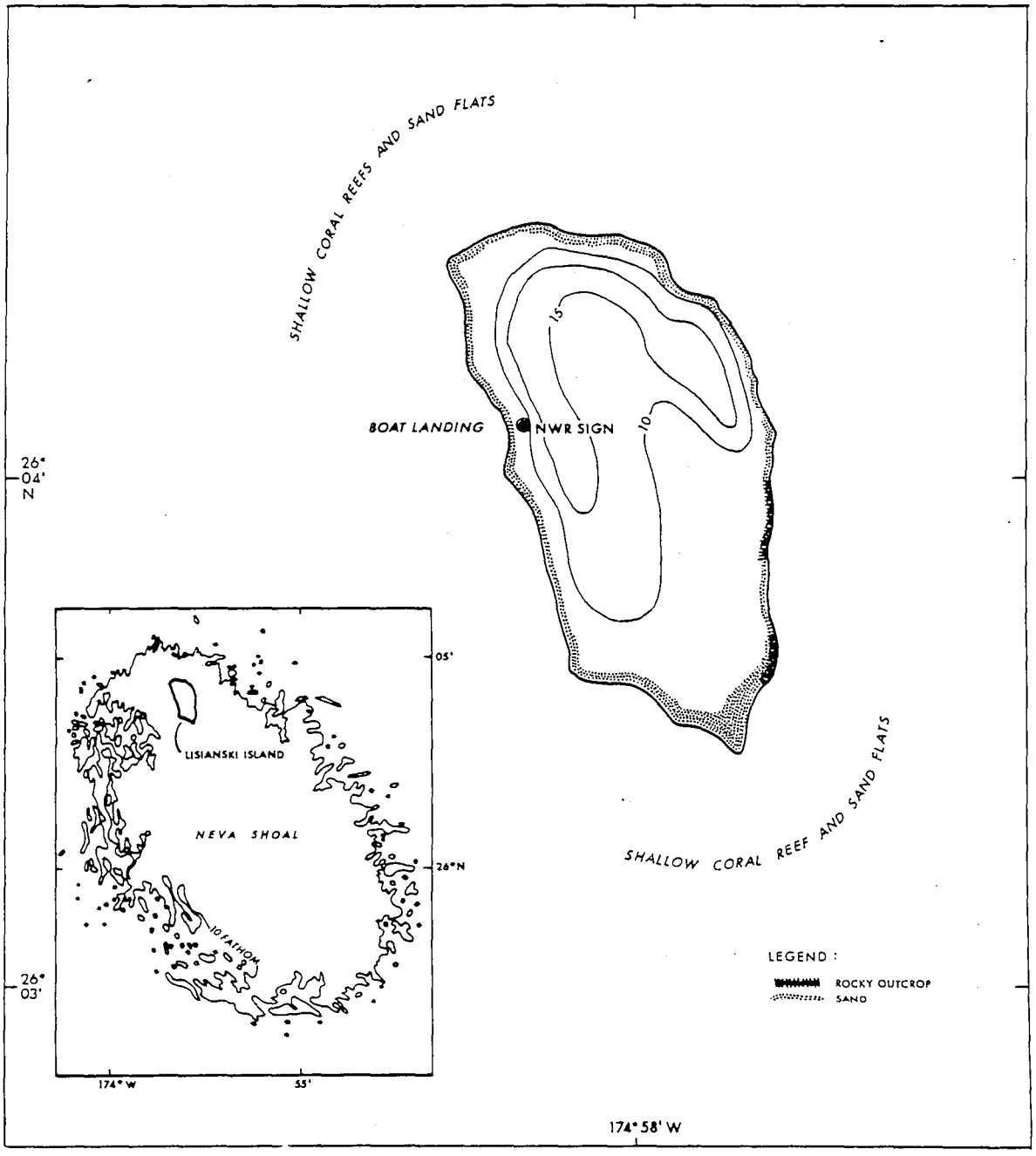
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
LAYSAN ISLAND

Map 7



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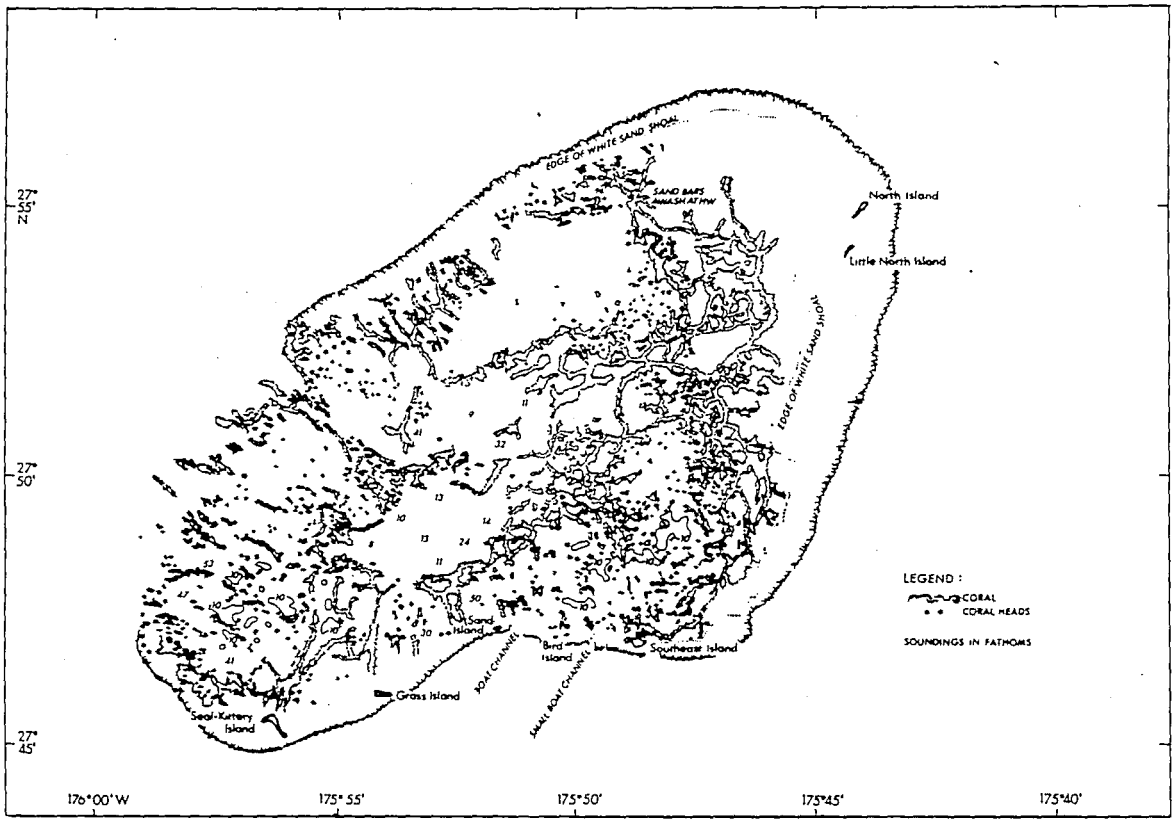
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
LISIANSKI ISLAND
North Pacific Ocean

Map 8



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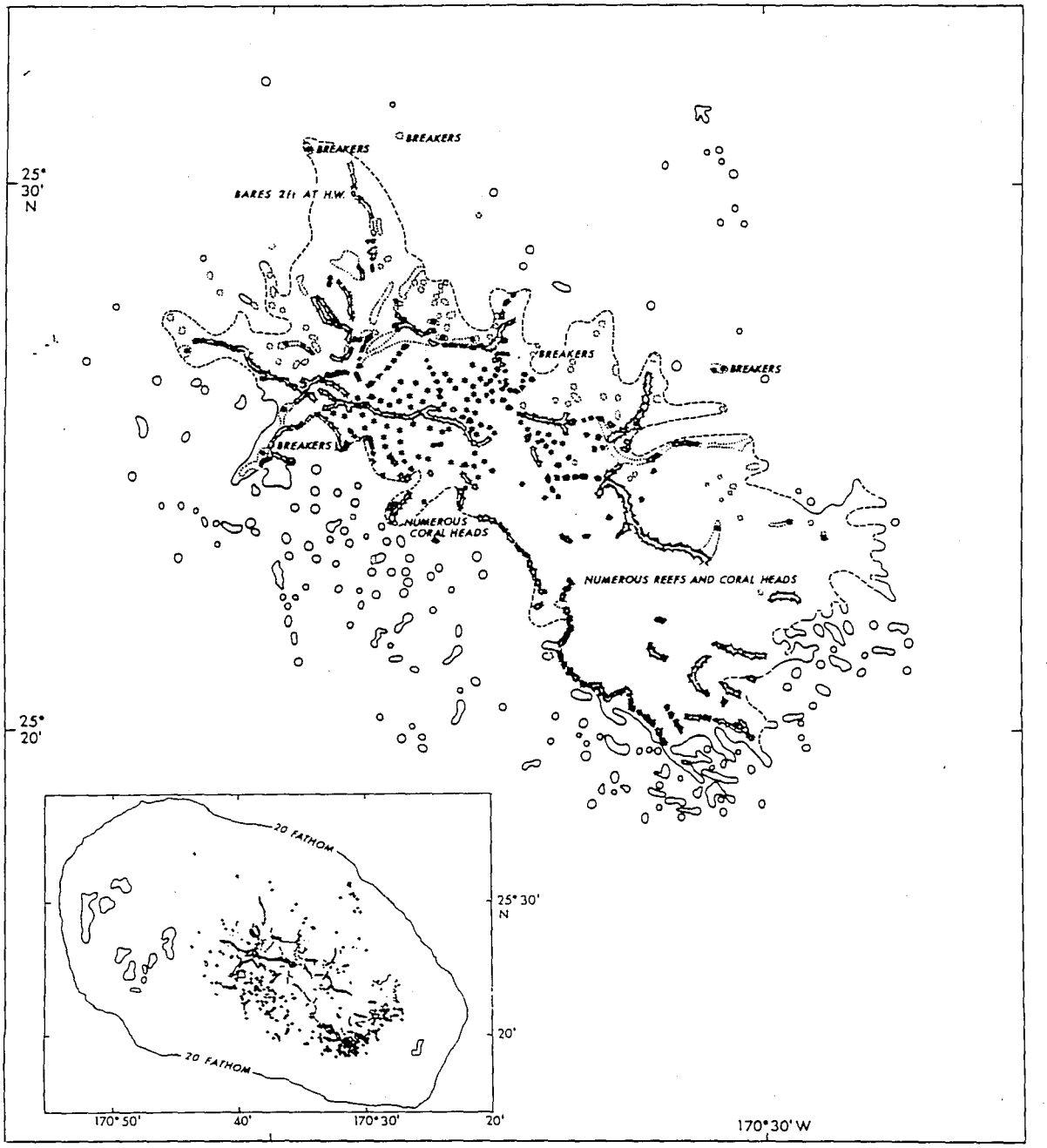
HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE
PEARL AND HERMES REEF
North Pacific Ocean

Map 9



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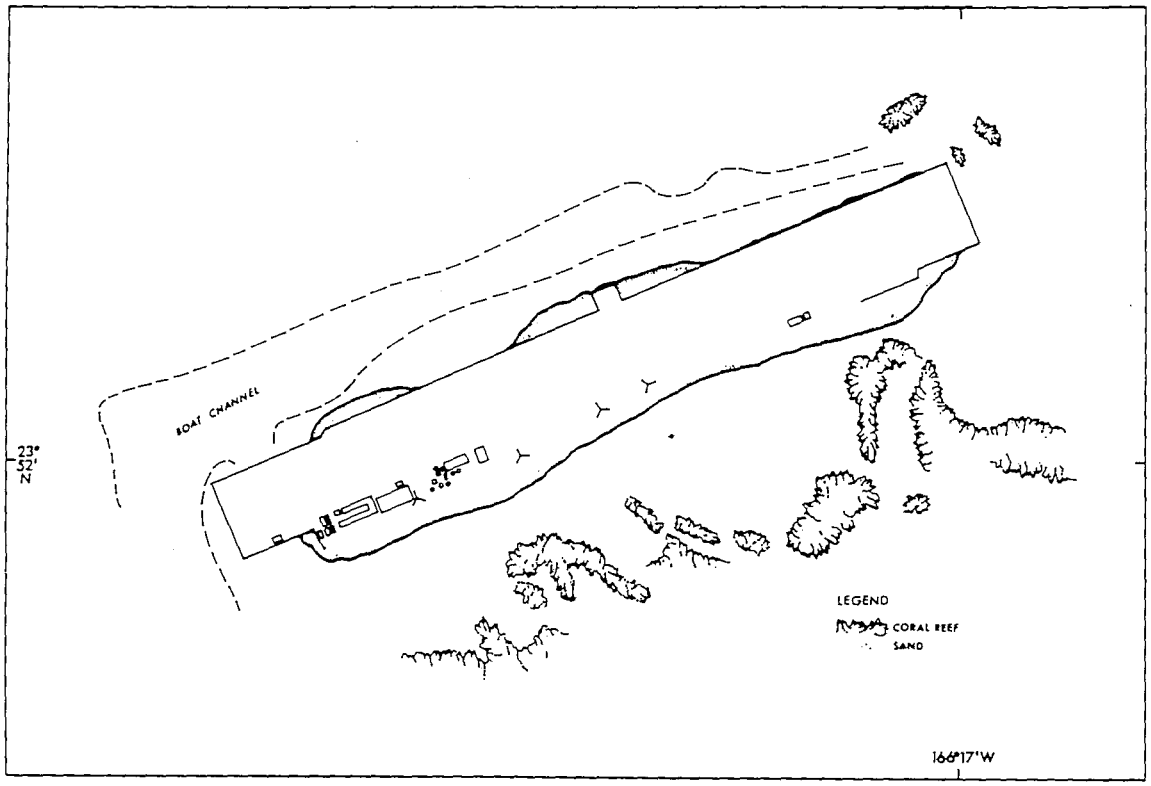
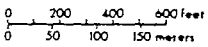
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
MARO REEF
North Pacific Ocean

Map 10





HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE
TERN ISLAND
North Pacific Ocean

2. Soils

The volcanic NWHI (Nihoa, Necker, La Perouse, Gardner) are composed of basalt. Bird guano also comprises a significant portion of the soil. The sandy NWHI are composed of loose calcareous sand, shells and coarse coral rock rubble. Some humus can be found in vegetated areas. Many of the smaller sandy islets undergo radical changes in shape and size due principally to wave erosion and nearshore currents.

The physical characteristics of individual islands at French Frigate Shoals and Midway and Kure Atolls have been altered through past human activity. Of these altered islands, only Tern Island is within the HINWR. Originally less than 11 acres in size, this islet was enlarged to approximately 37 acres by placement of dredged sand and coral from adjacent areas. Sheet piling contained the fill when the rectangular island was constructed in 1942. Since that time, sand has accreted along the south shore and eroded from the north and west shores.

3. Water

The only permanently standing water in the HINWR is the hypersaline lagoon at Laysan. Percolation of rain water through sand is rapid. Fresh water, being slightly lighter, tends to float on salt water below the ground or is trapped by cap rock of phosphatized coral. The coral cap rock overlays the basaltic volcanic base. Historic records reveal that potable brackish water could be found 5-10' below the ground surface on several of the sandy NWHI. On the rocky islands, rain water percolates through the porous basalt until it reaches layers of dike material. Ground water flows along the upper surface of dense materials and where it reaches the ground surface, fresh water seeps are found.

Ocean current movement in the Hawaiian region is typically from east or northeast to west or southwest. Circulation within the NWHI atolls varies considerably with reef configuration, water depth and the location and size of natural passages in the reef. Ocean waves typically break across exposed northern and eastern reefs. Swells within atoll lagoons generally run below four feet, but can exceed 8-10' on particularly windy days. Circulation within atolls has considerable effect on the shoreline configuration, size and shape of small sandy islets. Prior human activities affecting bottom topography, such as the channel dredging project adjacent to Tern Island, have altered water circulation patterns to some degree.

4. Climate

Climate of the NWHI is marine and tropical in character. Moderate easterly winds prevail most of the year, but strong westerly winds do

occur infrequently. Temperature variation in the NWHI is slight. Annual precipitation varies somewhat throughout the chain, ranging from 30-50". Most rain falls in the four month period between December and March. Severe storms, typhoons and tidal waves are relatively uncommon in the NWHI, but occur with sufficient frequency to affect human activities and the terrestrial environment of these islands.

B. Biological Environment

1. Terrestrial Community - Plants and Invertebrates

Less than three square miles of emergent land in the HINWR supports a rich and diverse terrestrial biota, including many species unique (endemic) to these islands. The endemic terrestrial biota includes at least 12 plant species, 8 land snails and an arthropod fauna in excess of 50 species (Conant, et al., 1984). This list is, at best, preliminary as many of the less conspicuous species have been discovered only recently.

Among the most important endemic plant species in the NWHI is the Nihoa palm (Pritchardia remota), although several other less conspicuous plant species are also found only on this 168-acre island. Many other terrestrial plant species are indigenous (also found naturally elsewhere) to these islands or are exotic species that were introduced accidentally or intentionally by man. Among the indigenous or endemic species are 13 species that are especially vulnerable to extinction and are considered candidates for federal listing as endangered or threatened. These are listed in Table 1, page 3.13. The most common and widely distributed plant species in the NWHI, the beach naupaka (Scaevola taccada), are among the 37 recorded indigenous species. Not surprisingly, the vast majority of the 112 known exotic species in the NWHI are found on islands inhabited by man (Herbst, 1981).

The endemic land snail fauna of the Hawaiian Islands includes over a thousand species which evolved from an estimated 25 immigrant species. This group of molluscs in Hawaii represents a remarkable example of the evolutionary process in an island environment. Many of the main Island land snails are now extinct, victims of several centuries of habitat change. Eight land snail species are known from the HINWR, seven of these on Nihoa Island alone. Alteration of the natural vegetation on other islands, particularly Laysan, has degraded the quality of land snail habitat.

Of the terrestrial species, the arthropod fauna is most ecologically diverse. The endemic Hawaiian insect fauna alone includes more than 7,000 species evolved from about 250 original colonist species. Equally spectacular evolution has occurred among Hawaii's spider fauna. The

Table 1

CANDIDATE ENDANGERED PLANTS OF THE NORTHWESTERN HAWAIIAN ISLANDS

Species	Location
Amaranthaceae	
Amaranthus brownii Christopherson & Caum[1]	Nihoa
Achyranthes atollensis St. John[2]	Kure, Pearl & Hermes, Midway, Laysan
Arecaceae	
Prichardia remota Becc.[1]	Nihoa
Caryophyllaceae	
Schiedea Verticillata F. Br.[1]	Nihoa
Cucurbitaceae	
Cladocarpa atollensis (St. John) St. John[1]	Kure, Laysan
Cladocarpa caumii (St. John) St. John[1]	Pearl & Hermes
Cladocarpa lamoureuxii (St. John) St. John[1]	Kure, Lisianski
Cladocarpa semitonsus (St. John) St. John[1]	Laysan
Sicyos laysanensis St. John[1]	Laysan
Sicyos nihoaensis St. John[1]	Nihoa
Fabaceae	
Sesbania tomentosa H & A[1]	Necker, Nihoa
Lamiaceae	
Phyllostegia variabilis Bitter[2]	Midway, Laysan
Poaceae	
Cenchrus agrimonioides var. *laysanensis* F.Br.[2]	Kure, Midway, Laysan

1. Taxa for which FWS has substantial information to support the biological appropriateness of proposing to list the species as endangered or threatened.

2. Same as #1, but the taxon is possibily now extinct.

islands of the HINWR, particularly Nihoa, have revealed a diverse endemic arthropod fauna consisting of nearly 500 species. More than half of the species collected on Nihoa alone are endemic. Large flightless tree crickets, giant earwigs, and unique spiders are among the array of endemic arthropods collected during recent studies in the HINWR. Inevitably, others await discovery. All of these endemic arthropods share the NWHI terrestrial habitat with nearly 300 exotic species. Thirty-two species are considered candidates for federal listing as threatened or endangered. (See Table 2 below.)

The unique terrestrial plant and invertebrate species of the HINWR are components of ecosystems which evolved in the absence of human influence. Continued survival of each is tied in some way to each other, as habitat, as prey, or as cover. These species, in turn, form the foundation of ecosystems which support endemic land birds. The invasion of exotic species onto these islands threatens the integrity of these ecosystems. Change may be dramatic, as was the case when rabbits devegetated Laysan Island. Yet the effects of less conspicuous exotics may ultimately be even more destructive.

Table 2

CANDIDATE ENDANGERED INVERTEBRATES OF THE NORTHWESTERN HAWAIIAN ISLANDS

Grasshoppers, Crickets, and Katydids (Insects, Order Orthoptera)	
Banza nihoae	Nihoa
True Bugs (Insects, Order Hemiptera)	
Nysius frigatensis[1]	French Frigate Shoals
Nysius fullawayi[1]	Pearl & Hermes, Lisianski, possibly Midway
Nysius neckerensis[1]	Necker
Nysius nihoa[1]	Nihoa
Nysius suffusus[1]	Nihoa
Beetles (Insects, Order Coleoptera)	
Plagithmysus nihoae[1]	Nihoa
Odemas breviscopum[1]	Nihoa
Odemas erro[1]	Nihoa
Odemas laysanensis[1]	Nihoa, Necker, Laysan
Odemas neckerensis[1]	Necker
Pentorthrum blackburni[1]	Laysan (also Oahu)
Rhyncogonus biformis[1]	Necker
Rhyncogonus bryani[1]	Laysan
Rhyncogonus exsul[1]	Nihoa

Table 2 (Continued)

CANDIDATE ENDANGERED INVERTEBRATES OF THE NORTHWESTERN HAWAIIAN ISLANDS

Beetles (Insects, Order Coleoptera)(Continued)	
Stenotrupis pritchardiae[1]	Nihoa (also Oahu, Molokai, Kauai, Hawaii, Maui)
Itodacnus novicornis[1]	Necker
Itodacnus paradoxus[1]	Necker
Flies (Insects, Order Diptera)	
Bryania bipunctata[1]	Nihoa
Butterflies and Moths (Insects, Order Lepidoptera)	
Petrochroa neckerensis[1]	Necker
Agrotis fasciata[2]	Midway
Argrotis kerri[2]	French Frigate Shoals
Argrotis laysanensis[2]	Laysan
Argrotis procellaris[2]	Laysan
Helicoverpa minuta[2]	Lisianski
Hypena laysanensis[2]	Laysan
Hedylepta laysanensis[2]	Laysan
Oeobia dryadopa[1]	Laysan
Ants, bees, and Wasps (Insects, Order Hymenoptera)	
Sclerodermus nihoaensis[1]	Nihoa
Eupelmus nihoaensis[1]	Nihoa
Nesoprosopis anthracina[3]	Lisianski (also Oahu, Molokai, Lanui, Maui, Hawaii)
Nesoprosopis perkinsiana[1]	Nihoa (also Oahu, Molokai, Hawaii where presumed extirpated)

1. Taxa for which information now in possession indicates that proposing to list the species is possibly appropriate, but for which conclusive data on biological vulnerability and threats are not currently available.

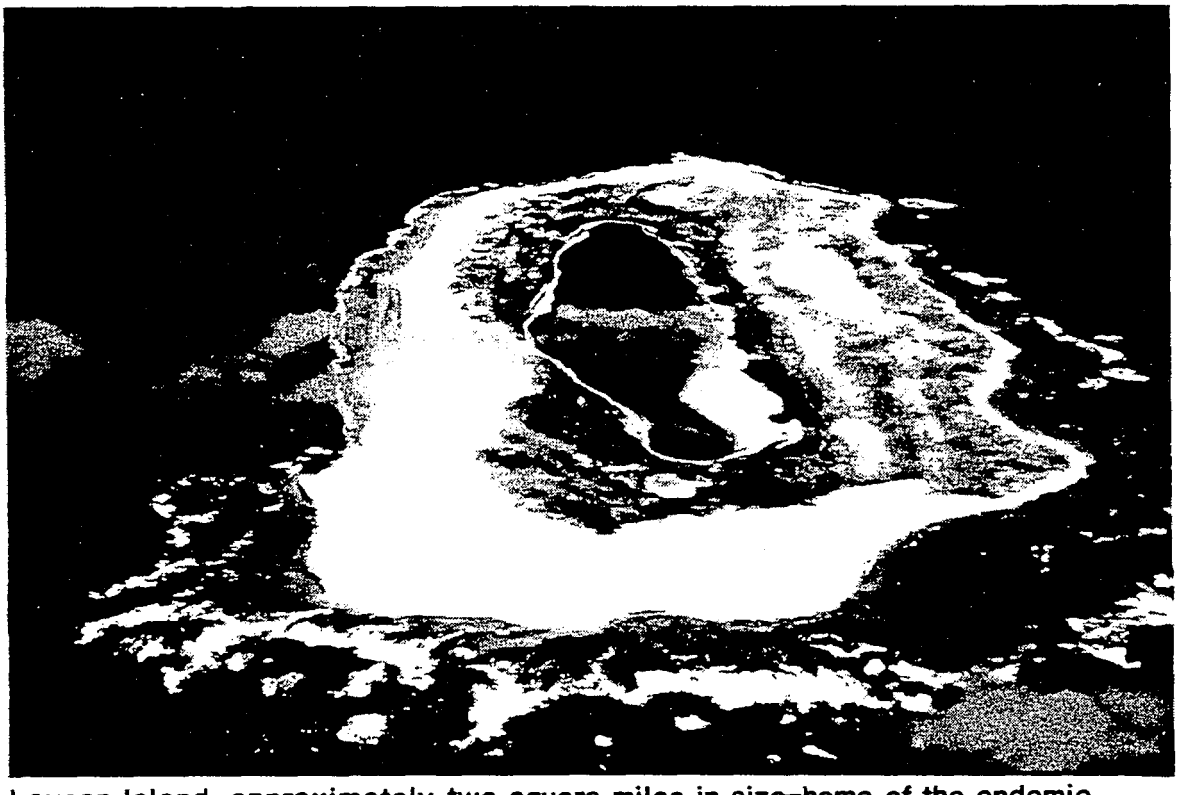
2. Taxa for which the FWS has persuasive evidence of extinction.

3. Same as 2, except taxa thought to be extinct.

2. Terrestrial Community - Land Birds

Seven endemic land bird species were known to exist in the HINWR. All were found either on Nihoa or Laysan islands. Of these, three species from Laysan (Laysan honeycreeper, Laysan rail and Laysan millerbird) became extinct in the early part of this century due to the devegetation of the their habitat by introduced rabbits. Two Laysan bird species survived this event.

The Laysan finch (Telespyza cantans) is presently found both at Laysan Island and at Pearl and Hermes Reef, where it was introduced intentionally to provide a hedge against extinction in its natural habitat. The current population is estimated at about 10,000 on Laysan and 500 distributed on several islets at Pearl and Hermes Reef. Laysan finches nest in clumps of bunch grass and feed on insects, plant parts and seabird eggs. The Laysan duck (Anas laysanensis) is restricted in natural distribution to Laysan Island, although it is maintained and bred in zoos around the world. The devegetation of Laysan caused the duck population to drop to less than a dozen individuals. The current population appears to fluctuate widely, but may range as high as 600 birds. The species is intimately dependent on the Laysan lagoon as a source of food (brine flies) and water. Neighboring vegetation provides cover for nesting.



Laysan Island, approximately two square miles in size—home of the endemic Laysan finch and Laysan duck.

Two endemic land birds inhabit Nihoa Island. The Nihoa finch (Telespyza ultima) is closely related to the Laysan finch. Both are believed to be similar in appearance and habits to the original colonist species that ultimately evolved into the more than 50 species and subspecies in the unique Hawaiian subfamily of birds, Drepanidinae. The Nihoa finch population may fluctuate between 2,000-4,000. They nest in holes in the cliffs or on rocky outcroppings. Nihoa finches feed on seeds, shoots and flower heads of plants, arthropods and seabird eggs. They drink water from fresh water seeps on the island. An attempted transplant of this species to Tern Island failed in the 1960's. The Nihoa millerbird (Acrocephalus familiaris kingii) is closely related to the extinct Laysan millerbird. Nihoa millerbirds number between 200-500 birds. They are associated with dense native vegetation that covers approximately 2/3 of the island. Millerbirds forage within vegetation and on the soil surface for various insects and other invertebrates.

The land bird fauna of the NWHI also includes a variety of introduced resident species and vagrants from other locations which occasionally land on these remote islands. Canaries, pigeons and mynas are well established on Sand Island at Midway. Vagrant land birds in the NWHI include, among others, mockingbirds, cattle egrets and short-eared owls.

3. Terrestrial Community - Seabirds and Other Species

The NWHI support among the most important seabird colonies in the world. They harbor approximately 5.4 million breeding birds of 18 species. (See Table 3, page 3.18.) Among these are albatross (2), petrels (2), shearwaters (2), storm-petrels (1), tropicbirds (1), boobies (3), frigatebirds (1), and terns (6). Together with non-breeding birds of these species, the total NWHI resident seabird population exceeds 12-14 million birds. Although there are also several seabird colonies within the main Hawaiian Islands, the NWHI colonies harbor more than 90% of the total Hawaiian archipelago seabird population.

No seabird species are endemic to the NWHI, yet these islands do provide breeding habitat for a substantial portion of the worldwide population of at least four species, the black-footed albatross, Laysan albatross, Bonin petrel and the sooty storm-petrel. For some seabird species it is difficult to assess the relative importance of the NWHI populations because estimates of populations elsewhere are unavailable. However, the NWHI populations of Christmas shearwater, gray-backed tern, and the blue-gray noddy are sizable and may be the most important populations worldwide. The sooty tern, the most abundant breeding seabird in the central Pacific, is also the most numerous nesting seabird in the NWHI, accounting for almost half of the total breeding population.

Table 3

SEABIRDS BREEDING IN THE NORTHWESTERN HAWAIIAN ISLANDS

Common Name	Scientific Name	# of Pairs
Black-footed albatross	*Diomedea nigripes*	49,000
Laysan albatross	*Diomedea immutabilis*	379,000
Bonin petrel	*Pterodroma hypoleuca*	331,500
Bulwers petrel	*Bulweria bulwerii*	103,000
Wedge-tailed shearwater	*Puffinus pacificus*	261,500
Christmas shearwater	*P. nativitatis*	3,000
Sooty storm petrel	*Oceanodroma tristrami*	7,500
Red-tailed tropicbird	*Phaethon rubricauda*	11,500
Masked booby	*Sula dactylatna*	2,500
Brown booby	*S. leucogaster*	500
Red-footed booby	*S. sula*	5,500
Great frigatebird	*Fregata minor*	10,000
Gray-backed tern	*Sterna lunata*	51,000
Sooty tern	*Sterna fuscata*	1,330,500
Blue-gray noddy	*Procelsterna cerulea*	4,000
Brown noddy	*Anous stolidus*	93,000
Black noddy	*A. tenuirostris*	16,500
White tern	*Gygis alba*	15,000

Adapted from Fefer et al., NWHI Symp. 1984.

Nearly one-half million seabirds of 17 species breed on Nihoa Island each year. This high rocky island provides abundant nest sites for crevice and cavity nesting petrels and noddies. Over 95% of the Bulwer's petrels and half the NWHI blue-gray noddy population occur on Nihoa. In total, this island harbors the largest NWHI colonies for six seabird species. Necker Island and Gardner Pinnacles together provide habitat for over 100,000 breeding seabirds of 16 and 12 species, respectively.

French Frigate Shoals provides rocky habitat for cavity nesters (La Perouse Pinnacle) and sandy habitat for burrow nesters. It is the only atoll in the NWHI at which all 18 breeding seabird species are found. About 200,000 seabirds nest here each year, including the largest NWHI colony of masked boobies.

Approximately 2 million seabirds of 17 species breed annually on Laysan Island. Only the crevice nesting blue-gray noddy is absent. Laysan Island supports the world's largest black-footed albatross colony and the largest wedge-tailed shearwater and Christmas shearwater colonies in the NWHI. Feather and egg hunters near the turn of the century killed

hundreds of thousands of seabirds at Laysan. The Island was nearly devegetated by rabbits. Only after eradicating this pest and several decades of recovery, have most seabird populations returned to levels comparable to those before the decline. However, the Laysan albatross and Christmas shearwater populations have not fully recovered.

Lisianski Island supports a breeding seabird population nearly as large as Laysan's. The sooty tern alone accounts for a million or more birds. The Bonin petrel is the next most numerous bird, with its burrows scattered across virtually the entire island. Lisianski Island has the largest NWHI colonies of both Bonin petrels and gray-backed terns.

About 165,000 breeding seabirds of 17 species breed on islets at Pearl and Hermes Reef. Over 20% of the world's population of black-footed albatross are found on islets totalling less than 85 acres in area. The atoll is also an important nesting site for the sooty storm-petrel. Feather hunting also occurred at Pearl and Hermes during the early part of this century, but seabird populations appear to have recovered.

Midway and Kure Atolls are not in the HINWR, but harbor significant populations of seabirds found throughout the archipelago. Midway has the world's largest nesting colony of Laysan albatross, as well as the largest NWHI nesting colony of red-tailed tropicbirds, black noddies and white terns. Over 550,000 seabirds of 14 species breed at Midway. In addition, a small number of short-tailed albatross (Diomedea albatrus), an endangered species largely restricted to Japan, appear regularly at Midway. Islands at Kure Atoll support many of the same seabird species as Midway, but harbor a substantially larger population of brown and masked boobies. Both Kure Island and Midway Island seabird populations have suffered declines due to the presence of introduced rats. Burrow nesters have been most severely impacted.

Several arctic breeding shorebird species winter on islands in the Pacific basin, including the NWHI. Regular migrants include the Pacific golden plover (Pluvialis dominica), ruddy turnstone (Arenaria interpres), sanderling (Calidris alba), wandering tattler (Heteroscelus incanus) and the bristle-thighed curlew (Numenius tahitiensis). More than a dozen other shorebird species appear irregularly on the NWHI during fall and winter months. Migratory waterfowl appear in low numbers as well. The greatest numbers of NWHI migrants appear at the Laysan Island central lagoon.

4. Marine Community - Reef Species

The geological and biological characteristics of the nearshore marine community in the NWHI are intimately tied to the volcanic origin of the Hawaiian Islands and the northwestward movement of the Pacific plate. Fringing reefs of larger sandy islands and shallow atoll lagoons are

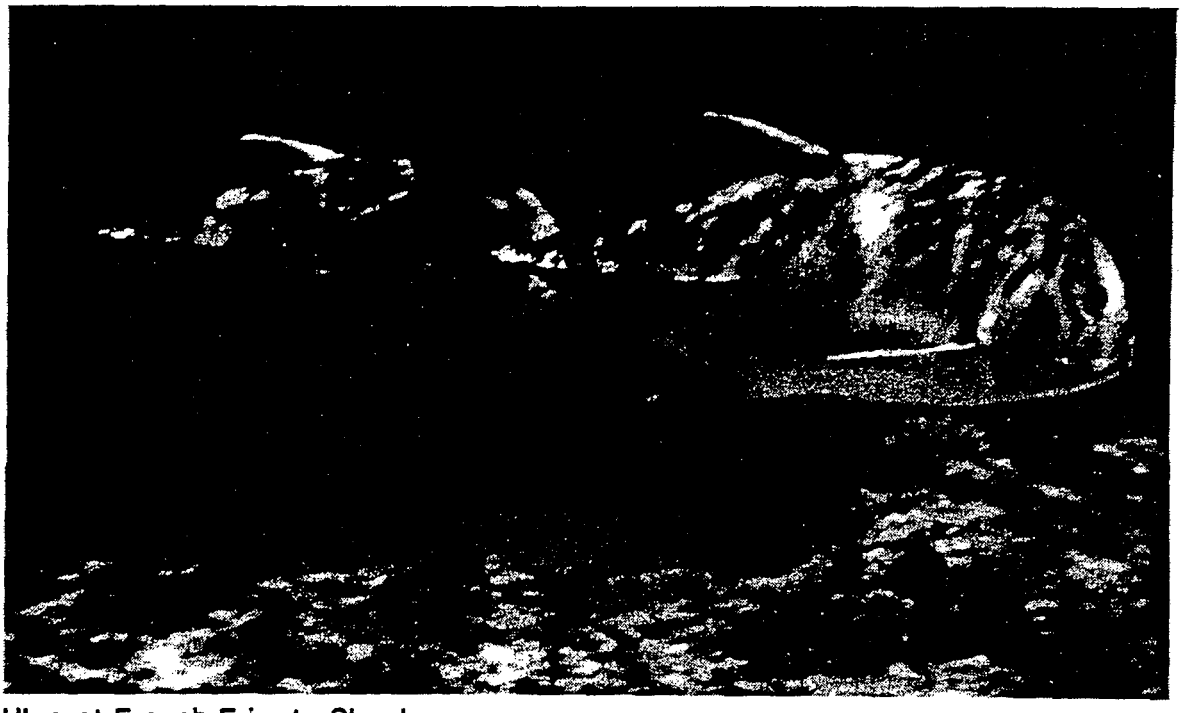
extensive in area. Corals are the most conspicuous members of the reef community. Yet, several studies have shown that limestone production by coralline algae, molluscs, echinoderms and foraminifera is also significant (Grigg and Dollar, 1980). Coral reefs provide habitat, shelter and food for most reef inhabitants, including species such as monk seals and turtles that also spend time on land.

Recent studies have clearly demonstrated a pattern of declining coral growth as a function of latitude in the NWHI (Grigg, op. cit.). Yet, no large differences in coral community structure have been documented within the archipelago. Variations in coral species dominance do occur and some types of coral, such as the genus Acropora, are restricted in their pattern of occurrence. The largest number of coral species and the highest coral species diversity occur midway in the chain at French Frigate Shoals and Maro Reef. These sites offer a wide variety of habitat, including seaward and leeward reefs, lagoons, coral flats, banks and shoals.

The Hawaiian nearshore marine community includes numerous species of fish (±700), algae (±400), molluscs (±1,000) and other invertebrates (±1,350). Most of these are representative of species distributed throughout the Pacific and Indian Oceans, yet about 20% are endemic to Hawaii (Grigg, op. cit.). Until recently, knowledge of the Hawaiian reef fish fauna was based almost entirely on the results of studies in the main Hawaiian Islands. The diversity of reef habitats influences the distribution and abundance of reef fishes in the NWHI. Recent data suggest that major fish species on main Island reefs tend to lose dominance northwestward, while major species at Kure and Midway are more evenly distributed over the archipelago (Hobson, 1980). Although the number of fish species tends to diminish in a northwest direction, the shift in reef fish community structure along the archipelago is not a smooth progression. As an example, some species of butterfly fish were found only at French Frigate Shoals (Hobson, op. cit.). For some fish species, greater historic fishing pressure in the main Hawaiian Islands may explain distributional trends, but for most, parameters such as water temperature and reef structure and diversity are influential.

The nearshore fish community of the NWHI includes several species that do not inhabit the interstices of the reef but are found in shallow atoll lagoons. Shoaling species within the HINWR include aholehole (Kuhlia sandvicensis), moi (threadfin, Polydactylus sexfilis), amaama (mullet, Mugil cephalus and Neomyxus leuciscus) and various baitfish (iao or silverside, Pranesus insularum, piha or sprat, Spratelloides delicatulus, akule or big-eye scad, Selar crumenophthalmus). These species, the focus of a short-lived fishery at French Frigate Shoals in the 1950's, are of interest to the commercial fishing industry. At some locations these species vary seasonally in abundance. Three species of

sharks (Galapagos, Carcharhinus galapagensis, gray reef, Carcharhinus amblyrhynchos, and tiger, Galeocerdo cuvieri) play an important role as top carnivores in the nearshore marine community. They are most conspicuous in summer months when breeding aggregations are observed and predation on fledgling seabirds is common. Carangid species (jacks or ulua) are also important nearshore marine predators, consuming other fish, cephalopods and crustacea (Parrish, et al., 1980).



Ulua at French Frigate Shoals.

Two species each of spiny lobster (Panulirus marginatus and P. penicillatus) and the slipper lobster (Scyllarides squammosus and S. haanii) occur throughout the Hawaiian archipelago. Of these species, all but P. pencillatus are of serious commercial interest. Lobsters inhabit nearshore waters but also range into substantially greater depths, where most commercial fishing occurs. Within atoll lagoons, they inhabit coral reefs, where they find shelter, food and protection from predation. Larvae of P. marginatus and S. squammosus are known to recruit to nearshore habitats throughout the archipelago (MacDonald, C.D. 1984; and Morin, T.D. and MacDonald, C.D. 1984).

5. Marine Community - Monk Seals and Turtles

Two species that are particularly conspicuous in the nearshore marine community are the Hawaiian monk seal (Monachus schauinslandi) and the green sea turtle (Chelonia mydas). The Hawaiian monk seal is a modern

representative of the most ancient lineage of living phocid seals and, as such, might be characterized as a "living fossil" (Repenning and Ray, 1977). The closely related Mediterranean monk seal (M. monachus) is reported to number between 500-1,000 and swiftly declining (Sergeant et al., 1979). The Caribbean monk seal (M. tropicalis) is believed to be extinct.

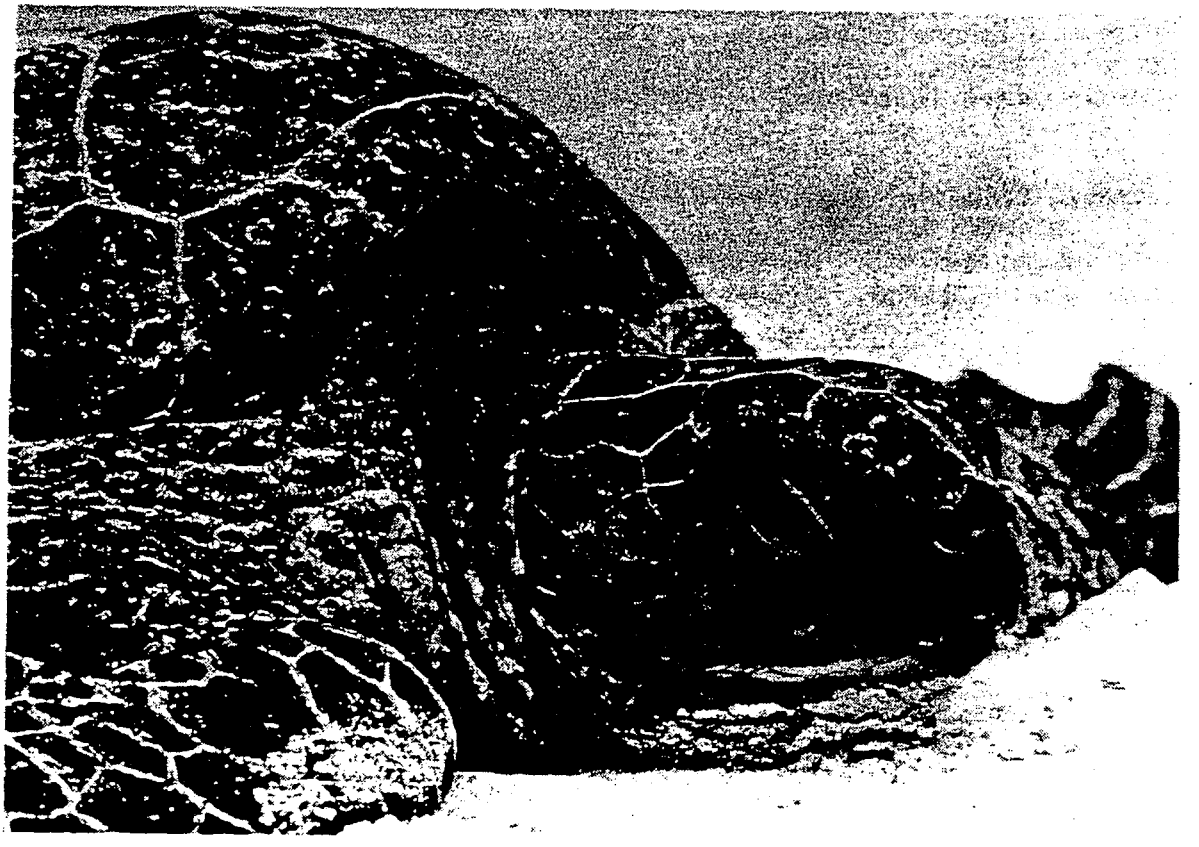
The endemic Hawaiian monk seal was almost eliminated by sealing expeditions in the mid-19th century. Under refuge protection in the first half of this century, the population recovered to a point where beach counts in the late 1950's averaged about 1,200 animals. Over the last 25 years the number recorded on beach counts dropped about 50% overall. The decline in the western atolls was particularly dramatic (70-90%), while the population at French Frigate Shoals increased and then leveled off in the last decade. Currently the beach counts at French Frigate Shoals represent nearly half of the census for the entire archipelago. Causes for the rapid decline appear to include predation by sharks, harassment of young and females by some aggressive adult males, ciguatera poisoning, human disturbance at inhabited atolls, and entanglement in lost and discarded fishing gear and other debris.

Coral beaches are the preferred habitat for monk seal pupping, hauling out and nursing. Protected reef and water areas are used by adult females with young pups that are learning to feed. Pupping occurs in nearly all months of the year with a peak between March and June. Females appear to breed about every other year, giving birth to a single black pup. Occasionally a female will "adopt" another female's pup. Mating behavior has been observed in nearshore waters. Diving studies indicate that seals forage in waters up to 100 fathoms or more in depth. Seals feed on eels, fish and marine macro invertebrates.

At least five species of marine turtles are known to occur in Hawaii (green, Chelonia mydas, loggerhead, Caretta caretta, Pacific ridley, Lepidochelys olivacea, hawksbill, Eretmochelys imbricata, and leatherback, Dermochelys coriacea). Of these, only the green turtle is widely distributed throughout the archipelago. Reductions in the world-wide population of green turtles have occurred throughout its range due to over-exploitation and habitat loss. In Hawaii, green turtles nested historically on beaches throughout the main Islands but now nesting is restricted, for the most part, to beaches of the HINWR. Even in this refuge, declines have been noted at Pearl and Hermes Reef and at Lisianski Island.

Over 90% of the remaining Hawaiian nesting population is found on East and Whale-skate Islands at French Frigate Shoals (Balazs, 1980). Most nesting occurs in June with hatching occurring approximately 60 days later in August. Young depart the nest site to graze in the pelagic zone soon after hatching. They are rarely observed again until they

reach about 35 cm. (Balazs, op. cit.). Recovery of the green turtle population from prior overharvest is inhibited by low recruitment of young into the breeding population, slow recolonization of under-utilized nesting islands, slow growth rates and infrequent breeding of adult females. The approximate number of females nesting annually at French Frigate Shoals ranges from only 94 - 248 (mean = 180), another factor which contributes to slow recovery even when their habitat is adequately protected.



Green sea turtle (Chelonia mydas) basking on a beach at French Frigate Shoals.

6. Marine Community - Offshore Species

Almost all of the 252,000+ acres of submerged lands in the HINWR are within the 10-fathom contour, so the offshore marine community is of less direct significance to Refuge management than are the nearshore or terrestrial communities. However, most of the inhabitants of the Refuge lagoons, as well as the abundant nesting seabirds, range in distribution well beyond Refuge boundaries. If for no other reason, this makes the characteristics of the offshore environment pertinent to this planning process.

Benthic slope resources adjacent to the HINWR islands and atolls include several species of bottomfish of considerable commercial importance. Among the most sought-after species are opakapaka, (Pristipomoides filamentosus), onaga (Etelis coruscans), uku (Aprion virescens), and hapuupuu (Epinephelus quernus). Except for the uku which most commonly occurs at a depth of 20-40 fathoms, these species are most commonly taken in waters from about 50-150 fathoms on atoll slopes, banks and seamounts. Spiny lobsters extend in distribution from nearshore waters out to approximately 100 fathoms. They too, are not evenly distributed in waters offshore the NWHI, with greatest catch rates during recent surveys occurring at Necker Island and Maro Reef (Uchida, et al., 1980). Other offshore crustaceans of commercial interest include caridean and penaid shrimps, slipper lobster, and kona crabs. Deep water precious corals have also been a focus of exploratory commercial surveys and harvest in the NWHI, at depths around 200-300 fathoms.

Pelagic fishes of the offshore zone in the NWHI are a source of commercial interest for both U.S. and foreign boats. True pelagic species of particular interest include big-eye tuna (Thunnus obesus), yellowfin tuna (ahi, Thunnus albacares), albacore (Thunnus alalunga), skipjack tuna (aku, Katsuwonus pelamis), mahimahi (Coryphaena hippurus) and various billfishes and sharks. More coastal species include ono (wahoo, Acanthocybium solandri), kawakawa (Euthynnus affinis), rainbow runner (Elagatis bipinnulatus) and akule (big-eye scad, Selar crumenophthalmus). Tunas and billfishes have been fished primarily by foreign longline vessels operating in the Fishery Conservation Zone and beyond, though recent restrictions imposed by the Preliminary Fishery Management Plan for Billfishes and Sharks have temporarily curtailed this fishery within 200 miles of the NWHI. Albacore are highly migratory across the north Central Pacific. The Hawaiian albacore fishery, principally north of Midway Atoll, peaks in the June-August period.

The offshore marine environment is of particular importance to those seabird species that breed on the NWHI and to several additional seabird species that migrate through Hawaiian waters enroute to and from other nesting areas. Some nesting seabirds feed within atolls, but most seek food outside Refuge boundaries, in some cases 500 miles or more from their colonies. Most feed opportunistically on surface shoaling fishes and squid, but take crustaceans and insects to a lesser degree. The nesting cycle of some seabirds appears linked to the seasonal abundance of their prey. The fish families Exocoetidae, Mullidae, Carangidae, Synodontidae, Dussumieriidae, Coryphaenidae, Molidae and Holocentridae and the squid family Ommastrephidae appear to be especially important to NWHI seabirds (Harrison and Hida, 1980).

Several species of cetaceans have also been recorded in both nearshore and offshore waters of the NWHI. A population of 1,200 humpback whales (Megaptera novaengliae) winters in Hawaiian waters and migrates to North Pacific feeding grounds in April and May. During the latter

stages of the winter migration, humpbacks are occasionally sighted near HINWR islands and atolls. Bottlenose dolphins (Tursiops gilli) and spinner dolphins (Stenella longirostris) are commonly seen adjacent to and within HINWR atolls and over offshore banks (Shallenberger, 1979). In addition to these common species, several other cetaceans are known to Hawaiian waters. (See Table 4 below.)

Table 4

CETACEANS IN HAWAIIAN WATERS
(From Shallenberger 1981)

Species	Common Name
Balaenoptera physalus	Fin whale
Balaenoptera edeni	Brydes whale
Megaptera novaeangliae	Humpback whale
Physeter catadon	Sperm whale
Ziphius cavarostris	Goosebeaked whale
Mesoplodon densirostris	Densebeaked whale
Orcinus orca	Killer whale
Pseudorca crassidens	False killer whale
Feresa attenuata	Pygmy killer whale
Peponocephala electra	Melon-headed whale
Globicephala macrorhynchus	Pilot whale
Grampus griseus	Risso's dolphin
Kogia breviceps	Pygmy sperm whale
Tursiops gilli	Bottlenose dolphin
Steno bredanensis	Rough-toothed dolphin
Stenella coeruleoalba	Striped dolphin
Stenella attenuata	Spotted dolphin
Stenella longirostris	Spinner dolphin

C. Social Environment

1. Archaeological/Historic Resources

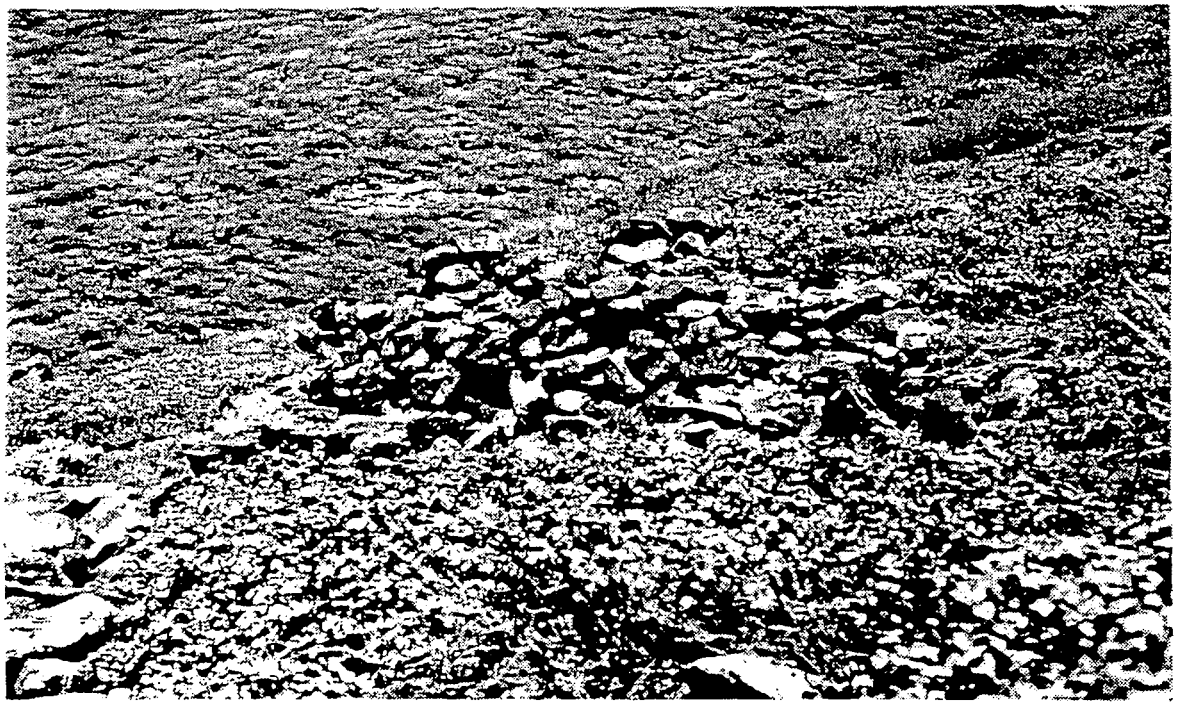
The primary archaeological resources in the NWHI are located on Nihoa and Necker Islands. These islands possess some of the densest scatters of prehistoric structural sites in Hawaii. Emory (1928) described 25-35 house terraces, 15 ceremonial structures, burial caves, bluff shelters and agricultural terraces at Nihoa. He also found squid lures, adzes, stone bowls and fish hooks which established a close relationship with the Hawaiian culture in the main Hawaiian Islands. Emory estimated that as many as 175 people could have survived for extended periods at Nihoa several hundred years before discovery of the island by European ships. Lack of a permanent water supply is theorized as a reason why the Island was eventually deserted.

Necker Island, with its numerous religious sites, appears to have been used primarily for worship by visitors from other Hawaiian Islands. Yet, numerous temples, called maraes, closely resemble those of inland Tahiti, establishing a strong link between this site and the early Tahitian culture. Necker is considered too small and dry to have supported human inhabitation for extended periods. Cultural sites on both Necker and Nihoa are some of the best preserved and represent a "pure sample of the culture prevailing in Hawaii before the thirteenth century" (Emory, op. cit.).

The historic significance of the other NWHI stems from the independent discovery of individual island groups and the subsequent commercial and military use of these areas. Captain Douglas of the Iphigenia rediscovered Nihoa Island in 1789. In 1822, Queen Kaahumanu heard ancient chants referring to Nihoa. She visited and annexed the island for the Kingdom of Hawaii. In 1885, Princess Liliuokalani and her 200-person entourage landed on Nihoa. A fire during this trip is said to have swept the island. Necker Island was rediscovered by Compte de La Perouse. More recently the island was used as a bombing target by the military.

French Frigate Shoals was first visited by two French ships under the command of La Perouse in November, 1786. Many additional sailing ships visited the shoals and other NWHI over the next century and several of these ended their voyage as shipwrecks on shallow reefs. Interest in the commercial exploitation of marine and terrestrial resources was the driving force that accounted for most visitation in the late 19th and early 20th centuries. Of the HINWR islands, development of land-based commercial facilities was greatest on Laysan Island, where guano and feather harvest operations continued until establishment of the Hawaiian Islands Reservation in 1909, and illegally for a few years beyond that date. The only obvious remnants of this operation now on Laysan are guano piles, pieces of rail and grave sites.

French Frigate Shoals is of particular historical significance because of the military activities which have occurred there. Remnants of this activity include the dredged seaplane runways and channels, Tern Island and its associated buildings and facilities, and debris on East Island from the Coast Guard LORAN station that occupied the island from 1944 until 1952.



Prehistoric house site on Nihoa Island.

2. Education/Recreational Opportunity

Meaningful educational and recreational use of refuge lands has been a high priority objective of the National Wildlife Refuge System for decades. This objective is based on the premise that public lands and the resources produced on those lands should be managed for the "benefit" of the public. The FWS encourages this activity on the belief that educational and recreational opportunity relating to wildlife and cultural resources fosters public awareness and ultimately results in broader public support for resource management programs. Research activities are also generally encouraged because they contribute to our basic understanding of natural resources and cultural and aid in the development and implementation of effective resource management programs.

The Hawaiian Islands Refuge, like most of the other early additions to the National Wildlife Refuge System, was established initially to put a halt to the unregulated commercial exploitation of wildlife resources.

Other resource values of the Refuge and the factors which threatened those resources, became the focus of a much broader resource management program in the HINWR over the years since the Refuge was established. To date, principal management attention is directed towards the numerous threatened and endangered species, the rich seabird resource and the unique terrestrial and marine ecosystems. Survey, documentation, and preservation of archaeological resources are additional Refuge concerns.

Because of the priorities placed on protection of fish and wildlife resources from direct and indirect human impact, educational, cultural, and recreational use of the HINWR has been far more restricted than is typical of most NWRs. An exception to that rule has been the FWS' policy of facilitating management-related research on HINWR lands and waters. This policy was formalized with designation of the HINWR lands and atolls as Research Natural Areas in 1967. Yet the criteria for acceptable research in the HINWR, like any other human use, has always been one of compatibility with programs to maintain, and recover if possible, the rich fish and wildlife resources of the Refuge. The two periods of most intense research in the HINWR occurred in the mid-60's during the Smithsonian Institute's Pacific Ocean Biological Survey Program and between 1978-1983, when multidisciplinary resource assessment (Tripartite) studies were conducted by the FWS, National Marine Fisheries Service, University of Hawaii, Sea Grant College and the State of Hawaii.

Since 1964, when a federal Refuge manager was first stationed in Hawaii, all Refuge activities have been managed by the Special Use Permit (SUP) process. Even the activities of the Coast Guard, stationed on Tern Island until 1979, were regulated by SUP. Other permitted visits to the HINWR have included biologists from cooperating agencies, authorized researchers and a very limited number of journalists, commercial filmmakers/photographers and other visitors, typically accompanied by Refuge staff. Most of these visits, particularly since the FWS occupied Tern Island in 1979, have occurred at French Frigate Shoals.

Although public interest in educational, recreational, cultural, and religious access to the HINWR has increased somewhat, recent research results have led to an even more restrictive policy regarding public visitation at certain locations. Our awareness of the vulnerability of unique terrestrial ecosystems and cultural resources to the indirect effects of frequent human visitation has increased measurably through recent studies. In addition, hazards and discomforts inherent in visiting the HINWR islands (e.g. rough landings, precipitous rocky slopes, sharks, rough ocean weather, bird - aircraft strikes) have been a deterrent to expanded public visitation.

In an attempt to realize the values of public educational and recreational use without the adverse effects, the FWS has explored and implemented related off-site activities. The Kilauea Point National Wildlife

Refuge on Kauai is the FWS' principal interpretive facility in the Islands. Visitors are exposed through interpretive signs and educational programs to the wildlife resources of the Hawaiian NWRs, including both wetland and remote island sites. Nesting seabirds, as well as turtles, dolphins and whales at the Point also provide an opportunity to experience wildlife species in common with the HINWR without disturbance to the resource.

In 1983, the volunteer Kilauea Natural History Association was formed to provide interpretive and educational programs at the Point and to distribute brochures and sell natural history materials to the general public. The site attracted about 140,000 visitors in 1983. Numerous school groups also used the site. Teacher workshop programs at Kilauea and at other main Island refuges also provide exposure to Refuge programs and wildlife habitats. HINWR brochures and related publications provide a source of information to the interested public as do frequent lectures and slide programs for groups by Refuge staff. A sound-slide program relating specifically to the HINWR is used widely by Oahu and Kauai schools, in particular. Films produced in the HINWR during previous visits are also used regularly by schools and, on occasion, by the local television media.

The FWS has cooperated with other agencies to accommodate and facilitate educational and recreational use of Midway and Kure atolls by military personnel, military contractors, and Coast Guard staff. Both Midway and Kure have a long history of human occupation. Midway, in particular, has proven to be a valuable site for research. Involvement of the FWS in educational or recreational programs for local military personnel at Midway and Kure has been coordinated closely with the site managing agencies.

3. Economic Considerations

The potential for commercial utilization of fish and wildlife resources has drawn attention to the NWHI for two centuries. European sailing ships made the earliest commercial excursions in the late 18th and 19th centuries. They took seals, whales, fish, turtles, sharks, birds, pearl oysters and sea cucumbers (beche-de-mer) at various NWHI locations. Reports of substantial guano deposits in the mid-19th century resulted in exploratory cruises and eventually led to the leasing of several NWHI to the North Pacific Phosphate and Fertilizer Company in the 1890's. Guano was removed from Laysan Island between 1891 and 1910. Over the same period, Japanese vessels began a series of trips into the NWHI to harvest bird skins and feathers. It was this activity which ultimately led to designation of the Hawaiian Islands Reservation in 1909 and vessel patrols to prevent bird poaching.

Military facilities constructed at French Frigate Shoals also attracted commercial interest. Soon after the Navy disestablished its station at Tern Island in 1945, commercial fishermen began to use the facility. A joint venture, Hawaiian-American Fisheries, chartered a DC-3 to fly fish from Tern Island, beginning in November, 1946. They operated for three years, grossing $73,000 in fishery operations at the shoals (Amerson, 1971). Subsequent short-lived fishery ventures occurred at the shoals, ending in 1959. Since that date, no commercial harvest of fishery resources within the managed boundaries of the HINWR is known to have occurred. This is the result of the enforcement of Refuge regulations by the FWS, the continued occupation of Tern Island and the greater interest of the fishing industry in resources substantially more abundant outside the Refuge boundary.

NWHI commercial fisheries over the last 25 years have focused primarily on bottomfishes, lobster, aku, albacore and shrimp. Exploratory surveys have addressed these species as well as squid, pelagic fishes, precious coral and kona crab. Most Hawaiian fishing vessels in the NWHI have been multipurpose boats that concentrate in areas east of Maro Reef. Albacore boats have focused their attention in waters north of Midway. All of these fishery resources noted above are found exclusively or in greatest concentration outside Refuge boundaries. However, the State of Hawaii has expressed the opinion that support of fishery operations outside the HINWR through shared use of Tern Island facilities would enhance the economic development of commercial fisheries. Furthermore, the State has expressed interest in the commercial exploitation of species inside HINWR boundaries, particularly at French Frigate Shoals, where a short-lived fishery for akule, opelu and various baitfish species occurred in the 1950's.

The State of Hawaii formalized its interest in fishery activities at French Frigate Shoals with a December, 1979 request to conduct 1) a "trial feasibility" study of fishery support at Tern Island and 2) a baitfish resource assessment within French Frigate Shoals. The proposal was subjected to Section 7 (Endangered Species Act) review by the FWS and National Marine Fisheries Service (NMFS). Both agencies determined the proposed activity would jeopardize the population of monk seals and turtles at French Frigate Shoals. An alternative project involving exploring the feasibility of a mothership operation and a primarily visual assessment of baitfish resources was proposed by NMFS and FWS, but was not initially acted upon by the State. The recent (November 1983) State proposal for a mothership-based multi-species fishery at French Frigate Shoals addresses the issue of fishery support raised in the 1979 proposal, but it does not address the originally proposed lagoon fishery for baitfish and other species.

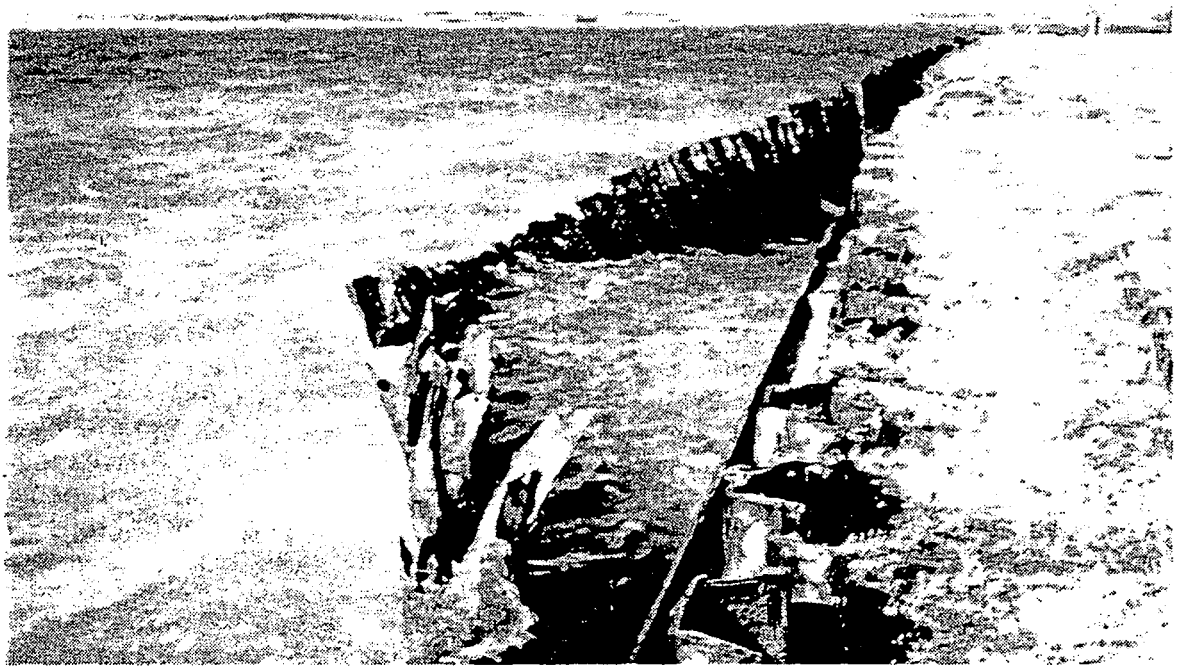
The effect that Refuge restrictions on the harvest of lagoon resources have had on the economics of NWHI fishery development is a subject of considerable debate. In the State's 1979 proposal for a test bait-

fishery within French Frigate Shoals, it was estimated that a minimum of 10,000 additional tons of aku (skipjack tuna) could be harvested from the central Pacific Ocean without any appreciable harm to the reproductive capacity of the basic stocks. Results of a small number of brief surveys conducted prior to 1950 were cited as evidence of a commercially viable source of baitfish within French Frigate Shoals which could be used to harvest aku in that area. In a response to this proposal, dated March 11, 1981, NMFS noted that these early reports had demonstrated a marked seasonality of fluctuation in abundance of baitfish at French Frigate Shoals. Upon review of the limited historic data on baitfish abundance, NMFS concluded that French Frigate Shoals represented an "erratic source of bait."

Even more complex than the baitfish issue is the role that restrictions on use of Tern Island have played in the economic development of NWHI commercial fisheries to date. In spite of the short-lived Tern Island based fishery in the 1950's, subsequent interest in the use of the island for fishery support was quite limited prior to 1979, when the Hawaii Fishery Development Plan was published. During that period, a small number of boats continued to exploit NWHI fisheries, largely independent of Tern Island. Over the last five years, the number of vessels fishing in the NWHI has increased and the degree of support provided by the Tern Island facility, now occupied by the FWS, has increased as well. Support in the form of aircraft transport of parts and people, emergency medevacs, equipment repairs and radio communications has facilitated the economic growth of the NWHI fishery. The fishing industry, in turn, has provided substantial assistance to the FWS in the transport of supplies and people to and from Tern Island. The tangible economic benefits to each party of this reciprocal support have been poorly defined, but have probably been on the order of $40,000-50,000 per year. The extent to which economic growth of the fishing industry may have been more rapid had a greater level of support been provided is a subject open to speculation but with little hard data. It is clear, however, that the less-than-projected availability of certain NWHI fishery resources and the limited ability of the Honolulu market to accommodate substantially increased catches have been a far greater deterrent to expanded NWHI fisheries than has the "limited" degree of fishery support at Tern Island.

The affected economic environment within which the HINWR master plan will be implemented also includes the projected commercial fishery potential in the NWHI and the role that the Refuge may play in the exploitation of the fishery. The Hawaii Fishery Development Plan (HFDP) identified a fisheries resource potential within the Hawaiian region of 74-117.5 million pounds per year, representing an additional harvest beyond present levels of 61-104 million pounds per year. Of this total, 47-71 million pounds of the resource potential were in open-ocean tunas. Since publication of this plan, results of NWHI fishing activities and various Tripartite studies have caused a

downward revision of the estimates of resource potential for some key species. The Tripartite Delphi study included projections by fishery "experts" of average annual catch estimates that were substantially less for all species than the HFDP estimates. For some key species (e.g. akule/opelu, bottomfish, aku), the Delphi expected average annual catch estimates ranged from 60-90% less than the HFDP estimates of resource potential (Miller and Davidson, 1983). The State of Hawaii is currently revising and updating the HFDP.



Deteriorated sea wall at Tern Island.

Other economic considerations include the management costs associated with and the contribution to the economy made by the Refuge management program. The HINWR budget and staffing picture is complicated because this Refuge is only one of 12 refuges within the Hawaiian and Pacific Islands NWR Complex. The total Refuge Complex budget (in thousands of dollars) and staffing (in full-time equivalent positions) over the last five years is shown on the next page:

	Budget	Est. HINWR Share	Staff	Est. HINWR Share
FY 80	$431.0	$235.0	15	8
FY 81	530.0	260.0	18	10
FY 82	537.0	275.0	18	10
FY 83	547.0	280.0	17	9
FY 84	680.0	305.0*	16	10

*Not including funds for master planning.

The figures for the HINWR represent an unusually high percentage of the Refuge Complex budget and staffing during this period due to FWS involvement in the cooperative Tripartite research project, start-up costs at Tern Island and involvement in master planning. Operational costs at Tern Island have included salaries (Tern Island staff, supervision, administration); equipment purchase, maintenance and repairs; supplies; and charter aircraft and vessels. Only very limited funds have been spent for major projects to rehabilitate facilities. Projected major rehabilitation costs (1984 data) and estimated scheduling is indicated below:

Facilities/Equipment	Est. Cost ($ X 1000)	Est. Date Required
1. Buildings	$ 30.0	1988-90
2. Runway	250.0	1990-95
3. Generators	30.0	1986 *
4. Boat Hoist	25.0	1988
5. Sea Wall	2-3,000.0	1990 **

* 250KW generators not required for present level of FWS operation. Projected cost is for repair and preparation for long-term storage.

** Sea wall rehabilitation presently under study by FWS and Corps of Engineers. Projected costs and timing very preliminary. Short-term repair of critical areas may postpone the need for major rehabilitation.

Funds spent on research within the HINWR contribute substantially to the local economy through the purchase of supplies, hiring of personnel, contracting of vessel and aircraft support, etc. While for some research projects it is difficult to clearly differentiate work outside

the HINWR from that within, it is estimated that between $300,000-400,000/year was spent by cooperating agencies for within-refuge research during the recent five-year (1978-1983) Tripartite project. Not surprisingly, results of the Tripartite research have stimulated rather than diminished interest among the research community regarding future projects within the HINWR, particularly at Tern Island.

Funds expended on or generated by non-FWS educational programs in the HINWR have been very limited due to restrictions on public access. On the average, 1-2 feature articles on the HINWR have appeared during each of the last 10 years in major publications directed at the general public. Commercial films and photographs from the HINWR have been distributed widely.

4. Aesthetics

Among the HINWR's most notable attributes is its richly varied scenic vistas and truly beautiful marine and terrestrial areas. Views of the Refuge are particularly spectacular from the air and underwater. Regrettably, relatively few individuals have had or are likely to have the opportunity to experience this beauty first hand. Numerous published photographs, displays and films provide the only tangible exposure to the aesthetics of this area for most of the general public.

Maintenance of the high quality of water has both aesthetic and resource management significance. The condition of the nearshore marine and shoreline habitats of the HINWR is intimately tied to the quality of the ocean waters in the NWHI. Human activities that adversely alter ocean water quality can have widespread and, potentially, irreversible effects. Fortunately, the HINWR has been relatively free of the effects of oil and chemical spills, although groundings and related events in the recent past make it clear that even these remote island and atolls are vulnerable. The vessel grounding and release of kaolin clay cargo from a freighter at French Frigate Shoals and the spillage of five million gallons of crude oil from a tanker north of Lisianski Island are the two most notable examples from recent years. Fortuitously, neither event appears to have had lasting effects on the Refuge or its fish and wildlife resources.

Air quality is another factor whose significance to the aesthetics of the HINWR is limited by the scarcity of people exposed to the area. Both natural and human-related phenomena do affect HINWR air quality. The odor of guano, decaying wildlife and rotten eggs are conditions to which all visitors to the Refuge are exposed. Human effects on air quality are most noticeable at Tern Island, where motor exhaust, intermittent open burning, aircraft-stirred dust and related conditions may be temporarily offensive.

Sooty tern (Sterna fuscata), the most abundant seabird in the HINWR.

5. Other Social Considerations

Restrictions on public access to HINWR lands and waters have prevented widespread direct exposure to the unique biotic and cultural resources of this area, for both consumptive and non-consumptive use. Yet, extreme isolation of these islands, water and weather conditions, recognition of ecosystem fragility and related factors have combined to limit observed and latent demand for access to the HINWR. Many concerned individuals and groups have acknowledged the desirability of measures to limit public access to the HINWR (including their own) if, as a result, the unique values of the area are preserved. For these people, the "quality of life" is enhanced by simply knowing this unique resource is protected, whether or not they experience it first hand. For others, the resource is of little or no value unless it is utilized.

IV

PLANNING CONSTRAINTS AND CONSIDERATIONS

A. Introduction

Many factors have been considered in preparing a master plan for the Hawaiian Islands National Wildlife Refuge (HINWR). Such factors include 1) the status of fish and wildlife populations and habitats (historic, current and projected); 2) the opportunities for resource enhancement through effective management; 3) public demand for utilization of fish, wildlife, and cultural resources; 4) the documented and anticipated effects of resource utilization; and 5) the comparative cost of various management options. Yet, no factor has had a greater effect in shaping the master planning process than the authorities, mandates and policies that govern the activities of the U.S. Fish and Wildlife Service (FWS).

Legal mandates and administrative guidance provide constraints or "side boards" to planning. Some constraints, particularly federal laws and regulations, provide very little flexibility in their application. Other authorities and policies provide greater license to consider and implement management strategies that can have far-reaching effects. In considering the large body of authorities, mandates and policies pertinent to this planning process, it is apparent that some have general applicability while others are specific to this Refuge.

