

HAWAIIAN AND PACIFIC ISLANDS NATIONAL WILDLIFE REFUGE COMPLEX

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

PERSONNEL (1982)

1. John B. Andre	Ass't. Refuge Manager GS-7 (CS)		(Tern Is.)
2. Noreen Bautista	Clerk-Typist GS-4 (PPT)		(Kauai)
3. Barry G. Brady	Ass't. Refuge Manager GS-9 (PFT)		(Kauai)
4. G. Vernon Byrd*	Wildlife Biologist GS-9 (PI)	Temp. Assign.	(Honolulu)
5. Richard A. Coleman	Ass't. Refuge Manager GS-11 (PFT)		(Honolulu)
6. Steven Fairaizl	Ass't. Refuge Manager GS-7 (PFT)	EOD 8/8/82	(Tern Is.)
7. Stewart Fefer	Wildlife Biologist GS-11 (CS)		(Honolulu)
8. Robert Ferguson	Bio. Tech. GS-5 (Temp.)	EOD 3/7/82	(Honolulu)
		Term 11/5/82	
9. Curt Griffin	Bio. Tech. GS-7 (Temp.)	EOD 4/4/82	(Honolulu)
		Term 12/30/82	
10. Craig Harrison	Wildlife Biologist GS-11 (PI)		(Honolulu)
11. Shirley Hernandez	Clerk-Typist GS-3 (Temp.)		(Honolulu)
12. Sharon Larson	Refuge Assistant GS-5 (PFT)	EOD 6/27/82	(Honolulu)
13. Gerald M. Ludwig	Ass't. Refuge Manager GS-11 (PFT)		(Honolulu)
14. Daniel Moriarty	Maintenance Worker WG-6 (PFT)		(Kauai)
15. Nanette Muraoka*	Clerk-Typist GS-3 (Temp.)	EOD 11/8/82	(Honolulu)
16. Maura Naughton	Ecologist GS-7 (CS)		(Honolulu)
17. Audrey Newman*	Ecologist GS-7 (CS)	Term 12/27/82	(Honolulu)
18. Robert Schulmeister	Ass't. Refuge Manager GS-9 (CS)	Term 4/4/82	(Tern Is.)
19. Robert Shallenberger	Refuge Manager GM-13 (PFT)		(Honolulu)
20. Mary Beth Wagner*	Bio. Tech. GS-6 (Temp.)	EOD 4/4/82	(Honolulu)
21. David Woodside	Maintenance Worker WG-6 (PFT)		(Honolulu)
22. Yvonne L. Wright	Refuge Assistant GS-5 (PFT)	Term 9/18/82	(Honolulu)

Volunteers

1. Charles Deutsch*
2. Gale Fairaizl
3. Elizabeth Flint
4. Ruth Ittner
5. Dave Jickling*
6. Richard Podolsky*
7. Peter Pyle*
8. Sue Schulmeister
9. Joanne Young*
10. Earthwatch Volunteers (15)*

YCC

1. Richard Bottomley*
2. Enrollees (6)*

*Not photographed.

Review and Approvals


Submitted By _____ Date _____


Regional Office Review _____ Date _____

ACTING

Area Office Review _____ Date _____



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13 19 5 9



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V-4 1 V-8 18



5

21



V-3

Organizational Chart as of 12-31-82
Refuges and Wildlife Resources

Refuge Manager
Dr. Robert J. Shallenberger
GM-485-13 (PFT)

Wildlife Biologist
Craig S. Harrison
GS-486-11 (PI-LWOP)

Refuge Assistant
Sharon Larson
GS-301-5 (PFT)

Clerk Typist
Shirley A. Hernandez
GS-322-3 (Temp.)

Clerk Typist
Nanette Muraoka
GS-322-3 (Temp.)

Wildlife Biologist
Stewart I. Fefer
GS-486-11 (PFT)

Refuge Manager (Wetlands)
Dr. Richard A. Coleman
GS-485-11 (PFT)

Refuge Manager (Remote Is.)
Gerald M. Ludwig
GS-485-11 (PFT)

Ecologist
Maura B. Naughton
GS-408-7 (GS)

Maintenanceman (Oahu)
David Woodside
WG-4749-6 (PFT)

Refuge Manager (Tern Is.)
John B. Andre
GS-485-9 (PFT)

Refuge Manager (Kauai)
Barry Brady
GS-485-9 (PFT)

Refuge Manager (Tern Is.)
Steven Fairaizl
GS-485-7 (PFT)

Maintenanceman (Kauai)
Daniel Moriarty
WG-4749-6 (PFT)

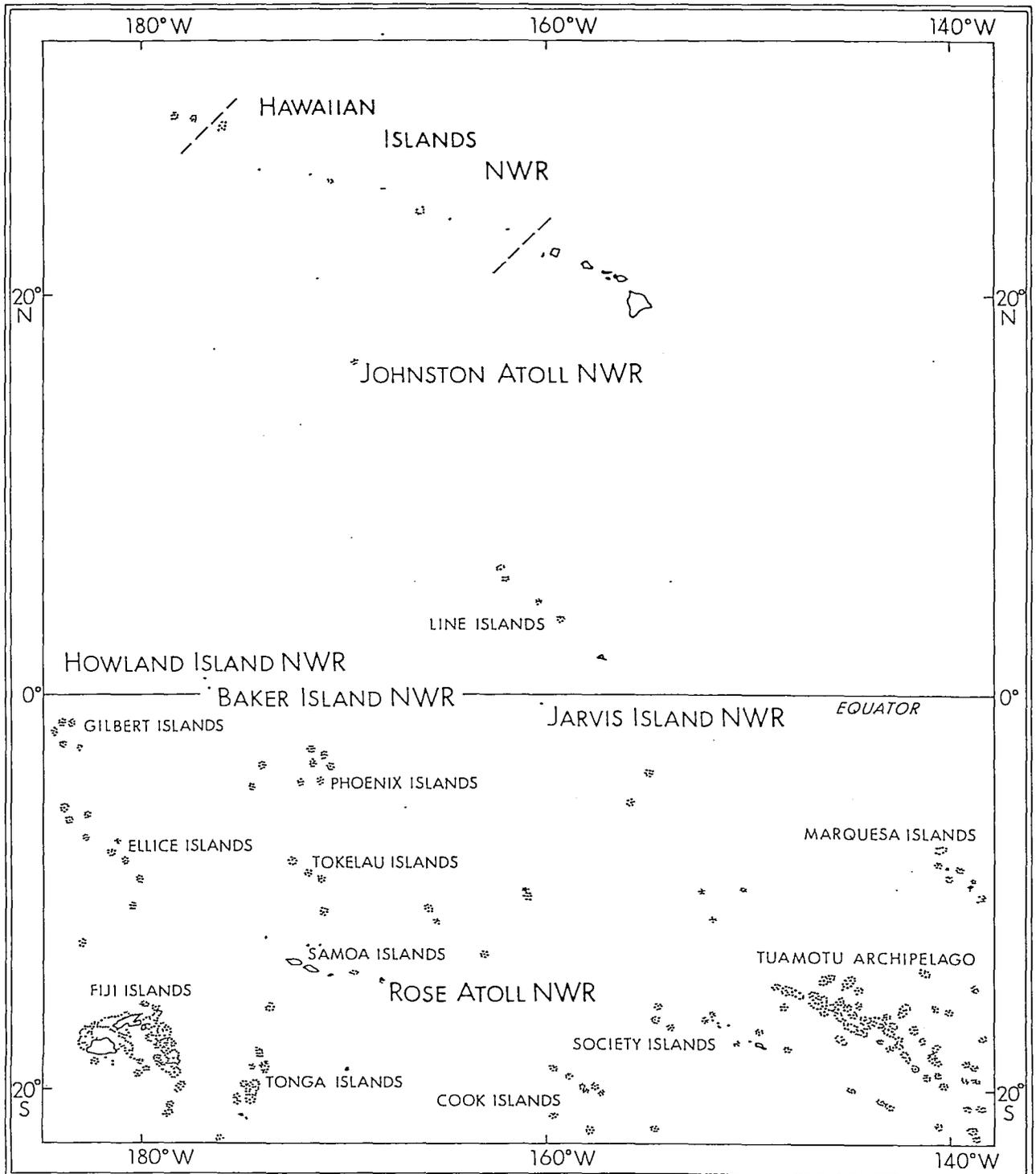
Biological Technician
Vacant
GS-405-5

Clerk Typist (Kauai)
Noreen Q. Bautista
GS-322-4 (PFT)

HAWAIIAN AND PACIFIC ISLANDS NATIONAL WILDLIFE REFUGE COMPLEX

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	See Individual Refuges (SIR)
C. <u>LAND ACQUISITION</u>	
1. Fee Title	2
2. Easements	SIR
3. Other	SIR
D. <u>PLANNING</u>	
1. Master Plan	4
2. Management Plan	SIR
3. Public Participation	SIR
4. Compliance with Environmental Mandates	SIR
5. Research and Investigations	SIR
E. <u>ADMINISTRATION</u>	
1. Personnel	5
2. Funding	5
3. Safety	7
4. Technical Assistance	7
5. Other Items	9
F. <u>HABITAT MANAGEMENT</u>	SIR
G. <u>WILDLIFE</u>	SIR
H. <u>PUBLIC USE</u>	SIR
I. <u>EQUIPMENT AND FACILITIES</u>	SIR
J. <u>OTHER ITEMS</u>	
1. Cooperative Programs	10
2. Items of Interest	10
3. Credits	11



<p>Fish and Wildlife Service</p>	<p>HAWAIIAN AND PACIFIC ISLANDS NATIONAL WILDLIFE REFUGE COMPLEX Remote Island Refuges</p>	<p>UNITED STATES DEPARTMENT OF THE INTERIOR</p>
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A. HIGHLIGHTS

This Complex is made up of 11 National Wildlife Refuges and one Wildlife Administrative Site. Five wetland refuges on Oahu, Kauai and Molokai are inhabited by endangered waterbirds unique to the Hawaiian Islands and by a variety of migratory waterfowl and shorebirds that visit Pacific islands during winter months. Six remote island refuges in Hawaii and the Central Pacific support literally millions of breeding seabirds, unique land birds and a variety of other marine species including endangered seals and turtles that inhabit extensive nearshore reefs and lagoons. The twelfth unit within the Complex is the Kilauea Point Wildlife Administrative Site on Kauai. This site provides habitat for several resident seabird species and doubles as the Service's primary visitor interpretation site and Kauai Refuge Office. The Complex is administered from within the Honolulu Area Office in the Federal Building.

A principal highlight on wetland refuges in the Complex was the negotiation and signing of a cooperative agreement with the State of Hawaii for transfer of State dollars (\$1.7 million) to complete the water delivery system at Hanalei NWR. As of the end of the year, the funding transfer had been delayed pending resolution of some legal problems and concerns raised about the future of the taro industry. Planning proceeded at Hanalei, James Campbell and Kakahaia NWR's for FY83 BLHP projects. After lengthy delays, electrical power was connected to new BLHP funded pumps at James Campbell NWR in January, 1982. These pumps will help alleviate flooding problems and allow maintenance of water levels in refuge impoundments. Our first teacher-training workshop at James Campbell NWR was also held in November, 1982. At Kilauea Point, our continuing efforts to obtain title to the facility from the Coast Guard were frustrated, at least temporarily, when the site became caught up in the Administration's program to reduce the national debt by excessing federal lands. As the year ended, the Service was attempting to negotiate a longer term agreement with the Coast Guard that would allow us to continue our programs without losing the site to the highest bidder.

On the remote island refuges, our major cooperative research effort continued in the Hawaiian Islands NWR where Tripartite studies with National Marine Fisheries Service, the State of Hawaii and Sea Grant are winding down in anticipation of a wrap-up symposium in May, 1983. Monk seal numbers at the Tern Island station continued to increase dramatically throughout the year. A new project, of major consequence, became the primary focus of our work at Johnston Atoll NWR when the Defense Nuclear Agency announced plans to build a large facility to demilitarize stored nerve gas and mustard gas. This was our biggest year of all for work at Jarvis Island NWR, with trips undertaken in July and October. We are cautiously optimistic that our cat eradication effort was successful, but planned a spring, 1983 trip to complete the task. Two trips to Rose Atoll NWR provided opportunity to complete an extensive field survey of Tridacna clams and to monitor turtle and seabird resources.

The weather highlight of the year was Hurricane Iwa in late November. Sustained winds, locally in excess of 100 mph, caused major property damage in the State but left the refuges largely unscathed.

C. LAND ACQUISITION

During 1982, Refuge staff made additional progress on acquisition studies for two areas of prime wildlife value in the State of Hawaii. Kealia Pond is a wetland on the island of Maui, of major importance to endangered waterbirds, particularly Hawaiian stilt. Midway Atoll, located northwest of the Hawaiian Islands National Wildlife Refuge, supports a large population of breeding seabirds and remnant populations of threatened green turtles and endangered Hawaiian monk seals. The following narrative explains progress made at Kealia Pond and Midway Atoll between 1978-1982. Acquisition efforts relating to transfer of Coast Guard title at Kilauea Point and refuge expansion at Kakahaia NWR and James Campbell NWR are addressed in sections relating to those specific refuges.

Kealia Pond

Background. Efforts to acquire Kealia Pond from Alexander and Baldwin, Inc. were initiated in 1971 when Director Greenwalt approved the appraised price of \$502K for acquisition of 747 acres of endangered and migratory bird wetlands. Delays in acquisition occurred as a result of stalemated negotiations due to price differences and undetermined locations of several private inholdings (Kuleanas).

1978. The Kuleana concerns were resolved and the original appraisal of \$502K was revised to \$3.2M for 500 acres. A draft EIS was completed after which opposition arose from the County of Maui, which opted for harbor development, and G.A.O. and the State, who objected to Federal purchase. G.A.O. recommended cessation of Federal acquisition on the argument that the acquisition was not consistent with the Service's criteria relating to the SE program. Acquisition was delayed pending resolution of the SE problems.

1979. Efforts to acquire Kealia Pond continued. Objections of G.A.O. in 1978 to Federal acquisition of Kealia Pond were rebutted by Secretary Joseph and acquisition efforts continued. However, A&B's new reappraisal of the 500A at a value of \$4.5M exceeded the Service's appraisal price by \$1.3M. Therefore, negotiations on a settling price were delayed. Although the State indicated a desire to purchase the Pond, budgetary restraints prevented their action from materializing.

1980. Biological data continued to be gathered in 1980, justifying preservation of the area for endangered waterbirds. Numerous State/Federal coordination meetings occurred that resulted in the consummation of a Cooperative Federal/State Habitat Protection Agreement on Sept. 5, 1980. This agreement opened the way for joint acquisition efforts whereby Federal acquisition would commence with the State option to purchase when funds became available. Reappraisals of the Pond area (500A) were undertaken by both the Service and A&B that resulted in a wide discrepancy of land values. The Service's appraised value for 500 acres was \$3.3M while A&B's appraisal was \$14.5M. The excessive difference in appraisals,

\$11.2M, resulted in delaying acquisition although \$4.5M of Service funds were available.

1981. Kealia Pond acquisition efforts, that were delayed in 1980 as a result of the wide discrepancy in appraised values (A&B \$14.5M and FWS \$3.3M), were reinitiated. A formal offer to A&B of \$4.5M was made in March, 1981. However, no response was received accepting or rejecting the offer. During this same period, a directive was received from RO indicating Secretary Watt had suspended all LWCF acquisition activities, thus resulting in additional delays in Kealia Pond acquisition effort. Later the suspension of acquisition was eased. Coordination with Federal, State and local government agencies was resumed and compliance with regulatory requirements including GZM, National Historic Preservation Act and NEPA and others were completed. The final EIS was printed and distributed for public comment in August, 1981. With the exception of the County of Maui and G.A.O., all comments on the EIS were favorable to the alternative "Federal Acquisition with State Option to Purchase." The County continued to emphasize future commercial development including aquaculture with G.A.O. maintaining that State protection was adequate, therefore Federal acquisition was unnecessary.

1982. Although no further progress was made in resolving the appraisal discrepancies, Refuge staff remained involved in the evaluation of various acquisition options. Shallenberger visited the site in August with Endangered Species staff from both the Washington Central Office and Portland Regional Office to explore these options. In November, Refuge staff prepared an alternative plan to acquire 220 acres (instead of 500) along the north side of the pond. Construction worksheets and a project proposal for this plan were submitted to cover preliminary development and staffing. At year's end, this plan was in the Regional Office for review.

Midway Atoll

Background. Midway Atoll, under the administration of the United States Navy, has always been recognized as an important atoll for wildlife including migratory birds, monk seals and green sea turtles. In July, 1972, a cooperative Service/U.S. Navy agreement was signed for the conservation and management of fish and wildlife on the island. The agreement continues to be in effect.

1978. Discussions commenced with the Midway Navy Command in April concerning the possibility of obtaining refuge status for Sand and Eastern Islands. The need for additional island wildlife protection was brought about as a result of the Navy's plan to reduce operations and the State's proposal to establish a commercial fishing station on the island under a one-year Naval trial permit. A draft cooperative agreement for a NWR overlay was submitted to the Regional Director for approval and meetings were held with the Navy to encourage support. Coordinating efforts continued throughout the year.

1979. The 1978 Midway refuge overlay proposal and agreement with the Navy was delayed in consideration of additional refuge alternatives. Two of the new alternatives involved a revision of the Sikes Act agreement, however, NWR overlay status was deferred until results of the Tripartite Study were in, jurisdiction questions regarding HINWR boundaries were adequately addressed, and a comprehensive resource management plan was developed for the Hawaiian Islands NWR. Data collection was initiated regarding the foregoing concerns.

1980. Coordination continued with the U.S. Navy concerning impacts on wildlife of the military's operational scale-down plan and the State's proposed development of a long-term fishing supply station on Midway. Data were compiled while developing additional alternatives for the long-range protection of island wildlife.

1981. A draft review of wildlife management options for Midway Atoll was completed in-house but distribution of the document was withheld pending final decisions by the Navy regarding award of a contract for island operations. In December, 1981, a contract was awarded to Base Services, Inc. A major reduction in onsite military staffing was scheduled for early 1982.

1982. Coordination continued with U.S. Navy officials regarding contractor (Base Services, Inc.) operations on Midway. Wildlife monitoring, disease and other seabird studies are addressed elsewhere in this report. Refuge staff completed a decision document evaluating various wildlife management options, including overlay refuge status, and submitted it for Regional Office review in October.

D. PLANNING

1. Master Plan - Wetlands

MKGG/Yamamoto, Inc. was contracted in September, 1978, to develop a Master Plan for five NWRs on the main Hawaiian Islands (excluding Pearl Harbor NWR). Despite numerous conferences with Refuge and RO personnel, the fourth and final draft, submitted to the Service in September, 1979, was a very poor quality document. The many factual errors and poor editing of this report rendered it useless for public review. A supplementary Master Plan for all five wetland refuges (excluding the Kilauea Point Wildlife Administrative Site) was initiated in November, 1980. Vernon Byrd, former Assistant Refuge Manager (Kauai), was detailed to Honolulu for three weeks in 1980 and four weeks in 1981 to work on the first draft of this plan. Byrd returned to work on the plan in March, 1982. Graphics work on the plan was completed in November. The Wetland Master Plan will be submitted for Regional Office review in early 1983.

Master Plan - Hawaiian Islands NWR

Robert Cleary, Regional Office Planner, visited Honolulu in February to coordinate on planning for the HINWR. A flow chart for master planning,

NEPA coordination and Tripartite study reporting was developed. Remote island refuge maps, including those for the HINWR, were completed. Supportive file material (enabling documents, etc.) were compiled for use in the master planning process.

E. ADMINISTRATION

1. Personnel

Major changes in Refuge personnel occurred during the 1978-1980 period, remained reasonably stable throughout 1981 and then underwent substantial changes again in 1982. Earlier increases in staffing occurred as a result of (1) expansion of the Tripartite research effort in the Hawaiian Islands National Wildlife Refuge, (2) increasing visitor demand and habitat development projects on Kauai and (3) establishment of a Service operated facility on Tern Island, French Frigate Shoals, in 1979.

Refuges and Wildlife Resources (RWR) staffing was reorganized in 1980 to accommodate increasing work loads and facilitate personnel management. The principal change involved splitting of the one primary Assistant Refuge Manager position in the Honolulu Office into two parallel positions for Remote Islands and Wetlands. In the reorganization, Tern Island staff were placed under the Assistant Refuge Manager (Remote Islands) and the Kauai staff under the Assistant Refuge Manager (Wetlands). This organizational plan worked efficiently throughout 1981 and 1982. In order to address public use objectives on Kauai, further reorganization was initiated near the end of 1982. This will involve creation of a Park Ranger (Interpretation) position and transfer of the Assistant Refuge Manager position on Kauai to Honolulu.

The following chart summarizes the staffing changes which have occurred between FY76-FY82.

	C/S	Permanent		Temporary	Total
		Full-Time	Part-Time		
FY76		.4	1		5
FY77	1	3	2	1	7
FY78	1	5	3	1	10
FY79	5	5	1	3	14
FY80	5	5	1	4	15
FY81	6	5	2	5	18
*FY82	1	10	2	5	18

*FY82 change reflects conversion of career seasonal positions to PFT.

2. Funding

The following table summarizes funding for Refuges and Wildlife Resources

between FY76-FY82. Additional narrative explains the funding changes which occurred during the period.

<u>FY</u>	<u>Total Staff</u>	<u>1210</u>	<u>1210 (O&M)</u>	<u>1220</u>	<u>1230</u>	<u>1240</u>	<u>1400</u>	<u>Total</u>
76	5	32.0				16.1	85.7	133.8
77	7	47.0	16.8			20.0	96.3	180.1
78	10	104.0	9.0			10.1	108.0	231.1
79	14	117.0	122.0			13.5	100.5	353.0
80	15	117.0	190.0	10.0		13.5	100.5	431.0
81	18	159.3	145.0	15.0		16.0	194.5	529.8
82	18	264.0	77.0	2.0	3.0	13.0	177.5	536.5

FY76: Base funding for 1210 was 12.7K, augmented by 0.3K in March and 19K in August. 1400 base funding was 99.0K: 1.7K pay act was added in March and a total of 16.7K was withdrawn in August. 1240 base funding was 19.1K with 3K withdrawn in September.

FY77: Base funding in 1210 was 47K, augmented by 1.8K pay act and 15K BLHP O&M added in June. 1400 base funding was 96.3K with 1.7K pay act added in June. 1240 base funding was 10K with 10K BLHP O&M added in June.

FY78: Base funding for 1210 was 104K with 4K pay act and 5K refuge "add-on" added in June. 1240 base funding was 9.8K with 0.3K pay act added in June. The substantial increase in 1210 was to initiate Service involvement in the Tripartite cooperative studies. A wildlife biologist was hired to conduct this work.

FY79: Base funding for 1210 was 113K, augmented by 4K pay act in July. 1210 (one time O&M) was 142.0K to cover a proposed cat eradication trip to Jarvis NWR (21K), rehab of the Kapahulu warehouse (30K), and Tern Island station start up costs (81K). This total was decreased by 20K in August because Kapahulu work was not done. 1240 base funding was 10.1K, 3K cyclic maintenance added in January and 0.4K pay act added in August. 1400 base funding was 100.5K.

FY80: 1210 base funding was retained, including funds for Tripartite research staffing/O&M. Anticipated O&M for 1921 (reimbursables MB) of 11,760 (NMFS share of boat charter) received in July. Substantial increase in 1210 one time O&M to permit additional staffing and O&M funds for Tern Island station. 1220 funds of 10K transferred from AO in August to cover Sikes Act work with military agencies.

FY81: 1210 base funding was 159.3K, augmented by 4.0K pay act in January. 1210 (one time O&M) was 145.0K to be used at Tern Island (120K) and Tripartite Study (25K). Reduction of 9K in January. 4.0K pay act received in January. 1240 base funding was 13.5K. 1400 base funding was 194.5K. 1941 quarters O&M 2.5K received June. 1220 funds of 15.0K received from AO.

FY82: 1210 base funding was increased to incorporate the Wildlife Resources share of Tern Island funding into the base. The budgeted (AWPA) funding for 1210 was 275K, but was reduced in February by 21K as part of a regionwide reduction affecting most stations. 1210 (one time O&M) was 77.0K to be used in Tripartite studies. Sikes Act funding in 1220 was eliminated. Only 2.0K remained in 1220. Funding in 1230 (3.0K) was initiated to cover investigation of waterbird depredation in aquaculture facilities.

In the Complex, migratory bird funding (1210) has been directed primarily at the management of remote island refuges while endangered species funding (1400) focused on the operation of wetland refuges for endangered waterbirds. Increases in 1210 funding associated with the Tripartite commitment in the Hawaiian Islands NWR reflect our primary research focus on resident seabirds. Although initial start up funding for the Tern Island station came from the 1210 account, the station also performs an important function in the management of threatened (green turtle) and endangered (monk seal) species. For this reason, costs of station operation were shared between the migratory bird and endangered species accounts in 1981 and 1982.

3. Safety

Safety items of interest that are specific to individual refuges are addressed in later sections of this narrative report.

Classes in cardio-pulmonary resuscitation (CPR) were attended by RWR staff members in Honolulu in September, 1982.

Assistant Refuge Manager (Remote Islands) Gerald Ludwig acted as a RWR representative to the AO safety committee in 1980-1982.

Shallenberger, Coleman, Ludwig, Fefer, Woodside, Fairaizl and Moriarty completed three fire training courses and one prescribed burn on November 16-18 (S-130 Basic Firefighter, S-190 Introduction to Fire Behavior, S-211 Water/Pumps). These courses were taught by Rangers Dan Sholly and Bob Seibert from Hawaii Volcanoes NP.

