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Hawaiian ISLANDS NATIONAL WILDLIFE REFUGE

Hawaii
1970

Sunrise over Shark Bay—Necker Island.

Warren Roll.



HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE

MASTER PLAN

Blue-gray Noddy Tern.



The National Wildlife Refuge System reflects concern of people for the welfare of native species. It is dedicated to preservation and management of a rich wildlife heritage as an ingredient of a quality environment. It comprises the greatest effort in this direction the world has known.

Purposes of this plan are to promote public understanding of refuge goals and to describe developments and operations needed to fulfill the destiny of this important area. Methods of achievement may vary as new ideas are developed, but the basic goal of benefit to present and future generations of Americans will remain unchanged.

Development of a master plan for this wildlife area is less a matter of establishing goals and procedures than of choosing between reasonable alternatives. The prime purpose of the refuge is to sustain abundant wildlife of the islands made more important because of the endangered species they sustain. This makes it impossible to permit types of public use usually offered on refuges. Tours would be damaging to wildlife and habitat; exploitation of known fishery resources also would be harmful. Thus, benefit of the refuge to man must be the satisfaction coming from preserving the islands and their wildlife as part of our living world. It is an easy choice when it is accepted that this is the highest value of these northwest islands.



Sooty Tern colony.

FOREWORD

This refuge consists of a series of small islands and atolls stretching in a chain over 800 miles long west of the main Hawaiian Islands to Midway. It was established by President Theodore Roosevelt by Executive Order 1019, dated February 3, 1909, as the Hawaiian Islands Reservation. Land area is less than 2,000 acres, but surrounding lagoons included in the established boundary cover more than 200,000 acres. This has been the home of native species for centuries. They are different from the flowering beauty of the main islands glamorized in song and story.

The refuge islands, sometimes called the "Leeward" or "Northwest Islands," vary in size, elevation and composition. All are the tops of giant underwater volcanic peaks. Atolls, some islands, and the reefs are coral formed on suboceanic peaks, but a few islands are composed of basalt. The only human habitation is the U. S. Coast Guard long-range navigation station on Tern Island at French Frigate Shoals.

Access to the refuge is difficult because it is remote, off normal shipping lanes, and landing on reefs and rocky shores in rough surf is hazardous.

The refuge has some of the greatest sea bird nesting colonies of the world, and vast numbers remain through most of the year. Rare and endangered wildlife found nowhere else in the world live here. Forms of marine life in waters surrounding the islands or within atoll lagoons, including those outside the refuge, require protection of their water habitat for survival.

This plan provides guidelines for maintaining native wildlife of the islands as they are. Minor developments required for effective administration of the refuge and its programs will avoid unnecessary disturbances to this wild area. It is fitting that bold effort be applied to the goal of preserving a segment of the Central Pacific as part of our whole environment.



Images from Necker Island.



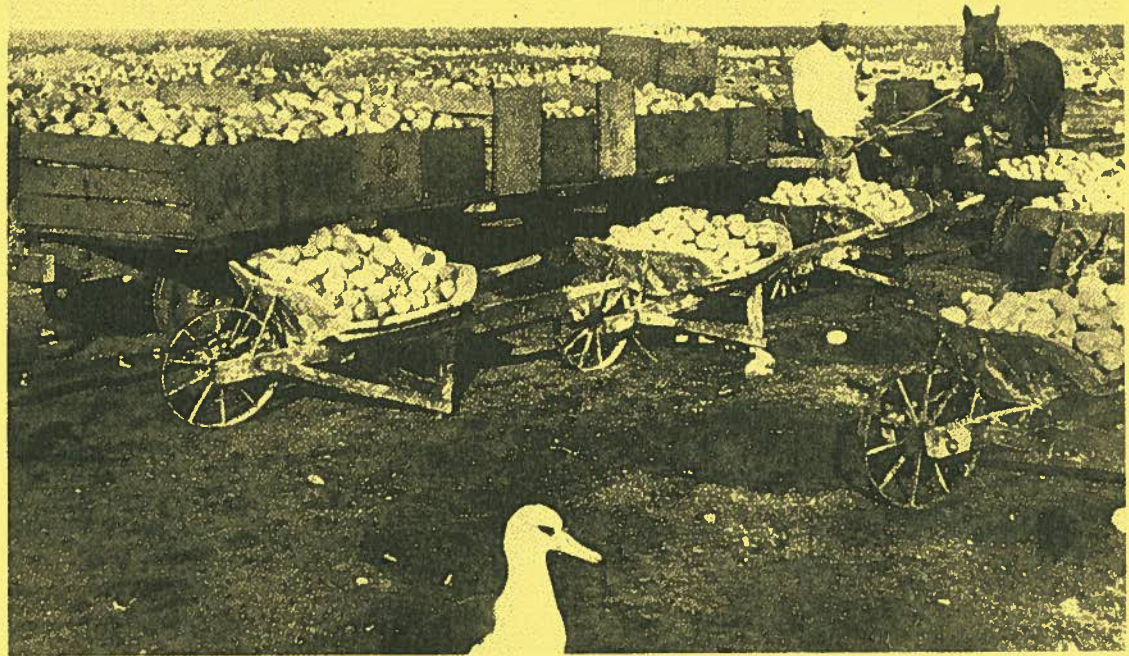
Ancient Hawaiian stone platforms on Nihoa.

PAST

Primitive temples, house platforms, and garden terraces are silent witnesses that some of these islands were occupied by ancient Polynesians, perhaps more than 700 years ago. Near the turn of the century, effects of man's intrusion became acute. Three species of native birds disappeared and two others were threatened with extinction. Slaughter of the rare Hawaiian monk seal resulted in the near loss of this unique animal. The green sea turtle, common on the refuge, has been eliminated as a breeding species on the United States mainland.

Native species often are unable to cope with invaders and the changes they cause. Rabbits introduced early in this century by guano diggers at Laysan Island consumed most of the vegetation and upset its ecology. As winds buffeted the island, much wildlife perished in sandstorms. Without food and cover derived from the plants, either directly or in the form of insects, the Laysan honeycreeper, Laysan millerbird, and the Laysan flightless rail—found nowhere else in the world—became extinct. Laysan rails transplanted to Midway were lost there later through accidental introduction of rats which fed on eggs and young birds.


This pre-1900 photograph by J. J. Williams is from the files of Alfred M. Bailey. "Egging" would wipe out one year's hatch, but it was not as destructive as the rabbits and plume hunters.