In reviewing the management recommendations contained in this plan, it is important to recognize the national significance of the issues under consideration here. The HINWR is part of a system of national wildlife refuges that now numbers over 420 units and includes more than 90 million acres of land and water. This system is the only such network of lands and waters in the entire world that is managed principally for the perpetuation and enhancement of fish and wildlife resources. With this in mind, it is clear that the decisions affecting the HINWR, or any other individual national wildlife refuge, must take into account issues of both local and national concern. Proposed actions must be evaluated in the context of their relationship to local and national, even international, priorities.

B. International Treaties

Four separate treaties between the U.S. and foreign countries were developed to ensure protection of migratory birds that range beyond national boundaries. These conventions were established with Great Britain (for Canada) in 1916, with Mexico in 1936, with Japan in 1974 and with the Soviet Union in 1978. The treaties with the Soviet Union and Japan include specific mandates to protect migratory bird habitats of special value. The treaty with the Soviet Union further directs each nation to undertake measures necessary to protect and enhance migratory bird environments and to prevent and abate pollution or

detrimental alteration of their habitat. It also requires each nation to identify those breeding, feeding, wintering and moulting areas of "special importance" under their jurisdiction and to take measures to protect these ecosystems. Authority for implementation of these treaties by the U.S. stems from the Migratory Bird Treaty Act, as amended. This Act further provides for regulations to control taking, selling, transporting and importing migratory birds, their nests, eggs, parts or products, and provides enforcement authority and penalties for violations.

C. National Authorities

1. Executive Orders

a) On February 3, 1909, President Theodore Roosevelt established the Hawaiian Islands Reservation through Executive Order 1019 which set aside the islands and reefs extending from Nihoa to Kure, excepting Midway Atoll, "for use of the Department of Agriculture as a preserve and breeding ground for native birds." This executive order (EO) made it "unlawful for any person to hunt, trap, capture, willfully disturb or kill any bird of any kind whatever, or take the eggs of such birds . . . ." Kure was placed under Navy jurisdiction in 1936 (EO 7299) and transferred to the Territory of Hawaii in 1952 (EO 10413). Administration of the Hawaiian Islands Reservation was transferred to the Secretary of the Interior in 1939 and incorporated into the National Wildlife Refuge System by a name change to the HINWR in 1940 (Presidential Proclamation No. 2466).

b) Executive Order 11593, issued in 1971, directs federal agencies to inventory historic, archaeological and paleontological properties for inclusion on the National Register of Historic Places and to adopt policies that would contribute to the protection of such resources.

2. Federal Laws and Regulations

a) Endangered Species Act, as amended: This Act provides for the conservation of federally listed threatened and endangered species of fish, wildlife and plants. The Act authorizes i) the determination and listing of such species; ii) the designation of "critical habitat"; iii) the prohibition of certain actions (unauthorized taking, possession, sale, transport); iv) the establishment of cooperative agreements/grants-in-aid to States; v) the assessment of civil and criminal penalties for violating the Act or implementing regulations; and vi) the development of programs for the recovery of threatened and endangered species. Section 7 of the Act instructs federal agencies to carry out conservation programs for listed species and to ensure that their actions do not

jeopardize the continued existence of listed species or destroy or adversely modify their "critical habitat."

Six wildlife species in the HINWR presently derive protection pursuant to the Endangered Species Act. The Nihoa finch, Laysan finch, Nihoa millerbird and Laysan duck were all listed as "endangered" in April 1967. The Hawaiian monk seal was listed as endangered in 1976 and the green sea turtle as "threatened" in 1978. To date, no "critical habitat" has been formally designated for any of these listed species. Recovery plans have been drafted for the monk seal and Laysan duck, a plan addressing the three passerine birds is being prepared and a plan to address all U.S. populations of the green sea turtle will be initiated in 1985. According to a memorandum of understanding, jurisdictional responsibility for the monk seal and green sea turtle is shared between the National Marine Fisheries Service (NMFS) and FWS. NMFS has principal jurisdiction over the monk seal although FWS regulations apply in the HINWR. NMFS has jurisdiction for sea turtles in the marine environment while the FWS retains jurisdiction for sea turtles on land. A total of 13 plant species were identified as candidate species in December 1980 but have not been formally proposed for listing.

"Endangered" Laysan finch (Telespyza cantans), endemic to Laysan Island. A small population has been transplanted to Pearl & Hermes Reef.

b) Marine Mammal Protection Act: This Act gives authority to the Secretaries of the Interior and Commerce (depending upon the species involved) to enforce provisions against "taking" or importation of marine mammals. In the case of the monk seal, listed in 1976 as "depleted" under the Act, NMFS has jurisdiction. This protection extends to cetaceans (whales and porpoises), some of which are known to frequent HINWR atolls and adjacent waters.

c) Migratory Bird Treaty Act, as amended: (See B.1. above.)

d) National Wildlife Refuge System Administration Act of 1966, as amended: This Act establishes policies and directives for administration and management of all areas in the National Wildlife Refuge System (50 CFR). The Secretary of the Interior is authorized to permit, by regulations, the use of any area within the System provided such uses are compatible with the purposes for which the Refuge was established. The Act requires congressional action for the divestiture of lands and waters within the System, with few exceptions.

e) Wilderness Act of 1964: This Act directs the Secretary of the Interior to review and recommend roadless areas which may qualify for formal preservation under a special Act of Congress. To qualify, an area must be largely unaffected by human activities and must be protected and managed so as to preserve its natural condition. Although specific regulations relating to management of Wilderness Areas do not apply unless formally designated by Congress, it is FWS policy that Wilderness management procedures are applicable to designated areas and to areas identified as qualifying and/or under formal consideration for designation. A formal proposal for designation of the entire HINWR (exclusive of Tern Island) as Wilderness was submitted by the FWS in 1969. In response to considerable local opposition, the proposal was changed to include only emergent lands of the refuge, again exclusive of Tern Island. The proposal has not, as yet, been acted on by Congress.

f) Antiquities Act of 1906: This Act requires that a permit be obtained for examination of archaeological sites on certain federal lands. It also authorizes scientific investigation of antiquities and authorizes the President to designate National Monuments.

g) Archaeological Resources Protection Act of 1979: This Act replaces the 1906 Act's permitting procedures for archaeological research. The Act protects irreplaceable archaeological resources on public lands which are subject to loss or destruction from actions of persons who would excavate, remove, damage, alter, or deface them for commercial or personal reasons.

h) National Historic Preservation Act of 1966: This Act provides for the protection, rehabilitation, restoration and reconstruction of historic and archaeological resources. This statute together with

EO 11593 designate the Secretary of the Interior as the responsible official for administering procedures for nomination, registration and protection of cultural resources. All federal agencies are directed to identify and protect potential and actual cultural resource sites that may be affected by their actions.

i) Fish and Wildlife Coordination Act, as amended: This Act specifies a process of coordination between the FWS and other federal and state agencies engaged in water resource projects that may affect fish and wildlife resources. The intent of the Act is to prevent, minimize, or mitigate adverse impacts on fish and wildlife resources that could result from these projects.

j) National Environmental Policy Act of 1969: This Act, known as NEPA, requires all federal agencies to prepare an environmental impact statement (EIS) for "major federal actions, significantly affecting the quality of the human environment." Subsequent regulations, published by the Council of Environmental Quality, provide guidance to federal agencies in the process of determining their NEPA responsibilities. The NEPA process, as it pertains to the HINWR master planning project, is discussed in more detail within Section II of this report.

k) Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977: This legislation effectively prohibits any type of discharge into waters of the United States unless permitted by a specified authority. Pursuant to Section 404 of the Clean Water Act, proposed actions in the HINWR that would involve dredging or deposition of fill in the water would require a permit issued by the Department of the Army.

l) Rivers and Harbors Act of 1899: This Act authorizes the U.S. Army Corps of Engineers to regulate, by permit, the construction of any obstructions to navigation in the navigable waters of the U.S. In the HINWR, this would apply to the proposed construction of shore protection structures, docks, pilings and pipelines in the marine environment.

m) Federal Aid in Wildlife Restoration Act of 1937, as amended: This Act, commonly known as the Pittman-Robertson Act, provides funding to states for wildlife restoration projects. The program is administered by the FWS.

n) Fishery Conservation and Management Act of 1976: This statute extends jurisdiction of the United States over waters 200 miles from the territorial sea baseline. Provisions of the Act exempt highly migratory species (e.g. tunas); prohibit foreign fishing (unless permitted by approved fishery management plans) and establish Regional Fishery Management Councils. In Hawaii and the Western Pacific, the Western Pacific Regional Fishery Management Council has been involved in the

development of Fishery Management Plans (FMPs) for spiny lobster, bill fish, precious coral, bottomfish, and seamount groundfish.

o) Refuge Recreation Act of 1962: This statute authorizes the Secretary of the Interior to administer refuges for recreational use, when such uses do not interfere with the area's primary purposes. It also authorizes the charging of fees for public use.

p) Refuge Revenue Sharing Act of 1935: This Act provides for the sharing with counties of revenues from areas solely or primarily administered by the FWS. For FWS lands withdrawn from the public domain, such as is the case in the HINWR, the payments to counties on an annual basis is 25 percent of net receipts. These payments are in lieu of taxes.

q) Refuge Trespass Act of 1909, as amended: This Act makes it unlawful (except in compliance with rules and regulations) to hunt, trap, capture, willfully disturb, or kill any bird or wild animal on a refuge.

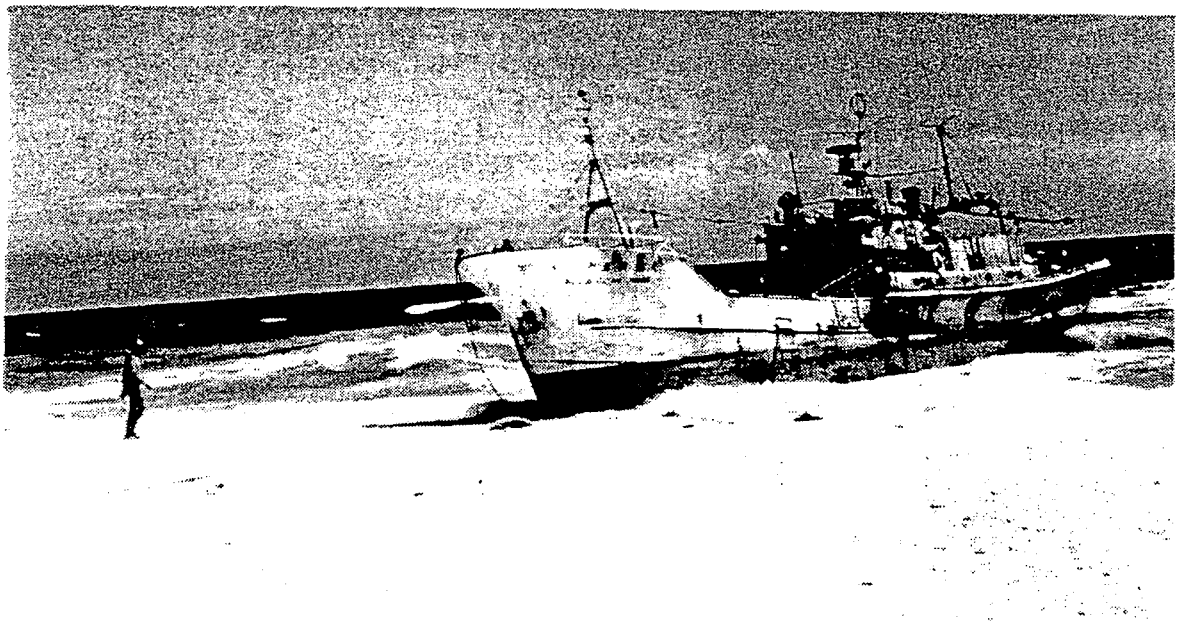
r) Coastal Zone Management (CZM) Act of 1972: This statute establishes federal policies and goals for management and development of the nation's "coastal zone" and provides a program to encourage coastal states to develop management plans in conformity with federal standards. Upon acceptance of such plans by the Office of Coastal Zone Management (OCZM) (National Oceanic and Atmospheric Administration [NOAA], Department of Commerce) states then have the authority to regulate all uses in the state-designated coastal zone. Federal lands are excluded from state control under the CZM Act, although Section 307 of the Act provides that all federal actions that affect the coastal zone must conform "to the maximum extent practicable" with the state management plans. Hawaii's coastal zone program, with the Department of Planning and Economic Development as the lead state agency, was approved by the OCZM in 1978.

s) Marine Protection, Research and Sanctuaries Act of 1972, as amended: This statute authorizes the Secretary of Commerce, with Presidential approval, to designate ocean waters as national marine sanctuaries for the purpose of preserving or restoring their conservation, recreational, ecological or aesthetic values. The Act is administered by NOAA through the OCZM. Goals of the program are to i) enhance resource protection through the implementation of a comprehensive, long-term management plan tailored to the specific resources; ii) promote and coordinate research to expand scientific knowledge of significant marine resources and improve management decisionmaking; iii) enhance public awareness, understanding, and wise use of the marine environment through public interpretive and recreational programs; and iv) provide for optimum compatible public and private use of special marine areas. At present, no marine sanctuaries have been designated in the NWHI. However, the FWS has received a proposal for marine sanctuary designation that

would include both atoll waters within the HINWR and adjacent nearshore waters. (See Section VI.C.5.)

t) Research Natural Area: Federal land management agencies have been actively developing a national system of Research Natural Areas (RNAs) since 1927. This system has grown to more than 400 areas. Each area is administered by one of eight cooperating federal agencies. The RNA designation is used by these agencies to establish areas on which natural features and processes are preserved with minimal human intervention for research and educational purposes. Each agency has a different procedure leading to the designation of an RNA. Existing regulatory authorities are utilized to protect the values of RNAs. The seven large islands or atolls of the HINWR (Nihoa, Necker, French Frigate Shoals, Gardner Pinnacles, Laysan, Lisianski, and Pearl and Hermes Reef) were each formally designated as RNAs in 1967 by the Department of the Interior.

u) Area to be Avoided: Several incidents of groundings and offshore oil spills in the NWHI resulted in a proposal to restrict vessel traffic in the vicinity of islands and shoals in 1979. The Intergovernmental Maritime Consultative Organization (IMCO) adopted an "Area to Be Avoided" proposal in May 1981 to encompass an area within a 50-mile radius of NWHI islands and atolls. The IMCO action was issued as an advisory only. It applies only to ships of more than 1,000 gross tons carrying cargoes of oil or hazardous chemicals, but does not apply to ships carrying cargoes of chemicals not on the EPA hazardous chemical list nor to ships carrying oil only as their fuel supply. Furthermore, the advisory excluded Midway and Kure from the Area to Be Avoided.



Grounding in 1969 of a foreign fishing boat on Laysan Island.

v) Other Regulations: Regulations concerning wildlife, including administration of wildlife refuges, are published in Title 50 of the Code of Federal Regulations (CFR). The regulations implement the various laws and Executive Orders. Once promulgated, the regulations have the significance and effect of law.

D. State Authorities

1. State Laws and Regulations

a) Hawaii Endangered Species Act and Monk Seal Act: These statutes provide protection similar to the Federal Endangered Species Act. The state list of endangered species is, with few exceptions, virtually identical to the federal list. The Monk Seal Act makes it unlawful to "molest, kill, capture or possess" any Hawaiian monk seal or part thereof.

b) State Wildlife Refuge: In cooperation with the FWS (then the Bureau of Sport Fisheries and Wildlife), the State of Hawaii established a wildlife refuge in the NWHI in 1952. The State refuge includes the emergent lands in the HINWR and the islands at Kure Atoll.

c) Coastal Zone Management Act: This statute implemented the federal statute (see C.2.r. above). The HINWR is within the coastal zone, as defined by implementing regulations. However, "refuges" are specifically defined in the federal statute as areas of "national interest" and each state is mandated to recognize this fact in their programs.

d) Leeward Islands Fishing Act: This statute provides the State authority to adopt, through the Department of Land and Natural Resources (DLNR), regulations to control fishing in the "Leeward Islands." Such authority is granted to DLNR where "the action will not deplete stocks of fish or shellfish" in the area. The statute also establishes a permit system for such fishing. However, federal regulations preempt regulations to implement this Act within the boundaries of the HINWR.

e) State Historic Preservation Act: This Act provides complimentary protection to the federal statute (see C.2.h. above). The State Historic Preservation Office maintains a list of cultural resource sites that are proposed and formally listed in the State Register of Historic Places.

f) State Department of Health Water Quality Standards and Water Pollution Control: These Administrative Rules specify specific water quality standards and criteria for certain classifications of waters, and describe regulatory and enforcement procedures to maintain/control such standards. FWS proposals have been developed in full consideration of these Rules.

E. Fish and Wildlife Service Mission, Goals and Policies

1. Service Mission

The mission of the FWS is to "Provide the federal leadership to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of people."

2. FWS Program Goals

The degree to which goals of various FWS programs have a bearing on the management of national wildlife refuges depends upon the fish and wild life resources found within a particular NWR. The following broad program goals, and subordinate objective statements are most relevant to the management of the HINWR:

a) Endangered Species: "To prevent the endangering or extinction of plant and animal species which is caused by man's influence on existing ecosystems, and to remove such species from threatened or endangered status."

i) List as endangered or threatened and add to the appendices of the Convention on International Trade and annex of the Pan-American Convention all species qualifying under existing authorities.

ii) Provide protection for all listed species from taking, interstate commerce, sale and offering for sale, import and export, and assist federal agencies in insuring that their proposed actions do not jeopardize the continued existence of the species or destroy or adversely modify its Critical Habitat.

iii) Effect the recovery of native species requiring help beyond the automatic benefits of listing and protection, and of foreign species to the extent possible under the Act and remove those species from the list when their recovery has been affected and their future well being is reasonably secure.

b) Migratory Birds: "To conserve and manage migratory birds in a way that provides optimum opportunity for their use and enjoyment by people."

i) Prevent any migratory bird species from becoming "threatened" with extinction.

ii) Maintain migratory bird population levels with optimum species diversity, consistent with the availability of habitat and the demands of society.

iii) Preserve and manage habitats needed to achieve population goals.

iv) Achieve migration and distribution patterns most beneficial to both migratory birds and society.

v) Minimize losses of migratory birds to disease, predation, illegal kill, crippling and other adverse influences.

c) Mammals and Non-Migratory Birds (MNB): "To assure natural diversity and optimum population levels of wildlife for the benefit of people through those management activities that are Service responsibility." (Note: The MNB program, in spite of its name, encompasses all wildlife except threatened and endangered species, migratory birds or fishery resources.)

i) Prevent any native wildlife species from becoming threatened with extinction.

ii) Manage FWS lands for a diversity of wildlife species at optimum population levels by providing a wide range of habitats at various successional stages.

iii) Assure the perpetuation of nationally important wildlife ecosystems.

iv) Protect native wildlife resources and other domestic interests from adverse impacts which would result from importation of injurious foreign wildlife species.

d) Interpretation and Recreation: "To inform and educate the public on environmental issues affecting fish and wildlife resources and provide compatible recreation on FWS lands."

i) Contribute to the natural heritage of all Americans through the preservation and management of cultural, historic and archeological properties, wilderness and other designated areas.

ii) Help develop an ecological understanding and public responsibility for conservation and the improvement of fish and wildlife and their environments.

iii) Provide compatible recreation on FWS lands where adequate funding exists and a need has been documented.

The FWS' program relating to fishery resources deserves mention at this point to clarify its relevance to activities within the HINWR. The Fishery Resources program goal statement is "To promote the conservation and management of the Nation's fresh water and anadromous fish populations for the benefit of people" (emphasis added).

3. Mission of the National Wildlife Refuge System (NWRS)

The special mission of the NWRS is to "provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available." The goals of the NWRS are responsive to broader FWS program goals (see above):

a) To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.

b) To perpetuate the migratory bird resource.

c) To preserve a natural diversity and abundance of fauna and flora on refuge lands.

d) To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment, and to provide Refuge visitors with high-quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the efuge was established.

4. FWS Public Use Policy

The Director of the FWS approved a new Public Use Policy statement on January 5, 1984. The objectives of the FWS' public use management philosophy are as follows:

a) To provide the public with wildlife/wildlands related opportunities when they are compatible with the primary purpose of the individual field station.

b) To provide visitors with the opportunity to enjoy appropriate activities on FWS lands and to learn about and understand the relationships of plant and animal populations within the ecosystem.

c) To enhance the public's understanding of natural resource management programs and ecological concepts to enable the public to: i) better understand the problems facing our wildlife/wildlands resources; ii) realize what effect the public has on wildlife/wildlands resources; iii) better understand the biological facts upon which FWS management programs are based; and iv) foster an appreciation as to why wildlife and wildlands are important to them.

d) To encourage public participation.

5. Regional and Area Goals/Policies

a) Regional Resource Plan (RRP): The RRP for Region One of the FWS was completed in 1983. It is a 10-year plan that addresses priority resource issues for Washington, Oregon, California, Nevada, Idaho, Hawaii and other Pacific Islands under U.S. jurisdiction. Emphasis in the RRP is on threatened and endangered species, migratory birds, and anadromous fishery resources. For the Pacific section of the RRP, management objectives are developed for threatened/endangered species and for migratory birds.

In the threatened/endangered species category, the RRP includes one major objective relating to listed HINWR species:

> "Maintain existing populations of Laysan duck, Laysan finch, Nihoa millerbird and Nihoa finch and protect the islands of the refuge from the introduction of harmful exotic species and oil spills."

The RRP places further emphasis on actions absolutely essential to prevent extinction of federal listed species. Priority is directed at actions included in listed species recovery plans.

In the Migratory Bird category, the RRP section for the Hawaii and Pacific Islands identifies nine management objectives:

i) Maintain/restore to non-sensitive status viable populations of sensitive species on non-FWS lands.

ii) Maintain/restore to non-sensitive status viable populations of sensitive species on FWS lands.

iii) Identify potentially threatened/sensitive species.

iv) Restore/increase nesting seabird populations restricted by limiting factors such as exotic plants/animals and ongoing activities on FWS lands.

v) Maintain the existing, naturally occurring populations, distribution and diversity of nesting seabirds on FWS lands.

vi) Ensure maintenance or enhancement of populations and optimum habitat conditions by documenting population status and distribution of nesting seabirds on non-FWS lands and waters in the Pacific Islands Area and utilizing all available programs and measures.

vii) Maintain existing populations and habitats for migratory shorebirds, wading birds and waterfowl.

viii) Protect populations and habitats of pelagic seabirds and other species that winter in or migrate through the Pacific Islands Area.

ix) Develop and implement a public awareness program to help achieve Area Migratory Bird objectives.

b) Regional Marine Bird Policy: Region One of the FWS issued a policy statement on March 9, 1981, relating specifically to marine birds. It is included here because of its relevance to management of the HINWR. Pursuant to this statement, it is the policy of the FWS in Region One to:

i) Implement to the fullest extent possible those Migratory Bird Treaty provisions dealing specifically with marine birds, especially those within the recent Japanese and Soviet Union treaties.

ii) Maintain all marine birds occurring on National Wildlife Refuge lands and waters at not less than current population levels, in their natural diversity and on native habitat throughout their range.

iii) Utilize all available programs and divisions of the FWS to influence the maintenance of the population and habitat conditions in #ii above on all non-FWS lands, especially other federally owned lands.

iv) Recognize that most marine bird colonies, roosts and loafing sites are important to their survival and work toward the establishment and active protection of these habitats and their adjacent waters as marine bird sanctuaries by private, local, state or federal interests.

v) Encourage formulation of comprehensive land management plans, and effective regulation of offshore oil and mineral development and stringent tanker safety laws to provide adequate protection for marine birds and their habitats in areas which may be developed.

vi) Encourage appropriate research and surveys on marine birds and their ecosystems, especially work related to long-term monitoring of populations and habitats and identifying species nearing threatened status.

vii) Remove all introduced predators from marine bird colonies on all national wildlife refuges and encourage their removal from all other colonies.

F. Related Plans and Proposals

1. Endangered Species Recovery Plans

The Endangered Species Act of 1973, as amended, directs responsible federal agencies to develop recovery plans for federally listed species. The intent of recovery planning is to chart a path that will result in sufficient population recovery or removal of limiting factors to justify downlisting or delisting of species. The responsible agency may determine whether or not appointment of a recovery team is needed for plan preparation. To date, recovery plans for HINWR species have been finalized for the Hawaiian monk seal and Laysan duck. A plan for the three endemic passerine bird species (Nihoa finch, Nihoa millerbird, Laysan finch) was completed and approved on October 4, 1984. Recovery planning for the green sea turtle is scheduled to begin during fiscal year 1985.

"Endangered" Hawaiian monk seal (Monachus schauinslandi). An endemic seal whose population has declined by 50% over the last 25 years.

a) Hawaiian Monk Seal: The plan for this species, finalized in March 1983, was prepared by the National Marine Fisheries Service. A recovery

team of 12 members, representing various agencies and organizations, assisted in plan preparation. The objectives of the specific activities outlined in the plan are to:

i) Identify and, where possible, mitigate the natural factors causing or contributing to the decreased survival and productivity of monk seals;

ii) Characterize the marine and terrestrial habitat requirements of the monk seal, including use patterns and feeding habits;

iii) Assess the monk seal population and monitor population trends;

iv) Document and, where possible, mitigate the direct and indirect effects of human activities on monk seals;

v) Implement appropriate management actions leading to conservation and recovery of the species; and

vi) Develop an educational program to foster greater conservation efforts among the users of the Northwestern Hawaiian Islands and the public.

The Recovery Plan outlines FWS involvement by recommending "overlay" National Wildlife Refuge status for Midway Atoll; enforcement of regulations in Title 50, CFR, that relate to management of NWRs, including the HINWR; issuance and enforcement of refuge Special Use Permits for all activities within the HINWR; development of a response plan for dealing with oil and other hazardous substance spills in the HINWR; and cooperation and support in population monitoring of monk seals. The FWS is currently conducting activities on Tern Island that are in direct support of at least four of the six stated objectives.

b) Laysan Duck: The plan for this species was finalized in December 1982. The major recovery strategies outlined by the recovery team include:

i) Maintain legislative and regulatory protection of Laysan Island.

ii) Manage the Laysan duck population and habitat, including exotic pest control, as needed, maintenance of captive flocks and continued studies of ecological requirements.

iii) Promote public awareness of the Laysan duck population and its habitat.

The Recovery Plan outlines FWS involvement by designation as lead agency in all management activities involving the Laysan duck, including such

actions as erecting snow fences to stabilize shifting sands which may encroach on the fresh water habitat of the duck and preventing disturbance by limiting entry and access to the islands.

c) HINWR Passerine Birds: This plan for three HINWR land bird species has been reviewed by various agencies and revisions are nearly complete. The final draft directs the following major actions:

i) Prevent unauthorized entry to Laysan and Nihoa Islands.

ii) Prevent the establishment of exotic organisms.

iii) Prevent the outbreak of avian disease.

iv) Monitor populations and habitat.

v) Establish additional populations to provide a buffer against catastrophic declines in the natural populations.

The Recovery Plan outlines FWS involvement by designation as lead agency in all management activities involving the Nihoa millerbird, Nihoa finch, and Laysan finch, including such actions as preventing disturbance by limiting entry and access to the islands and transplanting birds to islands that were historically inhabited by the species.

d) Green Sea Turtle: No recovery plan has been prepared for the green sea turtle. Recovery planning is scheduled for fiscal year 1985. The focus of recovery efforts will be the protection and enhancement of nesting habitat.

2. Critical Habitat Proposals

The Endangered Species Act of 1973, as amended, further provides for the formal designation of specific habitat areas determined to be "critical" to the recovery and survival of federally listed species. Formal designation of critical habitat would officially and specifically delineate those areas that constitute needed habitat. Federal agencies involved in some action in the "critical habitat" would be required to comply with the Endangered Species Act Section 7 requirements.

A proposal to designate critical habitat for the green sea turtle was prepared in 1978 but is not currently under active consideration. Critical habitat was proposed for the monk seal by NMFS in 1978 and in a second draft in 1980. The proposal included three boundary options and hearings were held to obtain public input into the consideration of these options. Considerable opposition to the critical habitat proposal was raised because of the potential adverse effect such designation might have on the development of commercial fisheries in the NWHI. In a Supplemental Draft Environmental Impact Statement distributed by NMFS in

December 1984, critical habitat was reproposed to include all beach areas, lagoon waters, and ocean waters out to a depth of 10 fathoms around Kure Atoll, Midway Islands, (except Sand Island), Pearl and Hermes Reef, Lisianski Island, Laysan Island, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island. This proposal is opposed by most of the members of the Monk Seal Recovery Team which has recommended designation of monk seal critical habitat to include selected beach habitats and waters to the 20-fathom isobath in the NWHI. Critical habitat has not been formally proposed for any land bird species in the HINWR.

There is considerable debate regarding whether or not critical habitat designation, for any species, would result in additional regulatory authority not presently provided by the portion of Section 7 prohibiting actions of federal agencies which "jeopardize the continued existence" of listed species. It would address actions which "destroy or adversely modify critical habitat", but, presumably, these actions would constitute "jeopardy" as well. Critical habitat designation would insure that adverse modifications to habitat were prohibited, whether or not jeopardy was demonstrated. In the case of the HINWR, where all activities within the efuge require Special Use Permits, the issuing of the permit would be a "federal action" as defined by the Act and would be subject to Section 7.

3. State Fishery Development Plan

This plan was prepared by the Hawaii Department of Land and Natural Resources (DLNR) in 1979 to increase the productivity of Hawaii's fishing industry in terms of landings, value and employment. The plan focused on those commercial fisheries showing the greatest potential net economic benefits. Estimates of fishery resource potential in the Hawaiian Islands region ranged from 74 million to 117.5 million pounds.

Relevance to HINWR issues was demonstrated by the projection that essentially all of the potential for expanded bottomfish, lobster, shrimp, akule and opelu fisheries was found within the Northwestern Hawaiian Islands. Of particular significance was strong recommendation in the plan that shore-based fishery support facilities be developed at both Midway and Tern Islands.

4. Other State Proposals for Tern Island/French Frigate Shoals

Interest in utilization of facilities at Tern Island for fishery support stems back to the period immediately following World War II, when a limited fishery for bait species, akule and turtles utilized the runway for fish transport. Recreational fishing was also considered at this time. No authorized fishing has occurred within French Frigate Shoals since 1959. In response to increasing pressure to permit fishery support at Tern Island, former Interior Secretary Cecil Andrus committed

the FWS in February 1979 to take no action at Tern that would preclude the possibility of its future use as a fishery support facility until Tripartite studies were completed.

By letter of December 1979, the State of Hawaii formally requested permission to initiate a test project using Tern Island as a fishery support station and also proposed to initiate a test fishery for bait species within French Frigate Shoals. Meetings were held to review the proposals. Endangered Species Act, Section 7 consultations were conducted by NMFS and FWS. A March 1981 biological opinion issued by NMFS concluded that the support facility would jeopardize the monk seal and green sea turtle. The opinion proposed that as a reasonable and prudent alternative to a fishery support facility on Tern Island, the feasibility of a mothership operation be explored. The proposed alternative to the baitfish test fishery was a limited visual survey and a net experiment. The FWS biological opinion concurred with the NMFS opinion.

As a result of the NMFS/FWS response to the proposal, then State Senator Wadsworth Yee made a formal request to then Interior Undersecretary Donald Hodel for a "return" of the Tern Island facility to the State and for use of the Island as a fishery support station. Undersecretary Hodel committed the FWS to further evaluate a shared use option for Tern, but after one meeting to discuss this option, the State was asked by Undersecretary Hodel to prepare a detailed proposal. The State then developed an alternate plan. Senator Yee announced a "mothership" option in February 1983 and both FWS and NMFS reviewed the proposal shortly thereafter. After review, the proposal was finalized by the State Division of Aquatic Resources in November 1983 and published in May 1984 under the title: "A Proposal to Establish a Fishery Support Operation at French Frigate Shoals, Northwestern Hawaiian Islands." French Frigate Shoals is designated as the preferred site for the support facility because 1) it lies near the geographic center of the fisheries it would service; 2) the reef is large enough to provide some shelter during heavy weather; 3) there is emergency access to facilities at Tern Island; and 4) access to Tern Island is available for gear storage and recreation.

The recent proposal is based upon the concept of a moored mothership within French Frigate Shoals that would service a fleet of 10 catcher vessels during a 70-100 day fishing season. This multi-species fishery would harvest a variety of resources including pelagic fish, bottomfish, spiny lobster and other species. Most of the catch would be stored frozen aboard the mothership for later transshipment to Honolulu. The mothership would also provide fuel, supplies and provisions. The proposal suggested that Tern Island be used for short-term recreation, emergency evacuations and temporary storage of some fishing gear.

This proposal, like any other public use considered for the HINWR, requires thorough assessment concerning compatibility with refuge objectives. Within this Master Plan/EIS compatibility is addressed in the conflict analysis described in Section V.D. Conflict and the absence of conflict (i.e. compatibility) is documented for each wildlife species and proposed use of the Refuge in the Output Summaries which are included in the Technical Appendix (under separate cover).

5. FWS Planning for Tern Island Operation

Upon notification by the Coast Guard in 1978 of intent to decommission the LORAN station at Tern Island, the FWS initiated planning for operation of the facility. In March 1979, Manta Corporation was contracted by the FWS to evaluate various short-term management options for the station. The data gathering phase of the study involved more than 45 separate interviews with interested parties and/or knowledgeable individuals, a review of pertinent published and unpublished documents and a field survey. Based, in part, on the information presented in the draft report of this study, the FWS manned the facility in July 1979 and has maintained continual presence since that date. The operational aspects of the station were considered further during an in-house planning exercise completed in June 1981.

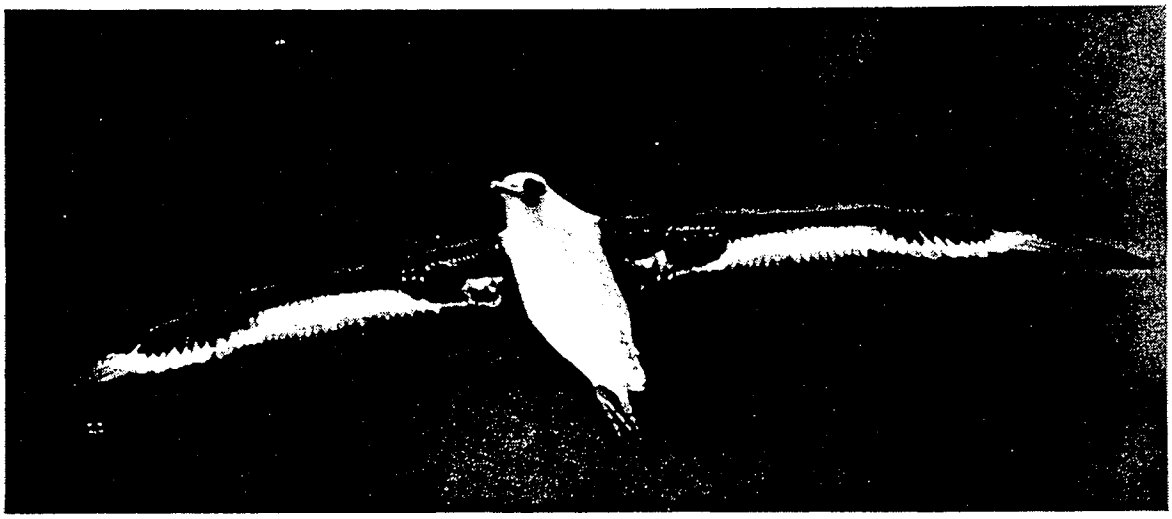
The TERN ISLAND STUDY revealed a wide diversity of opinions among interested agencies, organizations and individuals with respect to the long-term management of Tern Island. Concern was expressed among representatives of conservation organizations and others that FWS "presence" should be maintained at French Frigate Shoals, yet all activities, including research, should be limited to avoid adverse impacts on wildlife. Strong opinions were also voiced by representatives of state agencies and the fishing industry that Tern Island could provide valuable logistical support for commercial use of NWHI fishery resources.

6. Hawaii Wildlife Plan

This plan, approved in 1983, was prepared by the Division of Forestry and Wildlife, Department of Land and Natural Resources. The plan "is intended to provide an integrated strategy towards solving the most critical wildlife problems." The geographical scope is statewide, with an emphasis on state-owned or controlled lands. Recommended actions are proposed in three separate categories: species plans, general plans and special plans.

This plan addresses issues of significance to the HINWR in several areas. Seabird colony protection and monitoring is a high priority objective. Captive propagation of the Laysan duck, and possible introduction to other islands, are suggested as viable management tools to recover the species. The threat of introduced rats at Laysan is also noted. In the "general" plan section, high priority is directed at the

need for improved data collection, an expanded information and education program and improved avian disease response capability. The "special" plan section places considerable importance on the statewide endangered species recovery program, focusing on the need for close coordination with other involved agencies.



Laysan albatross (Diomedea immutabilis).

7. Fishery Management Plans

Fishery Management Plans (FMPs) for the Hawaiian portion of the Fishery Conservation Zone are prepared by the Western Pacific Regional Fishery Management Council (WPRFMC) in cooperation with the National Marine Fisheries Service (NMFS). The five FMPs now completed or in preparation focus on species groups that are selected on the basis of habitat similarities and susceptibility to capture on certain fishing gear (Rutka, 1983). These FMPs include billfish and other pelagic species (other than tunas), spiny lobster, bottomfish, seamount groundfish and precious coral.

The lobster and bottomfish plans will have the most direct bearing on the HINWR, although all five plans will affect the extent of vessel activity in the NWHI. The lobster FMP, officially implemented in March 1983, establishes as closure areas all NWHI waters shallower than 10 fathoms and within 20 miles of Laysan Island, and also establishes gear restrictions to reduce the risk of monk seal entrapment. The lobster FMP fails to address the FWS' managed boundary of the HINWR. In so doing, the FMP creates a potential conflict in management of the small amount of HINWR waters that are deeper than 10 fathoms. In spite of this area of conflicting jurisdiction, the lobster FMP provides an important foundation for regulating a fishery that might otherwise result in overexploitation of limited stocks.

In developing an FMP for bottomfish, the WPRFMC has acknowledged that main Island stocks are fully exploited and, for some species, possibly overfished. Economic incentives in an expanded NWHI bottomfishery have led to increasing pressure on this resource by both local boats and Mainland-based vessels. The draft FMP for Bottomfish and Seamount Groundfish Resources of the Western Pacific Region (March 1985) addresses this pressure by proposing a system to limit entry to the NWHI bottomfish fishery. A permit system would limit the number of participating fishermen, thereby reducing the risk of overfishing, imposing less surveillance and enforcement burden and assisting with the achievement of other management objectives. It is proposed in the FMP that permits be issued to fishermen who meet certain past performance conditions, namely, the ability to document a minimum of 50,000 lbs. of bottomfish landings or a minimum of ten landings and sales of fish from the NWHI during the past two years. Permit renewal would require the landing and sale of at least 25,000 lbs. of bottomfish or a minimum of five landings and sales of bottomfish from the NWHI. Entry would thus be limited to relatively few people with a history of fishing within the NWHI and with proven ability. Implementation of the system would have obvious benefits for the Refuge including:

a) The number of vessels bottomfishing in the area would be reduced from the present number (20 vessels in 1984) and no increases would occur. The potential for adverse impacts on wildlife resources and habitats would thus be reduced.

b) Having fished the area for two or more years, fishermen would be familiar with navigational hazards and sea conditions and less likely to be involved in accidental vessel groundings.

c) The permit requirement would give the refuge manager a point of contact with each fisherman, thereby facilitating information transfer, working relationships and educational efforts.

The WPRFMC has expressed the perspective that land-based support in the NWHI (specifically Tern Island and Midway) is essential to the effective utilization of this resource.

8. Ocean Management Plan

The Ocean Management Plan (OMP) was drafted by the State of Hawaii's Department of Planning and Economic Development (DPED) in July 1983 through the Hawaii Coastal Zone Management Program. It is intended to provide consistency in management of ocean resources by setting forth objectives and policies by which government entities can orient their efforts. It also attempts to resolve conflicts and establish priorities. As part of this planning effort, ten issue papers were prepared that focused on key ocean management problems and issues.

Those issue papers of most direct relevance to the NWHI include manganese nodules, fisheries management, nearshore recreation and marine conservation and preservation. The Fisheries Management issue paper, in particular, addresses the State's effort to utilize NWHI fishery resources. The issue papers and draft OMP have been revised and edited to incorporate comments, but neither has been finalized.

The July 1983 OMP draft includes a list of objectives, policies and implementing actions relating generally to ocean management and more specifically to each of the issue paper topics. The OMP places high priority on protection, public use and economic development of ocean resources and addresses conflicts between these objectives. Of particular relevance to the HINWR Master Plan/EIS is the recommendation to develop facilities in the NWHI "for seafood processing and transshipment as well as for conducting research" which appears in the Fisheries section of the OMP. Implementing actions and policies in the Marine Conservation and Preservation section of the OMP address the need to coordinate marine conservation efforts of various agencies.

9. City and County of Honolulu Planning for the NWHI

County authority in the NWHI arises from state statute and county charter. The geographical limits of the City and County of Honolulu includes all of the NWHI in the State of Hawaii (excludes Midway Atoll). The County does not presently assert a role in resource or refuge administration in the NWHI but it does have a major regulatory role in Honolulu. The NWHI are located in the State's designated coastal zone management area. Each county regulates activities in its coastal zone through the shoreline management area (SMA) permit process. No SMA has been officially defined for the NWHI as yet, so the City and County of Honolulu's role through the regulatory process is unclear. The County could, however, exercise some influence through the shoreline setback law, which restricts placement of structures in the area immediately above the wave wash line. The County also has the power to issue well, grading and building permits throughout its area of jurisdiction.

The existing city and county general plan does not include the NWHI. However, the Plan is currently being amended to address this area. City Council member Leigh-Wai Doo has pointed out that adoption of a county general plan for the NWHI would ensure that the State Land Use Commission would consider the County's general plan designation when reviewing proposed land use district boundary amendments. He has further noted that placement of the NWHI in "preservation" status through a general plan would ensure that all proposed construction projects would require a plan amendment, a procedure requiring a legislative mandate and thorough public review.

As all lands in the NWHI (except Midway) are presently in the State's "protective subzone" of the conservation zone, proposals for non-conservation type uses would require a Conservation District Use Permit (CDUP) and a public hearing would be required. Councilman Doo has recommended that the County could allow for greater public participation in the regulatory process by designating a SMA encompassing the land and nearshore areas of the NWHI. The process of obtaining an SMA permit and shoreline setback variance would occur before processing a CDUP application, so the County could deny the permit before it was even considered by the State. Councilman Doo has also noted that establishment of an SMA could lead to greater County input in development of oceans adjacent to the NWHI.

On June 29, 1983, the City and County of Honolulu, City Council adopted Resolution 83-240, requesting the preparation of a Ninth Development Plan "on Northwestern Hawaiian Islands and those islands in the City and County of Honolulu beyond the island of Oahu and to prepare an amendment to expand the scope of the General Plan." This resolution was followed by Resolutions 84-239 and 84-240 on August 1, 1984, requesting the Department of General Planning to process General Plan and Development Plan amendments relating to the description provided in Resolution 83-240.

On November 30, 1984, proposed amendments to both the City's General Plan and Development Plan Ordinance were presented for public comment. An informal public information meeting on the proposed amendments was held on December 18, 1984. The FWS then provided written comments on the proposed amendments. The General Plan explicitly expresses the City and County's interest in environmental preservation and protection, recognizes economic development must be compatible with objectives to preserve the area's unique environmental, marine, and wildlife assets, and further recognizes and encourages federal leadership to protect these assets.

The Development Plan is proposed "to preserve and protect the environmental, marine, and wildlife of the Northwestern Hawaiian Islands" and to "emphasize the protection of resources together with controlled use of these resources for educational, research, and recreational purposes."

In summary, Councilman Doo has proposed that adoption of a County General Plan, Development Plan, and SMA for the NWHI would ensure that extensive public input and County legislative mandate would be required before proposed changes to the islands could be implemented.

10. State/FWS Proposals for Midway Atoll

Exploratory albacore trolling operations by U.S. vessels in the central North Pacific began in 1975 and have continued in waters north-northwest of Midway since that date. On the basis of the results of historical Japanese fisheries and the results of exploratory fishing by U.S. vessels, the State of Hawaii began negotiations with the Navy in 1978 to permit entry to Midway for support of the fishery. A purse seiner was used as a support vessel at Midway under a Facilities Use Permit from the Navy in 1979. Similar support was not arranged in 1980-1982, although the number of vessels in the fishery increased.

In 1982, the State legislature appropriated funds for a Midway support facility feasibility study. This project was contracted to Pacific Analysis Corporation and their final report was completed in March 1984. The report recommended short- and long-term support scenarios, involving purse seiner motherships in the early phase, progressing to a tug/barge operation and eventually a cargo ship with refrigerated containers. A fleet of at least 100 catcher vessels was projected in this report.

During the same period of time that the State of Hawaii has been investigating fishery support options at Midway, the FWS has also been evaluating options to insure effective management of fish and wildlife resources at the site. The FWS has been involved in field studies at Midway since 1956, beginning with an assessment of the bird-aircraft strike hazard and expanding into an ambitious research program involving seabird population monitoring, predator control, study of disease and habitat manipulation. The FWS has also monitored monk seals at the site over the last 25 years and have been joined in this effort in recent years by NMFS.

Midway was designated a Navy Wildlife Refuge in 1973. Concern regarding the declining seal population, rat predation in seabird colonies and avian disease outbreaks prompted the FWS to accelerate its research and management role at Midway over the last decade. In association with this expanded role, the FWS, NMFS, and Navy entered into a cooperative wildlife management agreement to begin addressing the identified problem areas. In 1981, the FWS initiated an evaluation of long-term wildlife management options on Midway. Among the options considered in this evaluation has been an "overlay" national wildlife refuge scenario under which fish and wildlife management responsibility would rest cooperatively with the FWS and Navy while facility operational responsibility would be retained by the Navy. Such an arrangement is functioning at Johnston Atoll NWR, managed cooperatively by the Defense Nuclear Agency and the FWS. The Navy and the FWS are currently reviewing the results of this evaluation process.

These two planning efforts relating to Midway Atoll have considerable bearing on the long term management of the HINWR. The fishery station proposal could likely be implemented without significant adverse impact to fish and wildlife resources and habitat within Midway Atoll. Yet the expanded fishery facilitated by such a support operation poses additional risks (groundings, oil spills, rodent introductions, etc.) to and adds to the management burden of islands and atolls of the HINWR. The wildlife management options under review by the FWS and the Navy would not adversely impact either existing naval operations or proposed fishery support at Midway. However, to the extent that expanded FWS presence on Midway would facilitate wildlife research, the course of action at Midway will affect the array of preferred management strategies within the HINWR.

G. Other Issues

1. Boundary Dispute

It is the State of Hawaii's position that the boundary of the HINWR never legally included more than the emergent lands of the NWHI, excluding Midway, and that Kure was transferred to the Navy (and later the State) by Executive Order in 1936. In contrast, it is the FWS' position that the HINWR also includes approximately 252,000 acres of submerged lands, principally at French Frigate Shoals, Maro Reef and Pearl and Hermes Reef. The FWS' position stems from the original EO 1019 which included "islets and reefs" and identified the various atolls, not the individual islets. The boundary dispute extends to the question of ownership of Tern Island, an island that was increased from 11 to 37 acres by dredging in 1942.

The boundary dispute has obvious implications to the planning process and the actual management of the HINWR. However, it is the FWS' position that until such time as the boundary issue is resolved, hopefully by mutual agreement, it is appropriate to master plan for the refuge as defined by the FWS. It is our belief that the master planning process will result in the most appropriate resource management strategies, regardless of the location of the legally defined boundary. Virtually all fish and wildlife species that inhabit the disputed areas also range beyond the FWS' managed boundary so it is critical that the planning effort address their habitat requirements from a broader perspective.

2. Ocean Mining

The FWS is currently coordinating with the Minerals Management Service of the Department of the Interior and the State of Hawaii Department of Planning and Economic Development to focus on the exploration of the potential for deep offshore mining in the vicinity of the HINWR. A

joint federal-state task force was formed in February 1984 to evaluate the economic potential and environmental impacts of ocean mining for cobalt-rich manganese crusts in the 200-mile Exclusive Economic Zone surrounding the Hawaiian Archipelago. In September 1984, data collection began in the French Frigate Shoals area with the use of a deep-diving submersible. The data are being utilized in the development of a Draft Environmental Impact Statement. Leasing of deep ocean tracts could occur within three years. Because the specifics of leasing proposals, mining activities, the need for land-based support facilities, etc., are not yet known, ocean mining has not been addressed in any of the alternatives in Section VI. At the date of this writing, it appears that the areas on the flanks of the islands, atolls and shoals of the HINWR will eventually be excluded from further ocean mining consideration. As planning for ocean mining progresses, it is anticipated that the FWS will remain fully involved in assessing the potential impacts on refuge wildlife resources. A proposal for deep ocean mining will trigger the requirement for an Environmental Impact Statement prior to federal-state approval of the project.

V

FORMULATION OF OBJECTIVES

A. Introduction

This section describes the process used by the U.S. Fish and Wildlife Service (FWS) to formulate objectives for the Hawaiian Islands National Wildlife Refuge (HINWR). The results of the process are narrative objective statements which are also presented in this section. Objectives are the key ingredients of the HINWR Master Plan/EIS. Essentially every recommendation and proposed action within this document is influenced by objectives. In particular, the individual strategies that will constitute the various refuge management alternatives (see Section VI) are each developed to address one or more objectives.

B. Outputs

The first task in developing objectives for the HINWR was to prepare a preliminary list of the "things" produced or provided on the Refuge. This list included all of the "things" that are currently produced or provided, as well as those that have the potential to be produced or provided. These "things" are referred to in the Master Plan/EIS as outputs. An example of a current resource output of the HINWR is the production of young green sea turtles. This output is measured in terms of the number of young turtles produced per year. An example of a public use output would be the opportunity to conduct research. This output would be measured in terms of the number of studies conducted.

The HINWR Master Planning Team began the process of developing outputs for this Refuge by referring to a Master Output List. This list addressed a wide range of outputs arranged in national priority order for the National Wildlife Refuge System. This list also provided general guidance for prioritizing broad (generic) categories of outputs in formulating a list directly applicable to the HINWR. Guidance in developing priorities was also found in pertinent legal mandates, regional policy and other planning considerations (see Section IV). Developing an output list particularly suited to the HINWR required some adaptation of the Master Output List, in view of the uniqueness of this particular refuge in the System.

The HINWR output list was refined and revised throughout the master planning process based on further review of pertinent data and as a result of public and agency input through newsletter responses and meetings. The final output list is presented in Figure 3. Brief explanations of these outputs are provided on the following pages to facilitate the reader's understanding of the list. Several wildlife resource outputs include the terms "production" and "maintenance". For the purposes of this discussion, "production" refers to the number of

young produced per year. "Maintenance" refers to the number of individuals of a particular type of wildlife (e.g. seabirds) present on the refuge for a period of one day. A "maintenance" population is measured in "use-days".

Figure 3

HAWAIIAN ISLANDS NWR OUTPUT LIST

The following list represents all outputs that are currently produced or provided on the refuge or possibly may be produced or provided on the refuge. Outputs are listed in priority order.

VULNERABLE SPECIES (ENDANGERED, THREATENED, SENSITIVE, AND CANDIDATE):

1. Monk Seal Production and Maintenance
2. Laysan Duck Production and Maintenance
3. Endemic Finches and Millerbird Production and Maintenance
4. Sea Turtle Production and Maintenance
5. Sensitive/Candidate Species Production and Maintenance

ENVIRONMENT:

6. Cultural Resource Protection
7. Wilderness
8. Research Natural Area
9. Other Protective Status

OTHER FISH AND WILDLIFE:

10. Marine Bird Production and Maintenance
11. Other Migratory Bird Maintenance
12. Terrestrial Endemic/Native Species Maintenance
13. Marine Reef Species Maintenance

SCIENTIFIC AND PROFESSIONAL SERVICES:

14. Research Studies

EDUCATION/INTERPRETATION:

15. Environmental Education
16. Interpretation
17. Photography/Journalism/Art

OTHER PUBLIC USES:

18. Other Compatible Public and Economic Uses

Explanations of HINWR Outputs and Output Categories:

a) Vulnerable Species: This category includes endangered, threatened, sensitive or candidate species, all of which are susceptible (to various degrees) to extinction.

b) Endangered Species: This term includes any species in danger of extinction throughout all or a significant portion of its range. Endangered species resident in the HINWR include the Hawaiian monk seal, Laysan duck, Laysan finch, Nihoa finch and Nihoa millerbird. Endangered hawksbill turtles and other marine mammals are also found occasionally within Refuge waters. All threatened and endangered species are identified on a Federal list, pursuant to the Endangered Species Act.

c) Threatened Species: This term refers to species which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. The only wildlife species currently listed as threatened in the HINWR is the green sea turtle.

d) Sensitive Species: By FWS definition, sensitive species are vulnerable enough that they could become listed as threatened or endangered in the near future. Sensitive species identification focuses management attention on these species to avoid the need for future listing as threatened or endangered. To date, only one species in the HINWR (sooty storm-petrel) has been formally identified by the FWS as a sensitive species.

e) Candidate Species: Species which are currently being considered for listing as threatened or endangered (e.g. Acropora spp.).

f) Cultural Resource Protection: This output refers to the identification and protection of sites and areas of significance to human history.

g) Wilderness: This output refers to any area of land and/or water that qualifies for formal designation in accordance with the Wilderness Act of 1964. Portions of the HINWR have been formally proposed for "Wilderness" designation.

h) Research Natural Area (RNA): RNAs are formally designated areas of land and/or water recognized for their intrinsic values to research and education. Natural processes are generally permitted to operate without human intervention within an RNA. Each of the major islands and atolls of the HINWR were designated by the FWS as RNAs in 1967.

i) Other Protective Status: This broad output includes other types of formal protective designation that may be appropriate for refuge lands and waters. Among those under consideration are marine sanctuaries, critical habitat for listed species, world heritage sites and national

natural landmarks. For the purposes of discussion, this output also includes consideration of refuge boundary status.

j) Marine Birds: This output includes a population of more than 12 million birds (breeders and non-breeders) of 18 species of seabirds resident in the HINWR. Included are albatross, petrels, storm-petrels, shearwaters, tropicbirds, boobies, frigatebirds and terns.

k) Other Migratory Birds: This output includes more than two dozen shorebird and waterfowl species that migrate into or through the HINWR during their non-breeding season.

l) Terrestrial Endemic/Native Species: This broad output includes various species of plants, arthropods, land snails and other invertebrates native to or restricted in distribution to the terrestrial environment of refuge islands.

m) Marine/Reef Species: This output was created for the HINWR to include the wide variety of marine species that inhabit the lagoons and nearshore waters within the Refuge.

n) Research Studies: This output includes a variety of human activities within the HINWR that are designed to gather and disseminate data on vulnerable species, endemic terrestrial species, other refuge species, their habitats, and other environmental related research such as that associated with the weather. These studies may be performed by refuge staff or cooperating investigators.

o) Environmental Education: Included here is the use of refuge lands and waters for structured environmental studies, usually involving teacher- led groups. These activities are generally part of a formal course of study involving "hands-on" field work.

p) Interpretation: By FWS definition, interpretation is an educational activity aimed at revealing relationships, examining systems and exploring the relationship between the natural world and human activities. Conducted interpretation involves the use of trained staff or volunteers. Interpretation may also be self-guided (e.g. nature trails). Interpretation may also occur off the refuge when inaccessability or other conflicts with wildlife make on-site interpretation inappropriate or impossible.

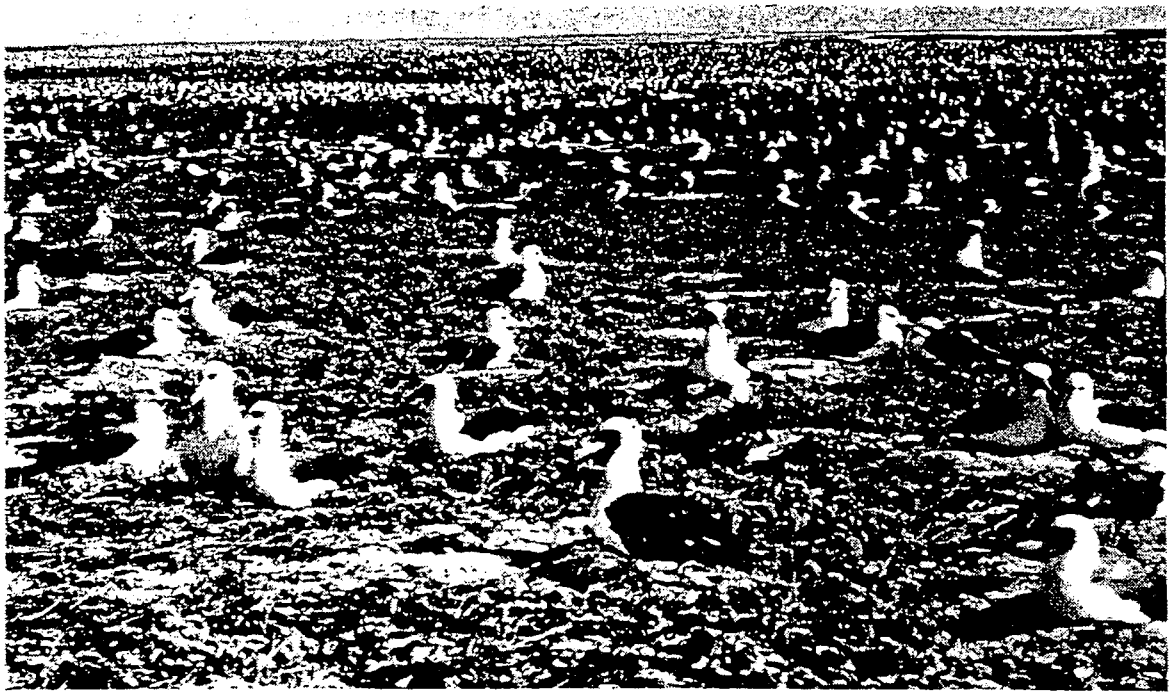
q) Photography/Journalism/Art (P/J/A): This broad output includes a wide range of non-consumptive activities that are wildlife-related. This output is grouped with the education and interpretation outputs in planning for the HINWR because the emphasis is placed on the educational exposure of the non-visiting general public to the the results of P/J/A activities (articles, books, films, etc.).

r) Other Compatible Public and Economic Uses: This broad output includes the following uses that have been determined to be compatible with refuge purposes (future uses will require assessment on a case by case basis):

(i) Support of Commercial Fishing: Provide logistical support for the commercial utilization of renewable fishery resources in the Northwestern Hawaiian Islands, including principally bottom-fish, lobster, aku, albacore, shrimp and other species.

(ii) Recreational Fishing: This activity refers to the non-consumptive recreational use of fishery resources within to the HINWR boundary.

(iii) Other Recreation: This use includes other recreational pursuits on the HINWR, including those activities not related to or dependent upon fish and wildlife resources.



Laysan albatross colony—Southeast Island, Pearl & Hermes Reef.

C. Locational Criteria

Once it was determined which outputs were appropriate for the HINWR and the priority listing for those outputs was determined, it was then necessary to study the resource conditions required to support the various outputs. This analysis makes it possible to determine how much or how little of an output the refuge is capable of sustaining. This

information was also needed to determine how outputs relate to each other and where potential conflicts among outputs may occur.

Locational Criteria statements were developed to organize and document a considerable volume of pertinent information in a concise, summarized manner. Locational Criteria statements describe ecological relationships, locational factors and quality ratings for specific resources that have been found to be essential to the existence of a particular output. Because of their volume, Locational Criteria Statements have been packaged under separate cover in the Technical Appendix.

D. Output Summaries

For the HINWR Master Plan, it was appropriate to go beyond the Locational Criteria Statements in an effort to fully analyze the potential to produce various outputs, the demand or justification for output production and the degree to which various outputs would conflict with one another. This analysis was accomplished by developing "Output Summaries" for each output. Output Summaries, which are included under separate cover in the Technical Appendix, provide this background of analysis undertaken in the development of narrative objective statements.

Potential to continue or increase production of a particular output on the HINWR is an important consideration in establishing realistic objectives for both wildlife and public use outputs. Simply stated, if the resources do not exist in sufficient quantities on the refuge to support a particular species, then it is not realistic to recommend a high production or maintenance objective for that species. Alternately, if a large, untapped resource is found to exist on the refuge, then the FWS has the responsibility to consider how this resource might be utilized to enhance outputs whose existence is dependent upon that resource. It is important to note, however, that high potential would not, in itself, justify programs to enhance production of a particular output if significant conflicts with higher priority outputs were apparent.

Demand for a particular output, like potential, is an important factor to consider in developing refuge objectives. Both documented and undocumented latent demand are relevant. For example, public interest in nature tour visits to the HINWR has been relatively limited, yet growing international interest in this type of activity makes it likely that considerable latent demand would become evident should this type of opportunity be made available. Also pertinent in this analysis is the "justification" for production of a particular output that derives from statutes or policy statements that are the foundation of refuge management programs (see Section IV). For example, existing legal mandates (Endangered Species Act) and recovery plans leave little room

for interpretation when considering whether or not production and maintenance of endangered species should be a high priority output for the HINWR. Numerous plans and proposals relating to the development of commercial fisheries in the NWHI also provide "justification" for serious consideration of this output in the master planning process.

The Output Summaries also include a brief analysis of the principal conflicts likely to occur in the production or maintenance of individual outputs. Conflicts between outputs may be direct, such as the case when two outputs compete for the same refuge resources at the same point in time. Conflicts may be indirect as well. An example might include the conflicts between the production and maintenance of endangered land birds on Laysan Island and the implementation of an environmental education (EE) program on that island. In this case, the EE program would not involve the direct consumption of land birds, but the disturbance of the birds and habitat associated with the activity may make the two outputs incompatible at this location. Where anticipated conflicts can be mitigated by adjusting locations or schedules, these measures are noted and subsequently incorporated into objective statements and management strategies. Where conflict cannot be mitigated, lower priority outputs are "traded-off" in order to accommodate or provide for higher priority outputs.

Having identified the areas of significant conflict, a set of objectives was developed that avoided or mitigated conflict to the greatest extent possible, while providing a diversity of compatible wildlife and public uses. It should be assumed therefore, that in order to be included in the final list of objectives (see Section V.E. below) each objective was found to be sufficiently compatible with the others on the list.

E. Objective Statements

The result of the analytical process described above was a clear, comprehensive understanding of the most important factors affecting the current and potential existence of various outputs in the HINWR. With this understanding, it was possible to develop realistic, long-range objective statements that satisfy statutory and policy requirements of the FWS while also representing a suitable balance between the protection and utilization of refuge resources. Objectives are quantified where appropriate and are listed below in priority order under output categories:

VULNERABLE SPECIES:

1) Monk Seal Production and Maintenance: Maintain existing populations at French Frigate Shoals, Necker and Nihoa at or above present levels. Recover populations at Laysan, Lisianski and Pearl and Hermes Reef to at least midcentury levels.

2) Laysan Duck Production and Maintenance: Maintain current population levels and captive breeding stock. Prevent ecological disturbances on Laysan Island.

3) Endemic Finches and Millerbird Production and Maintenance: Maintain current populations. Prevent ecological disturbances to Nihoa Island and Laysan Island.

4) Sea Turtle Production and Maintenance: Maintain aquatic habitat for sea turtles. Maintain existing nesting and basking populations of green sea turtles at French Frigate Shoals, Necker and Nihoa. Increase nesting populations at Laysan, Lisianski and Pearl and Hermes Reef to at least midcentury levels.

5) Sensitive and Candidate Species Production and Maintenance: Identify, maintain and/or restore viable populations of sensitive and candidate species in the HINWR.

ENVIRONMENT:

6) Cultural Resource Protection: Complete cultural resource studies; nominate eligible sites to State/National Registers and protect all identified sites from adverse impacts.

7) Wilderness: Manage all emergent lands, exclusive of Tern Island, as de facto wilderness. Nominate, if appropriate after review, HINWR lands and waters as Wilderness.

8) Research Natural Area: Manage the HINWR consistent with Research Natural Area designation.

9) Other Protective Status: Evaluate and seek, where appropriate, additional protective status for the NWHI (e.g. World Heritage Site, Marine Sanctuary, Natural Landmarks, Critical Habitat, Midway Overlay, Boundary Review).

OTHER FISH AND WILDLIFE:

10) Marine Bird Production and Maintenance: Maintain existing populations, distribution and diversity of nesting seabirds in the HINWR.

11) Other Migratory Bird Maintenance: Maintain existing terrestrial and marine habitats for migrating marine birds, shorebirds, wading birds and waterfowl.

12) Terrestrial Endemic and Native Species Maintenance: Maintain and restore natural diversity of terrestrial ecosystems.

13) Marine Reef Species Maintenance: Maintain current abundance, distribution and diversity in the reef ecosystem.

SCIENTIFIC AND PROFESSIONAL SERVICES:

14) Research Studies: Conduct and facilitate studies to gather data necessary to assess, monitor and manage refuge resources and environmental impacts of public use.

EDUCATION/INTERPRETATION:

15) Environmental Education (EE): Encourage off-site EE activities at more accessible locations where compatible with wildlife resource-related objectives. Facilitate, where feasible, limited on-site EE opportunities for both teachers and students.

16) Interpretation: Increase opportunities for off-site interpretive activities. Provide, where feasible, limited on-site supervised interpretive opportunities.

17) Photography/Journalism/Art (P/J/A): Increase opportunities for off-site P/J/A. Provide, where feasible, limited and strictly controlled on-site supervised P/J/A opportunities.

OTHER PUBLIC USES:

18) Other Compatible Public and Economic Uses: Provide support for other compatible public and economic uses throughout the NWHI archipelago. (At the present time, limited logistical support for the commercial fishing industry and recreation for authorized personnel on Tern Island are the only "other public uses" evaluated as compatible with refuge purposes. Compatibility of future uses will require assessment on a case by case basis).

VI

ALTERNATIVES INCLUDING THE PROPOSED ACTION

A. Development of Alternatives

The refuge objectives presented in Section V are the focus of various management alternatives described on the following pages. An array of management alternatives was formulated and analyzed in order to present decisionmakers with sufficient information needed to select the management scenario that best addresses the objectives of the HINWR.

The first task in developing an array of alternatives was to describe management of the HINWR as it presently exists. This description of the "present course of action" is needed to provide a reference point to compare and evaluate environmental effects associated with other alternatives under consideration. Existing management actions, which collectively are designated as the NO ACTION ALTERNATIVE (NAA), provide a "ground floor" from which other alternatives can be developed. "No Action" refers to "no change" from current management direction or level of management intensity.

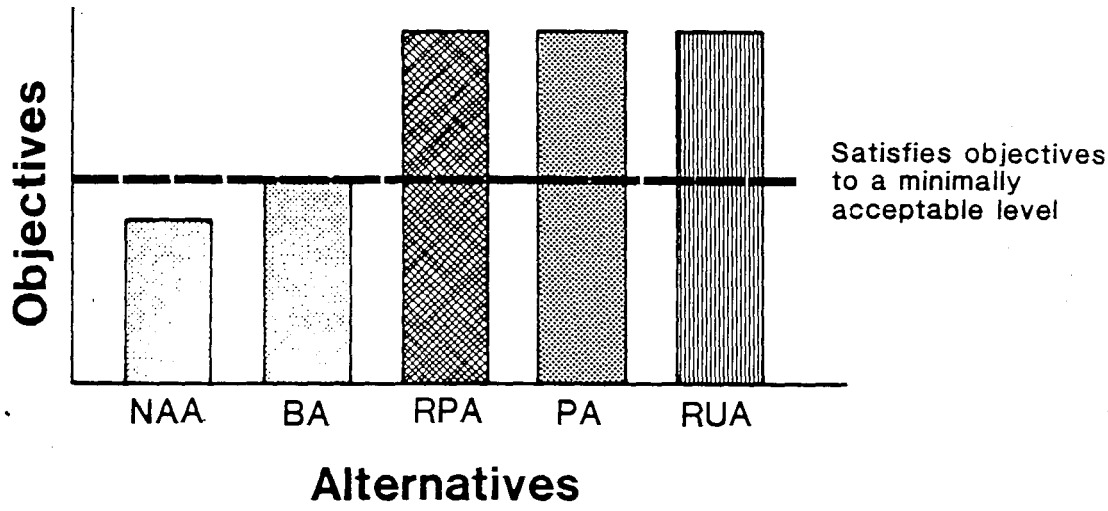
In documenting the NAA, it became apparent that current management direction and intensity falls short of accomplishing refuge objectives at a minimally acceptable level. This is due primarily to insufficient human and financial resources. In light of the fact that current management does not satisfy refuge objectives to a minimally acceptable level, the next task was to describe an alternative that addresses each of the objectives in Section V to a minimally acceptable level. This alternative represents what the FWS believes is the minimum level of activity necessary to fulfill statutory and policy mandates and to address public use considerations and other planning considerations contained in Section IV. Management strategies associated with this alternative are considered "must do" strategies and are collectively referred to as the BASELINE ALTERNATIVE (BA). As the BASELINE ALTERNATIVE addresses the full range of refuge objectives, it is clearly a multiple-use alternative. It seeks to create a balance between resource preservation and resource utilization needs within identified legal constraints and other considerations. The BA builds on the NAA, adding various management strategies to minimally satisfy refuge objectives.

Additional alternatives were created by defining other strategies beyond those included in the BASELINE ALTERNATIVE, which would further address refuge objectives. Just as the "must do" strategies were included in the BASELINE ALTERNATIVE, it was possible to portray "enhancement" alternatives that emphasized either resource preservation or resource utilization. Initially, the FWS developed four separate "enhancement" alternatives:

1) Resource Preservation Alternative
2) Intermediate Resource Preservation Alternative
3) Intermediate Resource Utilization Alternative

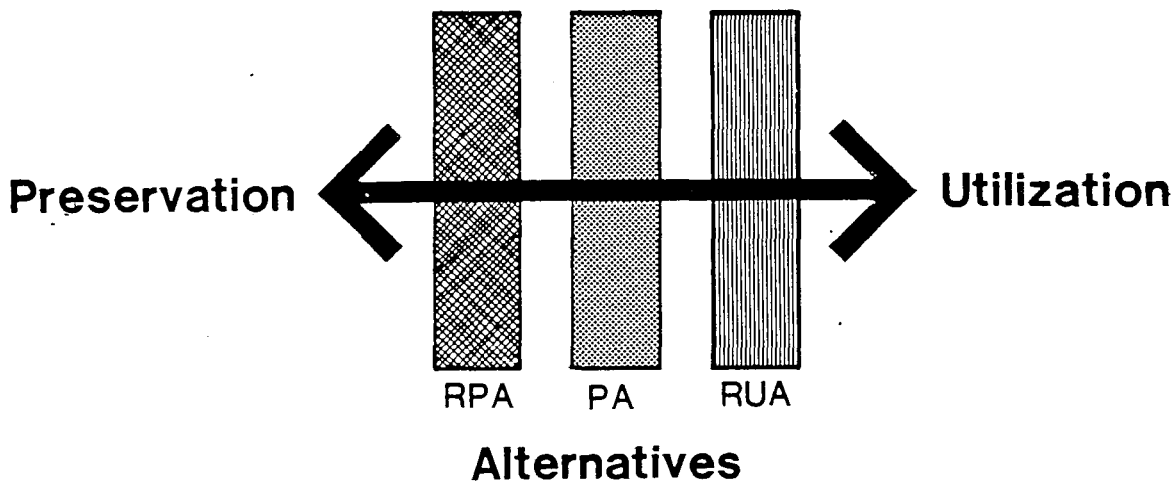
4) Resource Utilization Alternative

These four alternatives, and the strategies of which they were composed, were first portrayed in our third Planning Update (newsletter) distributed in March 1984. This presentation of alternatives was also the primary subject of discussion at the public workshop in Honolulu on March 20, 1984. Participants at the workshop were asked to comment on the specific strategies and alternatives and to select and defend a particular mix of strategies as their "preferred" alternative. Based upon input received at the public workshop and in response to the third Planning Update, together with additional background information gathered by the FWS, we reduced the total number of "enhancement" alternatives from four to three: a RESOURCE PRESERVATION ALTERNATIVE (RPA), a RESOURCE UTILIZATION ALTERNATIVE (RUA), and a PREFERRED ALTERNATIVE (PA). The PREFERRED ALTERNATIVE is a hybrid of strategies drawn from the RPA, and RUA, and it represents the FWS recommended action for management of the Hawaiian Islands National Wildlife Refuge (HINWR). The various alternatives are conceptually illustrated below in relation to accomplishment of refuge directives:



It should be understood that each of the three "enhancement" alternatives builds upon and incorporates all of the "must do" strategies that comprise the BASELINE ALTERNATIVE, which in turn builds upon and incorporates the NO ACTION ALTERNATIVE. Each enhancement strategy goes beyond the NAA and BA to include a mix of strategies that enhance either preservation of refuge resources or utilization of refuge resources. The RESOURCE PRESERVATION ALTERNATIVE contains enhancement strategies directed towards an even greater degree of fish and wildlife

preservation. The RESOURCE UTILIZATION ALTERNATIVE directs greater emphasis toward achieving educational, recreational, commercial, and other public use objectives. The PREFERRED ALTERNATIVE includes enhancement strategies from both the RPA and RUA and therefore lies between the RPA and RUA in terms of preservation and utilization of refuge resources. Schematically, the PA is located at an intermediate position on a continuum that has the RPA at the "preservation" end and the RUA at the "utilization" end.



Strategies included in the BA and each of the enhancement alternatives would be implemented over the span of a 10-20 year period, assuming funds, staffing, and appropriate involvement of cooperating agencies were obtained.

Throughout the development of management alternatives for the HINWR, the FWS has maintained that continued operation of the Tern Island field station is a necessary component of each alternative. It was concluded that many of the strategies in the NAA, BA, and the three enhancement alternatives, including the PA, are dependent upon the continued existence of the field station at Tern Island. However, because of the costs associated with the operation at Tern Island and the possibility of future budget constraints that could dictate a reduced level of operation at Tern, an analysis of tradeoffs necessitated by abandonment of Tern are presented in Section VI.G. Recognizing that the discussion of each alternative (NAA, BA, RPA, PA, and RUA) includes continuation of the Tern Island facility, the information concerning Tern Island abandonment is presented as a "management option" that could be incorporated with any of the alternatives except the NAA. (By definition, the NAA represents the present course of action. Because the Tern Island operation is presently a part of existing management, discussion of its abandonment in association with the NAA would be inappropriate.) It should also be recognized that, because the FWS views the Tern Island

THE FOLLOWING IS A SUMMARY OF THE STRATEGIES ASSOCIATED WITH THE NO ACTION ALTERNATIVE (NAA) AND BASELINE ALTERNATIVE (BA). BY DEFINITION THE NAA REPRESENTS REFUGE MANAGEMENT AS IT PRESENTLY EXISTS. THE BA, WHICH BUILDS UPON AND FULLY INCORPORATES THE NAA REPRESENTS A LEVEL OF ACTIVITY NECESSARY TO MINIMALLY SATISFY REFUGE OBJECTIVES. TOGETHER THE NAA AND BA PROVIDE A FOUNDATION FOR THE ENHANCEMENT STRATEGIES ON THE NEXT PAGE. ALL OF THE STRATEGIES LISTED BELOW ARE INCLUDED IN THE NAA EXCEPT WHERE FOOTNOTED.