4. Technical Assistance

Refuges and Wildlife Resources staff played a substantial technical assistance role during 1982. Assistance activities involving refuges are discussed in later sections of the report. Technical assistance off refuge lands and waters involved military installations, state agencies, county agencies and private citizens. With the elimination of Sikes Act funding in FY82, technical assistance to military installations focused on sites with highest priority resource problems/opportunities (Kaneohe,

Midway, Johnston). Technical assistance to Ecological Services (Honolulu AO) was provided upon request in the form of input and review to Corps permit applications, environment impact statements and other documents.

Principal areas of technical assistance during 1982 are summarized below:

Technical Assistance (1982)

<u>Location/Agency(ies)</u>	<u>Project</u>
(1) Kaneohe Marine Corps Air Station (U.S. Marine Corps, Hawaii Dept. Land & Natural Resources)	Cooperative wildlife management including wildlife survey, breeding bird studies, banding, habitat development, predator control, etc. Negotiated reimbursable funding agreement with Marine Corps to prepare a wildlife management plan for KMCAS. Initiated work in October, 1982, utilizing Vernon Byrd on temporary assignment. The first phase of planning was completed by December 31, 1982.
(2) Midway Atoll (U.S. Navy)	Cooperative wildlife management pursuant to signed coop agreement. Included wildlife surveys, disease investigation, law enforcement, wildlife information and bird-aircraft hazard assessment.
(3) Kaula Island (U.S. Navy, Hawaii DLNR)	Coordinated with Navy to develop protocol and schedule seabird studies to assess impacts of bombing.
(4) Kure Atoll (U.S. Coast Guard, Hawaii DLNR, Natl. Marine Fisheries Service)	Assisted State in review of wildlife management program. Provided aerial photos from May, 1981, for vegetation mapping.
(5) Northwestern Hawaiian Isl. (Hawaii DLNR, NMFS, Sea Grant)	Cooperation in implementation of Tripartite Agreement to assess fish and wildlife resources in the NWHI. Provided resource data, logistical support (i.e. Tern Island station), field camp management and other assistance. Participated in monthly meetings of Tripartite Coordinating Council.

- | | |
|---|---|
| (6) Statewide (Hawaii DLNR) | Cooperated in banding and auxiliary marking of Hawaiian waterbirds. Also conducted semiannual waterbird censuses and stilt recruitment count together with State biologists. |
| (7) Hawaii (DLNR, NMFS) | RWR staff participated as members on Hawaiian waterbird and Hawaiian monk seal recovery teams. |
| (8) Johnston Atoll (Defense Nuclear Agency, U.S. Coast Guard) | RWR staff assisted on site military personnel in wildlife management, review of military activities and wildlife information. Participated in JACADS evaluation (see Johnston Atoll NWR). |
| (9) American Samoa (Office of Marine Resources, ASG) | RWR staff cooperated with ASG staff in review of fishery proposals for Rose Atoll NWR, law enforcement, information and education (see Rose Atoll NWR). |
| (10) Lowe Aquafarm (Campbell Estate, Lowe, Inc.) | RWR staff assisted in the study and control of migratory birds that were impacting prawn farm production (see Campbell NWR). |
| (11) Wake Island (USAF) | Bird Survey. Preliminary assessment of wildlife management opportunities/problems. |

5. Other Items

Refuge and Wildlife Resources staff have played a dual administrative role since establishment of the Honolulu Area Office. Refuge headquarters are located within the AO in the Federal Building in Honolulu. AO staffing (3) has been inadequate to handle the volume of AWP reporting and other tasks without substantial support from RWR and ES staff. Project leaders, in particular, have worn two hats. Not surprisingly, this dual role has impacted the ability of Refuge staff to keep up with the normal volume of work involved in the operation and management of 12 refuges and other technical assistance roles.

Refuges purchased a Superbrain minicomputer with printer and modem initially for use in the analysis of Tripartite research data (see Hawaiian Islands NWR). We have also found it to be very useful in word processing. We will be utilizing this system, with additional computers, for inventory, budgeting, annual work planning and other data storage and analysis. The narrative reports for each of the remote island refuges were prepared on the Superbrain computer using the WORDSTAR software program.

J. OTHER ITEMS

1. Cooperative Programs

The primary cooperative program underway during the 1978-1982 time period was the Tripartite Cooperative Study, pursuant to an agreement signed by FWS, National Marine Fisheries Service and the Hawaii Dept. of Land and Natural Resources in May, 1978. This agreement calls for a five year cooperative study of fish and wildlife resources in the Northwestern Hawaiian Islands (see Hawaiian Islands National Wildlife Refuge).

Cooperative programs were also underway with State biologists, involving banding, auxiliary marking and the semiannual statewide census of resident and migratory waterbirds. Cooperative programs with National Marine Fisheries Service focused on support for turtle and monk seal research in the Northwestern Hawaiian Islands.

During this period, the Service also continued an investigation of the feasibility of a Cooperating Association for the Kilauea Point Wildlife Administrative Site (see Kilauea Point WAS).

2. Items of Interest

Refuge Manager Shallenberger and Assistant Refuge Manager (Remote Islands) Ludwig figured prominently in Regional and National photo competition in 1982. A total of 17 Regional and 11 National awards were taken.

Regional

Robert Shallenberger	3rd Place (color)	Threatened/Endangered
	3rd Place (color)	Public Use
	3rd Place (color)	General
	1st, 2nd, 3rd Place (b/w)	Threatened/Endangered
	2nd, 3rd Place (b/w)	Fish and Wildlife
	1st, 2nd, 3rd Place (b/w)	General
Gerald Ludwig	Honorable Mention (color)	Threatened/Endangered
	2nd, 3rd Place (color)	Fish and Wildlife
	1st Place (color)	Public Use
	Honorable Mention (color)	Public Use
	3rd Place (color)	Work of the Service

National

Robert Shallenberger	Honorable Mention (color)	Threatened/Endangered
	Best of Show/1st Place (color)	Public Use
	1st Place (color)	General
	1st/2nd Place (b/w)	Threatened/Endangered
	Best of Show/1st Place (b/w)	Fish and Wildlife
	Honorable Mention (b/w)	Fish and Wildlife
Gerald Ludwig	1st Place (color)	Threatened/Endangered
	3rd Place (color)	Fish and Wildlife

3. Credits

RWR staff involved in preparation and review of this narrative report included Robert Shallenberger, Richard Coleman, Gerald Ludwig, and Stewart Fefer. Shirley Hernandez and Darcy Hu typed the manuscript.

Photo credits are indicated by initials.

Hawaiian and Pacific Islands NWR Complex

Narrative Report
1982

	<u>Page</u>
1. Hanalei NWR	HAL-1- 8
2. Huleia NWR	HUL-1- 3
3. James Campbell NWR	JMC-1- 9
4. Pearl Harbor NWR	PHB-1- 5
5. Kakahaia NWR	KKA-1- 4
6. Hawaiian Islands NWR	HWN-1-29
7. Johnston Atoll NWR	JHN-1-11
8. Baker, Howland and Jarvis NWR's	BHJ-1- 7
9. Rose Atoll NWR	ROS-1-11
10. Kilauea Point Administrative Site	KPW-1-10

HANAIEI NWR

Hanalei, Kauai, Hawaii

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TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	NTR
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	1
3. Public Participation	NTR
4. Compliance with Environmental Mandates	1
5. Research and Investigations	1
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	Complex
5. Other Items	2
F. <u>HABITAT MANAGEMENT</u>	
1. General	2
2. Wetlands	NTR
3. Forests	NTR
4. Croplands	3
5. Grasslands	NTR
6. Other Habitats	NTR
7. Grazing	4
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	5
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1.	Wildlife Diversity	NTR
2.	Endangered and/or Threatened Species	5
3.	Waterfowl	6
4.	Marsh and Waterbirds	6
5.	Shorebirds, Gulls, Terns and Allied Species	6
6.	Raptors	NTR
7.	Other Migratory Birds	NTR
8.	Game Mammals	NTR
9.	Marine Mammals	NTR
10.	Other Resident Wildlife	NTR
11.	Fisheries Resources	6
12.	Wildlife Propagation and Stocking	NTR
13.	Surplus Animal Disposal	NTR
14.	Scientific Collections	7
15.	Animal Control	NTR
16.	Marking and Banding	NTR
17.	Disease Prevention and Control	NTR

H. PUBLIC USE

1.	General	NTR
2.	Outdoor Classrooms - Students	7
3.	Outdoor Classrooms - Teachers	7
4.	Interpretive Foot Trails	NTR
5.	Interpretive Tour Routes	NTR
6.	Interpretive Exhibits/Demonstrations	7
7.	Other Interpretive Programs	NTR
8.	Hunting	NTR
9.	Fishing	8
10.	Trapping	NTR
11.	Wildlife Observation	8
12.	Other Wildlife Oriented Recreation	NTR
13.	Camping	NTR
14.	Picnicking	NTR
15.	Off-Road Vehicling	NTR
16.	Other Non-Wildlife Oriented Recreation	NTR
17.	Law Enforcement	NTR
18.	Youth Programs	8
19.	Cooperating Associations	NTR
20.	Concessions	NTR
21.	Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

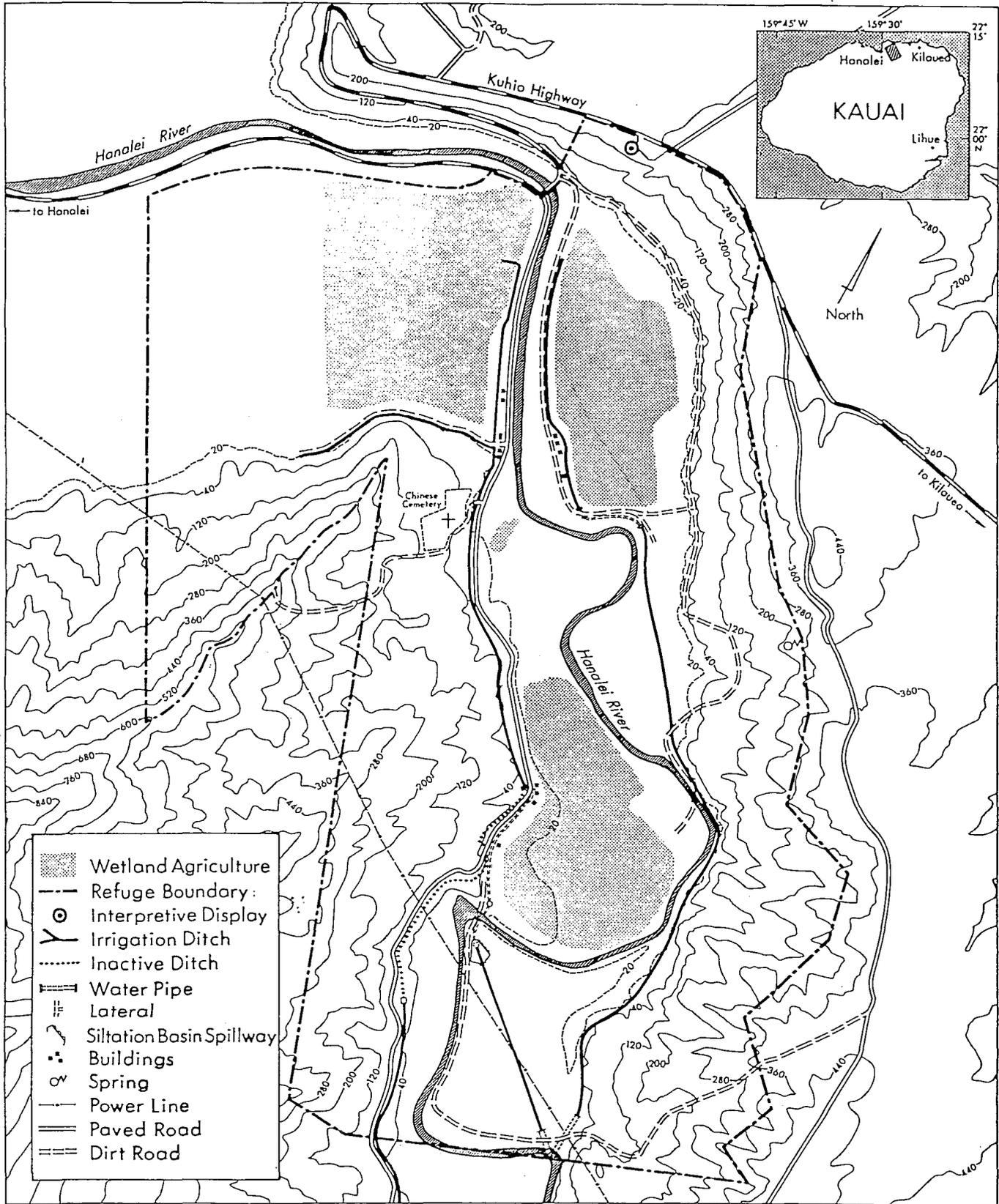
1. New Construction	8
2. Rehabilitation	8
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	NTR
5. Communications Systems	NTR
6. Energy Conservation	NTR
7. Other	NTR

J. OTHER ITEMS

1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR



0 1000 feet
 0 300 m
 NOTE: CONTOURS IN FEET

HANALEI NATIONAL WILDLIFE REFUGE
 Hanalei, Island of Kauai, Hawaii

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service

A. HIGHLIGHTS

A Cooperative Agreement was signed with the State of Hawaii in July, 1982, which provides for the opportunity to use State funds to complete the new water delivery system at Hanalei. Several concerns regarding water supply to non-refuge lands, legal conflicts between State agricultural park regulations and Federal refuge regulations and the existing EIA on the project delayed the transfer of this funding in 1982. Hurricane Iwa hit Kauai on November 23 and caused major damage to several permittee homes at Hanalei. The Rice Mill was totally destroyed. Taro crop damage was minor.

B. CLIMATIC CONDITIONS

Hurricane Iwa hit Kauai on November 23 with winds over 100 mph. Heavy rains in March and November caused several major floods at Hanalei and closed the Hanalei Bridge for short periods. The nearest weather recording station, Princeville Ranch, is located approximately $\frac{1}{2}$ mile north of the refuge. The station summary for 1982 reported several months of missing data. A composite report is not available at this writing (see Kilauea Point).

D. PLANNING

2. Management Plan

A grazing plan and a marsh/water management plan for Hanalei NWR were submitted in February and March, respectively.

4. Compliance with Environmental Mandates

Upon signing of a Cooperative Agreement with the State for use of State funds at Hanalei NWR, work began to update existing environmental documents to satisfy terms of the Agreement. It is not certain whether or not an updated version of the existing EIA will be sufficient to meet these requirements.

5. Research and Investigations

Hawaiian Gallinule Nesting Ecology - The nesting ecology of the endangered Hawaiian gallinule was monitored throughout 1982 by Brady. Flooding of nests continued to be the major cause of mortality. A paper on the Breeding Ecology of the Hawaiian Gallinule at Hanalei NWR was published in Western Birds in 1982.

E. ADMINISTRATION

5. Other Items

The Pacific Islands Administrator, Shallenberger and Coleman met with the State Department of Agriculture and DLNR Chairman on January 4, 1982, regarding State C.I.P. funding of additional work on the Hanalei water delivery system. All parties agreed that the \$1.7 million needed to complete the water delivery system would result in increased taro acreage (approximately 100 acres).

Intensive negotiations with State Department of Agriculture staff began in early June in an attempt to develop a cooperative agreement for transfer of State funds to the Service. These funds would permit completion of the Hanalei water delivery project on Kauai. The transfer is contingent upon designation of the refuge as a State agricultural park. Refuge staff drafted an agreement which was edited repeatedly during the remaining weeks before the State's fiscal year ran out (June 30) and the funds could no longer be obligated. When communication by phone and faxform became unfeasible, we requested assistance from the RO. The RO contingent who arrived on June 21 included Blayne Graves, Richard Munding, Bill Striplin and Ron Swan. Working long days with State representatives, including the Deputy AG (Coral Wong), an acceptable agreement was completed on June 24 as the RO crew boarded their plane. Although there were still some hoops to jump through, the Governor encumbered the funds at the last possible minute.

Throughout the remainder of 1982, coordination continued with the State regarding the Hanalei Agricultural Park Agreement. A meeting was held on September 30 with Susumo Ono, Robert Chuck, Paul Schwind and other State representatives to iron out problems that appeared to be delaying presentation of the agricultural park proposal to the Board of Land and Natural Resources. State representatives expressed concern that surplus water from the Hanalei NWR was not assured and asked that wording in the agreement be changed to incorporate this intent. Concern was also raised about the possible legal conflicts between State agricultural park law and refuge regulations regarding permittee selection and management.

The State Department of Agriculture also requested an updated version of the 1979 EIA on the Hanalei water delivery system. They required this update in order for them to decide if an EIS would be required prior to transfer of State funds for the project. All of these matters were still pending at the close of 1982.

F. HABITAT MANAGEMENT

1. General

This 917 acre refuge consists of river bottom land, taro farms and wooded slopes in the northern end of Hanalei Valley. The primary wetland

habitat is taro fields (120 acres) which are located on both sides of the Hanalei River. The river flows north through the middle of the refuge providing additional wetland habitat. Some of the 298 acres of grassland which surround the taro fields will eventually be converted to taro fields. The forested slopes (458 acres) along most of the refuge perimeter provide an excellent buffer zone for the wetland.

4. Croplands

Hanalei NWR was established for endangered waterbirds, and the overall plan has been to provide as much wetland habitat as possible. The traditional aquatic taro farming has been retained on a permit basis, because taro provides excellent habitat for waterbirds. During 1982, emphasis was placed on enforcing conditions of Special Use Permits, e.g. use of herbicides limited to those authorized by the Service, taro plants left for cover around gallinule nests found by farmers during harvest, control of pets, etc. In addition, considerable efforts were made to insure that the farmers actively cultivated taro on all of their assigned acreage.

The construction of the first phase of the new water delivery system in 1981 assured a more reliable water supply and less maintenance needs for the taro farmers on the west side of the Hanalei River. The westward extension of the China Ditch also enabled the conversion of 48 acres of grazing land into taro production. Eight new Special Use Permits were issued on October 1, 1981, to taro farm equal parcels of this new cropland, however, heavy rains throughout 1982 hampered farmers' efforts to develop this land.

Four of the eight new taro farmers at Hanalei NWR cancelled their Special Use Permits in 1982. The high cost of the initial development of the existing pastureland into taro and the wet weather prohibited them from completing this conversion. Other adjacent taro permittees were expanded to include the vacated lands.

The Hanalei Taro Farmers Maintenance Association was formed in March, 1982. Five taro farming permittees were elected for one year terms to coordinate the maintenance of common ditches and drains and to advise the Service on matters regarding taro farming on the refuge. This group coordinated the cleaning of the upper pasture ditch in September-October.



HAL-1 - A newly planted taro field in Hanalei NWR. This wetland crop provides habitat for all four species of endangered Hawaiian waterbirds. RJS

7. Grazing

Since the refuge was created, 3 grazing permits, totalling 163 acres, have been issued to control vegetation in dry areas. Permittees have been told annually that when the development of a new water system is complete, areas that can be used for wetland agriculture and other wetland habitats will be gradually removed from grazing land. Forty eight acres assigned to one grazing permittee were removed and assigned to taro farming permittees in October, 1981.

One grazing permittee, Samuel Apao, renegotiated his 5 year SUP in September, 1981, to clear up a misunderstanding about a SUP special condition to plant Pangola grass in all of his areas. Pangola grass is considered to be more beneficial to the endangered Hawaiian duck and causes less maintenance problems for neighboring taro farmers. This planting must be completed by October 1, 1982. Apao failed to meet this deadline and his grazing permit was revoked by Shallenberger on September 28. Apao appealed this decision to the Pacific Islands Administrator by a letter dated October 28. The PIA upheld the revocation by letter of January 10, 1983. Apao's appeal to the Regional Director is now pending.

10. Pest Control

Thirteen cats were trapped at Hanalei in 1982 by 10 taro farming permittees who were issued refuge live traps.

G. WILDLIFE

2. Endangered and/or Threatened Species

Population data were gathered monthly for the four endangered species found on the refuge; Hawaiian duck, gallinule, coot and stilt.

Hawaiian Duck - This species is difficult to count for several reasons. There apparently is diurnal movement, perhaps to mountain streams off the refuge during days, but back to safe roosting areas (like the refuge) during the night. Also birds tend not to form large flocks so scattered individuals near dense cover are difficult to detect. As a result, refuge counts are of questionable accuracy. There was no clear population trend during the period, but refuge populations tended to be higher in winter than in summer. Up to 54 birds were seen on the refuge, but counts averaged 20-30 birds.

Hawaiian Gallinule - Gallinules are relatively secretive and therefore difficult to count. Peak counts exceeded 50, but average counts were about 20. Population estimates are 80-100 birds on the refuge. Twenty-one nesting attempts were documented in 1982 in the dense taro patches. Many were later destroyed by flooding.

Hawaiian Coot - In wet periods this species apparently moves from Kauai to Niihau Island (30 km to the west) where ephemeral habitats are usually flooded by winter rains. In wet winters, like 1982, the species remains at Niihau until the wetlands dry up. The average coot population was less than 5 birds in the spring and summer and less than 40 birds in the fall. No coot nesting attempts have been observed on the refuge.

Hawaiian Stilt - Like the coot, the stilt is believed to migrate to Niihau during wet periods. The wet spring/summer population averaged 10 stilts, while the drier fall months averaged 30-40 stilts. Nesting at Hanalei is restricted to narrow dikes between taro fields. Five stilt nests were located in 1982.

3. Waterfowl

In addition to the native Hawaiian duck, incidental sightings of migratory waterfowl have included scaup, pintails and three canvasbacks (January).

4. Marsh and Waterbirds

Black-crowned night herons occurred regularly on the refuge during the period. Counts ranged up to 35, but the average was 20 herons. The heron is known to take chicks and eggs of other birds, and there is a possibility that it preys on endangered gallinules (the only common nester on the refuge of the four endangered species).

5. Shorebirds, Gulls, Terns and Allied Species

Approximately 80-100 American golden plover winter at Hanalei NWR each year. Migratory shorebirds include wandering tattler (4-10 birds), ruddy turnstone, sanderling, common snipe and occasionally a dowitcher.

11. Fisheries Resources

The aquatic fauna in Hanalei National Wildlife Refuge is found in the taro fields, adjacent wetlands and the Hanalei River. Many of these species are food sources for the endangered waterbirds. The waterbirds are attracted to chironomids (midges) and tubificids (worms), which exist in the taro fields. Chironomids are abundant in shallow water, while tubificids can flourish in wet and dry environments. Bird feeding is the most intense during the wet fallow period of the taro agricultural cycle, between harvesting and re-planting of the taro fields. Endemic and exotic gastropod mollusks (snails, slugs, etc.), as well as toads and bullfrogs, inhabit some of the taro fields and ponds.

In a recent aquatic survey, the Hanalei River was found to have a substantial population of native aquatic species. The Hanalei River not only yielded the greatest number of endemic species in the streams surveyed (based on the number of mountain shrimp per sampling station), but also had the highest percentage of endemic species sampled (74%).

Four species of native o'opu (gobies) are known to inhabit the streams and ponds of Hanalei Valley. These are o'opu nakea (Awaous stamineus), o'opu nopili (Sicydium stimpsoni), o'opu naniha (Awaous geniuttatus), and o'opu okuhe (Eleotris sandwicensis).

O'opu nakea is the largest goby, and is commercially valuable. The spawning season usually occurs between July and November, corresponding with periods of storm flows in the river. Adult o'opu nakea are washed down to the estuary areas where spawning occurs. The other species of o'opu are believed to spawn year-round at any location of the river.

Opae kala'ole, Atya bisulcata, fresh water mountain shrimp, is endemic to the Hawaiian Islands. It is described as a detritivore, consuming suspended organic particles, and generally inhabits the middle and upper portions of streams. Opae have a diadromous life cycle, requiring access to seawater to spawn. Couret's paper indicates that spawning takes place year-round, suggesting a multivoltine life cycle known for many other tropical species.

Other aquatic fish inhabiting the refuge include tilapia (Tilapia spp.), mosquito fish (Gambusia affinis), and swordtails (Xiphophorus spp.). Fish species inhabiting or spawning in the estuary and brackish waters of the Hanalei River include papio (Caranx sp.), mullet (Mugil cephalus), barracuda (Sphyraena barracuda), milkfish (Chanos chanos), and aholehole (Kuhlia sandwicensis). The brackish waters also provide habitat for a number of species of crabs.

14. Scientific Collections

On December 13, 1982, samples of snails, frogs, prawns, bottom feeding fish and predator fish were collected at Hanalei. These samples were analyzed for pesticides by Hazelton Raltech, Inc. in 1982. Results were negative for all samples submitted.

H. PUBLIC USE

2. Outdoor Classrooms - Students

A regional YMCA camp is situated 10 miles from the refuge. Approximately 100 of these campers per month visited the refuge throughout 1982. The 4 leaders per year, which were trained by the refuge staff, conducted the tours. A taro farmer also donated his time to show the campers how taro is grown, and how the agricultural cycle is timed to benefit waterbirds.

Kauai Community College students (20) visited the refuge twice a year as part of their biology field trip. Approximately five public school groups (20 students each) also visited the refuge during 1982.

3. Outdoor Classrooms - Teachers

(see above)

6. Interpretive Exhibits/Demonstrations

An interpretive display was constructed in September, 1980, at the scenic overlook located on a hillside above the refuge. An estimated 400,000 visitors per year view the refuge from this vantage point. The exhibit was part of a BLHP funded project including the interpretive walking tour at Kilauea Point. The three panels in the display explain taro farming, the endangered waterbirds and the refuge objectives.