Most of the plants have made a gradual reappearance on Laysan and Lisianski Islands, but some are lost forever. Plume hunters landing on the islands in the 1900's killed thousands of birds, large and small. Young birds perished when their parents were destroyed. Trespassers introduced pest plants and exotic insects; others left trash.

It was this series of tragic events and growing public awareness of the importance of these islands that led to establishment of the Hawaiian Islands National Wildlife Refuge.

PRESENT

 Islands of the refuge vary from flat and ^{coral} sandy to rocky pinnacles and volcanic peaks rising nine hundred feet high, and from a few acres to those covering 2 square miles. Some small islands are bare, while larger islands contain extensive stretches of knee-high vegetation interspersed with sandy ridges or rocky outcrops. The palm trees of Nihoa occur nowhere else.

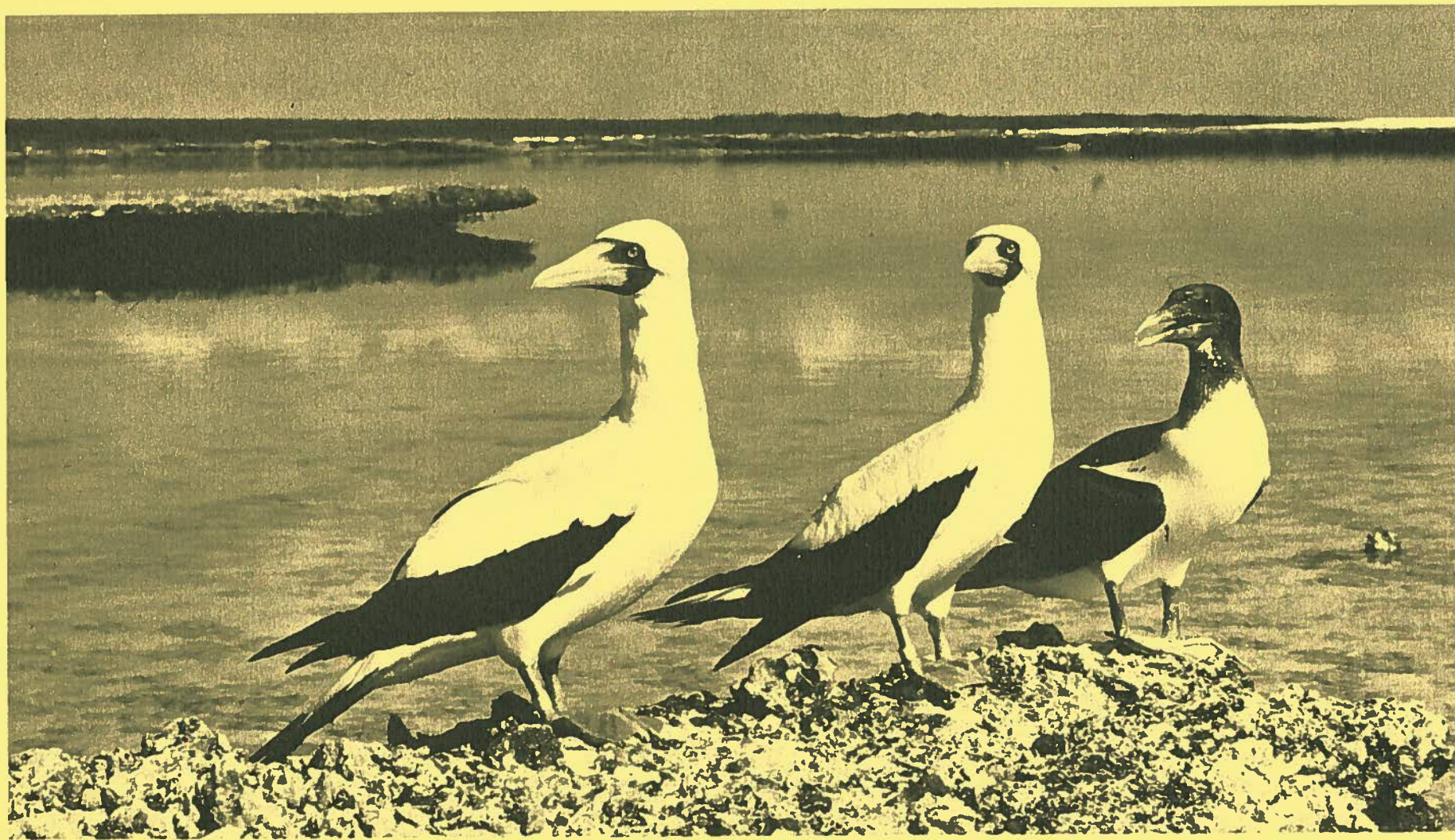
Sea birds like the Laysan albatross and black-footed albatross, known as "gooney birds," are familiar to many people. Over 160,000 nesting pairs on Laysan make it the world's largest colony. Occurring in even larger numbers are the trim black and white sooty terns. Laysan has nesting colonies over a mile in length, and it is difficult to walk there without stepping on eggs or young. Screams of these birds are deafening as they rise up in clouds before the intruder.

The dainty blue-gray noddy tern is a conspicuous bird of the high rocky islands of Necker and Nihoa. The white fairy tern, considered the most beautiful of sea birds, is found on most of the islands.

Little research has been done here compared with studies on and around the main Hawaiian Islands. Much can be accomplished, and the entire area offers outstanding opportunities for investigations, both marine and terrestrial. The refuge has been designated a national research natural area. Since it has qualities meeting basic criteria outlined in the Wilderness Act (Public Law 88-577), studies are underway to determine if the refuge, or parts of it, should be recommended for inclusion in the National Wilderness Preservation System.

Personnel are based on Oahu, not far from Honolulu. In addition to managing the refuge, they perform many diverse functions relating to Bureau of Sport Fisheries and Wildlife responsibilities. Present activities on the refuge are restricted to those relating to protection and research. It is fortunate ships of the world chart courses far from these islands where so much is at stake.

Blue-faced Booby.





Laysan Ducks

The Laysan Finch survives.



OBJECTIVES

How nearly the refuge meets responsibilities for which it was established determines the future of wildlife there. The principal objective is to preserve its flora and fauna, terrestrial and marine, as natural as possible. Danger of upsetting the delicate ecology by accidental introduction of non-native plants, insects, and other undesirable organisms, and disturbance, makes it necessary to restrict public use. Any act adversely affecting wildlife and its habitat must be prevented. Accomplishment of that and related goals hinges on dedicated efforts on the part of all who may influence the integrity of these extraordinary islands. The following aims relate to the overall objective:

Preserve rare and endangered species.