NO ACTION ALTERNATIVE AND BASELINE ALTERNATIVE

VULNERABLE SPECIES:

- Implement high priority research and management tasks in recovery plans.[1]
- Monitor populations and habitats.[1]
- Prevent/monitor/control harmful exotics.[1]
- Restrict access to islands/atolls.
- Enhance public awareness.
- Identify/protect candidate and sensitive species.

ENVIRONMENT:

- Conduct archaelogical survey; nominate sites to State and National registers.
- Nominate emergent lands for wilderness status.[2]
- Evaluate Marine Sanctuary status for HINWR.[2]
- Provide research opportunity consistent with Research Natural Area (RNA) criteria.
- Seek resolution of boundary dispute.
- Pursue overlay NWR status for Midway Atoll.

OTHER FISH AND WILDLIFE:

- Monitor seabird/other migratory bird populations.
- Restrict access to seabird colonies.
- Develop/implement oil spill contingency plans.
- Prevent/monitor/control harmful exotics.[1]
- Enhance public awareness.

SCIENTIFIC AND PROFFESSIONAL SERVICES:

- Utilize field camps/annual boat surveys to monitor populations and habitat.
- Produce/distribute research publications.
- Monitor human activities and effects.
- Provide logistical support for monitoring activities at Tern Island and throughout the Refuge.

EDUCATION/INTERPRETATION:

- Develop off-refuge exhibits and programs, particularily at Kilauea Point on Kauai.
- Develop/assist in publications and audio-visual materials.
- Develop curriculum materials for school system.[2]
- Encourage off-site photography, journalism and art (P/J/A) activities.[2]
- Develop educational/interpretive materials for Midway and Kure personnel.[2]

OTHER PUBLIC USES:

- Provide recreational opportunity for authorized personnel at Tern Island.
- Provide logistical support for NWHI commercial fishery operations (including use of existing emergency mooring buoy).
- Monitor logistical support activities for effect on fish and wildlife.

1 Strategy included in NAA and expanded or enhanced in BA.

2 Strategy not included in NAA but included in BA.

Alternatives Including the Proposed Action

EACH OF THE THREE ALTERNATIVES LISTED BELOW BUILDS UPON THE NO ACTION AND BASELINE ALTERNATIVES DESCRIBED ON THE PRECEEDING PAGE. THE RESOURCE PRESERVATION ALTERNATIVE (RPA) CONTAINS STRATEGIES DIRECTED TOWARDS A GREATER DEGREE OF FISH AND WILDLIFE PROTECTION. THE RESOURCE UTILIZATION ALTERNATIVE (RUA) DIRECTS EMPHASIS TOWARD ACHIEVING EDUCATIONAL, RECREATIONAL, COMMERCIAL AND OTHER PUBLIC USE OBJECTIVES. THE PREFERRED ALTERNATIVE (PA) IS A HYBRID OF STRATEGIES DRAWN FROM THE RPA AND RUA AND REPRESENTS THE FWS' RECOMMENDED ACTION.

RESOURCE PRESERVATION ALTERNATIVE (RPA)	PREFERRED ALTERNATIVE (PA)	RESOURCE UTILIZATION ALTERNATIVE (RUA)
Regulate and monitor nearshore vessel traffic. Conduct lower priority research and management action in recovery plans. Evaluate/establish additional populations of endemic land birds.		Monitor nearshore vessel traffic. Conduct limited additional research as in recovery plans.
	Monitor impacts of commercial fishery on listed species.	
Designate/support designation of critical habitat for threatened/endangered species. Evaluate/nominate HINWR as World Heritage Site / Biosphere Reserve / Natural Landmark.		
Nominate HINWR lands/waters to Wilderness System.	Nominate HINWR lands. Evaluate and, if appropriate, nominate waters.	
Conduct historical survey; nominate sites to State/National registers.		
	Permit limited access to cultural sites for religious purposes.	
Monitor and control disease in resident seabird populations. Regulate and monitor nearshore vessel traffic. Monitor distribution and abundance of native terrestrial species. Map and ground truth terrestrial and marine ecosystems.		
	Monitor the effects of the commercial fishery and other human activities on "other fish and wildlife."	
Conduct annual aerial photo survey.	Conduct biannual aerial photo surveys of HINWR islands and atolls.	
Conduct extended field camps and/or semi-annual boat surveys. Conduct comparative monitoring studies on Midway and Kure.		
	Conduct limited nature tours/environmental education at Tern Island. Facilitate limited, supervised photography, journalism and art visits to the HINWR.	
Regulate and monitor nearshore vessel traffic. Cooperate/assist in installation of a mooring buoy outside HINWR boundary at French Frigate Shoals.		Monitor nearshore vessel traffic. Permit use of existing emergency mooring buoy within HINWR boundary for multi-species fishery. Provide recreation, storage and emergency use of Tern Island in support of a multi-species fishery.

operation as necessary to accomplishing certain Refuge objectives, the abandonment option would significantly reduce the ability of an alternative to satisfy objectives. It is for this reason that the option for abandonment of Tern Island is not included in the FWS' PREFERRED ALTERNATIVE.

B. No Action Alternative

As stated previously, the NO ACTION ALTERNATIVE (NAA) includes all of the management actions and strategies that are a part of present day management of the refuge. "No action" refers to "no change" from present management. Each of the strategies that follow represent what the FWS is currently doing towards accomplishment of Refuge objectives. These strategies fall short of satisfying the objectives listed in Section V. Each of the strategies represent a consolidation of various management actions and are summarized below by major output category:

"Vulnerable" Species (Endangered, Threatened, Candidate and Sensitive Species):

1) Implement high priority research and management tasks in recovery plans:

By definition, this strategy includes only those threatened or endangered species for which recovery plans have been prepared (monk seal, Laysan duck) or are being prepared (other land birds and green sea turtle). Each plan identifies certain high priority research/management tasks and assigns responsibilities to various cooperating agencies. From the perspective of population stability, recovery capacity and understanding of limiting factors, the Hawaiian monk seal is clearly the most endangered of the listed HINWR species. For this reason, the greatest research and management attention has been, and will continue to be, directed towards recovery of this species. This effort will continue to be shared by National Marine Fisheries Service (NMFS) and the FWS, with NMFS having primary jurisdiction and responsibility for management of the recovery effort. Research projects will continue to focus on identification and mitigation of natural limiting factors, documentation of habitat requirements, monitoring of population trends, and the documentation and mitigation of human impacts. The FWS will continue to share in the monitoring program and will implement management measures to minimize disturbance to seals and their habitat. Principle management measures directed at more than one vulnerable species are identified as separate strategies.

Recovery and perpetuation of land bird species in the HINWR is dependent upon maintenance of habitat quality. Seemingly minor perturbations, such as the introduction of rabbits to Laysan in 1903, can have lasting adverse effects. Although the FWS is currently monitoring habitat

conditions on Nihoa and Laysan Islands to detect and correct conditions that jeopardize habitat stability, considerably more effort is required to implement recovery plan recommendations.

Hawaiian Monk seal (Monachus schauinslandi).

2) Monitor populations and habitats:

This is a key strategy that is of high priority for all "vulnerable" species, but is of greatest importance for those species whose numbers are precariously low and susceptible to rapid change. Monitoring is also the method by which the effectiveness of recovery programs is evaluated. Methods which have been used and will be continued include aerial and ground photography, sampling of population numbers, assessment of sex/age class composition, documentation of reproductive output, growth studies, and determination of the movements of individual animals.

3) Prevent, monitor and control the introduction of harmful exotic species:

The vulnerability of listed species in the HINWR, particularly terres trial species, is intimately tied to the limited presence of exotic

(non-native) species. Most of the exotic plants and insects now found on HINWR islands are either non-threatening to listed species and/or are manageable by conventional means (e.g. limited spraying, etc.). What is of greatest concern is the risk that new, harmful species will be inadvertently introduced to these islands and alter their ecological balance irreversibly before they can be detected and eliminated.

The list of potentially harmful exotic species includes various insects (predators, plant pests, disease vectors, etc.), weedy or competitive plant species, mammalian predators (rats or cats), and land birds (particularly those harboring avian disease).

The historic record of the Pacific Islands, including those in the NWHI, is replete with the documented results of such exotic introductions. Rabbits nearly eliminated the vegetation on Laysan Island, ultimately leading to the extinction of three bird species. Rats on islands at Midway and Kure atolls caused the extinction of transplanted Laysan rails during World War II and presently severely limit the production of young in ground-nesting seabird colonies. Mosquitos and flies at Midway spread avian pox in the seabird colony. Feral cats on central Pacific National Wildlife Refuges and other islands throughout the world have also wreaked havoc in seabird colonies.

Currently eradication of certain very harmful exotic species on remote islands is accomplished during annual visits to each of the Refuge islands and on an as-needed basis if detected through other means such as cooperating researchers and aerial photography.

The Special Use Permit (SUP) process is currently used to specify conditions that must be met by all Refuge users/visitors to prevent the introduction of new exotics. These conditions include management practices and techniques to control transfer of weed seeds, insects and predators from one island to another, special handling of equipment and supplies, and inspection, monitoring and enforcement by FWS personnel. Because Tern Island is used as a staging area from which gear and personnel often embark for other islands within the Refuge, and because harmful exotics exist on Tern Island presently, gear and personnel destined for other Refuge islands are cleaned and inspected to ensure that no exotic organisms from Tern Island are inadvertently introduced elsewhere.

4) Restrict access to HINWR islands and atolls:

Inherent in a program to limit unnecessary disturbance to vulnerable species is the enforcement of regulations to minimize human presence on islands and in atolls within the HINWR boundary. At present, and in the future, human access to HINWR lands and waters will be controlled through the SUP process, administered by the Refuge Manager. Authorized

activities in the Refuge must be conducted in a manner that minimizes disturbance to wildlife and habitat. These activities are prioritized to limit overall impacts and, if approved, will be scheduled to reduce cumulative effects. Although other applicable state and federal permits for refuge research will be required, they will not guarantee issuance of a refuge SUP if the work cannot be conducted with a minimum of disturbance or in the most suitable locations, as determined by the Refuge Manager. By virtue of the permitting process all authorized research and other activities within the HINWR that may affect threatened or endangered species are subject to the provisions of Section 7 of the Endangered Species Act as well.

Restrictions on access to the HINWR extend to atoll waters within the managed boundary. Regulations which now permit vessel access only for approved research projects, support for FWS operations or for emergency situations will continue to be enforced.

5) Enhance public awareness:

This strategy is highlighted here because of its contribution to accomplishing "vulnerable" species objectives. All draft and final recovery plans for threatened and endangered species have recommended actions to increase public awareness regarding the status and value of these species and the actions necessary to promote their recovery. Ongoing actions include publication of information (articles, brochures, etc.), development of audio-visual materials (films, slide shows, etc.) and presentations to various public groups. Other forms of public use opportunity addressing the public awareness objective are addressed in the Education/Interpretation category below.

6) Identify and protect candidate Threatened/Endangered and sensitive species:

By FWS definition, "candidate" species are those species which were published in notices of review appearing in the Federal Register for possible listing as threatened or endangered species. As it pertains to the HINWR, this includes 14 plant species which appeared in the December 15, 1980 Federal Register (FR 45:82480-82569) and 32 invertebrate species which appeared in the May 22, 1984 Federal Register (FR 49:21644-21675). "Sensitive" species are identified by Region One of the FWS as those species that are likely to become listed as threatened or endangered if present population trends continue. At present, only one species (sooty storm-petrel) is listed as "sensitive" within the HINWR. Because of their designation as "candidate" or "sensitive" species, the above-mentioned species should receive higher priority in monitoring and habitat protection programs than will other, unlisted species. However, due to current logistical, fiscal and staffing constraints little additional monitoring and protection efforts are made toward these species. Effort is also directed

at the identification of other, unlisted species in need of greater protection. The process of defining new "candidate or "sensitive" species is dependent upon effective population and habitat monitoring over time. Ultimately, such a program proves cost-effective and has a greater chance of success because it permits correction of conditions which jeopardize these species while their populations are most capable of rapid recovery.

Environment:

7) Conduct archaeological surveys and nominate eligible sites to state and national registers:

Important archaeological resources have been identified and subjected to preliminary surveys at Nihoa and Necker islands. These resources include remnants of garden terraces, house sites, crude shelters and temple sites. These sites have not yet been nominated for State or National Registers of Historic Places. The sites are vulnerable to disturbance and vandalism through unauthorized landings on the islands. They are also subject to natural deterioration. An archaeological survey was initiated in July 1984 by the Bishop Museum to provide a) an evaluation of the condition of identified sites; b) recommendations for site preservation and study; and c) preparation of site nomination forms for state and national registers.

8) Provide research opportunity consistent with Research Natural Area (RNA) criteria:

The research/education objective of the RNA program is to provide opportunities for scientists and others to observe, study and monitor natural environmental processes. Use of RNAs by researchers is generally restricted to investigations by advanced students and qualified professionals. All research is subject to prior approval and written agreement (in the case of the FWS, by Special Use Permit). The research use should generally be limited to non-destructive, non-consumptive, or essentially observational activities, but minimally disruptive research procedures may be permitted if determined appropriate. Particular attention will continue to be devoted to the use of RNAs as sources of baseline information for monitoring changes in environmental conditions.

9) Pursue overlay National Wildlife Refuge (NWR) status for Midway Atoll:

The FWS proposal for overlay NWR status at Midway Atoll is discussed in Section IV.F.10. This strategy addresses the need to enhance the effectiveness of fish and wildlife management programs at Midway Atoll through incorporation of the atoll into the National Wildlife Refuge System as an overlay NWR. Under this scenario, the U.S. Navy would

retain primary jurisdiction for the Midway naval operation, while the FWS would assume a greater cooperative role in fish and wildlife management. The FWS recognizes that prior to implementation of the overlay refuge, the roles and responsibilities for each agency must be clearly delineated and agreed to. This program would be similar to that presently in effect at Johnston Atoll, which is both a national wildlife refuge and a Defense Nuclear Agency facility.

10) Seek resolution of the HINWR boundary dispute:

The difference of opinion between the state and federal governments regarding the appropriate seaward boundary of the HINWR is based largely on the interpretation of public law (see Section IV.G.1). Growing concern among involved parties regarding this issue is fueled by the State of Hawaii's interest in commercial harvest of fishery resources within the disputed waters. The Tripartite Cooperative Agreement made reference to the boundary dispute, but noted that it was not the intent of the study to resolve the issue nor to detract from or add to the respective positions of the parties involved in the dispute. Rather, it was the intent of the study to gather scientific data which would be useful in managing fish and wildlife resources, regardless of jurisdictional responsibilities.

Now that Tripartite studies are completed, the FWS' ability to functionally manage resources within the disputed waters has been complicated by the State's reluctance to acknowledge FWS jurisdiction. Failure to resolve the issue clouds the relationship between the FWS and the State in virtually all situations where resource management responsibilities are shared. Therefore, this strategy addresses the need for timely resolution of the dispute in a cooperative manner.

Other Fish and Wildlife

11) Monitor seabird and other migratory bird populations:

The major focus of the FWS' research effort during Tripartite studies was the development of baseline data on seabird populations and the refinement of methods to be applied in the long-term monitoring of population health and status. This information proves particularly useful in assessing the effects of human activities, including fishery development, in waters where these species seek their food. Studies proposed to continue under this strategy include population size, reproductive success, growth rates, food habits, causes of mortality, inter-island movements and habitat requirements. Population monitoring of wintering migratory shorebirds is also proposed to continue.

12) Restrict access to seabird colonies:

The density of nesting birds on HINWR islands and the sensitivity of nesting habitat to disturbance dictate the need to minimize human activity within seabird colonies. The immediate effects on reproductive success of seabirds due to disturbance in the colony are often subtle, but the impact of repeated disturbance over the long term can be dramatic. Under this strategy, authorized visitors to HINWR islands are restricted in their activities on the island to minimize this problem. This includes restrictions both in location and time, taking into account seasonal variations in bird populations. The problem of unauthorized visitation and subsequent disturbance to nesting seabirds will continue to be addressed through education and enforcement activities as well.

13) Develop and implement oil spill contingency plans:

The critical importance of beaches and nearshore waters of the HINWR to seabirds, seals, turtles, and other marine resources raises serious concern about the potential damage that would be caused by a major spill of oil or hazardous chemicals. Logistical constraints would further add to the impact by preventing rapid and effective response to control spills or rehabilitate wildlife on remote islands. This concern was underlined in 1969 when a Japanese fishing vessel went aground on Laysan Island and in 1977, when the tanker, IRENES CHALLENGE, sank 50 miles north of Lisianski Island and spilled more than five million gallons of oil into the sea. Fortuitous weather conditions prevented this oil from reaching the islands, but the extreme vulnerability of this unique habitat was clearly demonstrated. More recent groundings of a large freighter and several fishing vessels on the NWHI, including the February 5, 1985 sinking of the CAROLYN K within the Refuge at French Frigate Shoals, have only heightened concern and, taken together, have dictated the need for improving our response capability as the number of vessels transiting nearshore NWHI waters increases.

This strategy addresses the need to continue evaluating appropriate means to respond to incidents and to determine roles and responsibilities of various agencies and organizations. It also includes the determination and stockpiling of appropriate equipment and supplies to permit effective response. Agreements and contracts for logistical support (aircraft, boats) will need to be developed in advance of a serious incident.

14) Prevent, monitor and control the introduction of harmful exotic species:

This strategy focuses attention on the need to maintain HINWR islands free of harmful exotic plant, insect and animal species as a means to maximize natural productivity <u>in resident seabird colonies</u> and to

maintain a more natural abundance and diversity of other terrestrial plant and animal species. This problem and strategies to address it are discussed in the Vulnerable Species category above (Strategy # 3).

15) Enhance public awareness:

The most visually obvious wildlife resource of the HINWR is the resident seabird population which numbers between 12 and 14 million birds (breeding and non-breeding) of 18 species. Many of these species frequent nearshore waters of the main Hawaiian Islands in smaller numbers, so there is at least general familiarity with the resource among many local residents and visitors. The general public is largely unaware of the other species that inhabit the islands and atolls of the HINWR. This strategy is designed to enhance familiarity through a public awareness program including publication, audio-visual materials and presentations. The details involved in implementing this strategy are treated in the Education/Interpretation category.

Scientific and Professional Services:

16) Utilize short field camps and annual boat surveys to monitor wildlife populations and habitat:

This strategy highlights the importance of repetitive field survey activity to accomplish all monitoring objectives, including enforcement of regulations. This strategy also includes year-around monitoring at the Tern Island facility. One annual boat survey of the entire HINWR, incorporating short camps, is proposed to continue as an absolute minimum level of field work necessary to address highest priority monitoring objectives.

17) Produce and distribute research publications:

One major value of research in the HINWR is the contribution it can make to future management of this Refuge and its fish and wildlife. This in formation can also prove highly useful to other resource managers responsible for similar species and habitats. The scientific data can also contribute to the general body of data accumulating from work around the world in pristine areas. Such transfer of knowledge is dependent upon the timely and effective publication of research publications within the body of literature that is freely accessible to other investigators and resource managers. This is also the source of information for more popular literature for the general public. With this in mind, the FWS will continue to participate in, encourage and facilitate the timely publication of research results.

18) Monitor human activities and their effects on HINWR islands and in nearshore waters:

This strategy is addressed in virtually all recovery plans and is equally applicable to other fish and wildlife resources potentially affected by human activities. A basic premise of refuge management is that compatibility of human use is judged by the effect of that use on fish and wildlife resources in that refuge. For this reason, it is critical that a substantive part of the monitoring and assessment effort be directed at the determination of human effects, both short- and long-term.

19) Provide logistical support for monitoring activities at Tern Island and elsewhere throughout the HINWR:

The unique importance of Tern Island in the HINWR resource monitoring program is singled out in this strategy. Not only does Tern Island provide year-around access to important terrestrial and marine resources, but it also provides the logistical capability to facilitate work on other islands in the HINWR and the ability to react effectively and quickly to resource management problems encountered midpoint in the archipelago. This strategy addresses this support function, within the constraints imposed by station capability and cumulative effects of human activities on the island. The role of Tern Island in support of HINWR management is addressed in detail in Section VI.G.

Education/Interpretation

20) Develop off-refuge education/interpretive exhibits and programs:

In view of the logistical problems and the anticipated conflicts inherent in substantially expanded public use on HINWR lands, the highest priority education/interpretation strategy is directed at off-refuge locations. The principal immediate focus of this effort is the FWS' interpretive facility at Kilauea Point on Kauai. This site presently attracts nearly 270,000 visitors per year. The opportunity for visitors to view several seabird species, whales and turtles from this scenic location provides a basis for expanded interpretive exhibits to enhance the quality of the experience. This is a convenient location to provide an interpretive "window" on the HINWR. This site has also proven appropriate for structured educational programs, such as teacher workshops and outdoor classrooms. Recent establishment of a cooperating association and a volunteer program at Kilauea Point will enhance educational and interpretive opportunities.

Kilauea Point provides a unique setting and opportunity for interpretive and educational programs focusing on the HINWR, but, by virtue of its location, it fails to reach the vast majority of the resident and visiting public found on Oahu. For this reason, this strategy also addresses the need to explore other Oahu-based locations for expanded FWS involvement in interpretive and educational programs relating to fish and wildlife resources of the HINWR. These programs should address

fish and wildlife resources as well as cultural resources, geological history and related topics. Possible Oahu-based locations include the Bishop Museum and the Honolulu Airport.

21) Develop and assist in the development of publications and audio-visual materials on HINWR resources:

The present availability of extensive photo documentation and published materials relating to the HINWR makes it feasible and practical for FWS personnel to publish and to assist others in publishing articles on the HINWR in popular literature. These publications are widely distributed, making a substantial percentage of the public at least generally aware of the HINWR and its unique values. Continued cooperation with the news media will also facilitate repetitive coverage of issues and topics of general interest pertaining to the HINWR. This strategy includes the expanded development of slide shows, brochures and other interpretive publications. FWS-owned movie footage will also be made available for documentary production and for use by the news media.

Other Public Uses:

22) Provide limited recreational opportunity for authorized personnel within the HINWR:

Tern Island is operated by the FWS, in cooperation with other agencies, principally in support of resource management and research programs in the HINWR. Refuge staff are stationed on the island for extended periods (up to five months) to operate and maintain the facility and to conduct long-term resource monitoring studies. In addition, shorter term station occupants include other researchers (FWS and other agencies), National Weather Service personnel, contracted maintenance personnel, and contracted pilots. Occasional authorized visitors include FWS program management staff, support vessel crews, news media and representatives of other agencies and organizations (U.S. Army Corps of Engineers, National Marine Fisheries Service, State DLNR, Marine Mammal Commission, Congressional subcommittees, State Legislature, City Council).

It is particularly important that station occupants with extended duty on Tern Island have recreational opportunities to facilitate adjustment to life on a remote island, although the recreation policy would apply to all authorized visitors. Tern Island has a few, limited recreational facilities. Within the Refuge, fishing is limited to catch and release pole fishing and jogging is allowed in non-sensitive areas. These and all other recreational activities will be permitted only in designated areas when not conflicting with higher priority wildlife outputs and are subject to approval by the Refuge Manager. Limited recreational activities for field camp personnel are also permitted on other islands in the HINWR. The exact nature of these activities will be specified by SUP.

23) Provide logistical support for NWHI commercial fishery operations:

Continued presence of Refuge personnel at Tern Island makes possible a limited degree of support to vessel traffic in the NWHI. During the period of FWS occupation since July 1979, this support has included regular transmission of radio traffic and phone messages; transport of supplies and parts on FWS contracted aircraft; transport of crew; emergency evacuations; medical assistance; fabrication and repair of equipment during vessel breakdowns; etc. The FWS has also assisted in the rescue of a stranded crew and provided aircraft and boat support in the salvage of the grounded freighter, ANANGEL LIBERTY and the fishing vessel, CAROLYN K. During the same period, the FWS has received a tremendous amount of vessel support in the operation of Tern Island from fishermen, and also from NMFS, Coast Guard, Navy, the State of Hawaii and others.

Under this strategy, the FWS role in the facilitation of vessel activity in the NWHI, particularly commercial fishing, will continue and expand within the limits of staff time and capability. There is no intent to significantly expand the FWS' presently limited ability to provide search and rescue assistance. This strategy will not include modifications of facilities or storage of other than incidental equipment or supplies at Tern Island in support of the commercial fishing industry. The existing Special Use Permit allowing installation and use of an emergency mooring buoy within French Frigate Shoals will be continued. Use of the buoy will continue to be limited to legitimate emergency or imminent emergency situations.

24) Monitor logistical support activities for effects on fish and wildlife resources:

Compatibility of public use activities with higher priority refuge management objectives is fundamental to the continuation of those activities. Determination of compatibility (assessment of effects) will require monitoring programs that are directly relevant to those activities. Use of the emergency mooring buoy, vessel traffic and anchoring within the Refuge, and other activities relating to logistical support will continue to be monitored to ensure that they occur as specified in Refuge regulations, appropriate public notices or Special Use Permits. This strategy also involves documentation of the response of seals, turtles and other wildlife to support activities (*mooring*, vessel traffic, transfer of supplies, etc.).

C. Baseline Alternative

The BASELINE ALTERNATIVE (BA) incorporates all of the strategies included in the NO ACTION ALTERNATIVE and those additional "must do" strategies needed to minimally satisfy the objectives for the HINWR included in Section V. These strategies take into consideration

anticipated limitations in staffing and funding of the FWS and cooperating agencies. The strategies have been modified somewhat since the third Planning Update and the March 20, 1984 public workshop to reflect input received through public involvement. Each of the strategies represent a consolidation of various proposed actions and are summarized below by major output category:

"Vulnerable" species (Endangered, Threatened, Candidate and Sensitive Species):

1) Implement high priority research and management tasks in recovery plans:

This strategy goes beyond the NO ACTION ALTERNATIVE Strategy #1 to include additional research and management actions needed to more fully address recommendations in recovery plans. In particular, considerable additional effort is required to implement recommendations associated with land birds. One focus for Refuge research and management action is addressing the accelerated filling of the lagoon at Laysan Island with windblown sand from a de-vegetated dune and the effects on various land birds, including the Laysan duck.

2) Monitor populations and habitats:

In addition to continuation of those monitoring activities included in NO ACTION ALTERNATIVE Strategy #2, this strategy includes additional recovery plan monitoring requirements not presently being addressed. These include annual population inventories and follow-up surveys of the four endemic land birds and monitoring the status of candidate and sensitive species on a regular basis.

3) Prevent, monitor and control the introduction of harmful exotic species:

Because eradication of harmful exotic species on remote islands is accomplished most easily upon introduction, this strategy goes beyond the NO ACTION ALTERNATIVE Strategy #3 to conduct more frequent visits to islands to monitor/control exotic species and implement effective, standardized survey and detection methods. Logistical constraints dictate the need for remote sensing methods as well.

Environment:

4) Reactivate nomination of emergent lands, excluding Tern Island, for Wilderness status:

Although FWS policy holds that lands under consideration for Wilderness status be managed as if formally designated, completion of the designation process for the HINWR lands would ensure consistent

management for Wilderness values into perpetuity. The resource values for which HINWR lands are managed are consistent with the definition of "Wilderness" as found in the Wilderness Act of 1964. Although use of motorized equipment is generally prohibited in Wilderness areas, exceptions are possible when such activities are essential to accomplishing refuge objectives and/or when the use is an established practice prior to formal Wilderness designation (and must continue for proper administration of the area). Use of generators for radio communication and small boats for landing on Refuge islands would fall under this description. This strategy, therefore, includes active nomination of HINWR lands for Wilderness status.

5) Evaluate Marine Sanctuary status for the HINWR:

A proposal has been made (Harrison, 1983) to consider Marine Sanctuary status for waters in the NWHI. The purpose of the proposal is to correct a problem of fragmented jurisdictional responsibilities that hampers an "ecosystem" approach to resource management. The proposal further contends that the "existing management regime fosters needless interagency conflict, inefficient exploitation of fisheries, and inadequate protection of some wildlife species". If adopted as proposed, the NWHI Marine Sanctuary would encompass all waters seaward to 12 miles for each island in the NWHI, including Midway and Kure. The Administrator of NOAA would have overall management responsibility, but an advisory board consisting of individuals from other agencies, industry and private organizations would be established to ensure wide representation during decision making. Both the State of Hawaii and the FWS would have to agree to the inclusion of waters in the Marine Sanctuary over which they now assert jurisdictional authority.

As a mechanism to provide a comprehensive management approach where fragmented authorities exist, the Marine Sanctuary concept has considerable merit. However, the complexities of the management issues involved in the NWHI and the wide diversity of parties involved, necessitate that this proposal be given lengthy and extensive consideration before possible application in the NWHI. It is beyond the scope of this plan for the HINWR to consider with the intent to resolve, the issue of whether or not a Marine Sanctuary should be established when most of the proposed acreage to be included is outside present FWS jurisdiction. With this in mind, this strategy recommends that the Marine Sanctuary proposal be thoroughly evaluated in a open forum, involving all concerned parties, including the general public, following completion and approval of the HINWR Master Plan/EIS.

Other Fish and Wildlife:

6) Prevent, monitor and control the introduction of harmful exotic species:

This strategy focuses attention on additional management actions included in BA Strategy #3 to prevent, monitor and control harmful exotic species in seabird colonies and where they may impact other terrestrial plant and animal species.

Education and Interpretation:

7) Develop appropriate curriculum materials for the school system:

Environmental education (EE) programs in Hawaii are severely hampered by the unfortunate lack of curriculum materials directly relevant to fish and wildlife resources of the island. This strategy will address the problem by focusing future efforts on the production of EE materials directed specifically for different age groups in island schools. An expanded version of the present effort in this direction will include sound-slide shows, teachers workbooks, class exercises and other appropriately structured reading materials. Such a program is fundamental to the development of local pride in the unique Hawaiian fish and wildlife resources and cultural history.

8) Encourage off-site photography, journalism and art (P/J/A) activities relating to HINWR resources:

Beyond the assistance the FWS can provide in making resource materials available, this strategy is directed at accommodating and encouraging P/J/A activities at other main Island locations where conflicts with wildlife or logistical problems are minimized or avoided. This effort will, by necessity, focus on seabird species common to both the HINWR and the main Islands. Principal public use opportunity for P/J/A activities will be located at Kilauea Point National Wildlife Refuge and, in cooperation with other agencies, at Kaneohe Marine Corps Air Station and Oahu's offshore islands.

9) Develop educational/interpretive materials for Midway and Kure personnel:

Military personnel, civilian contractors and authorized visitors to Midway and Kure atolls are immediately aware of the presence of large, diverse fish and wildlife populations, but they are given little help in learning about those resources. This strategy is directed at the cooperative development of educational programs and interpretive exhibit materials to enhance the quality of the human experience on these islands. This effort will also serve to reduce conflicts between man's occupation of these islands and the rich fish and wildlife resources that share the space. Although Midway and Kure are not within the HINWR, the fish and wildlife species found at these locations are common to and/or move between islands and atolls of the archipelago. This educational effort must be implemented in close coordination with other agencies that have primary jurisdiction at these sites.

D. Resource Preservation Alternative

The RESOURCE PRESERVATION ALTERNATIVE (RPA) incorporates all strategies included in the NO ACTION and BASELINE ALTERNATIVES and builds upon that foundation by including additional enhancement strategies emphasizing preservation of fish and wildlife resources within the HINWR. Because of the documented and potential effects of human activities outside existing HINWR boundaries, the RPA addresses the need for the FWS to exert influence beyond its area of primary jurisdiction. Many of the RPA strategies focus on reducing the risk of adverse human impacts, increasing "layers" of administrative protection and resource recognition, and expanding research and monitoring programs. The strategies which make up the RPA are discussed briefly below:

"Vulnerable" Species (Endangered, Threatened, Candidate and Sensitive Species):

1) Regulate and monitor nearshore vessel traffic:

This strategy is directed at the need to minimize the risk of vessel groundings on HINWR islands and reefs. It is considered here under the "Vulnerable" Species category but it has implications with respect to virtually all aspects of HINWR resource management. The historic record, particularly over the last decade, makes it apparent that the risk of groundings is real, not speculative. Increasing vessel activity associated with shipping traffic and expanding commercial fisheries increase the risk substantially. The prospect of fishery support facilities at Midway, and subsequent attraction of additional fishing boats, makes it virtually certain that more vessels, with crews unfamiliar with NWHI waters, will end up on HINWR reefs and islands.

This strategy will seek to improve the regulation and monitoring of nearshore vessel traffic by working cooperatively with the State of Hawaii, the U. S. Navy, NMFS, the Coast Guard, the Western Pacific Regional Fishery Management Council (WPRFMC), and fishing industry. A working interagency committee is proposed to consider, and implement where feasible, various measures to reduce the risk of and enhance the ability to respond to groundings. Among the measures proposed for consideration by the committee are:

a) Change the present Intergovernmental Maritime Consultative Organization (IMCO) "Area to Be Avoided" to regulatory, not advisory status. Alternatively, the nearshore portion of the area (e.g. within 10 miles of emergent land or submerged reefs) could be subject to regulation, the remaining area covered by the advisory. Include Kure into the area covered.

b) Establish a 100-fathom contour regulation that would prohibit vessels from transiting waters within the 100 fathom isobath surrounding each island or atoll. Vessels could enter the area (outside the refuge boundary) for the objective of fishing, observation/recreation and for authorized research and/or refuge-related projects. This would reduce the risk of groundings of vessels with "no business" in nearshore waters.

c) Require all vessels fishing in the NWHI to obtain Leeward Islands fishing permits from the State of Hawaii (not simply vessels targeting fishery resources subject to different regulations than within main Island waters, as is now the case). This regulatory process would provide a single point of contact for all fishing vessel owners and captains, facilitating education and enforcement.

d) Implement an educational program relating to the grounding hazards in the NWHI, particularly directed at vessel owners and captains with little or no experience in the area. The program should include documents with detailed discussion of particular hazards, anchorages, wind/wave conditions, emergency actions, rescue and communication procedures, etc. Owners and captains might also be asked to attend orientation meetings which would include slides/movies of recent groundings and interviews with people involved in groundings in order to emphasize the seriousness of travel in the NWHI. Issuing of Leeward Islands fishing permits should be contingent upon exposure to the educational program.

e) Consider vessel reporting requirements for activities within the 100 fathom isobath around HINWR islands and atolls. A more sophisticated approach could involve required satellite-monitored transponders. Radio reporting could be accomplished by the Coast Guard in cooperation with the FWS at Tern Island and the U.S. Navy at Midway.

f) Install an EPIRB receiver and radar equipment at Tern Island. The EPIRB receiver would permit immediate detection of groundings or other emergencies in the French Frigate Shoals area. The radar equipment would allow Refuge staff to monitor vessel activity in the north end of French Frigate Shoals, including that associated with use of the emergency mooring buoy and/or a multi-species fishery buoy.

g) Install prominent radar targets at vulnerable locations in the HINWR. This may not prove feasible in exposed reef areas where recent groundings have occurred, but should be considered.

It is envisioned that measures, such as discussed above, will not only protect HINWR resources but will also enhance the safety of vessel crews

and protect boat owners from serious financial losses. Improved monitoring of vessel activity will substantially reduce the time necessary to respond to groundings, making it possible to rescue crews and protect HINWR resources more effectively.

2) Conduct lower priority research and management actions in recovery plans:

As in the NO ACTION and BASELINE ALTERNATIVES, this strategy focuses on those six wildlife species presently listed on the federal list of threatened and endangered species. It builds upon the various high priority research/management programs implemented under the NAA and BA. As an example, such projects for the Hawaiian monk seal will include, among others, the treatment and rehabilitation of sick seals, ciguatoxin exposure and toxicity studies, shark monitoring and possibly localized control programs, marine habitat usage studies and expanded aerial surveys. For this species, the principal FWS role will continue to be in support of studies underway and planned by NMFS, the agency with primary responsibility for the monk seal recovery program. In contrast, the FWS will continue to have the lead role in the implementation of recovery actions for endangered land birds in the HINWR.

3) Evaluate/establish additional contingency populations of endemic land birds, consistent with recovery plans:

The major focus of approved and proposed recovery plan recommendations for endemic land birds concerns the protection and maintenance of essential habitats. However, because existing and potential threats could lead to catastrophic declines in natural populations, this strategy is proposed to provide a contingency against such disasters by establishing and maintaining at least one additional and disjunct population for each of the endemic land birds. The Laysan duck is presently distributed widely in several well-maintained zoological collections around the world. The Laysan finch has been transplanted to Pearl and Hermes Reef in 1967 and is well-established on several islets. These two species appear to have adequate "buffer" populations and will likely require little additional attention under this strategy. Management of any population must consider the implications of manipulation of natural processes and alteration of the terrestrial ecology throughout the HINWR. Presently it is expected that new actions associated with this strategy will be limited to transplanting millerbirds to Laysan Island depending on a scientific evaluation of taxonomic classification for HINWR millerbirds and further study of habitat requirements. Captive flocks of Nihoa finches will be pursued. Emergency capture and/or transplantation may be considered for any of the land birds in the event of natural or human-related catastrophe that seriously threaten wild populations.

Assistant Refuge Manager banding a Black noddy (Anous tenuirostris) chick for life history studies.

Environment

4) Designate or support designation of critical habitat (CH) for threatened and endangered species:

The role of formally designated critical habitat in the protection and recovery of listed species was discussed previously (see Section IV.F.2.). This strategy is based upon the perspective that designation of CH would increase protection, enhance recovery and draw public attention to the vulnerability and value of the habitat of these species. The process of CH designation for land bird species can begin immediately by FWS action alone. Consideration of CH designation for the green sea turtle will appropriately wait until conclusion of the recovery planning process. NMFS has recently re-proposed the NWHI beaches and waters out to the 10 fathom isobath as critical habitat for the monk seal. Although the FWS prefers designation of CH out to the 20 fathom isobath, under this strategy, the FWS will support and comply with the final designation whatever it is.

5) Evaluate and nominate, if appropriate, lands and waters of the HINWR for status as a World Heritage Site, Biosphere Reserve and National Natural Landmark:

This strategy is directed at the desirability of securing additional national and international forms of protection and recognition of the unique resource values of the HINWR following a thorough evaluation of the short- and long-term implications of additional protective designation for the HINWR. While not replacing current federal or state refuge status, such formal designations would acknowledge natural and cultural resource values that transcend political and geographic boundaries. Three such types of recognition, for which the HINWR appears to qualify, are World Heritage Sites, Biosphere Reserves and National Natural Landmarks.

The International Convention Concerning the Protection of World Cultural and Natural Heritage (UNESCO, 1972) provides for the designation of areas of "outstanding universal value" as World Heritage Sites. Suitable natural properties include those which a) represent major stages of the earth's evolutionary history; b) are examples of geological processes, biological evolution or man's interaction with the natural environment; c) are examples of unique, rare or superlative natural phenomena, formations or features or areas of exceptional natural beauty; or d) are habitats where populations of rare or endangered species of plants and animals still survive. These exceptional areas must be recommended by the signatory nation responsible for the site for declaration by the International World Heritage Committee. To be designated, sites must already have long term protection and be owned and managed by a government or a non-profit corporation or trust.

Where World Heritage Sites protect cultural and natural properties of outstanding universal value, Biosphere Reserves are established to preserve ecosystems representative of the world's terrestrial and aquatic biomes. The Biosphere Reserve project was an outgrowth of the UNESCO Man and the Biosphere program. Criteria and guidelines for selection of Biosphere Reserves were developed by a UNESCO task force in 1974. Each Biosphere Reserve is to include one or more of the following: a) representative examples of natural biomes; b) unique communities or areas with unusual natural features of exceptional interest; c) examples of harmonious landscapes resulting from traditional patterns of land-use; or d) examples of modified or degraded ecosystems capable of being restored to more natural conditions. To qualify for designation, a site must also be large enough to be an effective conservation unit, should provide opportunity for ecological research and education, and must have adequate long-term legal protection.

The purpose of the National Park Service's Natural Landmarks Program is to identify nationally significant landscapes and/or ecological areas. A 1981 evaluation included approximately 50 existing or potential land-

mark sites in the State of Hawaii, 31 of which were rated against several criteria. Highest priority was given to those sites which include outstanding and/or unique examples of the geological and ecosystem features characteristic of the Hawaiian Islands and which encompass several such features. In that review, the Northwestern Hawaiian Islands (from Nihoa to Kure), were assigned the highest priority.

6) Nominate HINWR lands and waters to the Wilderness System:

Whereas the BASELINE ALTERNATIVE includes a strategy directed at Wilderness nomination for HINWR lands, greater resource protection is sought through this strategy which will also include the approximately 252,000 acres of submerged lands and water within the HINWR (see Section IV.C.2.e.). Both strategies would exclude Tern Island and adjacent dredged areas. The strategy to include both HINWR lands and waters would be consistent with the original Wilderness proposal developed by the FWS. This earlier proposal was reduced to emergent lands only in recognition of the boundary dispute and in response to concerns of the State of Hawaii that inclusion of HINWR waters would jeopardize the planned exploitation of fishery resources.

7) Conduct historical resource surveys and nominate eligible sites to the State and National Historic registers:

Human activities in the NWHI, since their discovery by European explorers in the late 18th century, have left an obvious mark on the HINWR in the form of military facilities, shipwrecks and remnants of guano operations. The value of these and, as yet undiscovered, historical resources in the HINWR is the focus of this strategy. Field survey, documentation and nomination of eligible historical sites are proposed to protect these resources, in keeping with applicable federal statutes (see Section IV.C.2.h.).

Other Fish and Wildlife:

8) Monitor and control disease in the resident seabird populations:

The potential for a serious outbreak of avian disease within dense nesting seabird colonies of the NWHI is considerable. Furthermore, the FWS' ability to detect such a problem at its earliest stages and to react effectively is severely hampered by the infrequency of HINWR island visits and the logistical problems inherent in responding to a problem. In some areas, determination of the pattern of disease outbreaks and the role of various vectors will permit development of management programs to minimize the spread of the disease and its impact on seabird populations. FWS studies of avian pox in albatross populations at Midway Atoll is such an example. Documentation of "baseline" levels and forms of avian disease will provide an improved basis for evaluation of apparent outbreaks. Determination of the nature

of existing forms of disease may permit development of measures to prevent severe impacts to nesting populations. The protocol for monitoring disease levels is well established and easily incorporated into other population monitoring programs.

9) Regulate and monitor nearshore vessel traffic:

Because of the relationship between vessel groundings or spills and the ecological integrity of HINWR islands, the future productivity of seabird colonies is as dependent upon the control of vessel activity as are the Refuge's threatened and endangered species. Ground-nesting seabirds are particularly vulnerable to predation by introduced mammals. Dependency of seabird resources on nearshore waters as a source of food makes these species even more vulnerable than terrestrial species to the direct and indirect adverse effects of a major oil or chemical spill. For this reason, a strategy involving measures to regulate and monitor nearshore vessel traffic is included under this output category (see RPA Strategy #1 for details).

10) Monitor distribution and abundance of native terrestrial species:

This strategy is directed at other, unlisted species found on HINWR islands. Only very limited data are available for native and endemic terrestrial species of insects, arthropods, molluscs (e.g. land snails), and plants. Many of these species are of importance to endangered land birds, as food and cover. They are also components of unique insular ecosystems of considerable research and educational interest in their own right. This strategy will include the development and implementation of monitoring programs for key species or species groups. Quite likely, this effort would involve considerable participation by non-FWS researchers.

11) Map and ground truth terrestrial and marine ecosystems:

This strategy, as it applies to the HINWR land base, will tie directly to Strategy #10 above, as part of an overall monitoring program. Appropriate ground truthing of aerial photography in terrestrial ecosystems, in particular, would facilitate expanded use of remote sensing techniques that may be highly cost-effective. These techniques may also prove more sensitive to trends in habitat condition that are not readily apparent during ground surveys. One such trend of particular concern is the accelerated filling of the Laysan Island lagoon through wind-blown sand from a de-vegetated dune. This, in turn, appears tied to the pattern of vegetational succession on the island, a phenomenon that can be monitored effectively by remote sensing and ground survey. Aerial photography of HINWR atolls and nearshore reefs is an appropriate technique for inventory of habitat types and documentation of marine species distribution (e.g. sharks, baitfish, seals, and turtles).

Bonin petrel (Pterodroma hypoleuca), a nocturnal burrowing bird highly vulnerable to predation by rats.

Scientific and Professional Services:

12) Conduct annual aerial photo survey of all HINWR islands:

This strategy is singled out as a means to permit monitoring of terrestrial species and habitat, in conjunction with regularly scheduled ground survey. Photography is being used for documentation of island geological processes (e.g. change in shape of sandy islets); habitat utilization and population indicators for key species (e.g. seals, turtles and some seabirds); and baseline vegetation mapping. Annual repetition of this project will improve the FWS' ability to monitor these resources and to detect management problems at an early stage. Aerial survey will also enhance enforcement capability.

13) Conduct extended field camps and/or semi-annual boat surveys of HINWR islands:

This strategy is designed to gather additional resource data not obtainable through annual visits and short field camps, as described in the NAA. This approach will permit scheduling of surveys in a manner that allows more accurate and complete monitoring of reproductive biology for key species. Extended field camps will involve between 2-4 people in tent camps, conducting long term field surveys, principally

in spring-summer months. Several different island camps are possible in a given season.

14) Conduct comparative monitoring studies on Kure and Midway:

This strategy involves a cooperative program with the State, U.S. Coast Guard, National Marine Fisheries Service and U.S. Navy to monitor fish and wildlife resources whose distribution includes both HINWR islands and atolls as well as at Kure and Midway. These sites played an important role during recent Tripartite studies extending throughout the NWHI. Opportunities for year-around access and living quarters at Kure and Midway make possible biological monitoring studies not practical or feasible at locations other than Tern Island. In the case of seabirds, this permits inclusion of species with fall- winter nesting cycles into population monitoring programs. This strategy will also include facilitation by the FWS and cooperating agencies of appropriate non-FWS research/management studies at these sites.

Other Public Uses:

15) Regulate and monitor nearshore vessel traffic:

This strategy is included here to highlight its relevance to the expanding commercial fishery in the NWHI. Details of this strategy are addressed in RPA Strategy #1.

16) Cooperate/assist in the installation of a mooring buoy outside the HINWR boundary at French Frigate Shoals:

Although from a wildlife protection/preservation standpoint the fewer vessels in the vicinity of French Frigate Shoals the better, the FWS accepts as reality the following:

a) Interest in commercial fishery development in waters surrounding French Frigate Shoals is increasing.

b) The FWS has no direct control or jurisdiction over fishing activities in waters outside the HINWR.

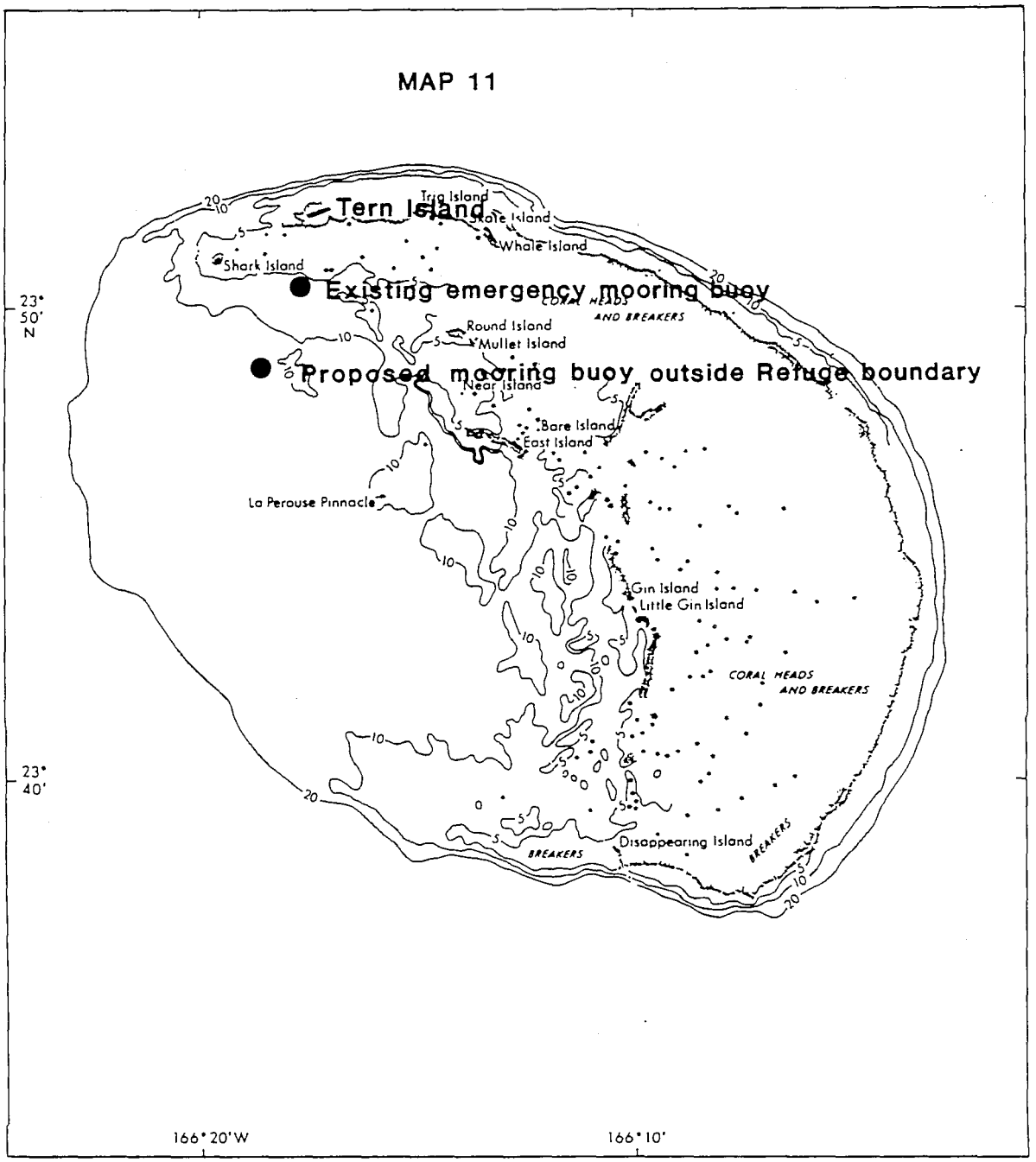
c) A commercial fishery mothership operating from a mooring buoy just outside the Refuge boundary is seen as environmentally preferable to a situation where the fishing industry operates outside the Refuge boundary independent of any FWS influence.

d) Support/cooperation with the commercial fishing industry in the HINWR has in the past and would likely continue to provide benefits to both the fishing industry and the FWS. (Fishing vessels have assisted in transporting FWS personnel and supplies to Tern Island.)

These realities considered together with the history of accidents in the vicinity of French Frigate Shoals underscore the need to implement measures that minimize the risk of vessel groundings while facilitating compatible fishery operations. Installation and use of a mooring buoy adjacent to the HINWR boundary at French Frigate Shoals would provide safe, secure anchorage and efficient transfer of catch and supplies with significantly less risk of impact to Refuge fish and wildlife resources; and would likely result in an increased level of logistical/communicating support from FWS in response to increases in the number of fishing vessels utilizing the buoy. The buoy, as proposed, would be installed and maintained by the fishing industry.

The existing emergency buoy and designated anchorage area within the HINWR boundary will continue to be available for regulated use by the industry for legitimate emergencies. (See NAA Strategy #23.)

The placement of a permanent mooring buoy outside the Refuge boundary would require a permit from the U.S. Army Corps of Engineers and the U.S. Coast Guard. These federal actions would require a biological review under Section 7 of the Endangered Species Act and provide further opportunity for public comment.



0 5000 yards
0 5000 meters

HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE
FRENCH FRIGATE SHOALS
North Pacific Ocean

E. Resource Utilization Alternative (RUA)

The RESOURCE UTILIZATION ALTERNATIVE (RUA) incorporates all strategies in the NO ACTION and BASELINE ALTERNATIVES and builds upon that foundation by including additional enhancement strategies emphasizing public use of the HINWR. Limitations on that use are dictated by the anticipated and potential conflicts with higher priority resource management objectives for the Refuge and by the staffing and funding implications. The strategies which make up the RUA are discussed below:

"Vulnerable" Species (Endangered, Threatened, Candidate and Sensitive Species):

1) Monitor nearshore vessel traffic:

As in the case of the RPA, this strategy addresses the increased risk of vessel groundings and unauthorized landings associated with expanding commercial fisheries and other vessel activities in the NWHI. However, in contrast to the RPA, this strategy will not regulate nearshore vessel activity but it will require that vessels in the NWHI take measures to allow an improved level of monitoring of that activity. Such measures could include filing of float plans, regular radio reporting schedules through Tern Island or Honolulu and mandatory use of EPIRB's for emergency use.

2) Monitor impacts of commercial fishery on listed species:

As vessel activity increases at authorized locations within the HINWR or in adjacent nearshore waters, this strategy will address the greater need to monitor the effects of that activity and to mitigate those effects if necessary. This monitoring will be particularly important at French Frigate Shoals, because of the significance of that area to monk seals and turtles and because of the anticipated focus of expanding fisheries in the vicinity of that atoll. Population monitoring studies under the NO ACTION and BASELINE ALTERNATIVES will detect gross population changes over time, but, in themselves, will not facilitate demonstration of a cause-and-effect relationship with fisheries or other human activities. This strategy will include monitoring of the incidence of seal and turtle sightings by vessels, interactions with vessels and fishing gear, attraction of seals and turtles to vessel lights or other operations, etc. Vessel activities within HINWR waters will be monitored most closely.

3) Conduct only limited additional research indicated in recovery plans:

In contrast to the RPA, several of the second and third priority research projects identified within recovery plans will not be implemented under this alternative. Only those studies most likely to

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Dr. John Craven, Chairman
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Marine Sciences Building
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Department of Natural Resources, CNMI
Saipan, Mariana Islands 96950

Marine Laboratory
University of Guam
Agana, GU 96910

Mr. Harry T. Kami
Division of Aquatic & Wildlife Resources
Government of Guam
Agana, GU 96910

Mr. Henry Sesepasara
Office of Marine Resources
American Samoa Government
Pago Pago, American Samoa 96799

Mr. Leigh-Wai Doo, Chairman
Planning and Zoning Committee
City Council
City and County of Honolulu
Honolulu, HI 96813

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Attn: Robin Foster
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650 South King Street
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Mr. Bill Bartlett
Policy Planning Branch Chief
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Honorable Tony Kunimura
Mayor, County of Kauai
P. O. Box 111
Lihue, HI 96766

Honorable Herbert T. Matayoshi
Mayor, County of Hawaii
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Hilo, HI 96720

10. Concerned Organizations, Businesses, and Individuals

Mr. Wadsworth Yee, Chairman
Western Pacific Regional Fishery Management Council
1164 Bishop Street, Room 1405
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1647 Michael Lane
Pacific Palisades, CA 90272

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Mr. John Nutter, Director
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The Nature Conservancy
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Dr. Ned K. Johnson, President
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Berkeley Museum of Vertebrate
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Berkeley, CA 94720

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Director, Wildlife Refuge Programs
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Marine Mammal Commission
John R. Twiss, Jr.
Executive Director
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Mr. Chuck Johnston
Hawaii Fishing News
6650 Hawaii Kai Drive, #201
Honolulu, HI 96825

Congress of Hawaiian People
c/o Ellamae Kupau
Frances Schuman Realty
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Honolulu, HI 96825

Society for Hawaiian Archaeology
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President
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Greenpeace Hawaii
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Mr. Frank Coto
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Alika Cooper and Sons
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Pacific Basin Maritime, Inc.
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Kailua, Oahu, HI 96734

Audrey Newman
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Honolulu, HI 96816

John Earle
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Ewa Beach, HI 96707

Mr. Dan Taylor, Regional Representative
National Audubon Society
555 Audubon Place
Sacramento, CA 95825

Environsphere
Attn: Ms. Vickie Nulle
3000 W. MacArthur Boulevard
Santa Ana, CA 92704

11. Libraries

Hamilton Library
University of Hawaii
2550 The Mall
Honolulu, HI 96822

Legislative Reference Bureau Library
State Capitol Building
415 South Beretania
Honolulu, HI 96813

Hawaii State Library
478 South King Street
Honolulu, HI 96813

Kailua Library
239 Kuulei Road
Kailua, HI 96734

Kaneohe Regional Library
45-829 Kam Highway
Kaneohe, HI 96744

Pearl City Regional Library
1138 Waimano Home Road
Pearl City, HI 96782

Kauai Regional Library
4344 Hardy
Lihue, HI 96766

Hawaii Regional Library
P. O. Box 647
Hilo, HI 96721-0647

Kailua-Kona Library
75-138 Hualalai Road
Kailua-Kona, HI 96740

Molokai Regional Library
P. O. Box 395
Kaunakakai, HI 96748

Maui Regional Library
P. O. Box 8
Wailuku, HI 96793

Colorado State University Library
Fort Collins, CO 80523

D. Comments Concerning the Draft Master Plan/EIS and FWS Responses

Displayed on the following pages are: 1) on the left hand side of each page, written comments concerning the September 1984 draft Master Plan/EIS from various agencies, organizations and individuals; and 2) on the right hand side of each page, FWS responses to specific comments made. Each comment and response is referenced numerically in the left margins. Below is an index of those agencies, organizations and individuals which provided written comments.

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Craig S. Harrison	8.98
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Comment

October 22,1984

Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Blvd. Rm. 5302
P.O. Box 50167
Honolulu, HI. 96850

Dear Sir;

Thank you for the opportunity to review the DMP/EIS for the Hawaiian Islands National Wildlife Refuge. The document reflects the years of reasearch which has been put into it.

1 I woudl like to see compatible public and economic uses expanded if possible. This would include support for the commercial fisheries as well as the potential visiting yachtsman.

I support the document and it's overall intent.

Sincerely,

James E. Coon
State Boating Task Force
P.O. Box 551
Lahaina, Maui Hawaii 96767

Response

Response to James E. Coon, State Boating Task Force

1. Considering each of the laws, regulations, policies and goals that guide management of the Hawaiian Islands National Wildlife Refuge (see Section IV of the Master Plan/ EIS), we feel that public and economic uses described in the Preferred Alternative represent the best, most extensive mix of uses that are compatible with refuge objectives. To recommend public uses in excess of those currently included in the Preferred Alternative would likely create conflict with higher priority refuge objectives such as those associated with endangered species.

Comment

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FT SHAFTER, HAWAII 96858 -5440

October 16, 1984

REPLY TO ATTENTION OF

Mr. Richard Wass, Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Wass:

Thank you for the opportunity to review and comment on the Draft Master Plan/Environmental Impact Statement for the Hawaiian Islands National Wildlife Refuge. The following comments are offered:

a. Any work on the waters of the United States may require a Department of the Army permit.

b. Page 1.1. The statement on attracting more boats to NWHI perhaps should be amended to include the increased potential of disturbance and harassment to species.

c. Page 3.1 & 3.16. Maro Reef is not described nor included in both sections.

1 d. Page 3.17. We suggest equal discussion for endemic birds, mammals and mollusks.

e. Page 3.24. Recent archaeological studies by B.P. Bishop Museum (1984) have established that both Nihoa and Necker have some of the densest scatters of prehistoric structural sites in Hawaii which are important for research and preservation purposes.

f. Page 3.25. We suggest expanding the last statement to read, ". . . . relating to wildlife and cultural resources . . . ."

g. Page 3.33. Throughout this section almost no attention has been paid to the very great significance of the archaeological resources on Nihoa and Necker. Although there was a general discussion in one section, no incorporation of its significance and interpretation into any other section has been made.

Response

Response to Department of the Army, Pacific Ocean Division, Corps of Engineers

We concur with comments a, b, c, f, g and h and have modified the Master Plan/EIS appropriately. Our responses to comments d, i and j follow below:

1. Comment acknowledged. No revisions necessary. Endemic birds are discussed on pages 3.16 - 3.17. There are no terrestrial mammals in the HINWR. Mollusks, because of their limited impact on refuge management practices, are included in the general discussion of invertebrates on page 3.12.

Comment

h. Page 4.24. We recommend that coordination be done with the Minerals Management Service under the Department of Interior and the State Department of Planning and Economic Development.

2 i. Page 6.28. Consideration should be given to limited education tours of the historic resources at Necker and Nihoa.

3 j. Page 6.32. Consideration should be given to organized research such as for thesis and dissertion research.

Sincerely,

Kisuk Cheung
Chief, Engineering Division

Response

2. We have thoroughly considered opportunities of this type but have not included them in our Preferred Alternative because of the high risks to unique species of wildlife and the hazards associated with access to these islands.

3. RUA Strategy #3 is intended to address the relative priority and quantity of research in this alternative as compared to other alternatives. This does not preclude research associated with thesis and dissertation.

Comment

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
RESTON, VA 22091

In Reply Refer To:
LMS-Mail Stop 644

NOV 16 1984

Memorandum

To: Refuge Manager (Remote Islands), Hawaiian and Pacific Islands National Wildlife Refuge, U.S. Fish and Wildlife Service

From: Associate Director for Offshore Minerals Management

Subject: Comments on the Draft Master Plan/Environmental Impact Statement for the Hawaiian Islands National Wildlife Refuge

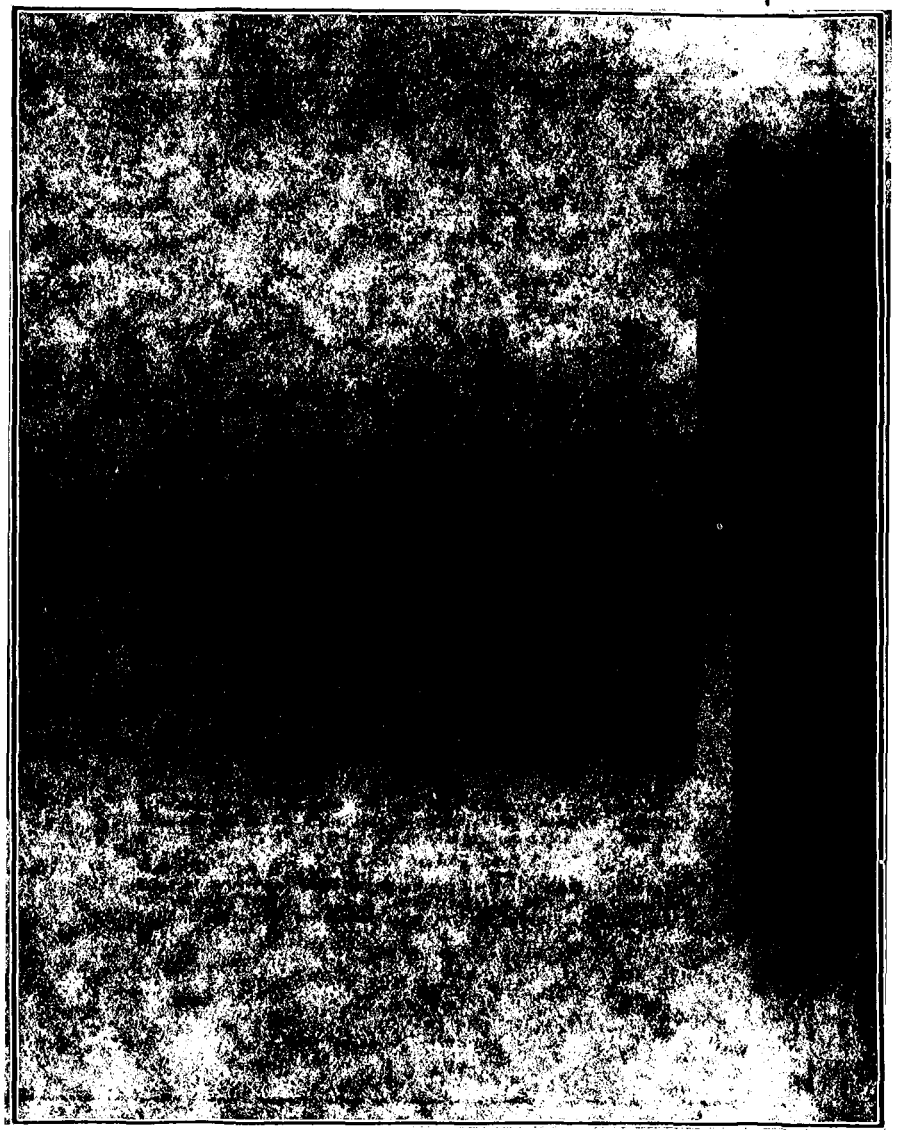
Attached are our comments on the subject environmental impact statement.

Should you have any questions, please call Buford Holt of the Office of Strategic and International Minerals, FTS 796-2901.

John B. Rig

Attachment

Response



Comment

Comments on the Draft Master Plan/Environmental Impact Statement (EIS)
for the Hawaiian Islands National Wildlife Refuge

1 1. The limits of the refuge are never clearly indicated. We recommend that a table be inserted early in the document listing the islands and shoals/reefs, their emergent areas, the areas of submerged lands claimed by the U.S. Fish and Wildlife Service (FWS), and areas either recognized or disputed by the State of Hawaii. As the document now stands, Map 1 can easily be interpreted to imply a claim to all lands and waters within the Exclusive Economic Zone between Kaula and Midway. The acreage of the refuge is first mentioned in chapter II, and it is only in the middle of the text that it is explicitly stated that refuge lands lie generally within the 20-fathom contour; but even then, the exceptions to this generality are unspecified. The disagreement between the State and Federal Governments on the bounds of the refuge are mentioned still later, near the end of chapter IV.

2 2. The paragraph on ocean mining is now outdated. The last sentence of the ocean mining paragraph (page 4.24) is incorrect since preparation of an EIS is underway. (Scoping meetings were held in Honolulu and Hilo on April 30 and May 1, 1984, respectively). Also, since it now looks as if areas on the flanks of the volcanoes responsible for the islands, atolls, and shoals in the refuge will eventually be excluded from further ocean mining consideration, we recommend that the Minerals Management Service, Office of Strategic and International Minerals be contacted for an update during the final stages of revision of the EIS.

3 We believe it would be more appropriate to say the FWS will remain fully involved in assessing potential impacts rather than saying, "it is anticipated that the FWS will become fully involved" since the FWS is represented on the joint Federal/State Task Force which is evaluating the potential for leasing.

4 3. The 50-mile "Area to be Avoided" (page 4.7) seems excessively large even though it seems for now that it will not cause problems.

Response

Response to the U.S. Department of the Interior, Minerals Management Service

1. We agree that the boundaries of the Refuge are not clearly defined in the Master Plan/EIS. Currently we are working to resolve this issue with the State of Hawaii, hopefully through mutual agreement (see Section IV.G.1.). However, until this issue is resolved, clarity of legal boundaries in the Northwestern Hawaiian Islands (NWHI) will remain a concern.

2. We concur. The Master Plan/EIS has been changed to include this suggestion.

3. We concur. This section has been rewritten.

4. Because a disabled ship, oil slick or other hazard to the fragile resources of the Hawaiian Islands National Wildlife Refuge (HINWR) could easily drift that distance, the 50-mile "Area to Be Avoided" is not viewed as excessive.

Comment

CITY COUNCIL

CITY AND COUNTY OF HONOLULU

HONOLULU, HAWAII 96813 / TELEPHONE 523-4000

LEIGH-WAI DOO
COUNCILMEMBER

October 29, 1984

Refuge Manager
Hawaiian & Pacific Islands NWR
300 Ala Moana Blvd, Room 5302
P. O. Box 50167
Honolulu, HI 96850

Dear Sir:

1 I have reviewed the Master Plan/EIS for the Hawaiian Islands NWR and find it to be a thorough assessment of the various alternatives. I continue to feel that protection of endangered, threatened and sensitive wildlife species should have higher priority over economic use of the Islands' resources.

By way of update please note that the County is presently studying an amendment to the established SMA to cover the NWHI as well as the amendment of the County General Plan to better define County objectives with respect to NWHI. A decision on these amendments may be made within the next 6 months.

Thank you for the opportunity to review and comment on your report.

Sincerely,

Leigh-Wai Doo

Councilmember Leigh-Wai Doo
Chair, Planning & Zonning
Committee

Response

Response to City Council, City and County of Honolulu

1. Comment acknowledged. No revisions to the Master Plan/EIS necessary.

Comment

UNIVERSITY OF HAWAII

Sea Grant College Program

October 29, 1984

Mr. Paul J. Camp
Program Analyst
United States Department of Interior
Fish and Wildlife Service
Lloyd 500 Building, Suite 1692
500 N.E. Multnomah Street
Portland, Oregon 97232

Dear Mr. Camp:

1 I circulated your Hawaiian Islands Wildlife Refuge Master Plan/Environmental Impact Statement (EIS) among my staff. They had no suggestions for change. Thank you for the opportunity to review it.

Sincerely,

Jack R. Davidson
Director

1000 Pope Road, Room 230 - Telephone (808) 948-7031 - Honolulu, Hawaii 96822/Cable Address: UHIRAW

An Equal Opportunity Employer

Response

Response to University of Hawaii, Sea Grant College Program

1. Comment acknowledged. No revisions to the Master Plan/EIS necessary.

Comment

Response

Pacific
Basin
Maritime
Inc.

9 Oct, 1984

Dr. Richard Wass
Refuge Manager
Hawaiian Islands NWR
300 Ala Moana Blvd.
Room 5302
Honolulu, HI 96850

Dear Dick:

Enclosed are my comments on the FWS Hawaiian Islands National Wildlife Refuge master plan. I have restricted my comments primarily to matters concerning the fishing industry.

A general statement about the ways Tern Island can help the fishing industry is appropriate.

As you well know, fishing in the NWHI is a serious matter, and only well found seaworthy vessels have any business being in the area. Vessels fishing the area must be able to withstand severe weather conditions, be selfsufficient, and be long enough range to stay out longer than anticipated. Vessels that require the support of another vessel have no business fishing the NWHI. Likewise, vessels should be manned by capable crews that are able to navigate under difficult conditions and cope with most problems that might develope at sea. To safely operate they must be able to handle their own problems and should notrequire the assistance of Tern Island or another vessel.

Regretably there are presently some vessels working in the area who do not meet these qualifications. The relatively mild weather we have had for the last two years has enabled lesser quality vessels to operate without large numbers of serious problems. This will undoubtably change.

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Kailua, Oahu
Hawaii 96734
(808) 261-4995
[illegible]
[illegible]
[illegible]
[illegible]

The presence of personnel on Tern Island is not essential to the fishery. With the exception of emergency evacuation Tern Island offers no service that vessels in the fishery can not handle by themselves, particularly now that there are more vessels in the area.

While not essential, the assistance of Tern Island does make operation

Comment

Pacific Basin Maritime Inc.

1 in the NWHI easier. Tern Island has proved helpful in repairs by lending both tools and expertise; bytransportation of parts and personnel on their aircraft; by communication (this has also been denied); and by giving the fishermen bread, pies etc (usually in trade for fish). All of the above services are useful and helpful, but none are essential to the fishery.

2 In addition to the general comments above I have several specific comments.

6.15 22 present amount of logistical support ok

6.20 1 I agree that the risk is real and not speculative, however, the things that will help are: 1. those things that will prevent groundings and 2. those things that will lessen the impact of a grounding. To determine those things that will prevent groundings one must first determine the causes of groundings. These are: 1. Operator negligence (Keola, Nightingale). 2. Operator error (misinterpreting navigational information, judgemental errors etc. 3. Equiptment failures (broken anchor line, engine failure etc.Any measures taken should relate directly to these reasons or they should attempt to lessen the impact.

a. How is this to be enforced? Depths are relative.

3 What is dangerous to a tanker is not necessarily dangerous to a fishing boat.

b. many banks less than 100 fathoms are safe to cross.

c. ok if used for education and communication, not just for enforcement.

d. ok, but not everyone will be willing to share their knowledge.

e. What good does reporting do? As long as the vessels are legal, why should they report? Fishing locations are highly protected secrets. Satellite monitoring would meet extreme resistance. USCG very hard to reach via radio.

4

f. EPIRB's have very limited range at sea level. Radar would enable operators to monitor fiberglass boats at 5-6 miles and steel boats at 10-12. It is expensive and requires regular maintenance.

g. Would be helpful at NW and SW corners of FFS, but would be difficult to maintain and might put FWS in a position of liability.

P.O. Box 516
Kailua, Oahu
Hawaii 96734
(808) 261-4322
162 Fort
~~81 Encina Ave.~~
~~Palo Alto, Calif.~~
~~94301~~
~~(415) 324-8791~~

Response

Response to Edward W. Shallenberger, Pacific Basin Maritime, Inc.

1. We concur with your comment that FWS occupation of Tern Island is not essential for a commercial fishery in the NWHI. Our primary reasons for operating the facility relate to management and protection of the unique wildlife resources of the NWHI.

2. Each of your specific comments have been acknowledged. No modifications to the Master Plan/EIS are necessary except as noted in items 3 - 6 below.

3. It is our expectation that matters of this nature will be resolved through the interagency committee described in RPA Strategy #1.

4. Comment acknowledged. Strategy revised.

Comment

Pacific
Basin
Maritime
Inc.

6.29	19		Abouy would help under tradewind conditions only. Under other conditions it might be detrimental by giving the vessel operator a false sense of security. The biggest advantage of a bouy is that it doesn't tear up the bottom like repeated anchoring does. If a bouy were installed by
		5	industry who would pay and who would accept liability?
6.31	1		Float plans, regular reporting etc take away from the independence and flexibility of fisherman. Anyone who doesn't have an EPIRB should not be at sea.
6.34	11		All of the types of support mentioned are possible. Air ship is possible, but not economically feasible at the present low price of fish.
6.38	11	6	How can FWS regulate traffic outside of refuge boundries?
6.40	22		Reporting won't eliminate risk
	23		This idea makes no economic sense

Dick, I hope these comments have been useful. Feel free to contact me if you would like me to expand on any.

Sincerely,

Ed Shallenberger

Edward W. Shallenberger

P.O. Box 516
Kailua, Oahu
Hawaii 96734
(808) 262-9051

~~81 Easton Ave.~~
~~Palo Alto, Calif.~~
~~94301~~
~~(415) 324-0791~~

Response

5. Our assumption is that the State of Hawaii and/or commercial fishing interests would install the buoy outside the refuge boundary and accept liability for it.

6. This strategy is directed at the need to minimize risks to vulnerable species of the HINWR by working cooperatively with the State of Hawaii, National Marine Fisheries Service (NMFS), the Coast Guard, the Western Pacific Regional Fishery Management Council and the fishing industry to seek out means of reducing the risk of vessel grounding on HINWR islands and reefs. We realize that the FWS has no authority to regulate vessel traffic beyond the boundary of the HINWR. Regulations are needed, however, to reduce the risk of groundings. Only suggestions that receive wide or total acceptance among the interagency committee would receive further consideration and study to determine if they could be effectively implemented and enforced. The committee would provide the fishing and shipping industries an avenue to voice and resolve concerns before any regulations are formally adopted. The important point here is that all concerned parties and interests would be involved at the outset in the formulation of any strategies for regulating and monitoring vessel traffic.

Comment

GEORGE R. ARIYOSHI
GOVERNOR

LETITIA N. UYEHARA
DIRECTOR

TELEPHONE NO.
548-6915

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
[illegible] HALEKAUWILA STREET
ROOM [illegible]
HONOLULU, HAWAII [illegible]

October 23, 1984

Mr. Dick Wass
Refuge Manager
Hawaiian Islands NWR
300 Ala Moana Blvd., #5302
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Wass

1 We support the Fish and Wildlife Service's preferred alternative or the resource preservation alternative. Either of these two alternatives would provide good protection for the endangered species found in the Hawaiian Islands National Wildlife Refuge.