The Hawaiian gallinule portion of the Hanalei NWR interpretive display was stolen during this period. The sign, which is located at the Hanalei overlook, was further damaged as a result of the vandalism. A 15" crack resulted from the force used to remove the circular panel.

9. Fishing

The Hanalei River attracts local fishermen searching for mullet, milkfish, barracuda, gobies (o'opu) and shrimp (opae).

An average of 45 visitors per month fish on the Hanalei River for an average of 2 hours each visit. The peak fishing occurs during the fall months, o'opu spawning runs (see G. 11).

11. Wildlife Observation

In addition to the many visitors at the scenic overlook, several birding tours by the National Audubon Society, the Sierra Club and other private groups visited the refuge. Since these groups made observations from the county roadway and the refuge overlook, no permits were required and no documentation was made of such visits.

18. Youth Programs

A YCC camp of 5 enrollees was active on the refuge this summer. Although most of their work was at Kilauea Point, the YCC enrollees helped clear and burn hau.

I. EQUIPMENT AND FACILITIES

1. New Construction

A thousand feet of 48" diameter concrete pipe was purchased in September for later installation in the upper pasture ditch. Survey work was conducted in September by Pete Cation and plans were drafted for the installation of this pipe in FY83.

Three water-flow meters were installed in the new water delivery system, one at the main flow upstream of lateral #00 and one each at lateral #00 and #01.

2. Rehabilitation

Ron's Construction completed repairs to the flood damaged new water delivery system in June, 1982. These repairs included extending the Little China Ditch, repairing the settling basin overflow and removing sediment from the open ditch in the high pasture.

HULEIA NWR

Kauai, Hawaii

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	NTR
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	1
3. Public Participation	NTR
4. Compliance with Environmental Mandates	NTR
5. Research and Investigations	NTR
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	Complex
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	NTR
2. Wetlands	1
3. Forests	NTR
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	NTR
7. Grazing	2
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	NTR
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1.	Wildlife Diversity	NTR
2.	Endangered and/or Threatened Species	2
3.	Waterfowl	NTR
4.	Marsh and Waterbirds	2
5.	Shorebirds, Gulls, Terns and Allied Species	NTR
6.	Raptors	2
7.	Other Migratory Birds	NTR
8.	Game Mammals	NTR
9.	Marine Mammals	NTR
10.	Other Resident Wildlife	NTR
11.	Fisheries Resources	NTR
12.	Wildlife Propagation and Stocking	NTR
13.	Surplus Animal Disposal	NTR
14.	Scientific Collections	2
15.	Animal Control	NTR
16.	Marking and Banding	NTR
17.	Disease Prevention and Control	NTR

H. PUBLIC USE

1.	General	2
2.	Outdoor Classrooms - Students	NTR
3.	Outdoor Classrooms - Teachers	NTR
4.	Interpretive Foot Trails	NTR
5.	Interpretive Tour Routes	NTR
6.	Interpretive Exhibits/Demonstrations	NTR
7.	Other Interpretive Programs	NTR
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10.	Trapping	NTR
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17.	Law Enforcement	NTR
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19.	Cooperating Associations	NTR
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21.	Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

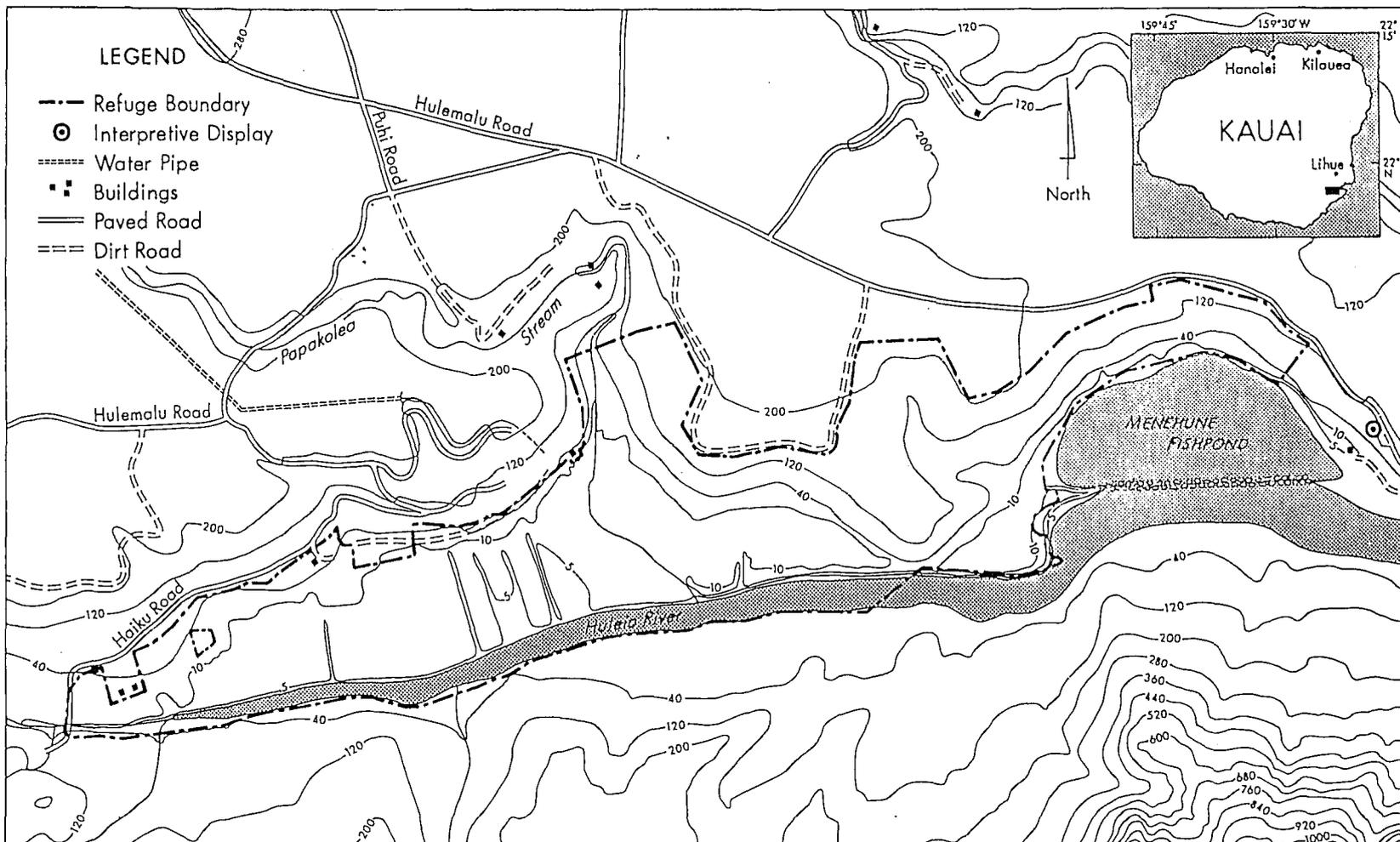
1. New Construction	NTR
2. Rehabilitation	NTR
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	NTR
5. Communications Systems	NTR
6. Energy Conservation	NTR
7. Other	NTR

J. OTHER ITEMS

1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR



LEGEND

- Refuge Boundary
- ⊙ Interpretive Display
- - - - Water Pipe
- Buildings
- ==== Paved Road
- == Dirt Road

0 1000 feet
 0 300 m
 NOTE: CONTOURS IN FEET

HULEIA NATIONAL WILDLIFE REFUGE
 Huleia, Island of Kauai, Hawaii

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service

A. HIGHLIGHTS

Since Huleia NWR was established in 1973 no operating funds have been available to create or maintain wetland habitat. The only available permanent wetland habitat on the refuge was the old drain ditches, cleared by a YACC crew in 1978. Progress continued on purchasing the remaining three parcels needed to consolidate the refuge boundary, and a preliminary master plan was completed. Cattle grazing was permitted throughout the period.

B. CLIMATIC CONDITIONS

The nearest weather recording station, Lihue Airport, is located approximately 2 miles northeast of the refuge. The following station summary for 1981 reflects the climatic conditions of the refuge:

	<u>Average</u>	<u>Extremes (dates)</u>
Temperature	76°	56°(1/31) 88°(7/28)
Rainfall	62" total	6.31"(10/30) 4"(1/21)

D. PLANNING

2. Management Plan

The Soil Conservation Service assisted with survey work and weir design to create preliminary development plans for establishing shallow impoundments in the lowland area of the refuge. It appears that it will be necessary to divert almost the entire flow from Papakolea Stream to maintain these shallow wetland habitats.

A grazing plan and a marsh/water management plan were drafted for Huleia NWR in February and March, respectively.

F. HABITAT MANAGEMENT

2. Wetlands

The refuge is primarily a river valley which has been used historically for wetland and dryland agriculture. Except for ephemeral habitats flooded after heavy rainfall, the only wetlands in the undeveloped refuge are a single stream and five 1 to 2 foot wide former drainage canals which extend perpendicularly from the river across the valley. The ditches are open to the river and the water level fluctuates with the tide cycle which affects the river. These canals were completely choked by mangrove and hau trees and unavailable for use by waterbirds until 1979 when the trees were cleared by YACC personnel. The canals

still provide habitat for waterfowl including the endangered Hawaiian duck. In preparation for habitat development, a method was developed for successfully transplanting bulrush, Scirpus californicus, on the refuge. Eventually, this robust emergent may be used as nesting cover in planned coot and gallinule nesting ponds.

7. Grazing

One grazing permit, totaling 158 acres, was active during the 1982 period. Grazing was permitted strictly for vegetation control, and when wetlands are developed, grazing will be eliminated in those areas.

G. WILDLIFE

2. Endangered and/or Threatened Species

The refuge was created to provide habitat for the endangered Hawaiian gallinule, coot, stilt and duck. During the period Huleia NWR provided limited habitat for an average of six Hawaiian ducks, and only one or two Hawaiian coots, gallinules or stilts were observed on the monthly census along Papakolea Stream. Active habitat manipulation will be necessary to convert the refuge into an important endangered waterbird habitat.

4. Marsh and Waterbirds

An average population of 2 black-crowned night herons (native) and 25 cattle egrets (introduced) were observed on the refuge during 1982.

6. Raptors

A short-eared owl, Pue'oa, and a barn owl were irregularly seen at the refuge during 1982.

14. Scientific Collections

Fish and invertebrate samples were collected in Papakolea Stream in September for analysis of pesticides. Results of the lab tests, conducted by Hazelton Raltech, Inc., were negative for all samples.

H. PUBLIC USE

1. General

Huleia NWR does not have convenient foot or automobile access because it is isolated from main roads, difficult to locate, and surrounded by private land (some of which is being acquired to extend the refuge boundary to an access road). In addition, there is little of interest to view on the refuge in its undeveloped state.

A small scenic overlook area, located just east of the refuge boundary, offers an excellent view of the Menehune fishpond (Alakoko Pond) and the refuge lands which surround the far side of this pond. Presently there is no visitor contact point at this location identifying the refuge. Visitation to this area is estimated to be 1,440 hrs./year. This number has diminished in recent years due to poor road conditions and the mangrove overgrowth which now blocks the view of the famous "Menehune wall" which separates the pond from Huleia River. An interpretative display constructed at this roadside vantage point may result in increased visitor use of the overlook and awareness of the refuge and its objectives.

No environmental education took place on this refuge during 1982. Efforts in this program were directed through the other refuges on this island (Hanalei NWR and Kilauea Point).

No Kayak tours were conducted on Huleia River in 1982 due to County control of concessionary operations on this public waterway.

JAMES CAMPBELL NWR
Kahuku, Oahu, Hawaii

NARRATIVE REPORT
Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	1
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	NTR
3. Public Participation	NTR
4. Compliance with Environmental Mandates	2
5. Research and Investigations	2
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	Complex
5. Other Items	Complex
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1. General	2
2. Wetlands	2
3. Forests	NTR
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	NTR
7. Grazing	NTR
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	4
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
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2. Endangered and/or Threatened Species	5
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4. Marsh and Waterbirds	6
5. Shorebirds, Gulls, Terns and Allied Species	7
6. Raptors	7
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16. Marking and Banding	NTR
17. Disease Prevention and Control	7

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1. General	8
2. Outdoor Classrooms - Students	8
3. Outdoor Classrooms - Teachers	8
4. Interpretive Foot Trails	NTR
5. Interpretive Tour Routes	NTR
6. Interpretive Exhibits/Demonstrations	NTR
7. Other Interpretive Programs	8
8. Hunting	NTR
9. Fishing	NTR
10. Trapping	NTR
11. Wildlife Observation	8
12. Other Wildlife Oriented Recreation	NTR
13. Camping	NTR
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18. Youth Programs	9
19. Cooperating Associations	NTR
20. Concessions	NTR
21. Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

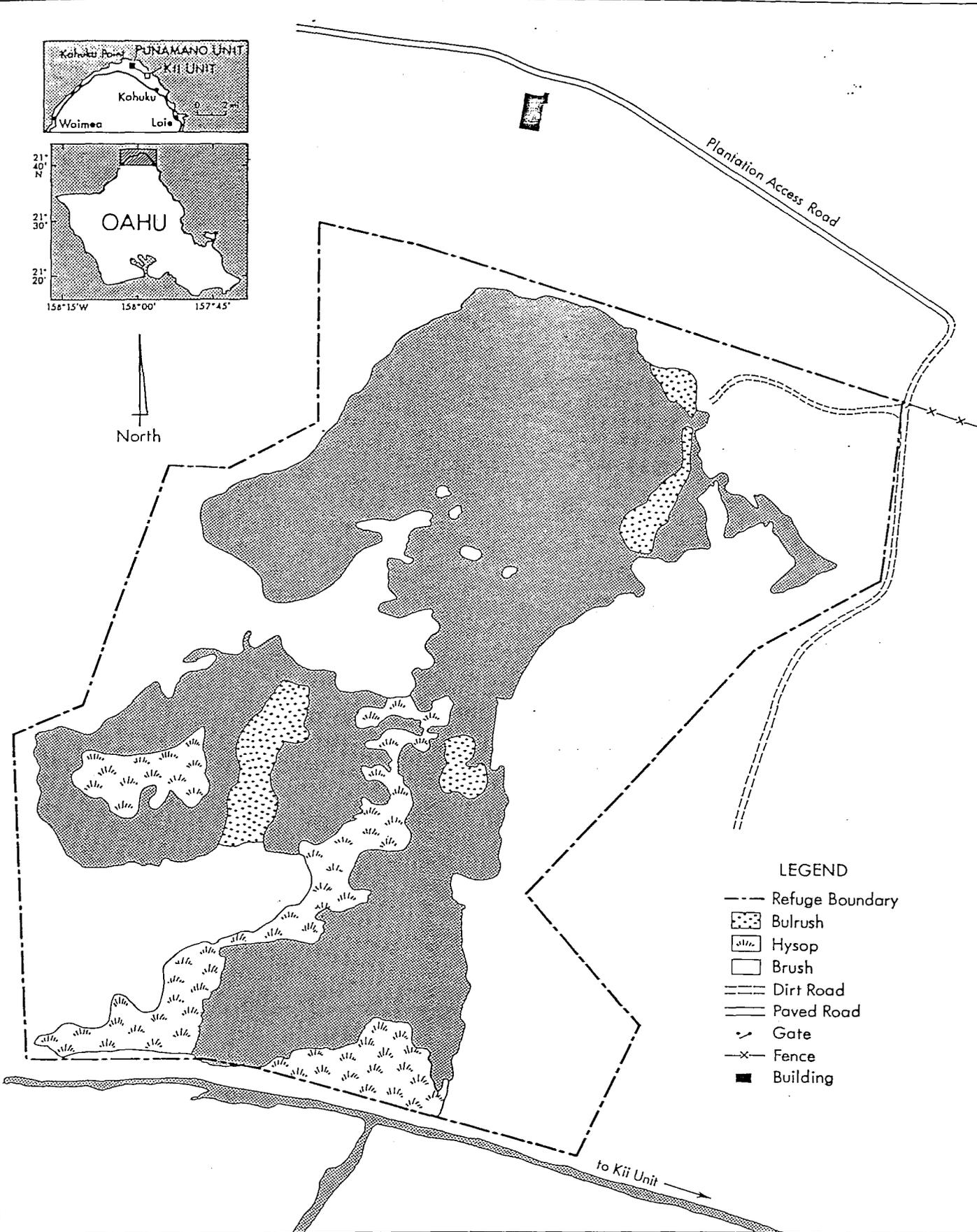
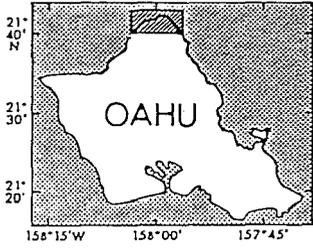
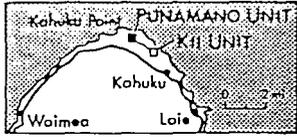
1. New Construction	9
2. Rehabilitation	NTR
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	9
5. Communications Systems	NTR
6. Energy Conservation	NTR
7. Other	9

J. OTHER ITEMS

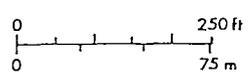
1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR



- LEGEND**
- Refuge Boundary
 - ▨ Bulrush
 - ▤ Hysop
 - Brush
 - Dirt Road
 - Paved Road
 - ⚡ Gate
 - x- Fence
 - Building



PUNAMANO UNIT
JAMES CAMPBELL NATIONAL WILDLIFE REFUGE
 Kahuku, Island of Oahu, Hawaii

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service

A. HIGHLIGHTS

The long awaited electrical service to the flood control and habitat management pumps at the Kii unit of James Campbell NWR was provided on January 5, 1982. This timely electrical hook-up occurred before over 9 inches of rain fell within a 24 hour period on January 6 and 7. Forty hp pumping efforts and use of a 30" by-pass culvert could not adequately drain the watershed above this unit. The access roadway and three roads within the unit were flooded for three days. This extensive flooding also removed almost all of the sand and debris which had previously accumulated at the ocean outlet north of the unit. As a result, excess water now flows freely through the by-pass ditch (with a newly installed flap gate) to the ocean without requiring costly electrical pumping.

Populations of all four species of endangered Hawaiian waterbirds dramatically increased in 1982 in response to the major wetland habitat development project completed in the summer of 1981 at the Kii unit of James Campbell NWR. This project, made possible through FY81 BLHP funds, nearly tripled in size the wetland habitat.

An outdoor classroom for 28 teachers, held in November, opened the refuge public use program potential to accommodate many self-guided student classrooms in 1983.

B. CLIMATIC CONDITIONS

The year 1982 was the wettest winter on record, with only 6 days of sunshine during March. Over 6 inches of rain fell in only 4 hours at Kahuku, Oahu, on March 21, resulting in a flash flood which destroyed Hawaiian stilt nests at James Campbell NWR.

The nearest weather recording station, Lowe Farms, is located adjacent to the refuge. The following station summary for January-October, 1982, reflects the climatic conditions at the refuge:

	<u>Average</u>	<u>Extremes (dates)</u>
Temperature	75.6° F.	55°(1/3) 86°(9/30)
Wind Speed	14 mph	Hurricane Iwa (11/23)
Rainfall	77" total	7.15"(1/6) 5.92"(5/7)

C. LAND ACQUISITION

3. Other

Shallenberger and Coleman met with Campbell Estate representatives in the fall to discuss expansion of the Kii unit boundary and access via the paved roadway to the Kahuku WWTP. No final decision was made by the end of the year, although a cooperative spirit prevailed.

D. PLANNING

4. Compliance with Environmental Mandates

An internal Section 7 consultation this month approved the refuge study of Hawaiian coot nesting success. BYU undergraduate student Carl Arume was subsequently issued a Special Use Permit to assist in this monitoring study.

5. Research and Investigations

Hawaiian Coot Nesting Study - Descriptive nest site data, clutch size, brood size and egg measurements were collected for 14 coot nests on the refuge in 1982. A BYU-Hawaii undergraduate student, Carl Arume, assisted with collecting the data and monitoring the success of each new nest. Arume postponed his study due to illness during the fall and winter months but is scheduled to resume his fieldwork in February, 1983.

F. HABITAT MANAGEMENT

1. General

This 141.5 acre refuge consists of approximately 74 acres of wetlands, 5 acres of grasslands, and 27 acres of scrub forest areas.

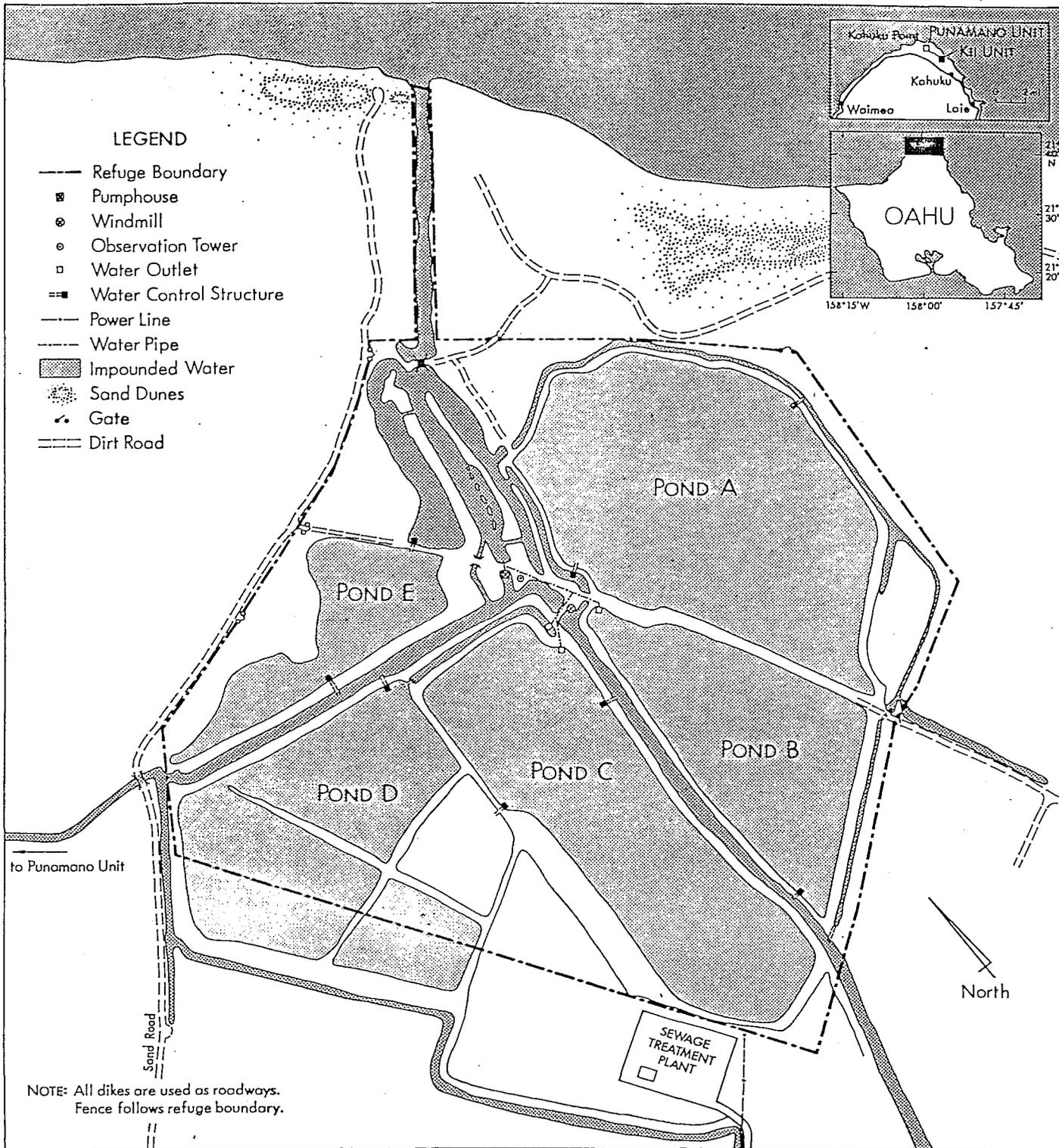
The 104 acre Kii unit is surrounded by a livestock fence while the 37.5 acre Punamano unit remains unfenced.

2. Wetlands

Electrical service was provided on January 5, 1982, to the pumps at the Kii unit, James Campbell NWR. Pond C (17 acres) was partially flooded using the 5 hp pump and waterbird use of the pond increased dramatically. Steady water levels in Ponds B, C and D were maintained with the 5 hp pump operating 12-15 hours per day. It appears that water from Pond C is leaking through the dike into Pond D. During extremely high tides, salt water flows into Pond E and the lower sections of the main canals. Ponds C and D were drained in August to enable earthwork and spraying. Ten acres of dense grass was herbicided on August 30 and 31. Pond A of the Kii unit was drained and 40% of the dense pickleweed cover was sprayed with a herbicide. Ponds C and D were flooded again this month following their September herbicide treatment.

Prescribed burning at the Kii unit cleared portions of Pond C and F and a drainage ditch. This burning was conducted as part of the fire training course on November 17 and 18.

Hawaii Gradall Service was contracted for 3 days in March to clear a drain for Pond A and other selected sites in the James Campbell NWR (Kii unit). Refuge staff also supervised the clearing of culverts along the Kii ditch which have been intentionally blocked for several years by Lowe Farms.



KII UNIT
JAMES CAMPBELL NATIONAL WILDLIFE REFUGE
 Kahuku, Island of Oahu, Hawaii

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service

0 500ft
 0 150m

Heavy rains throughout March flooded roadways and dikes in the Kii unit of James Campbell NWR. The flood control pump did not function properly and additional drainage ditches were dug to by-pass the pump and increase the rate of drainage to the sea.