Endangered birds present are the Nihoa millerbird, Nihoa finch, Laysan finch, and the Laysan duck. Priority will be given to insuring that human activities will not be detrimental. Desirability of transplanting populations of some species is considered. Such transplants will be undertaken only if there is no possibility of upsetting the ecology elsewhere.

Disturbance of the rare Hawaiian monk seal will be held to the minimum necessary to conduct approved scientific studies. It is described as rare in the U. S. Department of the Interior list of rare and endangered American wildlife. Principal breeding areas are the islets and islands of the refuge. More needs to be known about this animal and there will be studies to learn all its needs. It is apparent this animal cannot tolerate trespassing on its hauling and pupping grounds.

Basking



Laysan Albatross colony.



Preserve sea bird colonies.

Patrol of sea bird colonies and monitoring population trends will continue. Scientific studies will be permitted when they will not affect other wildlife. Protection from introduction of foreign plants and animals and physical changes caused by man is an important goal. Shearwaters and petrels are birds that construct burrows in the sandy soil. Roofs of these burrows often cave in under the weight of a man, and much human activity would cause loss of eggs and young. Extreme tameness of wildlife of the islands makes protection mandatory. Authorized landing parties are instructed on how to avoid altering the fragile ecology of the islands to assure breeding areas will remain secure and inviolate.

Wedge-tailed Shearwater in burrow.



During courtship, the male Frigatebird inflates his throat patch to many times its normal size.



George Laycock.

Survey plans discussed.

Preserve marine biota and opportunities for scientific study.

Waters around the refuge islands and within the atolls contain marine forms rare around the main Hawaiian Islands. The leeward archipelago was the probable immigration route for many of the high-island shallow water life forms. Marine communities will be preserved for their part in our total environment and opportunities they offer for scientific investigations.

A small marine laboratory with facilities for study of marine and land life of the atoll will be established on Tern Island of French Frigate Shoals. Since Tern Island already has been altered by military installations, refuge facilities proposed will add little conflict with wildlife still using the island. The airstrip there facilitates transportation of refuge personnel and supplies. Research around the more remote islands through the use of laboratory ships will be encouraged.

Interpret wildlife and natural environments to increase knowledge of the island ecology.

There is a special opportunity to study the relationship of the many features of the islands and their importance to the wildlife resource and, in turn, to people.

Disseminate information essential to public understanding of wildlife, wildlands, and benefits of the refuge.

Gathering information and interpreting its meanings become significant when they enrich human experience. Making knowledge of the refuge available to people will help fulfill this goal.

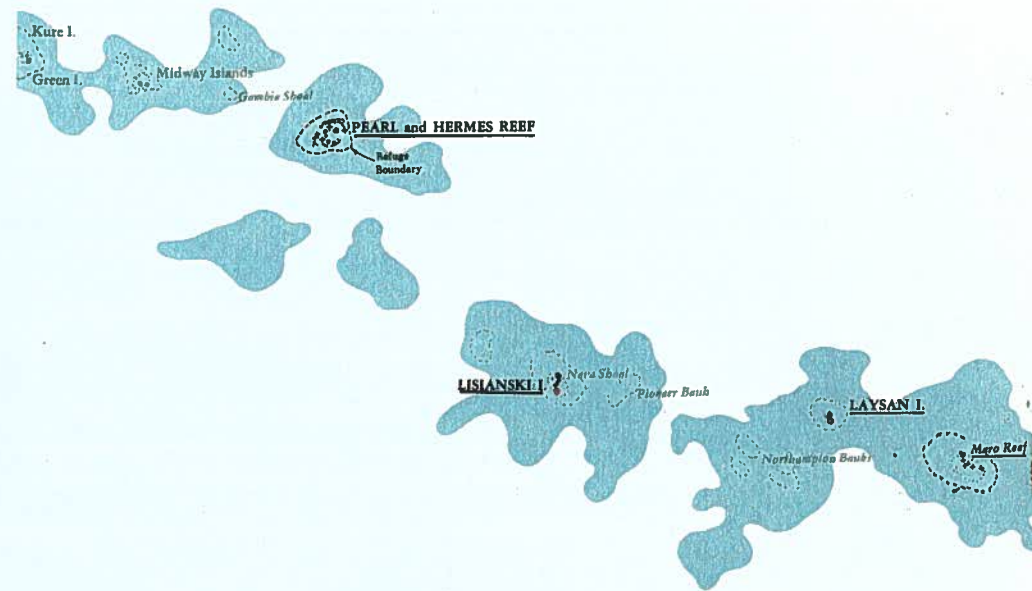
Preserve selected areas in their natural state for reference observations and study.

Isolated and remote, the refuge is in an ideal location to serve as a control environment for monitoring changes elsewhere. Many mainland refuges can support heavy public use; but here, because of the remoteness and hazards to be encountered in landings, the restriction on unauthorized visits will cause no public hardship.




Preserve historic features.

Two islands, Nihoa and Necker, contain remains of old Polynesian temples, house platforms and garden terraces. Archaeologists estimate some may be over 700 years old. They resemble those found in prehistoric Hawaii and inland areas of the Society Islands, thereby establishing a strong cultural link between Hawaii and Tahiti. These ancient structures on the refuge will be preserved as part of a civilization long past and a tie with the future.

The Hawaiian Islands are believed to have been born when the ocean floor ruptured, pushing up layers of lava until they protruded above the water. Volcanic action continues on the Island of Hawaii, but the Leeward Islands, or Northwest Islands, being older, have eroded. Coral has built up some, but generally the pinnacles and islets are remnants of large lava masses. These are the islands of the refuge where hundreds of thousands of birds converge from thousands of miles of ocean each mating season.