Sincerely,

Letitia N. Uyehara

Letitia N. Uyehara
Director

Response

Response to State of Hawaii, Office of Environmental Quality Control

1. We appreciate your support for the Preferred Alternative.

Comment

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMADU
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 12, 1984

Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Blvd. Rm 5302
P.O. Box 50167
Honolulu, HI 96850

Dear Sir:

This responds to your request for comments on the "Draft Hawaiian Islands National Wildlife Refuge Master Plan/Environmental Impact Statement."

Having participated in the workshops you sponsored to review earlier versions of the document, I feel that I have had and opportunity to provide input throughout the development process. Many of my earlier concerns have been addressed and incorporated in the final draft and I have little to add at this time. I have enclosed selected portions of the Plan/EIS with annotated comments
1 for your considerations.

I find that your "Preferred Alternative" (PA) is a well-reasoned compromise between a resource utilization emphasis and a total protection approach. While realizing that this is only a plan and not a commitment of funds, the PA seems very ambitious in its recommendations for actions beyond your present program.

2 The environmental statement is reasonable and fully discloses potential impacts. If all of the actions are implemented, certainly the natural resources will benefit, although there might be drawbacks to socio-economic considerations.

I compliment you on a job well done and particularly for the manner in which other agencies and the general public were involved in the development of the plan.

Thank you for including me as a reviewer/commenter.

Aloha,

RONALD L. WALKER
Wildlife Biology Program Manager

RLW:ssk

Enclosure

Response

Response to State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife

1. The following are responses to comments you annotated in a copy of the Draft Master Plan/EIS. Page numbers reference your comments in the draft document:

   a. Page 0.3: You questioned the statement regarding President Roosevelt setting aside islands and reefs from Nihoa to Kure. The statement regarding Kure is correct. The fact that Kure is not a part of the Refuge is explained in Section IV.C.1. of the final Master Plan/EIS.

   b. Page 0.6: You highlighted the need to address increasing demands by researchers to gain access to the HINWR and associated environmental impacts. We feel that issue is addressed in an introductory manner on page 0.6, paragraph 2, of the final Master Plan/EIS, and in greater detail on page 6.12 of the final report.

   c. Page 0.12: We agree with your comment that future management of the Refuge must be adaptable to change. This is explained on page 2.7 of the final Master Plan/EIS.

   d. Pages 1.2 and 1.4: We have revised the captions on these pages to improve their accuracy.

   e. Page 3.1: We incorporated your suggestion to indicate the fact that Midway is a U.S. Naval air facility and that Green and Sand Islands are included in the Hawaii State Seabird Sanctuary System.

   f. Page 3.14: Per your suggestion, we revised the text on page 3.17 of the final Master Plan/EIS to indicate that Nihoa millerbirds are associated with vegetation that covers approximately 2/3 of the island.

   g. Page 3.26: The text on page 3.28 of the final Master Plan/EIS has been revised to indicate that in 1964 a federal manager was first stationed in Hawaii.

   h. Page 4.14: The discussion of the Endangered Species Act is clarified per your suggestion to indicate that federal agencies are responsible for recovery plans for federally listed species.

Comment

Response

i. Page 4.19: Per your suggestion, the discussion of the Hawaii Wildlife Pan was changed to indicate that the plan was approved in 1983.

j. Page 5.2: The Output List has been corrected to include as item #5 "Sensitive/Candidate Species Production and Maintenance." This item was inadvertently left off in the draft plan.

k. Page 6.5: Numerous changes have been made to the Alternatives chart, including your suggestion to drop P/J/A activities at Kure.

l. Page 6.9: You recommended that we consider de-listing or down-listing in the strategy that deals with identifying candidate species. We feel the odds of de-listing or down-listing species in the HINWR is significantly remote; however, the FWS would support such action if recognized research and/or monitoring proved such was warranted.

m. Page 6.28: Per your suggestion, we have included the National Marine Fisheries Service in the strategy concerning comparative monitoring studies at Midway and Kure. Also, regarding your question as to why non-FWS researchers may be involved in these studies - simply stated, the FWS considers this as one option (possibly the most cost-effective and efficient) to accomplish these studies. The strategy regarding limited nature tours has been dropped as a result of comments from the U.S. Navy and the U.S. Coast Guard.

n. Pages 6.29 and 6.39: The strategy regarding photography, journalism and art at Midway and Kure has also been dropped in response to comments from the U.S. Navy and U.S. Coast Guard.

2. We concur and appreciate your support of the Preferred Alternative.

Comment

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
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DEPUTY DIRECTOR

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PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION

OFFICES
DIRECTOR'S OFFICE
ADMINISTRATIVE SERVICES OFFICE
INFORMATION OFFICE

Ref. No. P-588

November 7, 1984

Mr. Dick Wass
Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Boulevard, Room 5302
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Wass:

Subject: Draft Master Plan/EIS for the Hawaiian Islands National Wildlife Refuge (HINWR)

We have reviewed the subject master plan/environmental impact statement (EIS) and have the following comments.

Overall we are in accord with the plan. We support the Fish and Wildlife Service's commitment to compatible public and economic uses of the HINWR. In addition, maintaining the station at Tern Island is highly desirable for logistics support and refuge management.

With a few exceptions, it does not appear that pursuing the preferred alternative (PA) over the resource utilization alternative (RUA) will hamper fishery development in the Northwestern Hawaiian Islands (NWHI). Instead, it could be helpful in fisheries management in the NWHI as the recent Tripartite resources investigations have demonstrated. At this time major conflicts between proposed ocean mining activities and refuge management are not anticipated. The manganese crusts in question are between water depths of 800 and 2400 m, largely on older seamounts in the 200 mile zone rather than on the Hawaiian Ridge (which forms all of the Hawaiian Islands). A draft EIS on ocean mining activities will be available in early 1986 for Fish and Wildlife Service comment.

1 However, we do question two strategies presented in the PA. First, it is questionable whether the U.S. Fish and Wildlife Service should regulate vessel activity outside of the Hawaiian Islands National Wildlife Refuge (HINWR). The same concern applies to the proposed requirements that vessels near the NWHI take measures such as filing float plans, regular radio reports,

Response

Response to State of Hawaii, Department of Planning and Economic Development

1. Comment acknowledged. See response to National Marine Fisheries Service, #1, page 8.56.

Comment

Mr. Dick Wass
Page 2
November 7, 1984

etc. It is, however, justifiable to monitor nearshore vessel traffic.
Second, we support the PA recommendation to delay action to nominate HINWR
2 waters to Wilderness status until jurisdictional uncertainties can be
resolved. However, if HINWR lands are accorded Wilderness status, Tern
Island, Midway Islands, and Kure Atoll should not be included under this
designation. Their continued use in logistical support of ongoing and future
economic development activities in the NWHI is critical.

We also have a few other specific suggestions. These are as follows:

p. 3.19 Recommended text change: 2nd paragraph.

Two species each of spiny lobster (Panulirus marginatus and P. penicillatus) and slipper lobster (Scyllarides squammosus and S. haanii) occur throughout the Hawaiian archipelago. Of these species, (P. marginatis is the only species) all but P. penicillatus are of serious commercial interest. Lobsters inhabit nearshore waters but also range into substantially greater depths, where most commercial fishing occurs. Within atoll lagoons, they inhabit coral reefs, where they find shelter, food and protection from predation. (Nearshore habitats are critical for the recruitment of larvae, which disperse into deeper waters.) Larvae of P. marginatus and S. squammosus are known to recruit to nearshore habitats throughout the archipelago.

There is no evidence that nearshore habitats are critical for
3 recruitment of lobster larvae, although conceivably they might be.
(References: (1) MacDonald, C. D. 1984. Studies on recruitment in the Hawaiian spiny lobster, Panulirus marginatus. In Proceeding of the second symposium on resource investigations in the Northwestern Hawaiian Islands, May 25-27, 1983, ed. R. W. Grigg, and K. Y. Tanoue, pp. 199-220. UNIHI - SEAGRANT - 84-01. University of Hawaii Sea Grant College Program, Honolulu., and (2) Morin, T. D., and C. D. MacDonald. 1984. Occurrence of the slipper lobster Scyllarides haanii in the Hawaiian Archipelago. Pro. Biol. Soc. Wash. 97:404-407.)

P. 3.21 Section 6, 2nd paragraph, next to last sentence should include slipper lobsters. Suggested change would read - Other offshore crustaceans of commercial interest include caridean and penaid shrimps, slipper lobsters, and Kona crabs.

Slipper lobsters have increased greatly in trap catches in the NWHI. Specific statistics are available from the National Marine Fishery Service (NMFS). At times during 1984, however, slippers have constituted about 20-30% of total lobsters landed.

Response

2. We appreciate your support for this strategy. As indicated in RA Strategy #7 and BA Strategy #4, Tern Island would not be nominated for Wilderness status. Midway and Kure would not be included either as they are not a part of the HINWR.

3. We agree with your suggestions for changes in the text and have modified the Master Plan/EIS appropriately.

Comment

Mr. Dick Wass
Page 3
November 7, 1984

3 P. 6.45, 1.14 The submersible studies mentioned, took place, and successfully completed over 10 dives in the French Frigate Shoals area during September, 1984.

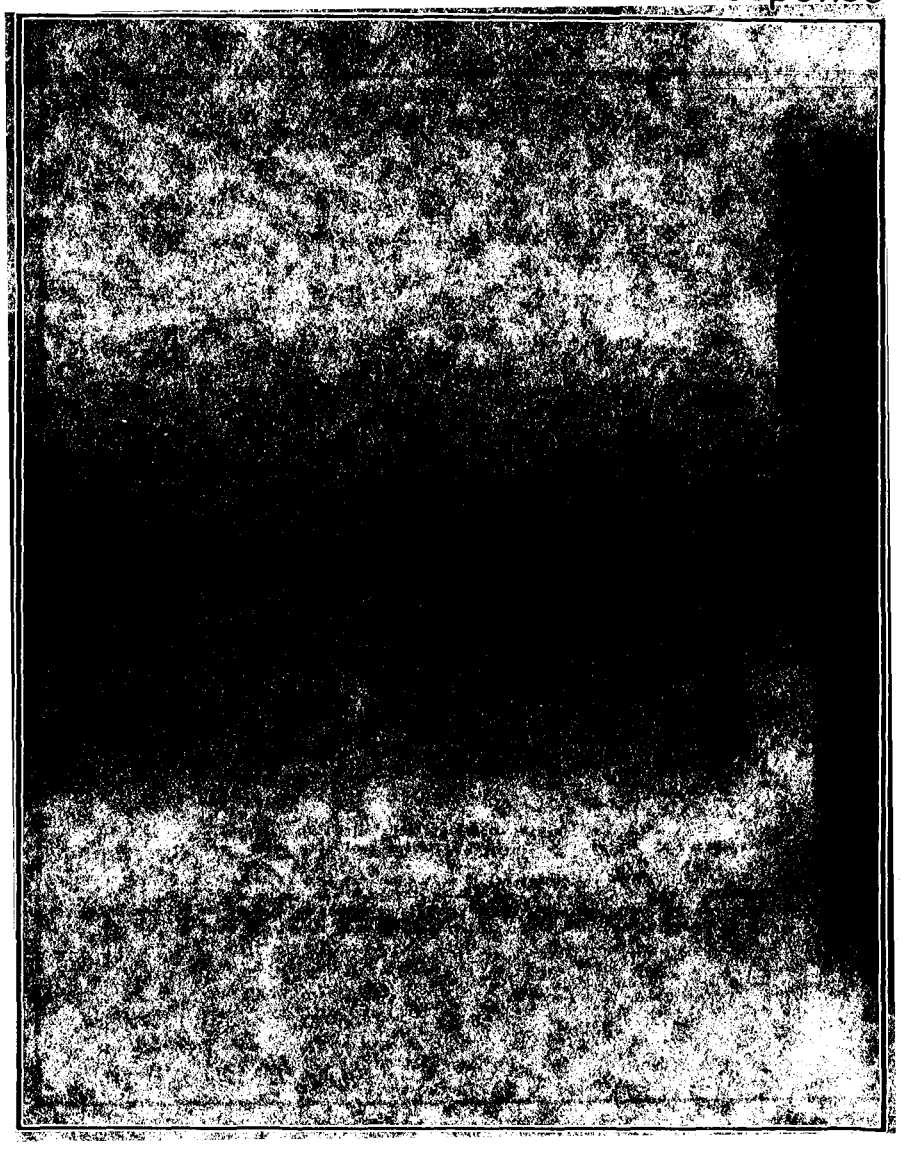
Thank you for the opportunity to comment on this document.

Very truly yours,

Kent M. Keith

Kent M. Keith

Response



Comment

HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:

9510
Ser 002B/2050

16 OCT 1984

Hawaiian and Pacific Islands National Wildlife Refuge
3000 Ala Moana Boulevard, Room 5302
P. O. Box 50167
Honolulu, HI 96850

Gentlemen:

DRAFT MASTER PLAN/ENVIRONMENTAL IMPACT STATEMENT (EIS)
FOR THE HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE 8/28/84

The subject Draft EIS has been reviewed by the Commander, Pacific Division, Naval Facilities Engineering Command, and the review comments are forwarded as enclosure (1).

Sincerely,

[illegible]
[illegible], CEC, U. S. NAVY
FACILITIES ENGINEER
BY DIRECTION OF THE COMMANDER

Enclosure a/s

Response

Comment

PACNAVFACENGCOM COMMENTS ON 10 OCT 1984

DRAFT MASTER PLAN/ENVIRONMENTAL IMPACT STATEMENT
FOR THE
HAWAIIAN NATIONAL WILDLIFE REFUGE

A. Pg 4.23 states with regard to Midway that "Fish and wildlife management responsibility would rest with the FWS." This is in direct contrast to your overlay proposal to the Navy pg 3 which states ..."an overlay NWR to be managed cooperatively by FWS and the Navy." If the overlay refuge does become established, the Navy will remain responsible for fish and wildlife management.

1 B. Pg 6.25 states "...FWS would assume a greater role in fish and wildlife management." This should read "...a greater cooperative role..."

C. Pg 7.14 "RPA strategy #15 adds Kure and Midway to the HINWR areas..." This should be clarified to indicate that Midway will not become a part of HINWR. In light of the HINWR regulations, i.e. special use permits for all activities, RNA designation for entire HINWR, and proposal for wilderness status, Midway cannot be included in the HINWR. Midway will remain a military installation and normal security restrictions will continue.

D. Throughout this plan there are various references to expanding activities on Midway if the overlay refuge becomes established.

1.) Pg 3.27 states "Logistical support capability (e.g. airplane access, housing, meal facilities, boats, etc.) makes expanded educational and recreational use of Midway substantially more practical and less impacting on wildlife resources and their habitat than similar activity in the HINWR." The Navy cannot provide facilities for either recreation use or for visitors on Midway, nor will security requirements permit unrestricted access to Midway.

2 2.) Pg 4.23 "...expanded FWS presence on Midway would facilitate wildlife research and interpretive activities, the course of action at Midway will affect the array of preferred management strategies within the HINWR." It is the Navy's position that the expanded FWS presence on Midway, if the overlay refuge is approved; would provide improved fish and wildlife management and on an incidental basis expanded research. The overlay refuge therefore should have no effect on preferred management strategies in the HINWR. Interpretive activities, resulting in increased visitors, are not appropriate.

3.) Pg 6.28 "Midway and/or Kure atolls are proposed as alternatives to HINWR locations where logistical constraints and the anticipated impacts of such activities (nature tours) on small insular ecosystems make this program incompatible with other refuge management objectives." It is the Navy's understanding that if the overlay refuge is implemented, Midway would be treated as any other wildlife refuge. Therefore, development of Midway as a tourist destination for visitors who wish "to visit and experience the rich fish and wildlife resources of the NWHI" is inappropriate.

4.) Pg 6.28 "Visitors would be transported on MAC or Coast Guard scheduled flights..." MAC flights are for military transportation and are

Enclosure (1)

Response

Response to Department of Defense, Headquarters Naval Base Pearl Harbor

1. We concur with your comments. Modifications have been made to reflect the cooperative role the FWS will have in managing fish and wildlife resources if an overlay refuge is established at Midway. Furthermore, we recognize the fact that Midway would not be nominated for Wilderness or Research Natural Area (RNA) status and that the Navy's activities would not require special use permits. We also recognize that prior to implementation of the overlay concept, the roles and responsibilities for each agency must be clearly delineated and agreed to. This has been noted in NAA Strategy # 9.

2. The Draft Master Plan/EIS included strategies to accommodate existing and potential demands by the public for environmental education, interpretation, photography, journalism, and art opportunities in the Northwestern Hawaiian Islands. The strategies were developed around the premise that similar lands already significantly altered by man could be substituted for fragile refuge lands which are little affected or altered by man. Much of the demand for these activities could, thus, be met by directing nature tours, journalists, etc. to islands outside the HINWR without compromising the management objectives of the refuge. Midway Island, owned by the Navy, and Kure Island, owned by the State of Hawaii and occupied by the U.S. Coast Guard, were lands identified as suitable for inclusion in the strategies. The Draft Master Plan/EIS proposed that these lands be substituted for refuge lands to accommodate limited public requests for educational and journalistic opportunities and that existing Naval and Coast Guard facilities and transportion, though limited, were adequate to meet the public's needs.

   Comments subsequently received from the Navy have made it clear that Midway Island is not accessible to the general public for national security reasons. Also, there is no commercial transportation available to the Island. The Coast Guard and the State of Hawaii have similarly commented that facilities and support are not available on Kure Island for recreational visitors. Commercial transportation to the Island is extremely limited and expensive.

   In this regard, we have removed from the Master Plan/EIS the strategies dealing with nature tours, photography, journalism and art visits to Midway and Kure.

Comment

not available to the recreational visitor. Prior approval from the military (Navy) is required for all travel. We do not know the Coast Guard regulations, but assume they are similar.

5.) Pg 6.29 "...be accommodated within facilities at these islands (Midway and Kure)." "They would pay the responsible agency (or base contractor) for these services (meals and lodging)." Our present BOS contract does not provide for this type of service nor is it planned to revise the contract to accommodate recreational visitors.

6.) Pg 6.29 "Activities (nature tours) on the islands (Midway and Kure) would be supervised by FWS and/or cooperating agency personnel." The Navy is
2 not planning on adding personnel as a result of the implementation of the overlay refuge.

7.) Pg 6.29 "Facilitate photography, journalism and art visits to Midway..." This type of activity was not contained in your overlay proposal. Our comments above about Midway not being open to tourism are relevant.

8.) Pg 7.14 and 7.15 These pages are mainly devoted to explaining how Midway would be used to provide logistical support for educational and recreational opportunities. This concept is in direct contrast to the Navy's understanding of the overlay concept.

In summary, Midway is a military installation closed to the public. If the overlay refuge is approved, the island will not be open to recreational or expanded visitor use.

E. Pg 4.22 "Concern regarding the declining seal population...prompted the FWS to accelerate its technical assistance role with the Navy..." This infers
3 that Navy activities are responsible for this decline whereas page 0.1 states that "population has declined over the last 25 years on the HINWR itself. Page 3.19 attributes this decline, in addition to human disturbance, to predation by sharks, harassment of young and females by some agressive adult males and ciguatera poisoning. It has not been shown that Navy presence on Midway was the main cause for the decline in seal population.

F. Pg 6.18 proposes "NWHI Marine Sanctuary would encompass all waters seaward
4 to 12 miles for each island in the NWHI, including Midway and Kure." The waters surrounding Midway are a Naval Defensive Sea Area. Unrestricted naval use of these waters must be recognized in the proposal.

G. Pg 6.20 recommends inclusion of Midway into the area covered by the IMCO in "Area to be Avoided." Since the regulations for "Areas to be Avoided" restrict ships carrying oil, other than for their own fuel supply, the Navy would be opposed to this proposal since it would restrict supplies needed for
5 operation of the Midway Naval Facility.

H. Pg 6.28 states that Navy personnel will monitor fish and wildlife resources. If the overlay refuge is approved, additional Navy personnel will not be available for monitoring fish and wildlife resources.

Response

3. We concur and have modified this section to delete inference to the Navy as being responsible for declining populations.

4. Comment acknowledged. No change necessary. We will recognize unrestricted use of waters by the Navy in the proposed sanctuary when it is considered.

5. Comments acknowledged. The Master Plan/EIS has been modified to reflect your comments.

Comment

For the Protection of Hawaii's Native Wildlife

HAWAII AUDUBON SOCIETY

P.O. BOX 22832
HONOLULU, HAWAII 96822

30 October 1984

Refuge Manager
Hawaiian and Pacific Islands National Wildlife Refuge
300 Ala Moana Boulevard, Room 5302
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Sir:

Subject: Comments on Draft Hawaiian Islands National Wildlife Refuge Master Plan/Environmental Impact Statement

Hawaii Audubon Society believes that the protective measures contemplated in the Preferred Alternative for future management actions in the Hawaiian Islands National Wildlife Refuge will aid in providing necessary increased protection for the unique resources of the Northwestern Hawaiian Islands. We believe, however, that proposals to facilitate fisheries development may pose unwarranted risks to the unique biota of these islands. Furthermore, we believe that designation of the HINWR under the World Heritage Site, Biosphere Reserve, and National Natural Landmark programs should proceed immediately, rather than being deferred pending further consideration, and that USFWS should proceed immediately with Wilderness designation for the HINWR and its included waters. In our opinion, the MP/EIS fails to give adequate consideration to the use of Midway Island as an alternative to Tern Island as a site for nature tours and fisheries support facilities. Most importantly, we believe that the
1 MP/EIS as circulated is seriously deficient as a disclosure document because of the absence of necessary information regarding the nature and impacts of proposed fisheries activities (Item 7, below); the absence of this information makes proper review of the document impossible at this time, and we believe a revised MP/EIS including this information should be circulated for public review and comment before a final MP/EIS is approved. Our comments on the management alternatives proposed and on other matters are as follows:

2 (1) We believe any plans for the HINWR that permit expanded use of Refuge resources for fisheries support and for other activities must be based on the attitude that any observed adverse impacts on wildlife <u>will be assumed to be caused by those activities until proven otherwise</u>; in other words, the burden of proof must be on advocates of increased resource utilization to show that their activities are safe, rather than upon FWS to show that these activities are hazardous. As exemplified in the refusal of the State of Hawaii to remove mouflon sheep from Mauna Kea despite their demonstrated impacts on the endangered Palila, advocates of increased economic development can be expected to move reluctantly if at all to reduce their activities in the face of evidence of adverse impact, and they are likely to demand an impossible degree of "proof" that their activities are indeed to

Response

<u>Response to Hawaii Audubon Society</u>

1. Information concerning impacts and/or conflicts associated with various public uses such as commercial fishing is located in two sections of the Master Plan/EIS: a) the Environmental Consequences Section, and b) the Technical Appendices.

   The Master Plan/EIS describes the management, development and use of the refuge on a conceptual level. We realize that many operational level details are not resolved in this document, however these will be addressed in subsequent planning efforts which are described in Section II. E. of the Master Plan/EIS .

2. Comment acknowledged. We believe that our approach to providing compatible public uses of the Refuge is environmentally sound. However, should adverse effects (associated with these uses) occur, the FWS would be <u>required</u> to revise our actions immediately.

   Clearly priorities and objectives for the HINWR favor management/protection of wildlife species over accommodating public uses. This is illustrated in the prioritized output list and statement of objectives in Section V of the Master Plan/EIS. Should conflict occur or tradeoffs be required, the "Vulnerable" species will be favored over other public uses.

Comment

30 Oct 1984, p. 2

2 blame for observed adverse environmental effects. If occurrences such as increased frequency of vessel groundings, reduced populations of sea birds, etc., are observed, FWS must act immediately and unilaterally to restrict resource development activities *before* definitive proof becomes available.

3 (2) p. 0.13, 7.26. In the "Comparison of Environmental Consequences", the scale of values for the upper table runs from 1 ("Positive Consequences") to 5 ("Very Positive Consequences"). This labeling is misleading, as increased use of the NWHI as proposed under the Resource Utilization Alternative (RUA) would have some *negative* consequences for marine and terrestrial animals inhabiting the HINWR, as compared with current conditions. Characterization of *all* alternatives as having only "positive" consequences is thus incorrect.

4 (3) p. 4.2-4.3. On 22 May 1984 FWS identified several invertebrate species inhabiting the NWHI as category "2" candidates for listing as Endangered or Threatened Species; these species must be considered in future plans for management of the HINWR, and formal listing as Endangered or Threatened Species should proceed where appropriate.

5 (4) p. 4.6. What is FWS policy with regard to designation of a Marine Sanctuary to include atoll waters within the HINWR and also adjacent nearshore waters?

6 (5) p. 4.16 (see also PA #4). Hawaii Audubon Society strongly supports designation of critical habitat for all listed Endangered and Threatened Species inhabiting the NWHI. Federal authorities should note that although designation of critical habitat does not necessarily enhance *Federal* protection of listed species, such designations may have a significantly favorable impact on State and local authorities and judicial officials by heightening their awareness of the the importance of these sites to the conservation of listed species.

7 (6) p. 5.2. In Figure 3, "Hawaiian Islands NWR Output List", no "Item 5" is included in the 18 items listed; has an item been inadvertently omitted, or are there actually only 17 output categories?

8 (7) p. 4.17-4.18. Information regarding the nature and claimed compatibility of proposed fisheries operations at Tern Island is apparently contained in a Technical Appendix that is mentioned in the text but has not been circulated to public reviewers of the MP/EIS; this information must be summarized in detail in the MP/EIS, as its absence precludes meaningful review of the draft MP/EIS by members of the public not privy to the information contained in the Technical Appendix. We believe a revised MP/EIS containing such information must be circulated for public comment before legal requirements for public review of the MP/EIS can be regarded as having been met.

9 (8) p. 6.8 etc. Under MAA No. 3, 13 (both included in BA No. 3), monitoring of alien species is proposed. In our opinion, such monitoring should include alien invertebrates, particularly insects, as future introductions are likely; some may have a direct negative impact on native animals and plants in the NWHI, and monitoring of the pace of new introductions can serve as an important measure of human-induced change in the NWHI.

Response

3. Comment acknowledged. The table has been eliminated due to confusion associated with labeling.

4. Comment acknowledged. The Master Plan/EIS has been modified to include mention of these species. These species are also listed in Table 2, page 3.14 which has been added to the document.

5. The FWS' position regarding a marine sanctuary in the Northwestern Hawaiian Islands (described in BA Strategy #5) is to evaluate the proposal upon approval of the Master Plan/EIS. See response to Craig S. Harrison, #1, page8.91.

6. Comment acknowledged. No changes necessary.

7. We concur. This was an omission that has been corrected.

8. We believe that sufficient information is included in the Master Plan/EIS for reviewers to evaluate its recommendations. In addition, just under 100 copies of the Technical Appendix were distributed to reviewers of the Master Plan/EIS including 11 local public libraries and several local governmental offices where the document was available for public inspection. Additionally, "loaner" copies were made available through our Honolulu office. We feel our efforts to provide this information to the public were appropriate.

9. Comment acknowledged. Strategy clarified to address invertebrates.

Comment

30 Oct 1984, p. 3

10 (9) p. 6.36-6.37. Under PA No. 5, it is proposed that actions to nominate the NWHI for listing under the World Heritage Site, Biosphere Reserve, and National Natural Landmark programs be deferred pending further study. Sufficient data are available to justify immediate action to proceed with nominations under each of these programs. As noted on p. 7.23, the nomination process for each of these designations includes opportunities for further agency and public review. Any conflicts and potential drawbacks associated with these designations could be fully addressed during these review processes, and persons or agencies opposing such designations would have ample opportunity to publicly state their case.

11 (10) p. 6.37. Under PA No. 7, designation of Wilderness status for HINWR would be restricted to emergent lands; Wilderness designation for waters within the NWHI would be deferred. We believe FWS should return to its original 1969 position, in which the entire HINWR (including its waters) was nominated for Wilderness status. In any event, no actions incompatible with eventual Wilderness designation should be permitted prior to resolution of the question of jurisdiction over these waters. We note that the document under review (p. 6.37) implies that current <u>and proposed</u> management and fisheries support activities may be incompatible with Wilderness designation of these waters. As described on p. 6.17, current use of motorized equipment for refuge management purposes would be permitted even after Wilderness designation; any threat to eligibility for Wilderness designation would thus seem to be due to the proposed increase in fisheries support activity. Since current USFWS policy (as stated on p. 4.4) is that "wilderness management procedures are applicable to designated areas <u>and</u> to areas identified as qualifying and/or under formal consideration for designation" any such incompatible activities are improper and should be forbidden. Clearly, any <u>change</u> in current practice (or in practices in effect as of 1969) that would be incompatible with Wilderness designation for these waters would be a violation of USFWS policy and should be prohibited pending resolution of the jurisdictional dispute.

12 (11) p. 6.37. Hawaii Audubon Society supports the rights of Native Americans for access to cultural sites for religious purposes as proposed under PA No. 9. Because such access would principally involve Nihoa and Necker Islands, each of which supports a diverse and vulnerable native terrestrial biota, prospective visitors should be carefully briefed on the extreme danger of fire and the ease with which alien plants and animals may become established on islands within the NWHI. USFWS supervision of these (and all other) visitors should include measures necessary to ensure that clothing and other articles taken ashore do not carry seeds or other materials that could lead to such establishment.

13 (12) p. 6.40 (PA No. 23). We believe increased vessel traffic in the nearshore waters of the NWHI, as proposed, poses an unacceptably increased risk of pollution, groundings, and of the introduction of alien animals (particularly rats) to the islands of the NWHI. It is proposed that "limited recreation" of an unspecified nature and frequency on Tern Island would be permitted for personnel involved in multi-species fisheries. In
14 our view, access for this purpose would be a <u>convenience</u>, not a necessity, for the conduct of these fisheries; in view of the documented impacts of human activities on seal populations on Tern Island, recreational activities on the island should not be permitted for fisheries personnel. On p. 7.25

Response

10. Basically, this strategy suggests that we carefully evaluate the management implications of nomination of any additional protective status so as to not hinder actions directed at enhancement of high priority vulnerable species. In all likelihood we would conduct such evaluation in any event and therefore have revised each of the strategies concerning this subject to include an evaluation component.

11. Comment acknowledged. Because of the uncertainty that all future management actions associated with the Preferred Alternative will meet "Wilderness" criteria, we feel a more appropriate approach to providing additional protection for the HINWR is to proceed with the nomination of emergent lands immediately and delay action to nominate waters of the Refuge until some of these uncertainties are resolved.

12. Comment acknowledged. RUA strategy No. 4 adequately addresses concern.

13. Comment acknowledged. This strategy has been rewritten to clarify the FWS' position concerning support of the commercial fishing

    industry and to justify our actions regarding a mooring buoy outside the Refuge Boundary.

14. Although details associated with the "enforcement" aspects of this strategy have not yet been fleshed out (they will be via operational plans to be prepared after the Master Plan/EIS is approved), our position is that provided this activity occurs on our terms and with all of the conditions and procedures to protect the fragile environment of the Refuge, then we have little basis to dismiss this use of the Refuge. Be assured that by virtue of our priorities (see output list page 5.2), should a conflict between vulnerable species and some other lower priority output such as "Other Compatible and Economic Uses" we will always favor the higher priority.

Comment

30 Oct 1984, p. 4

it is stated that "demand by the fishing industry . . . . . for recreational opportunity on Tern Island will increase the frequency of conflicts with research programs"; this further argues against recreational use of Tern Island by ship-based fisheries personnel. The same objections apply with even more force with regard to proposed storage of fishing equipment on Tern Island.

15 (13) Nowhere does the draft MP/EIS adequately discuss the use of Midway Island as an alternative site for fisheries support activities and nature tours proposed for Tern Island, although considerable mention of such an alternative was made at the May 1983 symposium on the NWHI.

We thank you for this opportunity to participate in the planning of future management actions for the HINWR.

Sincerely,

Sheila Conant
President

Carl C. Christensen
Conservation Chairman

Response

15. A fishery support base proposed for Midway would be primarily for the albacore fishery rather than the lobster/bottomfish/ahi fisheries that would be supported by an operation at French Frigate Shoals. Because of its great distance from the main Hawaiian Islands and from the center of the existing lobster/bottomfish/ahi fisheries, a support base at Midway would likely not be a feasible alternative to one at French Frigate Shoals. A support base at Midway could provide some of the bottom fishery support such as refueling, but because it does not fulfill many of the needs of a bottom fishery support base, it was not given full consideration as an alternative to such a base at Tern Island. We had included several strategies in the Preferred Alternative relating to interpretation and education opportunities at Midway and Kure. However, due to the Navy and Coast Guard's objection to such proposals (see comments on pages 8.43 and 8.82) we have eliminated these strategies from further consideration.

Comment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

Richard Wass, Manager
Hawaiian Islands National Wildlife Refuge
300 Ala Moana Boulevard
Room 5302
P. O. Box 50167
Honolulu, HI 96850

OCT 2 9 1984

Dear Mr. Wass:

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) titled HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE (HINWR). We have the enclosed comments regarding this DEIS.

We have classified this DEIS as Category EC-2, Environmental Concerns - Insufficient Information (see following page titled "Summary of Rating Definitions and Follow-Up Action"). EPA Region 9 supports the designation of the HINWR. However, we have rated this DEIS EC-2 because resolution of the boundary
1 dispute will have a significant bearing on environmental impacts for the island chain and this management plan. Preservation and protection of this pristine ecosystem may be endangered by promotion of activities that potentially affect water quality within or close to the refuge.

The classification and date of EPA's comments will be published in the Federal Register in accordance with our public disclosure responsibilities under Section 309 of the Clean Air Act. We appreciate the opportunity to review this DEIS. Please send four copies of the Final Environmental Impact Statement (FEIS) to this office at the same time it is officially filed with our Washington, D.C. office. If you have any questions, please contact Patrick J. Cotter, Federal Activities Branch, at (415) 974-0948 or FTS 454-0948.

Sincerely yours,

Charles W. Murray

Charles W. Murray, Jr.
Assistant Regional Administrator
for Policy and Management

Enclosure (3 pages)

cc: Leslie Matsubara, Director, Hawaii Department of Health

Response

Response to U.S. Environmental Protection Agency, Region IX

1. The dispute concerning the boundary of the HINWR spans many years and will likely continue for several more before being resolved - hopefully by mutual agreement. We believe that while this dispute is pending resolution it is appropriate to plan for the protection and use of the important resources of the Refuge - as the Refuge is defined by the FWS. Further, we believe that the master planning process will result in the most appropriate resource management strategies regardless of the ultimate location of the legally defined boundary.

Comment

-1-

Water Quality Comments

2 EPA recommends consideration of an alternative for the Hawaiian Islands National Wildlife Refuge (HINWR) that is consistent with current water quality standards adopted by the State of Hawaii and approved by EPA. Executive Order 1019 established the Hawaiian Islands Reservation (HIR) which set aside the "islands and reefs" from Nihoa to Kure as a reserve. The 1940 Presidential Proclamation No. 2416 incorporated the HIR into the National Wildlife Refuge System by changing the name to the Hawaiian Islands National Wildlife Refuge.

Waters of "refuges or sanctuaries established by the U.S. Fish and Wildlife Service" are listed as areas to be protected in Water Quality Standards, Chapter 37-A of the Hawaii Public Health Regulations (Section 6.2 (B) [j]). These regulations have been approved and adopted by EPA. Class AA Marine Waters of this type are to "remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions (Section 3.3 (A)).

All marine waters are classified as "either embayments, open coastal or oceanic waters" (Section 2.3 (A)). Section 6.2 (A) defines "open coastal waters" as marine waters bounded by the 100 fathom (183 meter or 600 foot) depth contour. EPA suggests that the 100 fathom contour should be used as the refuge boundary for each island, reef, atoll or shoal of the HINWR. This contour 2 area would be consistent with the Hawaii Water Quality Standards and all sensitive marine bottom types would be incorporated in the refuge. Marine bottom types defined as Class I protection areas within the open coastal waters include sandy beaches, lava rock shorelines, solution beaches, marine pools, protected coves, reef flats and reef communities defined under Section 7 of the Water Quality Standards. Soft bottom communities are classified as Class II protection areas under Section 7.

Coral reefs have been designated as special aquatic sites by the EPA (40 CFR Parts 230.3 [q] [1] and 230.44) that are essential critical habitat for rare, threatened and endangered species. EPA's major concern for this project is the preservation or enhancement of coral reef water quality to ensure protection of these endangered species and their critical habitats in the 2 HINWR. Therefore, EPA suggests consideration of an alternative in the FEIS which addresses the 100 fathom contour and the protection of water quality within these boundaries. Placement of a mooring bouy outside the refuge boundaries should be presented and addressed in this alternative. A "mapping and ground truthing survey" (p. 7.13 of the DEIS) must be completed 3 before the management plan can be implemented. This will ensure that all reefs and soft bottom communities within the 100 fathom contour will be included in the refuge.

Response

2. Although almost all of the 252,000+ acres of submerged lands in the HINWR are within the 10 fathom contour, we recognize the need to consider the off-shore environment (beyond 10 fathoms) in our planning primarily because of the extreme range of many of the species considered in the Master Plan/EIS. This is acknowledged in the Affected Environment Section of the document. However, because the FWS has no jurisdiction beyond the Refuge boundary, we believe the best way to influence activities in waters beyond the Refuge boundary is through cooperative efforts with the State and other regulating bodies such as the Western Pacific Regional Fishery Management Council.

3. As indicated in RPA Strategy #11, this is an ongoing activity that is proposed to continue in our Preferred Alternative on an annual basis.

Comment

-2-

In order to "succinctly describe the environment of the areas to be affected or created by the alternatives under consideration" (40 CFR 1502.16), the FEIS must document compliance with the appropriate State of Hawaii Water Quality Standards that are approved by the EPA. Specific criteria applied to water quality standards for the open coastal waters must be maintained to ensure the protection of these reef areas (Section 6.2 (C)).
4 The FEIS should list current water quality levels for each island, atoll, reef or shoal showing compliance with these standards. If the levels are not in compliance, mitigation measures should be presented to correct the situation.

Impacts to the area should be assessed with regard to the water quality standards. The impacts from proposed fisheries near the refuge should be addressed, including oil spills, spill clean-up capabilities, refuse disposal, anchor damage and threats to endangered species.

404 (b) Permit Comments

Both the No Action Alternative (NAA) and the Baseline Alternative (BA) indicate that dredge and fill activities are planned. These two alternatives are the basis for all other alternatives. Enlargement of the turning basin at Tern Island (p. 7.2, NAA) and retardation of sand movement at Laysan Island (p. 7.9, BA) involve physical manipulation of the environment. The FEIS should specify the nature of these activities.

The Pacific Ocean District Office of the U.S. Army Corps of Engineers should be contacted to determine the need for a Section 404 discharge permit for any portion of the proposed
5 alternatives. If a permit is required, EPA will review the project for compliance with Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the Clean Water Act. Our evaluation would focus on the maintenance of water quality and the protection of wetlands, fisheries and wildlife resources. If applicable, the results of further study should indicate the amount of dredging required, potential disposal sites, types of fill material to be utilized, and quantities to be discharged into waters and wetlands that fall under Section 404 jurisdiction.

Response

4. We have reviewed the State of Hawaii's Department of Health Administrative Rules 11-54 and 11-55 concerning water quality standards and water pollution control and find our proposed action to be in compliance. Reference has been so indicated in the Master Plan/EIS. Regarding a listing of current water quality levels for each island, atoll, reef and shoal, we believe this level of specificity to be beyond the scope of this conceptual Master Plan/EIS for the Refuge. We have indicated that our overall concept for management and development of the Refuge will be in compliance with State standards.

5. Additional description of these projects has been provided in the Environmental Consequences Section. The shore protection project is needed to maintain Tern Island and provide all of the benefits associated with continued operation of the facility (see Section VI.6.). The project is not likely to have a significant long term environmental effect. Application for Section 404 permits will be made as plans and specifications for these projects are developed. The Corps is required to prepare an environmental assessment prior to issuance of these permits.

Comment

Response

SUMMARY OF RATING DEFINITIONS
AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO—Lack of Objections
EPA has no objections to the proposed action as described in the draft impact statement or suggests only minor changes in the proposed action.

EC—Environmental Concerns
EPA has identified environmental impacts associated with the proposed action that should be corrected in order to fully protect the environment.

EO—Environmental Objections
EPA has identified significant environmental impacts associated with the proposed action that should be avoided in order to adequately protect the environment. EPA intends to work with the proposing agency to reduce these impacts.

EU—Environmentally Unsatisfactory
EPA believes that the proposed action is environmentally unsatisfactory because of its potentially harmful effect on the environment. If the potential for unsatisfactory impacts is not corrected at the final EIS stage, the project will be recommended for referral to the CEQ. EPA intends to work with the proposing agency to reduce these impacts.

Adequacy of the Impact Statement

Category 1—Adequate
The draft impact statement adequately sets forth the environmental impact of the preferred alternative or action and adequately sets forth alternatives that are reasonably available to the project or action.

Category 2—Insufficient Information
The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS which could reduce such environmental impacts of the action. The inadequate information, data, analyses, or discussion should be included in the final EIS.

Catergory 3—Inadequate
The draft EIS does not adequately assess the potentially significant environmental impacts of the action, or the reviewer has identified new, reasonably available, alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS which should be analyzed in order to reduce the potentially significant environmental impacts. The inadequate information, data, analyses, or discussions are of such a magnitude that they require full public review at a draft stage. This rating constitutes a finding that the draft EIS does not meet the purpose of NEPA and/or the Section 309 review, and thus must be formally revised and made available for public comment in a supplemental or revised draft EIS.

Comment

Response

John S. Carroll

November 9, 1984

Refuge Manager
Hawaiian & Pacific Islands National
Wildlife Refuge
P. O. Box 50167
Honolulu, Hawaii 96850

Gentlemen:

The attached comments of John Earle basically reflect my concerns with respect to the Master Plan and Enviromental Impact Statement regarding the Hawaiian Islands National Wildlife Refuge. It is a privilege to be allowed to review this matter and I am sorry that I did not return this sooner. Due to a number of political involvements I have been unable to respond until now.

Very truly yours,

JOHN S. CARROLL

JSC:NU
Enclosure

906 financial plaza of the pacific, suite 906
honolulu, hawaii 96813 (808) 521-5027

Comment

92-1188 Hookeha St.
Ewa Beach, HI 96707
October 21, 1984

Dear Sirs,

As a concerned individual, who has had the privilege of visiting Midway, Nihoa, and Kure Islands, I reviewed with interest the Draft Master Plan/EIS for the Hawaiian Islands
1 National Wildlife Refuge. I generally agree with the Preferred Alternative, subject, however, to the following comments.

1) I do not think that the delineated alternatives give adequate consideration to the diversity and vulnerability of habitats in the NW Hawaiian Islands, or the degree to which their biological environments have been affected historically. A policy applicable to all the islands may, in Procrustean manner, provide over-stringent or redundant protection for some areas, with commensurate attenuation of other potential uses, while leaving other islands vulnerable to drastic perturbations.
2 Had the Draft Master Plan/EIS analyzed the NW Islands in terms of habitat vulnerability, diversity, and the degree of historical modification, I believe that Nihoa Island would have stood out as the greatest biological treasure among the NW Islands, and an area deserving more stringent protection than any of the other islands.

Nihoa is unique because of its complex terrestrial community, with high rates of endemism, and many species yet undescribed. This community is virtually unaffected by the activities of modern man, in dramatic contrast to other
3 islands like Laysan. As one of the few relatively undisturbed tropical islands in the world, Nihoa is a unique laboratory to study and test Island Theories of speciation. I suspect that such studies will become increasingly important as natural environments throughout the world are reduced to "islands" by the activities of man. Accordingly, I strongly disagree with the relatively low priority (#12) given to Terrestrial Endemic/Native Species Maintenance on the prioritized list of NWR outputs on page 5.2.

The Nihoa biological community is highly vulnerable to the introduction of exotic vegetation, potential predators like rats or cats, or even exotic arthropods like ants, which have recently caused the extinction of the main Hawaiian Island counterparts to the now unique Nihoa terrestrial mollusk fauna. Additionally, the proximity of Nihoa to Kauai (I sailed there in one day) increases the risk of introduction of exotics.

Accordingly, I recommend the highest priority be given to the classification and study of the Nihoa terrestrial community, and that a prohibited zone be created for the waters surrounding Nihoa. At the present time I feel that it would
4 be too risky to permit commercial fishing anywhere in the vicinity of Nihoa.

Response

Response to John S. Carroll/John L. Earle

1. Your support of the Preferred Alternative is appreciated.

2. The diversity and sensitivity of the flora and fauna of Nihoa Island are highlighted on pages 3.12 - 3.14 of the Master Plan/EIS.

3. Endangered, threatened, sensitive and candidate species are the highest priority objective for the Refuge. Approximately 22 taxa endemic to Nihoa currently fall within this category. Priorities beyond those in the "Vulnerable" species category are responsive to the legal mandates, policies and guidance included in Section IV of the Master Plan/EIS. As indicated under NAA Strategy #6, efforts to identify unlisted species in need of greater protection are ongoing. Finally, we feel strategies associated with output priorities 6-9 (Cultural Resource Protection, Wilderness, Research Natural Area, and Other Protective Status) will provide the protection and recognition for the unique natural and cultural resources of Nihoa Island - as well as the rest of the HINWR.

4. The FWS has no jurisdiction in waters beyond the Refuge boundary.

Comment

(2)

5 2) In contrast to Nihoa, where none of the alternatives seem to provide adequate protection, I believe that even the Resource Utilization Alternative gives unnecessarily stringent restrictions to public access to Tern Island. Despite extensive recent human activity, French Frigate Shoals remains the stronghold for monk seal and turtle distribution in the NW Islands, which suggests that these populations may not be overly sensitive to controlled human proximity. Indeed, recreational lagoon shark fishing, or an Earthwatch type program to protect turtle nests and facilitate transportation of hatchlings to the water might benefit the turtle and seal populations.

Since French Frigate Shoals is the only site in the NWR where all eighteen species of breeding seabirds may be seen, I envision a greater demand for public nature tours that the RUA would permit (pg. 6.34 "...a small number of tour visits... 6-8 per year... maximum of seven people...") 6 Frankly, I see no reason why occasional one day birdwatching trips could not be accommodated, with tour groups utilizing such available commercial aircraft as Hawaiian Air's D-7 STOL aircraft.

3) I am concerned that the Preferred Alternative may be opening Pandora's Box by permitting access to cultural sites for religious purposes. Frankly, it is extremely doubtful that there remain any legitimate religious interests at stake on Nihoa or Necker since the ancient Polynesian religion is extinct, the islands have been historically uninhabited, and the style of marae on these islands is distinct from that of the main Hawaiian Islands. Indeed, except for an ancient 7 chant which may have alluded to the island now known as Nihoa, all knowledge of these islands had been lost at the time of Western Contact.

Aside from the desirability of limiting human contact on Nihoa and the difficulty of determining religious legitimacy, the refuge may be opening its gates to a troublesome group of activists, mystics, and malcontents by permitting "religious" visits. I suggest that the experiences of the U.S. Navy on Kahoolawe might be illustrative.

Sincerely,

John L. Earle

Response

5. Monk seals and turtles congregate at French Frigate Shoals primarily because the resources of the Shoals meet their ecological requirements. Seal and turtle populations at the Shoals are presently being monitored to determine if the reduced level of human activity occurring since the Coast Guard left Tern Island (in 1979) will result in population increases. Considerable data exist to support the view that seals and turtles are sensitive to human proximity. (Seals were seldom seen on the beaches at Tern Island during the late 1970's when the Coast Guard Loran Station was operational.) During the past two years, there have been several occasions when over 100 seals have been sighted on the beaches during a single survey.

6. Demand for nature tours will likely exceed the capability of the Refuge to support it. The number of tours is limited by the constraints noted in the discussion under RUA Strategy #8. An additional factor giving cause for limiting the number of tours is that aircraft take-offs and landings cause disturbance among seabird colonies nesting alongside and at either end of the runway at Tern Island.

7. Access to cultural sites for religious purposes will be extremely limited and rigidly controlled and supervised as indicated in the discussion under RUA Strategy #4. Additions to the text under this strategy have been made to reflect your comments.

Comment

Response

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

OFFICE OF THE ADMINISTRATOR

October 24, 1984

Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Boulevard
Room 5302
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Sir:

This is in reference to your draft environmental impact statement for the Hawaiian Islands National Wildlife Refuge dated August 28, 1984. Enclosed are comments from the National Oceanic and Atmospheric Administration.

We hope our comments will assist you. Thank you for giving us an opportunity to review the document. We would appreciate receiving four copies of the final environmental impact statement.

Sincerely,

Joyce Wood

Joyce M. Wood
Chief, Ecology and
Conservation Division

Enclosure

OCT 1984
RECEIVED
FWS PIA

Comment

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

October 11, 1984 F/SWR1:JJN:DEG:RTBI:
ETN:PAH

Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Boulevard
Room 5302
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Sir:

The National Marine Fisheries Service (NMFS) has reviewed the draft environmental impact statement (DEIS)/Master Plan for the Hawaiian Islands National Wildlife Refuge, dated August 28, 1984. The following comments are offered for your consideration.

General Comments

NMFS was consulted during the drafting of the DEIS/Master Plan. Resources for which NMFS bears a responsibility, and the alternatives presented to reduce adverse impacts on these resources, have in general been addressed to our satisfaction in the DEIS. Other than the noticeable redundancies throughout the document it appears to be a well written, thoughtful and comprehensive presentation.

1 We question the proposal to regulate vessel activity by the U.S. Fish and Wildlife Service (FWS) outside the Hawaiian Islands National Wildlife Refuge (HINWR) boundary. The same concern applies to the proposed requirements that vessels near the Northwestern Hawaiian Islands (NWHI) take measures such as filing float plans, regular radio reports and mandatory use of EPIRBs. In addition, the proposed establishment of 100 fathom contour regulations for waters outside of 3 miles would infringe on freedom of the high seas. These proposals need to be carefully scrutinized as to legality. Perhaps a change in the Intergovernmental Maritime Consultative Organization (IMCO) status of the "Area to Be Avoided" from advisory to regulatory would be the proper approach. This would involve an international treaty making process which would be binding on all signatories.

2 In terms of resource protection, the Resources Preservation Alternative (RPA) would be the preferred alternative, particularly when considering the status of the Hawaiian monk seal (Monachus schauinslandi) and the green turtle (Chelonia mydas), two vulnerable species for which this agency has major responsibility. However, we note that the Preferred Alternative (PA) contains a fair and balanced mix of resource preservation and utilization needs. With some possible refinement NMFS agrees that this alternative should be the recommended action.

Response

Response to National Marine Fisheries Service

1. We realize that the FWS has no authority to regulate vessel traffic beyond the boundary of the HINWR. This proposal is, however, directed at the need to minimize risks to vulnerable species of the Refuge by working cooperatively with the State of Hawaii, NMFS, Coast Guard, the Western Pacific Regional Fishery Management Council and the fishing industry to seek out means of reducing the risk of vessel groundings on HINWR islands and reefs. Proposals included in RPA Strategy #1 are only suggestions for such an interagency group to consider and test. Only those suggestions that receive wide or total acceptance among group representatives would receive further attention before being implemented.

2. We appreciate your support of the Preferred Alternative.

Comment

3 In order to evaluate more completely the effects on the Hawaiian monk seal and green turtle from HINWR master planning and the State of Hawaii's mothership proposal for French Frigate Shoals, we recommend reinitiation of formal consultation under Section 7 of the Endangered Species Act of 1973, as amended. The original consultations were conducted to evaluate the impacts of Refuge activities, a proposed baitfish feasibility study, and the use of Tern Island as a fishery support station, on threatened and endangered species in the HINWR based on activity information which was current at the time. These consultations were completed and Biological Opinions were issued by NMFS on March 11, 1981 and November 3, 1982. The request for reinitiating consultation should be addressed to: Regional Director, Southwest Region, National Marine Fisheries Service, 300 S. Ferry Street, Terminal Island, California 90731.

Specific Comments

SUMMARY

Page 0.1, paragraph 1. This paragraph states that the monk seal population "recovered to about 1200 animals in the late 1950's, but over the last 25 years, surveys indicate that the population has declined again to 560 seals in 1982." This statement should be corrected since the figures given are actually beach counts and do not represent the actual monk seal population.

Page 0.2, paragraph 4, Page 0.5, paragraph 4, Page 3.21, paragraph 4. Bluefin tuna (*Thunnus thynnus*) are only rarely taken in the offshore zones of the NWHI and should not be included as an important commercial species in this area.

4 Page 0.5, paragraph 5. While commercial harvest of tuna may indirectly affect seabird prey species, such impact may not necessarily be detrimental since removal of tuna, a major predator, may actually reduce competition between tuna and sea birds for the same prey species.

III. AFFECTED ENVIRONMENT

Page 3.19, paragraph 2. Recent lobster fishing in the NWHI has resulted in large catches of slipper lobsters. (Between August 1, 1984 and September 14, 1984, records show approximately 45,000 legal slipper lobsters were landed, versus 172,000 legal spiny lobsters for the same period). It can be said that slipper lobsters are of serious commercial interest.

Page 3.21, paragraph 3. The uku (*Aprion virescens*), an important bottomfish species, is most commonly taken from water depths of 20-40 fathoms depth, not 50-150 fathoms as stated in this paragraph.

Page 3.22, paragraph 1. NMFS knows of no legal foreign longline fishing for tunas and billfish presently occurring in the Fishery Conservation Zone of the NWHI.

Response

3. We concur. A Preliminary Draft Master Plan/EIS was sent to the NMFS, Western Pacific Program Office on July 13, 1984 for "informal" consultation purposes. Upon completion of the Preliminary Final Master Plan/EIS we will request formal Section 7 consultation by NMFS.

4. We concur with your specific comments and have modified the Master Plan/EIS appropriately.

Comment

Response

3

Page 3.23, paragraph 1. The latest estimate of the wintering humpback whale population in the Hawaiian Islands is approximately 1,200 animals. (Darling, 1983, In press).

There are no records of gray whales having been sighted in Hawaiian waters. Under the category of "other large whales" we suggest the inclusion of the bryde's whale (Balaenoptera edeni), a species sighted and confirmed on several occasions in the NWHI. In addition, this section should include a listing of cetaceans known from Hawaiian waters. See: Shallenberger, Edward (1981). The Status of Hawaiian Cetaceans. Final report to U.S. Marine Mammal Commission (Report No. MMC-77/23).

Page 3.29, paragraph 3. It can be argued that the Honolulu market has shown the ability to absorb greatly increased catches from the NWHI, particularly during certain seasons and/or when numbers of tourists are at high levels on Oahu.

IV. PLANNING CONSTRAINTS AND CONSIDERATIONS

Page 4.3, paragraph 2. To our knowledge the agreement for jurisdictional responsibility for the Hawaiian monk seal remains informal and has not been signed
4 by either FWS or NMFS. A draft memorandum of agreement has undergone several reviews and alterations and is presently being evaluated by the FWS.

Page 4.5, paragraph n. The last sentence should include seamount groundfish as one of the FMPs being developed by the Western Pacific Regional Fishery Management Council.

Page 4.7, paragraph 2. The IMCO advisory for certain types of ships to avoid the NWHI should be upgraded to regulatory status if possible (See General Comments above). The regulations should be broadened to include ships carrying general cargo, not merely oil or hazardous chemicals. Midway and Kure should be included in the IMCO designations.

Page 4.22, paragraph 6. NMFS is a signatory to the revised triparty Wildlife Management Agreement for Midway Island and should be noted here. The agreement is presently being reviewed by the U.S. Navy.

Page 4.24, paragraph 2. Ocean Mining. At the present time a DEIS is being developed for the proposed lease sale of cobalt-rich manganese crusts in the exclusive economic zone (EEZ) of the Hawaiian Archipelago. A separate EIS will have to be prepared prior to actual ocean mining of the crusts.

V. FORMULATION OF OBJECTIVES

Page 5.2. Hawaiian Islands NWR Output List. NMFS suggests the unique concentrations of three species of Acropora coral at French Frigate Shoals be considered for inclusion as a "Vulnerable Species" in the Master Output List. This would include those marine species (example: Chaetodon trifasciatus) associated with the genus Acropora.

Comment

Response

4

VI. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Page 6.20, paragraph 4. The strategy of regulating and monitoring nearshore traffic should be vigorously pursued as it is the most feasible way to prevent groundings, potentially the greatest threat to biological resources in the HINWR.

Page 6.28, paragraph 14). The strategy to "conducted extended field camps and/or semi-annual boat surveys of HINWR islands" increases the chance of accidental introduction of pests and diseases. The gathering of additional resource data may not be worth the risks to the sensitive biota of the islands.

Page 6.31, paragraph 2). The strategy to "monitor impacts of commercial fishery on listed species" should be included in the Preferred Alternatives and so listed in the chart on page 6.5.

Page 6.34, paragraph 11). The scope of "recreational opportunity" and "storage space" to be made available to the fishing industry should be detailed in this section.

Page 6.37, paragraph 6. We support the Preferred Alternative recommendation to delay action to nominate HINWR waters to Wilderness status until the uncertainties mentioned can be resolved.

Page 6.43, paragraph 2. Typing errors were not indicated in our report. However, many relatively minor errors were found. Example in this paragraph: "Over 90% of the remaining Hawaiian population rests on East and Whaleskate Islands at FFS." Change "rests" to "nests."

4

TECHNICAL APPENDICES

Page 105, Other Recreation. We feel it is unrealistic to deny recreation to field camp personnel in remote island areas of the HINWR. Rather than refuse permission for something that probably occurs anyway, guidelines should be set.

Page 106, paragraph 4. We have no data to substantiate that lower catches of ahi in the 1960's were due to overfishing. Lower ahi catches in the Hawaiian fishery probably resulted from a combination of factors including reduced fishing effort and changes in market conditions.

Page 107, Aku Fishing. The following general comments on this Output are offered for your consideration:

An expansion of aku fishing is unlikely to occur with long distance pole and line vessels. Lack of baitfish, low aku prices, and more efficient purse seine vessels weigh against a long distance pole and line fishery. The Japanese are phasing out pole and line vessels. Expansion of the aku fishery into the NWHI is most likely to develop with purse seiners in conjunction with fish aggregation devices (FADs), both fixed and free floating.

The aku fleet has not expanded. In 1948 there were 32 tuna boats, whereas in 1983 there were only 13. A vessel built in 1971 and one built in 1979 are the only recent additions to the aku fleet. Most vessels are 25 years or older.

The low value of aku casts doubt on the feasibility of transshipment of this species from pole and line operations in the NWHI.

Comment

Page 109, paragraph 4. The maximum sustainable yield (MSY) of north Pacific albacore is not believed to be in a range of 121,000 - 700,000 short tons. The Southwest Fisheries Center (SWFC), NMFS, in their most current estimate of MSY for the north Pacific albacore resource (September 1983), placed MSY in the 99,000 to 165,000 ton range.

Page 116, paragraph 2. Estimates of shrimp yield in the Hawaiian fishery are available. Although there are several species of deepwater shrimp in Hawaiian waters, the carideen shrimp Heterocarpus laevigatus appears to be by far the largest and possibly the most abundant species. The SWFC, NMFS, in April 1984 estimated the abundance of H. laevigatus in the Hawaiian Archipelago at
4 2,500 - 5,000 metric tons.

Major investments have recently been made in the Hawaiian deepwater shrimp fishery by a local shrimp fishing company. In addition, numerous vessel owners in Alaska and the Pacific Northwest have expressed an interest in entering the fishery.

Page 121-122. Aquarium Specimen Collecting. There appears to be a contradiction in this section. On page 121, paragraph 7., a statement is made that "aquarium specimen collecting is not permissable within the refuge." On Page 122, paragraph 7., it states that "limited entry collecting (for aquarium specimens) shall be permitted on a rotational basis...."

NMFS appreciates the opportunity to comment. Please send us the appropriate number of copies of the Final EIS/Master Plan as soon as they become available.

Sincerely yours,

E.C. Fullerton
Regional Director

cc: F/SWR3, Jim Slawson
F/M42, Ken Roberts

Response

Comment

Response

National Audubon Society

Western Regional Office
555 AUDUBON PLACE, SACRAMENTO, CA 95833 (916) 481-5555

October 23, 1984

Mr. Dick Wass, Refuge Manager
Hawaiian Islands National Wildlife Refuge
P.O. Box 50167
Honolulu, HI 96850

Dear Mr. Wass:

On behalf of the National Audubon Society we appreciate the opportunity to comment on the Hawaiian Islands National Wildlife Refuge Masterplan/Environmental Impact Statement of August 28, 1984.

In general, we find the plan and impact statement to be a comprehensive treatment of the issues which face the refuge and its many resources.

We would like to preface our specific comments by establishing the National Audubon Society's view of the purpose served by the national wildlife refuge system. We believe that the basic purpose of the system is the preservation and protection of native wildlife populations and habitats in their natural diversity. The preservation of wildlife has several long-term goals, including the enjoyment of present and future generations, and the inherent right of native species to inhabit land, air and water and to evolve independently of human uses.

Management of the refuges must further this basic purpose. Wildlife conservation programs such as endangered species restoration, research and law enforcement are top priority. Recreational, economic, cultural, or social activities on refuges constitute secondary uses and must be subjected to strict application of a compatibility test to determine whether they conform with the basic purposes of the refuge system. Such uses must be demonstrably beneficial or neutral to the preservation of wildlife and habitats.

Secondary uses of refuges almost inevitably result in a diversion of funds and personnel from primary refuge resource programs. Habitat and wildlife populations may be diminished and refuge management detrimentally complicated. For these reasons, all secondary or nonconforming uses of the refuge system must be very carefully evaluated and generally should be discouraged.

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8.61

Comment

Mr. Dick Wass
October 23, 1984
Page 2

The Hawaiian Islands National Wildlife Refuge (HINWR) is unique among the 400 units which comprise the refuge system and is truly a resource of national and international significance. It is home to at least 76 endemic species of plants and animals, 6 of which are classified as endangered or threatened by federal law. Because the refuge is geographically isolated and still basically intact, it ranks as a tremendous area to study the processes of biological evolution. With over 5.4 million breeding birds and a resident population exceeding 12-14 million birds, the HINWR is among the world's most important seabird colonies.

In view of these unique biological values, management decisions impacting the refuge must be made with great care and sensitivity. At stake is an irreplaceable resource.

The following specific comments are structured to address the five substantive topics contained in the cover letter which accompanied the draft plan:

Protection of endangered, threatened and sensitive wildlife species

We believe that protection of endangered, threatened and sensitive wildlife species must be maintained as the prime management objective for the HINWR. Probably no other unit of the NWR system includes as many species so
1 vulnerable to extinction due to their uniqueness and/or population declines. Management of the refuge must take place with the goal of maintaining these vulnerable species. We would include in this objective the maintenance of terrestrial endemic and native species, not currently protected by the Endangered Species Act of 1973. HINWR should remain as an example of the natural diversity and unique biology which typified the entire Hawaiian Islands chain before human discovery.

Priority of Refuge Objectives

The priorities of the Masterplan should be in priority order:

1) vulnerable species
2) other fish and wildlife
3) environment
4) education/interpretation
2 5) other public uses

This ranking is in harmony with our view that HINWR is primarily a biological resource which offers a tremendous opportunity for improving our understanding of evolution.

We believe that the scientific objective is inherent in the protection of vulnerable species and other fish and wildlife. Audubon strongly supports such research on the refuge which is compatible with wildlife protection and which provides insights into the functioning of plant and animal communities. All research programs must pass the compatibility test of the Refuge Administration Act.

Response

Response to National Audubon Society

1. We have included maintenance of terrestrial endemic and native species under the "Other Fish and Wildlife" objective rather than the "Vulnerable" species objective mainly because these endemic and native species presently do not enjoy the special protection or recognition granted under the Endangered Species Act, the Marine Mammal Protection Act, the "Candidate Species" status or the Region's "Sensitive Species" designation (reserved for migratory birds). In a climate where tight budgets are the norm, it is necessary to set realistic priorities. The FWS' highest priorities on the HINWR continue to be known threatened, endangered and other vulnerable species. While it is true that future endangered species could likely be drawn from the existing pool of native/endemic species, the Service simply does not have the budget and staff at the present time to individually conduct investigative research on these species. Therefore, our efforts will be directed at preserving the integrity of the ecosystems of which these species are a part, thereby preserving the opportunity for other scientists to study life forms such as endemic invertebrates, as well as preserving the organisms themselves.

2. The FWS ranked "Environment" above "Other Fish and Wildlife" for several reasons. First, national direction for master planning on all refuges ranks environmental outputs above outputs listed in the "other" category. The rationale for this ranking is that the FWS has clear legislative or policy mandates regarding such items as designation of Wilderness areas, protection of cultural resources and designation of various overlay protective measures on existing refuges (e.g. Biosphere Reserve, Natural Landmark, Research Natural Area.) We have no similar specific mandates with respect to protection of endemic terrestrial and marine species which are neither federally threatened nor endangered. Second, we feel that successful accomplishment of the objectives listed under "Environment" would, in effect, allow us to achieve, or at least greatly facilitate, achievement of the objectives listed under "Other Fish and Wildlife." For example, designation of the Refuge as a Wilderness area would greatly further objectives for marine bird production and maintenance, other migratory bird maintenance, terrestrial and marine species maintenance. Finally, we believe that the ranking provides the FWS with a rational and logical basis for making trade-offs in the event that a conflict arises. To use a hypothetical example, restoration of natural diversity of the terrestrial ecosystem on Laysan Island might involve habitat alteration work that could adversely impact cultural resources. The FWS could undertake no such restoration until this potential conflict was satisfactorily resolved. Resolution might take the form of avoiding cultural resource areas, thereby sacrificing some restoration of natural diversity. The FWS does not have the latitude to disregard cultural resources despite the fact that, as you point out, "...The HINWR is primarily a biological resource." The priority ranking of outputs merely provides us a mechanism for facilitating the often difficult trade-offs which we are forced to make in a climate of shrinking budgets.

Comment

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Environmental Consequences of the Preferred Alternative as Compared to other Alternatives Considered

Vulnerable Species

The Preferred Alternative (PA) presents a number of management strategies which would substantially improve upon current conditions at NIWWR.

3 We strongly support the regulation and monitoring of nearshore vessel traffic. It is clear that the major risks faced in the refuge are all related to boat traffic. Groundings, oil spills, unauthorized landings and the introduction of exotic species are all exacerbated by vessel traffic. Establishment of a comprehensive control program as described in the PA should be a top priority for implementation.

4 We are, however, uncertain about the goal of establishing additional contingency populations of endemic land birds, consistent with recovery plans. It appears that the PA allows for such augmentation but to a lesser degree than the Resource Preservation Alternative (RPA). We support the development of contingency plans to be used in emergencies but believe that the natural distribution patterns of these species should be maintained, absent an emergency situation.

Environment

5 We believe that the value and uniqueness of the NIWWR make it a deserving candidate for the special recognition and protection afforded by classification as a World Heritage Site, Biosphere Reserve, and National Natural Landmark. Such classifications could no doubt be structured to allow for compatible research, management, and interpretive activities within the refuge.

6 We strongly agree with pursuing NWR overlay status for Midway Atoll. That area is clearly related to the NIWWR and such an overlay would increase coordination and improve management on Midway Atoll and the NIWWR. We believe the precedent established on Johnston Island where wildlife is managed by the FWS and the facility by the Defense Department is the proper model for Midway Atoll.

We acknowledge and support the opportunity for cultural and religious visits to the refuge providing such activities are closely regulated to avoid impacts on the wildlife of Wake and Nihoa Islands.

Other Fish and Wildlife

National Audubon supports the provisions of this element, particularly the monitoring of commercial fishery impacts on these species.

7 The expansion of the commercial fishery in nearby waters presents a significant risk to the refuge's seabird populations. The associated impacts with increased competition between feeding seabirds and the fishing fleet need to be closely evaluated.

Response

3. See Response to the Western Pacific Regional Fishery Management Council, #4, page 8.73.

4. The FWS at this time has made no decision to transplant endemic species. Transplantation is, however, a management option which we feel we need to keep open, given the precarious situation of some of the listed endemic birds on the Refuge. (Also see Response to Audrey Newman's letter, #6, page 8.87.)

5. The FWS feels that while these designations would provide additional layers of protection for the Refuge, before nomination procedures are pursued, careful study is first warranted. We are uncertain, for example, how these designations might affect our management flexibility on the Refuge. Obviously, we would want to ensure that these designations in no way restrict management activities essential to the achievement of Refuge objectives. As pointed out in this comment, FWS would want to ensure that the designations were fully compatible with research, management and public use needs. See response to Hawaii Audubon Society, #10, page 8.46.

6. We concur. The FWS is working closely with the U.S. Navy to complete the NWR overlay of Midway by the close of our fiscal year 1985.

7. The FWS is fully cognizant of the potential impacts on seabirds associated with an expanded commercial fishery in the NWHI. (See information in the Output Summaries, pages 87, 88 and 117-124 of the Technical Appendix relating to possible impacts of increased competition between feeding seabirds and the fishing fleet.) As indicated in "Other Fish and Wildlife" strategies under the PA, appropriate studies would be undertaken to monitor the effects of commercial fishing on seabirds as well as other endemic life forms.

Comment

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Page 4

Scientific and Professional Services

8 Audubon supports the objectives of the PA with the exception of the biennual aerial photo survey schedule. Because much of the refuge is unattended or difficult to access, it appears that the benefits of photo surveying the refuge every year more than outweigh the costs.

We support the extended field camp provisions but strongly recommend that rigorous attention be given to avoiding both on-site wildlife impacts and the accidental release of exotic organisms.

Education and Interpretation

9 We support the education and interpretation objectives of the PA, particularly those relating to off-site programs. While we also support the on-site programs contained in the PA, we recommend that refuge personnel assign primary importance to wildlife management and protection and secondary importance to facilitation of on-site visitation.

10 On-site education and interpretation should be geared to broadly increasing the public's understanding and appreciation of the refuge. We would not support visitation of a more recreational nature where the major benefits would be restricted to the visiting group itself.

Support for Compatible Public and Economic Uses

In reviewing the draft NIWWR masterplan it is clear that the primary public and economic issue being considered is the proper role of the refuge in supporting the area's commercial fishery.

We believe that all demands made on refuge resources or personnel must be compatible, or in harmony with the basic mission of the refuge. As previously stated, secondary uses tend to divert already limited management resources away from the management objectives which created the refuge in the first place.

NIWWR was established to protect a recognized seabird resource of national significance. In later years its value as a haven for endangered and endemic species became known. Proposed uses for the refuge must recognize and honor the values which led to its formation.

11 We believe that the unique and fragile nature of the refuge, the Fish and Wildlife Service (FWS) Program Goals, the Mission of the NWRS and the FWS Public Use Policy all argue against involving the refuge in the direct and non-emergency support of the commercial fishery.

Our concerns with commercial fishing are the greater risks of grounding and accidents through increased fishing traffic, and the competition for fish between the seabird populations and the fishing industry.

We acknowledge that management of fishing beyond the boundaries of the refuge is not and should not be the duty of the FWS. However, we do maintain that refuge facilities should not be utilized for recreation or storage of

Response

8. While an annual photo survey would be preferable, the FWS believes that a survey once every other year, in combination with extended field camps and/or annual boat surveys, should suffice. Obviously, if a major ecological disaster such as a hurricane were to strike the islands, the FWS would likely take special measures to conduct an aerial photo survey soon after the event. The survey would greatly facilitate an inventory of damage to the Refuge in terms of vegetation losses, changes in island configuration, damage to seal haulout and pupping beaches, etc.

9. The recommendation is consistent with the priorities given in the Master Plan - wildlife use objectives have priority over public use objectives.

10. We concur with this comment.

11. As long as the FWS maintains an operating station on Tern Island, the primary and major role that we will fulfill with respect to commercial fishing is to provide emergency logistical support. The FWS has no intentions to permit use of Tern Island facilities as a staging or principal storage area for commercial fishing. As explained on page 4.17-4.19, the State's current proposal for a mothership and catcher vessels is an operation that could basically function independently of any land-based facilities. We therefore do not anticipate, nor do we have facilities to accommodate anything resembling a "staging area." What we do expect are occasional requests for short-term storage of gear or limited day-use recreation on Tern Islandto break the tedium of extended fishing periods at sea. Clearly, we do not have in mind a rest and recreation center for fishermen. The strategies to lend support to the multi-species fishery (PA #21, RPA #16, PA #22 and RUA #11) have been rewritten to clarify the incidental role that the FWS would play with respect to "non-emergency support" for the fishing industry. These support activities will, of course, be closely monitored and if we subsequently determine that the risks are unacceptable, measures would be taken to limit our support to strictly emergency situations. Our current analysis of the situation, however, indicates that the risks are acceptable and we would view this strategy as contributing to the mutually beneficial working relationships which have evolved between the FWS and the fishing industry. While this relationship has contributed positively to resource management in the NWHI, we intend to continuously monitor the nature of the relationship so that wildlife objectives are not compromised in the least.

Comment

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11 materials in support of the expanded fishery. Emergency support is a more appropriate role for both the refuge facilities and staff. Therefore, we do not support the use of Tern Island as a staging or storage area for the fishing industry.

12 We support the provisions of the Resource Preservation Alternative (RPA) regarding the use and placement of buoys. We see no serious problems in the placement of a mooring buoy outside of the refuge boundary to provide support for the commercial fishery. However, use of the existing buoy should remain restricted to legitimate emergency situations.

We would strongly oppose any proposals which would allow fishing within the lands and waters of the NIHWR.

National Audubon appreciates the efforts by the State of Hawaii to expand its economic base by enlarging its fishing industry. However, we would hope this could be accomplished without risking damage to the unique wildlife of the NIHWR.

We would call upon the state to carefully reevaluate the Hawaii Fishery Development Plan in recognition of recent information about the more realistic harvest levels in the area.

In the area of Support for Compatible Public and Economic Uses, the RPA best fits the federal management responsibilities for the refuge.

Continuation of the Tern Island Field Station

13 The Tern Island Field Station is an absolutely essential element in the effective management and operation of NIHWR. Without an adequately staffed and funded Tern Island facility, few, if any of the resource protection functions of the refuge could continue. It is clear that federal management responsibilities for the refuge would be seriously compromised if the facility were not operational.

We would urge the FWS to maintain Tern Island as a high budget priority in the Pacific Region.

Summary

We appreciate the opportunity to comment on this important plan. We agree with much that is proposed in the preferred alternative but believe that in certain areas, particularly compatible public and economic uses, improvements are still necessary. The NIHWR is an important part of our national ecological heritage and management decisions impacting it must be made with great care. Hawaii, with its unique wildlife treasures, has been largely compromised by the many activities of civilizations in progress. But remnants of this treasure survive in the Hawaiian Islands National Wildlife Refuge. Let us plan carefully and act agressively for its maintenance and protection.

Response

12. We concur with these comments.

13. The FWS agrees that the Tern Island station is an essential element in our management/research program in the NWHI for the forseeable future (at least the next five years). The longer-term future of the station remains to be seen. Progress over the next five years toward our Refuge objectives (as well as objectives for resource protection and management throughout the Central Pacific) and the extent to which the station contributes to that progress should allow us a good basis for assessing the need for the station five years hence.