Several meetings were held with representatives of the Estate of James Campbell and other neighboring tenants regarding these flooding problems. Shallenberger and Coleman met with Campbell Estate land manager Sam Keala on July 23, to discuss measures to reduce flooding hazards in the areas. Keala reported on the results of a contracted engineering study indicating that restrictions to flood flow within the refuge should be removed. He initially proposed that additional spillways or ditches be constructed and that roads blocking existing channels be removed. Keala's final plan in December called for dredging the Kii ditch between the Kahuku Airstrip Road and the Kii unit and along the west side of Pond E, to the water regulating outlet. We agreed with this Phase I to be completed at the Estate's expense. Coleman also met with City and County personnel in July to design a better drainage plan for their Kahuku Waste Water Treatment Facility adjacent to the Kii unit.

Coleman worked with 10 YGC enrollees from the State Division of Forestry to clear vegetation from nesting islets at the Kii unit in July. Old military tents were spread over some islands to shade and control the dense Batis vegetation.

Soil samples collected in January at the Kii unit of James Campbell NWR indicated a soil salt content too high to grow many waterfowl forage crops. Additional soil samples collected at the unit indicate that only the areas outside the historic sugar mill siltation basins have salinities low enough to grow waterfowl forage crops. Preliminary designs were discussed for a trial planting of buckwheat or millet adjacent to these impoundments.

10. Pest Control

Limited live-trapping of mongooses and cats was conducted during the stilt nesting season at the Kii unit. Trapping efforts were concentrated along the refuge perimeter and main roadway. One hundred thirty seven trap days captured 40 mongooses, 11 cats and a rat. Approximately 1,200 feet of perimeter fencing was replaced in April and May.

Vegetation control of California grass (Brachiaria sp.) on the numerous nesting islands in Pond C was conducted by manual and mechanical means. Approved herbicide "Roundup" was used with good success. Pickleweed (Batis maritima) was controlled in parts of Pond A using "Banvel" herbicide (2% solution).

No pest control measures were undertaken at the Punamano unit during 1982.

G. WILDLIFE1. Wildlife Diversity

Although the wetland management efforts made during this period were directed at improving the nesting and feeding habitats of the endangered Hawaiian waterbirds, particularly the stilt, numerous other migratory bird species utilized these same improved areas. This immediate wildlife response clearly indicates the great potential for wildlife diversity at the Kii unit when it approaches full development in the next few years.

2. Endangered and/or Threatened Species

During early August, 1982, Woodside noticed some turtle tracks and diggings on the beach adjacent to the Kii unit of the refuge. This important sighting was reported to George Balazs, of the National Marine Fisheries Service, and a biweekly monitoring schedule was set up. Hatchlings emerged on September 24. On September 28, Balazs visited the site and dug up an old nest, recovering several green turtle (Chelonia mydas) egg shells. This is the first recorded case of a green turtle nesting on Oahu.

All four endangered Hawaiian waterbirds, the Hawaiian stilt, Hawaiian coot, Hawaiian gallinule, and Hawaiian duck, nest and maintain populations on both units of James Campbell NWR. Resident populations of these waterbirds continued to increase during 1982. These birds were also observed at the adjacent Lowe Aquafarm. Incidental nest sightings were recorded and served to document clutch size and nesting chronology. Nesting attempts by both the Hawaiian coot and gallinule were regularly observed at both units of the refuge on a year-round basis.

A duck nest, containing 11 eggs, was found in Pond C at the Kii unit. The attending adults appear to be a Mallard hen and a Koloa/Mallard hybrid drake. A female Koloa which was color-banded and released at Kawainui Marsh in April, 1979, was seen at the Kii unit on February 15, 1982.

Seventeen Hawaiian coots were captured on October 14 at the Kii unit to be tested for diseases and/or parasites (see Section G. 17). Before their release, these birds were also measured, photographed, banded and auxiliary marked with a plastic numbered neck collar. One of these coots was found dead on October 16 in Pond B of the Kii unit, with its lower mandible stuck between the coils of the plastic neck collar. No other related mortalities were observed at the refuge. One of these marked coots was seen at the Haleiwa Lotus fields on January 6, 1983 (ca. 10 miles west of the refuge).



JMC-1 - Comparison of different Hawaiian coot frontal shield morphology. These birds were captured to obtain disease and parasite samples and were measured and auxiliary marked before released. RJS

3. Waterfowl

The deeper natural pond at the Punamano unit continued to support the greatest statewide concentration (30-40) of scaup each winter. Pintails and Northern shovelers, the most common migratory waterfowl in the state, averaged approximately 30 and 50, respectively, at the refuge. A few American wigeon were also commonly seen each winter. Unusual migratory waterfowl at the refuge included 4 buffleheads, 4-6 ring-neck ducks, 2 gadwalls, 2 green-winged teal and 6 Fulvous tree ducks.

With the recent development of the 140 acre (30 additional acres added this year) aquafarm adjacent to the refuge and the increase of stable wetland areas within the refuge, future waterfowl use at the refuge is likely to increase.

4. Marsh and Waterbirds

The black-crowned night heron population at the refuge appeared to increase from 50 birds in 1981 to over 100 birds in 1982. A heron rookery, shared with cattle egrets, was adjacent to the northwest corner of the Kii unit during 1978 and 1979. This rookery was mostly abandoned in 1980 and a new rookery was established 300 yards northeast of the Punamano unit. This new rookery was abandoned eight to ten months

later and the birds returned to the original rookery location adjacent to the Kii unit. Cattle egret populations on the refuge fluctuated with the change in the rookery location and in response to grass mowing activity on the Kii unit. Counts ranged from 10 to 300 egrets during 1982. It is uncertain what impact cattle egrets may have on endangered waterbirds as predators or vectors of avian disease. Their unchecked exponential population growth in the state is alarming!

5. Shorebirds, Gulls, Terns and Allied Species

The Kii unit of the refuge continued to be a "hot spot" for migratory shorebirds during 1982. Habitat manipulations designed for improved Hawaiian stilt use were equally attractive to most migratory shorebirds. The most common shorebird species included American golden plover, wandering tattler, sanderling and ruddy turnstone. Other incidental shorebirds recorded were long-billed dowitcher (6) and pectoral sandpiper (5). Three ring-billed gulls and two glaucous-winged gulls were regularly seen at the Kii unit from January through April. A common tern was regularly seen from January through July and was joined by another common tern in May. A least tern was seen being chased by the common tern on March 23.

6. Raptors

Short-eared owls and barn owls were often seen over the grassy areas of the Kii unit. The short-eared owl, or Pue'oa, probably nested on the refuge, although no nests were actually located.

14. Scientific Collections

Three Mallards, four Northern shovelers, one American wigeon, one pintail and eggs from a hybrid (Mallard X Koloa) nest were collected at the Kii unit in 1982 for analysis of pesticide residue. Results of the lab analysis, conducted by Hazelton Raltech, Inc., showed low levels of DDE in two of the brain samples (0.06 and 0.11 ppm wet basis) and in one egg sample (Mallard X Koloa) (0.53 ppm wet basis).

17. Disease Prevention and Control

Fecal and throat swabs and blood were taken from coots collected at Kii unit, James Campbell NWR (October 14, 1982) and submitted for analysis by the State Department of Agriculture. Blood smears were negative for blood protozoan parasites. Cloacal swabs were negative for Salmonella sp. Various species of bacteria were isolated from the throat swabs. Except for E. coli and gamma-strep. from a few birds, the bacteria isolated reflected flora from birds associated with water including shearwaters, boobies, etc.

H. PUBLIC USE

1. General

Public use of James Campbell NWR during 1982 was limited to specific requests by school groups, scout clubs or local bird groups to visit the refuge. Service efforts to increase public use during this period were directed toward outdoor classroom use by teachers trained at a special workshop held in November.

2. Outdoor Classrooms - Students

No formal environmental education program was developed until November. The few school groups visiting the refuge prior to November were escorted by refuge personnel. A brief introduction of Hawaii's endangered waterbirds was the focus of the Service talk presented.

3. Outdoor Classrooms - Teachers

Despite very wet weather, 28 public and private school teachers attended a 6-hour workshop at James Campbell NWR on November 20. Topics included wetland management, endangered species, migratory birds, water quality and aquatic fauna sampling techniques. These teachers are now eligible to use the Kii unit as an outdoor classroom for their students. A follow-up site visit was rescheduled for January 15, 1983.

7. Other Interpretive Programs

Off-refuge talks by Service personnel at the local chapter of the Audubon Society, church groups, school groups and business clubs often discussed the wetland NWR program in Hawaii. James Campbell NWR was highlighted in these presentations as a refuge soon to be intensively managed for the protection and preservation of Hawaii's four endangered waterbirds.

11. Wildlife Observation

The local chapter of the Audubon Society took an October field trip to the Kii unit. The group of 25 persons enjoyed several hours of bird watching and wildlife photography. Two individual bird watchers have obtained Special Use Permits to visit the refuge on a year-round basis with prior verbal approval from the Refuge Manager.

17. Law Enforcement

The new Sears air compressor was stolen from a locked tool shed at the Kii unit after Hurricane Iwa, between November 24th and 29th. A police report was filed on November 29 by Woodside.

Coleman and Special Agent Bartee conducted surveillance of the refuge on weekends during the November-December upland game bird season. No illegal trespassing was observed.

18. Youth Programs

A field crew of 2 Young Adult Conservation Corps enrollees worked at the Kii unit through March, 1982. Major work projects included fence maintenance, dike maintenance, nesting island modifications and vegetation control. They also assisted in predator control and in general area clean up.

I. EQUIPMENT AND FACILITIES

1. New Construction

Plans for the FY83 BLHP program work were drafted and submitted to the Regional Office. Earth-moving equipment rentals were proposed to rehabilitate dikes and level the substrate of Ponds A, C and F. Additional windmills and water control structures were also proposed.

4. Equipment Utilization and Replacement

The overload electrical component for the 40 hp pump at the Kii unit of James Campbell NWR was replaced in April with a larger sized component. The pump worked well after this replacement. Approximately 1,200 feet of perimeter fencing was replaced at the Kii unit in April and May.

7. Other

The observation tower at the Kii unit was bent in half by Hurricane Iwa on November 23 and had to be removed.

PEARL HARBOR NWR

Honolulu, Hawaii

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	1
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	NTR
3. Public Participation	NTR
4. Compliance with Environmental Mandates	NTR
5. Research and Investigations	NTR
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	Complex
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	1
2. Wetlands	2
3. Forests	NTR
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	NTR
7. Grazing	NTR
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	NTR
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1.	Wildlife Diversity	2
2.	Endangered and/or Threatened Species	2
3.	Waterfowl	3
4.	Marsh and Waterbirds	3
5.	Shorebirds, Gulls, Terns and Allied Species	4
6.	Raptors	NTR
7.	Other Migratory Birds	NTR
8.	Game Mammals	NTR
9.	Marine Mammals	NTR
10.	Other Resident Wildlife	NTR
11.	Fisheries Resources	4
12.	Wildlife Propagation and Stocking	NTR
13.	Surplus Animal Disposal	NTR
14.	Scientific Collections	4
15.	Animal Control	NTR
16.	Marking and Banding	NTR
17.	Disease Prevention and Control	NTR

H. PUBLIC USE

1.	General	4
2.	Outdoor Classrooms - Students	NTR
3.	Outdoor Classrooms - Teachers	NTR
4.	Interpretive Foot Trails	NTR
5.	Interpretive Tour Routes	NTR
6.	Interpretive Exhibits/Demonstrations	NTR
7.	Other Interpretive Programs	NTR
8.	Hunting	NTR
9.	Fishing	NTR
10.	Trapping	NTR
11.	Wildlife Observation	4
12.	Other Wildlife Oriented Recreation	NTR
13.	Camping	NTR
14.	Picnicking	NTR
15.	Off-Road Vehicling	NTR
16.	Other Non-Wildlife Oriented Recreation	NTR
17.	Law Enforcement	NTR
18.	Youth Programs	4
19.	Cooperating Associations	NTR
20.	Concessions	NTR
21.	Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

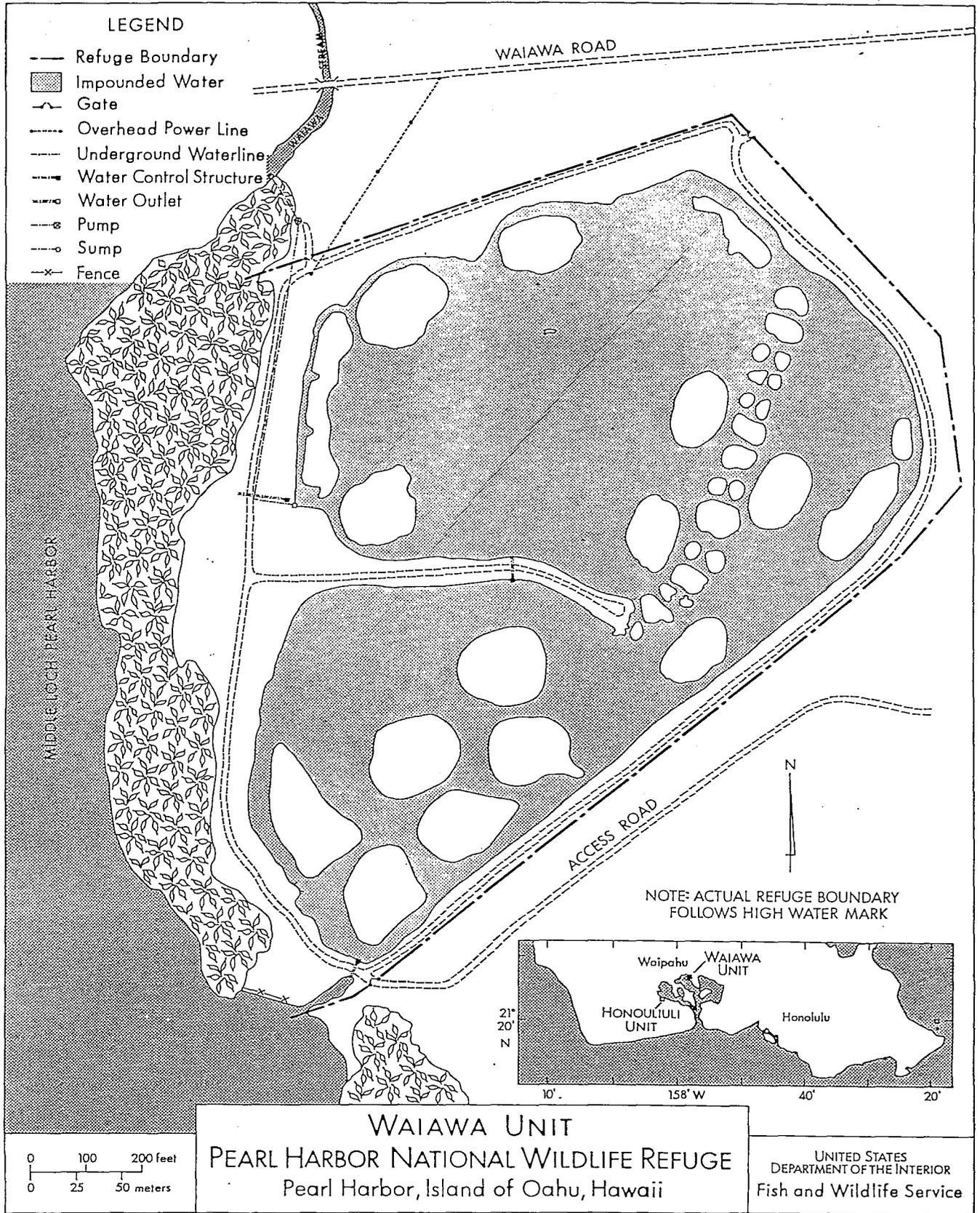
1. New Construction	NTR
2. Rehabilitation	NTR
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	5
5. Communications Systems	NTR
6. Energy Conservation	NTR
7. Other	NTR

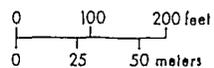
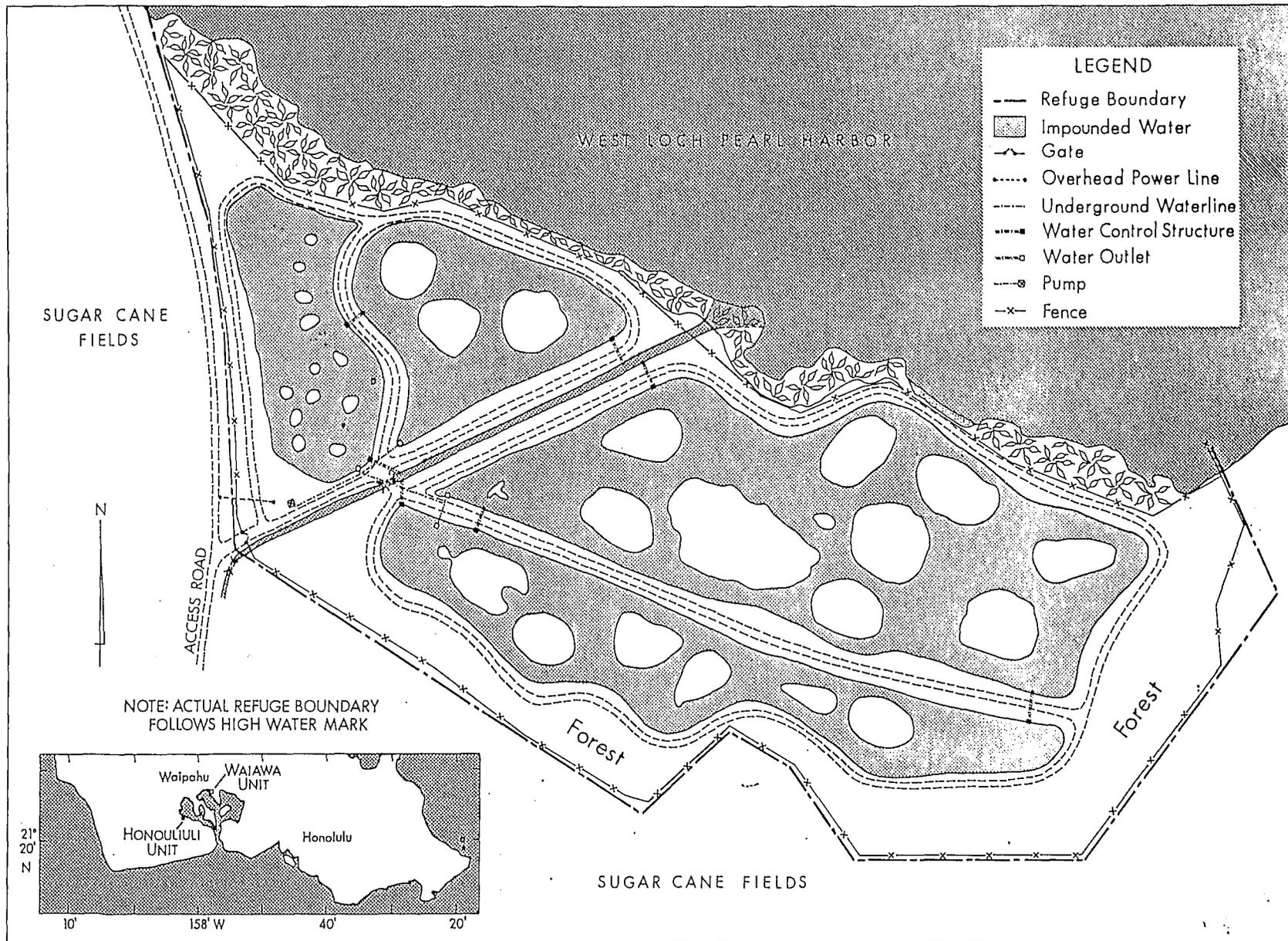
J. OTHER ITEMS

1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR





HONOLIULI UNIT PEARL HARBOR NATIONAL WILDLIFE REFUGE
 Pearl Harbor, Island of Oahu, Hawaii

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service

A. HIGHLIGHTS

The endangered Hawaiian coot population at the Waiawa unit increased from 2 to 21 birds in 1982. This is perhaps due to a decrease in the salinity from hyper-saline to less than 15 ppt. Three Canada geese were regularly seen at the Honouliuli unit in January, 1982.

B. CLIMATIC CONDITIONS

The nearest weather recording station, the Honolulu International Airport, is located approximately 3 miles southeast of the refuge. The following station summary for January-October, 1982, reflects the climatic conditions at the refuge:

	<u>Average</u>	<u>Extremes (dates)</u>
Temperature	77° F.	58°(1/31) 92°(9/7)
Wind Speed	-	-
Rainfall	28" total	3"(1/21)

C. LAND ACQUISITION

3. Other

Both units of the refuge, Waiawa unit (24.5 acres) and Honouliuli unit (36.5 acres), are perpetual easements from the U.S. Department of the Navy. These easements were obtained in 1976. An additional unit to this refuge; hereafter, called the Waiawa Annex unit, was offered to the Service by the Navy in 1979. The Service was reluctant to immediately accept the 14 acre parcel, approximately one-half mile south of the Waiawa unit on the same peninsula. This unit is a deep coastal fish pond overgrown with a dense stand of mangrove trees. High initial development costs for this area, with a low potential as a viable habitat for endangered waterbirds, was determined. The City and County of Honolulu expressed an interest in a portion of the Waiawa Annex land as part of a municipal golf course. Cooperative development plans for this site, initiated in 1980, were postponed throughout 1982.

F. HABITAT MANAGEMENT

1. General

This 61 acre refuge consists primarily of shallow man-made impoundments at two units (40 acres) surrounded by service roads (one-lane, gravel) and a partial scrub forest buffer zone 30-50 feet wide. A 7 foot high chainlink fence surrounds each refuge unit on three sides. A livestock fence isolates the refuge units from the adjacent harbor.

2. Wetlands

The intensive habitat management efforts at both units of the Pearl Harbor NWR have been reasonably successful. Due to the small size of these man-made habitats, disturbance by man and predators such as feral dogs, cats, and mongooses appears to be the major limiting factor in achieving the maximum use by the endangered waterbirds.

Water samples and sediment samples were collected on February 2 at the Honouliuli unit for nutrient and invertebrate analysis by AECOS. Supplementary water samples were also collected at the Waiawa unit. The outlet culvert at this unit was measured for construction of a flap-gate and a replacement fish grid.

Pond weed, Potamogeton sp. was unsuccessfully transplanted from Pond 1 to Ponds 3 and 4 at the Honouliuli unit on February 2. This water weed appears to be a good food item for Hawaiian coots.

Shallenberger and Coleman met with David Crear of AECOS in July, to discuss plans for use of milkfish at Waiawa unit, Pearl Harbor NWR. Strategies to increase salinity and productivity at the refuge were discussed. A tentative protocol was developed for a 3-4 year assessment of the relationship between salinity and other parameters, such as waterbird use, milkfish condition, benthic productivity and vegetative condition.

G. WILDLIFE

1. Wildlife Diversity

This refuge was established as mitigation for the loss of stilt feeding habitat when Keehi Lagoon reef runway was built in 1976. As a result, the man-made wetland habitats of this refuge were designed to provide ideal feeding and nesting areas for stilts. The other endangered waterbirds, shorebirds and waterfowl have also benefited from these habitat modifications. The high salinity conditions at the Waiawa unit had restricted the diversity of avifauna compared with the fresh-water conditions at the Honouliuli unit. Efforts to decrease the salinity at this unit were begun in 1980, and the average salinity at Waiawa in 1982 was 10-15 ppt.

2. Endangered and/or Threatened Species

The fresh-water habitat at the Honouliuli unit was utilized by all four of Hawaii's endangered waterbirds; the Hawaiian stilt, Hawaiian coot, Hawaiian gallinule and Hawaiian duck. The Waiawa unit supported the endangered Hawaiian stilt and an increasing number of Hawaiian coots (21 by December, 1982). The salinity dropped from 20-50 ppt to 10-15 ppt (sea water is 35 ppt), during the 1982 period. Limited nesting attempts each year by Hawaiian coots, stilts and gallinules at the Honouliuli unit produced only a few young. The driftwood and rock debris placed on

islands at the Waiawa unit in 1980 was used for nest cover by a number of stilt pairs in 1982. No coot nesting was recorded for the Waiawa unit.

3. Waterfowl

A few feral mallards were seen at the Honouliuli unit during 1982. Their large size and often white mottled appearance clearly distinguished these ducks from the Koloa, the endangered Hawaiian duck. Hybridization of the Koloa by these feral ducks is a major concern of biologists in Hawaii. Three Canada geese and 2 white-fronted geese were regularly seen at the Honouliuli unit January through March. Seven green-winged teal were seen at this unit in January. Ten to fifteen pintails, Northern shovelers and American wigeons were commonly seen in the winter months.



PHB-1 - These rare migrants, Cackling and Taverner's Canada geese, were regularly seen at the Honouliuli unit of Pearl Harbor NWR from January-March, 1982. RJS

4. Marsh and Waterbirds

The native black-crowned night heron was commonly seen in both units of the refuge. The average heron population numbered less than ten per unit. These birds were believed to be associated with a small rookery less than one mile away on the north side of Pearl Harbor's west loch.

A white-faced ibis was observed at irregular intervals at the Honouliuli unit during January. This ibis was also seen on the Waipio Peninsula, located between both units of the refuge.

5. Shorebirds, Gulls, Terns and Allied Species

The common migratory shorebirds at the refuge are ruddy turnstone (20-50), American golden plover (40-80), wandering tattler (5-10) and sanderling (10-20). A spotted sandpiper was seen at Waiawa on January 6.