LEGEND

-  Proposed Shelter
-  Reefs, Coral or Rocky
-  Refuge Islands and Atolls

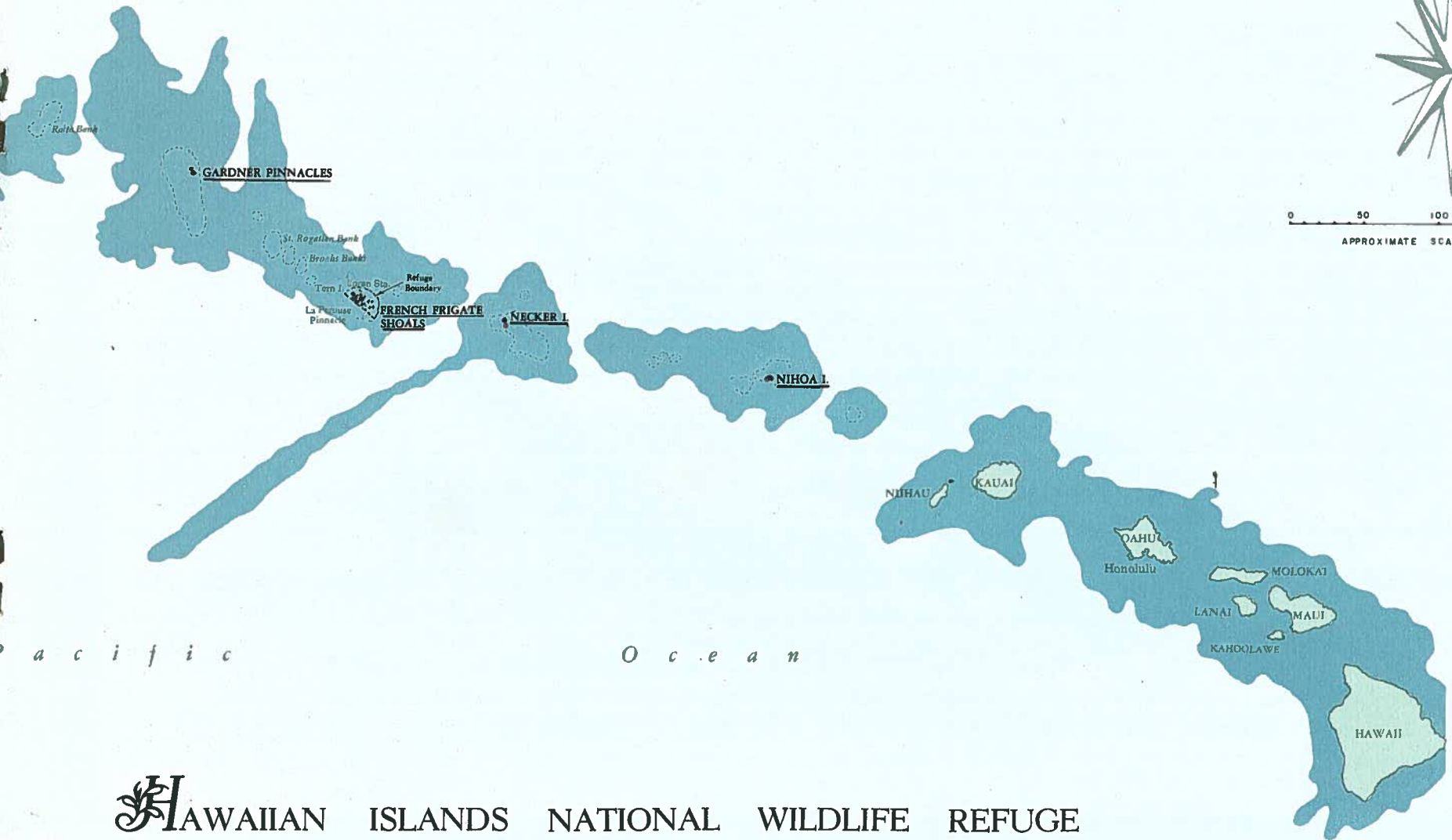
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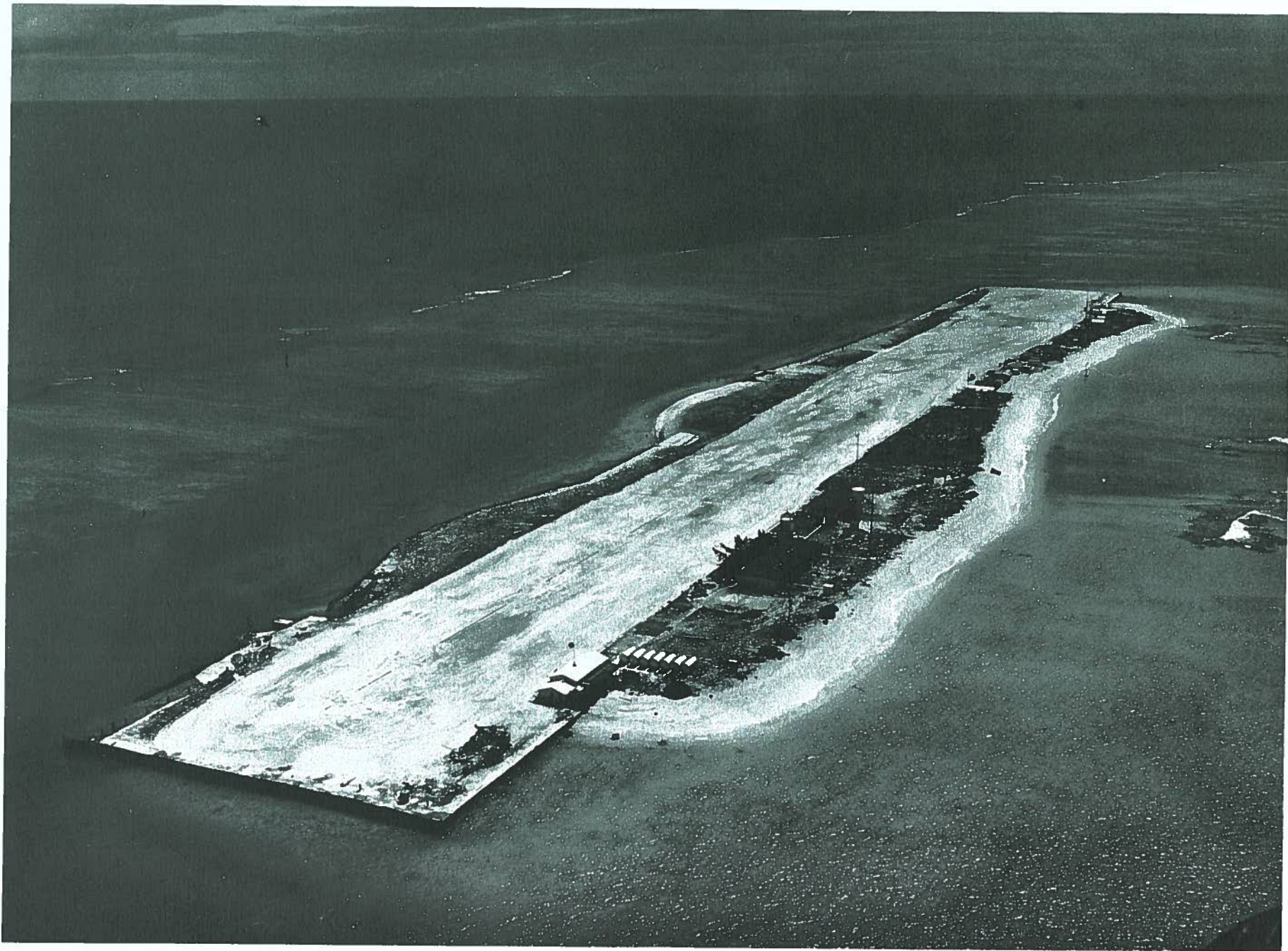
APPROXIMATE SCALE IN MILES