Comment

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Again, thank you for considering our comments on this plan and we look forward to working with you in its implementation.

Sincerely,

DANIEL TAYLOR
Regional Representative

DT/cr

cc: Richard Martyr
Amos Eno

Response

Comment

University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW

September 28, 1984

Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Blvd., Rm. 5302
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Camp:

1 Thank you for the opportunity to comment on the draft Master Plan, EIS for the Hawaiian Islands National Wildlife Refuge. While the document seems comprehensive enough, I had some difficulty in evaluating the various alternatives. It seemed to me that the best "alternative" was a mix of those presented. In the table presented on pages 0.10 and 0.11 and again on 6.4 and 6.5, this was particularly evident. For example, my choice at the top would be to implement high priority research, however, this choice was not "available" if one were to choose either the preservation, utilization or "preferred" alternative plan. Since most people would most likely differ on what they perceived as an ideal mix of actions, it might make more sense to present individual issues like research access giving a complete range of possible alternatives from complete restriction to open access and then seek input via public review or the public hearing process. The management alternatives as they are now structured, seem far too rigid.

2 Considerable discussion centered around the question of whether or not a mooring buoy should be permitted inside the NIWR. The problem, of course, is one of ship grounding if such a mooring were to be frequently used. It would seem that the engineering design of the mooring (weight and shape of anchor) would be as important as placement and yet there was no discussion on this topic. An absolutely safe mooring might be completely acceptable within the NIWR. The

3 statement on page 7.20 that vessel lights will attract wildlife particularly seals and turtles thereby increasing the risk of predation by sharks, is to my knowledge completely unfounded. I know of no documentation of such a thing other than the observation that people do occasionally see turtles and seals while anchored in the refuge at night. This does not prove attraction nor does it constitute evidence of increased shark predation. Statements such as this may damage the credibility of the document.

4 I would like to suggest one other change on page 3.1 at the end of paragraph one. If the words "of volcanic islands" were to be replaced by "and erosion"

AN EQUAL OPPORTUNITY EMPLOYER

Response

Response to University of Hawaii at Manoa, Institute of Marine Biology

1. High priority research and all other strategies under the No Action and Baseline Alternatives, are by definition included within the RPA, PA and RUA. The latter three alternatives incorporate NAA and BA strategies and, in addition, contain new strategies which emphasize either resource preservation (RPA) or resource utilization (RUA). The PA is really a hybrid of the RPA and RUA. The alternatives represent the most feasible mix of strategies, given agency mandates for resource protection and public demands for resource utilization. While it would have been theoretically possible to structure alternatives around individual issues such as research access, and to provide a full range of options from complete restriction to open access, we felt such an approach would have proven unpractical, given the large numbers of issues and the multiplicity of options that would be possible for each issue. Therefore, we intentionally structured the alternatives around a set of issues (or strategies) which we felt were absolutely essential if our management objectives were to be achieved. Those strategies are shown under the NAA and BA. We thus significantly narrowed the range of possible options, but in the process developed what we felt to be a more workable approach to identifying real-world, as opposed to theoretical, alternatives.

2. The FWS will investigate means for a more secure, permanent anchorage for both the existing (emergency use) mooring buoy inside the Refuge boundary and the proposed buoy outside the boundary to be installed by the State of Hawaii and/or the commercial fishing industry. However, our concern for moorage in the vicinity of French Frigate Shoals extends beyond engineering considerations for the actual buoy. Our basic rationale for not providing a general moorage within the refuge boundary relates to higher risks posed by increased vessel traffic such as increased potential for collisions, groundings, and fuel spills.

3. Fishermen and observers on the Easy Rider II, Cromwell and Feresa, to name a few, have reported the attraction of turtle hatchlings and seals to their lighted vessels while fishing in the NWHI. The statement on page 7.20 of the Master Plan/EIS has been amended to include reference to this phenomenon.

4. We concur. The Master Plan/EIS has been revised appropriately.

Comment

5 the sentence, I believe, would be more scientifically accurate. And finally, the technical appendices might read more clearly if plain English were substituted for output jargon.

In conclusion, I find the document to be well written and comprehensive. The information is all there. It would seem simply a matter of organization to restructure the issues and questions so that individuals could express their optimal combination of best choice among the various alternatives. I hope these comments will be useful and constructive and I compliment you on the hard work that went into this planning effort.

Sincerely,

Richard W. Grigg

RICHARD W. GRIGG
Marine Biologist

RWG:ec

cc: Jack Davidson
Philip Helfrich
Doak Cox

Response

5. Planning, like any other discipline, has its share of technical jargon. We have attempted to define some of the more important terms as they are introduced in the text. However, to facilitate reader understanding, we have added a short glossary of the key planning terms.

Comment

Response

THE WILDERNESS SOCIETY

FOUNDED IN 1935

November 8, 1984

Refuge Manager
Hawaiian and Pacific
Islands NWR
300 Ala Moana Blvd
Rm. 5302, PO Box 50167
Honolulu, HI 96850

Dear Sir:

On behalf of the over 100,000 members of The Wilderness Society (TWS), I submit these comments regarding the draft Hawaiian Islands National Wildlife Refuge master plan/EIS. They are sent several days late; we request your indulgence and ask that you consider them.

The Wilderness Society is impressed with the quality and substance of the plan. It appears to fully set forth and describe the relevant issues facing management of this important National Wildlife Refuge. It also portrays the extreme sensitivity of refuge habitats and key wildlife species, and the need to treat them delicately. The preferred alternative properly emphasizes refuge wildlife priorities and considers this sensitivity when determining which human activities may be compatible with refuge purposes. Thus, the preferred alternative is soundly balanced and supported by The Wilderness Society. Several specific comments and suggestions follow.

COMMERCIAL FISHING

TWS agrees that the commercial fishing mothership should be moored outside refuge boundaries. It is apparent from the EIS discussion that on-refuge locations could unduly jeopardize reef and island habitat and negatively impact several endangered species, and would thus be incompatible with refuge purposes. The off-refuge site should also serve to minimize other environmental impacts and assure human safety by leaving the on-refuge moor for emergency situations.

Similarly, the disruptions caused by an on-refuge commercial fishery render it incompatible with refuge goals, due to impacts on the bird populations, increased likelihood of groundings, and possible introduction of harmful exotics. TWS supports the decision to close the refuge to such uses. We fully endorse the proposed inter-agency committee to develop a mechanism for minimizing the likelihood of ship groundings.

1901 PENNSYLVANIA AVENUE, N.W., WASHINGTON, D.C. 20006
(202) 828-6400

Comment

Refuge Manager
November 8, 1984
Page Two

1 The preferred alternative would allow fishing crews to use Tern Island for recreation and other uses. While we agree with the general idea, we are concerned that it will be difficult to safely implement. Great care must be taken to insure that such activities do not disturb the monk seal or other species and habitats on the island. Thus, permissible recreation must be structured to protect these resources and closely monitored to ensure compliance; however, such activities could become a burden on refuge staff. Once a precedent of use is established, it is often very difficult to scale it down, so management must make it very clear from the onset that wildlife preservation is of utmost importance on the island, and that recreational activities must be circumscribed accordingly.

RECREATION

TWS also supports the limitation on general public entry and recreation. On a national wildlife refuge, protection of the natural resources should be paramount. Management must initiate programs to ensure that impacts do not conflict with refuge goals. While many refuges can safely absorb higher levels of visitor use, it is apparent that HIMWR cannot. Due to the fragility of its ecosystem, low-level, carefully controlled visitor entry is necessary.

WILDERNESS

TWS urges refuge management to actively pursue having its lands and near shore waters declared wilderness. As the EIS clearly depicts, many refuge species thrive best in pristine, undisturbed conditions. Wilderness is an excellent tool for ensuring that these habitat needs will be fulfilled. Necessary existing motorboat uses can be grandfathered to the degree appropriate in the wilderness designation process.

CRITICAL HABITAT DESIGNATIONS

TWS urges FWS and NMFS to adopt critical habitat proposals on HIMWR for the monk seal and green sea turtle. Especially for the monk seal, the need for such designation is obvious, given its extremely limited range. Such designations would further ensure that all future activities will fully consider the imperiled status of these species.

Likewise, HIMWR lands should be considered for World Heritage Site or Biosphere Reserve status by the FWS. These designations could serve to highlight the exceptional ecological richness harbored by the islands and surrounding waters.

Response

Response to The Wilderness Society

1. The strategies to provide non-emergency support to the commercial fishing industry (PA #21, RPA #16, PA #22 and RUA #11) have been clarified to address these concerns. (See also the response to the National Audubon Society, #11, page 8.64.)

Comment

Refuge Manager
November 9, 1984
Page Three

TERN ISLAND REFUGE STATION

2 It is clear from the EIS discussion that the Tern Island Station is of critical importance to management efforts on the refuge. Without the station, refuge management would largely be stripped of its ability to monitor wildlife populations and habitat and human impacts upon them, provide research opportunities, protect refuge habitat from invasion by harmful exotics, ensure that human activities are compatible with refuge purposes, etc. The refuge could no longer be properly managed if the Tern Station were abandoned. It should remain an integral facet of management operations.

OVERLAY REFUGE STATUS AT MIDWAY

3 The rich wildlife resources of Midway Island make it a prime candidate for refuge status. TWS believes legislation should be introduced to establish a national wildlife refuge on the island. While it might be necessary to have refuge status be secondary to certain current uses, the legislation must grant FWS full authority to take necessary actions to ensure that wildlife preservation goals are fulfilled.

Another possible arrangement would be to rewrite and expand the current cooperative wildlife management agreement with the Navy. Once again, the cooperative agreement should endow FWS with adequate managerial authority to fully apply the compatibility standard to the "overlay" refuge lands. Even then, refuge management should play a consultative role to minimize adverse impacts associated with any such actions. The Wilderness Society would appreciate the opportunity to review and comment upon any proposed cooperative agreements or proposed legislation.

Thank you for this opportunity to comment.

Sincerely,

William C. Reffalt

William C. Reffalt
Director
Wildlife Refuge Programs

WCR:kw

Response

2. The FWS agrees that Tern Island is critical to Refuge management efforts. (See also the response to the National Audubon Society, #13, page 8.65.)

3. Overlay National Wildlife Refuge status is being actively pursued for Midway Atoll. NWR status would be effected through a cooperative agreement between the FWS and the U.S. Navy. We hope to consummate that agreement before the close of our fiscal year 1985.

Comment

WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

1164 BISHOP STREET - ROOM 1405
HONOLULU, HAWAII 96813
TELEPHONE (808) 523-1368
FTS 546-8823

November 19, 1984

Dr. Richard C. Wass
Refuge Manager
Hawaiian Islands National Wildlife Refuge
U.S. Fish & Wildlife Service
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Dick:

The staff of the Western Pacific Fishery Management Council has reviewed the Draft Master Plan/EIS for the Hawaiian Islands National Wildlife Refuge. However, our meeting schedule did not permit the Council to take up this matter at a regular meeting during the specified review period (August 31 to October 30, 1984).

The Council staff has identified a number of statements in the master plan concerning fisheries which need correction or updating. However, this is to be expected in any draft report, and I suggest that our staffs meet to discuss these relatively minor errors. This letter focuses on the larger issues raised in the master plan.

The Council agrees with the intent of the "Preferred Alternative" to accomodate human uses of the refuge while protecting wildlife. However, we believe that the entire master planning process is clouded by the jurisdictional dispute between the State of Hawaii and the Federal government. Particularly at issue is the jurisdiction over Tern Island, which has a central role in the USFWS plans for the Northwestern Hawaiian Islands.

1 Planning for the future use of Tern Island, as well as for future uses of nearshore and offshore waters, cannot be very productive without resolution of this dispute. We are not advocating that USFWS personnel be removed from Tern Island. The presence of the caretakers at Tern Island has been of assistance to fishing vessels, and the presence of fishing vessels in the NWHI has aided the Tern Island personnel by carrying supplies to the island. This mutually beneficial relationship should continue, and we can support USFWS efforts to maintain the Tern Island station.

2 The Council understands the need to manage living resources and their habitats as complete ecosystems. Therefore, we can appreciate the need for integrated master planning for emergent lands and adjacent shallow water areas

A COUNCIL AUTHORIZED BY THE FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976 (P.L. 94-265)

Response

Response to Western Pacific Regional Fishery Management Council

1. We believe that planning for the protection and use of the important resources of the Refuge cannot await settlement of the dispute concerning the HIMWR boundary. That dispute spans many years and there is no guarantee that it will soon be resolved. In the meantime, we have relied on the master planning process to generate the most appropriate resource management strategies for Tern Island, regardless of the location of the legally defined boundary. Also see response to U.S. Department of the Interior, Minerals Management Service #1, page 8.29.

2. The FWS does not consider the HIMWR Master Plan to be a "unilateral" effort. Throughout the planning process, the FWS has made a concerted effort to involve outside interests and to ensure that the final products are responsive to public concerns. Our public involvement program has been designed to reach the broad spectrum of interests concerned with wise management of HIMWR resources. This program has to date included news releases, newsletters, newspaper announcements, radio spots, presentations for and/or coordination with special interest groups or involved agencies, the State Clearinghouse review process and two public workshops.

   While the FWS does not wish to close off any possible options for interagency cooperative management of the Refuge, we do not see at the present time how joint FWS-State management of the Refuge would result in a significantly stronger resource management program. The marine sanctuary proposal (see responses to comments from the Pacific Seabird Group and Craig S. Harrison, pages 8.80 and 8.98) should provide a public forum for looking at other possible options.

Comment

Dr. Richard Wass
November 19, 1984
Page - 2 -

2 in the Northwestern Hawaiian Islands. However, we do not believe that such a planning effort should be undertaken unilaterally by the USFWS. Clearly, an ecosystem management approach in the NWHI should be the joint responsibility of the State of Hawaii and the USFWS, just as management of certain fisheries resources is a joint responsibility of the State and the Western Pacific Fishery Management Council. Our partnership with the State has proven very workable, and we believe that cooperative State-USFWS management of the NWHI refuge and adjacent shallow waters would be similarly productive. For one thing, lengthy and costly litigation to resolve the jurisdictional issue might be avoided.

3 The Council believes that existing State and Federal laws enforced under a cooperative State-USFWS management system would be adequate to protect the wildlife resources of the refuge and adjacent State waters. We see no need for the involvement of additional agencies implied by status as a "wilderness", a "marine sanctuary", a "world heritage site", or other such proposals in the draft master plan. We remain unconvinced that the entire body of water surrounding the refuge which is bounded by the 20-fathom contour is really "critical" for the survival of the Hawaiian monk seal, and we believe that this would only add an unnecessary layer of regulation.

4 The preferred alternative in the master plan implies that the USFWS would regulate nearshore vessel traffic. The USFWS does not have this authority. Consideration of public user needs, particularly the State's proposal for a French Frigate Shoals fishery support station in the master plan, is encouraging. However, the general tone of the master plan implies that the presence of commercial fishermen in the NWHI is unnatural and is a direct threat to the unique and sensitive wildlife resources and their habitats. There is no basis to blame domestic fishermen for past problems. In fact, the presence of
5 fishermen in the NWHI, which dates back to the 1920's, has probably been a positive factor in conserving endangered species in more cases than not. I refer you to a letter (attached) written in 1973 by Bill Shinsato, whose fishing operations in the NWHI span the period from the 1930's to the present. Louis Agard, Jr., a member of our Council, also has extensive fishing experience in that region, particularly at Tern Island, where he maintained a fishing base for several years. Fishermen are as "natural" a part of the NWHI as the non-human resources, and they should not be discriminated against in the master plan.

Shortly after the draft master plan was circulated, the Council received a letter from Dr. Allan Marmelstein, the Pacific Islands Administrator for the USFWS. He was interested in obtaining input concerning the proposal for a French Frigate Shoals fishery support station, in the light of increasing concern expressed by fishermen about potential overfishing of spiny lobster and bottomfish. The Council's response to this specific question follows:

The fishery station proposal provides an important option which may or may not be exercised in the future by the fishing industry. The present

Response

3. The FWS feels that the additional layers of protection offered by these designations warrant careful study as discussed in the Master Plan/EIS. Agencies such as the Western Pacific Regional Fishery Management Council and the general public will be given ample opportunity to comment if and when specific proposals are made. With respect to the 20-fathom critical habitat proposal for the monk seal (more recently proposed as 10-fathoms) the National Marine Fisheries Service, not FWS, has authority to designate monk seal critical habitat. The FWS, however, does support the Recovery Team's recommendation that waters within the 20 fathom contour be designated critical habitat.

4. The FWS has no authority to regulate vessel traffic beyond the boundary of the HINWR. Actions are needed, however, to reduce the risk of groundings. A possible forum for developing such regulations would be an interagency committee with representatives from each of the concerned agencies and the fishing and shipping industries. Only suggestions that receive wide or total acceptance among the groups represented (including the fishing industry) would receive further consideration and study by the committee to determine if they could be effectively implemented and enforced. The committee would provide the fishing and shipping industries an avenue to voice and resolve concerns before any regulations are formally adopted. The important point here is that all concerned parties and interests would be involved at the outset in the formulation of any strategies for regulating and monitoring vessel traffic.

5. It is not the intent of FWS to "discriminate" against fishermen in the NWHI. The Master Plan/EIS recognizes fishing as a legitimate public use in the Islands, and the FWS will accommodate that use provided it can be conducted in a manner which is compatible with the major purposes for which the Refuge was established. Any public use (not just commercial fishing) has the potential to threaten fragile Refuge ecosystems, if such public uses are not properly planned. It is with the intent of avoiding and minimizing these potential threats that the FWS has structured protective strategies in the Master Plan/EIS.

Comment

Dr. Richard Wass
November 19, 1988
Page - 3 -

emphasis in both the spiny lobster and bottomfish fisheries is for large boats to make extended trips, without support in the NWHI. Therefore, existing operations do not require the high level of support which a French Frigate Shoals station could provide. The very size of these boats may be one of the factors which could encourage overfishing. If catch rates are reduced in the future, large boats may find it uneconomical to operate in the present manner. In such a circumstance, it might be more economically feasible for smaller boats to fish, with support at French Frigate Shoals, in the manner suggested in the State's proposal. I think of the fishery station as insurance should fishing operations shift from large, self-sufficient boats to smaller boats at some future time.

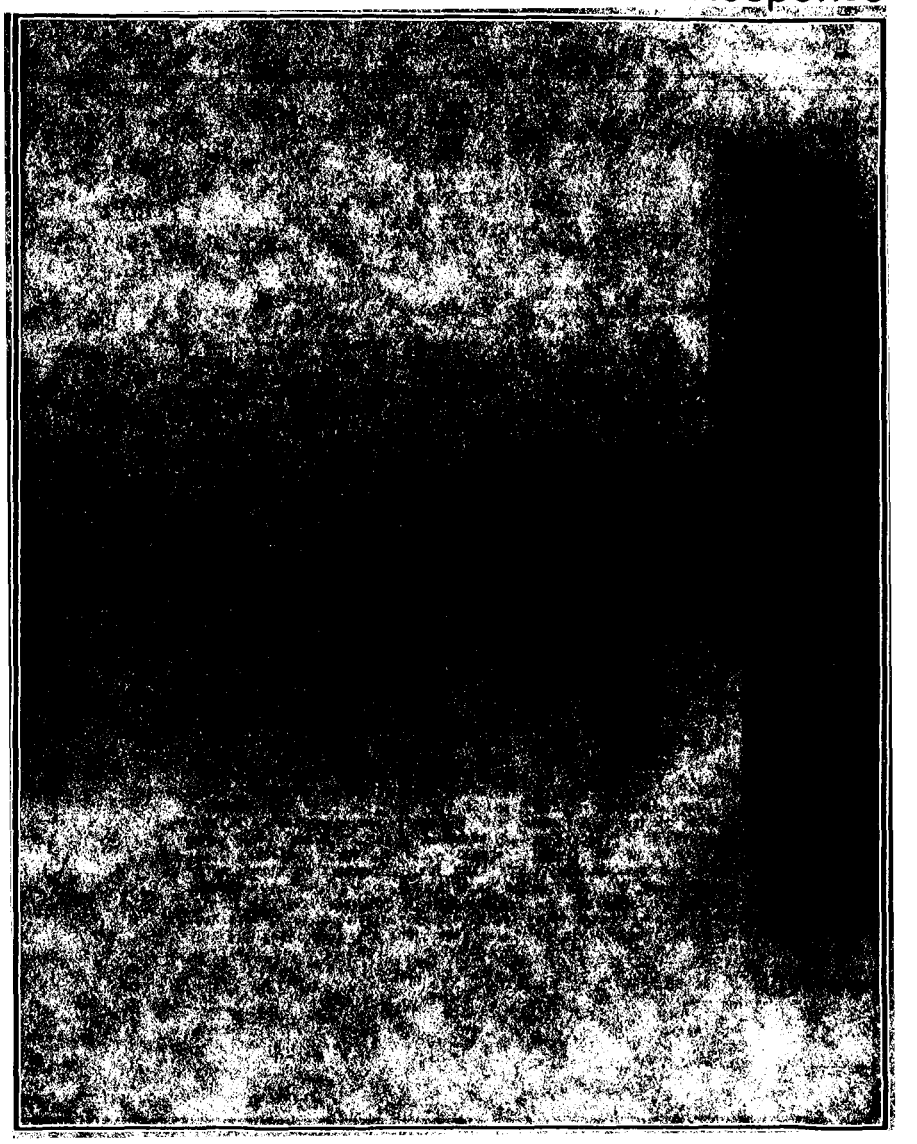
In closing, we wish to remind the USFWS that cooperation between the Tern Island personnel and fishing vessels has been mutually beneficial. There are other areas where cooperation between refuge managers and fishermen could prove fruitful. There is no disagreement about the need for prudent use of the natural resources of the refuge, as well as those in nearshore and offshore waters.

Sincerely,

Wadsworth Y. H. Yee
Chairman

Attachment

Response



Comment

Response

HEISKI "BILL" SHINSATO
Owner And Operator Of The Taihei Maru
2461 Lakoloa Place
Honolulu, Hawaii 96819

May 9, 1973

Regional Director
Bureau of Sport Fisheries and Wildlife
P. O. Box 3737
Portland, Oregon 97208

Dear Mr. Findlay:

It is imperative that the waters composing the Hawaiian Islands National Wildlife Refuge remain open to fishermen. Commercial fishermen have explored and fished the entire chain since the 1920's. The exploration and the fishing of the leeward chain continues today and in the near future will expand beyond past levels of exploration and fishing.

The following is a partial list of boats that have at one time fished or are still fishing the leeward chain, the approximate date they were fishing the area and what they primarily fished for:

LANIKAI and ISLANDER - fished around all of the islands and the LANIKAI had a fishing station at Pearl and Hermes Reef. They fished for pearl oysters, ulua, mullet, weke, akule, lobster from the reef and shoal areas and deep sea species such as uku, ehu, ula ula, opakapaka and hapapu'u. The ships were skippered by Captain Bill Anderson and operated in the 1930's.

SIMBA - fished the same area as the LANIKAI and ISLANDER but was actually a mother ship for three or four smaller sampans. The SIMBA fished primarily for inshore species such as akule, moi, weke, lobsters, and turtles. It was skippered by Captain Hoapai and was lost at sea with eleven men in the late 1940's.

DAIKOKU MARU - primarily netted inshore species in the shoal waters of the leeward chain. Vessel was lost at sea while returning from a fishing expedition in the 1920's.

RELIABLE - skippered by Arthur Rice was operated by the Hawaiian Tuna Packers to net inshore species and capture turtles during the mid 1940's.

KATSUREN MARU - fished for inshore species and turtle as far up as Maro Reef during the 1930's.

KOYO MARU - skippered by Dick Shiroma fished for deep sea and inshore; shoal inhabiting species. The sampan was lost at sea in the early 1960's and prompted a search by the sampan, BELLATRIX, skippered by Bill Shinsato. The BELLATRIX searched and explored

Comment

Heisei "Bill" Shinsato--May 9, 1973

the entire chain of leeward islands up to Lisianski Island. Upon returning from this search and exploration voyage the skipper and crew of the BELLATRIX reported that there were extraordinary quantities of fish of considerable commercial value along the entire chain of islands. The skipper and crew of the KOYO MARU were never found.

KAKU - skippered by Kuni Sakamoto fished the entire chain for both shoal inhabiting species and deep sea species up as far as Maro Reef.

SEA HAWK and OSPREY - sistership, fished up to Lisianski Island for both shoal inhabiting species and deep sea species. The OSPREY skippered by Bill Shinsato was lost at sea in the 1950's. All hands were rescued off of French Frigate Shoals by the U.S.S. Pictor.

ELAINE and BROTHERS - The ELAINE, operated by Bill Shinsato, and the BROTHERS, owned and operated by Captain Otness, worked as partner ships in the French Frigate Shoals area.

They fished primarily for lobster and inshore species. The ELAINE was stationed at French Frigate Shoals for six months trapping lobster and inshore fish. The ELAINE acted as the catcher boat and the BROTHERS acted as the mother ship, transporting supplies to the ELAINE and the fish back to Honolulu. The lobsters were sent back on the TAIHEI MARU when she returned to Honolulu. The ELAINE fished primarily with fence traps but discontinued the use of the fence traps when it was discovered that the traps also caught seals very effectively. They then resorted to the standard fish traps (box type with a funnel on one side).

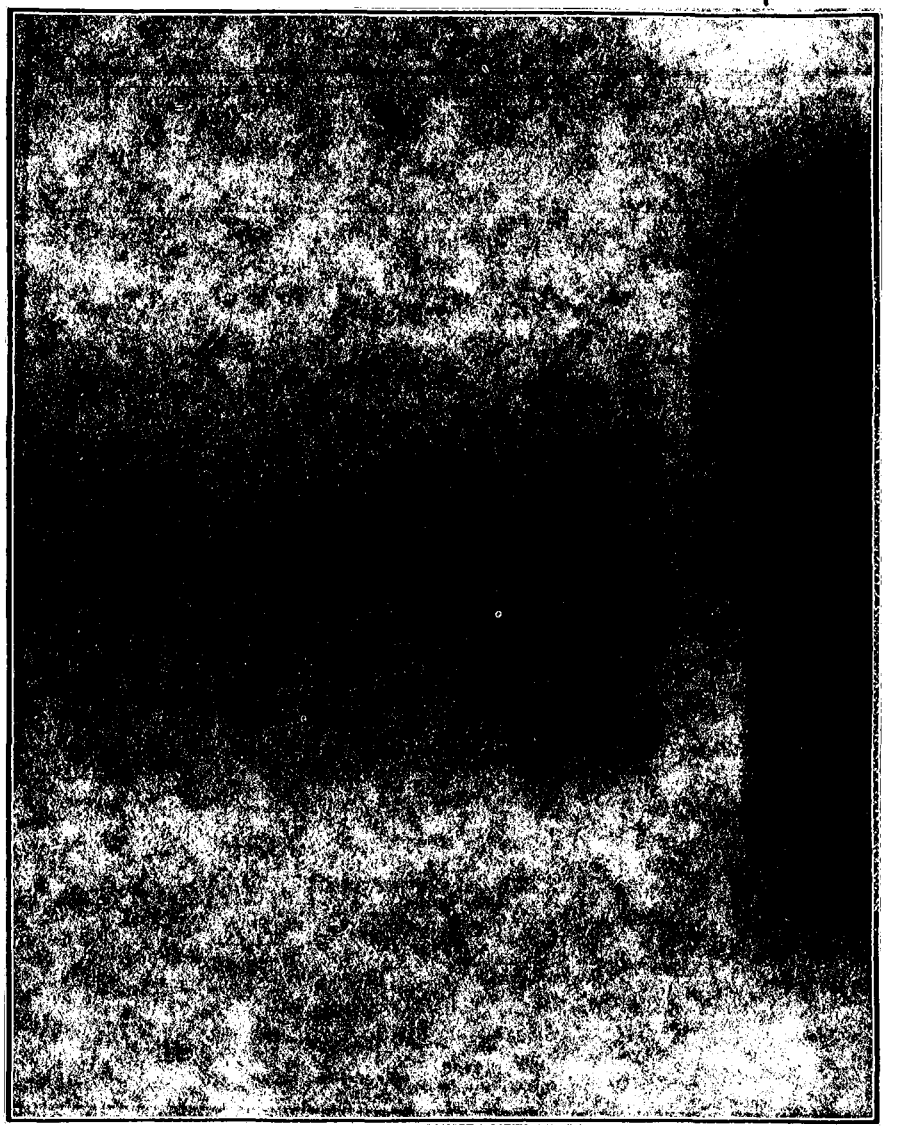
While they were stationed at French Frigate Shoals, the ELAINE explored the lobster fisheries potential and discovered that large amounts of lobster could be taken by luring the lobsters into the lagoon area where they could be caught by hand or trap. The experiments with the lobster fisheries and the fishing ended when the BROTHERS was lost at sea. The lobster fisheries proved to be unsuccessful because the price for the lobsters hovered around 40 cents per pound and there were difficulties in transporting the live lobsters back to Honolulu. At present, lobster commands a premium price of two to three dollars per pound and it is economically feasible to fish for them.

The sampan, CONSTANCE C, berthed at Kewalo, was purchased with the intention of refitting her for the lobster fisheries at French Frigate Shoals at the urging of the late Vernon Brock. However, French Frigate Shoals was placed off limits before the refitting could begin.

TAIHEI MARU - At present, the TAIHEI MARU is the only boat which is fishing the leeward islands regularly. Skippered by Bill Shinsato, she fishes occasionally up to Lisianski Island, but more regularly to Maro Reef. She takes ulua from the shoal waters as well as deep sea species such as ula ula, opakapaka, etc.

Other fishermen have made tentative plans to expand fisheries

Response



Comment

Response

out to the leeward islands. Two such fishermen are Buzzy Agaard and Leo Ohai. Buzzy Agaard has fished the leeward islands for inshore fish such as akule, moi, weke and is at present, a spotter pilot for a Honolulu based akule boat. Leo Ohai is skipper of the MALAHINI, a Honolulu based akule boat. They catch or assist in catching akule spotted from planes and surrounded by nets. Both men agreed that if inshore fisheries are to expand, the leeward islands are the only areas where such expansion is possible.

Akule is an important fish both to Hawaii's consumers and ahi fishermen. Akule is probably the most reasonably priced fish available to Hawaii's consumers and constitute an important commercial species. Hawaii's ahi fishermen are fairly dependent on akule for their bait. The high price of the sauri and the scarcity of the Pacific sardine have made it impractical to use these imported species for bait. In the near future, Hawaii's longline fishermen will become dependent upon the akule fishermen for their bait.

Ulua, another commercially important species is available in sufficient quantities around the leeward islands especially around the shoal areas of Lisianski Island, French Frigate Shoals, Maro Reef and Pearl and Hermes Reef. The fisheries for ulua round these areas were very lucrative at one time and in the near future will again become very important. At present, we are importing large amounts of ulua from foreign countries such as Australia. In the past, when caught in large quantities, the price of ulua dropped to 15 cents a pound, making it unprofitable to go after the species. At present, ulua commands a price of approximately 85 cents to one dollar per pound, depending on the size, making it profitable to go after ulua again. In the future, the price of the imported fish will increase to a level where Hawaii's fishermen will be able to compete with the imported fish in Hawaiian markets.

This is important in the sense that it will enable Hawaii to become just a little more self-sufficient and less dependent on the rest of the world for our existance. Perhaps, more than Hawaii trying to become more independent, it is sheer folly to import fish from other countries and place Hawaii's fishing areas off limits to fishermen.

I understand your deep concern for the wildlife in the area, but what you fail to consider is the deep concern we, as fishermen, also have. We depend on these areas for our support--we need these areas and the fishes they provide for our existance. We do not abuse these areas, and never kill for anything except necessity.

We have many examples to prove this conservation and ecological-mindedness. Some of these examples are listed below:

SHARKS - We never kill sharks unless they interfere with our

Comment

Meirei "Bill" Shinsato--May 9, 1973

fishing. Even the sharks we kill for their interference are dried for our consumption, used as bait for fish or brought back to Honolulu where it is given to the Asahi Maru for use as crab bait. There are two reasons why we do not kill sharks except out of necessity. 1) In the future, sharks may again be considered an important source of food. 2) Sharks perform an important function by weeding out the sick and the weak fish. In the past, when we attempted to wipe out the sharks in a given area, we noticed an increase in weak and skinny fish. This indicated that without the sharks fish would tend to overpopulate the area and exceed their food supply.

SEALS - We never hurt the seals in any way. In the past, we have even changed our fishing methods to avoid capturing seals.

TURTLES - We voluntarily stopped fishing for turtles. The last turtle we ever took in the French Frigate Shoals area or in any other area was over ten years ago. We stopped taking them when we noticed that their numbers were being reduced. We had hoped that by not taking them for a number of years, they would replenish their numbers and make it economically practical for us to fish for them again.

BIRDS - We have never in any way, maliciously hurt the birds nor disturbed them. We take extreme delight in observing their antics and when we have hooked them by accident on our trolling lures, we have always unhooked them and released them as carefully as possible.

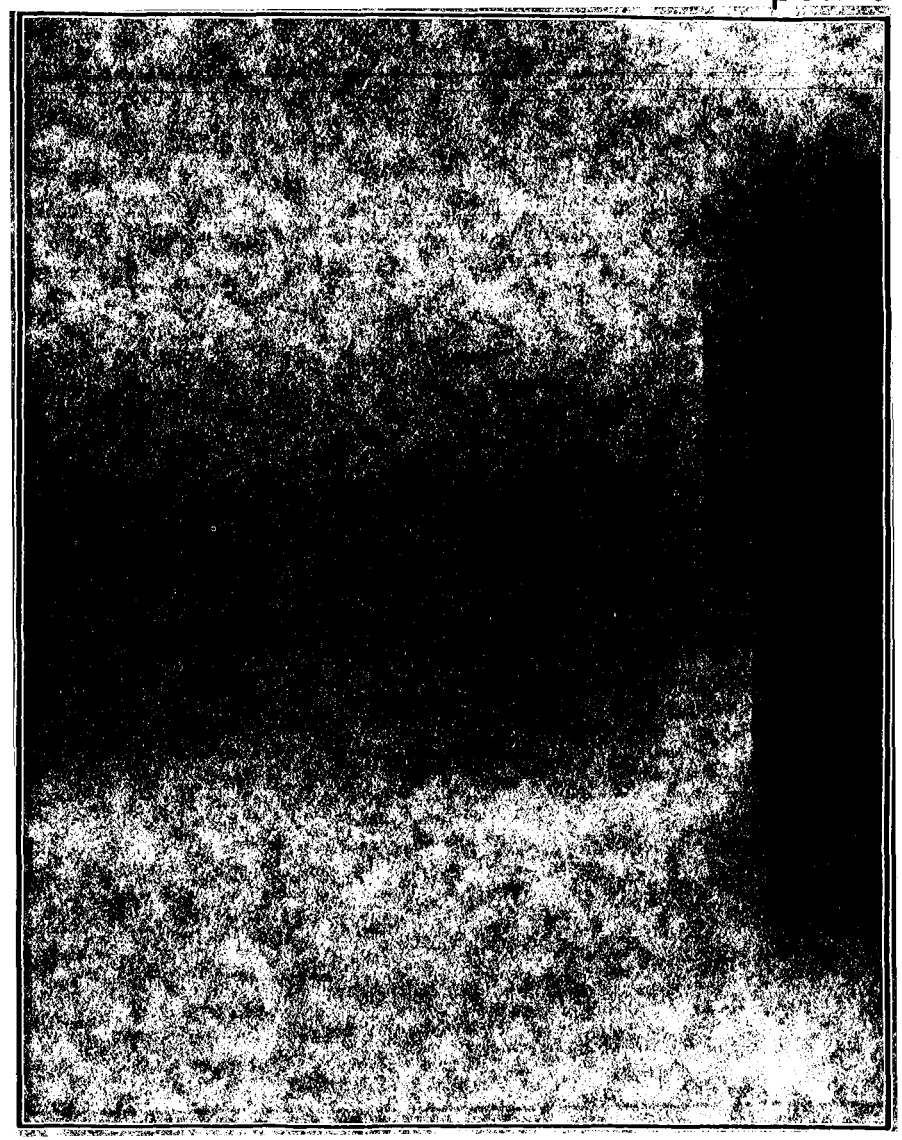
FISH - We never waste any fish. All the fish we catch are either used by us or brought back to Honolulu for sale. We also never overfish any given area for two reasons: 1) If we overfish an area to a point where the fish cannot replenish their numbers, we, in effect, have lost a fishing ground. 2) When an area has been fished for any length of time, the fish become wary and difficult to catch. This makes it economically impractical to fish that area unless there is nowhere else to fish. If an area is large enough, fishermen will rotate their fishing from area to area and never deplete the fish to dangerous levels.

The species of fish that we take do not appear to constitute a major food source for any of the animals in the wildlife refuge. For example, while I was stationed at French Frigate Shoals with the Elaine catching fish and lobsters, I never saw the seals eat anything else but eels. I have also had the opportunity to observe the turtles and have never seen them eat anything else but seaweed. When we used to catch turtles for market, we cleaned them and never found anything except seaweed and remnants of what appeared to be small crabs in their stomachs.

Based on my personal experiences, I feel that fishermen do not compete with the animals for food or any other reason.

By placing the leeward chain as a wilderness area, you will force the fishermen of Hawaii to fish extensively in other areas. This will have many effects on the people of Hawaii. 1) It will deplete the fishery resources to level where the fisheries will

Response



Comment

Response

never be able to replenish themselves. 2) You will drive the people fishing in the present and the future out of business. 3) Hawaii will be forced to import more fish from the other sources, especially Japan, Taiwan, and Australia. 4) You will make the people of Hawaii more dependent on the outside world.

Please consider these facts before you make your decision.

The commercial fishermen have explored and fished the entire leeward area and plan to expand the existing fisheries there. By placing this area off limits to our fishermen, you will deal a serious blow to Hawaii's economy and squelch our potential for growth.

The purpose of this letter was to show you that the leeward islands have indeed been explored and that the commercial fishermen of Hawaii do realize the potential of the area. It was also intended to attempt an explanation as to why the area has been left almost unexploited for a number of years. Although I could not hope to explain and illustrate everything, I do hope that I have illustrated the need for this area to remain open to fishermen and that fishermen, perhaps more than any other people are conservation and ecologically minded.

Thank you for your time and consideration.

Sincerely yours,

Heisei Shinsato

Heisei Shinsato
Owner and operator of the
TAIHEI MARU

Comment

Pacific Seabird Group

DEDICATED TO THE STUDY AND CONSERVATION OF PACIFIC SEABIRDS AND THEIR ENVIRONMENT

1647 Michael Lane
Pacific Palisades, CA 90272
26 October 1984

Regional Director, Region One
U.S. Fish & Wildlife Service
500 N.E. Multnomah Street
Portland, Oregon 97232

Dear Sir:

The following are comments to the Draft Environmental Impact Statement for the Master Plan of the Hawaiian Islands National Wildlife Refuge, prepared by our members most familiar with the region. We appreciate this opportunity to comment on these important issues.

We endorse the general approach of the DEIS with respect to the objectives in the management of marine birds and other resources. To improve management and efficiency, however, some approaches should be modified and should be discussed in the final EIS.

1 1. Although the DEIS states that this plan should guide management of these resources for as long as twenty years, most of the plan dwells on immediate problems, such as fishing, to the exclusion of other problems that ultimately may be more important. More attention should be devoted to deepsea mining (mentioned very briefly on 4.24), nuclear waste disposal (proposed recently for Midway), or other developments that might affect the refuge even though FWS does not control such actions.

2 2. The refuge does not seem to provide a management framework to manage and protect some of its resources. Fishing outside the refuge (0.5) and deepsea mining may affect marine birds. The Director of FWS or the Secretary of the Interior should formally nominate the Northwestern Hawaiian Islands to be a marine sanctuary. We agree with the DEIS that this concept requires extensive consideration (6.18), but because the lead agency, NOAA, requires a five-year review process, it seems inappropriate to await an FWS internal review before NOAA begins its deliberations (which would have FWS input).

3 3. Research and management of the NWHI seems to be expensive. The final EIS should consider the use of a private non-profit organization to conduct research in the NWHI and possibly to manage facilities such as Tern Island. Such an arrangement has been very successful on the Farallon Islands refuge in California,

Response

Response to Pacific Seabird Group

1. The section on deep sea mining has been expanded. The FWS is aware of and has had input to the DEIS currently being prepared for the proposed mining of manganese crusts. We feel it is premature to address other potential developments for which there are no specific plans at present.

2. We agree that the marine sanctuary concept has considerable merit in terms of providing a possible "cooperative interagency" management framework for the Northwestern Hawaiian Islands. At present, however, the State of Hawaii, the Western Pacific Regional Fishery Management Council and others are opposed to the concept. This does not necessarily mean the concept is unworkable. Rather, it implies there are a number of major problems for the cooperating parties to resolve before a sanctuary could ever be implemented. We do not feel that the Master Plan/EIS is the appropriate vehicle for resolving those problems. We are confident, however, that over time, the Preferred Alternative in the Master Plan/EIS will prove itself to be a viable option for the wise management of the Refuge and will also provide a more objective basis for evaluating the need for a sanctuary in the NWHI.

3. Regarding the management of Tern Island by private non-profit corporation, see response to Craig S. Harrison, #4, page 8.100.

Comment

Regional Director, Region One
page 2

3 saving government funds and positions. More important, it enhances opportunities for long-term research and allows agencies such as NSF to be involved in funding studies (NSF is not allowed to fund FWS studies). Should that approach be adopted, PSG would be pleased to lend the expertise of its members to the formation of such an organization.

4 4. The final EIS should provide a systematic process for the decisions (2.3) with respect to research on the refuge. The DEIS is too vague. Clear guidelines should be provided that ensure such decisions do not change with differing attitudes of each new refuge manager. This has been a problem in the past, especially with respect to collecting birds. In addition, clear policies must be promulgated with regard to space on research vessels. Special Use Permits to do research in the refuge, for example, should not be bartered for allocations of berths on research vessels.for Federal employees. If this is the policy of FWS, however, it should be clearly stated.

5 5. Any policies using Special Use Permits to restrict access to the NWHI should be modified for Midway Islands, if or when they become part of the refuge. Midway bird populations have survived almost fifty years of the U.S. Navy and are unlikely to be adversely affected by visiting tourists or researchers.

6 6. FWS should establish a consent regime for Special Use Permits for research. A written request for a SUP for research should be deemed to be granted if FWS does not make a written reply within thirty days. Individual researchers have been frustrated in the past because of extensive delays in processing routine research permits.

Again, thank you for this opportunity to review this DEIS.

Sincerely,

Judith Latta Hand

Judith Latta Hand
Chair, Pacific Seabird Group

cc: Harrison
Vermeer
Anderson

Response

4. Although the Master Plan/EIS does not provide operational details concerning specific research activities, it does provide (many times over in the strategies regarding research, monitoring and studies) a clear indication of FWS policy regarding the priority which research has in the overall management of the refuge. Additional details concerning research will be provided at a future date as we develop our operational and management plans (See Section II.E.). The FWS does not barter Special Use Permits for berths on research vessels but does reserve the right to accompany researchers on the Refuge to ensure compliance with the conditions of the permit and to ensure the compatibility of the research with Refuge objectives.

5. Concur. If Midway becomes an overlay National Wildlife Refuge, it will be managed separately from the HINWR. Policies guiding the issuance of Special Use Permits will differ from those for the HINWR and will be tailored specifically to meet the management needs of both the U.S. Navy and wildlife resources.

6. Written requests for Special Use Permits are currently processed well within the suggested 30 day period. We realize that delays are frustrating and will make every effort to continue to act on the requests in timely fashion.

Comment

U.S. Department of Transportation
United States Coast Guard

Commander (dpl)
Fourteenth Coast Guard District

Prince Kalanianaole
Federal Building
300 Ala Moana Blvd
Honolulu, Hawaii 96850
Phone: (808) 546-2861

11000
Serial No. 5/012
25 October 1984

Mr. Dick Wass
Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Blvd
PO Box 50167
Honolulu, Hawaii 96850

Dear Mr. Wass:

The Coast Guard has reviewed your draft EIS/Master Plan for the Hawaiian Islands National Wildlife Refuge and has the following comments to offer.

1 a. As you have noted Coast Guard facilities on Kure Island are very limited. In as much as we have no support capability, any plan which envisions use of Kure Island by the general population should be discouraged.

2 b. All three alternatives (RPA), (RUA) AND (PA) address regulating and monitoring near shore vessel traffic as a means to protect HINWR. Implementation of any of these strategies would require legislative action by Congress to extend present authorities or create new ones. It is recommended that further investigation be made into these strategies prior to the development of the final EIS.

3 c. The cost to rebuild the facilities on Tern Island FFS in 1972 was $1,215,000 not $200,000 as noted on page 6.41.

J. F. MILBRAND
Commander, U. S. Coast Guard
District Planning Officer
By direction of Commander
Fourteenth Coast Guard District

Copy: COMDT (G-WP/4)

Response

Response to U.S. Coast Guard

1. Given the limited facilities available on Kure to accommodate public recreational demands, the FWS has dropped the strategies to facilitate photography, journalism and art visits to Kure.

2. The FWS recognizes it has no authority to regulate vessel traffic outside the Refuge boundary. We also recognize, however, that regulations and some means of enforcing those regulations are needed to reduce the risk of accidental groundings. It is the latter need which prompted us to look at the measures discussed under the RPA, RUA and PA. We continue to believe that an inter-agency committee, composed of representatives from the concerned agencies and the fishing/shipping industries, would provide a viable forum for developing reasonable regulatory and monitoring measures without the need to request any special authorities from Congress.

3. The higher cost figure has been incorporated into the Master Plan/EIS.

Comment

United States Department of the Interior

NATIONAL PARK SERVICE
PACIFIC AREA OFFICE
300 Ala Moana Blvd., Box 50165
Room 6305
Honolulu, Hawaii 96850

IN REPLY REFER TO:

L76 (PAAR)

October 12, 1984

Mr. Al Marmelstein
Pacific Islands Administrator
Fish and Wildlife Service
300 Ala Moana Boulevard, Room 5302
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Al:

Thanks for the chance to review the Hawaii Islands National Wildlife Refuge Master Plan.

I have only a brief nitpic--that is, we feel the plan should show as "preferred alternative" that this Refuge will be nominated as a World Heritage/Biosphere Reserve site. The Hawaii Island Refuge fully qualifies in several important criteria:

1. It is one of the earliest wildlife reservations established, way back by "TR" himself. It is an integral part of a significant conservation ethic at its origin.

1 2. It has been very successful, probably saving several wide ranging species and a few of local endemics from extinction. The management philosophy and techniques you have developed there have wide application to pelagic bird breeding grounds elsewhere.

3. It is the best, most extensive example of its ecosystem in the world; and this type of system is poorly represented in the existing Biosphere Reserves.

4. Using such an excellent refuge as a type specimen gives world wide credence to the Biosphere Reserve/World Heritage program, and serves as an outstanding example for others to follow in the many cases where similar island ecosystems are in jeopardy.

Otherwise, I concur with the plan. Your crew has done a fine and thoughtful job preparing it. I personally get a great deal of repeated pleasure in watching some of the seabirds that probably were born and raised on your fine refuge.

Sincerely yours,

Bryan Harry

Bryan Harry
Director, Pacific Area

Response

Response to National Park Service, Pacific Area Office

1. We agree that the criteria cited would fully support nomination of the HINWR to the Biosphere Reserve/World Heritage Program. However, before nominating the Refuge, we would want to make sure that the new designation would in no way restrict management activities that are essential to the achievement of our Refuge objectives. Additionally, the ongoing boundary dispute with the State makes it unclear what the designation would geographically encompass. This strategy, therefore, calls for further study before pursuing nomination. (RPA Strategy #5 has been reworded to reflect the need to first study the implications of this strategy before moving toward implementation.)

Comment

Response

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

November 28, 1984

RE:0408

Refuge Manager
Hawaii and Pacific Islands
Wildlife Refuge
300 Ala Moana Boulevard #5302
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Sir:

Draft Master Plan/Environmental Impact Statement
National Wildlife Refuge
Northwestern Hawaiian Islands Archipelago

The Environmental Center has conducted a review of the above cited document with the assistance of Sheila Conant, General Science; Robert Schroeder, Hawaii Cooperative Fishery Research Unit/Zoology; Jacquelin Miller and Juliane Mansur, Environmental Center.

The proposed management plan appears to be comprehensive and the DEIS is generally well written. However, we have two general areas of concern that should be addressed in the Final EIS.

1. As stated in the Master Plan/DEIS (p. 6.4), basic authorities and mandates going back to 1909 when the refuge was established by Theodore Roosevelt establish a clear resource conservation responsibility for the U.S. Fish and Wildlife Service (USFWS) with regard to the Hawaiian Islands National Wildlife Refuge. However, the USFWS agency's "mission statement" is to "provide the federal leadership to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of people". According to the MP/DEIS "benefit to people" has been interpreted as the responsibility to provide certain human "uses" of the refuge resources. Hence, much of the content of the draft Master Plan involves the various methods and proposed ways in which the resources of the refuge can be made more readily available to human use, be it by tourists, photographers, or even commercial fisheries.

AN EQUAL OPPORTUNITY EMPLOYER

Comment

1 Because the emphasis in the Master Plan/EIS is so heavily placed on this "use" concept, we consider it essential that the procedures, methods, and analysis techniques that will be required to assure that comprehensive monitoring of the human activities, that are to be permitted or encouraged in the refuge, be fully documented. Certainly the primary goal, as mandated by executive order and Congress, must be protection and preservation of the fragile ecological environment of the refuge. The proposed human "use" activities have the potential for the greatest environmental impact. Precise monitoring and documentation of human "use" is essential to adequately meet the USFWS's protection responsibilities.

2 2. The topic of fishery support facilities deserves a special focus in the Finaid EIS. This would include the rationale for choosing Tern Island, further discussion and expansion of the Midway Island alternative, as well as the appropriate feasibility studies or cost-benefit analysis concerning fisheries development.

Other specific topics identified by our reviewers that should be addressed in the Final EIS include:

3 1. The serious reef-fish ciguatera problem at Midway and its implications (if any) with respect to the proposed management plan.

4 2. We note that on page 0.13 and 7.28, the scale in the "Comparison of Environmental Consequences" uses the range 'Positive Consequences' to 'Very Positive Consequences'. This terminology is not standard and its use may invite arguments concerning the value judgements it implies.

5 3. On page 5.2, we noticed that there was an omission of a fifth item in Figure 3 "Hawaiian Islands NWR Output List". Is this a typing error?

6 4. We understand the necessity of the Technical Appendicies. However, since they are under separate cover summaries of their results or conclusions should be provided in the Final EIS in order for it to be considered a self-contained instrument.

7 We might add for your further background information that observations by one of our reviewers indicates that tiger sharks are common at Midway Island during the summer months of June and July, coinciding with the Laysan albatross fledging peak. These sharks although still present, are sighted much less often in August and the rest of the year. Gray reef sharks, in contrast, are common in all calendar months with no noticable peaks in abundance.

Response

Response to University of Hawaii at Manoa (Environmental Center)

1. We concur that monitoring of human activities will be a critical element in our Refuge management programs. The FWS has made a substantial effort toward the development of baseline resource data and various monitoring methods. However, at this time we have not yet developed the specific procedures and techniques for monitoring activities such as expanded commercial fishing, possible increased interpretive and educational uses on Tern Island or even ocean mining off the NWHI. As the plans for these activities are firmed up, the FWS will develop monitoring procedures tailored to be responsive to the anticipated impacts which each activity would generate. Monitoring would be conducted on at least two fronts - the human activities and the species likely to be impacted. We anticipate that all such activities and the specifics of FWS monitoring procedures would be open to public review through the NEPA process.

2. The discussion of the State's proposal to establish a fishery support base at French Frigate Shoals in Section IV.F.4. has been expanded to include the rationale for choosing French Frigate Shoals. The State's proposal for a fishery support base at Midway is adequately addressed in Section IV.F.10. Further details regarding feasibility studies and cost-benefit analyses may be obtained from the proposals themselves.

3. FWS recognizes the reef fish ciguatera problem at Midway, but feels there will be no major implications with respect to implementation of an overlay Refuge. The major areas of concern will be for the welfare of the seal population and seabirds that utilize the island. We will provide, or facilitate obtaining, technical advice on reef fish and associated problems as requested.

4. The consequences comparison chart has been deleted from the final document to reduce confusion resulting from the inherent tendency to "overgeneralize" from charts of this type.

5. The omission has been corrected.

6. The Technical Appendices provide backup support for the management strategies contained in the PA. In addition, they provide more detailed information on the resource base of the HINWR. The appendices were bound separately so that the reviewing public would not be distracted by the mass of technical material on which the Master Plan/EIS is based. We therefore view the Master Plan/EIS as a self-contained document which can stand on its own without the appendices.

7. FWS biologists have also noted the relationship between albatross fledging and the June-July peaks in the numbers of tiger sharks found around Midway Island. Shark control has been discussed in the planning process. It is a potential strategy to employ if future research/monitoring shows that sharks constitute a significant mortality factor on such species as the endangered monk seal or threatened green sea turtle.

Comment

We appreciate the opportunity to review this document and we hope our comments are useful in preparation of the Final EIS.

Yours truly,

Doak C. Cox
Director

cc: OEQC
Sheila Conant
Robert Schroeder
Jacquelin Miller
Juliane Mansur
Pamela Bahnsen

Response

Comment

27 October 1984

Refuge Manager
Hawaiian Islands NWR
P.O. Box 50167
Honolulu, HI 96850

Dear Refuge Manager (aka Jerry, Dick, Stew, Darcy, Rob and Mark):

I am finally committing my comments on the NWHI Master Plan to paper. Overall, I felt you did a thorough and fair job, maintaining a clear FWS commitment to protecting the resource. I want to compliment you especially on your clear summary presentation, so often planning documents are frustratingly obscure.

1 Of the official alternatives, I favor FWS' "Preferred Alternative" with two exceptions. First, I think the impacts of the fishery on listed species should be monitored under all alternatives (BA), not just the RUA; perhaps I misunderstood your intent. Second, I

2 question the wisdom of providing fishery storage facilities on Tern Island. The plan did not explain the value of such facilities, and I anticipate many inevitable hassles associated with assisting fishermen with onloading and offloading gear at Tern, plus the possibility of gear theft or disappearance. Plainly, it will cost the FWS substantial personnel time. The choice is yours, but I feel very strongly that FWS SHOULD NOT SUBSIDIZE THE FISHING INDUSTRY. Any services provided should be repaid AT LEAST in shared support of the station or reciprocal services of equal or greater value.

Since the "Preferred Alternative" is the most expensive, I also wish to submit an economic contingency vote for the "Resource Preservation Alternative. If budgets are limited, management activities should be guided by these strategies, except where they are more expensive (e.g. annual vs biannual erial photo surveys).

Now that you can tally my votes on your tick list, I also had a number of specific comments that came to me as I read the Draft Plan/EIS, which I'd like to share. Hope they are useful.

3 VULNERABLE SPECIES:
- Monitoring and regulating nearshore vessel traffic and illegal landings is essential to NWHI wildlife protection, since accidental introductions and disturbance are the greatest threats to these ecosystems. It should be high priority in allocating funds.

4 - I like your fisherman education plan (id, p 6.21) and suggest including photos, movies and/or interviews on the recent groundings to dramatize the reality of the lesson.

5 -I can't comment on "lower priority research without knowing what it is. I think this vagueness is a weakness in the Plan.

6 -I personally do not support transplantation of endemic species for

Response

Response to Audrey Newman

1. The strategy to monitor the impacts of commercial fishing on listed species is included in the Baseline Alternative under MAA #17, "Monitor human activities and their effects on HINWR islands and in nearshore waters." The recovery plans for listed species specify (or will specify when they are prepared) that human impacts, both short and long-term, be continually monitored and assessed to ensure that listed species are not further jeopardized.

2. The strategy to provide recreational opportunity, storage space and aircraft use at Tern Island in support of a multi-species fishery has been rewritten to address some of the concerns raised.

3. While the FWS considers monitoring and regulating near-shore vessel traffic a high priority, presently we have only a conceptual understanding of how to implement this strategy. Our current thinking is outlined in more detail in the response to the Western Pacific Regional Fishery Management Council, #4, page 8.73.

4. Thanks for the good suggestion. We've added it to the text and intend to include it in the implementation of educational programs on grounding hazards.

5. Lower priority research refers to the lower priority items listed in recovery plans that either have been, are being, or will be prepared for the six listed species. Examples for the monk seal are listed in Section VI.D.2.

6. A project with the objective of transplanting millerbirds to Laysan Island will be undertaken only after thorough taxonomic study and evaluation of habitat requirements as discussed in the Master Plan/EIS. The potential impact of millerbirds on endemic invertebrates at Laysan will also be considered. If a decision is made to proceed with the transplant, the ecological impact will be closely monitored.

Comment

population protection. However, it will inevitably be suggested again and again. Therefore, I suggest that you only consider permitting introduction of the millerbird to Laysan IF AND ONLY IF it is done as part of a carefully planned, rigourous research project to document and study the effects of the introduction on the island's vegetation, resident fauna, and the millerbirds themselves. It should not be done for aesthetic or purely failsafe reasons, since you are creating a new, isolated population (and sacrificing unknown natural invertebarate populations) -- not really protecting
6 the natural population on Nihoa. The manipulation might be justified if we could learn something about ecological and evolutionary processes at the same time. Such opportunities are rare. I am not saying you should introduce birds, but if you decide to treat these islands as experimental stations rather than functioning natural systems, we should reap the full benefits from each manipulation.

ENVIRONMENT: I just want to add my strong support for Midway overlay status WITH A RESIDENT REFUGE MANAGER stationed on Midway. It's a wonderful example of constructive inter-agency cooperation.

OTHER FISH & WILDLIFE: I am not clear on the differences between "monitor seabird/other migratory bird populations" (BA); and "monitor the effects of the commercial fishery and other human
7 activities..." (PA & RUA), especially since "monitor human activities and effects" are in the BA in the next section. However, I agree that monitoring the wildlife resources is the keystone to good, rational management decisons.

SCIENTIFIC & PROFESSIONAL SERVICES:
- Biannual photo surveys are probably sufficient unless there has been a major weather event, e.g. hurricane or drought.

- Nihoa is biologically the richest, most diverse island and deserves the strictest protection. Field camps should be severely restricted.

- Identification of invertebrate fauna and election of rare sp to threatened/endangered status should be a very high priority. Just because we haven't studied them doesn't mean they are not important.

- I was very pleased to see the plan's concern for research impacts. Population estimation and vegetation surveying are probably the most disruptive. Aerial photography and sound study sample selection can minimize these impacts without sacrificing information.

EDUCATION/INTERPRETATION:
Your work at Kilauea Pt. and your publication/public presentation
8 record are admirable. I concur with the PA and strongly oppose educational activities on any of the uninhabited islands. I believe Midway and Tern (and possibly Kure) can meet all such needs. I'd like to humbly remind you of a planning paper I prepared in October 1982, "Evaluation of Public Education Program Options for the NWHI".

Response

7. The "Other Fish and Wildlife" strategy to "monitor seabird and other migratory bird populations" in the Baseline Alternative does, in fact, overlap in large measure the strategy to "monitor the effects of commercial fishing and other human activities" under the Resource Utilization Alternative. However, the latter is more inclusive and would go beyond monitoring seabirds (although seabirds would be the primary focus). For example, endemic populations of plants or animals (not presently listed as threatened or endangered) could be monitored under this strategy. Also, as mentioned in the text, the FWS (or other researchers) could monitor possible changes in reef or marine ecosystems as a result of commercial fishing.

8. The FWS Hawaiian and Pacific Islands Complex Office is seeking authorization and funding for a position in 1985 that would include environmental education responsibilities. The idea of a visitor's center on Oahu to expose the public to the resources of the NWHI was considered in the master planning process. We also considered interpretive exhibits at the Honolulu International Airport or the Bishop Museum, two locations which would guarantee maximum public exposure. However, because these exhibits would necessarily be limited to graphic/visual presentations, they were dropped in favor of strategies to expand the Kilauea Point interpretive center, where visitors have an opportunity to actually see many of the wildlife resources of the NWHI. Nonetheless, we do not intend to close off the future option of some type of interpretive exhibit on Oahu.

Comment

8 Five alternatives were considered to guide action in the next five years. I concluded that the most promising five-year plan was to hire a "dynamic environmental education professional to design and publicize a wide variety of educational materials on NWHI natural history and resource issues" (Staffed E & M). If more time (e.g. the 10-20 years considered in the draft plan) and increased funding were available, then a Visitor's Center on Oahu might be most effective (better than nature-tours to Midway or Tern - see Fig. 2 from report). I hope the FWS will at least examine the feasibility of such a center, possibly associated with Manana Is. and supported jointly with Hawaii's Dept. of Land and Natural Resources. It would be a lasting contribution to Hawaii's understanding of its natural heritage.

OTHER PUBLIC USES:
- Emergency logistical support for fishing vessels is completely appropriate for the refuge.

- Can't support the RUA buoy within boundaires due to increased risk of grounding by unfamiliar and unregulated vessel traffic.

9 - Mothership - I have no objection to the mothership itself. However, with the additionl ship traffic, you will have to increase Coast Guard patrols and wildlife monitoring to be sure people are not visiting the islands illegally and to be sure the wildlife is not be adversely affected by the fishing.

- Also, see discussion of storage above.

MISC: The Hawaii Botanical Society (BOTSOC) recently voted to refer to non-native plants in Hawaii as "alien" species, rather than "exotic" species. Personally, I welcome the change, since I am often faced with having to explain why something "exotic" is not desirable. In contrast, "alien" is interpreted as unknown and possibly undesirable. Please consider changing your terminology in future documents.

In summary, I applaud the plan's commitment to wildlife monitoring, prevention of accidental introduction of alien species, and active public education. I believe the best and highest use for the NWHI is as unaltered naturally functioning ecosystems. Access should be strictly limited and nearby traffic should be regulated to minimize unfortunate accidents. Within these restrictions, both research and commercial fishing can be pursued. If I can be of any assistance in the future, please let me know.

Sincerely

Audrey

Audrey Newman
1250B Koko Head
Honolulu, HI 96816

Response

9. A mothership operation will likely result in an increased presence by both the FWS and U.S. Coast Guard to ensure minimal impacts on wildlife. FWS would pursue these strategies as outlined under RUA #5 (also part of PA).

Comment

MARINE MAMMAL COMMISSION
1625 EYE STREET, N.W.
WASHINGTON, DC 20006

9 November 1984

Dr. Richard Wass
Refuge Manager
Hawaiian and Pacific Islands
National Wildlife Refuge
300 Ala Moana Boulevard, Rm. 5302
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Dr. Wass:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the "Hawaiian Islands National Wildlife Refuge Master Plan/Environmental Impact Statement" prepared by Region One of the U.S. Fish and Wildlife Service and offers the following comments and recommendations.

GENERAL COMMENTS

The Master Plan/Environmental Impact Statement (MP/EIS) provides a general description and assessment of a proposed master plan and four possible alternatives for managing the Hawaiian Islands National Wildlife Refuge. From the information provided, it seems that the proposed action probably is the preferred alternative. However, the nature, scope, and possible consequences of some aspects of the alternatives, including the proposed action, are not described in sufficient detail to be certain. As an example, the nature, scope, and possible consequences of the proposal to continue and expand support of fishery development in the Northwest Hawaiian
1 Islands (NWHI) are not described in sufficient detail to determine precisely what is being proposed or whether the proposal is compatible with other higher priority refuge uses.

In addition, it is questionable whether each of the alternatives have been structured so as to exclude any significant negative consequences as is stated on page 0.13
2 of the draft MP/EIS. It also is not clear whether and, if so, what action has been taken pursuant to Section 7 of the Endangered Species Act to ensure that certain activities proposed in the plan (e.g., support for commercial fishing/mothership operations, nature tours, etc.) will not jeopardize listed species such as the Hawaiian monk seal.

Response

Response to Marine Mammal Commission

1. We concur with your comment concerning the example cited and have rewritten this strategy to clarify the FWS' position concerning support of the commercial fishing industry and to justify our actions regarding a mooring buoy outside the Refuge boundary. Regarding the general lack of detail/specificity in the Master Plan/EIS, please refer to the response to the response to Hawaii Audubon Society, #1, page B.44.

2. The chart has been deleted from the final document to reduce confusion resulting from the inherent tendency to "overgeneralize" from charts of this type. Before the Master Plan/EIS is finalized, the National Marine Fisheries Service will be asked to review the document with regard to Section 7 of the Endangered Species Act, particularly to ensure that our proposed actions will not jeopardize the Hawaiian monk seal.

Comment

2

SPECIFIC COMMENTS

Page 3.19 (Marine Community-Monk Seals and Sea Turtles): The last sentence in the second paragraph of this section indicates a number of possible causes for the decline of Hawaiian monk seals. It does not, but should, indicate that entanglement in lost and discarded fishing gear and other debris may have caused or contributed to the decline.

3 Page 4.17 (Other State Proposals ...): The second paragraph in this section indicates that a biological opinion, issued by the National Marine Fisheries Service in 1981, concluded that a fishery support facility on Tern Island would jeopardize the monk seal and green sea turtle, and "proposed the alternative of a mothership operation." The biological opinion recommended that, as a reasonable and prudent alternative, the feasibility of a mothership operation be explored. It did not propose "the alternative of a mothership operation."

Page 4.18, par. 2: This paragraph indicates that a State proposal, to moor a mothership within French Frigate Shoals and to use Tern Island for short-term recreation, emergency evacuations and temporary storage of fishing gear, would require thorough assessment concerning compatibility with refuge objectives. From the information provided, it is not clear whether the State has actually proposed mooring a mothership within French Frigate Shoals or, alternatively, has finalized a proposal which may or may not be submitted to the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) for consideration.

Such an action could impact monk seals and other endangered species and it should be noted that, in addition to ensuring compatability with refuge objectives, assessment pursuant to Section 7 of the Endangered Species Act would be required to insure consistency with the intents and provisions of the Endangered Species Act. Also, it should be noted that a permit from the Coast Guard would probably be required and, if so, that Section 7 review would be necessary in order to install a mooring buoy either inside or outside the refuge boundary at French Frigate Shoals.

4 Pages 5.4 - 5.5 (Other Compatible Public and Economic Uses): This section indicates that the Service has determined that support of commercial fishing, recreational fishing, and other recreational activities is compatible with refuge purposes. From the information provided here and elsewhere in the MP/EIS and its Technical Appendices, it is not clear that such uses are compatible with refuge purposes. A clearer indication of the basis of this determination should be provided.

Response

3. We concur with each of the specific comments made and have modified the Master Plan/EIS appropriately, with the exception of items 4-12 below.

4. The issue of compatibility has been addressed for each output in the "conflict" section of the Output Summaries which are included in the Technical Appendix. Additionally, strategies associated with the FWS' support of the commercial fishing industry have been clarified.

Comment

3

Page 5.7 (Vulnerable Species): As drafted, the objective concerning monk seal production and maintenance can be interpreted to mean that the Service would prohibit any increase in monk seal populations at French Frigate Shoals, Necker and Nihoa. If this is not the intent, such an interpretation could be avoided by inserting the words "at or above present levels" after the word "Nihoa". If it is the intent, the reason should be explained.

3 For similar reasons, the words "at least" should be inserted between the word "to" and the word "midcentury" in the second sentence describing the objectives.

Page 5.9 (Item 14): This item is somewhat ambiguous. It might better be phrased as follows:

> "(14) Research Studies: Conduct and facilitate studies to gather data necessary to assess and monitor the status of refuge resources and the effectiveness of conservation programs."

Page 5.9 (Education/Interpretation): These and other objectives are appropriate only when and if they are consistent with higher priority conservation objectives, including the original purpose of the refuge to serve as "a preserve and breeding ground for native birds." To emphasize this point, it might be desirable and appropriate to make these objectives conditional. For example, objective 15 might usefully be revised to read something like:

> "(15) Environmental Education (EE): Encourage off-site EE activities at more accessible locations, where compatible with primary conservation objectives. Facilitate, where possible, limited on-site EE experience for both teachers and students."

Page 5.9 (Other Public Uses): This section states that support for commercial fishing outside the refuge boundary
4 has been "evaluated as compatible with refuge purposes". As noted previously, the rationale for this statement is not self-evident and should be provided.

Pages 6.20 to 6.22 (Regulate and monitor nearshore vessel traffic): This section proposes the establishment of a "working interagency committee" to consider and implement measures for reducing the risk of and enhancing the ability to respond to vessel groundings. It does not indicate how
5 this committee would be constituted, how it would operate, what authority it would have, or what it would or could do

Response

5. Comment acknowledged. As referenced on page 6.20 the working interagency committee is a conceptual proposal at this time which we feel is appropriate for the conceptual format of the Master Plan/EIS. Operational details such as committee constitution and authority have not been fully developed as a part of the Master Plan/EIS. Matters of this type will be addressed through an operational level of planning which will follow approval of the Master Plan/EIS. Also, see response to Western Pacific Regional Fishery management council, #4, page 8.73.

Comment

4

5 to facilitate consideration and implementation of the proposed measures listed on pages 6.20 and 6.21. Such information is necessary to judge what reasonably might be accomplished by the committee and to adequately evaluate the proposed action. Therefore, a more detailed discussion and evaluation of this action item should be provided in the final MP/EIS.

6 Page 6.29 (Item 19): Although it seems reasonable, as implied here, to assume that there would be less possibility of adverse effects from installation of a mooring buoy outside, rather than inside, the refuge boundary at French Frigate Shoals, the risk of adverse impacts may well be significant in either case. Installation of a mooring buoy, either inside or outside the refuge boundary, presumably would result in increased vessel traffic and fishing effort in the vicinity of French Frigate Shoals which, in turn, would result in increased risk of groundings, collisions, oil spills, loss or dumping of net fragments and other debris, disturbance, etc. Such things could adversely impact monk seals or other endangered species, or result in the destruction or degradation of habitat critical to their survival.

7 In recognition of this potential for adverse impacts on endangered and threatened species, it is necessary for the Fish and Wildlife Service to undertake review of this proposal pursuant to Section 7 of the Endangered Species Act and to document the results of that review in the final MP/EIS. It is clear that review is required for those activities such as providing support services to commercial fishing operations which would be authorized under the master plan to occur within the boundaries of the Refuge.

8 In addition, because authorization for the placement of the mothership mooring buoy would probably be required from the United States Coast Guard, it should also be indicated that Section 7 review would be required for that Federal approval process. In this regard, the Commission recommends that the Fish and Wildlife Service contact the Coast Guard to determine if a permit would be required for the buoy. If so, the Service and the Coast Guard should discuss the steps that would have to be taken to provide Section 7 review for that permit approval process. In addition, if a permit is required the MP/EIS should be revised to indicate that fact and to discuss the Section 7 review procedures that will be incorporated into the Coast Guard's permit issuance decision making process. Similar efforts should be made to determine if a Corps of Engineers authorization such as a permit under Section 10 of the Rivers and Harbors Act of 1899, is required for mooring buoy installation.

Response

6. This strategy has been rewritten to clarify/justify the FWS' position.

7. FWS Section 7 review was initiated upon completion of the Draft Master Plan/EIS. The findings of this review have indicated that adoption of the Preferred Alternative will promote conservation of listed species.

8. Comment acknowledged. Reference as to the need for appropriate Section 7 reviews and various permits has been noted. FWS assumes the lead role in initiating Section 7 review of Preferred Alternative strategies on endangered species. Furthermore, it is recognized that the U.S. Coast Guard would initiate Section 7 review of the placement of a mooring buoy and the Corps of Engineers the same with regard to Section 10 of the Rivers and Harbors Act. Additional procedural details have not been included due to the conceptual nature of the Master Plan/EIS.

Comment

The importance of undertaking Section 7 review for these activities is illustrated by the 1981 biological opinion rendered by the National Marine Fisheries Service, which concluded that commercial fishing operations within the boundaries of the Refuge would jeopardize the continued existence of the Hawaiian monk seal.

Page 6.36 (Item 2): This item indicates that the Preferred Alternative would include, as does Resource Protection Alternative No. 2, conduct of lower priority research and management actions in recovery plans. From the information provided, it is not clear precisely what research and management actions will or will not be implemented under the various management options. Also, it is not clear how the proposed plan considers and reflects actions recommended in the Hawaiian Monk Seal Recovery Plan and recovery plans, if any, for other endangered and threatened species which occur in the Refuge. In this regard, it is not clear whether efforts needed to effectively implement recovery plans were determined and used to develop the identified alternatives, including the preferred alternative, or whether the alternatives, as described, reflect an assumption that recovery plans
9 should and would be implemented differently under different refuge management strategies. As an example, the NMFS has lead responsibility for determining and taking actions needed to protect and encourage recovery of the Hawaiian monk seal but it is not clear whether the proposed master plan reflects actions being taken or planned by the NMFS or considers only those actions being contemplated by the FWS.

To provide a more adequate basis for evaluating the proposed action, the final MP/EIS should provide a more detailed description of the research and management actions which would be taken under the various alternatives and how these would affect and be affected by efforts to implement the Hawaiian monk seal and other recovery plans.

Page 6.36 (Item 4): Under the Endangered Species Act, the National Marine Fisheries Service, not the Fish and Wildlife Service, is authorized to designate critical habitat for the Hawaiian monk seal. Therefore, to avoid confusion, this and other similar statements in this document should be clarified. This statement would be more accurate, for example, if it
3 was changed to read: "Designate or support designation of critical habitat..."

Pages 6.39 and 6.40 (Items 20 and 21): There can be little
10 doubt that it would be beneficial to provide access to Tern Island, as proposed, provided such an action would not jeopardize

Response

9. RPA #2 lists six projects associated with "lower priority research and management actions in recovery plans." NAA #1 describes six other higher priority projects associated with "high priority research and management tasks in recovery plans." Although these projects are not described in any detail (we feel such would be inappropriate for the conceptual format of the Master Plan/EIS), the simple listing of the projects should give the reader an appreciation for the overall level of commitment to recovery plan research/management action for each alternative. In the case of the monk seal recovery plan, responsibility for implementing recovery action is shared between NMFS and FWS. Our intent in NAA #1 and RPA #2 is to implement all of those actions that are within our management capability that have reasonable odds of producing resource results. These actions are, in our view, an integral part of the Master Plan/EIS. Clearly recovery plans for the monk seal and Laysan duck were strong influences in our planning process.

10. Small nature tour and photography/journalism groups have routinely and successfully utilized Tern Island in the past. FWS personnel have experienced little difficulty in providing proper management/supervision of the groups. Because we are proposing only a slight increase in this activity over existing levels, we envision few if any operational concerns.

Comment

endangered or threatened species. It also seems unlikely that the program envisioned on pages 6.33 and 6.34 would jeopardize endangered or threatened species, provided refuge staff would be able to provide adequate supervision.

10 It is not clear, however, that the refuge staff could provide adequate supervision and, before authorizing such activities, a review should be conducted to ensure that staff supervision would be adequate to assure that the proposed action would not jeopardize monk seals or other endangered or threatened species. The results of this review should be reported in the final MP/EIS.