11. Fisheries Resources

A large population of milkfish, Chanos chanos, and mullet still remains at the Waiawa unit. Several research groups have expressed an interest in obtaining the milkfish (stunted by high salinity and low food supply conditions) as potential breeding stock for additional baitfisheries development. Several milkfish were collected by AECOS in December to determine the age of this captive population (results pending). A controlled harvest of this fishery resource during the stilt's non-breeding season is still under study.

14. Scientific Collections

Three mallards were collected in March at the Honouliuli unit for analysis of pesticide residues. The lab results, conducted by Hazelton Raltech, Inc., showed a low level of DDE (0.67 and 1.10 ppm wet basis) in two of the brain samples.

H. PUBLIC USE

1. General

The urban, yet hidden, location of this refuge affords a great potential for environmental education at this unique (man-made) wetland habitat. The small area of each unit would restrict the size of school groups and season of visits to minimize disturbance to the endangered birds. Special teacher-training sessions could be easily accommodated and lesson plans should be designed to maximize the learning during the subsequent brief visits by their respective school group. Budget and staff limitations will deter such activity in the immediate future.

11. Wildlife Observation

Two individual bird watchers received permits to infrequently visit the refuge throughout the year, totaling less than 50 hours per year.

18. Youth Programs

A field crew of 2 enrollees in the Young Adult Conservation Corps participated in various habitat improvement projects at the refuge until

March, 1982. These projects included vegetation control on the nesting islands and along the perimeter fence, predator trapping, drainage ditch maintenance and boundary posting.

I. EQUIPMENT AND FACILITIES

4. Equipment Utilization and Replacement

The Waiawa unit pump was repaired on April 26 by Atlas Electric. A bad fuse and dirt in the voltage controller were the cause of the pump shutdown. The timer for this pump operation remained set at 12 hours per day. A flap-gate was installed at the seaward outlet of this pond to prevent high tides from overflowing the stop-logs.

KAKAHAIA NWR
Molokai, Hawaii

NARRATIVE REPORT
Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	1
3. Other	NTR
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	NTR
3. Public Participation	NTR
4. Compliance with Environmental Mandates	1
5. Research and Investigations	1
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	Complex
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	2
2. Wetlands	2
3. Forests	2
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	NTR
7. Grazing	NTR
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	NTR
11. Water Rights	2
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1. Wildlife Diversity	NTR
2. Endangered and/or Threatened Species	3
3. Waterfowl	3
4. Marsh and Waterbirds	3
5. Shorebirds, Gulls, Terns and Allied Species	NTR
6. Raptors	NTR
7. Other Migratory Birds	NTR
8. Game Mammals	NTR
9. Marine Mammals	NTR
10. Other Resident Wildlife	NTR
11. Fisheries Resources	NTR
12. Wildlife Propagation and Stocking	NTR
13. Surplus Animal Disposal	NTR
14. Scientific Collections	NTR
15. Animal Control	NTR
16. Marking and Banding	NTR
17. Disease Prevention and Control	NTR

H. PUBLIC USE

1. General	4
2. Outdoor Classrooms - Students	NTR
3. Outdoor Classrooms - Teachers	NTR
4. Interpretive Foot Trails	NTR
5. Interpretive Tour Routes	NTR
6. Interpretive Exhibits/Demonstrations	NTR
7. Other Interpretive Programs	NTR
8. Hunting	NTR
9. Fishing	NTR
10. Trapping	NTR
11. Wildlife Observation	NTR
12. Other Wildlife Oriented Recreation	NTR
13. Camping	NTR
14. Picnicking	4
15. Off-Road Vehicling	NTR
16. Other Non-Wildlife Oriented Recreation	NTR
17. Law Enforcement	NTR
18. Youth Programs	NTR
19. Cooperating Associations	NTR
20. Concessions	NTR
21. Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

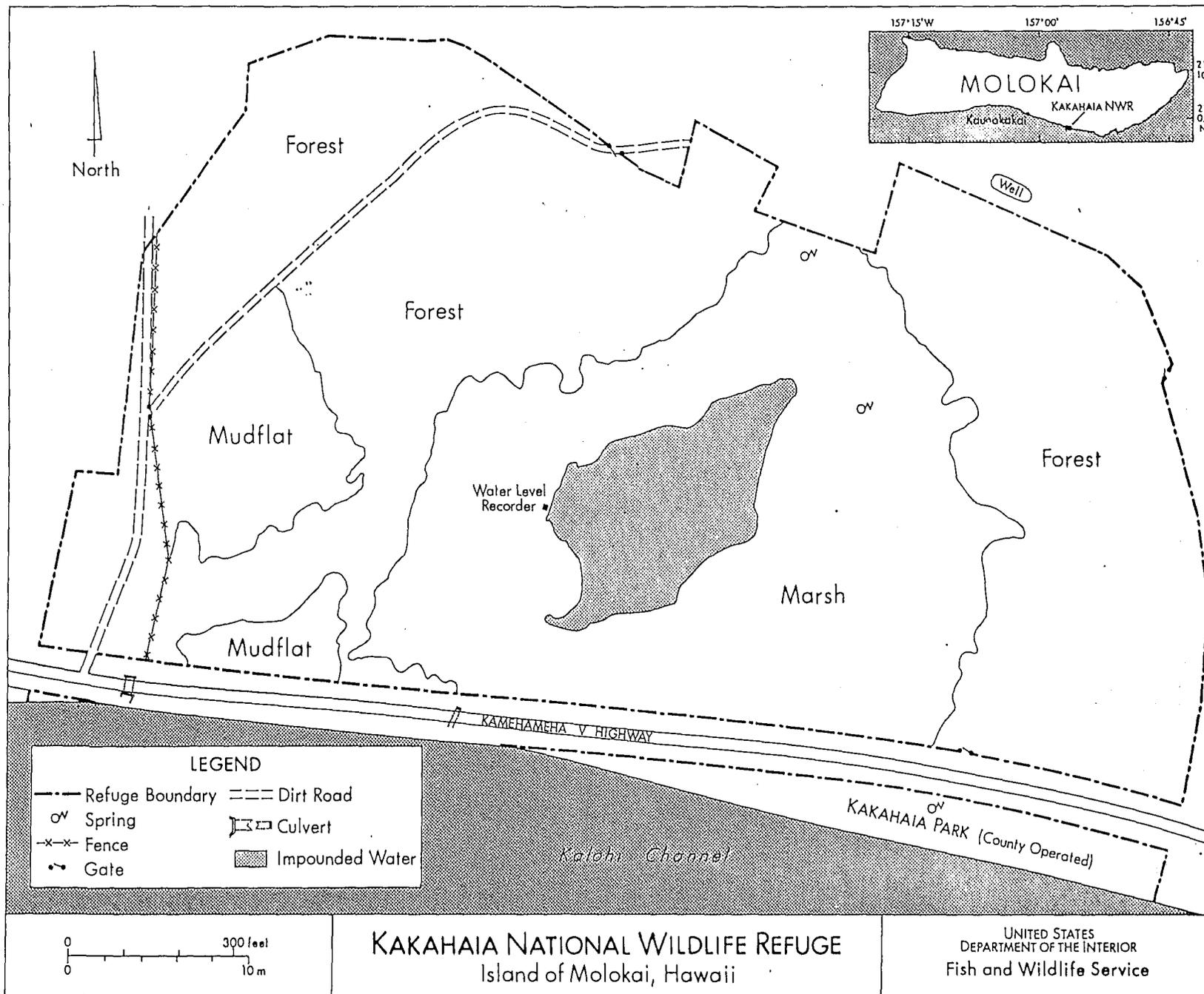
1. New Construction	4
2. Rehabilitation	NTR
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	4
5. Communications Systems	NTR
6. Energy Conservation	NTR
7. Other	NTR

J. OTHER ITEMS

1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR



A. HIGHLIGHTS

Kakahaia NWR continued to support 30-40 endangered Hawaiian coots during 1982. Coot nesting seemed to be less active this year, with no nests located during the October 10 visit.

B. CLIMATIC CONDITIONS

The nearest weather recording station, Molokai Airport, is located 10 miles west of the refuge. Temperature and rainfall data from this station, at a higher elevation than the refuge, would not accurately reflect the conditions at the refuge. No wind speed data are available for the island of Molokai. General weather conditions are similar to that reported for Honolulu International Airport (see Pearl Harbor, B).

C. LAND ACQUISITION

2. Easements

Wilma Grambush (heir to Kamakana) contacted the refuge regarding access to her property along the northern boundary of Kakahaia NWR. She wanted immediate access provided to 4 parcels which are landlocked by the refuge boundary. Coleman planned an alternative access route along the northern boundary, inside the refuge but outside the field fence. This route will be constructed during the BLHP construction work in the spring, 1983.

D. PLANNING

4. Compliance with Environmental Mandates

The Bernice P. Bishop Museum was contracted in February, 1981, to conduct a pedestrian archaeological survey and auger testing of the refuge. This work was performed on June 19 and August 19-21. Marshall Weisler, field supervisor for the study, reported that no prehistorical cultural resources were located during the survey. A final report on the archaeological survey is still pending.

5. Research and Investigations

Hawaiian Coot Nesting Study - No additional data on nest site parameters and egg sizes were collected at Kakahaia NWR in 1982.

F. HABITAT MANAGEMENT

1. General

This 44.6 acre refuge consists of a centrally located 15 acre spring-fed wetland area which was formerly used for rice and taro cultivation. The wetland area is bordered by a two-lane highway to the south and surrounded by a scrub forest (22 acres) on the remaining three sides. A strip of land (1.8 acres) on the ocean-side of the highway is developed as a picnic area and operated as a County park under a special use permit.

Vertical format 5 inch aerial photographs (color) were taken of the refuge in May, 1981, for use in vegetation mapping and habitat analysis.

2. Wetlands

A total of 15 acres of wetland habitat on this refuge consists of 11 acres of a dense bulrush stand surrounding 4 acres of open water. A thick algal mat covers 50-80% of the open water area. Waterbird use of this spring-fed wetland habitat is restricted, for the most part, to the open water pond (avg. depth ca. 50-70 cm) and the bulrush border surrounding the open pond. During the summers of 1979 and 1980, YCC enrollees removed bulrush (5 m wide strip) along the north and west sides of the open water. Regrowth of this bulrush was not significant during 1981-1982. An open flat area, approximately 5 acres, along the west side of the refuge is interspersed with a low succulent plant, Batis maritima. This area, periodically flooded after heavy rains, has a potential for development into a shallow wetland habitat for the endangered Hawaiian stilt and other shorebirds.

3. Forests

A buffer zone of 22 acres of forest land surrounds the centrally located refuge wetland. Kiawe and Koa haole are the dominant species in this stand. No stand improvements have been conducted or planned for this refuge.

11. Water Rights

Development of an agriculture subdivision, Kawela Plantations, which borders the refuge to the north and west, was begun in 1980. Three wells were drilled within 1,600-2,000 feet of the refuge boundary. The potential impact of these wells on the spring flow within the refuge wetland area was discussed in several earlier meetings with the developers and refuge staff. A Stevens water level recorder, installed along the west side of the open water area in the refuge on November 5, 1980, documented baseline water level data during 1981 and 1982. The future of the Kawela Plantation is now in question as the initial developer has backed out of the project and the original landowner, Molokai Ranch, is now in control of the area.



KKA-1 - View of Kakahaia NWR from the hillside above the refuge. This upland area was under development in 1981-1982 as an agricultural subdivision, Kawela Plantations. RJS

G. WILDLIFE

2. Endangered and/or Threatened Species

The Hawaiian coot and stilt were the only endangered species observed on the refuge during 1982. Semiannual census indicated an average population of 30-35 adult coots at the refuge in 1982. Four to six stilts were also occasionally seen at the refuge. No active nests were located on the October 12 visit.

3. Waterfowl

Limited waterfowl use of the refuge has been noted during the winter months. Five Northern shovelers and a cinnamon teal were seen during the October visit to the refuge.

4. Marsh and Waterbirds

Only a few indigenous black-crowned night herons are regularly observed around the edge of the open water area. No heron nesting was observed on the refuge during 1982.

H. PUBLIC USE

1. General

Kakahāia Pond is located immediately adjacent to the southern coastal highway and only 5 miles east of Kaunakakai, the largest town on the island. Traffic on this road is very light and most travelers pass by the refuge without seeing this important wetland. A tall, dense stand of bulrush shields any view of the open pond from the highway. If such a view was afforded to the local residents and the limited number of tourists, there could be increased disturbance and/or poaching of the endangered coot. With no FWS staff or State Forestry and Wildlife personnel on the island, this problem would be difficult to control.

14. Picnicking

A day-use picnic area was constructed in 1978 on the ocean-side of the highway intersecting the refuge and continued to be maintained by the County of Maui. The concrete tables, constructed by the YCC in 1978, and metal barbecue grills are used on a limited basis by local residents and tourists. No view of the wetland area is presently available from the picnic area.

I. EQUIPMENT AND FACILITIES

1. New Construction

Plans were drafted for the construction of a shallow impoundment (6-8 acres) along the west side of the refuge. This work will be performed during the FY83 BLHP program.

4. Equipment Utilization and Replacement

Arrangements were made to conduct a demonstration of a Menzi Muck climbing hoe in Kawaiū Marsh. This machine has the ability to clear out dense mats of bulrush without the need of a supporting platform. The demonstration is scheduled for January 12, 1983. FY83 BLHP work may include the rental of this machine to clear bulrush at this refuge.

HAWAIIAN ISLANDS NWR

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM



TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	
	1
B. <u>CLIMATIC CONDITIONS</u>	
	2
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	NTR
D. <u>PLANNING</u>	
1. Master Plan	2
2. Management Plan	3
3. Public Participation	NTR
4. Compliance with Environmental Mandates	4
5. Research and Investigations	4
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	17
4. Technical Assistance	17
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	18
2. Wetlands	NTR
3. Forests	NTR
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	18
7. Grazing	NTR
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	NTR
11. Water Rights	NTR
12. Wilderness and Special Areas	18
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1. Wildlife Diversity	NTR
2. Endangered and/or Threatened Species	18
3. Waterfowl	21
4. Marsh and Waterbirds	NTR
5. Shorebirds, Gulls, Terns and Allied Species	21
6. Raptors	24
7. Other Migratory Birds	24
8. Game Mammals	NTR
9. Marine Mammals	24
10. Other Resident Wildlife	24
11. Fisheries Resources	24
12. Wildlife Propagation and Stocking	NTR
13. Surplus Animal Disposal	NTR
14. Scientific Collections	25
15. Animal Control	25
16. Marking and Banding	25
17. Disease Prevention and Control	25

H. PUBLIC USE

1. General	26
2. Outdoor Classrooms - Students	NTR
3. Outdoor Classrooms - Teachers	NTR
4. Interpretive Foot Trails	NTR
5. Interpretive Tour Routes	NTR
6. Interpretive Exhibits/Demonstrations	NTR
7. Other Interpretive Programs	NTR
8. Hunting	NTR
9. Fishing	NTR
10. Trapping	NTR
11. Wildlife Observation	NTR
12. Other Wildlife Oriented Recreation	NTR
13. Camping	NTR
14. Picnicking	NTR
15. Off-Road Vehicling	NTR
16. Other Non-Wildlife Oriented Recreation	NTR
17. Law Enforcement	NTR
18. Youth Programs	NTR
19. Cooperating Associations	NTR
20. Concessions	NTR
21. Volunteers Program	27

I. EQUIPMENT AND FACILITIES

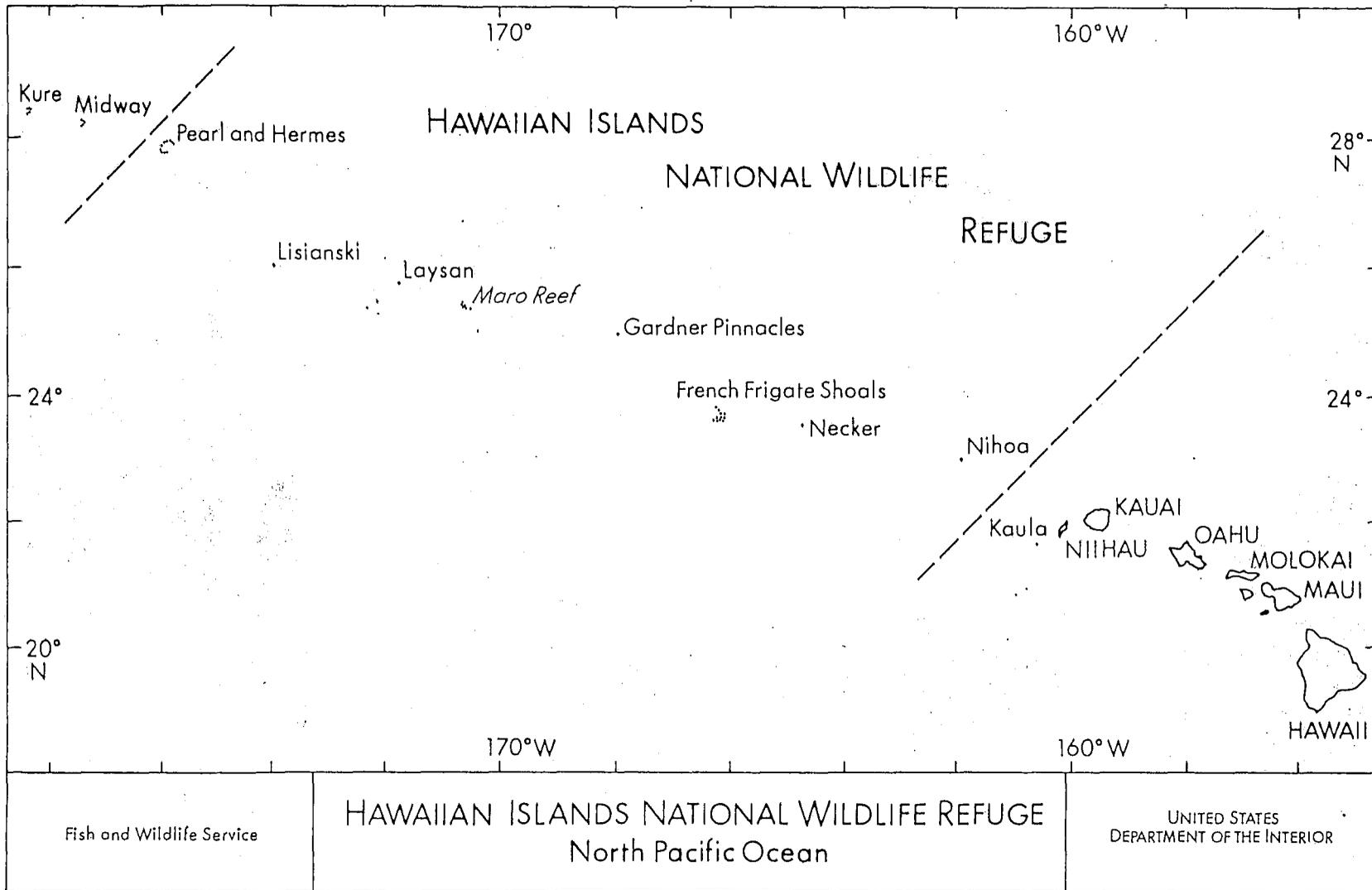
1. New Construction	27
2. Rehabilitation	27
3. Major Maintenance	28
4. Equipment Utilization and Replacement	28
5. Communications Systems	28
6. Energy Conservation	29
7. Other	29

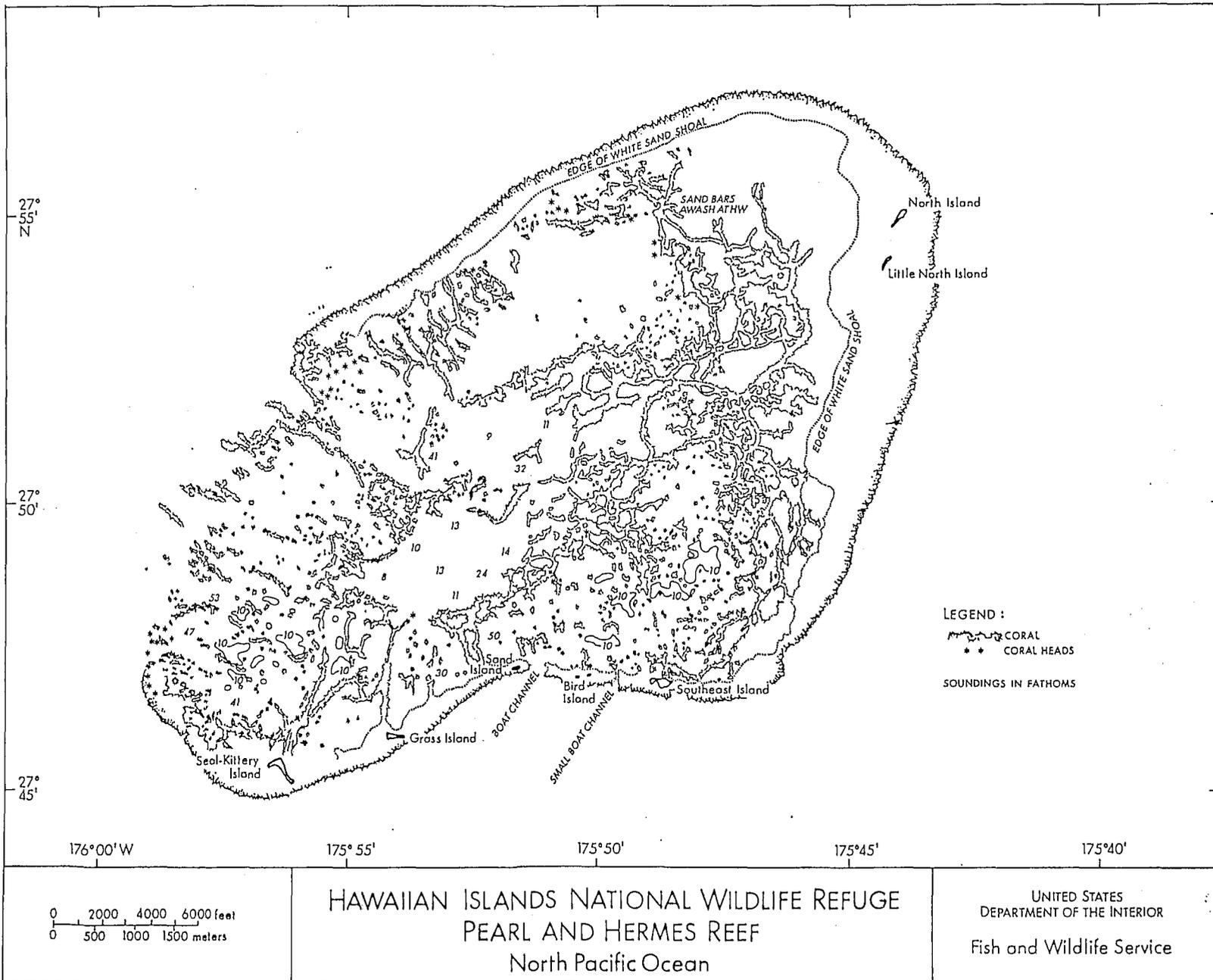
J. OTHER ITEMS

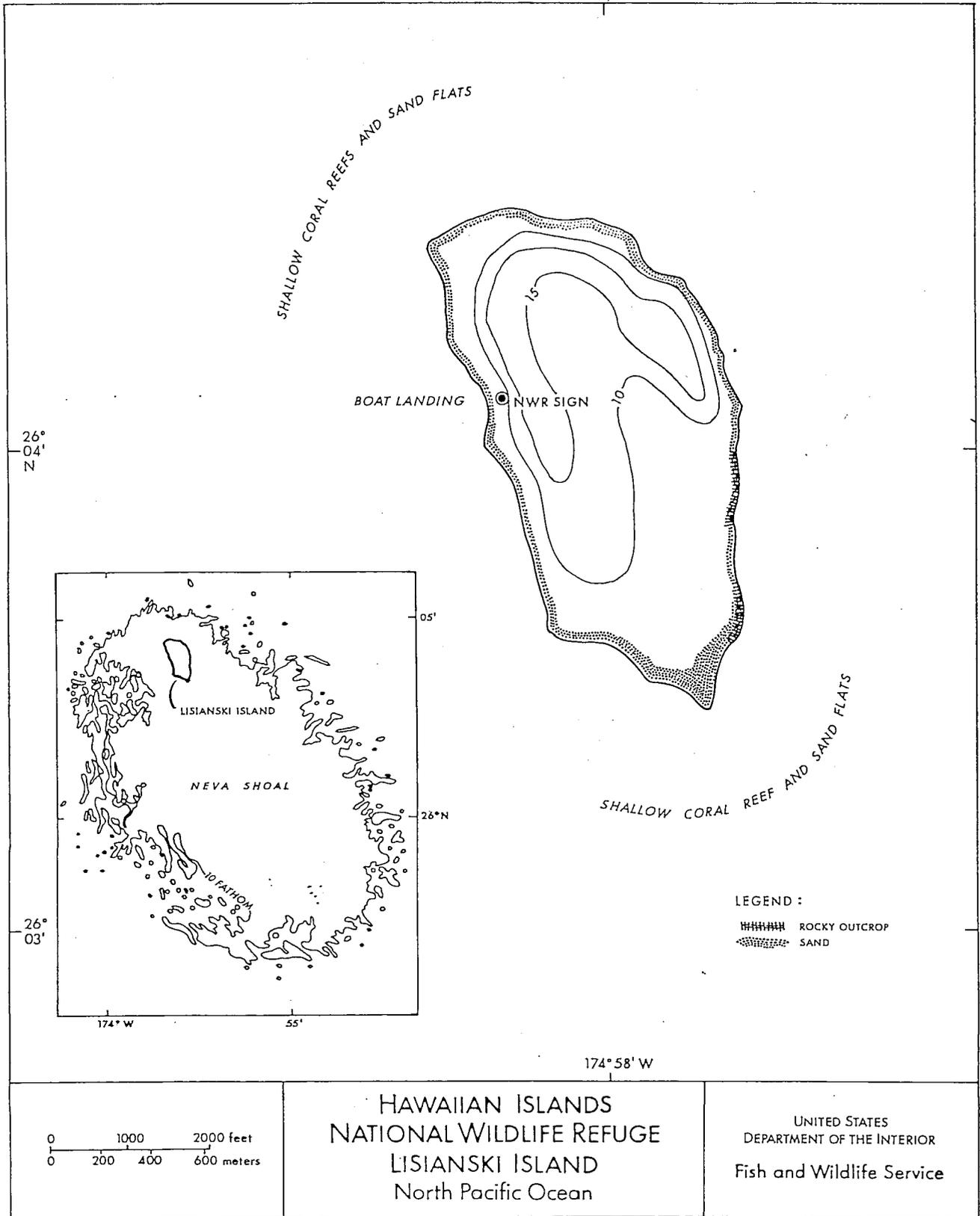
1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR

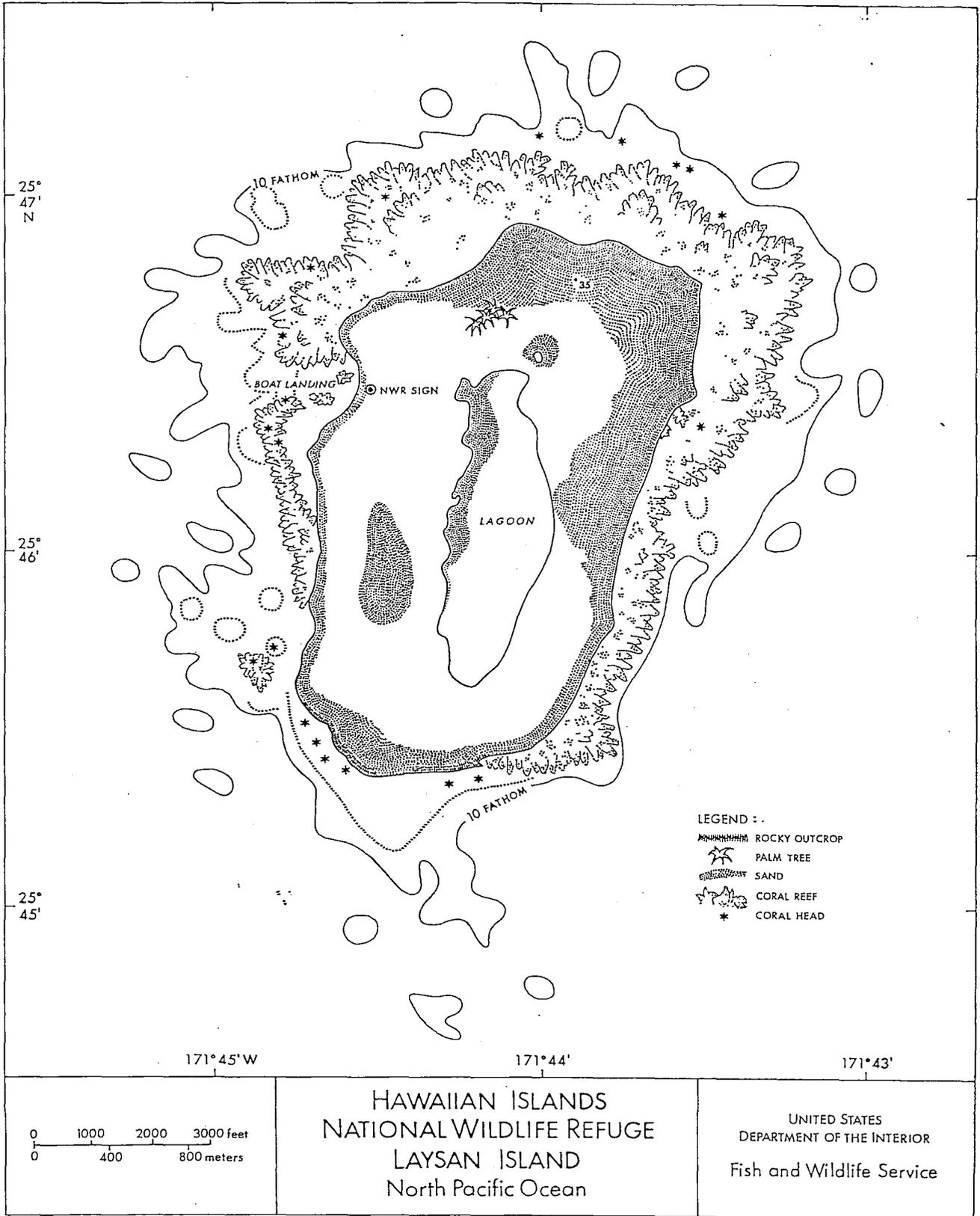


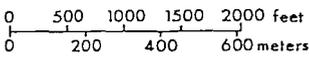
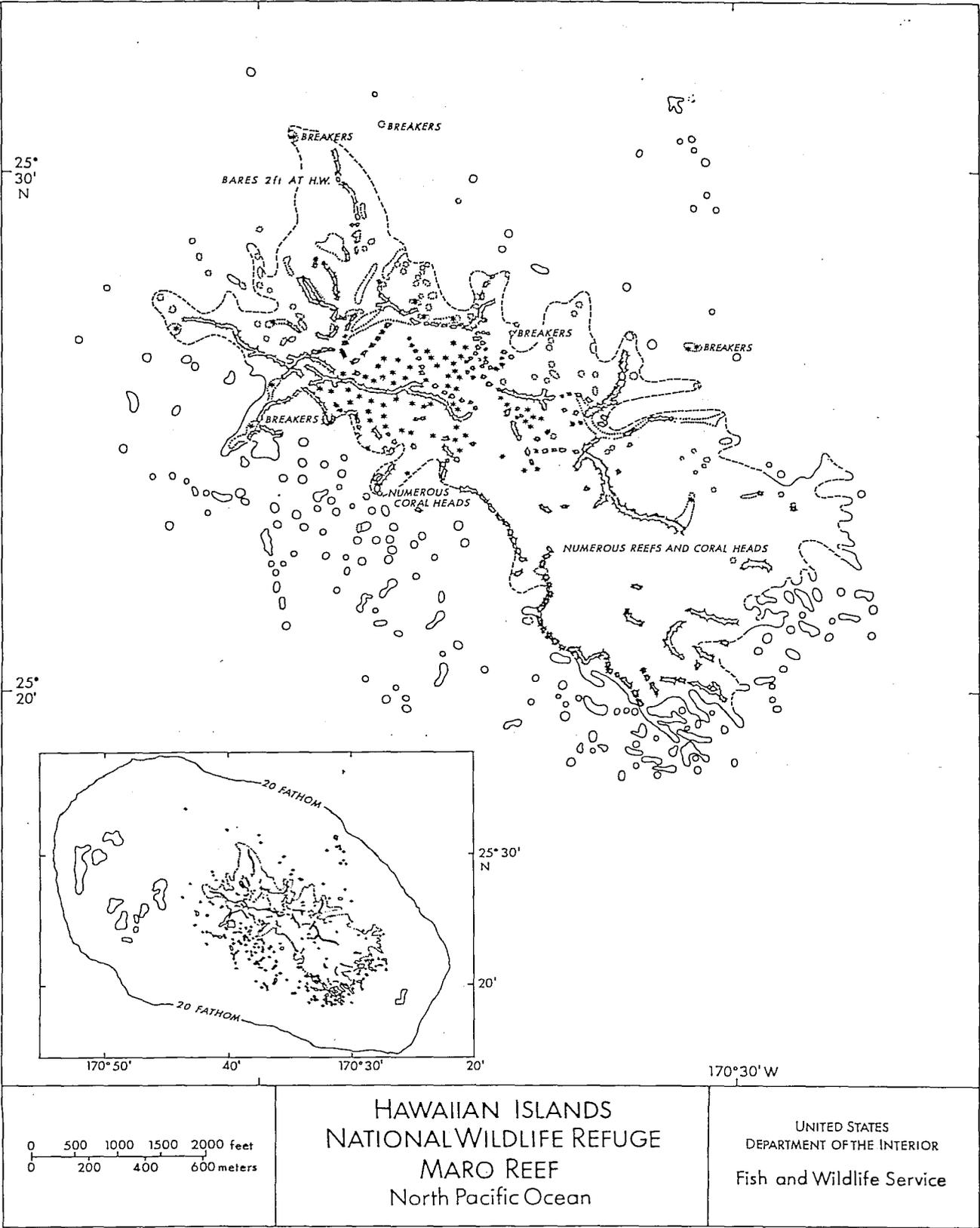




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 NATIONAL WILDLIFE REFUGE
 LISIANSKI ISLAND
 North Pacific Ocean

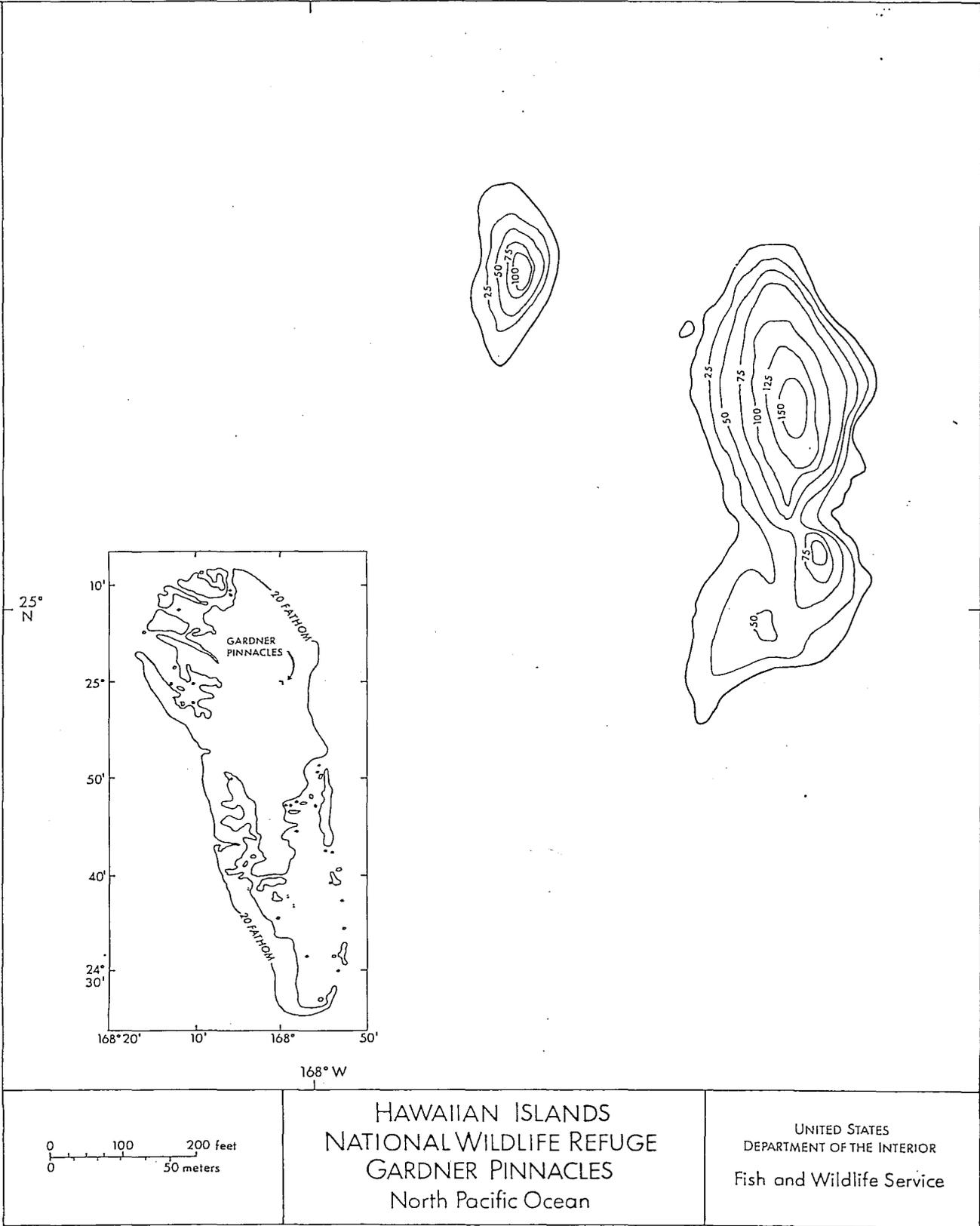
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 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service





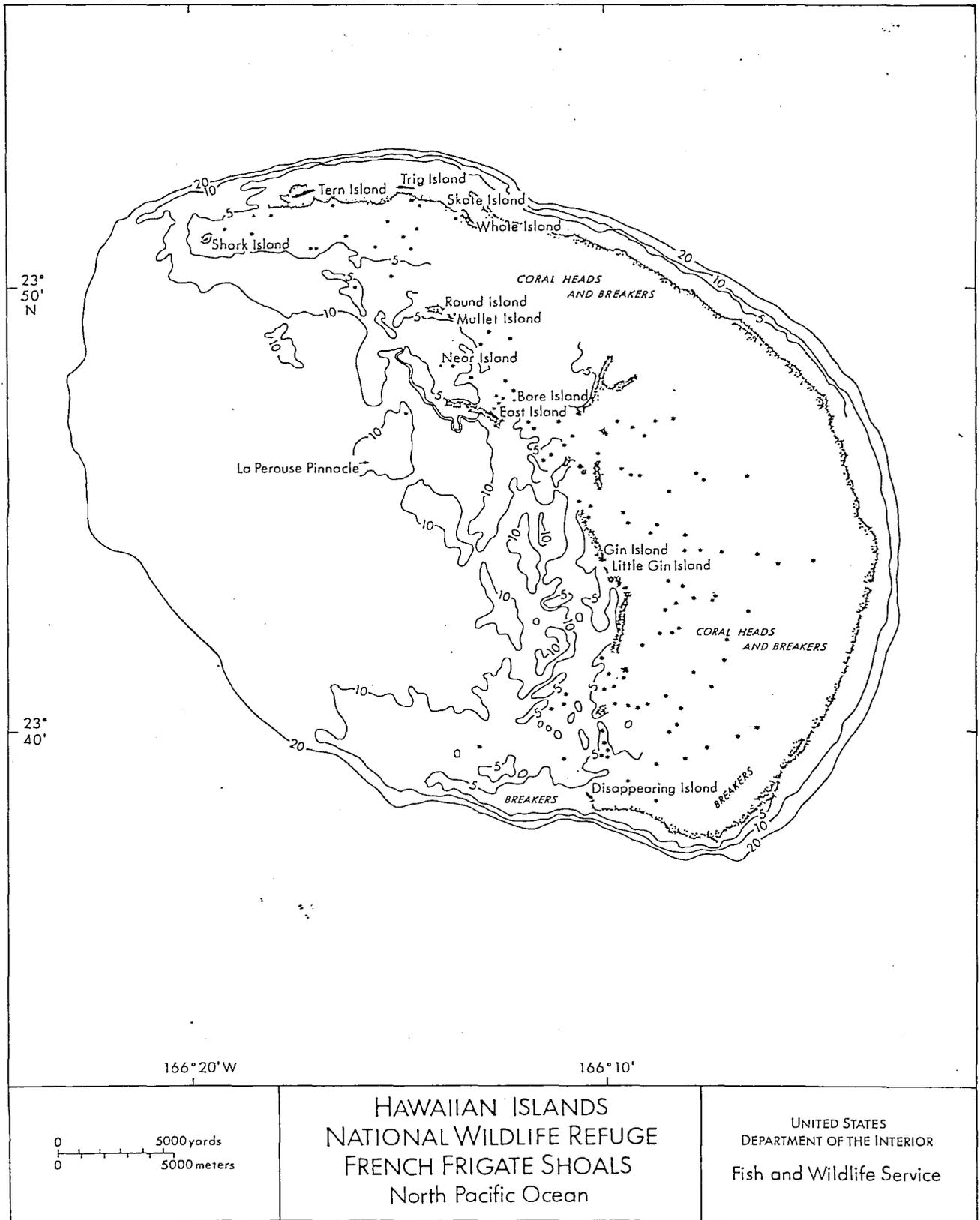
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 MARO REEF
 North Pacific Ocean

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service



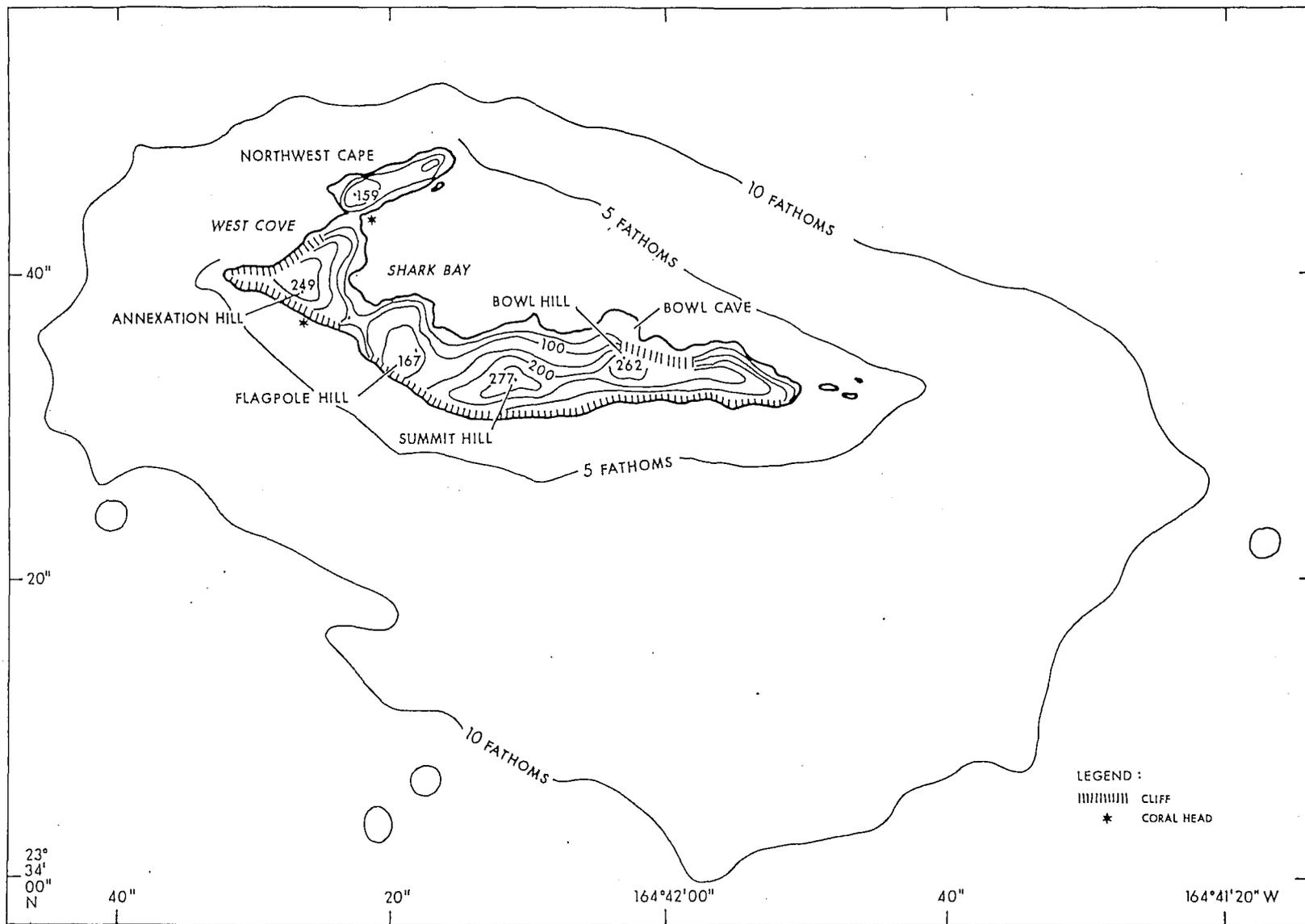
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 NATIONAL WILDLIFE REFUGE
 GARDNER PINNACLES
 North Pacific Ocean

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HAWAIIAN ISLANDS
 NATIONAL WILDLIFE REFUGE
 FRENCH FRIGATE SHOALS
 North Pacific Ocean

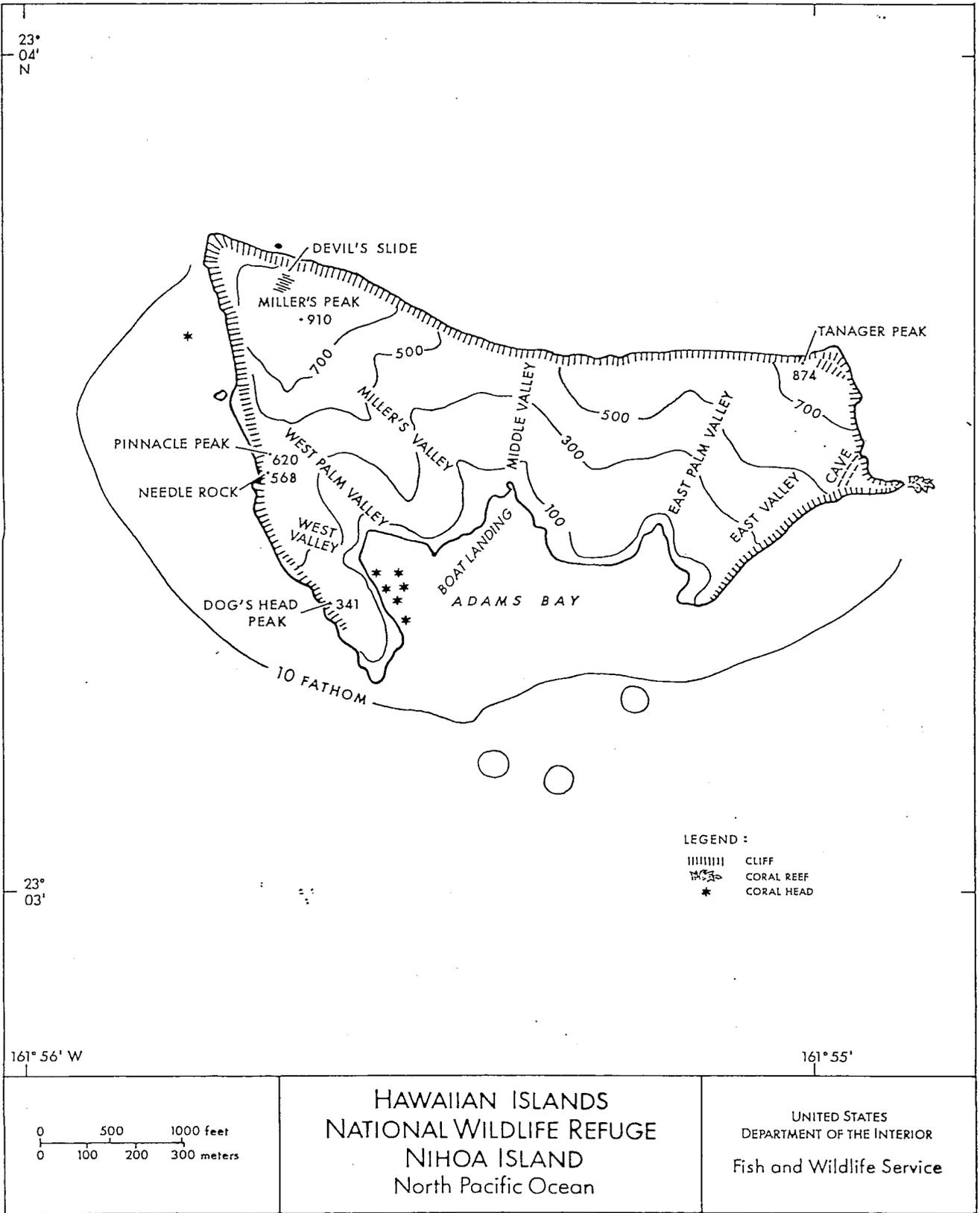
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HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE
 NECKER ISLAND
 North Pacific Ocean

LEGEND:
 CLIFF
 CORAL HEAD

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 Fish and Wildlife Service



A. HIGHLIGHTS

The Tripartite Agreement (U.S. Fish and Wildlife Service, National Marine Fisheries Service, State of Hawaii Department of Lands and Natural Resources) research continued throughout the Refuge. French Frigate Shoals continued to be the focus for much of the research during 1982 with the staff and field station on Tern Island providing support and a base for operations (see Research and Investigations).



HWN-1 - Necker Island.

GML

The highest number of endangered monk seals ever recorded (76) on Tern Island was observed during October. A major marking study of the threatened green sea turtle during August included over 1000 hatchlings.

B. CLIMATIC CONDITIONS

The portion of the Hawaiian archipelago included in this Refuge extends from Nihoa Island (23 03'N., 161 55'W.) to Pearl and Hermes Reef (27 47'N., 175 49'W.). Weather conditions are variable because of the change in latitude but generally are tropical to sub-tropical in nature with a fairly constant north-east tradewind blowing.