P a c i f i c

O c e a n

HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE



Tern Island, French Frigate Shoals. This Coast Guard station is the only habitation between the main Hawaiian Islands and Midway.

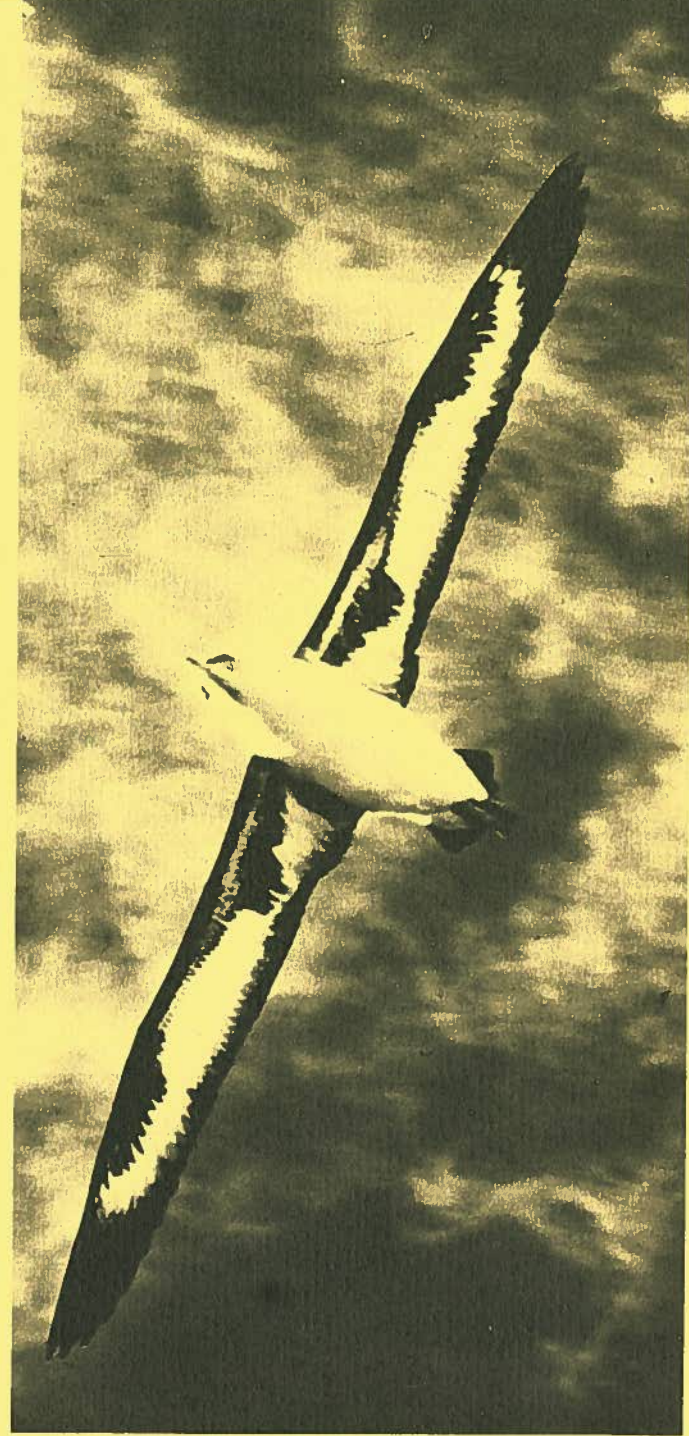
DEVELOPMENT & OPERATIONS

Except for improvement of the boat channel to Tern Island, reefs and lagoons will remain as they are. Land management will consist of preserving refuge islands in near natural state with development held to minor projects beneficial for wildlife and helpful to administration. Personnel will try to eliminate exotic plants or animals there now or which may be introduced accidentally.

A cooperative agreement permits the Coast Guard to improve existing facilities on Tern Island. Enlarging the boat channel for small ships and reconstruction of the airstrip at French Frigate Shoals would benefit official access. ¹

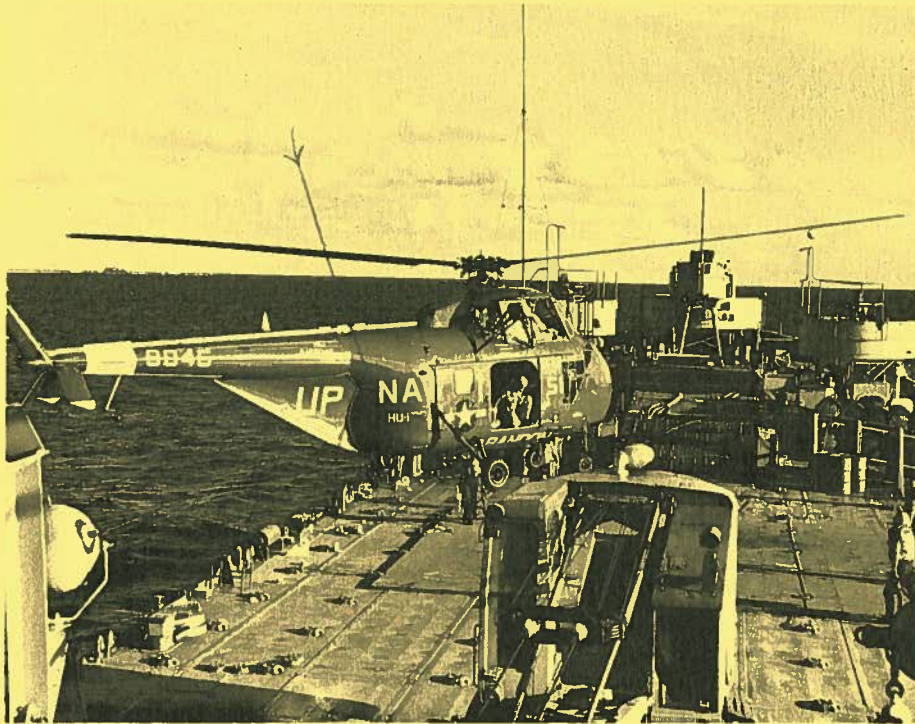
Sudden and violent storms occasionally hamper operations, and small shelters will be erected on major islands to house personnel during patrols and investigations. They will be of design easily transported ashore by small boat or helicopter, stout enough to protect basic equipment and supplies, and be located and designed to attract little notice. Now, provisions and equipment are brought ashore with each landing, sometimes under hazardous conditions. The shelters will make it possible to store food, water, bedding, and instruments needed to conduct activities. This will reduce time and effort of assembling and transporting material, thereby promoting efficiency and safety.