11 Page 6.40 (Item 22): The first sentence in this section states that: "This strategy recognizes both the need to reduce the risk of vessel groundings and the legitimate right of the fishing industry to operate free from unnecessary regulation and invasion of privacy." It does not describe or provide an assessment of the "strategy" which is being proposed.

12 Page 6.40 (Item 23): Precisely what is included in this proposal is not clear. It implies, for example, that more than one buoy might be installed outside the refuge boundary. It also indicates that regulated access to Tern Island would be provided for limited recreation, equipment storage and emergency evacuation when weather conditions within the Shoals make small boat activities permissible. It implies that the FWS has determined that such activities would be compatible with the primary purposes of the refuge, and would not jeopardize endangered or threatened species, but does not provide the rationale for this determination.

Such an action could jeopardize the Hawaiian monk seal and other endangered species. Therefore, as noted earlier, the FWS should undertake a Section 7 review to determine whether the proposed action might have a significant adverse impact on the Hawaiian monk seal or other endangered species, and, if so, how the impacts might be avoided. The results of the review should be reflected and reported in the Final MP/EIS.

3 Page 7.4, par. 2: The data presented in Table 2 do not support the statement in this paragraph that the rate of increase in monk seal use of Tern Island beaches appears to be leveling off.

Page 7.16, last paragraph: The basis for the statement in the second sentence of the paragraph concerning expectations for an additional infusion of non-Federal dollars for research in the Northwest Hawaiian Islands is not self-evident and should be explained.

Response

11. This strategy expands upon RPA #1 which describes in greater detail the strategy to regulate and monitor nearshore vessel traffic.

12. This strategy has been rewritten to clarify and justify FWS' position regarding support of the commercial fishing industry. Section 7 consultation by both NMFS and FWS will address this strategy. The FWS section 7 biological opinion issued on January 10, 1985 concluded that adoption and implementation of the Preferred Alternative would promote conservation of the six listed species addressed in this Master Plan/EIS. This finding has been incorporated into the final Master Plan/EIS. NMFS section 7 review findings are expected in July 1985.

Comment

7

Page 7.25, second paragraph: Since the description of the Preferred Alternative on page 6.39 indicates that Kure would be eliminated from consideration as the destination for nature tours and education programs, references to Kure Island in this paragraph probably should be deleted.

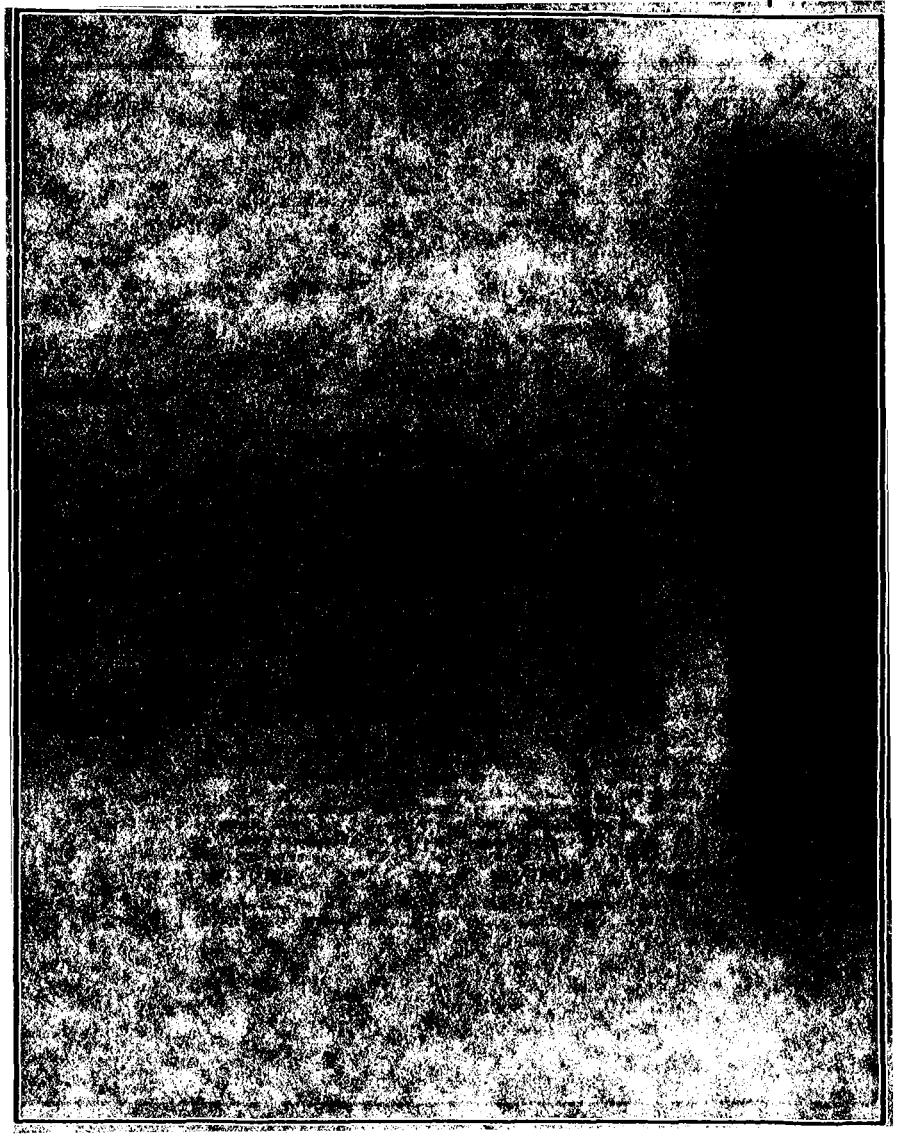
Page 7.6 (last par.): Among other things, this paragraph indicates that both terrestrial and marine biological resources will benefit directly from continued support of fisheries in the NWHI and that monitoring may result in some future modification of the fishery support program, in the interest of preventing adverse impacts. It is not self-evident that the fishery support program will not have adverse effects on either terrestrial or marine biological resources or that the referenced monitoring will be sufficient to detect and prevent possible adverse impacts. Therefore,
3 as indicated earlier, the FWS should undertake Section 7 consultations to determine whether the proposed continuation and possible expansion of fishery support activities likely would jeopardize monk seals or any other endangered or threatened species and, if not, whether on-going and planned monitoring programs and regulatory programs are adequate to detect and prevent possible unforeseen impacts.

Page 7.9, par. 1: The latter option referenced in the last sentence in this paragraph also could reduce the risk of fuel spills, groundings, and disturbance from vessel traffic in the vicinity of the refuge. Therefore, it would be appropriate to add a sentence that reads something like: "The latter option also could reduce the risk that fuel spills, groundings, and nearshore vessel traffic could adversely affect wildlife resources in the refuge."

SUMMARY COMMENTS AND RECOMMENDATIONS

In summary, while most aspects of the proposed action seem appropriate and justified, it is not clear that continued and expanded support of fishery development in the Northwest Hawaiian Islands are compatible with other higher priority objectives, such as protection of endangered and threatened species, or that proposed monitoring and management programs will be sufficient to detect and prevent possible adverse effects. In addition, it is not clear that the proposed plan appropriately reflects the National Marine Fisheries Service's responsibilities and efforts to implement the
2 Hawaiian Monk Seal Recovery Plan. Therefore, if the Fish and Wildlife Service has not already done so, the Commission recommends that it undertake consultations, pursuant to Section 7 of the Endangered Species Act, to ensure that the

Response



Comment

Response

2 proposed action will not jeopardize the Hawaiian monk seal or other endangered or threatened species, or result in the destruction or adverse modification of habitat critical to their survival, that the proposed action be modified as necessary to reflect the results of the reviews, and that the results be reported in the final MP/EIS.

* * * * *

If you have any questions concerning these comments or recommendations, please let me know.

Sincerely,

John R. Twiss, Jr.
Executive Director

Comment

October 29, 1984

Refuge Manager
Hawaiian Islands NWR
P.O. Box 50167
Honolulu, HI 96850

Dear Sir:

These comments are in response to the DES #8448 concerning the master plan of the Hawaiian Islands NWR.

The draft generally presents a reasonable attempt to balance the multiple demands on NWHI resources. However, it focuses primarily on actions that the Fish & Wildlife Service (FWS) can take to reach the various management objectives. Little effort was spent on potential actions of other federal agencies or Congress.

The National Environmental Policy Act (NEPA) is an action-forcing statute. NEPA regulations state that alternatives to a proposed action are "the heart of the environmental impact statement." 40 C.F.R. § 1502.14 (1984). Such alternatives must include reasonable alternatives that are not within the jurisdiction of the lead agency. Id. Court cases that have interpreted NEPA have clearly come to this conclusion. For example, Circuit Judge Leventhal in Natural Resources Defense Council v. Morton, 458 F.2d 827 (D.C. Cir. 1972) stated

1 > Congress contemplated that the Impact Statement would constitute the environmental source material for the information of Congress as well as the Executive, in connection with the making of relevant decisions, and would be available to enhance enlightenment of--and by--the public...the mere fact that an alternative requires legislative implementation does not automatically establish it as beyond the domain of what is required for discussion, particularly since NEPA was intended to provide a basis for consideration and choice by the decisionmakers in the legislative as well as the executive branch. 456 F.2d at 833-37.

Given the explicit regulations and the legislative intent of NEPA, it is clear that the draft master plan is inadequate. While it is a coherent exposition of the means by which FWS can achieve some of its goals, many other reasonable alternatives have not been explored. These are not necessarily "better" than the preferred alternative in the draft master plan but they must be discussed in order to comport with the intent and requirements of NEPA. Only after such analysis can decisionmakers and other interested parties select a preferred alternative.

Response

Response to Craig S. Harrison

1. The early phases of the HINWR master planning process included an extensive scoping effort where considerable discussion of other possible alternatives occurred. A variety of alternatives were considered including ones similar to those referenced on page 2 of your letter. For many of the same reasons cited in your proposal for a marine sanctuary (splintered jurisdictional responsibilities among federal resource agencies, conflicting policies and goals among concerned state and federal agencies, single purpose interest groups that could never function as part of a NWHI commission, etc.) these alternatives are viewed as not having a reasonable chance of being implemented. For these reasons we have not addressed ideas such as a marine sanctuary as fully-developed alternatives in the Master Plan/EIS. We did, however, feel it appropriate to include in our Preferred Alternative a strategy to explore a marine sanctuary, outside the scope of the Master Plan/EIS once it is approved.

Comment

Refuge Manager
page 2

The final master plan should totally reorganize its approach and thoroughly discuss the merits and disadvantages of:

1. changing the refuge boundaries by federal statute (either increasing or decreasing refuge waters);
2. creating a marine sanctuary;
3. creating a NWHI Commission by federal statute to adminster the lands and waters of the NWHI (membership of the commission comprised of appropriate agencies and interest groups);
4. creating a state entity to manage the NWHI within federal guidelines;
5. other similar possibilities.

1

The preferred alternative and master planning process solve few, if any, of the NWHI resource problems. The DES recognizes that FWS' ability to functionally manage the resources has been complicated by the State's reluctance to acknowledge FWS jurisdiction. The DES neglects to mention that FWS' ability to manage marine birds, the motivation for establishing the refuge in 1909, is seriously hampered by the legal opinion of the Department of the Interior that Interior cannot enforce the Migratory Bird Act beyond the three-mile territorial sea. Fishing for tunas outside refuge boundaries may impact seabird populations. Deepsea mining for cobalt-rich manganese crusts may occur near the refuge and affect refuge wildlife via the food chain. The existing refuge framework cannot deal with these problems, and a planning document that seeks to manage resources for several decades requires more foresight than has been shown in the DES. The approach of the draft master plan may be appropriate for typical FWS terrestrial refuges in North America, but is inadequate for the NWHI. The EIS is an opportunity to rigorously explore and objectively evaluate reasonable alternatives, not merely endorse policies and approaches of the past. The scope of this effort is far too limited.

1

In addition to general comments on the adequacy of the DES, several specific alternatives merit comment:

(1). The master plan contemplates an FWS role in conducting nature tours. While the idea of nature tours on Midway is excellent, it is inappropriate for a government agency, federal or state, to become a tour operator. This would commit precious dollars and ceilings to an activity that would be far more

2

Response

2. Included in the U.S. Navy's response to the Draft Master Plan/EIS is the statement that ". . . Midway is a military installation closed to the public . . . the island will not be open to recreational or expanded visitor use." See pages 8.42 and 8.43. This statement has caused us to revise strategies regarding interpretive use at Midway Island and makes the discussion of private vs. government operation of interpretive tours moot. Refer to response to Department of Defense, Headquarters Naval Base Pearl Harbor, #2, page 8.42.

Comment

Refuge Manager
page 3

2 efficiently administered by the private sector; there is no reason for federal employees to be tour guides on Midway. If nature tours to Midway are economically feasible, it will not be difficult to locate tour operators that have similar experience elsewhere. Consideration might be given to sponsership of such tours by the Bishop Museum, Waikiki Aquarium, or the Oceanic Society. The reason there are no tours on Midway today is the refusal of the U.S. Navy to guarantee access on tour dates. FWS' most positive role with Midway tours is simply to convince the Navy to allow them, not to attempt to run or regulate such tours.

3 (2). FWS should clarify the purported benefits in adding Midway to the refuge system. The DES implies that FWS cannot solve wildlife problems on Midway unless it becomes a wildlife refuge. The primary wildlife problem on Midway today is the explosion of the rat populations that threaten the existence of the Bonin petrel colony there, a problem that has been recognized since at least 1979. FWS could solve this problem now. The Animal Damage Control Division of FWS has conducted research on rat populations and control in the sugar cane fields on the Island of Hawaii for many years. The research did not occur on any wildlife refuge. I hope that the existence of the Bonin petrel population on Midway is not being used as a bargaining chip to add Midway to the refuge system.

4 (3). The costs of managing and monitoring the resources of the NWHI could be substantially reduced if the Point Reyes Bird Observatory (PRBO), or a similar institution, ran Tern Island and other field camps. PRBO has run the field camps and conducted research on seabirds and seals in the Farallon Islands, another wildlife refuge, for over a decade. Such an approach could easily work in the NWHI, and should be explored and evaluated in the final environmental impact statement.

5 (4). If FWS continues to do its own research in the NWHI, it should explain why it does not use its own Research Division. FWS has a team of seabird specialists in Anchorage that could provide long-term technical support for the refuge.

Thank you for this opportunity to comment on the DES.

Sincerely,

Craig S. Harrison

Craig S. Harrison
46-024 Puulena St. #614
Kaneohe, Hawaii 96744

Response

3. The benefits associated with an "overlay" refuge at Midway Island are referenced in NAA Strategy #9 as "...to enhance the effectiveness of fish and wildlife programs at Midway Atoll...." The key reference here is "enhance." It is true that certain existing resource problems at Midway can be addressed through the current cooperative wildlife management agreement. However, "overlay" refuge status provides for a greater opportunity in managing resources of the island toward achievement of refuge objectives, provided our management does not conflict with the Navy's operation. Examples of such opportunities include the provision of direct assistance to the naval contractor in rat control efforts through the presence of an on-site refuge manager; the provision of similar assistance in the effort to control mosquitoes as vectors for avian pox and avian malaria; and stronger enforcement of the regulations restricting access to the monk seal haulout beaches at Eastern Island.

4. The question of who specifically operates the Tern Island field station and other field camps in the HINWR is a detailed, operational matter that is not appropriately addressed in the Master Plan/EIS. In our view, the broader and more important issues are: 1) whether the operation of the Tern Island field station and other field camps should be continued at all; 2) the objectives/ purpose of these operations; and 3) the priority/importance of these operations. These have been addressed thoroughly in the Master Plan/EIS.

   As a parenthetical note, Point Reyes Bird Observatory (PRBO) activities in the Farallon Islands would not be possible without the considerable financial and operational/maintenance support provided by the FWS. Currently the FWS provides approximately $35,000 for salaries and maintains three diesel generators and other facilities in the Farallons. Additionally, PRBO draws mostly on volunteer labor to conduct studies on the Farallons. Volunteers are responsible for providing their own transportation to and from the islands. Such an arrangement, because of significantly greater logistical constraints is, in our opinion, not feasible in the HINWR.

5. Research and monitoring strategies included in the Preferred Alternative of the Master Plan/EIS are directly related to management actions needed to enhance/preserve certain populations of wildlife species. For this reason, strategies concerning research and monitoring have been determined to be an appropriate function for the Refuge staff. Furthermore, the matter of which division of the FWS conducts the actual research/monitoring activities is also an operational matter that rests outside the scope of this document. What we believe to be the important issues regarding research/monitoring are: 1) identification of <u>what</u> research/monitoring is needed to effectively manage and preserve important wildlife resources; 2) review/supervision of research to insure study objectives are achieved; 3) the priorities of such activities; and 4) insuring these activities are consistent with FWS policy for research on units of the Refuge System. Each of these issues has been addressed in the Master Plan/EIS.

Comment

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDWIN H. HARADA
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 31, 1984

Dr. Richard Wass, Refuge Manager
Hawaiian Islands National Wildlife Refuge
U.S. Fish and Wildlife Service
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Dr. Wass:

Enclosed are our Department's comments on the Draft of the Hawaiian Islands National Wildlife Refuge Master Plan/Environmental Impact Assessment and Technical Appendices.

We are glad that many elements of our French Frigate Shoals fishing support station proposal were incorporated into the draft Master Plan. The Service's consideration of public user needs in the NWHI is appreciated. It is our hope to continue to work cooperatively with the Service to protect and manage the unique wildlife and resources of the NWHI.

We have several general reservations regarding the strategies presented in the draft. Basically, they concern those items that involve the jurisdictional dispute between the state and federal government, and those that may impact the state's plans for fisheries development and management in the NWHI.

1 The state does not recognize the boundaries for the Hawaiian Islands National Wildlife Refuge (HINWR) that you suggest. As stated in the past, it is our position that the state has jurisdiction over all submerged lands in the Northwestern Hawaiian Islands, except for Midway Islands. Although it is not mentioned in your Master Plan, the expansion of the HINWR to include submerged reefs and shoals occurred very recently in an arbitrary manner, without public notice or state government input. As recorded in the 1982 State of Hawaii Data Book on page 183, a letter from the General Services Administration to the State statistician noted that "this increase of nearly 258,000 acres is almost entirely due to a correction of acreage holdings submitted by the U.S. Fish and Wildlife Service. That office revised a Hawaiian Islands National Wildlife Refuge holding from 1,906.5 acres to 254,418.1 acres to include the lagoon water acreage of the circular reefs and shoals."

Response

Response to State of Hawaii, Department of Land and Natural Resources

1. The FWS understands that the State of Hawaii is in disagreement with the boundaries of the HINWR as recognized by the federal government. This issue is addressed on pages 4.2 and 4.25 of the Master Plan/EIS to the extent appropriate for this document.

Comment

Dr. Richard Wass
October 31, 1984
Page 2

2 We oppose the designation of Wilderness for the HINWR for it is redundant and unnecessary. The NWHI are also a state refuge under the jurisdiction of our Department. Existing federal and state laws are adequate to protect the unique and sensitive wildlife resources of the refuge. We are also concerned with the welfare of the threatened/endangered species and unique habitat of the NWHI, and our wildlife refuge responsibilities extend up to Kure Atoll. We believe that cooperative federal and state management of the NWHI refuge can protect the wildlife and habitat there, while promoting prudent use of natural resources.

3 We have reservations on the proposed 20 fathom boundary for the Critical Habitat for the monk seal. However, designation of Critical Habitat for the NWHI for emergent lands and a few feet of the shallow water along the beach required by very young pups may be supportable. We believe that the determination of what is "critical" habitat in nearshore waters is still in question and that further research and discussion is necessary before full agreement can be reached.

4 The plan suggests that sanctuary status be sought for waters around the NWHI. The recent experience of the state with the National Oceanic and Atmospheric Administration's Marine Sanctuary program for humpback whales has made the state wary in supporting a proposal to establish a marine sanctuary around the NWHI. This proposal should be deleted.

5 The location of a fishing support mooring buoy in French Frigate Shoals is within state waters, notwithstanding the location of the refuge boundary as suggested by the Service. However, there is no need to place the buoy close to Tern Island, as long as it is within protected waters and within small-craft range of Tern Island. The buoy location shown on Map 11 on page 6.30 seems acceptable. We are confident that environmental impacts of the fishing support station on French Frigate Shoals will be minimal and controllable.

6 The Hawaii Fisheries Coordinating Council, a council composed of government representatives and appointed representatives from the fishing industry and the public which advises the Board of Land and Natural Resources on fisheries related matters, concurs with the Department's positions regarding the Refuge and Master Plan.

7 We can agree with the intent of the draft Preferred Alternative to both protect the unique wildlife and habitat of the HINWR while allowing prudent public use of the resources. However, we do not necessarily agree with all of its provisions, as our comments indicate.

Thank you for this opportunity to review and comment on this document. Other more specific comments are attached. Your effort to produce a Master Plan for the HINWR is commendable.

Very truly yours,

SUSUMU ONO, Chairperson
Board of Land and Natural Resources

encl.

Response

2. By law the FWS is directed to recommend areas that satisfy certain criteria for Wilderness status. (See page 4.4.) Recommended in the Preferred Alternative of the Master Plan/EIS is a proposal to nominate appropriate emergent lands of the HINWR for Wilderness status. Additionally, the FWS would pursue nomination of HINWR waters for Wilderness, but only after evaluation and resolution of important issues such as the boundary dispute.

3. The strategy referring to this matter has been revised to acknowledge only "support" for critical habitat for the seal as determined by NMFS.

4. The FWS recognizes the State's past experience with marine sanctuary designations. However, public comments in support of the sanctuary concept require us to consider the potential merits of such a proposal in an open public forum following approval of the Master Plan/EIS . Because much of the area proposed for sanctuary status involves responsibilities of other state and federal agencies, participation by such organizations in such a study is essential.

5. Your acceptance of the buoy location shown on Map 11 is recognized and appreciated.

6. Comment acknowledged.

7. We recognize the fact that agreement on every issue of a plan of this magnitude is extremely difficult to attain. We appreciate your comments and your general overall concurrence with the intent of the Preferred Alternative.

Comment

Specific Comments on HINWR Master Plan draft:

Page	Para.	Sent.		Comments
0.5	2	1		Sentence should be clarified.
	3		8	The Hawaii Fisheries Development Plan stressed fisheries development throughout the state, not just NWHI.
	4			We agree that commercial fisheries will take place outside refuge boundaries.
	4		9	There is no evidence for a direct linkage between presence of tuna and seabird feeding success. No evidence presented that catching tuna will affect seabirds. Baitfish often school near the surface without being driven there by tuna.
	5		10	Not within HINWR boundaries according to state interpretation.
	5	1		Aku fishermen do not use squid for bait.
		2	10	We consider the lagoon to be state waters.
0.6	2&3		8	The primary purpose of the Tripartite study was to assess the natural resources of the NWHI for later development and management planning.
.11	1		11	Regulation of vessels is not possible; how this would be done is unclear.
	2		12	Since the islands are already a refuge, there is no need for Wilderness designation.
	4		13	The Service has no jurisdiction over Kure Atoll.
	6		10	Mooring buoy will be in state waters, not inside boundary.
2.7	D 1		8	Agree that Master Plan/EIS must show flexibility.
3.18	2			Kuhlia sandvicensis misspelled.
3.19	2			The slipper lobsters are becoming important commercially too. State management is applied through minimum size (one pound) for sale, closed season, no spearing, etc.
3.21	1	5	14	"Infrequent" turtle breeding is mentioned. Does that mean they normally breed infrequently, or they don't breed as frequently as in the past?

Response

8. We concur with the comment and have modified the Master Plan/EIS appropriately.

9. Comment acknowledged. Master Plan/EIS uses the word "could" to acknowledge that factual evidence may be lacking. Additional clarification added.

10. Comment acknowledged. See response # 1 above.

11. Comment acknowledged. Methods suggested for regulation of vessels are listed in RPA Strategy #1. See response to Western Pacific Regional Fishery Management Council #4, page 8.73.

12. Comment acknowledged. See response # 2 above.

13. Comment acknowledged. Reference is with regard to cooperative studies only.

14. Comment acknowledged. Sentence clarified.

Comment

2

Page	Para.	Sent.		Comments
3.28	2	4&5	15	The decrease in commercial fishermen and improved enforcement of refuge regulations in the last 25 years has evidently not helped the monk seals much.
	3	3	16	Most fishermen work east of Maro Reef. There is no basis to blame commercial fishermen for decline of monk seals in the west. It seems that commercial fishermen continue to be blamed for environmental damage, yet, even researchers have harassed seals and turtles. Since fishermen are trying to make a living fishing, they have no time to waste on land, where most harassment occurs. Most encounters with seals at sea occur because the seals are so curious. In a NMFS administrative report by Humphreys (1981), he notes that very few encounters with threatened and endangered species occurred relative to the amount of time spent fishing, and that no interactions occurred while fishing in 943 days at sea.
3.30	1	3	17	Who are the "industry representatives"?
		4&5	18	We do not think it appropriate to use Delphi results to derive resource estimates. DLNR is currently revising and updating the Hawaii Fisheries Development Plan.
3.32	2	4		Vessel groundings rather than "grounds"?
4.4	4		12	We object to Wilderness nomination. Also many islands in NWHI are hardly "unaffected" by human activities..
4.5	2		8	There is also supposed to be coordination with state agencies pursuant to Fish and Wildlife Coordination Act.
4.6	4	last		Note that it is Department of Planning and Economic Development.
4.8	2	3		Green sea turtles are listed as threatened under DLNR Administrative Rules Chapter 13-124.
	5		10	Appears that an old edition of the statutes was used. Also boundary is still disputed.
4.9	2a		19	Protection of endangered species from natural disasters should also be considered.
4.12	3	(1)&(6)	20	"Non-FWS" lands and authority over them should be clarified.

Response

15. Comment acknowledged. No changes required.

16. Comment acknowledged. No changes required.

17. Comment acknowledged. Sentence modified.

18. We feel the Delphi study is a valid information source for projections of this type. We have noted the Hawaii Fisheries Development Plan update.

19. Comment acknowledged. FWS policy with regard to endangered species is focused on mitigating impacts associated with man's influence.

20. Non-FWS lands include any land and water areas not owned by the FWS. We acknowledge that the FWS has no authority on many of these lands. This specific reference concerns cooperative involvement in restoring species that utilize such lands.

Comment

3

Page	Para.	Sent.		Comments
4.16	5	3	21	How would "adversity" of modifications be judged objectively, and if there was no jeopardy, then why would it be adverse?
4.17	5	2	8	The state was asked by Assistant Secretary of Interior Hodel to prepare a detailed proposal.
4.22	3	3		An albacore tuna fishing mothership operation was conducted only in 1979.
6.11	1	2		State's interest is in rational use of all resources, in line with preservation of unique features of the area.
6.12	5	1	22	Several estimates for bird populations have been used (10, 12, 14 million). Which one is correct?
6.16	1	4	8	The buoy was also installed under a state Conservation District Use permit.
6.17	4		12	Wilderness status is unnecessary.
	5		23	Marine Sanctuary is unacceptable.
6.20-21			24	The proposal to regulate vessel traffic is restrictive and implementation will be difficult, if not impossible. Also, accurate position reporting by commercial fishing vessels is highly unlikely.
6.31	2		8	It appears that the use of Emergency Position Indicating Radio Beacons for routine monitoring is suggested. This is improper and restrictive. It is the U.S. Coast Guard's responsibility to set requirements for vessels.
6.33	2			Cooperative programs may be proposed, but should not be implemented without state approval.
6.34	3		10	Mooring buoy will be in state waters.
6.36	4)		8	The state representatives on the Monk Seal Recovery Team dissented on the Monk Seal Critical Habitat as proposed.
6.39	17)&19)			For Kure, with permission of DLNR and Coast Guard.
7.11	5	1	10	Vessel traffic will be outside HINWR boundary.

Response

21. Comment acknowledged. An action could be evaluated as adverse but not so significant as to constitute "jeopardy."

22. Estimates of bird populations are presented as breeding birds, breeding pairs, and total of breeding and non-breeding birds. Thus, despite different numbers appearing, all numbers referenced are correct.

23. Comment acknowledged. See response #4 above.

24. Comment acknowledged. See response to Western Pacific Regional Fishery Management Council #4, page B.73.

Comment

Comments on Technical Appendices:

Page	Para.	Sent.	Comments
2	6	25	If human activity disturbs seals thereby causing them to avoid the area, why is the boating beach at Kure used frequently by seals to haul out (Gilmartin, pers. comm.)?
	7	26	Might these changes have begun even before extensive exposure and monitoring took place? Maybe skewed sex and age ratios are due to seal intraspecific aggression.
10	6	2 27	If tiger sharks are a major predator on turtles, it might be a good idea to encourage fishermen to catch them.
12		10 12	The establishment of Wilderness for the HINWR is unnecessary. It also appears that the HINWR would not qualify for Wilderness status (5000 acres) unless the Service succeeded in expanding area to include nearshore waters. Is this why this was done?
15	1	1 28	There is some disagreement with the 20 fm boundary of the proposed Critical Habitat.
	2	23	We object to marine sanctuary.
	4	29	We don't think World Heritage site status should be pursued.
16	2	10	Do not agree with the Service's stated goals for boundary review.
17	Table - Food	30	Note that no fishing occurs for flying fish, and none for squid too, so competition for food from humans is nil.
18	4	31	How about predation by sharks?
	Table - Food		Ditto previous comment; if anything, large tuna are eating the squid these birds prey on, so they too are competing for resource.
20	Table - Food	30	Noting what these birds eat, namely Myctophids, squids, Sternoptychids, which come up near the water surface at night when tuna are not active, it appears competition by fishermen is nil.
21	Table		Ditto previous comment.

Response

25. While seals may still haul out on the boating beach, the total number of seals using Kure has declined about 50%, according to comparisons of counts from the early 1960s with more recent ones. Following closure of the Loran Station and the subsequent decrease in human presence at French Frigate Shoals, the number of seals using Tern Island beaches increased significantly.

26. It is not known when these population changes began. Skewed age and sex ratios may be due to male aggression, although cause and effect are difficult to determine. Human presence may be the only factor involved in these changes. The wording of the paragraph has been changed to reflect this.

27. In the face of "excessive" predation, shark control would be considered in both the optimum and acceptable scenarios for turtle production and maintenance.

28. Concur; wording changed.

29. Although the FWS does not yet have enough information to fully evaluate all ramifications of World Heritage Site status at this point, we feel the matter is worth pursuing.

30. The food table is informational only. Sections within the body of the Master Plan/EIS discuss seabird-human competition. For a concise review, see part C of the Summary section. No change necessary.

31. Concur; wording changed.

Comment

5

Page	Para.	Sent.		Comments
23-39			32	Perhaps if the state's program on FADs were implemented in the NWHI, these birds could benefit more than humans, i.e., make more food available and easier to get.
47			33	We believe commercial fishing should receive higher priority given the potential for fisheries development of the NWHI.
	2	4	34	This sentence proposes restrictive regulations on commercial fishing activities in "near" refuge waters. What is meant by "near" refuge waters? Also, the draft appears to put the onus on commercial fishing to prove it is "innocent" of causing environmental damage, rather than THE SERVICE taking the responsibility to prove that commercial fishing is detrimental. And of course, a decline in pre-harvest populations of fish will take place as fishermen catch them. After an initial period of high catch rates, the fishery will settle into a period where consistent catch rates result, if effort remains the same. It is also implied that the Service will manage fisheries that are the responsibility of either the state or the Western Pacific Regional Fisheries Management Council. The Service has no authority over the activities of commercial fishermen fishing in state waters.
		5	35	What is meant by "conflict of interest"?
48	Table		36	Subject to revision with update of Hawaii Fisheries Development Plan.
52	4		37	Humans are not responsible for the shrunken gene pool of the monk seal, its aberrant and non-adaptive behavior with regard to attacking their own pups and females, and the depredations of sharks and diseases like ciguatera.
53	3&4		38	Agree that the effects of human activity on monk seals should be studied and documented before promulgating regulations to mitigate such activity.
55	(5b)	5	39	The first regulations protecting green sea turtles was passed by the state as Hawaii Fish and Game Regulation No. 36 in 1974. It was not until 1978 that the federal government protected the green sea turtle under the Endangered Species Act.
	(5c)		40	The state is not currently interested in commercial harvest of green sea turtles.

Response

32. Comment acknowledged. No change necessary.

33. Sections IV and V in the Master Plan/EIS provide rationale for priorities.

34. Concur, wording changed. Again for a discussion of priorities, see Sections IV and V in the Master Plan/EIS. See response #1 above regarding boundary.

35. Concur; it has been deleted from the text.

36. Comment acknowledged; no change necessary.

37. Note that population decline is attributed to a "combination of natural and human-related factors" in the first sentence of paragraph 4.

38. Comment acknowledged; no change necessary.

39. Concur; additional information inserted.

40. Comment acknowledged; no change necessary.

Comment

6

Page	Para.	Sent.		Comments
56	1	2	41	As predator control, one could encourage fishermen to catch tiger sharks.
68	6		12	As the plan notes here, there is no need for Wilderness designation, and it is not acceptable, especially with regard to state claimed waters.
71-74			23	Problem with marine sanctuary, other protective measures unnecessary and redundant.
76	5		42	Conservation District overlaps, does not "override" County Shoreline Management Area.
77	2		43	No Hawaii Revised Statute No. 188-55.
79	1	3	44	The Service may regulate what it has jurisdiction over, but not fishing.
84	4	3	45	Overharvesting of oysters took place during federal administration; later, the Territory of Hawaii was asked to take over administration.
	6	1	10	HINWR does not include waters.
		4	46	State does not zone.
		5	47	Do these species need protecting? Are they threatened or endangered?
		6	48	Please clarify this statement.
85			49	Agree that more expertise is needed.
90	6		50	Not necessarily a point of contention. As stated in the draft Master Plan, cooperation is possible and desirable.
91	2		51	The National Marine Fisheries Service has also transplanted monk seals.
94	5		52	Kure Atoll is state property.
95	2		53	Check also on Project WILD of State Department of Education and DLNR. The contact is John Hawkins of DOE.
98-104			54	It seems many of these activities could be just as detrimental to threatened and endangered species as some of the others.

Response

41. Concur; no change necessary.

42. Concur; wording changed.

43. Concur; change made.

44. The fourth sentence under "Objectives and Strategies" is not intended to mean that FWS will be the sole regulator. It is hoped that management of seabird populations and marine resources will be based upon all available information, regardless of the source of such data, and will be done cooperatively by involved parties. The islands and oceans are linked biologically; optimally, their management would also be unified.

45. Comment acknowledged; no change necessary.

46. Concur; change made.

47. No reef fauna are officially threatened or endangered, although Section IV. E. 3. in the Master Plan/EIS states that the FWS' responsibility is not confined to officially-listed endangered and threatened species.

48. Statement deleted.

49. Comment acknowledged; wording change made.

50. Concur; sentence deleted.

51. Concur; information added.

52. Concur; clarification added.

53. FWS has been in contact with the DOE in conjunction with all FWS interpretive programs including those for the HINWR. If an Oahu interpretive site is developed, we will expand this contact to include use of such a site by Project Wild or the DOE.

54. Concur. Most of these outputs are not included in the final output list for the HINWR.

Comment

7

Page	Para.	Sent.		Comments
106			55	Do not agree that principal conflicts are the same as albacore. By the very nature of the market, ahi are destined for different markets and are handled differently than albacore. That is, a mothership operation will not be needed for ahi fishing.
107			56	If the cannery doesn't reopen, this activity is highly unlikely in the NWHI.
109	4	2	57	Tern Island (French Frigate Shoals) not likely to be used to support albacore fishing, and not desired by most fishermen for this purpose.
110	1	1	58	The shift from pole-and-line to purse seine fishing began more than 20 years ago and mostly applies to ahi and aku fishing, not albacore. The information here needs updating.
111	1	4	59	States that without tuna to drive baitfish to the surface, the birds would starve to death. Is there evidence that such a strong symbiotic relationship exists?
112	3	6	60	How are opelu and akule catches inversely related?
113	1		61	What proportion of the standing stock of these species are these estimates? It also seems far-fetched that birds will become entangled in nets, since the fishermen watch their nets carefully, and the nets are not left in the water very long. Also, it has not been shown that the tunas are essential for the survival of the seabirds.
114	4		62	What is the source of the estimates?
115	1		63	Is this a thorough and current analysis?
	2&3		64	Since bottomfishing will occur away from the refuge, and has little direct effect on the refuge, why is this listed as an output? The management of such fisheries is not the responsibility of the Service.
116			65	Information is outdated, more recent information available from National Marine Fisheries Service and Western Pacific Regional Fisheries Management Council.
118	8		66	Since recreational fishing is so harmful, maybe the station personnel shouldn't be allowed to fish recreationally as well?

Response

55. Concur; wording changed.

56. Concur; information added.

57. Concur; changes made.

58. Concur; changes made.

59. See Section C of the Summary section in the Master Plan/EIS and Fefer 1984:53 for further information. No change necessary.

60. The unclear sentence has been deleted.

61. The standing stocks of baitfish species in the NWHI are unknown. The possibility of birds becoming entangled in baitfishing nets has been deleted from the text.

62. Information deleted.

63. We believe the analysis to be accurate.

64. Bottomfishing, as well as other types of fishing that occur outside the HIMWR boundary, are listed as outputs because they have been analyzed through the planning process as potential uses of the Refuge. In the case of all types of commercial fishing, we have determined that they are not compatible within the Refuge and have removed them from the output list except with regard to FWS support. See Section V of the Master Plan/EIS.

66. NAA #22 specifies that only catch-and-release pole fishing is permitted on Tern Island.

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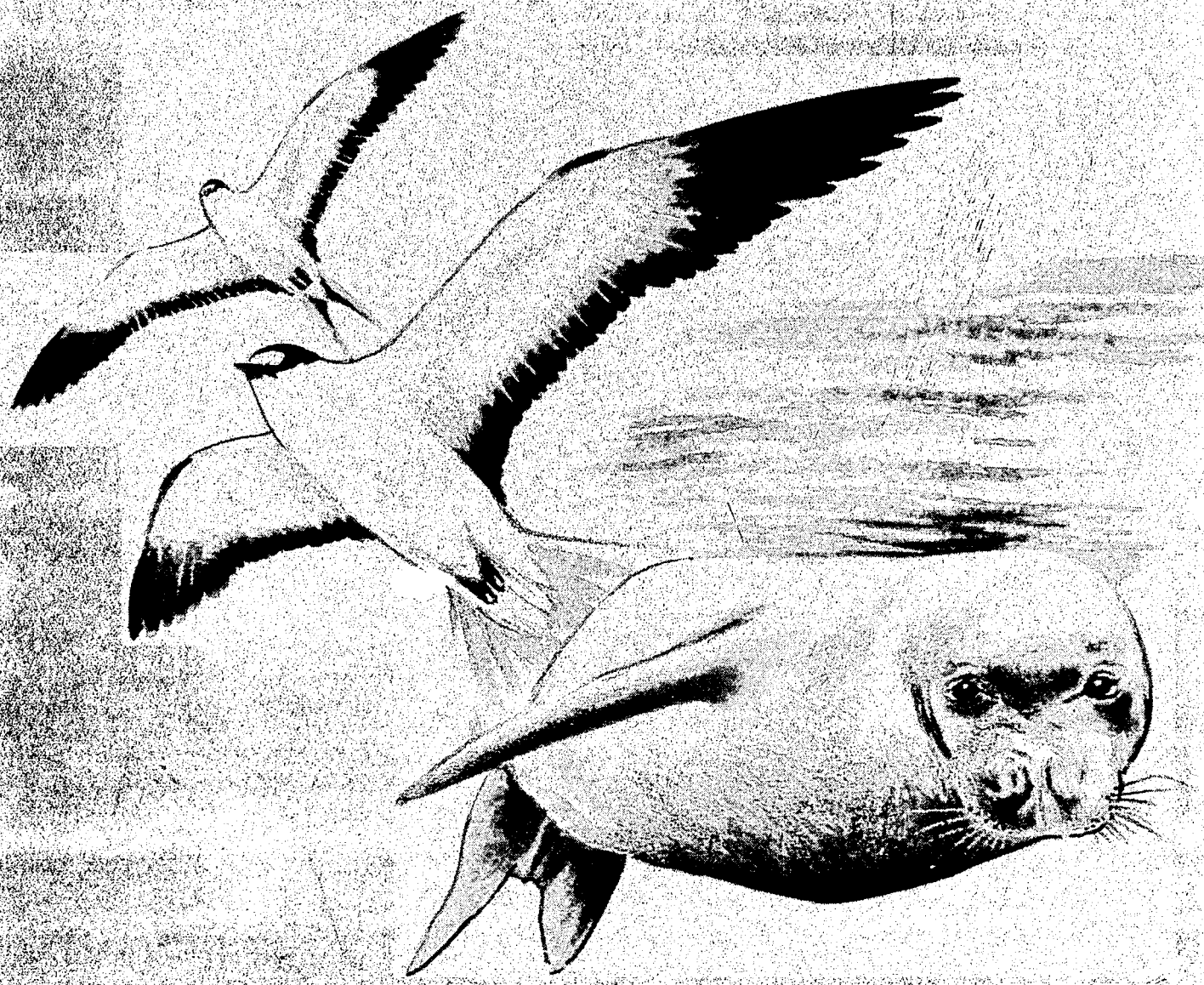
HAWAIIAN ISLANDS
NATIONAL WILDLIFE REFUGE

MASTER PLAN/ENVIRONMENTAL IMPACT STATEMENT

TECHNICAL APPENDICES



Department of the Interior
U.S. Fish and Wildlife Service Region One

HAWAIIAN ISLANDS
ATIONAL WILDLIFE REFUGE

STER PLAN/ENVIRONMENTAL IMPACT STATEMENT

CHNICAL APPENDICES

tment of the Interior
Fish and Wildlife Service Region One

TECHNICAL APPENDIX

This Technical Appendix consists of Locational Criteria and Output Summaries which support the findings and recommendations in the Hawaiian Islands National Wildlife Refuge (HINWR) Master Plan/Environmental Impact Statement (EIS). Locational Criteria are information which describe the resource conditions necessary for the production or maintenance of a given output on the Refuge. Output Summaries provide information concerning an output's background, potential, demand, and the degree to which it would conflict with another output. Locational Criteria and Output Summaries were prepared prior to developing the management alternatives in Section VI of the HINWR Master Plan/EIS in order to fully understand all of the important factors and relationships of each output considered.

Locational Criteria and Output Summaries were prepared for all outputs considered in the planning process. For various reasons, not all of these outputs have been incorporated as objectives in the final Master Plan/EIS. Some outputs were dropped from further consideration due to conflict with other higher priority outputs. Others were dismissed due to low demand or a lack of resources to support the output. Additionally, certain outputs have been grouped together in the Master Plan/EIS (because of similar resource needs, demands, and potential) in order to reduce repetition and streamline the planning process. Other outputs have been renamed to better reflect their true meaning. The following chart provides a cross-reference between outputs as originally described in the Locational Criteria or Output Summaries and the final listing in the Refuge Output List (Master Plan/EIS, page 5.2) and the objective statements (Master Plan/EIS, pages 5.7-5.9).

Output Reference in Locational Criteria and Output Summaries		Output Reference in Refuge Output List and Objectives Statements
Hawaiian Monk Seal	=	Monk Seal
Laysan Duck	=	Laysan Duck
Laysan Finch, Nihoa Finch, Nihoa Millerbird	=	Endemic Finches and Millerbird
Sea Turtle	=	Sea Turtle
Sensitive Species	=	Sensitive Species (Sooty Storm Petrel)
Cultural Resource Protection	=	Cultural Resource Protection
Wilderness	=	Wilderness
Research Natural Area	=	Research Natural Area
Other Protective Status	=	Other Protective Status

State of Hawaii Land Uses	=	Other Protective Status
Black Footed Albatross, Laysan Albatross, Bonin Petrel, Bulwer's Petrel, Wedge-Tailed Shearwater, Christmas Shearwater, Red-Tailed Tropicbird, Masked Booby, Brown Booby, Red-Footed Booby, Great Frigatebird, Gray Backed Tern, Sooty Tern, Brown Noddy, Black Noddy, Blue-Gray Noddy, White Tern	=	Marine Birds
Other Migratory Birds	=	Other Migratory Birds
Native Terrestrial Plants and Invertebrates	=	Terrestrial Endemic and Native Species
Marine Reef Species	=	Marine Reef Species
Ecological Monitoring	=	Research Studies
Studies and Publications	=	Research Studies
Cooperative Programs	=	Research Studies
Species Transplantation	=	Not Included
Environmental Education	=	Environmental Education
Interpretation	=	Interpretation
Nature Tours	=	Interpretation
Wildlife/Wildlands Observation	=	Interpretation
Photography/Journalism/Art	=	Photography/Journalism/Art
Other Recreation	=	Other Compatible Public and Economic Uses
Ahi Fishing, Aku Fishing, Albacore Fishing, Baitfishing, Bottomfishing, Trap Fishing, Recreational Fishing, Consumptive Recreation, Other Commercial Consumptive Uses, Aquarium Specimen Collecting, Other Consumptive Uses	=	Not included within the Refuge. Support for Commercial Fishing Off-Refuge included in Objective for "Other Compatible Public and Economic Uses".

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LOCATIONAL CRITERIA

OUTPUT: HAWAIIAN MONK SEAL PRODUCTION/MAINTENANCE

DESCRIPTION: Production and maintenance of monk seals (Monachus schauindslandi) requires adequate haul-out areas for pupping, nursing and resting, food, minimized exposure to disease and predators, and freedom from harassment by people, boats, fishing nets, etc.

ECOLOGICAL RELATIONSHIPS: The Hawaiian monk seal is found throughout the Northwestern Hawaiian Islands and rarely around the main Hawaiian Islands or other Pacific atolls. Major congregation areas are Pearl and Hermes Reef, Lisianski Islands, Laysan Island, French Frigate Shoals, Necker Island and Nihoa Island within the Refuge and Kure Atoll and Midway Islands at the north end of the NWHI.

Haul-out areas for pupping, nursing, and resting are primarily sandy beaches, but hard substrate bench areas and exposed reef are used as well (Gilmartin 1983). Vegetation behind beaches is sometimes used for shelter from wind and rain. Protected shallow water adjacent to the haul-out areas is important for the young animals. The nearshore areas, inside the reef are extensively used by weaned pups learning to feed (Johnson and Johnson 1978). During the breeding season, adults commonly feed in the nearshore areas, most often in waters less than 20 fathoms (DeLong et.al. in press).

Foods include spiny lobster, octopi, eels, and various reef fishes. Foods are located in coral communities, over extensive offshore banks surrounding the islands and on the precipitous bank slopes. Monk seals will use suitable feeding areas around the NWHI even without emergent lands nearby for hauling out.

Population counts have been made almost every year throughout the NWHI since the late 1950s. Counts indicate declines on all atolls except French Frigate Shoals (Gilmartin 1983). Counts over the last 7 years have averaged more than 500 animals, about half of what was counted in the late 50's (Gilmartin 1983). The proportion of the total population included in the count is unknown. Population estimating techniques used by Johnson and Johnson (1981) for Laysan Island suggest the Laysan population was about three times the daily beach count.

Various human activities are the major factors limiting monk seal production. Extended human activity on beaches causes monk seals to abandon haul-out areas. The seals are also vulnerable to entanglement in various fishing gear, especially nets. Monk seals are subject to ciguatera poisoning although the extent of mortality is not known. Predation by sharks is also a mortality factor of unknown proportions.

Extensive changes in population structure have been noted since monk seal monitoring began. Skewed age and sex ratios and mortality of juveniles and subadults are major current problems. Attacks by adult males on weaned pups and adult females are an additional problem possibly resulting from the current anomalous population structure.

OUTPUT: HAWAIIAN MONK SEAL PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Haul-out areas	X	Sandy beaches hard substrate benches, exposed reefs	Same	Same
Inner reef waters	X	Abundant food source, no limitations from competition, no predators, balanced age/sex structure	Adequate food source, minimized competition, minimum effect of predators, balanced age/sex structure	Same
Food	X	Spiny lobsters, octopi, eels, various reef fishes	Same	Same
Predators/ mortality disease	X	Minimize predation by sharks, no mortality from intraspecific interactions, no disease problems	Prevent predation from affecting population levels, no mortality from interspecific interactions, no diesease problems	Prevent predation from affecting population levels, minimize mortality from interspecific interactions, disease not affecting population levels
Human-related disturbance	X	No mortality caused by people or their tools (e.g. fishing nets), no disturbance of haul-out or feeding areas	Mortality minimized to that which cannot be avoided (under controlled use of resources by people), minimal disturbance of haul-out and feeding areas which does not affect long term population status	Same

OUTPUT: LAYSAN DUCK PRODUCTION/MAINTENANCE

DESCRIPTION: Production and maintenance of Laysan ducks (Anas laysanenis) requires nesting substrate, food and lack of contact with exotic organisms including disease, and human disturbance.

ECOLOGICAL RELATIONSHIPS: Laysan ducks are endemic, permanent residents of Laysan Island. These ducks are terrestrial but will fly short distances when disturbed (Ely and Clapp 1973). During crepuscular and nocturnal hours, Laysan ducks appear to be active in the lagoon, in low vegetation zones around the lagoon and in other patches of vegetation (Sincock and Kridler 1977, FWS 1983). During daylight, particularly in warm weather, they seek cover and rest in dense stands of Pluchea sp., Ipomoea sp., and Sicyos sp., where they tend to remain until early evening. Their nest is a shallow depression on the ground concealed in vegetation, usually Eragrostis, Cyperus sp., Chenopodium or Scaevola sp. (Ely and Clapp 1973).

Laysan ducks are primarily insectivorous. They frequently feed on brine flies (Neoscatella sexmaculata) along the damp edge of the lagoon, and brine shrimp (Artemia sp) in the lagoon during nocturnal hours. Other invertebrates including larval and pupae flies of moths, beetles, crustaceans and other littoral forms around the lagoon and small potholes are also known to be taken by these birds.

The Laysan duck population was reduced to less than 20 birds during the early part of this century when vegetation on the island was destroyed by introduced rabbits. Since the island recovered, the Laysan duck population has increased substantially. Census data between 1957 to 1980 vary between 25 and 688. The carrying capacity of the island for Laysan ducks is estimated to be 500 to 600 based on population present in 1979-80 (FWS 1982).

A number of factors may potentially affect the Laysan Duck, although at present the population appears secure. The major threats involve the stability of the habitat. Action was taken in the fall of 1984 to stabilize a substrate of windblown sand in a devegetated area on the windward side of the lagoon at Laysan Island. Aerial photographs had revealed a decrease in the surface area of the lagoon due to the sandfill. The dynamics and natural succession of the lagoon system and the surrounding patches of vegetation are not thoroughly understood. Abrupt or widespread changes in these areas could have detrimental affects on Laysan ducks. Exotic organisms are the main threat to the stability of these systems. Past effects of exotics may still be influencing these systems (e.g. soil blowing into lagoon). Exotic organisms such as rats or diseases can directly threaten the duck. Human disturbance can effect this fragile system directly and indirectly.

OUTPUT: LAYSAN DUCK PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nest habitat	X	Partially open stands of vegetation (e.g. Cuperus sp., Chenopodium sp., Scaevola) which provide some shelter	Same	Same
Food	X	Brine flies (e.g. Neoscatella sexmaculata), brine shrimp (Artemia sp.); larvae and pupae of various moths, flies, beetles; small aquatic crustaceans.	Same	Same
Introduced species	X	Prevent the introduction of exotic plants, invertebrates and vertebrates to Laysan Island	Same	Same
Human-related disturbance		No disturbance	Infrequent human disturbance at (certain) distance	Infrequent human disturbance at (closer) distance

OUTPUT: LAYSAN FINCH PRODUCTION/MAINTENANCE

DESCRIPTION: Laysan finch (Telospiza cantans) production and maintenance requires nesting substrate, food and lack of human disturbance and contact with exotic organisms including disease.

ECOLOGICAL RELATIONSHIP: Laysan finches historically were endemic to Laysan Island, although additional populations have been established on several islands on Pearl and Hermes Reef. Laysan finches are found in almost all plant associations on the 400 hectare island, although they appear to favor the Eragrostis sp. (bunch grass) association. Clumps of the Eragrostis sp. are the primary nesting substrates for this bird.

Laysan finches are omnivorous. They appear to use almost any kind of food available including leaves, flowers and seeds of many types of plants, various invertebrates, eggs of seabirds and carrion (seabirds) (Sincock and Kridler 1977, Ely and Clapp 1973). They have been observed probing at the base of Eragrostis clumps, presumably for water. Apparently they require fresh water, they have also been observed drinking from the hypersaline lagoon (Sincock and Kridler 1977).

Population estimates from censuses conducted over the last 15 years average at about 10,000 birds on Laysan Island, although in some years population estimates have ranged from less than 7,000 to over 20,000 birds (FWS 1983). the average carrying capacity for the island is approximately 10,000 birds.

A population of about 500 birds has been established on Southeast Island of Pearl and Hermes Reef. Birds have apparently spread to nearby islands: North, Grass, and Seal-Kittery Islands. These islands contain small populations of up to 50 birds or more.

The Laysan finch populations appear to be maintaining themselves in an essentially pristine environment, free of any significant influences of people. The major threats to the present conditions include the potential of harmful exotic organisms becoming established on Nihoa, avian disease being introduced into the finch population, human disturbance of various kinds, and major natural disasters such as tsunamis.

LOCATIONAL FACTORS	IMPORTANT FACTORS	OPTIMUM	ACCEPTABLE	MINIMUM
Nest habitat	X	Clumps of Eragrostis sp. (bunch grass)	Same	Same
Food	X	Parts of native plants (seeds, flower heads, etc.) native invertebrates, some seabird eggs, seabird carrion	Same	Same
Exotic organisms	X	Prevent the introducation of exotic plants, invertebrates, or vertebrates to Laysan Island and Pearl Hermes Reef.	Same	Same
Human-related disturbance		No disturbance	Infrequent human disturbance at 500 feet	Infrequent human disturbance at 300 feet.

OUTPUT: NI CH PRODUCTION/MAINTENANCE

DESCRIPTION: Nihoa finch (Telospiza ultima) production and maintenance requires nesting substrate food, and lack of contact with exotic organisms including disease and human disturbance.

ECOLOGICAL RELATIONSHIP: Nihoa Finches are endemic to Nihoa Island and occupy virtually the entire 62 hectare island including the valleys, slopes and rocky outcroppings. They appear to prefer the open areas covered by stands of low shrubs dominated by Sida fallax, or Chenopodium oahuense and Solanum nelsoni (Conant 1983). This vegetation type covers much of the sides and floors of the valleys. Small holes in rocky outcroppings are apparently the preferred nesting sites.

Nihoa finches are omnivorous, eating a wide variety of plant material (seeds, flower heads, ect.), invertebrates, and sometimes bird eggs. These birds also tend to congregate at the few seeps or pools of water on the island (Clapp et.al. 1977). Apparently they require a source of fresh water.

The popultion appears to fluctuate between 1,000 and 5,000 birds, based on census data over the last 20 years (FWS 1983). Despite any population fluctuations, Nihoa finches appear to be maintaining their population in what is essentially a pristine environment. The major threats to the present conditions include the potential of harmful exotic organisms becoming established on Nihoa, avian disease being introduced, harmful exotic organisms becoming established on Nihoa, human disturbance of various kinds, and major natural disasters such as tsunamis.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nest habitat	X	Stands of native low shrubs in valleys Sida, Chenopodium, Solanum, with rocky outcroppings	Same	Same
Food	X	Parts of native plants (e.g. seeds, flower heads etc.), various native invertebrates, some seabird eggs	Same	Same
Exotic organisms	X	Prevent introduction of exotic plants, invertebrates, or vertebrates to Nihoa Island	Same	Same

OUTPUT: NIHOA MILLERBIRD PRODUCTION/MAINTENANCE

DESCRIPTION: Nihoa millerbird (Acrocephalus familaris kingi) production and maintenance requires nesting substrate, food and lack of contact with exotic organisms including disease and human disturbance.

ECOLOGICAL RELATIONSHIP: Nihoa millerbirds are endemic to and generally distributed throughout the 62 hectare Nihoa Island. They are found primarily in the dense shrubs of Sida fallax and Chenopodium oahuense where they tend to forage and place their nests (Clapp et al. 1977, Sincock and Kridler 1977). This preferred habitat occupies about 40 hectares.

Densities are relatively low for this species. The population appears to vary between 200 and 600 birds. Millerbirds are apparently quite sedentary, occupying territories between 0.2 and 0.4 hectares (Conant 1983). Movements and territory size are probably related to distribution and abundance of vegetation and terrestrial arthropods (their primary food source) which result in low densities.

Populations appear to remain around the carrying capacity of the habitat on Nihoa Island. The island remains in a relatively pristine condition with no perceptible effects of people evident on the Millerbird population. The major threats to the present conditions on Nihoa Island include the potential of harmful exotic organisms becomming established, the introduction of avian disease and major natural disasters such as fire.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nest habitat	X	Native shrubs, (Sida, Chenopodiumin dense stands	Same	Same
Food	X	Invertebrate fauna, primarily arthropods	Same	Same
Exotic organisms	X	Prevent introduction of exotic plants, invertebrats or vertebrates to Nihoa island	Same	Same
Human-related disturbance		No disturbance	Infrequent human disturbance at (certain distance) 500 feet	Infrequent human disturbance at 300 feet

OUTPUT: SEA TURTLE PRODUCTION/MAINTENANCE

DESCRIPTION: Production and maintenance of the Hawaiian population of green sea turtles (Chelonia mydas), requires adequate nesting sites, food, a certain level of protection from natural predators, and freedom from exotic predators.

ECOLOGICAL RELATIONSHIPS: The Hawaiian population of the green sea turtle was historically distributed throughout the 2,450km long Hawaiian Archipelago. The current distribution of adults is a function primarily of the availability of acceptable breeding, feeding, and nesting habitat (Balazs 1980). Feeding and nesting areas are located in coastal waters of both the main islands and the NWHI. Feeding "pastures" used by adults are usually less than 10m deep, and frequently not more than 3m deep (Balazs 1980). Resting sites are usually nearby feeding areas, normally at less than 20 meters. Suitable sites include coral recesses, undersides of ledges, sand bottom areas, or other sites relatively free from strong currents and disturbances from predators and people (Balazs 1980). Surface basking in the water and on the shoreline is also done.

The only appreciable amount of nesting still known to occur is at French Frigate Shoals, on several islands most notably East and Whale-Skate. Successful nesting requires a sloping beach platform and moist but well drained, friable sand substrate which can easily be excavated by the female (FWS 1980).

Green sea turtles of all age classes feed on a variety of algae species. Adults appear to feed mostly nearshore on a small number of algae species. They graze off calcarious reef structures, rocks, or they take floating material (Balazs 1980). Juvenile and subadults are known to also feed on various invertebrates. Younger turtles (<35cm) living in pelagic waters presumably feed on various invertebrate forms, although data are lacking (Balazs 1980).

In the NWHI, resident aggregations of adults are known to occur at Necker Island, French Frigate Shoals, Lisianski Island, Pearl and Hermes Reef, and to a lesser extent, Laysan, Midway, and Kure Atoll. An average of about 200 females nest annually at French Frigate Shoals and less than 20 at Laysan, Lisianski Islands and Pearl and Hermes Reef (Balazs 1980). The number of females nesting annually since 1973 has fluctuated substantially. Total population size in unknown.

The major limiting factor is predation. Adult turtles are vulnerable to predation by tiger sharks, which can reach apparently significant levels in certain areas such as the NWHI. Hatchlings are vulnerable to ghost crabs and to a lesser extent, various carnivorous fishes. Illegal and accidental taking by people and human disturbance of turtles while on land are an additional concern.

Four other species of marine turtles are known to occur in Hawaii. The hawksbill (Eretmochelys imbricata) and the Leatherback (Dermochelys coriaces) are currently listed as endangered species. The hawksbill has been recorded nesting in small numbers in the southern end of the Archipelago. Leatherbacks are seen regularly in the pelagic zone surrounding Hawaii, yet are not known to nest in Hawaii. Both the loggerhead (Caretta caretta)and the olive ridley turtle(Lepidonchelys olivaces) occur only as rare vagrants.

OUTPUT: SEA TURTLE PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nest habitat	X	Moist, well-drained substrate which can be excavated by female. Must be readily accessible beach from open ocean	Same	Same
Food	X	Adults, subadults - primarily various species of algae usually in near shore area including adjacent to nest sites subadults, juveniles - also take various invertebrates in. coastal areas, hatchlings feed on a variety of invertebrates near the surface in pelagic waters	Same	Same
Predators	X	Protect hatchlings, control ghost crabs when excessive predation as needed, control sharks if excessive predation of adults	Same	No managem
Human-related	X	No moratality caused by people or their tools (e.g. fishing nets), no disturbance of nesting beaches	Mortality minimized to that which is unavoidable (under controlled use of resources by people), minimal disturbance of nesting beaches which has no long term affect on population status	Same

DESCRIPTION: The 1964 Wilderness Act (16 U.S.C. Sec. 1131-1136) defines "Wilderness" and provides for its designation and use. A Wilderness is recognized as an area of the earth and its community of life that is untrammeled by humans, where people themselves are visitors who do not remain. It is an area of land retaining its primeval character and influence, without permanent improvements or human habitation, and which is protected and managed so as to preserve its natural conditions. Furthermore, wilderness: 1) generally appears to have been affected primarily by the forces of nature with unnoticable human imprint; 2) has outstanding opportunities for solitude or primative recreation; 3) has at least 5000 acres or is of sufficient size as to make practicable its preservation in unimpaired condition; and 4) may also contain ecological, geological, or other features of scientific, educational scenic or historical value. The HINWR was proposed as a Wilderness Area by the FWS in 1967.

ECOLOGICAL RELATIONSHIPS: To preserve the Wilderness quality of units within the National Wildlife Refuge System it is necessary to manage so as to maintain the Wilderness character of the biological and physical features of the area; to manage the resource so as to maintain the wilderness quality for future benefit and enjoyment; to provide opportunities for research, solitude and permitted recreational uses; to retain the area in the same condition as in its pre-wilderness designation; and to insure that human works remain substantially unnoticeable.

BASIC ASSUMPTIONS: Although not yet designated Wilderness, the FWS currently manages the refuge as such. Wilderness areas may be closed to specific uses if they are determined to be incompatible with refuge objectives. The use of motorized equipment is prohibited except in emergency search and rescue missions, where essential to the refuge objectives, and when boat and aircraft use is an established practice prior to wilderness designation. All vehicle use must meet 'minimum tool' criteria. The use of aircraft is permitted over Wilderness Areas.

Source: Refuge Manual
Tern Island Study
Committee on Merchant Marine and Fisheries. 1967. A Compilation of Federal Laws Relating to Conservation and Development of Our Nation's Fish and Wildlife Resources, Environmental Quality, and Oceanography. Serial No. 95-B. U.S. Government Printing Office, Washington, D.C.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Site Condition	X	Free from evidence of human manipulation. Contains significant ecological, historic, scientific values	Relatively free from human manipulation	Same
Natural Diversity	X	Varied and pristine ecological communities	Same	Same
Wildlife		Areas with excellent wildlife habitat	Same	Same
Access		Available to recreationists by charter plane and boat.	Same w/charter plane	Same

OUTPUT: RESEARCH NATURAL AREA

DESCRIPTION: Research Natural Areas (RNAs) are part of a national network of reserved areas under various ownerships. RNAs are intended to present the full array of North American ecosystems, biological communities, habitats, and phenomena, geological and hydrological formation and conditions. They are areas where natural processes are allowed to predominate without human intervention. However, under certain circumstances, deliberate manipulation is used to maintain unique features that the RNA was established to protect. (Refuge Manual)

Public Use Natural Areas (PUNAs) are designed to assure the preservation of a variety of significant natural areas for public use which, when considered together, illustrate the diversity of natural environments and preserve those environments that are essentially unaltered by humans for future use.

The key distinction between RNAs and PUNAs is that the latter allows public access for recreation compatible with maintenance of resource integrity.

ECOLOGICAL RELATIONSHIPS: HINWR was designated a RNA in 1967 because of important populations of seabirds and seals and other attributes including: a significant ecological community illustrating characteristics of a coral atoll in sub-tropical waters; biota of relative stability maintaining itself under prevailing natural conditions; an ecological community significantly illustratingthe process towarda climax community; habitat supporting vanishing, rare and restricted species; relic flora and fauna persisting from an earlier period, and seasonal haven for concentrations of native animals.

BASIC ASSUMPTIONS: Activities limited to colleges and other scientific agencies for research, observation, monitoring and educational activities. Minimal disruptive procedures may be permitted provided activities do not impair or threaten the area. Non-research education will be permitted when it does not conflict with research use. No permanent physical improvements are permitted in RNAs. Management practices are used only when necessary (e.g. feral animal control). Use of RNAs will be governed by management plan compatible with refuge objectives detailing protection, management and practices. Disestablishment procedures are initiated if an area is no longer useful for its established purposes.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Wildlife	X	Areas with excellent wildlife viewing possibilities without disturbance	Areas with good wildlife viewing w/out disturbance	Areas with fair viewing w/out disturbance
Natural Diversity	X	10 or more micro-habitats available for study	7 or more micro-habitats available	5 or more micro-habitats available
Site Condition	X	Free from evidence of human manipulation Endangered species population present	Relatively free from human manipulation Threatened species population present	Same Sensitive species population present
Access		Available to scientist w/ charter plane and boat	Available to scientist w/ charter plane, FWS boat	Same

OUTPUT: OTHER PROTECTIVE STATUS

Critical Habitat for the Hawaiian Monk Seal
The FWS will support critical habitat designation by the National Marine Fisheries Service. This protection will overlay existing protection offered by the Research Natural Area and by the current boundaries of the HINWR. However, critical habitat will offer more inclusive protection to the waters surrounding Lisianski, Necker and Nihoa Islands, and will standardize the protection zone around all the islands of the Northwestern Hawaiian Islands (NWHI).

Marine Sanctuary Proposal
The intent of this proposal is to unify fragmented jurisdictional management to present an ecologically comprehensive perspective while allowing multiple use to be granted by permit. The boundaries include all lands and waters enclosed by the 12 mile radius drawn around all NWHIs. The sancturary is designed to preserve coastal areas and fisheries, provide regulations for planning and management, provide protection where gaps exist in laws, and ensure balance in multiple use. This proposed sanctuary would be managed by NOAA as a unit in a series of existing Marine Sanctuaries in the U.S.

Both Critical Habitat and Marine Sanctuary proposals would enhance protection of unique wildlife resources of the NWHI not currently and/or comprehensively protected e.g. monk seal feeding areas and tuna schools. Both proposals would be enforced by NOAA. Both are overlain to some degree by existing protective status.

World Heritage Site
The International Convention concerning the Protection of the World Cultural and Natural Heritage (UNESCO 1972) provides for the designation of areas of "outstanding universal value" as World Heritage Sites. These exceptional areas must be recommended by the signatory nation responsible for the site for declaration by the International World Heritage Committee. The sites will undoubtedly include many previously designated protected areas.

The primary objective is to protect the natural features for which the area was considered to be of world heritage quality. Also important is to provide publications of information for worldwide public enlightenment as well as to provide for research and environmental monitoring.

Management of these sites will stress the maintenance of the heritage values, the continuation of legal protection, and will promote each site as to its significance to each country, its people and the world.

All sites will have to have strict legal protection and will be owned by government or a non-profit corporation or trust for the long term. While recreation and on-site interpretation will generally be developed, some sites may be of such significance that public use will either be strictly controlled or prohibited.

Boundary Review
Seek to resolve conflicts with the State of Hawaii concerning the extent of the Refuge boundaries. Seek to expand boundaries to the edge of the reef on islands not currently protected e.g., Lisianski. Seek to hold boundaries on Maro Reef, Laysan, French Frigate Shoals, Pearl and Hermes Reef. Seek to expand boundaries at Necker and Nihoa to a specific fathom line. This will offer a more inclusive area of aquatic habitat, and will enhance and standardize jurisdictional management.

Midway Overlay
Seek and include islands at Midway as areas under the protective agencies of the FWS. Coordinate with U.S. Navy to manage islands consistent with the FWS objectives concerning migratory birds, endangered species and predator control and contingency plans.

National Landmark/Historic Sites
Seek to include Nihoa and Necker as archeological sites suitable for Historic Site recognition. Review status and history of other islands in the NWHI as potential Historic site. Seek National Landmark status of appropriate islands.

Source: Marine Sanctuary Proposal, C. Harrison 1983
Recovery Plan for the Hawaiian Monk Seal, W. Gilmartin 1983

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Site Location	X	All Hawaiian waters	NWHI waters	HINWR waters
Access	X	Access with special use permit	Access with permit	Same
	First line is Critical Habitat for seals Second line is Marine Sanctuary Proposal			
Site Location	X	Boundary out to 20 f. Boundary out to 12 mi.	Boundary out to 3 m.. Boundary out to 7 mi.	Boundary out to 10 f. Boundary out to 3 mi.
Access	X	Area closed w/out permit	Area closed w/out permit	Same
		Area open to public use with permission	Same	Same

OUTPUT: BLACK-FOOTED ALBATROSS PRODUCTION/MAINTENANCE

DESCRIPTION: Black-footed albatross (*Diomedia nigripes*) production and maintenance requires substrate, food and freedom from introduced diseases, predators and human disturbance.

ECOLOGICAL RELATIONSHIPS: Black-footed albatross use all NWHI except Gardner Pinnacles from October through June or July. They are colonial ground nesters, preferring open areas, and will feed offshore. This species is particularly vulnerable to food shortages during its breeding season. One of the predominant causes of natural mortality in chicks is starvation, which occurs when parent birds are unable to secure enough food to keep growing young alive. This species migrates away from the NWHI after breeding.

The occurrence of avian pox and possible lead poisoning on Midway Islands, predation by rats (Kepler 1967) on Midway Islands and Kure Atoll, and control programs on islands where people and birds coexist (especially Midway) are all causes of reduced breeding or mortality in black-footed albatross.

In the NWHI, black-footed albatross populations have largely recovered from the depredations of feather hunters and the results of devegetation. With introductions of soil and exotic vegetation on Sand Island, Midway, numbers of breeding birds have increased there. Population numbers during the past several years appear to have been fairly constant, or perhaps increasing slightly.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

OUTPUT: BLACK-FOOTED ALBATROSS PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Substrate	X	Large, open sand beaches above storm tide line. Exotic vegetation lacking.	High, sandy ridges; open, sandy areas running inland from the beach between vegetation, especially Scaevola and Eragrostis Exotic vegetation lacking.	Flat, rocky strata with little vegetation.
Disease	X	Avian pox absent.	Pox incidence decreased.	Pox incidence decreased from present levels
Predators	X	Rats absent.	Rats absent.	Where they now occur, rats decreased.
Isolation		People absent from colonies during breeding season.	Slight human impact during breeding season.	Light human impact.
Food		By percent volume in diet: Exocoetidae 44.2 Ommastrephidae 29.2 Fish 5.4 Crustacea 4.3 Other squid 2.6	Same	Same

OUTPUT: LAYSAN ALBATROSS PRODUCTION/MAINTENANCE

DESCRIPTION: Laysan albatross (Diomedia immutabilis) production and maintenance requires nesting nesting substrate, food and freedom from introduced diseases, predators and human disturbance.

ECOLOGICAL RELATIONSHIPS: Laysan albatross breed on all NWHI, generally from October through July. They are ground nesters and tend to select nest sites closer to vegetation than the black-footed albatross (Fisher 1972). Individual pairs return with the same mate to the same nest site annually.

This species feeds offshore during the breeding season and is vulnerable to food shortages during this time. Most natural chick mortality can probably be attributed to starvation although shark predation occurs to an unknown extent.

Additional causes of mortality include rats (Kepler 1967), avian pox and possible lead poisoning on Midway Islands, and control programs in breeding colonies by humans.

Feather hunting in the late 19th and early 20th centuries resulted in the loss of several important Laysan albatross colonies worldwide. In the NWHI, the decline of this species was exacerbated by the devegetation of Laysan and Lisianski Islands earlier this century; but the population apparently recovered throughout the refuge and may be increasing on several islands, most notably Midway Islands. This is due to the introduction of exotic flora and soil on Sand Island which created additional nesting habitat.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

OUTPUT: LAYSAN ALBATROSS PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting	X	Flat, interior plains close to vegetation and protected from blowing sand and high water. Exotic plants absent.	Interior areas covered by Lepturus and Tribulus. Beach perimeters.	Rocky areas with litt'e vegetation; slopes; open beaches or dense vegetation.
Disease		No avian pox.	Same	Pox controlled.
Predators		Rats absent.	Rats absent.	Decreased populations where they presently occur.
Isolation		No human disturbance.	Same	Slight human disturbance.
Food		By percent volume in diet: Ommastrephidae and other squids 64.8; crustacea 8.6; Velellidae 4.0; Exocoetidae ova 3.6; Molidae 2.8; Fish 2.4; Janthinidae ova 1.8	Same	Same

OUTPUT: BONIN PETREL PRODUCTION/MAINTENANCE

DESCRIPTION: Bonin petrel, (Pterodroma hypoleuca) production and maintenance requires nesting substrate, food, freedom from excessive competition and predation and isolation from human presence.

ECOLOGICAL RELATIONSHIPS: Bonin petrels are present on all NWHI except Nihoa, Necker and Gardner Pinnacles. They nest in burrows, breeding from January or February through June or July. However, birds have been recorded during all months. Bonins probably feed pelagically, occasionally in association with other species. The non-breeding distribution of this species is not well-known.

The two principal causes of mortality of Bonin petrels in the NWHI are rat predation and shearwater attack. Rat predation has been documented at Kure Atoll and Miday Islands. Both Rattus rattus and R. exulans are involved. Studies by Woodward (1972) and Grant et al. (1981) have documented that rat predation, in the absence of effective control programs, can virtually eliminate successful fledging of young birds and could eventually lead to local extirpation. The significance of chick mortality by wedge-tailed shearwaters to the NWHI breeding population of Bonin petrels is uncertain, but it is clear that impact on localized colonies can be severe. Late nesting petrels are particulary vulnerable, as chicks are less able to defend themselves against shearwaters. Petrel mortality may result from direct attach or as a result of starvation caused by separation from parents when young are evicted from burrows. In addition, on Laysan Island, the Laysan finch preys on eggs of this species.

Burrows are also often destroyed inadvertently by persons walking through nesting colonies. Even prior to egg laying, such destruction of habitat may cause prospective nesting birds to abandon the area and not nest during the season in which disturbance occurs.

Although it appears that populations on Refuge islands are stable, population trends are hard to document due to the nesting habits and pattern of nocturnal activity in Bonin petrets. However, a drastic population decline has occured on Midway Island due to black rat predation (Grant et al. 1981).