The weather station that was present when the U.S. Coast Guard was stationed at Tern Island is no longer active; however, Refuge personnel keep daily logs of the weather. The U.S. Weather Bureau also maintains a remote weather station at Tern Island that is used for weather prediction. The station broadcasts to a satellite. Data from this station are supplied to the Refuge, but it has not been summarized for 1982. The following data is from the station log:

Temperature

Annual mean temperature	74.34° F
Mean maximum temperature	79.73° F
Mean minimum temperature	68.96° F
Departure from mean annual temperature	unknown

Precipitation

Total annual precipitation	37.4 in.
Wettest month	7.5 in. (Jan.)
Driest month	0.1 in. (May)
Departure from mean annual precipitation	unknown

Winds of up to 70km and 80km (gusts) buffeted Tern Island in January and November. Several times during the year boats were delayed in unloading supplies because of adverse wind, wave and current conditions.

D. PLANNING

1. Master Planning.

Robert Cleary of the Regional Office visited the refuge in March to assist with the development of a flow chart and timetable for master planning, NEPA coordination, Tripartite study reporting and other related activities. Cleary was able to visit Tern Island during his visit. Tern I. will continue to be one of the

focal points for future refuge operations in the HINWR.

Preliminary activities in the development of a master plan for the HINWR and other remote island refuges have included the gathering of maps, documents and other information pertaining to the acquisition, history and descriptions of the refuges. Attempts were also made to obtain high level aerial photographs of all of the islands, but good quality LANDSAT, EROS or U-2 photos are not presently available for most of the remote island refuges. Those that were available did not have sufficient resolution to serve our purposes. New maps of each island in each of the remote island refuges were also drawn up by HIG Graphics of the University of Hawaii.

2. Management Plan

Preliminary search and rescue and safety plans were drawn up for the HINWR. The plans involve close coordination with the U.S. Coast Guard and fishing boats that may be in the vicinity of any area within the islands where search and rescue operations may be necessary.

All field camp operations within the refuge are required to develop an emergency contingency plan. This was done for National Marine Fisheries Service camps that operated in the northern half of the island chain.

Preliminary work began on the Exotic Animal Introduction Hazard Assessment and Contingency Plan. Dr. Russell Reidinger, Jr., ADC Research, Philadelphia, PA., travelled to Hawaii at the request of the Denver Wildlife Research Center to participate in providing background for the preparation of a contingency plan for determining the presence of introduced rodents and other predators on islands and recommending procedures for their control/eradication. Dr. Reidinger provided a report detailing his trip findings. He included recommendations on how to detect rodents during short visits to islands and methods for eradicating rodents where they have been introduced on islands. This work will be continued in 1983.

A variety of other management plans that have direct and indirect effects on the Refuge were reviewed. A lobster management plan and an "Assessment of the need for a bottomfish management plan" that were developed by the Western Pacific Regional Fisheries Management Council were among those reviewed.

A USFWS Pacific Fisheries Strategy Plan was also reviewed. Recommendations that various native fishing strategies be described or even included as part of our operating procedures were made.

Shallenberger participated as a member of the Hawaiian Monk Seal

Recovery Team. An agency review draft of the Monk Seal Recovery Plan was prepared and distributed in December. A draft Memorandum of Understanding between the USFWS and the NMFS for coordination on monk seal management was developed and reviewed.

4. Compliance with Environmental Mandates.

A Special Use Permit was issued to a fisherman for the installation of a mooring bouy for emergency use at French Frigate Shoals. Before issuing the permit Ludwig assisted the fisherman in obtaining the necessary permits from the U.S. Coast Guard, U.S. Army Corp of Engineers and the Hawaii Department of Lands and Natural Resources. In addition, Section 7 Consultation was coordinated with the National Marine Fisheries Service and with the U.S. Fish and Wildlife Service.

The Refuge prepared a draft Oil and Hazardous Substanced Response Plan. Fefer served as alterante Area Oil Spill Response Coordinator throughout the year.

5. Research and Investigations

Research pursuant to the Tripartite Cooperative Agreement signed by representatives of the National Marine Fisheries Service, the U.S. Fish and Wildlife service and State of Hawaii continued in 1982.

This Agreement has led to a multi-agency research program focusing on the determination of abundance and distribution of major terrestrial and marine vertebrates and selected marine invertebrates. Additional research addresses the interaction between the terrestrial resources (including endangered Hawaiian monk seals and threatened sea turtles) and those marine resources that are of potential commercial value. Particular emphasis is directed toward the possible effect that commercial or recreational fishing may have on the wildlife resources of the Refuge. Much of the data are being utilized in the development of a model of energy flow through the atoll ecosystem at French Frigate Shoals.

Shallenberger and Ludwig participated in the Tripartite Coordinating Council on a monthly basis to facilitate Tripartite research and to be involved in the transfer of information gathered as a result of the ongoing studies. This council is chaired by Dr. Richard Grigg of the Hawaii Institute of Marine Biology of the University of Hawaii. Ludwig and Ferguson also coordinated the logistics of getting researchers to French Frigate Shoals via boats and planes. Tern Island Assistant Managers Schulmeister, Andre and Fairaizl provided a tremendous amount of help and hospitality to the visiting researchers.

Research has been conducted by the signing agencies and by the University of Hawaii Sea Grant Program. French Frigate Shoals was a focal point for many of the Sea Grant studies during 1982.

The following research projects were conducted or continued during 1982:

HWN-1 Tripartite Seabird Breeding Biology and Monitoring Studies (continuing):

Our principal efforts during 1982 involved work on the Tripartite Report. Data from field camps on several of the NWHI during the past three years were transcribed and analyzed. Results of this analysis were written up as part of the Draft Tripartite Report which was completed in September. This report presents the results of Tripartite research on marine birds and includes sections on the population magnitude of the seabirds in the NWHI, breeding biology and distribution of seabirds, food habits, foraging methods, at-sea distribution, consumptive rates and the direct and indirect effects of human activities in the area. Appendices to this report include sections on methodology and a complete list of references used in compiling the report. In addition to completion of the draft Tripartite Report, progress was made on developing methodologies for monitoring seabirds. Several breeding biology parameters were investigated as possible methods to detect population trends, including chick growth, egg size, adult weight and reproductive success. Computer programs have been written using the SAS (Statistical Analysis System) programming language to analyze these data. Several data sets on these parameters have been created and analyzed using these programs. This study will continue in 1983.

HWN-2 Tripartite Seabird Feeding Study (continuing):

A draft manuscript on the results of the feeding study was prepared, reviewed and edited during the year. The manuscript was accepted for publication in the Wildlife Monograph Series of the Wildlife Society and will be published in 1983. Data on the food habits of black noddies and red-footed boobies were collected weekly throughout the year at Tern Island. These data will be analyzed to investigate seasonal and annual variation in food habits. Food habits data are also on-line for investigation of possible variation in diet when future collections are compared to the baseline. This is one of the potential monitoring techniques with great promise for anticipating potential effects of fishery development.



HWN-2 - Collecting food sample from
red-footed booby. RJS

HWN-3 Physiology and Energetics of Seabirds (continuing):

A preliminary study of the energetics and consumptive rates of seabirds in the NWHI was completed; results of this preliminary work were incorporated into the Tripartite Report Draft completed in September. This work is an important contribution to the Tripartite Investigations as it pulls together data gathered on populations, phenology, breeding biology and food habits and results in a preliminary determination of the consumptive rates of the species. Thus, results indicate the amount of specific food items seabirds need to breed successfully in the NWHI. These data have obvious important management implications. This study is continuing in 1983.

HWN-4. POBSP Pelagic Survey Analysis

Programs have been written to analyze data from the Pacific Ocean Biological Survey Program on the distribution of pelagic seabirds

in the vicinity of the NWHI. Since data received from the Smithsonian to date have been incomplete, analysis has not proceeded. Requests to the Smithsonian Institution staff responsible for dearchiving these data have been made but the complete data set has not yet been made available.

HWN-5 Breeding Biology of Sooty Terns

Due to the late nesting of sooty terns this year, research on the populations, phenology and breeding success of sooty terns was not conducted by Flint. However, Young collected these data when she was on Tern Island in June-July. During May-June Flint collected data on at-sea flight behavior of sooty terns in the NWHI.

HWN-6 Golden Plover Study (continuing):

Golden plovers landing on Tern Island are being observed for behavioral interactions and also being banded as part of a study done in cooperation with Dr. Oscar Johnson of Moorhead State University, Moorhead, Minnesota. Dead plovers found on the island last year were extremely emaciated as compared to plovers that survived the winter season on the main Hawaiian Islands. Dr. Johnson is attempting to determine if the birds are dying as a result of arriving at the island in very poor condition or as a result of their inability to establish a feeding territory before they starve to death. Dr. Johnson has been conducting behavioral and life history studies on this species on Oahu Island for several years.

HWN-7 Nihoa Finch and Millerbird Study (continuing):

Dr. Sheila Conant of the University of Hawaii, Dept. of General Sciences, continued her studies of the population status and various aspects of the life history and ecology of the endangered Nihoa finch and Nihoa millerbird. Both of these species are endemic to Nihoa Island. Part of the rationale for this study is to determine the environmental requisites of these species, to determine if transplantation to another island is a feasible conservation program.

One of the islands that is being appraised as a possible site for transplantation is Necker Island. Necker Island is the closest island in the refuge to Nihoa. It is also the most similar in habitat. Dr. Conant concentrated on assessing Necker Island's vegetation and insect communities this year. Dr. Patrick Conant assisted with the work by making collections and analyzing the insect community. Both scientists also collected data on sea birds, Hawaiian monk seals and green sea turtles.

Dr. Conant is planning to continue her studies during 1983. The results of the studies will be entered into a recovery plan that is being developed for the Nihoa finch and Nihoa millerbird.



HWN-3 - Aerial photo of monk seals on Tern
Island RJS

HWN-8 Aerial Survey of Monk Seals -- FFS (continuing):

Aerial photographic surveys of all islets at French Frigate Shoals were conducted on a monthly basis to determine the relative abundance of this species at the atoll. Ground truthing was done simultaneously on Tern Island by refuge personnel stationed there. An intensive survey was done for four days in May, 1982. During that period three flights a day were flown while ground truthing was conducted on Tern, Whale-Skate and East Islands.

In addition to obtaining an indication of the relative abundance of the seals at this coral atoll, the data from this study will also enable us to determine seasonal differences in the utilization of the various islets in the atoll, pup production, habitat utilization, changes in habitat and size structure of the population.

Data for the Oct. 1981--September, 1982 period demonstrate a substantial reduction (45%) of hauled out seals during rainy, cold weather when compared to typically sunny days. For the nine monthly surveys conducted on similar, sunny days, the mean atoll count was 261 seals (range 229-297), with highest numbers in the October-December period when molting most commonly occurs. On Tern Island, the most densely vegetated islet, counts from aerial

surveys averaged 21% less than simultaneous ground counts. The aerial surveys of less vegetated islets such as Whale-Skate and East Islands indicated only 2-9% fewer seals than the ground truthing indicated (during midday flights). Aerial surveys that were done at 0900 hrs over Tern Island resulted in a far more significant underestimation (100--250%) of the actual numbers of seals that could be located on the ground. The seals were spending the evenings within the vegetation and were not as visible from the air during the early morning. The degree of variability of underestimation was typically least during the afternoon surveys (1600 hrs.).

Analysis of data relating to pup production and age/size composition of the population has not been completed yet. However, preliminary review indicates that spacing of flights at intervals less than the estimated averaging weaning period (36-38 days) results in an overestimation of total pups produced. To some extent, this error is compensated for by the underestimation of actual numbers on each aerial survey. Intervals between flights were thus lengthened to 36-38 days beginning Oct. 1982.

HWN-9 Hawaiian Monk Seal Study (continuing):

Susan Schulmeister and Ruth Ittner, volunteers at Tern Island, have conducted surveys of Hawaiian monk seal utilization of Tern Island every four days and of other islets of French Frigate Shoals every 35-38 days (weather permitting) in order to determine population levels, pup production and the increase in utilization of Tern Island by the seals. This study complements a 5 year research study that was conducted on Laysan Island until 1981 and other work that is being conducted by National Marine Fisheries Service personnel on a continuing basis (see below).

One of the basic techniques utilized in this study is the identification of individual seals. As of October, 1982, over 250 individuals had been identified and catalogued at French Frigate Shoals on the basis of shark bite scars and other individual markings.

The most significant data derived from these surveys includes the documented continuing increase in seals utilizing Tern Island. Between July 1979 and December 1981, the monthly mean of the 4-day seal counts at Tern increased from 5.7 animals to a high of 43.5 animals (November, 1981). The Tern island numbers continued to increase throughout 1982. The highest monthly mean, 56.1, again occurred in November (Table 1).

Table 1. Average monthly numbers of Hawaiian Monk Seals using beaches on Tern Island, French Frigate Shoals.

	1979	1980	1981	1982	Mean*
January		10.8	29.6	33.9	24.8
February		14.2	28.8	31.6	24.9
March		24.5	25.9	39.3	29.9
April		13.9	28.0	36.9	26.3
May		14.9	22.9	28.4	22.1
June		16.7	19.6	30.5	22.3
July	5.7	17.7	20.7	43.0	27.1
August	5.3	21.9	27.3	46.6	31.9
September	4.3	19.5	28.3	44.3	30.7
October	2.5	23.4	43.4	49.9	38.9
November	9.0	22.9	43.5	56.1	40.8
December	13.7	33.5	37.5	48.6	39.9

*mean value is for 1980-1982

The highest individual count in the four day interval series was 76 on October 31, 1982.



HWN-4 - Hawaiian Monk Seals on Tern Island

RJS

A manuscript that summarized the Hawaiian monk seal data collected from 1979 to 1982 was prepared by Susan Schulmeister and submitted to the refuge and to National Marine Fisheries Service for review. Much of the data included in this narrative is from Schulmeister's report.

Pup production at French Frigate Shoals during 1982 is estimated to be 114. This represents about a 20% increase over the estimated 1981 pup production.

In addition to participating in the population surveys and islet utilization study, Ruth Ittner also collected scat and spewing samples for analysis by NMFS personnel.

Refuge staff provided substantial logistical support for NMFS field camps at Laysan and Lisianski Islands and Pearl and Hermes Reef during 1982. Their field personnel were present on Laysan Island from March 15 to June 19 and also on July 10. They conducted 48 censuses, and the number of seals counted averaged 90 (range 66-119). Female seals which were known to have pupped were photographed and catalogued for future determination of reproductive rates as their pupping activity is followed in the future. Injurious and fatal interactions between female monk seals and sharks and adult male seals were observed. Scat and spewing samples were routinely collected for analysis of feeding habits. Nets and other debris which could entangle seals were studied to evaluate what fisheries may be involved.

A Lisianski Island field camp was conducted by NMFS personnel from March 18 - September 13 and from October 26 -- November 22. A total of 13 weaned pups were tagged and marked with bleach. A total of 211 other seals were marked with bleach in order to make estimates of the population levels present. Censuses were conducted 35 times during the first field camp and 13 times during the second camp. An average of 81 seals were seen per census during the early season; the results of the second camp have not been calculated yet. Behavior of weaned pups was monitored and scat and spew samples were collected. On several occasions young seals were freed from fishing nets and other debris.

Field research was carried out by NMFS at Pearl and Hermes Reef on April 29--May 10, July 2-6 and October 27-31. Counts during these visits averaged 31 seals (other than pups). At least nine pups are known to have been born at Pearl and Hermes Reef during 1982. A total of 55 seals were bleach marked.

National Marine Fisheries Service personnel also counted one weaned pup and seven other monk seals on Nihoa on June 24, three pups and 19 other seals at Necker Island on June 25 and six adult seals at Gardner Pinnacles on July 11.

HWN-10 Green Sea Turtle Study (continuing):

George Balazs and Alan Kam of the National Marine Fisheries Service conducted field work to gather data on the threatened green sea turtles that inhabit the Refuge.



HWN-5 - Green Sea Turtles.

GML

(Note: First Place, Endangered Species Category, National FWS Contest, 1982.)

Balazs camped on East Island at French Frigate Shoals from June 5 to June 26 and conducted surveys of breeding turtles. He estimated the breeding female population as 250 individuals or about the same level as it had been the previous year. The years 1978, 1981 and 1982 had the highest level of breeding females that Balazs has observed since 1973 when he began his work at the Shoals. During the 1982 study Balazs encountered 190 tagged turtles. Of these, 37.9% per cent were tagged during previous work in the refuge. The sexual distribution of the turtles that Balazs found was 158 females and 32 males. Most of the nesting that was observed by Balazs was on East Island.

Balazs also assisted a group of NMFS scientists collect about 1000 hatchling turtles for a mark and recapture study. This study utilized a new marking technique that involved removing small areas of the plastron and carapace and interchanging the pieces. The pieces (which are of contrasting colors) are then

held in place by glue until a natural grafting process takes place. The hatchling turtles were then released except for several that were held as controls for the experiment. Results observed in the controls suggested that the tagging technique may not have been very successful (although previous pilot tagging experiments had indicated that the technique works). This experiment will continue in 1983.

Ruth Ittner provided an evaluation of the possible effects that the hatchling collections may have had on Hawaiian monk seals. She found that some disturbance to seals did occur but it seemed to be minimal. The technique of catching turtle hatchlings with a night light that is positioned away from the shore was less disruptive to seals and to basking turtles than techniques that involved digging up turtle nests or roaming along the beach in search of "erupting" nests.

Mr. Kam participated in field camps at Laysan Island (March 13--June 30), Pearl and Hermes Reef (July 2-6 and October 27-31) and Lisianski Island (March 17--September 13) to examine the abundance and distribution of green sea turtles.

Kam found that nesting began on Laysan I. on May 25 and lasted until he left the island. Twelve nest sites were located during his stay. He tagged 24 animals and captured 6 that had previously been tagged. During Kam's first visit to Pearl and Hermes Reef he found 19 pits but none were confirmed as successful nests. Sixteen animals were tagged and 11 previously tagged animals were found at this atoll. One of the turtles had been seen before at French Frigate Shoals (582 nm away). During his second visit to the Atoll Kam located 36 turtles, 13 of which were previously tagged. Kam tagged 68 turtles and found 24 others that had been tagged at Lisianski Island. Two of the turtles had made trips between Lisianski and French Frigate Shoals (450 nm away). Nesting on Lisianski Island began on May 28 and lasted until August 14. The peak nesting period was in July when 13 nest sites were excavated. The total nests for the island was 23. An additional 24 false nests were found.

HWN-13 Secondary Productivity of Coral Reefs. (continuing):

Dr. Richard Grigg of the Hawaiian Institute of Marine Biology, University of Hawaii, continued studies of primary and secondary productivity at French Frigate Shoals during 1982. Grigg and two assistants collected data at the Shoals from January 19--February 13 and on October 2-4. The results of the field work will be reported following completion of Grigg's study in 1983.

HWN-15 Study of Inshore Molluscs.

Dr. Lucius Eldridge of the University of Guam visited Tern Island on January 16 and made collections of intertidal molluscs. He did not report any unusual findings.

HWN-46 Lobster Research (continuing):

Analysis of the life history, growth and production of two species of lobsters in the Northwestern Hawaiian Islands was continued by Dr. Craig MacDonald of the University of Hawaii. The primary purpose of the current studies at French Frigate Shoals (and at Kure Island) is to establish the generality of the results obtained for management of the spiny lobster fishery in the Northwestern Hawaiian Islands as a whole.

Dr. MacDonald and his assistants conducted field work at French Frigate Shoals during June of 1982. Part of his study included the collection of larval lobsters throughout the year. Tern Island personnel assisted MacDonald in tending the larval collectors that had been installed between Tern and Trig Islands.

MacDonald reported that he had tagged over 1000 lobsters during his 1981 and 1982 field seasons. He is utilizing the tagged lobsters to determine population densities and growth. Preliminary results indicate that lobsters were smaller and had a higher rate of natural mortality at French Frigate Shoals than at Kure. The higher rate of natural mortality at French Frigate Shoals was perceived to be the result of a higher predator density there (definitely monk seals and large jacks) than at Kure. MacDonald published an account of predation on lobsters by monk seals at the Shoals in the Journal of Mammalogy (1982,63:700).

Differences in the relationship between population density and catch rates were also found between the two atolls. This is of significance for management of a commercial fishery because the standard procedure of using catch rates as a measure of population size may then yield unrealistic estimates of abundance and fishery production.

MacDonald will be continuing his studies in 1983.

HWN-47 Fish Trophic Studies (continuing):

Dr. James Parrish of the Cooperative Fisheries Study Unit (USFWS) at the University of Hawaii continued monitoring experimental and control reefs at French Frigate Shoals to determine the effect of removing piscivorous fish from the reef. Members of his study group made frequent trips to the Shoals for this purpose. Dr. Parrish is also determining food webs among inshore reef fish at French Frigate Shoals and at Midway Island.

HWN-48 Bottomfish Studies (continuing):

National Marine Fisheries Service personnel continued to survey pelagic and bottomfish stocks in the waters surrounding the Refuge during cruises of the NOAA ship Townsend Cromwell.

HWN-19 Life Histories of Fish Studies (continuing):
Tony Sudekum of the Hawaiian Cooperative Fisheries Unit collected specimens of the jacks, Caranx ignobilis and C. melampygus at French Frigate Shoals in order to obtain information on the life history of these species. Other species that were collected during the fish trophic studies will also be utilized for life history studies.

HWN-20 Ciguatera Toxin Study (continuing):
The Department of Land and Natural Resources reported on the extensive presence of ciguatera in inshore fish in the refuge.

HWN-21 Ecosystem Modeling (continuing):
Dr. Jeffrey Polvina, National Marine Fisheries Service, is continuing to incorporate data from research in the Northwestern Hawaiian Islands into a computer model of energy flow through the island ecosystems.

HWN-22 Weather Data (continuing):
Weather data is continually being broadcast from a remote weather station on Tern Island as part of a satellite system, RAMOS, being used by NOAA to predict weather patterns. Logistical support was given to personnel working on maintenance of the system by Tern Island and Honolulu Staff.

HWN-23 Tide Data (continuing):
A continually recording tide gauge is maintained at Tern Island for the Hawaiian Institute of Geophysics, University of Hawaii. Data from this station are made available to scientists at UH who are studying tidal and sea level fluctuations throughout the Pacific Ocean.

HWN-25 Delphi Project (continuing):
Sue Miller, a Sea Grant researcher from the University of Hawaii, is conducting this study. It involves the use of the Delphi Technique for development of consensus on various management options concerning resources near or within the Refuge. The principal subject being considered is the development of fisheries within the Northwestern Hawaiian Islands area and the potential effects that various methods of developing these fisheries may have on the endangered species and other resources within the refuge. Shallenberger, Ludwig and Harrison participated in one or more sessions of questionnaire filling. In addition Shallenberger and Ludwig were interviewed for their views of the potential effects of various fisheries developments within the refuge.

HWN-26 Survey of Inshore Fishery Resources (continuing):
The Hawaiian Department of Lands and Natural Resources continued its surveys of the distribution and abundance of inshore reef fishes and invertebrates during a cruise on the Wicked Wahine.

Four of their staff biologists and two student assistants from the University of Hawaii conducted the following number of fish surveys: one at Nihoa I.; two at Necker I.; 30 at French Frigate Shoals; 13 at Maro Reef; six at Laysan I.; six at Lisianski I.; and 48 at Pearl and Hermes Reef. Exploratory fishing for shrimp, lobsters and kona crab were also conducted during the cruises. Five hundred fifty-six fish samples were taken for feeding and ciguatera research. An edible limpet, Opihi, was sampled at Nihoa Island as part of an assessment of their population density.

The State summarized the results of their 1981 surveys of the inshore fishery resources and found the following results. The blue damselfish, Chromis ovalis, and the rudderfish, Kyphosus bigibbus, were the most abundant fishes observed during the surveys. The white ulua (jack), Caranx ignobilis, had the highest biomass. As a part of the surveys, their biologists tagged 43 white ulua at Lisianski Island and Pearl and Hermes Reef. Five per cent of 412 individual fish (34 species) contained high levels of ciguatoxin. Of the ciguatoxic fishes, one third were threadfin fish, Polydactylus sexfilis, from French Frigate Shoals.

The State of Hawaii also contracted two vessels to conduct surveys of new deep water bottom fishing grounds in waters proximal to the refuge. Each vessel spent 18 fishing days in the islands and each landed a total catch in excess of 10,000 lbs. The species caught in order of abundance were two species of jacks, a grouper and two snappers. The State preliminarily interprets the catches to indicate that substantial stocks of these fish are available in the waters surrounding the refuge.

The State of Hawaii also contracted a vessel to assess the feasibility of a deep water long-line fishery in the vicinity of the refuge. This fishery would concentrate on bigeye and yellow fin tuna. An area north of Necker Island was sampled as part of this study. Preliminary results indicate that the fishery would not be economical because of competition from fish that were caught in waters closer to Honolulu.

HWN-27 Spectral Sensitivity of Seabirds (new study):

This new study was initiated at French Frigate Shoals in December by Jonathan Reed, a graduate student from the University of Wisconsin. He is being assisted by Janet Smith. His advisor is Dr. Jack Hailman. The study will involve testing the sensitivity of the eyes of adults and young of 11 seabird species to a variety of colors. Results of the study may lead to the development of filters for street and other bright lights used in areas where seabirds are present. High mortalities have occurred after seabirds were disoriented by lights. Bird specimens will be obtained and released on Tern and possibly Trig Islands.

HWN-28 Coralline Algae Growth Studies (continuing):

This study started as a part of the primary productivity studies that were conducted in 1981 but has now become independent from that Sea Grant supported study. University of Hawaii graduate student Catherine Agigian is marking coralline algae with dyes at French Frigate Shoals as a part of this study. She later analyzes the amount of new tissue that is laid down over a given time period to determine growth of the algae. Coralline algae is the principle component of reef growth in the tropics.