Utilities for the modest living quarters, laboratory, boathouse, and equipment storage building planned for Tern Island may be provided by the Coast Guard station there.



La Perouse Pinnacle, remains of an old volcanic peak.





Combining military maneuver with an official survey of the islands.



Helicopter atop Gardner Pinnacle.

Transportation

Personnel and cooperators will continue to travel via government or private ships and aircraft. Effectiveness of administration depends in large part on ability to reach the islands. Because they are safer and more efficient, helicopters carried aboard ships are preferred to boats for access. But when helicopters are not available, improvements to facilitate boat landings are needed. Simple booms over the water and small boat slips are possibilities considered. Past refuge use of helicopters incidental to military missions has been successful and sometimes fixed-wing airplanes will be used for observation flights.

Administration

The refuge office will remain in Kailua, Oahu, Hawaii, while programs continue at present levels. As the number and scope of activities increase, additional space and staff will be needed. Refuge responsibilities may include administration of some new, small areas on the main islands. Government-owned facilities suitable for expanded programs, including visitor services, will be developed in the Honolulu area. An administrative complex will include wildlife displays, an auditorium for meetings and slide shows, office space, and a place to store equipment and supplies. Design will be determined by types and directions of Bureau of Sport Fisheries and Wildlife activities in Hawaii. This complex will provide greater service to the public.

Recreational Facilities

Remoteness of the islands and hazards of access interfere with casual pleasure visits. Importation of pest animals and plants could easily upset the fragile ecology of the islands, and intolerance to human disturbance by some animals makes public use a threat to natural values. The principal contributions of the refuge to recreation will be its information and interpretation values and enjoyment people receive knowing native species will survive. An interpretive center to be developed in connection with an administrative complex near Honolulu will display island wildlife in typical habitat. Pictures and printed information will complement slides and movies available for showing for groups. //

BENEFITS



Young Gooney Bird trying wings.

The refuge has flora and fauna which, in combination with unusual topography, are unique in all the world. That these shall be preserved is a goal fitting our most purposeful interest and effort. It has not been possible to repair all past damage or to prevent all trespass, but time has healed some of the abuse.

Scientific studies are producing new information. Tagging of birds, seals, and turtles gives information on migration, distribution, and basic life history data helpful in their management. Transplants of certain species will provide greater safety and wider distribution should some catastrophe occur on a single small island where they now live. Control of nonnative animals and plants will prevent changing the environment and protect resident species.

But the outstanding benefit is perpetuation of this wonderful area and its unique land and marine forms. Its remoteness, hazards, and lack of adornments sought by most travelers are assurances against mass public intrusion.

Wildlife of the islands of the refuge need not be harvested to be valuable; the knowledge it exists is enough for some people. Others see the refuge as a stopover for wildlife in migration, a base for dispersal or nesting. Still others believe the islands may have a significance not now known and recognize their importance to research.

Species lost cannot be restored, and it is unfortunate that some once found on the islands are gone forever. A responsible civilization cannot deny those now endangered this chance for survival. That this vast area shall remain a representative segment of the Central Pacific, no longer exploited, is a value beyond any imaginable monetary return.

Nihoa Millerbird.

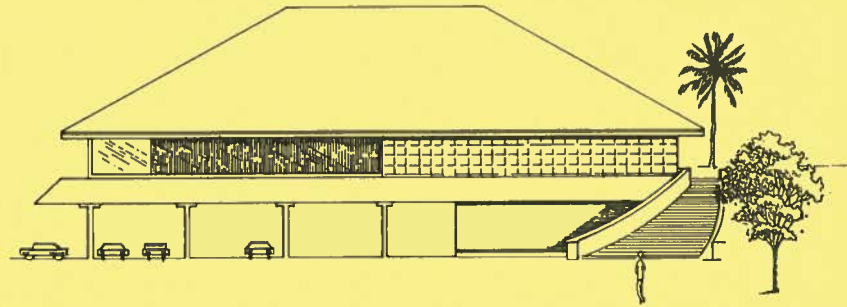




Refuge scientists weighing green sea turtle for life history studies.



Insect study.



Schematic drawing of administration and interpretation center.

ESTIMATED COSTS

Low estimates shown reflect intent to maintain natural conditions. Structures planned will be simple, inexpensive, and limited to those necessary for safety and effective administration:

Shelters (6)	\$18,000
Laboratory and Quarters	12,000
Boat ramps (2)	6,000
Boathouse	4,000
	<u>\$40,000</u>

Costs listed do not include development of an administration-interpretation complex in the Honolulu area. This would be a cooperative project costing approximately \$500,000 for the building and displays. Possibility of a site being acquired by exchange of public lands for a tract fitting the purpose will be explored.

Operational costs will be proportional to the tempo of activity. Field studies, travel, visitor services, expanded responsibilities, all affect expense of administration. Normal routine costs relating only to the refuge are expected to remain under \$140,000 a year.

Underwater survey.





SUMMARY

Baby green sea turtles leaving the nest.

Establishment of the refuge has prevented new damage to this unique island chain, and efforts to preserve native wildlife as a valuable part of our national heritage have been quite successful. Planned development essential to fulfillment of refuge purposes, respecting natural values, will provide substantial returns. Assured survival of species remaining in a setting best described as wilderness is a credible goal worth strong public support. Our posterity deserves no less than this as part of a rich wildlife heritage.