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

OUTPUT: BONIN PETREL PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Substrate	X	Sandy soil overlain by *Eragrostis* and shrubby vegetation.	Sandy soil covered with grass, *Eragrostis* and *Ipomoea* or *Scaevola*.	On surface under dense vegetation.
Predation	X	No human presence in colonies during breeding season.	Minimal disturbance during breeding.	Same
Competition		Wedge-tailed shearwaters absent.	Wedge-tailed shearwaters present in low numbers.	Wedge-tailed shearwaters present in moderate numbers.
Food		By percent volume in diet: Myctophidae 24.3 Ommastrephidae 17.4 Sternoptychidae 11.5 Crustacea 6.8 Mullidae 4.2 Gonostomatidae 2.8 Other squid 3.6 Fish 2.7 Synodontidae 2.3	Same	Same

OUTPUT: BULWER'S PETREL PRODUCTION/MAINTENANCE

DESCRIPTION: Nest habitat, food isolation and freedom from predators are required for the production and maintenance of Bulwer's petrels. (*Bulweria bulwerii*)

ECOLOGICAL RELATIONSHIPS: Bulwer's petrels breed on all NWHI except Midway and Kure Atoll. They are ground nesters, using the islands from late March to October. At these times they feed within 80 km of their colonies (King 1970). This species is not particularly reliant on predatory fishes to drive prey to the surface. Winter feeding and dispersal patterns are unknown.

Natural egg predators include Nihoa and Laysan finches and crabs (*Grapsus sp.*). Crabs may also consume small chicks, but the extent of this loss is uncertain. Egg predation is exacerbated by human disturbance that causes incubating adults to temporarily abandon their eggs. On rat infested islands, rat predation of Bulwer's petrels can be severe. In the NWHI, Midway Islands and Kure Atoll are the only islands with rats; no Bulwer's petrel colonies exist on these islands.

There are insufficient data from any of the Hawaiian Island nesting colonies to document population trends, with the exception of Midway Islands, where Bulwer's petrels were once "abundant" (Munroe 1944) and no longer exist.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Habitat	X	Rocky areas and ledges affording holes and crevices. *Sicyos* absent.	Under human-related structures. Under dense vegetation on the surface of the ground.	Abandoned wedge-tailed shearwater burrows.
Predators	X	Absence of cats or rats.	Absence of cats or rats.	Controlled predators where now present.
Isolation	X	Absence of people in colonies during breeding season.	Little human disturbance in colonies during breeding season.	Same
Food		By percent volume in diet: Myctophidae 30.5 Sternoptychidae 29.3 Ommastrephidae 20.7 Crustacea 3.9 Fish 3.6 Exocoetidae 3.2 *alobates sericeus* 2.6	Same	Same

OUTPUT: WEDGE-TAILED SHEARWATER PRODUCTION/MAINTENANCE

DESCRIPTION: Wedge-tailed shearwater (*Puffinus pacificus*) producation and maintenance requires nesting substrate, food, isolation and freedom from introduced predators.

ECOLOGICAL RELATIONSHIPS: Wedge-tailed shearwaters breed on all NWHIs. They are burrow nesters, using the islands from March through December. During this time, they feed within 80 km of their breeding grounds, often in association with tuna schools.

Human-related causes of mortality include historic depredation by Hawaiians and burrow destruction by intruders. Disturbance to nesting birds can cause abandonment of eggs and young with resulting mortality, as well as increased predation on unattended eggs by Nihoa and Laysan finches on these islands. Many young wedge-tailed shearwaters, particularly those from islands offshore of Oahu, perish when attracted to onshore street and automobile lights when they fledge.

Dogs, cats, rats, mongooses, owls and mynas are known to predate wedge-tailed shearwater nests.

Inconsistent censusing methods make the interpretation of historic population trends difficult. It is known, however, that dramatic population declines have occured on Midway in recent years, probably due to rats introducted in 1943. Main Island populations, including those on off-shore islets, have probably fluctuated radically because of Hawaiian hunting pressures, military activities and rats. It is thought that much of the historical breeding range of this species in the Main Islands has been reduced.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

OUTPUT: WEDGE-TAILED SHEARWATER PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Substrate	X	Soil overlain by *Eragrostis*, *Scaevola* and *Ipomoea*, dense *Solanum Sicyos*, or grasses.	Loose sand under rocks. Soil under hardpan.	Rocky areas with de crevices and holes. Surface nesting on sand overlain with scant vegetation.
Predators	x	Exotic plants absent. Rats, dogs, cats, mongooses and mynas absent.	Same	Some predators pres but controlled.
Isolation	X	Colonies free of human presence. Street, auto and other lights not visible from colony.	Same	Minimal human prese lights shaded and distant.
Food		By percent volume in diet: Ommastrephidae 28.2 Carangidae 27.6 Mullidae 19.3 Myctophidae 4.2 Exocoetidae 4.2 Monacanthidae 4.1 Fish 3.2 Nomeidae 1.8 Gobiidae 1.5 Crustacea 1.1	Same	Same

OUTPUT: CHRISTMAS SHEARWATER PRODUCTION/MAINTENANCE

DESCRIPTION: The production and maintenance of Christmas shearwaters (*Puffinius nativitatis*) requires nest cover, food, isolation and freedom from excessive predation and competition.

ECOLOGICAL RELATIONSHIPS: Christmas shearwaters breed on all NWHI except Gardner Pinnacles and Necker Island. They nest on the surface of the ground under various types of cover. Birds use the islands from January through November, during which time they feed offshore. They are well-known to associate with tuna schools.

This shearwater is quite skittish, and when disturbed the bird will often leave the nest. On Laysan Island and Nihoa Island, resident finches eat unattended eggs; this is the most common cause of egg loss on these islands.

Interspecific competition is also responsible for loss of both eggs and chicks. Red-tailed tropicbirds and brown noddies, which nest in similar sites, will occasionally chase Christmas shearwaters off eggs or kill the chicks.

Christmas shearwater populations declined drastically on Laysan Island (Ely and Clapp 1973) and Lisianski Island (Clapp and Wirtz 1975) during the era of feather hunting, and after the extensive destruction of habitat by introduced rabbits in the early twentieth century. It is probable that the Christmas shearwater has never fully regained its former numbers on these colonies, by far the most important colonies in the NWHI. The original vegetation of these islands may have been different from that which occurs today, and this change may have adversely affected recovery. Present numbers seem to have been stable for the past several years, except for the Midway Islands population, which is probably low because of the introduction of the black rat in 1943. (Fisher and Baldwin 1946).

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which result in decreased availability of food for birds, especially during the reproductive season.

OUTPUT: CHRISTMAS SHEARWATER PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting	X	Dense *Scaeola*, rocky outcrops at perimeter of island. In shallow trenches under boards, other vegetation, or rocks. Exotic vegetation absent.	Sheltering debris such as boards, sheets of tin, etc.; may be in conjunction with *Eragrostis-Ipomoea Boerhavia* association. In interior within *Ipomoea*.	*Tournefortia*, *Scaevola* and *Chenopodium*.
Predation		Nihoa finches absent.	Small number of finches present.	Moderate number of finches present.
Competition		Red-tailed tropicbirds and brown noddies absent.	Red-tailed tropicbirds and brown noddies present in small numbers.	Red-tailed tropicbirds and brown noddies present in moderate numbers.
Food		By percent volume in diet: Ommastrephidae 47.4 Mullidae 14.9 Carangidae 13.5 Exocoetidae 10.3 Fish 4.8 Nomeidae 2.5 Holocentridae 2.4 Gonostomatidae 1.5	Same	Same

OUTPUT: SOOTY STORM-PETREL PRODUCTION/MAINTENANCE

DESCRIPTION: Sooty storm-petrel (*Oceanodroma tristrami*) production and maintenance requires nesting habitats, food, and freedom from excessive competition and predation.

ECOLOGICAL RELATIONSHIPS: Sooty storm-petrels are present from October through May and nest on all NWHI except Gardner Pinnacles and Midway Islands. Their presence on Lisianski Island and Kure Atoll is suspected, although not confirmed. They nest in a variety of habitats, depending on availability, though they are generally found in subsurface burrows, under vegetation or in cavities. Sooty storm-petrels probably feed offshore while using the islands.

On Laysan Island, wedge-tailed shearwaters peck and kill late-fledging storm-petrel chicks, forcibly removing them from their burrows. It is likely that the presence of the black rat on Midway Islands accounts for its absence there, and undoubtedly Polynesian rats on Kure Atoll kill adults, young or eggs.

Our knowledge of this species consists largely of colony locations and basic natural history. Reliable information concerning population trends is not available. Ely and Clapp (1973) ventured a guess that populations on Laysan Island are probably roughly equal to estimates at the beginning of this century. However, Hasegawa (1978) noted that the "breeding population appears to have greatly decreased recently" on Torishima Island in the Izus.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Substrate	X	Inaccessible recesses in talus slides. Exotic vegetation absent. Burrows under *Eragrostis* and *Ipomoea*.	Burrows under *Ipomoea* and hardpan. Also within *Ipomoea* cavities and cavities in guano piles. Burrows in soil under *Cynodon*.	Under *Eragrostis* and *Boerhavia*; also in open rubble.
Predators		Cats and rats absent.	Cats and rats absent.	Cats and rats present but controlled.
Competition		Wedge-tailed shearwaters absent.	Wedge-tailed shearwaters in small numbers.	Wedge-tailed shearwaters in moderate numbers.
Food		By percent volume in diet: Unidentified squid 28.8 Stepnoptychidae 23.0 Velellidae 11.9 Argasidae 10.0 Crustacea 5.0 Halobates Sericeus 1.1		

OUTPUT: RED-TAILED TROPICBIRD PRODUCTION/MAINTENANCE

DESCRIPTION: Red-tailed tropicbird (*Phaethon rubricauda*) production and maintenance requires nesting cover, food and freedom from introduced predators and diseases.

ECOLOGICAL RELATIONSHIPS: Red-tailed tropicbirds breed on all NWHI, generally from January through October. They are surface nesters requiring shelter from the sun. This species rarely feeds in association with predatory fishes; instead, it is usually a solitary (Gould 1971) pelagic feeder (Diamond 1975).

Red-tailed tropicbirds are highly vulnerable to rat predation. Egg and nesting loss due to rats have been documented on Kure Atoll (Woodward 1972) and on Midway Islands (Ludwig et. al. 1979). At Johnston Atoll, dogs, cats and ants all affect nesting success to some degree. Avian pox has been found on tropicbirds on Midway Islands.

Current populations of red-tailed tropicbirds are probably fairly stable, but historically they have undergone dramatic fluctuations. On Laysan Island (Ely and Clapp 1973) and Lisianski Island (Clapp and Wirtz 1975), populations crashed after rabbits devegetated the islands in the early part of this century. The birds had been extirpated as a breeding species from Lisianski Island by 1923, when Wetmore visited the island in May and found only two birds and no nests (Clapp and Wirtz 1975). Today, the vegetation has recovered and the birds have repopulated these islands. On Midway Islands, human alteration of the islands is probably the main reason for increased populations. Wetmore (in Fisher 1946) estimated 20 birds in April 1923 on Midway Islands. By 1946, 19,000 birds (10,000 on Sand Island; 9,000 on eastern Island) were estimated for both islands. Today, as estimated 10,000 birds nest there. This decline since 1945 may be due to rat predation. Tropicbird populations have also increased on Kure Atoll (Woodward 1972) and Tern Island (French Frigate Shoals) (Amerson 1971) where there is permanent human habitation. Similar to Midway Islands, increased tropicbird populations on these two islands are probably a result of increased nesting habitat created by structures and introduced vegetation.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

OUTPUT: RED-TAILED TROPICBIRD PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Cover	X	Large, dense Scaevola stands on island perimeter. Exotic plants absent.	In Tournefortia, human debris, Pluchea, and holes and crevices in rock. Also in Eragrostis, Casuarina and Solanum. Lower, less dense Scaevola on island perimeter or Ipomoea over low Scaevola interiors.	Around rock piles; within and beneath human-made structures. Small caves, over-hangs, crevices and holes.
Disease	X	Pox absent.	Same	Pox present but controlled.
Predators	X	Rats, dogs, cats, and ants absent.	Same	Where now present, predators controlled.
Food	X	By percent volume in diet: Exocoetidae 33.5 Ommastrephidae 17.3 Carangidae 14.3 Coryphaenidae 9.7 Molidae 5.0 Scomberesocidae 4.3 Tetradontidae 4.0 Scombridae 3.6 Fish 3.3 Hemiramphidae 2.5 Xiphiidae 1.6 Other squid 0.5	Same	Same

OUTPUT: MASKED BOOBY PRODUCTION/MAINTENANCE

DESCRIPTION: Masked booby (Sula dactylatra) production and maintenance requires suitable nesting substrate, roosting areas and food.

ECOLOGICAL RELATIONSHIPS: Although immatures range widely, adult masked boobies are year-round residents and breed on all NWHI. Most breeding occurs from February through October. Nesting is on the surface, usually in open areas. Breeders and non-breeders roost on the islands in large aggregations or clubs.

Feeding is pelagic, up to 150 km from land (Palmer 1962). Masked boobies rarely associate with one another when feeding, but frequently occur in mixed species foraging flocks (Gould 1971). Generally these feeding flocks occur when skipjack or yellowfin tunas drive smaller prey to the surface. Populations of the masked boody appear to be fairly stable throughout the NWHI, both in recent and historical times, except for an apparent decrease on Necker Island (Clapp and Kridler 1977) for unknown reasons. Generally, this easily counted species seems to have fairly large fluctuations in breeding populations. During the early part of the twentieth century, this species declined severely on Laysan Island (Ely and Clapp 1973) and Lisianski island (Clapp and Wirtz 1975) due to feather hunting. The introduction of rabbits and the devegetation that followed were probably only secondary factors affecting numbers of this ground-nesting species.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which result in decreased availability of food for birds, especially during reporductive season.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting	X	Sand of upper beaches; exotic vegetation absent.	Open, sandy areas in island interiors among Tribulus, Lepturus and Scaevola. Flat, sandy beaches. High, open slopes, ridges and summits of high islands.	High, level rocky substrate or lower rocky areas.
Roosting Areas		Open beaches seperate from breeding areas.	Same	Same
Food		By percent volume in diet: Exocoetidae 58.0 Carangidae 29.0 Coryphaedidae 2.8 Hemiramphidae 2.8 Ommastrephiae 2.6 Scombridae 2.2 Fish 2.2	Same	Same

OUTPUT: BROWN BOOBY PRODUCTION/MAINTENANCE

DESCRIPTION: Brown booby (Sula leucogaster) production and maintenance requires nesting habitat, nest material, food and freedom from introduced predators.

ECOLOGICAL RELATIONSHIPS: Brown boobies breed on all NWHI except Midway Islands. They breed in all months, with a definite peak in spring and summer. Nesting is on the ground in rocky, cliffy areas. In sandy areas, brown boobies breed amoung vegetation, contructing substantial nests. Birds feed inshore year around (Diamond 1978), most within 80 km of the breeding island (King 1970).

Rats are suspected to be a problems on several islands, but definitive information on their effect on brown boobies is lacking. However, Polynesian rats have been observed attacking and killing incubating Laysan albatrosses (Kepler 1969). Therefore, it is believed that brown boobies would also be vulnerable.

Populations of the brown booby appear to be fairly stable throughout the NWHI, both in recent and in historical times, except on Midway Islands. In the late 1930s, it was the most common booby (Hadden 1941). Today, single birds occasionally roost on the island; but none breed. Counts of this conspicuous bird make population esimates on a given visit to a breeding island relatively accurate. However, asynchronous nesting cycles make it impossibe to estimate all nesting attempts during that year from a single visit. Severe vegetation losses on Laysan Island (Ely and Clapp 1973) and Lisianski Island (Clapp and Wirtz 1975), caused by the introduction of European rabbits in the early twentieth century, did not seem to affect the populations of this ground nesting species.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproduction season.

OUTPUT: BROWN BOOBY PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Substrate	X	Rocky strata on slopes or ridges overlooking sharp elevational drops. Inland on grassy, Sesuvium or Chenopodium areas. Exotic vegetation absent.	Open areas within Scaevola. Exotic vegetation absent.	Small, rocky ledges or bare areas of coral rubble. Exotic vegetation absent.
Nesting Material		Vegetation such as grass, twigs, etc. in sandy areas. nothing in rocky areas.	Vegetation.	Material absent.
Predators		Cats and rats absent.	Same	Where they presently occur, cats and rats in reduced numbers.
Food		By precent volume in diet: Carangidae 27.9 Exocoetidae 26.4 Mullidae 15.7 Hemiramphidae 9.9 Ommastrephidae 4.8 Belonidae 4.6 Fish 3.9 Kyphosidae 3.7 Scomberesocidae 2.7	Same	Same

OUTPUT: RED-FOOTED BOOBY PRODUCTION/MAINTENANCE

DESCRIPTION: Red-footed booby (Sula sula) production and maintenance requires suitable nesting substrate, nest material, isolation, food and freedom from introduced predators.

ECOLOGICAL RELATIONSHIPS: Red-footed boobies nest on all NWHI except Gardner Pinnacles. Birds may be found on the islands at all times during the year, although breeding is concentrated in the spring and summer. These boobies are shrub nesters and build nest platforms with a variety of plants. A significant number of immature birds roost on the isands (Woodward 1972).

Birds forage pelagically (Diamond 1978), frequently in feeding flocks which occur when yellowfin or skipjack tunas drive smaller prey to the surface. They probably remain in NWHI waters throughout the year.

Theft of eggs, young and/or nest material from red-footed booby nests by frigatebirds is common, especially when boobies are disturbed from their nests. Rats prey on booby eggs, young and adults on Kure Atoll (Kepler 1967) and Midway islands (Ludwig et al. 1979).

Red-footed booby populations seem to have remained steady over the last century, with the exceptions of declines in breeding birds on Laysan/Lisianski in the 1920's (Ely and Clapp 1973; Clapp and Wirtz 1975). However, the Laysan and Lisianski colonies have recovered and populations on Tern Island (French Frigate Shoals) may have increased recently.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease availability of food for birds, especially during the reproductive season.

OUTPUT: RED-FOOTED BOOBY PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Habitat	X	Mid and lower elevations of higher islands; in low Chenopodium, Sida and Sesbania 3-4' above the ground. Also in Scaevola. Exotic vegetation absent	In Tournefortia and Chenopodium, rubble from humans. In Prichardia on Nihoa. Scaevola-Pluchea in Island interiors. Exotic vegetation absent.	Matted Solanum, Tribulus, Sicyos Scant low-growing Scaevola and Solanum. Exotic vegetation absent.
Nesting Material		Scaevola branches and twigs, Tribulus and/or Sicyos, Boerhavia	Data not available.	Solanum, Tribulus, Sicyos or Boerhavia
Predators		Rats and cats absent.	Rats and cats absent.	Predators controlled where they presently occur.
Food		By percent volume in diet: Exocoetidae 46.3 Ommastrephidae 27.2 Carangidae 10.6 Scombersocidae 4.3 Scombridae 3.1 Fish 2.7 Hemiramphidae 2.1 Molidae 1.8 Mullidae 1.6	Same	Same

OUTPUT: GREAT FRIGATEBIRD PRODUCTION/MAINTENANCE

DESCRIPTION: Great frigatebird (*Fregata minor*) production and maintenance requires nesting habitat, nest material food, isolation and freedom from introduced predators.

ECOLOGICAL RELATIONSHIPS: Great frigatebirds nest on all NWHI except Gardner Pinnacles. Although some birds are on the islands in all months, the breeding season lasts from March to November, during which time twig nests are constructed on vegetation. Feeding usually occurs within 80 km of the breeding or roosting grounds. Juveniles wander, however, adult birds remain in NWHI waters all year (Diamond 1978).

Egg and chick loss among great frigatebirds is often due to disturbance by other frigates pillaging nest material or unmated males attempting to set up breeding colonies within existing ones. This problem can be seriously exacerbated by human intruders in a colony, which cause parent birds to flush from eggs and young, allowing neighboring frigatebirds to raid the nests.

Attacks of black rats (*Rattus rattus*) on incubating red-footed boobies on Eastern Island, Midway (Ludwig et al 1979) suggest that similar problems may also exist for the great frigatebirds which nest in the same area.

Most populations of great frigatebirds in the NWHI appear to have been reasonably stable based on historical records, but there are two important exceptions. The populations of this shrub-nesting species plummetted during the early twentieth century on Laysan Island (Ely and Clapp 1973) and Lisianski Island (Clapp and Wirtz 1975), when introduced rabbits destroyed most of the native vegetation on those islands. It seems that the population on Lisianski Island has recovered, but that on Laysan Island has still not achieved its former levels. The populations on Nihoa Island and Necker Island, where large colonies are scattered along cliff slopes, are particularly difficult to census and consequently only gross changes in nesting populations can be observed. On Tern Island (French Frigate Shoals) the first nesting of this species was attempted in 1982.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

OUTPUT: GREAT FRIGATEBIRD PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Habitat	X	Dense *Chenopodium* and *Sesbania* or large clumps of low, thick *Chenopodium* and *Sida*, higher elevations of canyon and valley walls. High, thick *Scaevola*.	Scattered *Chenopodium* and Sida. Low *Scaevola*, *Chenopodium* *Tribulus* and *Solanum*.	Low, thick *Tribulus* and *Tournefortia* jutting rock crags.
Nesting Material	X	Data Not available.	*Tribulus* stems, *Boerhavia* and *Solanum*.	*Tournefortia* twigs.
Predators	X	Rats Absent.	Same	Rats controlled.
Food	X	By percent volume in diet: Exocoetidae 61.9 Ommastrephidae 13.6 Carangidae 9.2 Hemiramphidae 4.6 Fish 3.3 Coryphaenidae 1.8 Monacanthidae 1.8 Scombersocidae 1.3 Scombridae 1.2	Same	Same

OUTPUT: GRAY-BACKED TERN PRODUCTION/MAINTENANCE

DESCRIPTION: Gray-backed tern (Sterna lunata) production and maintenance requires nesting habitat, food, isolation and freedom from predation and excessive competition.

ECOLOGICAL RELATIONSHIPS: Gray-backed terns return annually to colonies on all the NWHI to breed, arriving as early as December and departing in September. They nest on the ground, often in association with sooty terns, and feed inshore during this time. Cowfish, (Lactoria fornasini) (Ostraciontidae), are especially important in the diet, regardless of season or island. After breeding, gray-backed terns migrate to unknown areas.

If disturbed, this species will leave the nest, exposing the egg or chick to predators, especially finches on Laysan and Nihoa. Rats will also predate gray-backed terns. Sooty terns are known to kill gray-backed chicks, and may compete with adults for nesting sites, as well.

Little pre-20th century mention is made of gray-backed terns. However, it is known that breeding populations declined on Laysan and Lisianski Islands in the 1910's and 1920's following the introduction of rabbits. These populations are believed to have recovered. On Midway Islands, this species is thought to have declined much from pre-World War II levels (Fisher 1946) and has probably not yet recovered.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

OUTPUT: GRAY-BACKED TERN PRODUCTION/MAINTENANCE

LOCTIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Habitat	X	Under Scaevola, Eragrostis and other vegetation. Around perimeters of sooty tern colonies. On sparsely vegetated rocky ledges and ridges within canyons and gulches. Exotic vegetation absent.	Rocky strata ledges and ridges. Broken coral and rubble, high on beach outside sooty tern colony.	Under scattered beach vegetation and along the perimeter of beaches. Open sand on beaches; within sooty tern colony.
Predators		Rats absent.	Same	Rats controlled on islands where they presently occur.
Competition		Sooty terns absent.	Few sooties.	Moderate numbers of sooty terns.
Isolation		Human disturbance in breeding colonies absent.	Same	Minimal
Food		By persent volume in diet: Ostraciontidae 43.0 Exocoetidae 9.7 Fish 7.7 Mullidae 7.6 Clupeidae 5.6 Coryphaenidae 3.9 Ommastrephidae 3.8 Nomeidae 3.5 Crustacea 3.2 Pegasidae 2.4 Caragidae 2.0 Balistidae 1.7 Cheilodactylidae 1.4 Gonorhynchidae 1.1 Chaunacidae 1.0 Istiophoridae 1.0	Same	Same

OUTPUT: SOOTY TERN PRODUCTION/MAINTENANCE

DESCRIPTION: Sooty tern production and maintenance requires appropriate nesting substrate, food, freedom from introduced predators and human disturbance.

DESCRIPTION: Sooty terns (Sterna fuscata) are ground nesting birds with breeding colonies on all NWHI, including Midway Islands and Kure Atoll, from December through September. Although they are pelagic feeders (Diamond 1978; King 1967), feeding concentrations occur around colonies during the breeding season, depending on predatory tunas to drive prey to the surface. Non-breeding birds may stay on the wing for months.

As ground nesters, sooty terns are quite vulnerable to predators. Rats take eggs, young and adults on Midway Islands and Kure Atoll. Great frigatebirds take sooty tern chicks throughout the NWHI. Adult sooty terns will peck and kill neighboring chicks which wander into their territory. Ruddy turnstones (Arenaria interpres) will take eggs (Feare 1976; Dinsmore 1971). On Laysen Island and Nihoa Island, the endemic finches eat unattended eggs and are the prime cause of egg loss. Cattle egrets (Bubulcus ibis) have been observed taking sooty tern chicks at French Frigate Shoals, where they are a vagrant species. Ant infestation also commonly causes egg and chick loss (Brown 1973).

Historically, sooty tern populations appear to have been stable and not significantly differert from present levels, with the possible exception of Midway Islands.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of breeding islands and competing activities which decrease the availability of food for birds, especially during the reproductive season.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Habitat	X	In Eragrostis in island interiors.	At edges and within dense Scaevola clumps. Also in areas vegetated with Tribulus, Boerhavia, Lepidium.	High rocky ledges.
Predators		Finches, cattle egrets, rats and ants absent. Finches present.	Same	Cattle egrets, rats and ants controlled where they now exist.
Food		By present volume in diet: Ommastrephidae 53.4 Mullidae 14.5 Exocoetidae 8.8 Carangidae 6.9 Nomeidae 3.1 Gempylidae 3.0 Fish 2.8 Scombridae 2.5 Monacanthidae 1.9 Holocentribae 1.6 Molidae 1.0	Same	Same

OUTPUT: BROWN NODDY PRODUCTION/MAINTENANCE

DESCRIPTION: Brown noddy (Anous stolidus) production and maintenance require appropriate nesting habitat, nest material, food and an absence of predators.

ECOLOGICAL RELATIONSHIPS: Brown noddies breed on all NWHI between March an October, nesting both on the ground and in vegetation. Nest material include vegetation. During this time, birds feed pelagically (Diamond 1978) i association with tuna schools (Gould 1971), usually within 50 miles of lan (King 1967). Brown noddies are absent from NWHI waters in the winter.

Because of nesting habitat, this species is quite vulnerable to mammalia predators. Among those animals knows to predate brown noddies in Hawaii an elsewhere, are rats (Kepler 1967), rabbits (Brown 1974) and cats (Dorward an Ashmole 1963).

Based on historical records, populations appear to be stable, with severa exceptions. Declines occurred on French Frigate Shoals due to Coast Guar disturbance in the 1960's (Amerson 1971) after rabbits were released in th 1920's. Midway populations have declined since the introduction of the blac rat (Fisher 1946). With the exception of Midway Islands, all thes populations have recovered.

Potentially conflicting outputs are those which include activities resultin in disturbance or habitat alteration of breeding islands and competin activities which decrease the availability of food for birds, especiall during the reproductive season.

OUTPUT: BROWN NODDY PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Habitat	X	On ground in ravines. May be under thick Chenopodium or on rock outcroppings and ledges. Also in shallow holes in cliffs. On ground under vegetation, such as dense Scaevola-Ipomoea or thick Eragrostus.	In Scaevola bush from 1-3' off ground or on ground in association with Tribulus, boerhavia and Solanum.	Bare rock under Eragrostis, Scaevola-Eragrostis or Ipomoea
Nesting Material		Bones, feathers, pebbles, sticks, weed stems, straws.	Scaevola, Eragrostis, bones.	Feathers, Portulaca.
Predators		Rats and other exotic mammals absent.	Rats absent.	Predators controlled where they now exist.
Food		By percent volume in diet: Ommastrephidae 32.8 Mullidae 24.0 Carangidae 10.3 Exocoetidae 9.1 Synodontidae 6.0 Fish 6.0 Gempylidae 2.8 Holocentridae 2.0 Monacanthidae 1.0	Same	Same

OUTPUT: BLACK NODDY PRODUCTION/MAINTENANCE

DESCRIPTION: Black noddy (Anous tenuirostris) production and maintenance requires nesting substrate, nest material, roosting sites, food and freedom from exotic predators.

ECOLOGICAL RELATIONSHIPS: Black noddies breed in winter and spring on all Refuge islands and on Midway. Although exact breeding months vary widely from year to year, generally, eggs are laid as early as November; and chicks may fledge as late as July. The nests themselves, built on cliff ledges or on vegetation, contain some plant material in them. A substantial portion of the population is non-breeding and uses the islands to roost. Both breeding and non-breeding black noddies are inshore feeders (Diamond 1978; King 1967), depending on tuna and nearshore fish such as ulua to drive their prey to the surface.

Black noddies are not particularly vulnerable to introduced mammalian predators. However, avian predators are known, i.e., Mynas.

Historically, populations of these birds have been stable in the NWHI, except for Laysan Island (Ely and Clapp 1973). The devegetation of that island caused depressed populations in the 1920's, although numbers have now returned to previous levels. On Midway Islands, numbers have increased since the beginning of the century due to increased nesting habitat provided by introduced Casuarina litoria.

Other outputs that are potentially conflicting include human activities resulting in disturbance or habitat alteration of breeding islands, and competing activities which lead to decreased availability of food for birds, especially during the breeding season.

OUTPUT: BLACK NODDY PRODUCTION/MAINTENANCE

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Habitat	X	On high islands, ledges on steep cliff faces; Scaevola, Casuarina, Tournefortia, Pluchea, Cocos.	Ledges, Pluchea, Eragrostis or Scaevola.	Rocks, ledges, small growth forms of Scaevola, artificial structures, Eragrostis clumps, Solanum.
Roosting Sites	X	Rocks, Cocos. Tournefortia, Eragrostis, Casuarina	Chenopodium or Brassica.	Beaches, small growth forms of Scaevola, artificial structures.
Predators	X	Mynas absent.	Same	Mynas controlled.
Food	X	By percent of volume in diet: Mullidae 32.7 Synodontidae 21.7 Clupeidae 10.7 Exocoetidae 8.6 Ommastrephidae 6.7 Other fish 5.8 Gobiidae 2.9 Gempylidae 2.3 Gonorhynchidae 1.9 Atherinidae 1.9 Holocentridae 1.5		

OUTPUT: BLUE-GRAY NODDY PRODUCTION/MAINTENANCE

DESCRIPTION: Blue-gray noddy (Procelsterna cerulea) production an maintenance requires nesting substrate, food and isolation from huma disturbance when incubating eggs.

ECOLOGICAL RELATIONSHIPS: In the NWHI, blue-gray noddies breed on Nihoa an Necker Islands, on La Perouse Pinnacle in French Frigate Shoals, and o Gardner Pinnacles. While present all year, they breed primarily in winte and spring. They nest on cliffs and feed inshore year-round. However, foo requirements are most critical from December to June.

Predation by finches probably occurs on Nihoa if adults are flushed fro nests.

Blue-gray noddy populations appear to be stable. However, the Kaula Islan population has decreased; and total loss of the colony may have occurred.

Potentially conflicting outputs are those which include activities resultin in disturbance or habitat alteration of breeding islands and competin activities which decrease the availability of food for birds, especiall during the reproductive season.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Substrate	X	Recesses and hollows on steep cliffs, often just above shoreline.	Rock faces and ledges along valley sides and ridge tops.	Same
Isolation	X	Colonies free from human disturbance during nesting season.	Minimal disturbance of colonies during breeding season.	Same
Food	X	By percent volume in diet: Synodontidae 19.9 Halobates Seruceys 18.8 Crustacea 17.9 Exocoetidae 14.8 Mullidae 14.2 Misc. fish 7.8 Gempylidae 2.0 Bothidae 1.8 Ommastrephidae 1.5	Same	Same

OUTPUT: WHITE TERN PRODUCTION/MAINTENANCE

DESCRIPTION: White tern (Gygus alba) production and maintenance requires adequate nesting substrate, food and freedom from introduced predators.

ECOLOGICAL RELATIONSHIPS: White terns breed on all NWHI. Although breeding occurs throughout the year, it peaks in spring and summer on islands where phenology is known. Eggs are laid on a variety of substrates, depending on availability; nests are not constructed. During this time, approximately March through August, food needs are especially critical in colony waters: non-breeding birds feed far offshore. White terns feed in association with predatory tunas.

Aside from Nihoa and Necker Islands, where estimates are unavailable, populations in the NWHI seem to be fairly stable. However, there was a severe decline on Laysan Island (Ely and Clapp 1973) and Lisianski Island (Clapp and Wirtz 1975) when rabbits were introduced. Populations on these two islands have regained their former levels. The population on Midway has greatly increased during the past 50 years, possibly due to the introduction of Casuarina litorea (Fisher and Baldwin 1946). Present numbers on Midway are probably stable, but may still be growing slowly.

Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration on breeding islands, especially during the reproductive season, and competing activities which result in decreased availability of food for birds.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Nesting Substrate	X	Ledges on sheer cliffs from 50' to 250' above the sea on high islands. Rocks and ledges along the periphery of islands, elevated at least several inches above the ground.	In vegetation such as Scaevola, Casuarina, Cocos and Eragrostis.	Coral Rubble on open beach. Ground under Scaevola or Eragrostis
Predators	X	Rats, mynas and ants absent.	Same	Predators controlled where they now occur.
Food	X	Readily available within feeding grounds. By percent volume in diet: Exocoetidae 22.7, Mullidae 19.5, Ommastrephidae 11.6, Misc. fish 6.1, Hemiramphidae 4.6, Coryphaenidae 4.4, Belonidae 4.0	Same	Same

OUTPUT: ECOLOGICAL MONITORING

DESCRIPTION: Ecological monitoring includes studies, publications a banding. It is used to sample and assess population levels and trends and i causative factors for the observed trends in an effort to maintain seabird a other elements of HINWR at optimum levels. Research which is conducted responsible scientists, educators and cooperating organizations is encourag providing such activities will not threaten or impair a species or ar Collection of scientific specimens is with permit only.

ECOLOGICAL RELATIONSHIPS: Techniques used to monitor populations inclu various methods to sample and measure breeding populations, reproducti success, chick growth rates, egg sizes, adult weights, estimates of feed intervals of chicks and incubation shift lengths. In addition to monitor seabird growth rates, these data may be useful in monitoring fish stocks a environmental pollution.

BASIC ASSUMPTIONS: Parameters used in monitoring must be accurate measurable in the field, should be related to detectable causes such as f shortages or pollution levels, should be limited to as little interpretat as possible. Data must be directly comparable when collected by differe researchers, must be relatively non-disturbing to birds and oth wildlife/wildland elements, must have natural variability that significantly less than the variation cuased by external factors, must biologically feasible and relevant. Research will be according to F established policies: non-disturbing without permit, permitted take on conducted away from monk seals, sea turtles, subject to periodic checks Refuge personnel and results made known to HINWR for future planning.

HINWR has allowed research which is compatable with Refuge objectives to conducted. In 1981, as a participant in the Tripartite Study, FWS hosted research projects in the HINWR. Research has occured in cooperation w other federal organizations i.e. NMFS, FWS-Research; State organizations, DLNR, U.H. Sea Grant Program, HIG, Inst. Marine Biology; other Universiti i.e. UCLA, UC-Davis; and private organizations such as Bishop Museum.

SITE LOCATION: Three methods are described based on site access: 1) sho duration population assessment will be conducted on short visits (5-10 da on periodically planned and otherwise opportunistic visits to NWHI; 2) lo duration population assessment used especially for asynchronic breeders w be used in conjunction with other field camps when possible and/or at le one every five years; and 3) continous study of populations on Tern Isla French Frigate Shoals.

Sources: FWS Draft Report of Monitoring Manual of Seabirds of the NW Unpubl.
HINWR 1983.
HINWR Narrative Report, 1981-1982
Fefer, et.al. 1983.

OUTPUT: ECOLOGICAL MONITORINGS

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Monitoring, studies and site locations	X	Plan 1. Short visits every 1-2 years to all islands	Visits every 5 years to key lands	Same
		Plan 2. Long visit every 2-3 years	Every 5 years	Every 6 years
		Plan 3. Continious study	Same	Same
Site Restricitons	X	Work will not occur within 1000' of E/T species	Work will not occur within 500' of E/T species	Within 300' of E/T species
Banding Site Location	X	Able to band birds on all islands	Able to band birds on 2/3 of all islands	Able to band on 1/2 of of islands
Recovery	X	Able to recover bands on all islands	Able to recover bands on 2/3 of the islands	Able to recover on 1/2 of islands
Access		Access once a year band site	Access every 2-3 years to band site	Access every 5 years to band site

OUTPUT: ENVIRONMENTAL EDUCATION

DESCRIPTION: Students and teachers involved in formal environmental educ (EE) programs with a school district or college in which refuge 1 resources and facilities provide a place to actively study and learn , ecology and environmental relationships and enhance environmental aware understanding and appreciation.

ECOLOGICAL MONITORING: Environmental Study Areas are places where stu and teachers can become involved in an organized environmental educ. program. Locational criteria are not aimed at specific studies but su locations where marine and terrestrial ecosystems interact.

Because of the possibility of disturbing and disrupting seabird nestin sea turtle/monk seal haul-out behavior, EE sites must be located on spe sites. Shelters and work benches/tables would be included as su facilities.

The areas should provide places for students to enrich their course of as presented by their teacher. Areas also provide locations where the r staff could conduct EE workshops. For the most part, refuge manager staff serve as coordinators, consultants and resource persons. The ma number of people using the area at one time would be 20.

BASIC ASSUMPTIONS: Activities will occur year-round. Sites should be from hazards, nesting and endangered species.

SITE LOCATION: Kilauea Point Wildlife Administrative Site is the existi site on Kauai. It is easily reached by local, regional and national educ and is the closest existing site to the remote NWHI. No other EE sit Oahu are currently being considered.

Sources: Grays Lake NWR Master Plan

OUTPUT: ENVIRONMENTAL EDUCATION

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
DIVERSITY		3 or more habitat types adjacent to discussion area	2 or more habitat types	Same
HAZARDS		Within fenced-in area from cliffs, deep water, sharks, nesting species	Same	Same
ACCESS		Area within 300' of parking area	Area within 100'	Within 2000'
SLOPE		0-2%	2-5%	5-10%
FACILITIES		Within 1/4 mi. of restrooms, drinking water, shade	Within 1/2 mi. of same	Within 1/2 mi. of same
NESTING SPECIES		2 or more nesting sp. within 300'	1 or more sp. within 400'	1 or more sp. within 500'
SEASON		Suitable for use year-round	Suitable for 9 months	Suitable for 6 months
LAND USE		Over 1/2 mi. from other activities	Infrequent interuption	Same
VEGETATION		Within grass or sand area	Within sand area	Same

OUTPUT: INTERPRETATION

DESCRIPTION: Interpretation is an educational activity aimed at reveali ecological relationships, examining systems through conducted nature tour: underwater tours, etc. On-site interpretation is preferred but not alwa possible. However, the use of audiovisual media, exhibits and presentatio by experienced personnel is highly desirable and a necessary component to of site programs. More people may be reached and exposed to the ecological a human relationships through these media.

ECOLOGICAL RELATIONSHIPS: Due to the sensitive nature of island ecosystem endangered species and difficult logistics, off-site interpretive centers wi reach more people. The use of quality audiovisual material will enhance t interpretive experience and address priority and regional topics in a mo comprehensive manner for more people than would on-site interpretatio Consequently, less environmental impact to fragile ecosystems would resul Conducted tours and talks will usually start or center at the Refu Headquarters when possible, with access from there being by foot. Tour rout will include sites of public interest, scenic vistas, locations wi informative signs and structures. The quality of the experience is the mo important factor, hence, sites with important ecological components a diversity will be emphasised without disturbing the wildlife. The maxim number of people should be less than 20.

BASIC ASSUMPTIONS: Interest exists in populations limited by financial a time constraints. Programs will be conducted by those with direct experien with the Northwestern Hawaiian Islands. Tour areas will be placed well awa from unprotected sensitive areas, areas frequented by endangered specie areas of potential hazard and refuge work or storage areas.

Interpretive tours will be led by personnel familiar with refuge poli regarding sensitive areas.

SITE LOCATIONS: Kilauea Point Wildlife Administrative Site is the close interpretive site that is easily reached by local, regional and nation groups.

Tern Island is a staffed refuge field station located at French Frigat Shoals. Special airplane charters are necessary to reach this site. On-si interpretive programs are not currently available there.

Source: Refuge Manual
Kern and Pixley NWR Master Plan, Locational Criteria Forms

INTERPRETIVE CENTER (OFF-SITE)

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Off-site Location	X	Within large urban center	Within large rural district	Same
On-site Location		Greater than 1000' from endangered species, hazards	Greater than 500' from endangered species, hazards	Same
Access	X	Reachable by public transport	Reachable by private transportation	Same
Points of Interest	X	Several multimedia events	One or more media events	Same
Area		Seating for at least 60	Seating for 40	Seating for 20

OUTPUT: PHOTOGRAPHY/JOURNALISM/ART

DESCRIPTION: On-site visitors engaged in wildlife-oriented photograph journalism and art. Includes both on-site activities and at Kilauea Point.

ECOLOGICAL RELATIONSHIPS: Diversity of habitat and existing wildli concentrations, peak nesting seasons and proximity to vistas are k locational criteria. Other considerations are accessibility, avoidance hazards and conflicts, quality of viewing sites, proximity of blinds nesting species, ease of monitoring activities of recreationists, lack disturbance to environment and wildlife but with close enough proximity wildlife/wildlands for full appreciation.

Photographic opportunities are best in early morning and evening, when lig is less intense. Photo opportunities are available at any point on the Refu but may be optimized by the use of blinds. This would concentrate useage specific areas for ease in monitoring effects.

BASIC ASSUMPTIONS: Refuge personnel will be available to monitor nc consumptive land uses on an opportunistic basis. Design of blin should be considerate of surrounding landscape. Other considerations shou include handicapped access, vandalism, maintenance and construction metho Users will avoid critical nesting grounds, sensitive sites and proximity endangered species. Users will be required to file for special use permi Size of groups will be limited. Group tours will be responsible f their own food; lodging will be provided on Tern Island for a fee.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Wildlife	X	Areas with excellent wildlife viewing/ photographing without disturbance	Areas with good wildlife viewing/ photographing without disturbance	Areas with fair wildlife viewing/ photographing with out disturbance
Natural Diversity (Habitat)		4 or more natural features nearby	3 or more natural features nearby	One or more natural features nearby
Access (On-site)	X	Charter boat and airplane	Charter airplane, refuge boat	Space available FWS flight. Refuge boat
Visual		High-quality visual elements in view, no human development in sight	Quality elements in view, little human development in sight	No negative elements in view

OUTPUT: OTHER RECREATION

DESCRIPTION: Limited recreational opportunity in designated areas for authorized personnel. Includes swimming, snorkelling, scuba, jogging and volleyball.

ECOLOGICAL RELATIONSHIPS: Such activities will be limited to designed areas on Tern Island and will be managed in ways which will avoid disturbance to wildlife and/or other habitats.

BASIC ASSUMPTIONS: Non-wildlife oriented recreation will be limited to authorized personnel: those stationed on Tern Island with FWS or other researchers with Special Use Permits. Also may include commercial fishermen stationed on motherships, fishing vessels, service vessels, aircraft, etc. at Tern Island for extended periods.

SITE LOCATIONS: Limited solely to designated area of Tern Island.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Wildlife	X	Not within sight or earshot of E/T animals.	Within 500' of E/T animals.	Same
Facilities	X	Existing runway.	Same	Same

OUTPUT: COMMERCIAL FISHING

DESCRIPTION: Commercial use of a renewable fishery resource outside Refuge boundaries by rod and reel, baited lines, various nets, traps and spearguns. This includes mothership and commercial charter boat fishing.

ECOLOGICAL RELATIONSHIPS: Maintaining and enchancing existing resource potentials are priorities of HINWR. NWHI seabirds consume an estimated 410,000 metric tons of fish. Their nesting islands and atolls are vulnerable to human disturbances such as pollution and the introduction of exotic or alien organisms. If it could be demonstrated that commercial fishing would not lead to a significant decline in both fish and wildlife stocks, fishing might be permissible within the Refuge on a limited entry, seasonally determined basis. Only permitees who have demonstrated a willingness to follow guidelines and objectives of HINWR would be seasonally renewed.

BASIC ASSUMPTIONS: The HINWR, via Tern Island, will allow and/or provide radio communication, emergency flights, limited transport of parts and people to those involved with the industry.

An emergency buoy inside Refuge boundaries will be available for use in emergencies.

SOURCES:

Fefer et al. 1982.
Okamoto and Kanenaka. Preliminary Report on the Nearshore Fishery Resource Assessment of the NWHI, 1977-1982. In proceedings of the Second Symposium on Resource Investigations in the NWHI, Volume 1, R.W. Grigg and K.Y. Tanone, ed. pp. 123-143.
DLNR. 1979.

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Site Locations	X	Areas manageable by on-site personnel	Areas manageable by off-site personnel	Same
Access	X	Charter boat and plane (people and supplies)	Charter boat	Same
Wildlife	X	Activity conducted 1000' from endangered species	Activity conducted 500' from endangered species	Same

1978 LANDINGS AND POTENTIAL SUSTAINABLE YIELDS IN THE HAWAIIAN REGION (MODIFIED FROM HAWAII FISHERIES DEVELOPMENT PLAN, 1979)

SERIES/GROUP	1978 LANDINGS		ADDITIONAL POTENTIAL*		TOTAL POTENTIAL*	
	1 ST	2 MT	ST	MT	ST	MT
SKIPJACK (AKU)	3,397	3,082	10,000	9,072	13,400	12,156
ALBACORE TUNA (SURFACE)	285	258	5,000	4,536	5,285	4,794
ALBACORE (SUB-SURFACE)	63	57	3,000	2,722	3,063	2,779
BIGEYE TUNA (AHI)	230	209	5,000	4,536	5,230	4,745
YELLOWFIN TUNA (AHI)	1,061	963	500	454	1,561	1,417
BOTTOM FISH (INSHORE)	522	474	450	408	972	882
BOTTOM FISH (DEEP SEA)	385	349	500	454	885	803
SEAMOUNT/ GROUNDFISH	0	0	2,000	1,814	2,000	1,814
AKULE	208	188	225	204	432	392
OPELU	150	136	500	454	650	590
SHARKS	11	10	300	272	311	282
BILLFISH	371	336	500	454	871	790
SPINY LOBSTER	17	15	350	318	367	333
SHRIMP (DEEP SEA)	1	1	2,000	1,814	2,000	1,815
KONA CRAB	14	13	25	23	39	36
TOTAL	6,712	6,089	30,350	27,533	33,622	

* - UTILIZING THE CONSERVATIVE (MINIMUM) VALUES GIVEN IN HAWAII FISHERIES DEVELOPMENT PLAN (1979), TABLE III-1.

1 - ST = SHORT TONS (2000 LB) = 0.9072 x METRIC TONS
2 - MT = METRIC TONS (2205 LB) = 1.102 x SHORT TONS

OUTPUT: RECREATIONAL FISHING

DESCRIPTION: Noncommercial, consumptive or nonconsumptive use of a renewable fishery resource by rod and reel and/or speargun. This activity provides the public with high quality, wildlife oriented recreation in a pristine setting with relatively unexploited fish stock.

ECOLOGICAL RELATIONSHIPS: All fishing programs will be reviewed to determine if they affect, adversely or beneficially, endangered species or their habitats. See Non-consumptive commercial use (charter SCUBA diving).

BASIC ASSUMPTIONS: Pending further analysis:

See Non-consumptive commercial use (charter SCUBA diving)
All safety requirements must be met.
Fishing only in designated areas.
No fish may be sold.
Catch and release fishing will be favored,
Fishing plan proposed to regional Office will be adopted.

Sources: Tern Island Report
Refuge Planning Manual

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Site Locations	X	Areas off-refuge supported by on-site personnel	Areas off-refuge manageable by off-site personnel	Same
Access		Charter boat and airplane	Charter plane	Same
Wildlife	X	Areas with excellent fishing potential	Areas with good fishing potential	Areas with fair potential

OUTPUT: OTHER CONSUMPTIVE USES

DESCRIPTION: Consumptive use is taken here to include but not limited to salvage for glassballs, shells, bottles and other historical artifacts including war paraphernlia, ship salvage, precious and nonprecious coral harvest.

ECOLOGICAL RELATIONSHIPS: Such activities will be managed in ways which will avoid serious disturbance to wildlife and/or plant communities. Such activities will be subject to state and federal laws. All activities will be reviewed to determine if they affect, adversely or benefically, endangered species (Section 7 consultation) or their habitats.

BASIC ASSUMPTIONS: Special-use permits will be issued for all activities. Activities will occur in designated areas. The use of metal locators will not be allowed because of potential conflicts with antiquities legislation and habitat disturbance. Consumptive use will be in accordance with Refuge objectives. Said useage will be subject to state and federal laws including taxation.

SITE LOCATION: Various activities will be located in specific areas.

Source: Refuge Planning Manual

OUTPUT: OTHER CONSUMPTIVE USES

LOCATIONAL FACTORS	IMPORTANT FACTOR	OPTIMUM	ACCEPTABLE	MINIMUM
Site Locations	X	Areas manageable by on-site personnel	Areas manageable by off-site personnel	Same
Access	X	Charter boat and plane	Charter boat	Same
Wildlife	X	Activity conducted 1000' from endangered species	Activity conducted 500' from endangered species	Same

OUTPUT SUMMARIES

VULNERABLE SPECIES
OUTPUT: HAWAIIAN MONK SEAL PRODUCTION/MAINTENANCE

1. Description: Species in danger of extinction deriving special protection and management emphasis pursuant to the Endangered Species Act of 1973, as amended.

2. Existing Levels/Distribution: Aerial and beach counts of monk seals in the NWHI have declined from approximately 1,200 animals in 1958 to 550-600 animals in 1982. Studies involving identification of known animals at Laysan and Lisianski Islands indicate beach counts represent approximately 1/3 of the total island population, leading to the conclusion that the NWHI population is currently between 1,500-1,800 animals. The 1982 counts (typical of recent years) of seals at various NWHI are as follows:

Nihoa Island	8
Necker Island	24
French Frigate Shoals	297
Gardner Pinnacles	6
Laysan Island	90
Lisianski Island	81
Pearl and Hermes Reef	29
Midway Islands	2
Kure Atoll	24
Total 1982 Count	561

3. Locational Criteria: Monk seals haul out and pup on lava benches and sandy beaches. Feeding occurs in shallow nearshore waters and to depths exceeding 30 fathoms. (See Locational Criteria Form.)

4. Potential for Continued/Increased Production and Maintenance: Documented population decline appears attributed to the combination of natural and human-related factors including disturbance to hauling beaches, shark predation, mobbing by overly aggressive males and disease. Decline is particularly dramatic on western atolls and islands. Mortality of pups and adult females is particularly serious. Skewed sex ratios (more males) in western atolls inhibits potential for population stabilization or recovery. There appears to be little that can be done to enhance hauling or feeding habitat. Recovery is dependent upon control of limiting factors and reestablishment of balanced age and sex ratios in each of the different subpopulations. Major population manipulation (shark control, culling males, transplantation) is possible if decline continues.

5. Demand/Justification for Continued/Increased Production and Maintenance:

   a. Mandates/Policies: Endangered Species Act (Federal/State), Marine Mammal Protection Act, NWRS Administration Act, Research Natural Area and Monk Seal Recovery Plan.

   b. Historic/projected public use demand: Principal demand has focused on research value. Historic harvest, resulting in near extinction, was terminated near the turn of the century. Research interest is likely to continue/expand as species remain in jeopardy. Biological characteristics of this unique tropical seal are also of research and educational interest. Considerable latent demand for observation opportunity might be expected if access was made available.

   c. Potential/projected economic return: Current mandates prevent harvest for economic use. Research/educational interest generate substantial project funding (principally federal government funds).

6. Conflict with Other Outputs: Principal conflicts occur with outputs that create disturbance to seals on hauling/pupping beaches and harassment or potential mortality threats within feeding habitats. Certain fishery outputs may conflict through direct or indirect impacts on food supply/habitat. Certain recreational and perhaps scientific/educational outputs may conflict by causing excessive harassment on haul-out areas.

7. Objective/Strategies: The intermediate goals stated in the Recovery Plan direct management/research efforts to 1) stop the downward trend in numbers of monk seals in the central and western portions of the species' range; 2) take action to develop positive growth rates at most or all islands; 3) take action to identify or prevent human activities that could result in degradation or destruction of vital habitats; and 4) determine the population level which will result in maximum net productivity.

   Basic strategies to deal with these problems include 1) identify and mitigate natural factors contributing to decreased survival and productivity; 2) characterize marine and terrestrial habitat requirements; 3) monitor population trends; 4) document and where possible, mitigate the direct and indirect effects of human activities on monk seals; and 5) implement programs leading to conservation and recovery.

VULNERABLE SPECIES
OUTPUT: GREEN SEA TURTLE PRODUCTION/MAINTENANCE

1. Description: (See definition of endangered species production/maintenance).

2. Existing Levels/Distribution: The Hawaiian population of green sea turtles was historically distributed throughout the 2,450 km Hawaiian Archipelago. Taking of sea turtles for food, oil and shell products persisted throughout the era of Polynesians and increased with the influx of people from other parts of the world.

   Severely reduced populations remain today with over 90% of the extant breeding population found at French Frigate Shoals (about 300 breeding females). Because all mature females do not breed each year, the total mature female population at French Frigate Shoals is probably about 750 (Weatherall 1983). An estimated total of not more than 20 females nest annually at Laysan and Lisianski Islands and Pearl and Hermes Reef.

3. Locational Criteria: Nesting green sea turtles require suitable beaches (sloped with well-drained sand) free from exotic and excessive numbers of natural predators. Major food resources are various species of algae found at inshore areas. The main island areas have larger standing crop densities of the preferred algae species. Basking areas (sand beaches, beach rock slabs and sand bars) are important also. (See Locational Criteria Form).

4. Potential for Continued/Increased Production and Maintenance: Continued production and maintenance will require continued protection of the habitats on the NWHI and the nearshore areas of these and the main Hawaiian Islands and enforcement of regulations protecting the turtles. There are opportunities to increase nesting populations on many of the NWHI, however restoration of major nesting colonies on the main islands appear unlikely. A potential exists for increasing the number of turtles nesting at Laysan and Laysan and Lisianski Islands and Pearl and Hermes Reef. This may require artificial stocking, "headstarting" (raising hatchlings in captivity to a juvenile size), some predator control, and continued enforcement and educational efforts and restricting human access/disturbance.

5. Demand/Justification for Continued/Increased Production and Maintenance:

   a. Mandates/Policies: Endangered Species Act (Federal/State), NWRS Administration Act, Research Natural Area, Green Sea Turtle Regulations (State).

   b. Historic/projected public use demand: The exploitation of green sea turtles was a traditional use, strictly regulated for the nobility and priests of native Hawaiians. Turtles were captured by hand, or with spears or nets. The populations around the main islands were taken. Traditional controlled take gave way in the mid-1800's to more intensive and commercial take, including around the NWHI. Regulation to protect the remaining population was adopted in 1974 by the State of Hawaii and in 1978 by the Federal Government A small amount of interest in renewing harvest of turtles persists. Some people would like to see subsistence catch regulations developed to meet traditional native Hawaiian demands. Research interest has been ongoing and promises to continue. There may be some demand for observation opportunities if access can be made available.

   c. Potential/projected economic return: Current mandates prevent harvest for economic use. There could be a potential for a small economic return from harvesting a sustained yield from a non-endangered population. Research/educational interest generates some project funding (principally federal government funds).

6. Conflicts with Other Outputs: Principal conflicts involve outputs that could interfere with nearshore feeding or create disturbance to nesting or basking turtles or the nests. These include bait fishing, nature tours and sport fishing. Certain fishery outputs may conflict through threat of entanglement in nets. Any output which potentially presents threat of exotic predators becoming established on the islands may conflict.

7. Objectives/Strategies: No Recovery Plan has yet been prepared for the Pacific populations of green sea turtles. Thus, management objectives at this point are directed at first maintaining existing populations, particularly the viable breeding/nesting population at French Frigate Shoals. In addition, efforts will be made to encourage or actively restore nesting populations at other major atolls in the NWHI.

Strategies to achieve these objectives will start with protection of all the atolls with current or historic nesting use. Additional management efforts may include artificial stocking in suitable but unused or underused habitat, predator control, manipulation of hatchlings, etc.

1. Description: Species in danger of extinction deriving special protection and management emphasis pursuant to the Endangered Species Act of 1973, as amended.

2. Existing levels/Distribution: Laysan ducks are endemic to Laysan Islands. These birds are vitally linked to the lagoon ecosystem and its surrounding mud/sand flats and vegetation. The Laysan duck population has been severely threatened by a number of factors since the late 1800's. Following the prohibition on hunting, establishment of a sanctuary and rehabilitation of the habitat, the Laysan duck population increased to several hundred. Population estimates fluctuate some but the population appears to be relatively stable.

3. Locational Criteria: The lagoon system, including much of its invertebrate fauna, is vital to the survival of the duck. Feeding occurs in the lagoon and along the shoreline. These birds also depend on the shrub and grass vegetation surrounding the lagoon for cover. (See Locational Criteria Form.)

4. Potential for Continued/Increased Production and Maintenance: Relatively stable populations appear to approach or meet the carrying capacity of the available habitat for Laysan ducks. The chief concern is not to increase populations but to assure continued existence of the duck population through maintenance of a viable lagoon system. The lagoon system must be thoroughly understood so unnatural changes can be recognized and trends in deteriorating habitat conditions can be prevented.

5. Demand/Justification for Continued/Increased Production and Maintenance:

   a. Mandates/Policies: Endangered Species Act (Federal/State), NWRS Administration Act, Research Natural Area, Laysan Duck Recovery Plan and Migratory Bird Treaty Act.

   b. Historic/projected public use demand: Historic use has been limited to a very few people. Laysan ducks were killed for food and sport by members of the early guano operations and feather traders. Since that era, use has been confined to research, an interest which is likely to continue at sporadic intervals. A limited amount of interest may exist for observation

opportunities if access to Laysan Island is available. Various zoological gardens or similar institutions are interested in maintaining or obtaining collections of these birds.

   c. Potential/projected economic return: Current mandates prevent consumptive use; in addition, there are no current demands for such use. Research/educational interest generates some project project funding (principally federal government funds).

6. Conflicts with Other Outputs: Principal conflicts occur with outputs that require frequent human access to Laysan Island or modification of the island. Additional conflicts arise with outputs which result in additional threats of harmful exotic organisms becoming established on the island.

7. Objectives/Strategies: Because of the unique nature of the threats to this species, the Recovery Plan objectives focus on two points. The maximum population of 500-600 does fluctuate some but management efforts will simply attempt to maintain this natural population. To achieve this, efforts will be directed at preventing exotic influences from disturbing the delicate environment, particularly the lagoon system. In addition, captive breeding stock will be maintained as a backup in the event a disaster hits the population.

   The thrust of recovery management will be an intensive program to prevent introductions of exotics and effects of people coupled with careful preparation to eliminate exotics if they do colonize the island. In addition, the physical/chemical and biological conditions of the lagoon will be monitored in relation to conditions for the Laysan duck. Population monitoring techniques will be developed and scheduled surveys conducted.

1. Description: Species in danger of extinction deriving special protection and management emphasis pursuant to the Endangered Species Act of 1973, as amended.

2. Existing Levels/Distribution: Twelve line transect censuses from 1966 to 1976 yielded population estimates between 6,764 and 20,802 (average 10,087). More recent counts (1983) have resulted in similar population estimates (11,047). Roughly 10,000 appears to be the carrying capacity of the habitat on Laysan Island. These birds are distributed throughout the terrestrial portions of the island.

   One hundred and eight Laysan finches were introduced to Southeast Island, Pearl and Hermes Reef, in 1967. This population increased and appears to have stabilized at about 500 birds. Individual birds have emigrated to neighboring islands in Pearl and Hermes Reef. There are now small populations of about 50 birds each on North, Grass, Seal and Kittery islands.

3. Locational Criteria: Laysan finches nest primarily in clumps of bunch grass (*Eragrostis* sp.), although they will use other vegetation types. They feed on many parts (seeds, tender shoots, flower heads) of various plants, invertebrates, and sometimes seabird eggs and carrion. (See Locational Criteria Form.)

4. Potential for Continued/Increased Production and Maintenance: All populations appear to be at the full carrying capacity of the habitat. Populations also appear to be relatively stable over the long term, despite some fluctuation from year to year. Recovery plan objectives aim towards maintaining current distribution and abundance. There are no plans for increasing production and maintenance.

5. Demand/Justification for Continued/Increased Production and Maintenance:

   a. Mandates/policies: Endangered Species Act (Federal/State), NWRS Administration Act and Research Natural Area.

   b. Historic/projected public use demand: There are no historic uses other than limited scientific investigations (population censuses, specimens collected, life history observation). Scientific

   interest is likely to continue, to assist as needed, with management of this endangered species. There could be some small demand for observation opportunities, depending on access availability.

   c. Potential/projected economic return: There are no known consumptive uses of this species. This species is a potential attraction for commercial nature tours. Research/educational also interest generates some project funding (principally federal government funds.)

6. Conflicts with Other Outputs: Principal conflicts occur with outputs which involve either frequent or illegal human access to Laysan Island or the potential of harmful exotic organisms becoming established on the islands.

7. Objective/Strategies: Because of the unique nature of the threats to this species, the Recovery Plan objectives simply require that the existing habitat and population be maintained at current levels. The key component of the recovery objective is to guarantee to the extent possible, that exotic influences (organisms, effects of people) are not allowed to change the nature of Nihoa Island. An intensive program to prevent introductions of exotics and effects of people, coupled with careful preparation to be able to eliminate exotics in the event they do colonize the island, will be the prime strategy for recovery.

. Description: Species in danger of extinction deriving special protection and management emphasis pursuant to the Endangered Species Act of 1973, as amended.

. Existing Levels/Distribution: Line transect censuses, conducted between 1964 and 1975, generated population estimates of Nihoa finches from 1,318 to 6,686. The only census since then, conducted in 1981, provided a population estimate of 1,608 birds. The total population probably fluctuates between 2,000 and 4,000 birds.

. Locational Criteria: Nihoa finches appear to nest most often in holes of cliffs or rocky outcroppings. Foods include seeds, tender shoots, and flower heads of plants, invertebrates, and also seabird eggs. (See Locational Criteria Form.)

4. Potential for Continued/Increased Production and Maintenance: Nihoa finches appear to be fully occupying all suitable habitat on Nihoa Island. The population also appears to be relatively stable over the long term, although census data from different years indicate that the population may fluctuate quite a bit. Recovery Plan objectives aim toward maintaining the current population level. There are no plans for increasing production and maintenance on the refuge (with the potentia exception of transplanting birds to another island).

5. Demand/Justification for Continued/Increased Production and Maintenance:

   a. Mandates/policies: Endangered Species Act (Federal/State), NWRS Administration Act and Research Natural Area.

   b. Historic/projected public use demand: No historic use other than very limited scientific investigations (population censuses, a few specimens collected, life history observation). Scientific interest is likely to continue, assisting as needed, with management of this endangered species. There is a possibility of a small demand for observation opportunities; however, access to Nihoa Island is difficult and relatively dangerous.

   c. Potential/projected economic return: There are no consumptive uses of this species; in any case consumptive uses of endangered species are illegal. This species could potentially be one attraction for commercial nature tours of various kinds, although access to Nihoa Island is difficult and relatively dangerous. Research/educational interest generates a small amount of project funding (principally federal government funds).

6. Conflicts with Other Outputs: Principal conflicts occur with outputs which involve either frequent or illegal human access to Nihoa Island or the potential of harmful exotic organisms becoming established on the island.

7. Objectives/Strategies: Because of the unique nature of the threats to this species, the Recovery Plan objectives simply require that the existing habitat and population be maintained at current levels. The key component of the recovery objective is to guarantee, to the extent possible, that exotic influences (organisms, effects of people) are not allowed to change the nature of Nihoa Island. An intensive program to prevent introductions of exotics and effects of people, coupled with careful preparation to be able to eliminate exotics in the event they do colonize the island, will be the prime strategy for recovery.

. Description: (See definition of endangered species production/maintenance.)

. Existing levels/Distribution: Line transect censuses between 1964 and 1973 produced population estimates from 41 to 625. A more recent census (1981) indicates an estimated population of about 338 birds. Apparently a more or less stable population of between 200 and 500 birds occupies the island. They appear to be confined mostly to the dense, shrubby vegetation which occupies about 40 hectares (64%) of the islands.

. Locational Criteria: Nihoa millerbirds are associated with dense stands of Sida sp. and Chenopodium sp. shrubs. They place their nests within the densest portion of the plants. Millerbirds forage within the shrubs, in the leaf litter and on the soil surface, taking various insects and other invertebrates. (See Locational Criteria Form for further detail.)

1. Potential for Continued/Increased Production and Maintenance: Nihoa millerbirds are endemic to Nihoa Island and appear to be fully occupying available habitat on the Island. The population may fluctuate some but it appears to be stable over the long term at around the carrying capacity of the island for millerbirds. The Recovery Plan for the Nihoa millerbird focuses on assuring the continued existence of this population. Expansion of the population is not a primary need except for the possibility of establishing buffer populations. The option will be kept open to move the millerbird to Laysan Island where a closely related subspecies once occurred.

5. Demand/Justification for Continued/Increased Production and Maintenance:

   a. Mandates/policies: Endangered Species Act (Federal/State), NWRS Administration Act, Research Natural Area.

   b. Historic/projected public use demand: No historic use other than very limited scientific investigations (population censuses, a few specimens collected, life history observation). Scientific interest is likely to continue, assisting, as needed, with management of this endangered species. There is a possibility of a small demand for opportunities to observe this species, however access to Nihoa Island is difficult and relatively dangerous.

6. Conflicts: Principal conflicts occur with outputs that involve either frequent or illegal (unregulated) human access to Nihoa Island or the potential increased risk of introduced organisms becoming established on Nihoa.

7. Objectives and Strategies: Because of the unique nature of the threats to this species, the Recovery Plan objectives simply require that the existing habitat and populations be maintained at current levels. The key component of the recovery objective is to guarantee to the extent possible that exotic influences (organisms, effects of people) are not allowed to change the nature of Nihoa Island. An intensive program to prevent introductions and the effects of people, combined with careful preparation to be able to eliminate exotics in the event they do colonize the island, will be the prime strategy for recovery.

OUTPUT: SENSITIVE SPECIES (SOOTY STORM-PETREL) PRODUCTION/ MAINTENANCE

Description: Species, subspecies or distinct populations that could become federally listed as endangered or threatened in the forseeable future throughout all or in a significant portion of the ranges without active management or removal of threats. Currently, the sooty storm-petrel is the only NWHI species designated as sensitive.

Existing Levels/Distribution: Sooty storm-petrels are restricted to the North Pacific Ocean, with breeding colonies in the NWHI and in Japan, on the Volcano, Izu and possibly Bonin Islands. Storm-petrels are difficult to census accurately, and both existing and historical estimates are very approximate. For this reason, reliable information on population trends is not available. However, breeding populations on Torishima Island (Izu Islands) have greatly decreased recently. Estimates of breeding populations in the NWHI (1979-1982) are as follows:

Nihoa	2000-3000 pairs
Necker	+
French Frigate Shoals	+
Gardner Pinnacles	0
Laysan	500-2500 pairs
Lisianski	?
Pearl and Hermes Reef	1000-2000 pairs
Midway	0
Kure	?
Total	3500-7500 pairs

3. Locational Criteria: Sooty storm-petrels are present on the islands only during the breeding season. They nest in a variety of habitats including subsurface burrows, under vegetation and in natural rock crevices. They probably feed offshore while associated with the islands.

4. Potential for Continued/Increased Production and Maintenance: Continued production and maintenance will require continued protection of the breeding habitats in the NWHI. Sooty storm-petrels have been recorded on Kure Atoll, but no nesting has been documented. Their absence there and on Midway Islands is probably due to rats, which kill adults, chicks and eggs. Predator eradication and/or control programs are necessary to encourage breeding on these islands.

OUTPUT: SENSITIVE SPECIES (SOOTY STORM-PETREL) PRODUCTION/ MAINTENANCE (Continued)

5. Demand/Justification for Continued/Increased Production and Maintenance: Breeding populations of sooty storm-petrels are small and limited to a few localities. The small colonies in the NWHI probably comprise a significant proportion of the world population. Protection of existing nesting habitat and efforts to increase the limited distribution are necessary to prevent this species from becoming threatened or endangered.

6. Conflicts with other Outputs: Principal conflicts occur with outputs that harass birds on the nesting islands or destroy nesting habitat. Certain fishery outputs may conflict by affecting food availability and accidentally introducing predators.

7. Objectives and Strategies: Present breeding populations should be protected by restricting access to colonies during the reproductive season. Expansion of these populations should be encouraged by urging the institution of persistent rat control measures at Midway Islands.

ENVIRONMENT
OUTPUT: CULTURAL RESOURCE PROTECTION

Description: This output involves preservation of Polynesian archaeological sites and artifacts, as well as historic artifacts. Religious use of sites is also an aspect of their protection.

2. Locational Criteria: House sites, terraces, burial caves and ceremonial structures are found on Nihoa; Necker has numerous maraes (temples). Evidence of past commercial and military use may exist on all NWHI.

3. Existing Levels/Distribution: The Bishop Museum is assessing archaeological sites on Nihoa and Necker; no on-site visitation by nonresearchers has been allowed. Historical artifacts on other NWHI have not been cataloged, nor has their collection been allowed.

4. Potential for Continued/Increased Production and Maintenance: Bishop Museum archaeologists could complete assessments for all NWHI. Hawaiian sites would be available, when logistically feasible, to the public for religious purposes.

5. Demand/Justification for Continued /Increased Production and Maintenance: Groups have requested access to religious sites on Nihoa and Necker. Approval of these would likely lead to more requests for visitation.

6. Corflict: Nesting seabirds and endangered land birds are most likely to be affected by human visitation to islands. Seals and turtles also may be disturbed by landings and departures. On and off-loading can be extremely hazardous or impossible on Necker and Nihoa; the steeply sloping, rubbly terrain is an additional hazard. Costs, which must be born by the visitors, may be quite high. A FWS employee must accompany all groups.

7. Objectives and Strategies: Specific archaeological aims for sites on Nihoa and Necker will be established using Bishop Museum recommendations when that study concludes in early 1985. The remaining refuge islands will be assessed and, where appropriate, nominated to state and national registers. Groups desiring access to archaeological sites will be accommodated whenever possible. Such visits will be scheduled to minimize wildlife conflicts.

RESOURCE MANAGEMENT
OUTPUT: WILDERNESS

1. Description: An area of federal land in excess of 5000 acres and lacking permanent improvements or human habitation which is designated by Congress. The minimum size requirement makes practical the land's preservation in an unimpaired condition. Compatible uses are allowed with specific restrictions.

2. Locational Criteria: The proposed Hawaiian Islands Wilderness was first suggested after a review of all federal lands in excess of 5000 acres. The first proposal included a total of 303,936 acres out of a tentative total of . 304,203 acres of HINWR lands and waters. This recognized that Tern Island was not of wilderness quality. After public hearings on this proposal, it was amended to include 255,878 acres, reflecting a new refuge boundary agreement between the State of Hawaii and the Department of the Interior. Hawaii later was dropped from House Bill 1907 with the formal recommendation that only 1,742 acres of emergent lands be considered as wilderness on the initial designation and at such time as the actual boundaries are resolved with the state of Hawaii, the additional submerged lands be adopted.

3. Existing Status: Because of the unresolved boundary dispute, the proposal was not presented to Congress in spite of support from both Senators from Hawaii.

4. Potential for Enactment: So long as the boundary dispute remains unresolved, it is unlikely that wilderness status will be granted. It appears that the refuge has been dropped from consideration. FWS policy is to manage all emergent lands, excluding Tern Island, as de facto wilderness.

5. Demands for Output: The demand for wilderness status has declined somewhat since the initial proposal and depends on the outcome of the boundary dispute.

6. Conflicts: In the face of other legislation such as Research Natural Area Status, the need for Wilderness classification of refuge lands may not be as great. Wilderness status may prevent the execution of some proposed refuge activities, including such fishery support as small boat traffic and vessel mooring. However, Tern Island, the proposed site for most of the activity including tours, photography, environmental education, etc., has been excluded from wilderness consideration. The use of motorized boats and generators for management purposes, already an established practice and necessary to accomplish refuge goals, could continue if the HINWR is granted Wilderness status.

7. Objectives and Strategies: With resolution of the boundary dispute and clarification of permitted activities as prerequisites, the emergent lands and, if feasible, HINWR waters will be nominated for wilderness status. As before, Tern Island would be excluded from this consideration. This would ensure consistent long-range management goals for the refuge. Pending a decision on the boundary dispute, the refuge will be managed as de facto wilderness, as is FWS policy.

1. Description: In a research natural area, natural processes are allowed to procede unhampered, providing baseline ecological data, research and educational opportunities for advanced students, scientists and managers.

2. Locational Criteria: The seven large islands and atolls in the HINWR are designated RNAs: Nihoa, Necker, French Frigate Shoals, Gardner Pinnacles, Laysan, Lisianski and Pearl and Hermes Reef.

3. Existing Levels/Distribution: The FWS carries out continuous seabird monitoring at French Frigate Shoals, primarily on Tern Island. Both the Service and NMFS conduct spring and summer field camps on several of the other large islands and atolls of the refuge. Shorter visits are also scheduled or occur opportunistically or when necessary for management.

4. Potential for Continued Status: Graduate students and researchers regularly submit research proposals for projects in the HINWR. Increased fishing in NWHI waters will necessitate close seabird monitoring. Monk seal and green sea turtle research will continue.

5. Demand/Justification for Continued Status: Baseline data collection for seabirds nesting within the refuge began in the five year Tripartite Study, which concluded last fall. To be of management value, data collection must continue, especially as use of the refuge and surrounding waters increases.

6. Conflicts: RNA status limits nonresearch activities on most of the emergent refuge land. It also precludes activities interfering with naturally-occurring processes on the designated islands and atolls. Educational uses of RNAs may interfere with refuge goals for wildlife.

7. Objectives and Strategies: The FWS will continue to conduct research and monitoring on HINWR lands. Outside research proposals will be evaluated individually, especially with respect to management applicability and effect on wildlife. Limited educational opportunities will be available to educators (see Environmental Education).

ENVIRONMENT
OUTPUT: OTHER PROTECTIVE STATUS

1. Description: Potential designations of areas in the HINWR include critical habitat for all threatened and endangered species, marine sanctuary, refuge overlay status for Midway, world heritage site, biosphere reserve and national natural landmark.

2. Locational Criteria:

Critical Habitat: Areas that may be proposed for the monk seal include beaches and lava benches inland to 100' beyond the vegetation line, submerged land, lagoon waters and all waters from the low low water mark out a yet undecided depth. Sea turtle, land bird and waterbird habitat has not yet been proposed.

Marine Sanctuary Proposal: This would encompass all land and waters within a 12 mile radius of all NWHI.

Midway Refuge Overlay: This plan seeks to include the islands of Midway in the NWR system as an overlay refuge.

World Heritage Site: Such a plan could include the entire refuge.

Biosphere Reserve: Potentially, the entire HINWR could be included.

National Natural Landmark: In a 1981 evaluation of possible state areas to be designated landmarks, the NWHI from Nihoa to Kure were ranked first.