Fairy Terns



As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.



This administrative plan proposed and prepared by the Bureau of Sport Fisheries and Wildlife's Western Region, Portland, Oregon, supports and furthers the high objectives of the Department of the Interior for the wise development, management, and use of the lands, waters, and other resources of the National Wildlife Refuge System.

April—1970



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

BIRDS OF THE

HAWAIIAN ISLANDS

NATIONAL WILDLIFE REFUGE

Introduction

The Hawaiian Islands National Wildlife Refuge consists of a series of eight islands, reefs, and atolls extending a distance of about 800 miles from Nihoa Island, the easternmost, to Pearl and Hermes Reef, the most westward. Included are Nihoa and Necker Islands, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan and Lisianski Islands and Pearl and Hermes Reef. Pearl and Hermes Reef lies about 95 miles east of Midway.



Geology

Geologically, the refuge is part of a chain of tremendous underwater peaks. Nihoa, Necker, Gardner Pinnacles and La Perouse Pinnacle at French Frigate Shoals are the cores of the old volcanic cones. Absence of beaches and sheer cliffs of basalt, dropping into the ocean, are typical of these islands. Laysan and Lisianski Islands are low, flat sandy islands surrounded by submerged coral reefs. French Frigate Shoals and Pearl and Hermes Reef are typical Pacific atolls. Maro Reef has only one small rock protruding a few feet above the surface of the ocean. Pearl and Hermes Reef is a circular atoll almost 47 miles in circumference. Located within its fringing reef are seven small sandy islands. French Frigate Shoals is a crescent-shaped atoll with a lagoon containing eight similar islands. Laysan, comprising some 1,100 acres, is the largest of the refuge islands.



Bird Life

Most of the species of birds which utilize the refuge are pelagic seabirds, and this is the only national wildlife refuge in the nation where most of these species nest.

Located near the center of the North Pacific Ocean the refuge islands are visited by many species of birds considered as stragglers. Several Asiatic species are listed in the appended list of accidentals.

Some of the most remarkable sea bird colonies in the world occur on this refuge. Some species utilize the islands throughout most of the year. Others come only to reproduce their kind. Although the winter and spring months are the periods of peak nesting activity, at least one species or another may be found nesting throughout the year. In the early spring many thousands of terns, petrels, shearwaters and other such species join those on the islands and the air over each becomes a whirling bedlam of shrieking birds.

These bird populations are extremely difficult to estimate because many nest in burrows which honeycomb the islands. Populations are increased manifold by birds which return at night to roost on the islands after having spent the day at sea searching for food.

The refuge is home to four kinds of birds found nowhere else in the world. These are the Nihoa Millerbird and Nihoa Finch which are restricted to Nihoa Island, and the Laysan Teal and Laysan Finch which are confined to Laysan Island. A small population of the latter species exists now also on Southeast Island at Pearl and Hermes Reef as a result of an experimental transplant of a few from Laysan Island. Because of man's interference with nature on Laysan Island many years ago, three species of birds endemic only to that island became extinct. These were the Laysan millerbird, honeycreeper and rail.

The precarious status of the birds, fragile ecology of these small islands which can be easily upset by too much human activity, and the dangerous landing conditions to be encountered, preclude general public use. All major units of the refuge have been designated as national research natural areas, and at present only scientists on approved research projects are permitted entry.

Refuge headquarters is located at 337 Uluniu Street, Kailua, Hawaii 96734. Inquiry about the bird life on the refuge, including accidentals, may be directed to that office.

Climate

The climate is mild with temperatures seldom reaching as high as 90 or lower than 50 degrees Fahrenheit. Precipitation varies between 26 and 29 inches per year. Occasionally, however, severe Pacific storms with waves of over 30 feet buffet the islands. Although these storms do not affect the rocky islands greatly, the low, sandy islands may suffer considerable damage from erosion and the loss of vegetation, undoubtedly with adverse effects on nesting populations of sea birds.

Brown Booby with Chick



Fairy Terns



BIRDS OF THE HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE

SOOTY TERN (*Sterna fuscata*) One of the most abundant species on all the refuge islands. Populations on Laysan may number between one to two million. Absent during late fall and early winter. Peak of nesting during the spring. Nests in dense colonies with some nests being less than 6 inches from each other.

GRAY-BACKED TERN (*Sterna lunata*) Present in large numbers on all islands most of the year, but scarce in the fall. Most abundant on Laysan, Lisianski and Nihoa. Much less abundant than the sooty tern.

BLUE-GRAY NODDY TERN (*Procelsterna cerulea*) A resident in the high hundreds on Nihoa and Necker. Has been recorded on Gardner Pinnacles and Lisianski. More common in the spring. Nests in holes and crevices in the cliffs. The smallest of all the terns found on the refuge.

COMMON OR BROWN NODDY TERN (*Anous stolidus*) Abundant on all refuge islands throughout most of the year, especially in the summer. Highest concentrations on Nihoa, Necker and Laysan. Nests on the ground on all islands.

HAWAIIAN OR WHITE-CAPPED NODDY TERN (*Anous minutus*) Common on all islands throughout the year. Most abundant on Nihoa and Laysan. Prefers to nest off the ground in low vegetation on the sandy islands and in holes in the cliffs of the rocky islands.

FAIRY OR WHITE TERN (*Gygis alba*) Common on all islands throughout the year except at Pearl and Hermes Reef where it is scarce and French Frigate Shoals where it is found only in low numbers. Does not build a nest but lays eggs on exposed surface of rock or in fork of a branch of low growing brush or small tree. Considered to be the most beautiful of sea birds.

BLACK-FOOTED ALBATROSS (*Diomedea nigripes*) Abundant on all islands during the nesting season from early November to early July. Usually absent from August to late October. Most roam the north Pacific for the first 4-5 years of their life before returning to land to pair and eventually nest which usually is in their seventh year. Most abundant on Laysan where populations may reach 50,000. Preferred nesting areas are the beaches of these islands.

LAYSAN ALBATROSS (*Diomedea immutabilis*) Abundant on all islands except Nihoa where they are found in very low numbers. Most abundant on Laysan where well over a half-million may occur during the nesting season. Preference is shown for the interior of islands as nesting sites. Similar in habits to the preceding species.

WEDGE-TAILED SHEARWATER (*Puffinus pacificus*) This species is abundant on all refuge islands. It nests in burrows which it digs in the sand on the low islands or in the shallow depressions or crevices on the higher rocky islands. It is most abundant on Nihoa, Necker, Laysan and Lisianski Islands from March to November. Commonly called the moaning bird, its vocal repertoire consists of moans, squalls and caterwauls. On Nihoa and Necker at dawn during the summer months the steady chorus of calling by thousands of birds blends into a steady low dull roar.

CHRISTMAS ISLAND SHEARWATER (*Puffinus nativitatus*) Found in the low thousands primarily during the spring and summer months on Laysan and Lisianski. Present in lower numbers on the other refuge islands. Similar in habits to the preceding species.

BONIN PETREL (*Pteradroma hypoleuca*) Most common on Laysan and Lisianski during the fall and winter months where populations may reach 1 million some years. Like other petrels and shearwaters, it nests in burrows in the packed sand.

BULWER'S PETREL (*Bulweria bulwerii*) Abundant on Nihoa and Necker. About a quarter million were estimated to be on the former island in July. Present in low numbers elsewhere on the refuge. Sometimes confused with the sooty storm petrel from which it can be separated by its wedge-shaped instead of forked tail.

SOOTY STORM PETREL (*Oceandroma markhami*) Most abundant on Southeast Island at Pearl and Hermes Reef during the winter and spring. Populations there number in the high hundreds. Usually absent in the summer. This island is considered to be the most important breeding area for this species in the central Pacific. A small colony exists on Laysan. A few nest on Nihoa. Nests in burrows.

RED-TAILED TROPIC BIRD (*Phaeton rubricauda*) Common on all refuge islands but most abundant on the larger islands such as Laysan, Lisianski and Nihoa. Prefers to nest under vegetation or in crevices. Frequently called Bosun Bird because of its harsh cry when disturbed.

Great Frigate Bird



Tropic Bird



Sooty Terns



Albatross in flight

BLUE-FACED BOOBY (*Sula dactylatra*) The largest of the three species of boobies found on the refuge, this species is common to all islands. It is most abundant on Laysan and Lisianski. Nesting may occur throughout most of the year but takes place mainly between February and April. The outer beaches of the low sandy islands and the exposed ridges of the high rocky islands are preferred nesting sites. Males have a high pitched squeak, while females possess a hoarse squawk.

BROWN BOOBY (*Sula leucogaster*) Found in low numbers on most of the refuge islands. Most common on Southeast Island at Pearl and Hermes Reef — less than 100 pair. The wariest and smallest of the three booby species. Usually lays two eggs in the nest which is placed on the ground.

RED-FOOTED BOOBY (*Sula rubripes*) Nests throughout most of the year on all islands, although the peak occurs during the spring. Almost non-existent in the early fall. Most abundant on Nihoa, Necker, Laysan and Lisianski. Several thousand nesting pairs occur on Nihoa. Nests usually contain but one egg and are constructed in low vegetation off the ground.

FRIGATE BIRD (*Fregata minor*) Present throughout the year on all islands although some wandering may take place. Most abundant on Nihoa where populations may be in the mid-thousands. Somewhat less abundant on Laysan, Lisianski and Necker. Frequently observed soaring on wide-spread wings high above the islands. Robs other birds of their freshly taken fish.

LAYSAN TEAL (*Anas laysanensis*) Endemic to Laysan Island. Although the population was once down to 7 birds, it has since recovered. Populations have fluctuated in recent years from 100 to 600 from unknown causes. Primary source of food are the brine flies which coat the shores of the saline interior lagoon.

AMERICAN WIDGEON (*Mareca americana*) A regular straggler each fall and winter at Laysan. Populations usually number less than 10.

SHOVELER (*Spatula clypeata*) Regular winter visitor at Laysan. Usually found in very low numbers.

PINTAIL (*Anas acuta*) Regular visitor at Laysan. Usually found in very low numbers.

SHARP-TAILED SANDPIPER (*Erolia acuminata*) A straggler in low numbers. Most commonly observed around the lagoon at Laysan.

SANDERLING (*Crocethia alba*) Uncommon in low numbers on Laysan. Occasionally found on the other sandy islands.

WANDERING TATTLER (*Heteroscelus incanum*) Scattered individuals found throughout the year on all islands, except Laysan, where they are common.

BRISTLE-THIGHED CURLEW (*Numenius tahitiensis*) Found on all islands during fall, winter and spring in very low numbers. Most common on Laysan and Lisianski. Uncommon on the high islands of Nihoa and Necker.

GOLDEN PLOVER (*Pluvialis dominica*) Present during fall, winter and spring on all islands in low numbers. Most abundant on Laysan where 900 may occur during these seasons.

LAYSAN FINCH (*Psittirostra cantans*) Endemic to Laysan Island. During recent years populations have varied from 7,000 to 11,000 birds. A member of the unique family of Hawaiian honeycreepers (*Drepaniidae*). A small population now exists on Southeast Island, Pearl and Hermes Reef as a result of a transplant from Laysan.

NIHOA FINCH (*Psittirostra ultima*) Endemic to Nihoa Island. During recent years, populations have varied from 2,300 to 5,000 birds. Considered by some ornithologists to be a race of the Laysan finch.

NIHOA MILLERBIRD (*Acrocephalus kingii*) This old world warbler is endemic to Nihoa Island. During recent years populations have varied between 300 and 600. It was unknown to science until 1923 when a scientific expedition to that island discovered it. The first recorded nest was found in 1962.



Nihoa Millerbird on Nest

LIST OF ACCIDENTALS
(Those birds which have been
recorded no more than 5 times)

Horned Puffin
Black-legged Kittiwake
Northern Fulmar
Glaucous Gull
Glaucous-winged Gull
Western Gull
Herring Gull
Ring-billed Gull
Franklin's Gull
Bonaparte's Gull
Sooty Shearwater
Herald Petrel
Murphy's Petrel
Red-billed Tropicbird
Pelagic Cormorant
Mallard
Gadwall
Green-winged Teal
Bufflehead
Harlequin Duck
American Coot
Red Phalarope
Northern Phalarope
Common Snipe
Knot
Pectoral Sandpiper
Dunlin
Semipalmated Sandpiper
Ruff
Marbled Godwit
Bar-tailed Godwit
Greater Yellowlegs
Lesser Yellowlegs
Semi-palmated Plover
Black-bellied Plover
Short-eared Owl
Peregrine Falcon
Mockingbird



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