3. Existing Levels/Distribution:

Critical habitat: Designation of critical habitat for the monk seal was deferred until after the recovery plan. The plan was recently (1983) completed and it included a recommendation for critical habitat by the recovery team. No formal proposal by National Marine Fisheries Service (NMFS) has been made yet. A formal proposal by NMFS for the green sea turtle has been deferred until completion of the recovery plan. Critical habitat for land birds has not been designated.

Marine Sanctuary Proposal: A proposal has been submitted to NOAA. It has not yet been acted upon.

OUTPUT: OTHER PROTECTIVE STATUS (Continued)

Midway Refuge Overlay: The FWS presented a proposal to the U.S. Navy and negotiations are now underway.

World Heritage Site: No formal proposal to designate all or part of the HINWR a world heritage site has been made.

Biosphere Reserve: No proposal has been made.

National Natural Landmark: No proposal has been made.

4. Potential for Continued/Increased Protection:

Critical Habitat: This designation, as described in the recovery plan, would enlarge the protective area for monk seals by including waters around Nihoa, Necker and Lisianski; other areas of monk seal critical habitat would overlay current refuge boundaries. Exact boundaries of green sea turtle critical habitat have not yet been delineated. Critical habitat for the land and water birds would overlay present refuge boundaries.

Marine Sanctuary: This status would overlay management areas currently protected to varying degrees by state and federal agencies. This overlay is proposed to ameliorate the potential conflicts between these organizations' different management perspectives.

Midway Refuge Overlay: This plan would enhance the wildlife management programs at Midway by increasing FWS effectiveness.

World Heritage Site: Designation of HINWR as a heritage site may provide additional protection for natural features in the refuge, as well as encouraging publication of informative material for the general public.

Biosphere Reserve: This designation, which specifies that the site should provide research and educational opportunities, provides production and maintenance guidelines similar to RNA status.

National Natural Landmark: This status may offer additional protection for refuge resources.

5. Justification for Continued/Increased Protection:

Critical Habitat: Recent monk seal population declines, although not yet completely understood, indicate the need for maximum protective efforts. Protection and recovery

: OTHER PROTECTIVE STATUS (Continued)

will be enhanced by critical habitat designation for all endangered and threatened species in the refuge.

Marine Sanctuary: This comprehensive management plan is designed to enhance the management of the waters surrounding the NWHI.

Midway Refuge Overlay: These islands contain the largest NWHI breeding colonies of three seabird species, as well as producing a small number of monk seal pups annually. Green sea turtles frequent adjacent waters. The coexisting human population makes Midway's wildlife management situation unique. Production and maintenance of wildlife could be increased if the FWS was able to enact more consistent and sustained research and control projects than are now possible.

World Heritage Site: There is no present demand to nominate HINWR for this status. The possible additional protection and support of refuge goals justifies investigating this designation for the refuge.

Biosphere Reserve: RNA designation may make nomination of the HINWR unnecessary; however, the possibility should be explored before this designation is dropped from consideration.

National Natural Landmark: Although there is no present demand to nominate HINWR for landmark status, this designation should also be considered.

Conflicts:

Critical Habitat: Permits will be required for activities within critical habitat; this may hamper some research projects. Inclusion of waters not within the HINWR may restrict fishing and traffic.

Marine Sanctuary: Parties now claiming jurisdiction over potential sanctuary lands and waters must negotiate. NOAA would manage the sanctuary, allowing use of it by permit. This may restrict some refuge programs.

Midway Refuge Overlay: Refuge overlay status for Midway Islands may require the Navy to increase consultation with the FWS concerning projects potentially affecting seabirds and other wildlife. This addition to the refuge system would increase FWS responsibilities, perhaps necessitating additional staff and funds.

OUTPUT: OTHER PROTECTIVE STATUS (Continued)

World Heritage Site: Heritage sites generally provide recreation and on-site interpretation which would likely conflict with refuge management goals. However, sites of outstanding significance may have much more limited public access.

Biosphere Reserve: The educational stipulation of biosphere reserve status may conflict with research and management goals.

National Natural Landmark: Inclusion of Midway and Kure with refuge islands may restrict current uses of those two atolls.

7. Objectives and Strategies:

Critical Habitat: Designate appropriate critical habitats for all threatened and endangered species.

Marine Sanctuary: With all involved parties, thoroughly investigate the submitted proposal.

Midway Refuge Overlay: Continue dialog with the Navy concerning the FWS proposal.

World Heritage Site: Investigate the possibility of nominating all or part of the HINWR as a world heritage site. If appropriate, nomination will follow.

Biosphere Reserve: Evaluate the consequences of biosphere reserve status for the HINWR; nomination would be contingent upon recommendation.

National Natural Landmark: Evaluate the effect of this designation on the refuge. Implement nomination procedures if appropriate.

Conservation Land Use District:
Lands within the various counties bounded by conservation district lines as established by Act 187, SHL 1961, and Act 205, SHL 1963, or future amendments. There are five established subzones;

A. Protective (P) Subzone is designed "to protect valuable resources in such designated areas as restricted watersheds, marine, plant, and wildlife sanctuaries, significant historic, archaeological, geological and volcanological features and sites; and other designated unique areas. The boundaries of the (P) subzone shall encompass: All lands encompassing the NWHI except Midway Island."
B. Limited (L) Subzone is to limit uses where natural conditions suggest constraints on human activities i.e., lands subject to floods, tsunamis, volcanoes, erosion, etc.
C. Resource (R) Subzone is to develop, with proper management, areas to ensure sustained use of natural resources of those areas. These areas include offshore islands of the state unless placed in a (P) or (L) subzone; Lands and territorial waters below the upper reaches of the wash of waves, usually evidenced by the edge of vegetation, unless placed in a (P) or (L) subzone.
D. General (G) Subzone is designated open space where specific conservation uses may not be defined, but where urban use would be premature.
E. Special (EE) Subzone possessing unique developmental qualities which compliment the natural resources of the area.

The (P) and (R) subzones are delineated in the NWHI. The following uses are permitted with the (P) subzone: Research; recreational and educational use which require no physical facilities; establishment of marine, plant, and wildlife sanctuaries and refuges, wilderness and scenic areas including habitat improvements, maintenance of desired vegetation, removal of dead or noxious plants; programs for control of animal, plant, and marine populations, to include fishing and hunting; monitoring, observing and measuring natural resources. Governmental use not enumerated herein where public benefit outweighs any impact on the conservation district will be implemented. The (R) subzone will include all uses of the (P) subzone and aquaculture, artificial reefs and commercial fishing operations.

Conflicts: The designation of (P) and (R) subzones provides superficial protection to the resources of the NWHI. The (P) subzone applies to all lands in the NWHI except Midway. The regulation can be interpreted to read that no structures can be built on lands in the subzone. The definition includes the control of marine populations by fishing and the final clause could invalidate all conservation measures inherent in the regulations for the benefit of the public. The (R) subzone includes commercial fishing and aquaculture development. It appears these subzones are not adequate to ensure continued and comprehensive protection for resources in the HINWR.

2. Marine Life Conservation Area:
Special area designation of unique marine resources. All marine waters of the State of Hawaii are designated a marine life conservation area to be administered by the Department of Land and Natural Resources. No persons shall take any fish, crustacea, squid or other marine animal within any conservation district except in accordance with specific regulations. These may be limited area and species taken, manner of take, seasons and closures.

3. Coastal Zone Management Act:
State of Hawaii authorizes Department of Planning and Economic Development to manage CZM complying with federal CZMA of 1972: to apply when development significantly affects coast zone or for a project whose market value exceeds $25,000.

4. Special Management Area:
Classification of special marine areas extending not less than 300 feet inland and including the waters themselves. No development will be permitted that will have an adverse environmental and ecological effect on the area except if it is outweighed by public health and safety concerns.

5. Shoreline Management Area:
Classification by City and County which follows state ordinance. Requires special management use permit. City jurisdiction in urban areas only. This classification overlaps the conservation land use status of the NWHI.

6. Definition of shoreline:
Upper reaches of the wash of the waves evidenced by vegetation line, or if not vegetation, then by debris line on beach.

Natural Area Reserve System:
Preservation of unique natural resources. Preserves, sanctuaries, refuges must be strengthened and additional areas of land and shoreline suitable for preservation should be set aside and administered solely and specifically for the aforesaid purpose. This is a state-wide system established to preserve in perpetuity specific land and water areas supporting natural flora and fauna native to Hawaii in a condition as unmodified as possible.

State Endangered Species Act:
Follows federal lead but recognizes that a threatened species on the federal list may be an endangered species on the state list. Provides regulations pertaining to the conservation of such species.

a. Hawaiian monk seal - protected species by HRS 195-D. It is unlawful to molest, kill, capture, possess, except with permit, the Hawaiian seal.

Wildlife Sanctuary/Refuge:
Designated area of land or water to preserve, protect, conserve and manage wildlife, where hunting and other activities may be restricted.

0. Wilderness Preserve:
Relatively large designated areas with diversity and abundance of native flora and fauna and geological formations, largely undisturbed by people or their influences, in which the introduction of exotic plants, animals or construction of structures is prohibited.

1. Scenic Reserve:
Designated areas possessing natural, scenic, wildland qualities which in total or individually outweigh all other values the area may possess, when evaluated in the long run for public interest.

2. Historic Site:
Specifically defined location, site or area designated on the national or state register of historic places and identified with... the indigenous culture of the state.

1. Description: All bird species (except waterfowl), which move seasonally from one place to another and return, or are included in the terms of International Convention and the Migratory Bird Treaty Act.

2. Existing Levels/Distribution: Five million seabirds of 18 species breed each year in the NWHI. Several million additional shorebirds return to the islands each year, but do not breed (see Other Migratory Bird Maintenance). With few exceptions, recent surveys (1978-1982) indicate the magnitude and distribution of seabird breeding populations and shorebird wintering populations in the HINWR are not significantly different from populations surveyed in the 1960's (Tables 1 & 2).

3. Locational Criteria: Migratory birds nest, feed and roost on all islands of the HINWR.

4. Potential for Continued/Increased Production and Maintenance: Documented declines in the NWHI have occurred at Midway Island and Kure Atoll where rats were introduced. Historical declines were documented on Laysan and Lisianski Islands when introduced rabbits devegetated the islands. Continued production and maintenance of seabird populations are dependent upon 1) maintenance of predator free nesting islands with suitable vegetation to provide nesting habitat and 2) maintenance of available good resources in the waters surrounding the islands.

5. Demand/Justification for Continued/Increased Production and Maintenance: It is the policy of the USFWS to manage refuges and to maintain migratory bird populations at a level consistent with their role in the environment. The migratory birds are protected by provisions of the Migratory Bird Treaty Act (1916), Migratory Bird Conservation Act (1929) and NWRS Administration Act (1966).

6. Conflicts with other Outputs: Principal conflicts occur with outputs which create disturbance to birds on nesting islands and outputs which could potentially cause mortality in feeding areas. Certain fishing outputs may conflict through direct or indirect competition for food supply or habitat. Certain recreational and perhaps scientific or educational outputs may conflict by causing excessive harassment on nesting islands. Conflicts can occur with outputs which have the potential of introducing harmful organisms to the islands.

'UTS: MARINE BIRD PRODUCTION/MAINTENANCE (Continued)

Objectives and Strategies: Migratory bird populations must be maintained or enhanced according to FWS policies. Populations should be monitored to detect declines when they occur. In the event of declines, follow up investigations are needed to determine the cause. The health of the bird populations in the HINWR should be considered when regulating other outputs (i.e. fishing, recreating, etc.), which may conflict. Enforcement of regulations restricting access to the islands and a monitoring program to prevent accidental introduction of non-native species are essential.

OTHER FISH AND WILDLIFE
OUTPUT: OTHER MIGRATORY BIRD MAINTENANCE

1. Description: All bird species which move seasonally from one place to another and return, and/or are included in the terms of international convention and the Migratory Bird Treaty Act. This consists primarily of shorebirds.

2. Locational Criteria: Shorebirds are present in the HINWR throughout the year, although populations decline significantly in the late spring and summer. Over 35 species of shorebirds have been recorded in the NWHI.

3. Existing Levels and Distribution: The most abundant species are ruddy turnstones, lesser golden plovers, sanderlings, wandering tattlers and bristle-thighed curlews. Highest estimates presented below are derived from the 1960s and recent surveys (1979-1982). Birds are found in a variety of habitats on the different islands; but the largest concentrations of all species are found on Laysan Island, where the interior lake provides mudflat habitat. Both ruddy turnstones and bristle-thighed curlews have been recorded eating seabird eggs.

High total for HINWR (1979-1982)

Golden plover	1,807
Ruddy turnstone	11,758
Sanderling	56
Wandering tattler	634
Bristle-thighed curlew	384

4. Potential for Continued/Increased Production and Maintenance: Maintaining the integrity of the hypersaline lake on Laysan Island is the key to maintaining populations.

5. Demand/Justification for Continued/Increased Production and Maintenance: The Migratory Bird Treaty Act is the prime regulatory motivation to maintain numbers of shorebirds. Aside from their role in the terrestrial and marine ecosystems of Hawaii, they play a relatively important role in arctic ecology.

6. Conflicts: Potentially conflicting outputs are those which include activities resulting in disturbance or habitat alteration of islands, especially the interior lake of Laysan. Feeding habits of shorebirds at Laysan have not been studied sufficiently, but they appear to eat crustacea and brine flies and their larvae. Any disturbance to these foods would directly affect the shorebirds.

TPUT: OTHER MIGRATORY BIRD MAINTENANCE (Continued)

Objectives and Strategies: Maintain the integrity of the island ecosystems by limiting boat traffic and human intrusion on the islands.

OTHER FISH AND WILDLIFE
OUTPUT: NATIVE TERRESTRIAL PLANTS AND INVERTEBRATES PRODUCTION AND MAINTENANCE

1. Description: The Northwestern Hawaiian Islands (NWHI) have many endemic, rare or unique species of terrestrial plants and invertebrates associated with them. Some taxa are endemic to single or several islands, while many are indigenous to the NWHI. Undoubtedly a number of forms are yet unknown or undescribed.

2. Existing Levels/Distribution: Inventory of plant taxa for the various island groups is fairly complete.

3. Locational Criteria: The following is a summary of the number of endemic/indigenous plant taxa on the HINWR:

Island Group	Endemic Taxa	Indigenous Taxa
Nihoa Island	4	17
Necker Island	-	5
French Frigate Shoals	1	11
Gardner Pinnacles	-	1
Laysan Island	6	23
Lisianski Island	1	13
Pearl and Hermes Reef	3	12

A total of 15 taxa are endemic and 82 are indigenous.

An additional 133 taxa are known from the HINWR which are exotic in origin. Of these, 55 have become naturalized on the island. The endemic and indigenous species represent 25 different families.

Laysan and Nihoa Islands support the most diverse array of indigenous and endemic species. This is due largely to the more diverse habitats found on these islands. Laysan also has a number of naturalized exotic species, as does French Frigate Shoals.

Information on endemic or indigenous terrestrial invertebrates on the HINWR is very sketchy. Only limited effort has been made to inventory these animals. It is anticipated that many forms are yet to be described. Recently on Nihoa Island, limited surveys have been done for terrestrial arthropods and land mollusks. Some rarely collected or undescribed taxa have been discovered. A number of endemic taxa are known. Surveys have also been conducted on Laysan Island. Much still remains to be learned.

OUTPUT: NATIVE TERRESTRIAL PLANTS AND INVERTEBRATES
PRODUCTION/MAINTENANCE (Continued)

. Potential for Continued/Increased Production and Maintenance: Continued production and maintenance of native terrestrial plants and invertebrates depend on maintaining an intact ecosystem. Factors, primarily exotic organisms, which can upset the ecological balance of these island systems are the chief threat. Actions to protect the endangered terrestrial birds should adequately protect Laysan and Nihoa Islands. The other islands will need to be protected similarly.

5. Demand/Justification for Continued/Increased Production and Maintenance:

a. Mandates policies: NWRS Administration Act and Research Natural Area.

b. Historic/projected public use demand: A limited amount of research interest from all over the world has been and will continue to be focused on these taxa and their evolutionary history. The rare, specially adapted forms found on these islands pose interesting ecological questions regarding dispersal mechanisms, genetics of small populations, evolution of distinct forms, etc.

c. Potential / projected economic return: Research/educational interest may generate a small amount of project funding (principally research grants).

. Conflicts with other Outputs: Outputs which involve human use of the islands or near shore use by a substantial number of vessels present a potential threat through the possible introduction of exotic organisms. Disruption of the fragile terrestrial ecosystem is the chief concern.

'. Objectives/Strategies: The objective for this output is to simply maintain the distribution and abundance of native flora and fauna through maintenance of the ecosystem. Actions prescribed to accomplish this for the endangered terrestrial birds on Laysan and Nihoa Islands will simultaneously conserve the terrestrial plants and invertebrates. Similar strategies can be applied to maintain native plants and invertebrates on the other islands. Fourteen of these taxa are considered candidates for listing as threatened or endangered.

OTHER FISH AND WILDLIFE
OUTPUT: MARINE REEF SPECIES

1. Description: Organisms inhabiting the reef ecosystem.

2. Locational Criteria: Surveys have been conducted throughout the NWHI to assess nearshore marine species. Detailed studies were conducted at French Frigate Shoals.

3. Existing Levels/Distribution: Data were collected during the Tripartite Study by the Department of Land and Natural Resources and the FWS Cooperative Fishery Research Unit throughout the NWHI to provide baseline population levels of nearshore marine species.

4. Potential for Continued/Increased Production and Maintenance: Enhancing marine reef populations requires reef manipulation, creation of artificial habitat, expansion of existing reef habitat and microclimate manipulation. Maintaining populations requires non-disturbance. Even then, some species may not respond. Evidence from Pearl and Hermes Reef indicates that the Black-lipped Oyster has not recovered from overexploitation early in this century. Fishing for sharks may enhance the survival of some species of fish at the expense of the balanced ecosystem. Fishing for select species will require specific monitoring programs to determine population fluctuations.

5. Demand/Justification for Continued Maintenance and Production: HINWR exercises jurisdiction over certain near-shore waters, i.e., Laysan Island, Maro and Pearl and Hermes Reefs, French Frigate Shoals. Inside these waters, marine organisms are closed to fishing. Waters adjacent to Necker and Nihoa are fished primarily for lobster. Lisianski Island waters are not fished but are considered state waters and susceptible to increased fishing. The state of Hawaii strongly contests FWS jurisdiction in the NWHI.

6. Conflicts with other Outputs: As mentioned above the state of Hawaii contests the ownership/control of waters of the HINWR. In part, this is due to a potential conflict of marine reef species management goals, especially lobster and baitfish. While it is possible to fish for these organisms without disrupting marine ecosystems, the presence of fishermen and equipment in inshore waters could adversely affect threatened and endangered species. Currently the state and county have designated the island waters as a resource subzone suitable for development of aquaculture and commercial fishing. Settlement of the boundary dispute in favor of the FWS will add protection to these species.

TPUT: MARINE REEF SPECIES (continued)

Objectives/Strategies: Continued surveys of the reef community are essential to monitor changes in the relative abundance of specific species if harvest and sport fishing are instigated. The Cooperative Fishery Research Unit conducted trophic level studies as part of the Tripartite Study. Fishing will disrupt future studies unless specially designated areas are set aside. FWS should attempt to develop in-house expertise in marine ecosystems.

SCIENTIFIC AND PROFESSIONAL SERVICES
OUTPUT: ECOLOGICAL MONITORING

1. Description: Formalized programs to monitor the natural environment on a recurring basis at a number of sites specifically to detect changes in the population of sea birds, sea turtles, monk seals and vegetation cover.

2. Locational Criteria: This activity is carried out on all islands of the HINWR.

3. Existing Levels/Distribution: The recent completion of the Draft Ecological Monitoring Manual for NWHI Seabirds commences a program to measure changes in the biota in the face of increased competition from commercial fisheries. From 1979-1982, food habits and aspects of the breeding ecology of NWHI seabirds were studied. The objectives of this research were to 1) provide baseline data on populations, food habits, pollutant levels and breeding biology and to document natural variation; 2) assess the use of specific measures for monitoring seabirds and design practical, standard methodologies for long-term monitoring. Hawaiian monk seal surveys have been conducted annually since 1972. These surveys involve annual visitation to each island group to monitor population changes. Field camps have been established on Laysan, Lisianski, Pearl and Hermes Atoll and Nihoa Islands for the past several years to gather seabird, monk seal and sea turtle data. Vegetation on Laysan Island is being mapped and compared with previous years' records.

4. Potential for Continued/Increased Production and Maintenance: The following were determined to have monitoring technique potential for certain NWHI seabirds:

Table 1. Parameters of seabirds that were considered for use as monitoring techniques.

number of breeding pairs	laying synchrony
number of eggs laid	age at first breeding
number of chicks	relaying behavior
number of chicks fledged	time between laying
number of non-breeding birds	length of incubation
number of immature birds	length of chick rearing
age composition	weight at fledging
sex composition	adult weights
number of nests	egg size(includes egg volume, weight, length & breadth)
density of nests	egg shape
area of colony	egg composition
percent nest occupancy	fledging rate
mortality	food (volume, composition)
hatching rate	pollutant levels
breeding success rate	organ/body weight
recruitment	blood lipid levels
growth rate	
feeding intervals of chicks	
incubation shift length	

5. Demand/Justification: Under the Tripartite agreement, the FWS was obligated to study the onshore biota. As a result, the ecological monitoring manual was produced. The initial stimulation for monitoring is still present: to develop a means of gauging the environmental impacts of an expanded commercial fishery in the NWHI. The FWS has the responsibility to maintain present numbers of seabirds and to maintain and enhance monk seal numbers in the HINWR. The demand takes the form of legal mandates.

6. Conflicts: The ecological monitoring output is designed to reduce or eliminate conflicts which result from incompatible uses of the HINWR as well as areas outside the refuge. Potential conflicts could result when adverse trends in bird or seal populations are noted and the causative factors are unknown. Disruptive agents may be identified, yet remain unresponsive to change. Inherent in the monitoring must be an enforcement capacity. Also inherent in the monitoring is the potential to conflict with other high priority outputs through (human) disturbance, introduction of exotic plants.

7. Objectives and Strategies: Ongoing studies must continue to be able to interpret periodic fluctuation in seabird populations. Annual seal counts are necessary to monitor population declines in specific island groups. However, the FWS must use a means of determining the effect and effectiveness of the monitoring programs. The inadvertent adverse effects of researchers on their subjects is a very real concern of the HINWR.

1. Description: All studies carried out at least in part on-site, for which results have not been published in a technical journal. It includes studies active throughout the fiscal year, whether completed or not, and studies which may or may not yield information valuable for more effective refuge management. Also included are articles published in a technical journal or other equivalent publications which are aimed at others in the professional community.

2. Locational Criteria: Under the existing status as a Research Natural Area, HINWR has hosted many studies which have resulted in publications.

3. Existing Levels/Distribution: In 1981-82, as a participant in the Tripartite Study, FWS hosted 26 research projects in the HINWR in cooperation with other federal and state organizations: National Marine Fisheries Service, FWS Research, Dept. of Land and Natural Resources, University of Hawaii, Hawaiian Institute of Geophysics, Institute of Marine Biology, Bishop Museum.

4. Potential for Continued/Increased Production and Maintenance: Ongoing studies at Tern Island, Laysan Island and Nihoa will provide data for future publications. The termination of the Tripartite Study has initially decreased the amount of research in the HINWR, however, it is expected that the number of studies will increase as a result of the ecological monitoring project and the Hawaiian monk seal program.

5. Demand/Justification for Continued Production and Maintenance: At least two surveys at different times of the year would be required to inventory numerous vertebrate population levels in order to fulfill the data requirements for accurate ecological monitoring. Various FWS objectives including Migratory Bird Treaty Act, Endangered Species Act, etc., demand enhancement of specific population levels. Measuring these levels is mandated. Vegetation mapping, aerial photography, reef surveys, fish stock census, etc., are all studies with potential publications that are justified on the basis of using the Research Natural Area to its full capacity.

6. Conflict: Due to the limited accommodations at Tern island, only a small number of researchers can be present at one time. Conflicts over FWS priorities and projects can develop. The limited transportation options prevent extensive projects from being conducted in the field. Studies requiring heavy equipment will have difficulty getting into the HINWR. Periodic surveys throughout the

UTPUT: STUDIES AND PUBLICATIONS (Continued)

archipelago are limited by the availability of research vessels, both government-owned and charter. The possible conflict between various research projects must be supervised by FWS personnel, i.e. monk seal surveys and seabird research are compatible so long as seals are not disturbed in any way.

Objectives/Strategies: Studies and publications have been and will continue to be important outputs of the HINWR. It is an objective of the FWS to increase the number of studies on the HIWNR without adversely affecting the study subjects. Ongoing ecological monitoring will continue to provide data suitable for publication in the future. Making available the accommodations at Tern island will enhance research opportunities. Periodic cruises into the HINWR should address a variety of research questions not currently investigated.

PROFESSIONAL SERVICES
OUTPUT: COOPERATIVE PROGRAMS

1. Description: Programs in which the Refuge participates by making available real estate, facilities and/or provides technical assistance or operational services to other agencies and individuals both within the Service and outside of it.

2. Locational Criteria: Cooperative programs occur throughout the HINWR.

3. Existing Levels/Distribution: Cooperative programs occur on an opportunistic basis in the HINWR. The policy and mandates of the FWS are designed to ensure research and land use cooperation with individuals and organizations with compatible interest. However, due to the sensitive nature of the biotic resource in the HINWR, the use of facilities and real estate is limited.

4. Potential for Continued/Increased Production and Maintenance: Cooperative programs will continue at the current level. Due to the high possibility of disturbing threatened and endangered species, cooperative use is likely to be limited to use of specific areas of Tern Island and waters outside of the HINWR boundaries. Continued support will be provided to vessels in need and emergency use of the Tern Island facilities will be available. This may include radio contact, air charter service, emergency evacuation, food and lodging.

5. Demand/Justification: There is a high demand for the use of facilities at Tern island for a fishery support station. The justification is based on the State of Hawaii contention that the facilities are within state jurisdiction and necessary to make commercial fishing economically feasible.

6. Conflict: The increased use of the HINWR is likely to cause disturbance to the endangered monk seal and threatened green sea turtle. Additional adverse affects are possible through the use of Tern Island and the rest of the HINWR if the programs are not compatible. Compatible uses include meteorological stations, technical assistance not previously mentioned in other outputs and other similar activities.

7. Objectives/Strategies: Cooperative programs will continue on an opportunistic basis except when uses are not compatible with FWS objectives. As requests are received, they will be assessed for any adverse impacts they might impose. If there are means to mitigate the adverse affects, then the use may be permitted.

1. Description: Certain species formed on the HINWR may require transplantation to historical and/or unoccupied habitat elsewhere on the Refuge to meet desired levels for those respective outputs. Transplanting may involve actually moving a group of individuals from one island to another, or it could involve taking captive individuals to an unoccupied island. Such activities would have to be done with the proper approval and permits.

2. Existing levels/Distribution: Very few transplants of organisms, native to the NWHI, to other islands has been attempted. There is little reason to move most endangered species and there are significant environmental risks associated with transplanting. The only transplanting of species done so far has been with species for which there is concern for their survival. The Laysan finch was transplanted to Southeast Island in Pearl and Hermes Reef in 1967. It has since become well established on several islands in Pearl and Hermes Reef. Nihoa finches were transplanted to Tern Island and East Island in French Frigate Shoals in 1967 but neither population survived. The National Marine Fisheries Service has transplanted monk seals: Other transplantations of native species have apparently occurred accidentally, plant species have been moved from one island to another by people. Of course there have also been some exotic species brought to the NWHI accidentally.

3. Locational Criteria: Any of the islands could be selected as a site for transplanting a species. It depends on which species need to be transplanted and what the objectives and constraints will be for such a transplant.

4. Potential for Continued/Increased Production and Maintenance: Further transplants of species will be done only after careful scrutiny of objectives and anticipated impacts. There are several threatened or endangered species which may require transplantation of individuals as part of the recovery program. For other species it is highly unlikely that this will be done.

5. Demands/Justification for Continued/Increased Production and Maintenance:

   a. Mandates/policies: The Endangered Species Act directs agencies of the federal government to use their authorities in furtherance of the purposes of the Act. Recovery programs for certain endangered species may involve transplanting individuals to areas outside their present range.

   b. Historic/projected public use demand: A small portion of the public has varying opinions regarding transplantation of birds from one area to another. The issue revolves around the validity of moving a species outside is presumed historic range.

   c. Potential/projected economic return: No economic return will be generated by such actions; however some funding (principally government) will be needed if any transplanting is conducted.

6. Conflicts with Other Outputs: Transplanting species may create conflicts. Adding a species to an environment in which it is not native can potentially effect indigenous species of that environment. Careful evaluation must be made of all anticipated impacts on indigenous species, particularly invertebrates and plants.

   Introduction of a species, particularly an endangered one, into a new environment will also subject that area to restrictions which associated with conservation of that species.

7. Objectives/Strategies: Transplanting species will be pursued only as it serves the needs of other outputs, in the order of their priority. It is anticipated that very few transplants will be necessary under these conditions and they will be primarily or exclusively for endangered species. Recovery plans will guide this effort.

EDUCATION/INTERPRETATION
OUTPUT: ENVIRONMENTAL EDUCATION

1. Description: Structured educational activities within an approved course of study aimed at 'hands-on' experience concerning the natural environment and people's role in it.

2. Locational Criteria: In order to obtain "hands-on" experience, this activity must occur within the HINWR or at other ecologically similar sites. Within the refuge, only Tern Island can be easily reached via boat or air transportation. In the main islands, Kilauea Point National Wildlife Refuge is appropriate for environmental education (EE).

3. Existing Levels/Distribution: Environmental education does not currently occur within HINWR lands.

4. Potential for Continued/Increased Production and Maintenance: Environmental education programs could be developed for Kilauea Point by the Kauai Community College to take advantage of the proximity to elements found in the HINWR. Special field trips could be made to Tern Island, French Frigate Shoals, if funds were available to defer transportation costs.

5. Demand/Justification for Continued/Increased Production and Maintenance: At present there is low-level demand for EE among educators in Hawaii. The FWS could develop a program to stimulate interest in including EE in school curriculums.

6. Conflicts: Conflicts described in the Interpretation output summary apply to this output as well. Funds needed to visit HINWR could be better spent on local field trips or trips to Kilauea where similar elements occur nearer population centers.

7. Objectives and Strategies: Develop a program suitable for Kilauea Point based on the elements common to HINWR and Kilauea. Outreach programs into schools with lectures, films and specimens can supplement this, although they cannot offer hands-on experience. Limited EE tours to Tern Island will be permitted for educators. Restrictions on these trips are similar to those imposed on other tour groups (see Interpretation, Conducted).

EDUCATION/INTERPRETATION
OUTPUT: INTERPRETATION OFF-SITE

1. Description: Educational and recreational activity conducted away from HINWR (off-site) at various interpretive centers using exhibits, displays, and other media and personnel.

2. Locational Criteria: The nearest site to HINWR that is suitable for interpretation is Kilauea Point Wildlife Administrative Site on Kauai. Interpretation is conducted in Honolulu at FWS offices and outreach programs for schools, conservation groups, etc.

3. Existing levels/Distribution: Interpretative displays are set up at Kilauea Point. A relatively high volume of people are exposed to the center on a daily basis. Interpretation in Honolulu is sporadic and responsive to demand. The recently-completed film for the Tripartite Study has been successful and is well-received. Currently, as part of the Master Planning Process, an outreach program to educate potential users is being conducted.

4. Potential for Continued/Increased Production and Maintenance: Plans call for an expansion of the Kilauea facilities to increase off-site interpretation. This is advantageous because Kilauea is easily reached by tourists on Kauai, and available to other groups off Kauai as well. The natural landscape of the Point is very similar to the high islands of the HINWR. The seabird species that can be readily seen there represent most species found in HINWR. The recent attraction of Laysan albatrosses to the Point added a good measure of the uniqueness of the HINWR. Interpretation in Honolulu is limited by space. If additional space were available, displays, films, slides and personnel could be used to systematically conduct interpretation sessions. The completion of the Tripartite film has enhanced the outreach program.

5. Demand/Justification for Continued/Increased Production and Maintenance: The low level demand for interpretation is currently being met in Honolulu by members of the refuge staff on an opportunistic basis. Additional demand is being created with the showing of the films and slides. The display at Kilauea answers questions raised during tourist exposure to the wildlife resources. However, demands to get into the HINWR for interpretation are often created through the use of these displays. The interest is to interact with the native biota at close range in a near-pristine setting.

OUTPUT: INTERPRETATION OFF-SITE (Continued)

6. Conflict: Interpretation programs pose the potential to disturb the subject of study. Conducted tours and display maintenance require additional work by Service staff. At Kure, tours may conflict with the monk seal program and LORAN station operation.

7. Objectives and Strategies: The continued development of Kilauea Point interpretive facilities and exploration of an Oahu site will be pursued. These will provide exposure to the unique HINWR without incurring the associated disturbance to sensitive wildlife species. Outreach programs by refuge staff will continue to reach interested groups.

   The state of Hawaii and the Navy will be contacted about the development of interpretive displays at Kure and Midway.

EDUCATION/INTERPRETATION
OUTPUT: INTERPRETATION CONDUCTED

1. Description: An educational activity aimed at revealing species relationships, examining ecosystems and exploring how the natural world and human activities are interrelated.

2. Locational Criteria: The possibility of conducted interpretation in HINWR is greatest at Tern Island.

3. Existing Levels/Distribution: Currently, there is no ongoing interpretation program conducted in the HINWR. (See Interpretation, Off-Site).

4. Potential for Continued/Increased Production and Maintenance: An interpretation program conducted within HINWR is a potential output at Tern Island; all other areas of HINWR are too remote for people to easily reach. Small groups could be flown to Tern Island for periods ranging from several hours to several days. Overnight stays involve use of the sleeping and cooking facilities there.

5. Demand/Justification for Continued/Increased Production and Maintenance: Based on the interest generated in current interpretative programs concerning HINWR, it appears that there is a low level demand for on-site conducted interpretation. Special groups capable of paying transportation costs and with ample time in case of weather changes could be accommodated on an intermittent basis.

6. Conflict: Principal conflict involves potential disturbance of threatened/endangered species of HINWR. Interpretation areas must be discrete from those of research. Interpretation conducted on-site may violate the intent of the Research Natural Area designation and the state and federal endangered species acts. Consequently, seal hauling beaches will be completely off-limits, while access to sea-bird colonies will be restricted; this lessens the quality of the observer's experience. Supervision by refuge staff will be necessary. Transportation and lodging costs may be prohibitive.

7. Objectives and Strategies: Limited on-site interpretation will be permitted at Tern Island. Small (7 people maximum) groups will be accommodated when wildlife conflicts can be minimized. Six to eight such groups, staying no more than three days per trip, will be scheduled annually. Although school groups will not be permitted, educators interested in including information relating to the HINWR in their curriculums will be allowed (see Environmental Education). All groups will be under the direct supervision of refuge staff.

EDUCATION/INTERPRETATION
OUTPUT: NATURE TOURS

1. Description: On-site visitors engaged in wildlife/wildland observation as part of a non-consumptive commercial group led by naturalists committed to enforcing FWS policy. This does not include interpretive or environmental education groups.

2. Locational Criteria: The use of tour ships makes this activity possible throughout the HINWR. Small groups could travel by air to Tern Island, base themselves there and tour by boat.

3. Existing Level/Distribution: Nature Tours are not presently being conducted in the HINWR.

4. Potential for Continued/Increased Production and Maintenance: Several tour agencies of international scope have approached the HINWR for permission to conduct nature tours. Due to the conflict with the Tripartite Project, tours were not allowed into the HINWR.

5. Demand for Continued/Increased Production and Maintenance: Once the tour option is made available, the demand will increase. Several international tour agencies will make this option accessible to the public. The destination of Hawaii as a site for natural history tours is well established. Both local, mainland and international tourists will be drawn to the NWHI since it is a pristine wilderness with abundant wildlife. A parallel between the Galapagoes and the NWHI can be made. Both offer potentials for close viewing of wildlife, unique photographic opportunities and warm, sunny weather.

6. Conflict: Tour groups could disturb threatened/endangered species if not properly supervised. Vessels could only land at designated areas. The use of Tern Island would have to be restricted to avoid interference with FWS objectives. More people in the area means a possibility for conflict with wildlife and cultural resources preservation. Special area designation and the use of photo blinds would help orient traffic on Tern Island. Accommodations are limited.

7. Objectives/Strategies: These are the same as objectives for conducted interpretation. In addition to Tern Island, tours may be possible at Midway, in cooperation with the Navy.

EDUCATION/INTERPRETATION
OUTPUT: WILDLIFE/WILDLANDS OBSERVATION

1. Description: Non-consumptive recreation involving on-site visitors engaged in observation and study of wildlife/wildlands.

2. Locational Criteria: This output is available throughout the entire HINWR.

3. Existing Levels/Distribution: This output currently exists as a by-product of other activities such as photography, sailing, art etc. by those living or visiting the HINWR.

4. Potential for Continued/Increased Production and Maintenance: Expanding the opportunities for this output require the opening up of Tern Island to users, either as an overnight station or as a port of call for boats and planes. Observation blinds could be constructed to minimize disturbance to wildlife. The potential to disturb threatened/endangered species is high and without these support facilities, unsupervised observation should not be considered an appropriate use of HINWR.

5. Demand/Justification for Continued/Increased Production and Maintenance: The demand for wildlife observation opportunities is linked with other outputs such as photography, and other more specific land uses. As it stands, wildlife observation is a low level activity.

6. Conflicts: Conflicts described in non-commercial photography apply.

7. Objectives and Strategies: The development of facilities to accommodate observation will minimize disturbance to wildlife, especially the construction of blinds and fenced off areas.

EDUCATION/INTERPRETATION
OUTPUT: PHOTOGRAPHY/JOURNALISM/ART COMMERCIAL USE

1. Description: On-site visits to HINWR for the purpose of photography/journalism/art (P/J/A) for commercial markets.

2. Locational Criteria: Opportunities for this output occur throughout the HINWR. Specific areas where certain elements may be viewed exist, i.e., Laysan finches, etc. From a logistical point of view, Tern Island is the most appropriate location.

3. Existing Levels/Distribution: Tern Island has been used as a base for past photo/journalistic productions. Other artistic and journalistic opportunities exist throughout the NWHI, especially at Midway and Kure Islands.

4. Potential for Continued/Increased Production and Maintenance: Expanding the P/J/A base beyond Tern Island will require the use of a charter boat with full berthing facilities (see Nature Tours). The use of Tern Island will continue to be the best, most convenient location for P/J/A operations. The housing facilities can support as many as 11 at one time (not including FWS personnel), provided those spaces are not in use.

5. Demand/Justification for Continued/Increased Production and Maintenance: A moderate level of demand exists for this output and the use of Tern Island as a base of operations. In 1983, at least 3 major stories appeared in national magazines. This exposure of the HINWR justifies the continued activity as a public relations and education effort.

6. Conflicts: P/J/A could disturb threatened and endangered species and migratory birds if not properly supervised. Specific areas need to be set aside for P/J/A opportunities. The use of blinds will decrease the potential for disturbance.

7. Objectives and Strategies: The need to increase exposure of the HINWR while maintaining the integrity of the ecosystems demands special consideration. Accommodating the production of professional articles on the HINWR should be a priority. This may be accomplished by inviting magazines to send out a special staff to take photographs and write stories while on Tern Island. Photo blinds, trail space viewing, etc, can be used to minimize impact on wildlife.

EDUCATION/INTERPRETATION
OUTPUT: PHOTOGRAPHY/ART NON-COMMERCIAL USE

1. Description: Visitors whose primary purpose is to photograph, draw, paint, sculpt, etc., wildlife/wildland subjects for non-profit use.

2. Locational Criteria: Artistic opportunities exist throughout the HINWR. Specific elements may be seen at precise locations, i.e. Bristle-thighed Curlews at Lisianski and Nihoa millerbirds at Nihoa. From a logistical point of view, most bird species can be viewed at Tern Island, French Frigate Shoals. Underwater photographic opportunities are excellent there.

3. Existing Levels/Distribution: Tern Island has been a base for photo expeditions for several years. Other amateur photographers have gone to Kure Atoll and Midway Islands.

4. Potential for Continued/Increased Production and Maintenance: Expanding the photographic and artistic opportunities calls for expanding the capacity of Tern Island to handle increased traffic and use of facilities. In order to minimize disturbance, photo blinds and designated areas should be established. The potential to disturb threatened/endangered species is high; without these support facilities, photography and art cannot be allowed to go unsupervised. If Tern Island was advertised as an available option, usage would increase accordingly.

5. Demand/Justification for Continued/Increased Production and Maintenance: Photography as a recreational activity is highly regarded and pursued; the field of wildlife and wildlands photography is especially popular with amateurs and professionals alike. Wildlife art is a widely practiced hobby. The excellent opportunities within the HINWR to obtain close-up views of seabirds surpasses other areas of the main Hawaiian Islands and the world. Thus, it can be concluded that if accommodations and transportation logistics were manageable, Tern Island use would greatly increase. The results would serve to advertise the unique nature of the HINWR to both the private and public sectors of Hawaii and the world.

6. Conflicts: People desiring close-up views of wildlife may disrupt threatened/endangered species, migratory birds and research. Increased use of air transport could increase the chance of accidents and bird strikes. All activity must be monitored by FWS personnel.

OUTPUT: PHOTOGRAPHY/ART NON-COMMERCIAL USE (Continued)

7. Objectives and Strategies: The development of facilities to accommodate photographers and artists will minimize disturbance to wildlife. Blind construction and fenced off areas should be considered to control the effects of people on threatened/endangered species.

OTHER PUBLIC USES
OUTPUT: OTHER WILDLIFE/WILDLAND RECREATION

1. Description: Non-consumptive recreation including such diverse activities as birding, sailing, art, recreational diving, HAM radio operation, etc.

2. Locational Criteria: These activities could potentially occur on or around most refuge islands or islets.

3. Existing Levels/Distribution: These activities occur at low levels as permitted in HINWR especially at Tern Island, French Frigate Shoals. Limited housing and other facilities make this an acceptable location for such pursuits.

4. Potential for Continued/Increased Production and Maintenance: These outputs have potential to expand since their non-consumptive nature poses little threat so long as the activities are properly monitored and supervised. Special interest groups could be accommodated at Tern Island. Due to the isolation of other islands in HINWR, these outputs would probably be limited to Tern Island. Sailboats could reach other islands in the refuge but since the potential for disturbing threatened/endangered species is high, their activities onshore must be limited to Tern Island.

5. Demand/Justification for Continued/Increased Production and Maintenance: A low-level demand exists for these refuge outputs. If this activity were encouraged, the user level would probably increase. If housing were made available at Tern Island, usage would soon approach maximum levels, provided that transportation was economically feasible.

6. Conflict: Unmonitored activities could adversely affect threatened/endangered species and migratory birds. Introduction of exotic pests could result from unauthorized landings. The potential for great harm exists. Increased ship traffic to the HINWR would increase the possibility of groundings, oil spills, etc. Ongoing research projects could be affected by unsupervised groups. The use of FWS personnel to supervise visitors would detract from the time spent on maintenance work and wildlife management unless additional funds were obtained. Since Tern Island has become a major hauling area for monk seals, strict beach regulations must be obeyed. A fence around off-limits areas may be considered in lieu of enforcement personnel. Transportation costs may be prohibitive for most people.

OUTPUT: OTHER WILDLIFE/WILDLAND RECREATION (Continued)

7. Objectives and Strategies: These activities appear compatible with the outputs and objectives of HINWR so long as they are properly monitored, supervised, and limited. Specifically designated areas of Tern Island should be established for such recreational purposes. Fencing for delineation may be advisable. Visits will be scheduled to minimize conflicts with wildlife. Applicants for special use permits must be familiar with the restrictions before leaving Honolulu. Under the current transportation system, only those able to stay for several hours or weeks of time have been able to go to Tern Island. (See Environmental Education, Interpretation, Other Recreation.)

OTHER PUBLIC USES
OUTPUT: CHARTER SCUBA/SKIN DIVING

1. Description: On-site visitors engaged in extensive underwater wildlife observation, exploration, photography (amateur or professional) using SCUBA or skin diving, charter boats, yachts or skiffs.

2. Locational Criteria: Charter SCUBA diving can occur in relatively shallow waters of HINWR. High island diving may be suitable on limited basis. It is expected that most activity would occur at French Frigate Shoals due to extensive coral growth. In addition to onshore facilities, the marine environment is particularly diverse.

3. Existing Levels/Distribution: Commercial diving is not permitted in the HINWR now.

4. Potential for Continued/Increased Production and Maintenance: French Frigate Shoals (FFS) is a potential areas for this output to occur. Charter boats can reach FFS without excessive travel. Onshore facilities could be utilized. Other islands may be suitable if charter boats carry enough berthing space. It may be desirable to place Refuge employees on board to help interpret, gather data opportunistically and enforce refuge objectives.

5. Demand/Justification for Continued Production and Maintenance: Currently, a low level demand exists. If permits for this activity were available, the demand would probably increase sharply.

6. Conflict: Unauthorized landings could disturb threatened/endangered species and degrade the islands; monitoring by FWS personnel would be necessary. Charter boats must be U.S. Coast Guard approved with appropriate medical facilities. Tern Island evacuation may be used only in emergencies. Commercial diving is not permitted in Research Natural Areas (RNAs).

7. Objectives/Strategies: Commercial diving will not be permitted in the HINWR because of potential conflicts with endangered or threatened species, possible groundings leading to habitat disturbance and the refuge's current classification as a RNA.

OTHER PUBLIC USES
OUTPUT: OTHER RECREATION

1. Description: Limited recreational outlets include swimming, scuba, snorkeling, jogging and volleyball.

2. Locational Criteria: Water sports can be practiced around all refuge islands and islets. The runway will accommodate jogging and volleyball.

3. Existing Levels/Distribution: Personnel and authorized permittees recreate on and around Tern Island. Occasionally, these people snorkel or dive elsewhere within French Frigate Shoals. Field camp staff engage in some limited recreation, mostly swimming.

4. Potential for Continued/Increased Production and Maintenance: People on remote islands will continue to need recreation, especially those stationed at Tern Island for long time periods.

5. Demand/Justification for Continued/Increased Production and Maintenance: Adjustment to life on a small, remote island is facilitated by recreational opportunities. This is especially true for those stationed at Tern Island for long tours of duty (up to 5 months).

6. Conflicts: If poorly scheduled and/or in inappropriate areas, recreation can interfere with endangered and threatened wildlife and seabirds. Around some islands, especially at certain times of the year, sharks make water sports hazardous.

7. Objectives and Strategies: Recreation will be permitted on and in waters adjacent to Tern Island in designated areas. It will be scheduled to minimize conflicts with wildlife. Scuba and snorkeling also will be permitted in designated areas elsewhere in French Frigate Shoals when disturbance to wildlife can be minimized. Recreation on or around other Refuge islands and islets will also be permitted for authorized personnel although its regulation will be by Special Use Permit or the FWS field supervisor.

OTHER PUBLIC USES
OUTPUT: AHI FISHING

1. Description: Yellowfish tuna (*Thunnus albacares*) and Bigeye (Ahi) (*T. obesus*) fishery occurring in deep water (50-150 fm) using long-line and deep-sea hand lines.

2. Locational criteria: Fishing occurs around the main islands to a small degree. The primary fishing grounds are in the north and central Pacific.

3. Existing Levels/Distribution: Bigeye was the second most important commercial species fished in Hawaii. Yellowfin tuna is now more commercially valuable. In 1978, 209 metric tons were landed. Landings fluctuate yearly.

4. Potential for Continued/Increased Production and Maintenance: Fishing output reflects historic Hawaiian trends: high in the late 1940's after the war, low in the 60's, upturn in the 70's with increased effort and technology, with a steady increase to present. However, ahi landings have steadily decreased since the peak in 1952. Ahi landings could be increased by exploiting new grounds to the north, west and south of the Hawaiian Islands.

5. Demand/Justification for Continued/Increased Production and Maintenance: Ahi demands continues to be high since it is the desired fish for sashimi in Hawaii and Japan. Prices have steadily climbed in spite of an unstable supply.

6. Conflicts: Principal conflicts are same as in aku fishery.

7. Objectives/Strategies: Same as those for albacore.

OTHER PUBLIC USES
OUTPUT: AKU FISHING

1. Description: Skipjack tuna (Katsuwonus pelamis) fishery using pole and line vessels and baitfish or purse seiners. On and nearshore facilities necessary.

2. Existing levels/Distribution: Based on 1978 data, 3082 metric tons were landed from 14 Aku fishing boats. The fishery is the mainstay of the Hawaiian fleet. Fishing occurs around the main islands and Midway.

3. Locational Criteria: Aku is a pantropical tuna whose migratory movement brings it into the Hawaiian archipelago seasonally. It is believed there are 3 distinct stocks of Aku having different movements. Landings extend from April to September.

4. Potential for Continued/Increased Production and Maintenance: Skipjack or Aku is the most valuable Hawaiian commercial fishery in terms of landing and values. Catches have ranged from 2267-7256 metric tons. It is estimated that the fishery could yield 12,156 metric tons, a 75% increase, if expanded. Currently, 75% of the catch is made within 20 miles of the main islands. In 1977, fish aggregating devices were placed near Oahu and Lanai. Catches near these sites constituted a significant portion of the landings. In addition to fishing, Aku boats spend much time obtaining live bait. Competition from Japanese boats has a negative effect on the amounts of Aku reaching the Hawaiian market. To expand the existing fishery, aggregating device deployment should be increased, the north and west fishing grounds should be harvested and overall efficiency must be increased. Reliable sources of baitfish need to be maintained. If the local cannery remains closed, an aku fishery in the NWHI is unlikely.

5. Demand/Justification for Continued/Increased Production and Maintenance: Due to a growing Aku fleet, good fishing years, and a market slump in 1980-82, the demand and price for Aku has decreased. Cannery prices for frozen Aku do not provide much economic incentive for fishery expansion. The existing fleet relies on local markets for fresh fish at relatively high prices. The limited shelf life for fresh Aku prohibits the movement of fish from NWHI to local markets in Honolulu via air shipment. However, if cannery prices for light meat tuna improve, and if suitable long-distance pole and line boats and baitfish are available, a NWHI base could be utilized for transshipment of frozen Aku to the cannery. Additionally, the Aku resources of NWHI may be harvested by U.S. purse seiners that would not need storage or shipment out of Tern Island.

OUTPUT: AKU FISHING (Continued)

Infrastructure necessary to expand the existing aku fishery in NWHI requires the deployment of no more than 5 fish aggregating devices between Necker and Maro Reef. This would greatly save on fuel for exploratory fishing. Conceivably, the fish caught could be transported to Tern Island where a mothership may be anchored. Frozen fish would then be moved to the market site periodically. If the market could bear an additional cost increase, fresh fish could be flown out of Tern Island (an additional $1.00/lb). However, this appears doubtful. The mothership/barge could store water, fuel, supplies, baitfish, etc. If baitfish are obtained at French Frigate Shoals, then small boats and nets would be necessary. The crews of barge and catcher boats could use Tern Island for recreation and personnel changes and emergency evacuation. Radio contact with HINWR staff would be necessary.

6. Conflicts: Principal conflicts result from use of the Tern Island facilities and French Frigate Shoals as a base. Frequent travel to the Shoals increases the likelihood of accidental groundings. Six recent groundings have occurred in 5 years. The placement of a mothership at moorings south of Tern Island implies an increase in small boat use of the Shoals. Activities such as fuel transfer pose risks of potential spillage and other accidents. Recreation of the fishing crew could conflict with policies established for migratory bird, monk seal and sea turtle production and maintenance. Seals and turtles could be adversely impacted through continual disturbance from small boats and bait-fishing nets within French Frigate Shoals. The use of nets nearshore could further jeopardize seals: accidental and purposeful entanglement has occurred. In addition, the pursuit of inshore fish could disturb food supplies to those seabirds that rely on tuna to drive prey to the surface. Thus, both birds and fishermen, who use seabirds to locate tuna schools, may be adversely affected. Increased pollution, i.e., oil and trash, may lower the integrity of the atoll.

7. Objectives/Strategies: Close seabird monitoring in the NWHI is necessary to detect any population change which may be caused by the depletion of Aku stocks. Regulated use of the emergency buoy within the atoll by fishing vessels will be permitted for resupply of Tern Island or in emergencies. A leeward mooring buoy outside the refuge is possible. Regulated Tern Island access from moored fishing vessels via small boat will be permitted for limited equipment storage, recreation and emergency evacuations. Cooperation with the tuna industry to minimize the risks inherent in increased atoll traffic is suggested.

1. Description: Albacore (Thunnus alalunga) is a cosmopolitan tuna species found in warm and temperate waters but occurring at greater depths in lower latitudes. This species supports a fishery using long-line, trolling and ika-shibi (squid-tuna).

2. Existing levels/distribution: Hawaiian catch pre-1979 was incidental to other long-lined species, representing 1% of the total landings (73,000 tons). Considerable fluctuation occurs from year to year. Data suggests that the mean size of fish and the real abundance decreased between 1955 to 1968. After 1973, the catch per unit effort began a rise with the initiation of a ika-shibi method. In 1979, an experimental station was established at Midway in order to exploit fishing grounds previously fished solely by the Japanese. A purse-seine mothership and 26 trollers fished the waters north of Midway for about 5 months and landed 1609 short tons. In 1982, 75 trollers worked the area with out the mothership present. Fifty-five trollers did likewise in 1983. Catches were smaller than in 1979.

   Albacore are highly migratory across the north central Pacific. The cycle apparently begins in April off the Japanese coast. Fish move east as the summer progresses. The Hawaiian fishery peaks in the June-August period as the fish are approximately due north of the NWHI. Good catches have been made through December. The fishery out of Midway is apparently most successful in early summer. After that, the center of the stock moves east by north, closer to other ports for offloading. The fish return west and apparently spawn near land in the western Pacific.

3. Locational Criteria: Albacore fishing in Hawaii occurs throughout the year in the northern waters, peaking from June to August. Use of Midway Island as a fishery support station is desired by much of the fishing community to facilitate delivery, reduce transit time, recreate, etc.

4. Potential for Continued/Increased Production and Maintenance: The relatively new ika-shibi fishery has increased landings of albacore. The North Pacific trolling fishery has greatly expanded landings. If the fleet is expanded to 100 vessels, annual catch rates of 5,000-12,000 short tons might be expected. Recent (1983) maximum sustainable yield estimates range from 99,000 to 165,000 short tons. Some suggest the fishery can withstand an additional catch of 10-20% without significantly affecting the stock.

5. Demand/Justification for Continued/Increased Production and Maintenance: During the past 20 years, a shift from pole-and-line fishing which targets albacore, aku and ahi to purse seining which targets only aku and ahi has occurred. This shift has recently reached the Central and Western Pacific. This emphasis on seining is expected to increase competition and increase world supply of light-meat tuna i.e., aku, ahi. Since 50% of the Pacific albacore catches are pole and line, this trend may lower albacore catch and create a stronger demand for domestic white-meat (albacore). During 1980-82, U. S. light-meat demand dropped by 15% due to competition by poultry and meat prices (Rule of thumb: 1% drop in meat prices = 5.7% drop in tuna consumption). However, white-meat demand is steady for 3 reasons: 1) it is consumed by higher income brackets, so it is less susceptible to inflation and price fluctuation; 2) tuna can be 'stretched' more easily due to its firmness; 3) and it is used by institutions and restaurants steadily. Overall market slump will affect harvesters' ability to move to Midway without a support station. A shift in cannery procurement processes from long-term supply contracts with boats to open market purchases has caused more disruptions among harvesters, directly affecting the number of vessels financially able to enter the Midway albacore market in Honolulu.

6. Conflicts: The albacore fishery in the north central Pacific poses potential conflicts with high priority HINWR objectives. The development of a support station at Midway in the proposed form of a mothership with associated vessels could adversely impact endangered and threatened species. It is estimated that between 400 and 600 transits through the reef during one 5 month season would occur. This traffic increases the associated risks of atoll navigation. Since most of the captains would be unfamiliar with such navigation, the potential of accidental grounding, loss of human life, oil spills, fires and introduction of exotic organisms is very real. The incidence of groundings in the NWHI over the last 5 years provides some index of the potential, especially in light of the grounding in May 1982 at the entrance to the Midway harbor. The traffic and oil leakage could adversely affect the struggling monk seal and sea turtle populations in the area. Off-duty, recreating crew members could further affect seals while they look for glass balls and shells, jog on the beach, etc. Currently, fishermen are restricted to their boats by the commanding officer at Midway. The development of a station at Midway would encourage diversification of fishing throughout the NWHI. This could have direct effects on the biotic resources. Increased fishing nearshore enhances the possibility of conflict with wildlife species. Accidental or purposeful discharge of bilge oil could wash ashore;

unauthorized landings could occur, resulting in the introduction of rats, cats, insects, and plants not currently present.

Direct conflicts could result from the competition for food fish used by birds. Baitfish, opelu and akule all are utilized by seabirds during each season. Secondary effects are possible through the decrease of tunas. Tunas are responsible for driving bird prey species to the surface, thereby making food available. Albacore fishing, however, should have little effect since the fish are deep and seabirds rarely occur with albacore schools. Aku and Ahi fishing could have an effect.

7. Objectives/Strategies: Objectives are similar to Aku fishery development. The use of Tern Island as a multi-species fishery support base is not recommended. However, placement of a mooring buoy outside refuge boundaries is a possible alternative. Cooperation with the industry to minimize the risks inherent in increased atoll movement is suggested.

OTHER PUBLIC USES
OUTPUT: BAITFISHING

1. Description: Resource harvesting of inshore baitfish including nehu (Stolepherous buccaneeri), juvenile opelu (Decapterus sp.) and akule (Selar crumenopthalmus) using surround nets and hook and line.

2. Locational Criteria: Fishery restricted to main islands but extensive schools found in HINWR lagoon waters.

3. Existing Levels/Distribution: Akule ranks third in landings and fourth in value of commercial Hawaiian fishes. The highest recorded landing was about 1 million pounds, decreasing to 700,000 pounds by 1978. The majority of the catch occurs within 2 miles of shore. The Kauai portion of the catch is considered the major source. Opelu ranks fourth in landings, fifth in value. Landings have fluctuated between 150,000 and 525,000 pounds, averaging 257,000 pounds. Both species show periodic population fluctuation. Nehu populations in Kaneohe Bay provide the bulk of the baitfish for the Aku fishery. The population is overexploited at present.

4. Potential for Continued/Increased Production and Maintenance: Baitfishing in the main islands could withstand additional fishing. Although the resource potential may exceed an additional 2 million pounds, including fish from the HINWR, expansion of the fishery seems to be restricted by consumer demand. Upwards to an additional 2 million pounds of each species could be harvested from the NWHI, if logistically possible. Currently, in the main island fishery, spotter planes and trailable boats are used to fish. Specific adaptations would have to be in place in order to fish the NWHI.

5. Demand/Justification for Continued/Increased Production and Maintenance: Currently, live fish are used as bait for Aku fishing. The need for sustainable live bait is critical to the potential expansion of the tuna fishery. Experimental use of tilapia and mollies has not been as successful as hoped. Thus, the industry relies on live traditional baitfish. The use of these fish for personal consumption is limited to fresh fish. The market for frozen fish is poorly developed and also unlikely to expand significantly. An expansion of the fishery would have to entail an aggressive marketing approach to sell the vast increase in products.

OUTPUT: BAITFISHING (Continued)

6. Conflicts: The harvest of shoaling baitfish in the HINWR could have a direct, immediate and significant effect on the seabird populations. These fishes are important foods for most species. Approximately 39,000 metric tons of baitfish are consumed annually by NWHI seabirds including 390 metric tons of nehu, 135 metric tons of akule and 16,000 metric tons of opelu. In addition to direct competition for food, this fishery could have an adverse effect on wildlife through net entanglement of sea turtles and monk seals, the latter having shown curiosity about nets in its environment. Onshore facilities to process, handle and transport the resource would have similar environmental impacts to the albacore or aku fishing support stations. The synergistic effects of bait and aku fishing could hold disastrous results for some species of seabirds. Depriving birds of the predatory fish which drive prey to the surface, then removing the prey itself, could leave certain species with no alternative food sources. Of all public use outputs, inshore baitfishing holds the greatest potential threat to the marine and terrestrial resources of HINWR.

7. Objectives/Strategies: The potential magnitude of the effects of landings, groundings, human activities associated with nearshore fishing, commercial development and environmental pollution by oil, heavy metals and organochlorine will increase with use. Thus, inshore baitfishing must be prohibited from HINWR waters.

OTHER PUBLIC USES
OUTPUT: BOTTOMFISHING

1. Description: A fishery conducted in deep offshore waters using baited hook and line gear which is hauled in by hand or by mechanical line-haulers. A complex of species, especially snappers, jacks and groupers, are harvested.

2. Existing Levels/Distribution: Bottomfish stocks near the main islands are being fully fished, and in some cases, overexploited, primarily by small-boat fisheries. The fishery peaked after WWII at approximately one million pounds. Since 1978, catches and fishing effort have increased markedly around the main islands. Reduced catch rates are attributed to a combination of increased fishing effort, displacement of native bottomfish by the introduced ta'ape, and aberrations in normal current patterns. Results from stock assessments in NWHI indicate that resources between Nihoa and Gardner Pinnacles have been noticeably affected by fishing. Areas to the north have not been so.

3. Locational Criteria: The area of capture is centered around offshore terraces and slopes to depths of approximately 200 fathoms. The potential habitat for bottomfish is very limited. Because handline gear is the principal method of capture, the fishery is extremely localized. The relative abundance of individual species changes with latitude.

4. Potential for Continued/Increased Production and Maintenance: Substantial increases in the distant-water bottomfish catch cannot presently be accommodated without adverse effects on market stability and price. Long travel times to the Honolulu market from the NWHI and the limited life of iced fish have placed a limit on commercial fishing. Fresh fish need better refrigeration and handling. A market for rapid frozen fish needs to be developed. Fishing success is highly dependent upon ocean conditions in the frequently turbulent NWHI waters. If a support station is developed at Tern or Midway Island, the prospects of overfishing bottom fish stocks would be of greater concern. Traditional fishing grounds near the main islands are currently fished to their sustainable limit.

5. Demand/Justification for Continued/Increased Production and Maintenance: Bottomfish demands from restaurants will cause bottomfishing efforts to remain at high levels or even increase. The fishery will have to continually expand its range of operation to sustain catch rates. In addition to restaurants, the new markets needed for frozen fish and the

uncertain economic feasibility of the distant water fishery suggest that rapid-freezing is not likely to become widely accepted. Thus only a fresh fish market will exist. This precludes an extensive distant water fishery since the transit time is prohibitive. A NWHI support station needs a thorough assessment of market constraints and economics before being implemented.

6. Conflicts: If a support station is considered, then the potential conflicts identified in the review of albacore and aku fishing apply. Although this fishery does not compete either directly or indirectly for seabird or seal foods, onshore infrastructures could adversely impact the fauna. Seals have been observed stealing fish and with bottomfishing hooks imbedded in their mouths.

7. Objectives/Strategies: A fishery for bottomfishes could have some secondary enhancing effects on the populations of seabird food species through reduced consumption of mutual prey. Limited development of support facilities would have minimum impact on wildlife species. Since bottomfish are quickly depleted and slow to recover, even a temporary fishery might have long-lasting effects.

OTHER PUBLIC USES
OUTPUT: TRAP FISHING

1. Description: Fishery which primarily uses traps to capture fish, lobster, shrimp and crabs in waters outside the HINWR.

2. Existing Levels/Distribution: Lobster fishing occurs in the main and NWHI. In 1977, 70,000 pounds were landed; in 1978, the catch totaled 31,000 pounds. Although there are several species of deepwater shrimp in Hawaiian waters, the caridean shrimp *Heterocarpus laevigatus* appears to be by far the largest and possibly the most abundant species. Estimated abundance of *H. laevigatus* in the Hawaiian archipelago is 2,500-5,000 metric tons. The total landings may only be speculated; as much as 25,000 pounds have been landed through 1978. Kona crab landings also fluctuate, ranging from 15,000 to 45,000 lbs per year. The record catch is 71,000 pounds in 1972.

3. Locational Criteria: Lobster fishing occurs over 1600 nm^2 in the main islands and surrounding Necker and Nihoa Islands of the HINWR. Shrimping is conducted in specific areas around all main islands. Within the optimum depth range of 75-400 fm, several species of shrimp have continuous distribution throughout the Hawaiian Islands. The Kona crab occurs in greatest abundance in localized areas of the main Hawaiian Islands.

4. Potential for Continued/Increased Production and Maintenance: Hawaii Fishery Development Plans projected in 1979 that 100,000 to 150,000 lbs of lobster could be landed if all grounds were fished. This includes 3500 nm^2 of NWHI grounds with 1600 nm^2 main island grounds. The Fishery Management Council has concluded that the best available information supports a tentative determination that maximum sustainable yield is in the range of 15,000 to 30,000 lobsters, approximately one pound each, for the main Hawaiian Islands. Catch data for the NWHI fishery is extremely limited. Council estimates indicate the fishery grew from 72,000 lbs in 1977 to 200,000-400,000 lbs in 1980. Estimates of fishing effort are unavailable. The NWHI fishery represents a fundamental transformation in Hawaii's commercial lobster fishery. There are insufficient data to estimate catches and MSY's for slipper lobster, Kona crabs and shrimp.

OUTPUT: TRAP FISHING (Continued)

5. Demand/Justification for Continued/Increased Production and Maintenance: Spiny Lobsters are a relatively small part of the Hawaiian Islands commercial fisheries. Virtually all are processed to frozen tails for the restaurant market. In recent years, the world price for frozen lobster tails has been increasing about 18% per year. The current wholesale price is about $3.00/lb. for whole lobster. The NWHI lobster fishery has developed outside the confines of the local fish market by opening up export markets in frozen tails. Increased landings will not lower the price. The fishery remains volatile due to fluctuating catch rates. It is currently estimated that 1-2,000,000 lb. of shrimp might be economically harvested. Kona crabs may sustain a fishery capable of removing 60,000 - 100,000 lb. in the main islands and another 50,000-75,000 lbs. from the NWHI. Major investments have recently been made in the Hawaiian deepwater shrimp fishery by a local shrimp fishing company. In addition, numerous vessel owners in Alaska and the Pacific Northwest have expressed an interest in entering the fishery.

6. Conflicts: The presence of fishing vessels, the placement of fishing gear and the alteration of the lobster populations will modiiy the proposed critical habitat of the monk seal. There is insufficient information to fully assess the potential conflicts inherent in these environmental modifications. The potential impacts of trap fishing are disturbance, incidental mortality and reduction of known food resources, accidental groundings and oil spills.

7. Objectives: Collection of information on incidental mortality and disturbance is of high priority. Seal and turtle food habit studies need to be continued. Activities which are likely to jeopardize the continued existence of endangered or threatened species should be thoroughly evaluated.

OTHER PUBLIC USES
OUTPUT: RECREATIONAL FISHING

1. Description: Consumptive recreation involving renewable fish resources and charter boats in and around HINWR waters and lands, possible use of Tern Island facilities, radio contact with Tern Island and air transport facilities.

2. Locational Criteria: Onshore, offshore and lagoon waters of HINWR have potential for sport fishing.

3. Existing Levels/Distribution: Sport fishing is not now permitted in HINWR waters. Distance to HINWR prohibits most fishermen from reaching the virgin fishing grounds. In addition to distance, expense and regulations are prohibitive.

4. Potential for Continued/Increased Production and Maintenance: Virgin fishing grounds exist in the NWHI, particularly in the HINWR. However, refuge waters are closed to commercial or recreational fishing. If air and boat charters were available, increased use would be expected. Continuous fishing pressure would soon result in maximum sustainable yields.

5. Demand/Justification for Continued/Increased Production and Maintenance: Occasional requests are received for fishing groups to go into HINWR. If Tern Island were opened to fishing, usage would increase accordingly.

6. Conflict: Onshore and nearshore fishing are not recommended because of the potential disturbance to monk seals and sea turtles and the introduction of exotic or alien organisms to refuge islands. Offshore consumptive fish harvest also may conflict with turtle and monk seal refuge management goals since both animals range widely. Nearshore feeding seabirds such as black noddies depend on predatory fish in and outside the reef to drive their prey to the surface. They may be impacted during their breeding season by competition with humans.

   Increased boat traffic will in turn increase the possibility of accidental spills and groundings; it also necessitates monitoring by FWS personnel, both by radio and visually. Certain reef fish contain ciguatoxin in quantities great enough to affect people; these species would have to be avoided entirely. If commercial fishing is permitted, less fish will be available to sport fishers.

7. Objectives and Strategies: Because of the increased risk of disturbance to threatened and endangered species, possible competition with feeding seabirds and potential habitat damage from accidental groundings and spills, consumptive recreational fishing will not be allowed within the HINWR.

OTHER PUBLIC USES
OUTPUT: CONSUMPTIVE RECREATION

1. Description: Collection of glass balls, bottles, sea shells, war mementos, personal salvage, etc. for non-commercial use.

2. Locational Criteria: Could occur throughout NWHI, however, most easily accessible at Tern Island, Midway and Kure Islands.

3. Existing Levels/Distribution: These activities are conducted to a small degree by people stationed at or visiting the NWHI for recreation.

4. Potential for Continued/Increased Production and Maintenance: The collection of renewable items such as shells, glass balls, bottles, etc. could continue and increase as supply lasts. Collection of items for personal salvage could continue to be conducted opportunistically. Private collection of war mementos on federal land is forbidden by the Antiquities Act of 1906.

5. Demand/Justification for Continued/Increased Production and Maintenance: Demand for recreation is high among those stationed or visiting NWHI and HINWR. If more people were stationed there, demand for these activities would increase. Work conditions in the NWHI can become unbearable if confined to a boat, work site or campsite for prolonged periods. The desire to get away from the facilities is legitimate.

6. Conflict: The collection of renewable items may disturb threatened or endangered species. It is probable that the collection of glass balls and shells at Midway and Kure have played a significant role in the reduction of monk seal numbers there. Since the U.S. Coast Guard's departure from Tern Island and limitation of beach access, seal numbers have increased radically to an average of about 40 per day. Both state and federal regulations prohibit the disturbance of threatened/endangered species and seabirds.

7. Objectives and Strategies: Since most beaches in HINWR are frequented by monk seals and turtles, collecting cannot be permitted on the refuge. The potential for disturbance is too great to justify the activity. In spite of the high demand for glass balls, beaches will remain off limits to those without legitimate research purposes.

OTHER PUBLIC USES
OUTPUT: OTHER COMMERCIAL CONSUMPTIVE USE

1. Description: Consumptive commercial use is assumed to include but is not limited to salvage for glass balls, shells, bottles, and other historical artifacts including war paraphernalia, ship salvage, nonprecious coral harvest and aquarium specimen collection.

2. Locational Criteria: Salvage operations occur opportunistically when ships run aground. Glass balls occur on all islands of HINWR. Non-precious corals are harvested at Kure, Midway and perhaps other NWHI periodically, but probably not commercially. Collecting for commercial use is not currently pursued or permitted in HINWR.

4. Potential for Continued/Increased Production and Maintenance: Ship salvage will continue as necessary either by the ship insurance companies or opportunistically by other salvagers. Glass ball collecting is a renewable resource that could bring sustained money to the collectors. Low level use to date for historic and other salvage will not change. Depending on demand, nonprecious coral harvest could become a viable industry.

5. Demand/Justification for Continued/Increased Production and Maintenance: Demands for salvage permits occur periodically. These are not expected to increase in the future. Glass ball collecting is a very popular recreational activity. If fishing is allowed to take place on the HINWR, then requests for glass ball harvesting will probably increase. Off-duty fisherman are likely to engage in this activity. Collection of these and other items (shells, bottles, etc.) could develop into a commercial endeavor. Interest exists at low levels for aquarium specimen collection; allowing collection would probably precipitate increased demands for this activity.

OUTPUT: OTHER COMMERCIAL CONSUMPTIVE USE (Continued)

6. Conflicts: Sea shells, glass balls and coral occur on the beaches and/or in nearshore waters. Collecting these renewable resources is likely to disturb sea turtles and monk seals. Continued disturbance to these threatened/endangered species is illegal (Section 7 Endangered Species Act). The pursuit of these activities at Midway is suspected to have helped cause the decline of seals there. The collection of historic artifacts by individuals on federal land is illegal according to the Antiquities Act. Periodic ship salvage is the only suitable consumptive commercial activity likely to occur on HINWR lands and waters. The potential for conflict with preservation of cultural resources is high. Ship salvage will be mandated to remove vessels if possible and to prevent oil pollution and escape of exotic organisms. Aquarium specimen collection is not permitted in Research Natural Areas.

7. Objectives/Strategies: All grounded ships will be removed from HINWR property as soon as possible to prevent pollution, introduction of exotic organisms, and remove rusted iron. Glass ball, shell, coral and other beach collecting will not be permitted due to seal and turtle disturbance. Commercial collection of historical artifacts cannot legally occur. Likewise, aquarium specimen collection is not permissible within the refuge.

[NOTE: This output summary has been incorporated into "Other Commercial Consumption Use"]
PUBLIC USE MANAGEMENT
OUTPUT: AQUARIUM SPECIMEN COLLECTING

1. Description: The collection of marine specimens in HINWR waters by commercial operators for resale.

2. Locational Criteria: This activity could occur inside HINWR boundaries near inshore reefs, especially at Tern Island.

3. Existing Levels/Distribution: Specimens have been collected through HINWR as part of the Tripartite Study for scientific purposes. Collecting for commercial use is not currently pursued or permitted in HINWR.

4. Potential for Continued/Increased Production and Maintenance: Specimens could be collected in specially designated areas on a rotational basis. Current research areas must not be disturbed by collectors. FWS marine researchers could best identify areas suitable for collecting on a one-time basis initially. New areas would subsequently need to be identified to avoid overfishing. Specimens could be air transported from Tern Island to insure high survival. Consequently, French Frigate Shoals would be the best collecting site.

5. Demand/Justification for Continued/Increased Production and Maintenance: Interest currently exists at a low level. Interest and demand is expected to rise sharply if permits are allowed. Under the existing protection rendered by the Research Natural Area, collecting is not permitted.

6. Conflict: French Frigate Shoals is unique in Hawaiian waters since it has the only extensive beds of *Acropora* coral. Associated biota is thus restricted in range. Collection of these resources should be strictly monitored, if permitted at all. As mentioned in 5 above, collecting is not permitted under the Research Natural Area jurisdiction. Changes in the legal overlay would have to be made. If changed, collecting activities would have to be closely monitored to be sure they did not interfere with threatened and endangered species. No unauthorized landings on islets and islands will be permitted except during emergencies.

OUTPUT: AQUARIUM SPECIMEN COLLECTING (Continued)

7. Objectives/Strategies: When incorporated into Other Commercial Consumptive Use, the output Aquarium Specimen Collecting was modified. Other Commercial Consumptive Uses became Other Compatible and Economic Uses in the final refuge output list (Section V in the MP/EIS). These changes reflect the evolution of the final MP/EIS from its earliest inventory stage to the final synthesis (Section II). In the final document, aquarium specimen collecting is prohibited. Limited entry collecting shall be permitted on a rotational basis so long as activities do not conflict with HINWR objectives and mandates.