HWN-29 Mini-Sub Fish Investigations

The Hawaiian Undersea Research Laboratory (HURL) has proposed to conduct surveys of fishery resources in the vicinity of French Frigate Shoals during the summer of 1983. They would like to utilize the facilities at Tern Island to support the study. Much information about the facilities has been given to this group via phone and during several meetings. The group would also like to assess bottom fish resources at Necker Island while they are on their way to French Frigate Shoals.

E. ADMINISTRATION**3. Safety**

A loss in radio contact with the National Marine Fisheries camps on Laysan and Lisianski Islands in June resulted in a concerted effort to have fishing boats and Coast Guard/Navy planes and ships in the area attempt to establish contact. Contact was established after several days and much worry. The problem was found to be incorrect use of a battery charging system.

Ludwig attended Safety Committee meetings throughout the year.

No serious accidents happened on the refuge; however, a work boat was almost lost when its anchor rope broke during research activities at French Frigate Shoals. Andre located the boat several miles away from where it had been anchored. Next stop for the boat would probably have been the Phillipines if Andre had not located it.

4. Technical Assistance

The U.S. Navy was again advised that if they continue low-level flights over Tern Island during the height of the seabird nesting season their planes are apt to ingest birds large enough to stop their engines. They stated that their pilots would be instructed to stop flying so low.

[See Technical Assistance (Complex)]

F. HABITAT MANAGEMENT

1. General

A leaflet was distributed to boats participating in the albacore fishery north of the refuge informing fishermen that entry onto the islands in the refuge was prohibited and that we would be happy to assist should they need help .

Refuge staff continued to take still and cine photographs that are used for evaluation of habitat condition, production of documents, for public lectures and for information for visiting researchers. Underwater housings were obtained for the refuge still and movie cameras and will be used to document and assess the condition of underwater resources within the refuge.

6. Other Habitats

Land management practices at Tern Island have included maintaining the landing strip free of nesting birds and repairing damage to the island caused by heavy rain or wave erosion. The west end of the landing strip was landscaped in September to prevent sea birds from nesting there. Filling in erosion-caused holes has helped prevent endangered monk seals from becoming injured or trapped when they wander about the island.

12. Wilderness and Special Areas

All areas within the Hawaiian Islands NWR, with the exception of the dredged area around Tern Island and highly modified areas of Tern Island, were designated as a Research Natural Area in 1967. Most Tripartite studies that were ongoing during the period of this report fall within the realm of activities sanctioned by this designation. Most of these studies are also geared to determining the effects of a commercial activity (fishing) on the natural resources within the Refuge/Research Natural Area.

G. WILDLIFE

2. Endangered and/or Threatened Species

The islands within the Hawaiian Islands National Wildlife Refuge harbor four endangered land birds (all are endemic to single islands), the endangered Hawaiian monk seal and the threatened green sea turtles. The endangered land birds are the Laysan duck, Laysan finch, Nihoa millerbird and Nihoa finch.

Research conducted on Hawaiian monk seals, green sea turtles, the Nihoa miller bird and Nihoa finch was described in the preceding research sections. No research was conducted on the Laysan duck or the Laysan finch during 1982.

In addition to research, specific management practices directed toward the protection of the endangered or threatened species include strict control of all research and other activities within the refuge. The following are among the measures taken to protect endangered species on the refuge: (1) entry onto the refuge is prohibited to all but persons with special use permits, (2) all special use permits include provisions indicating the permittee must maintain minimum distances away from monk seals and avoid disturbing any other endangered species, (3) movement of all personnel on Tern Island is restricted to areas not frequented by seals and turtles, (4) and fishermen are given pamphlets indicating the boundaries of the refuge and regulations pertaining to entry.

In addition to these precautions, all activities conducted in the refuge that may have an impact on endangered or threatened species are submitted to Section 7 (Endangered Species Act) consultation. Descriptions of actions that may affect Hawaiian monk seals and turtles are submitted to the National Marine Fisheries Service for consultation. Restriction of human activities at Tern Island appears to have a high positive correlation with the increase in use of the beaches of this island by monk seals (see research, HWN-9)

Other endangered species activities included filming monk seal research activities by the Center for Environmental Education and a visit to Tern Island by Dr. Robert Hoffman of the Marine Mammal Commission to observe the seals and research activities. Endangered Species staff from the Portland Regional Office (Sandy Wilbur) and the Central Office (Ron Lambertson, John Spinks, and John Murphy) visited Hawaii for a programmatic review. As part of the review Lambertson visited Tern Island and had the opportunity to observe the monk seal aerial survey at French Frigate Shoals. He also reviewed the Tern Island operation, saw monk seals and turtles at close hand and was also able to view the terrestrial and underwater habitat of these species.



HWN-6 - Ron Lambertson and Hawaiian monk seal. RJS

Shallenberger attended a meeting of the Marine Mammal Commission and National Marine Fisheries Service held at the Southwest Fisheries Center on August 11, 1982. The purpose of the meeting was to review NMFS and FWS programs underway or planned to protect and encourage recovery of the Hawaiian monk seal. Dr. William Gilmartin (NMFS) and Shallenberger discussed ongoing and proposed research. Future research plans were prioritized and tentatively budgeted. Involvement of FWS in this review process was valuable in assuring that ongoing FWS research is continued, particularly at French Frigate Shoals.

The refuge received a report of a monk seal fatality on Lisianski Island that occurred during NMFS research activities there. The animal died during handling to place a radio tag and depth of dive recorder on the animal. The animal was believed to have died from overheating or stress associated with the handling. This is the first fatality associated with a project that to date has involved restraining over 70 animals. Tagging was stopped after the fatality to determine if procedures to avoid a similar occurrence could be developed. Additional tagging was then done in areas where animals could be kept calm and cool.

An adult male monk seal was observed at Anini beach on Kauai on July 24. Brady visited the site to determine the condition of the sea and to keep people away from it. He photographed scars

on the animal for comparison with animals cataloged at French Frigate Shoals. The animal left the beach and was later reported about 42 miles away. Additional sightings of monk seals in the high Hawaiian Islands have occurred on Oahu, Maui and Kahoolawe.

A draft publication entitled "Biology and Conservation of the Laysan Duck" was received for review. This draft by D.W. Moulton and M.W. Weller is for publication in the Minnesota Agriculture Experiment Station Series.

A juvenile short-tailed albatross was observed on Lisianski Island by NMFS personnel in November. The bird remained at the island for most of that month. This species has occasionally been observed in the refuge and consistently been observed on Midway Island. The only known breeding colony of these species is in the Izu Islands south of Japan.

3. Waterfowl

The general lack of suitable habitat for waterfowl and the location away from major waterfowl migratory routes accounts for the rarity of these species within this refuge. The only resident waterfowl within the refuge is an endemic and endangered species, the Laysan duck that inhabits a hypersaline pond on Laysan Island. A previous study of this species was noted in the preceding section.

Four American wigeons were observed at French Frigate Shoals in December.

5. Shorebirds, Gulls, Terns and Allied Species.

Migratory seabirds were emphasized in the management and research programs of the Hawaiian Islands NWR. During 1982 additional information was collected and analyzed on the breeding biology and ecology of the 19 species of seabirds that utilize the islands for nesting. Studies conducted in 1982 included determination of population levels, phenology, breeding success, chick growth rates, incubation shift lengths and food habits. Additional knowledge of the baseline status and variability of these parameters should prove to be useful in monitoring the status of the resource in the future. (See Research and Investigations, HWN-4 - 5.)



HWN-7 - Fairy terns at French Frigate Shoals. GML

Greater Frigate birds were recorded nesting on Tern Island for the first time this year. A black-footed X Laysan albatross hybrid incubated an egg at Tern Island.

Non-breeding birds of this category at French Frigate Shoals include cattle egrets, a glaucous winged gull, a sharp-tailed sandpiper, a ruff, ruddy turnstones, golden plovers, wandering tattlers and bristle-thighed curlews.

Seabird population and distribution data that were collected during the past few years are summarized in the following table:

Estimate of breeding pairs of seabirds, MHI.

	<u>Nihoa</u>	<u>Necker</u>	<u>French Frigate Shoals</u>	<u>Gardner Pinnacles</u>	<u>Laysan</u>	<u>Lisianski</u>	<u>Pearl & Hermes Reef</u>	<u>Midway</u>	<u>Kure</u>	<u>Total</u>
Black-footed albatross	40-60	200-250	4,000-4,500	0	14,-21,000	2,800-3,800	8,000-11,000	6,500-7,500	700-1,300	49,410
Laysan albatross	1-5	450-550	900-1,000	10-15	105,-132,000	23,-30,000	9,000-12,000	150,-200,000	3,000-4,000	379,570
Bonin petrel	0	0	30-50	0	50,-75,000	150,-250,000	400-600	2,500-5,000	400-600	331,250
Bulwer's petrel	75,-100,000	250-500	200-500	10-15	1,000-2,000	50-100	<10	0	0	103,125
Wedge-tailed shearwater	30,-40,000	1,500-2,500	1,500-1,750	25-50	125,-175,000	10,-30,000	5,000-10,000	500-1,000	900-1,100	261,400
Christmas shearwater	200-250	0	15-20	0	1,500-2,000	400-600	<10	25-50	20-30	2,960
Sooty storm-petrel	2,000-3,000	+	+	0	500-2,500	?	1,000-2,000	0	?	7,500
Red-tailed tropicbird	250-300	100-150	550-600	20-25	1,500-2,500	900-1,300	40-60	4,000-5,000	1,000-1,300	11,275
Masked booby	250-300	250-300	500-600	125-150	400-425	300-350	140-160	5-10	65-75	2,370
Brown booby	150-200	20-25	40-60	5-10	34	15-25	50-60	0	50-60	474
Red-footed booby	1,500-2,000	650-750	550-600	0	700-800	350-450	40-60	450-500	400-450	5,610
Great frigatebird	3,500-4,500	700-900	350-375	0	2,000-2,500	750-850	300-400	60-75	200-250	9,850
Sooty tern	10,-25,000	12,500-25,000	60,-78,000	250-500	375,-500,000	400,-600,000	35,-45,000	30,-45,000	8,000-12,000	1,330,500
Gray-backed tern	9,000-12,000	3,500-4,500	750-1,000	1,500-2,500	5,000-10,000	15,-20,000	650-750	100-200	30-50	51,000
Blue-gray noddy	2,000-2,500	1,000-1,500	+	+	0	0	0	0	0	4,000
Brown noddy	25,-35,000	10,-15,000	5,000-7,500	1,000-1,500	10,-15,000	7,500-15,000	1,700-2,000	500-1,000	700-800	92,800
Black noddy	1,000-5,000	300-500	750-850	200-300	1,500-2,500	500-1,000	75-125	2,000-6,000	0	16,275
White tern	1,000-5,000	100-300	500-750	150-250	1,000-2,000	50-100	10-20	5,000-7,500	5-10	15,930
Total	235,115	52,725	98,155	5,315	945,259	953,575	84,255	278,835	22,025	2,675,259

+ - Indicates breeding occurs but there was not sufficient data to make a quantitative estimate.

? - Indicates breeding is suspected but no nests were found.

The results of work being conducted as part of the Tripartite studies is summarized in the research section (HWN-1, 2, 3, 4 and 5). Research on Golden Plovers is described there also (HWN-6).

6. Raptors

A short-eared owl was seen at Tern Island in December.

7. Other Migratory Birds

A mockingbird was observed at Tern Island between August and October.

9. Marine Mammals.

Pods of spinner and other porpoises and humpback whales were observed at French Frigate Shoals and at other islands in the refuge.

10. Other Resident Wildlife.

Work done with other resident wildlife included research on lobsters, coralline algae, corals and molluscs (see research sections HWN-13, 15, 16, 26, 29).

11. Fisheries Resources.

Results of fishery surveys and other fishery research conducted in the refuge are reported in the research section (see HWN-16, 17, 18, 19, 20, 26 and 28).

Ferguson and Ludwig distributed information to the fleet of albacore fishermen in Kewalo Basin about the Hawaiian Islands NWR. The information emphasized the prohibition of trespass on the refuge and our desire to assist them, if necessary, through our facilities at Tern Island.

Shallenberger photographed a concentration of gray reef sharks in the inshore area of Trig Island, FFS. Concentrations of about 50 of these sharks show up in that area in May and June each year and are believed to be pupping and breeding there.

A new fish species, Saurida flamma, has been described for the Hawaiian Islands with the help of specimens collected from French Frigate Shoals (Waples, R. 1981. A biochemical and morphological review of the lizardfish genus Saurida in Hawaii, with the description of a new species. Pac. Sci. 35(3):217-235).

Fishing boats in the refuge area were assisted on several occasions. Locations, weather conditions, and catches of the State-chartered fishing boats Feresa and Wicked Wahine were relayed to

Honolulu via Tern Island. Equipment was loaned to the Mokehana to assist with the repair of a drive shaft that broke at FFS. A proposal for the placement of a mooring bouy for the use by fishing boats during inclement weather at FFS was evaluated and a special use permit was issued for its placement .

14. Scientific Collections

Caranged fishes, lobster larvae, opihi, corals and coralline algae were collected within the refuge as parts of the research activities reported above. In addition, golden plovers were salvaged as part of the golden plover study (HWN-6).

15. Animal Control

Shallenberger and Fefer met in December with James Keith of the Denver Wildlife Research Center, ADC Research, to discuss research needs on refuge lands with which the Denver lab may be able to asist. Dr. Russell Reidinger, Jr. assisted in evaluation of management methods to prevent and detect the introduction and eradicate exotic species on remote islands (See D.2. Management Plan).

16. Marking and Banding

Marking and banding activities included turtles, fish, monk seals and birds. The first three groups are reported on in the research sections. Results of banding activities in the HINWR are summarized in the following table.

Species name	Number banded in 1982
Laysan albatross	408
Black-footed albatross	148
Bonin petrel	1
Red-footed booby	260
Brown noddy	96
Black noddy	752
White tern	81

17. Disease Prevention and Control

A large die-off of Laysan albatross fledglings on Midway Atoll prompted a request to the National Wildlife Health Laboratory for assistance. Dr. R. Stroud found that the fledglings had extremely high lead concentrations in their blood and lead inclusion bodies in other tissues. In addition the birds had Salmonella san-diago. A sampling scheme was developed in consultation with Dr. Stroud to determine the extent of the

salmonella and lead in adult and young albatross during 1983. It is possible that the lead problem is related to the extent of chipped paint on Midway that has resulted from deterioration or demolition of buildings.

H. PUBLIC USE

1. General



HWN-8 - Frans Lanting and black-footed albatross
on Trig Island. GML

Public use of the Hawaiian Islands NWR is highly restricted because of the presence of endangered species and the high potential for introduction of exotic organisms to these fragile environments. In order to maintain public support for our programs we attempt to keep the public informed by encouraging and assisting newsmen and representatives of local, national and international media to obtain information and photographs. These are done either at the Honolulu headquarters or by arranging for the representatives to visit the refuge (usually Tern Island). The Center for Environmental Education of Washington, D.C. filmed research activities on monk seals and other species on several islands in the refuge. A local television station ran several short news segments concerning the

operation and research that is conducted on Tern Island. A locally produced fishing television program also filmed our programs at FFS to publicize the refuge programs. Frans Lanting, an internationally known photographer obtained material at FFS and used it for an article in GEO Magazine. Shallenberger published an article on monk seals and many photographs in Natural History Magazine. Mark Wexler, an editor for National Wildlife visited Tern Island and an article about the refuge is scheduled for publication in early 1983.

Other activities that publicized the refuge included an interview of Naughton by an educational TV station, and presentation of scientific papers by Naughton, Harrison, Fefer and Shallenberger at the Pacific Seabird Conference. Harrison also presented a paper at the International Council of Bird Preservation meeting in London. Shallenberger presented talks at several civic and educational groups.

24. Volunteers Program

Ruth Ittner, Susan Schulmeister and Gail Fairaizl provided much assistance to staff and visiting researchers at Tern Island in addition to collecting considerable data on monk seals. Charles Deutsch spent several months at FFS collecting data on monk seals. Beth Flint of UCLA collected data on sooty terns and other seabirds on several refuge islands. Joanne Young assisted in the collection of seabird data on Tern Island. Sheila Conant collected data to estimate the population of Bulwer's petrel on Necker Island. Peter Pyle collected data on migratory birds at Midway Atoll.

I. EQUIPMENT AND FACILITIES

1. New Construction

Plans were developed for the construction of a new dock and two boat houses at Tern Island. Construction will be completed during 1983. The runway on the island was extended to help alleviate the problem of seabirds nesting at the approach or takeoff points on the runway.

The electrical generators at Tern Island were altered to allow more efficient cooling and to prevent breakdowns of the exhaust system.

2. Rehabilitation

Rehabilitation is a constant activity at Tern Island because of the constant corrosive effects of salt spray in a tropical environment. Corrosion of the metal supports for water and other

pipes beneath the buildings required that they be replaced during the year. Major repainting of building exteriors and interiors was accomplished during the year. The truck electrical system and parts of the brake system was replaced. Water tanks were repaired and cleaned. The diesel motors for both generators were overhauled. One of the generators was converted from 15kw to 17.5kw during its overhaul.

Wind and waves at Tern Island frequently erode the runway and other parts of the island. The runway requires frequent scraping and eroded holes behind the island's bulkheads are filled often.

Frequent use of the boats and motors by staff and visitors requires them to be repaired on a regular basis.

3. Maintenance

Maintenance activities include regular servicing of the generators that provide electricity for Tern Island, tuneups of outboard motors, a truck, a back hoe and a variety of pumps and motors that are integral parts of the refrigeration, water supply, sewage and other systems on the Island. In addition, rust removal and painting is a constant, ongoing activity. The roofs of several buildings were repaired to prevent water leaks. A leak near the exhaust system on the generators affected one of the generator governors and resulted in much effort to repair it. Runway lighting was dug up for repairs of a short in the system.

4. Equipment Utilization and Replacement

A 23-foot boat was obtained from the U.S. Coast Guard on excess property. It is being prepared for transport to Tern Island.

A major refueling operation at Tern Island was contracted and carried out by a commercial fishing boat in November

5. Communications Systems

A radio base was established in the Honolulu headquarters. Naughton coordinated with GSA for the installation of the antenna on the roof of the Federal Building. Ferguson was instrumental in much of the coordination for installation and repair of the radio system. Work included the installation of high frequency crystals and frequent tuning of the system. The antenna system on Tern Island was enlarged to carry additional frequencies. The entire antenna system at Tern Island, including that of the NDB, was replaced with new wire during the year. National Weather Service and FBI personnel provided much assistance in the detection of problems in the radio systems in Honolulu and at Tern Island.

Ludwig coordinated a meeting with the U.S. Coast Guard and NMFS personnel to obtain agreement on what radio equipment should be utilized at field camps to provide adequate safety standards.

6. Energy Conservation

A proposal for energy conservation projects involving wind power generation at Tern Island was prepared and sent to the Regional Office.

7. Other

Considerable time was spent in the coordination of flights and boat trips to supply Tern Island with food and supplies. The fishing boats Kaimi, Feresa, Archer and Easy Rider provided free transportation of materials to Tern Island. Air logistical support for the island included one or more flights per month to the island.



HWN-9 - Unloading supply boat at Tern Island. RJS

JOHNSTON ISLAND NWR

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	NTR
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	2
3. Public Participation	NTR
4. Compliance with Environmental Mandates	2
5. Research and Investigations	4
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	6
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	6
2. Wetlands	NTR
3. Forests	NTR
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	6
7. Grazing	NTR
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	NTR
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1. Wildlife Diversity	NTR
2. Endangered and/or Threatened Species	7
3. Waterfowl	7
4. Marsh and Waterbirds	NTR
5. Shorebirds, Gulls, Terns and Allied Species	7
6. Raptors	9
7. Other Migratory Birds	NTR
8. Game Mammals	NTR
9. Marine Mammals	NTR
10. Other Resident Wildlife	NTR
11. Fisheries Resources	9
12. Wildlife Propagation and Stocking	NTR
13. Surplus Animal Disposal	NTR
14. Scientific Collections	NTR
15. Animal Control	NTR
16. Marking and Banding	10
17. Disease Prevention and Control	NTR

H. PUBLIC USE

1. General	10
2. Outdoor Classrooms - Students	NTR
3. Outdoor Classrooms - Teachers	NTR
4. Interpretive Foot Trails	NTR
5. Interpretive Tour Routes	NTR
6. Interpretive Exhibits/Demonstrations	NTR
7. Other Interpretive Programs	NTR
8. Hunting	NTR
9. Fishing	NTR
10. Trapping	NTR
11. Wildlife Observation	NTR
12. Other Wildlife Oriented Recreation	NTR
13. Camping	NTR
14. Picnicking	NTR
15. Off-Road Vehicling	NTR
16. Other Non-Wildlife Oriented Recreation	NTR
17. Law Enforcement	NTR
18. Youth Programs	NTR
19. Cooperating Associations	NTR
20. Concessions	NTR
21. Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

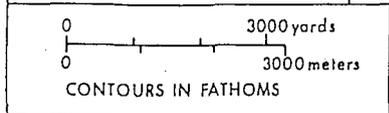
1. New Construction	11
2. Rehabilitation	NTR
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	NTR
5. Communications Systems	NTR
6. Energy Conservation	NTR
7. Other	NTR

J. OTHER ITEMS

1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR



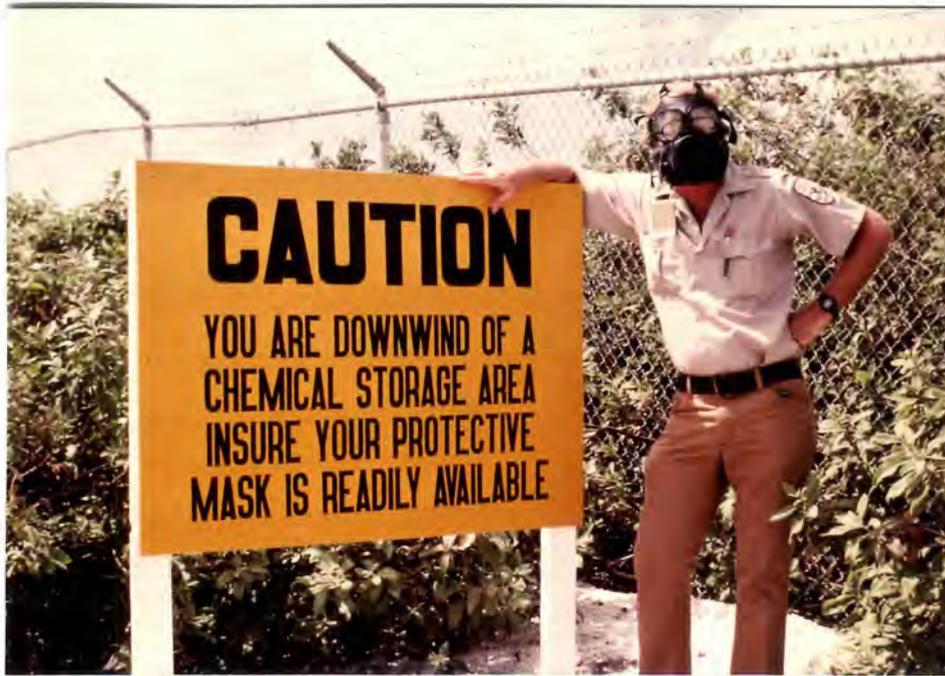
JOHNSTON ATOLL NATIONAL WILDLIFE REFUGE
North Pacific Ocean

UNITED STATES
DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

A. HIGHLIGHTS

Plans for a plant to dispose of potentially leaking nerve and mustard gas ordnance at Johnston Atoll (JACADS Project) were made public. Considerable coordination with the military commands, the USA Corp of Engineers, National Marine Fisheries Service, EPA and within other offices of the USFWS has taken place.

Two field trips to Johnston Atoll occurred in 1982 to survey terrestrial and marine environments. A sooty tern colony that usually nests on Sand Island moved to East Island.



JHN-1 - Ludwig at warning signs for storage areas. RJS

B. CLIMATIC CONDITIONS

Johnston Atoll NWR has a very mild climate that is tempered by the influence of the tropical seas that constantly flow past. The mean annual temperature is 78.9 degrees F. Daily range in temperature is about 8 degrees F. The atoll is generally quite dry with an annual rainfall averaging at 26.2 inches. The trade winds average about 15 mph and blow about 98% of the time. It is this nearly constant ENE wind along with the isolation of the

atoll that makes Johnston Island suitable for the storage of poison gas munitions. Although Johnston Atoll has a remote recording weather station the statistics for 1982 have not been summarized yet.

D. PLANNING

2. Management Plan

Johnston Atoll is administered jointly with the Defense Nuclear Command who maintain the island in a state that would allow reestablishment of atmospheric nuclear testing, should the need arise. In addition, the island has been the storage area for a variety of gas munitions since the early 70's. Agent Orange was stored on the island before it was incinerated at sea north of Johnston Atoll. The joint jurisdiction is outlined in a Memorandum of Understanding that places the responsibility for the military operations under the jurisdiction of the Defense Nuclear Command and the responsibility for the fish and wildlife resources under the jurisdiction of the Fish and Wildlife Service.

Close communication between the Defense Nuclear Agency and the Refuge staff continued during 1982. Ludwig and Shallenberger met with the Commanding Officer, LTCOL Robert Lambert, and his staff and with the new CO, LTCOL Rober Pennington, at the time the command changed. A visit with the incoming Commanding Officer, the outgoing Commanding Officer and representatives of Holmes and Narver, Inc. (the civilian support group) has now become an annual event during June when the change in command occurs.

4. Compliance with Environmental Mandates

The command at Johnston Atoll was advised of the need for permits through the Corp. of Engineers for activities such as dredging or filling in the waters surrounding the islands and for activities that include the disposal of materials into these waters. They have subsequently applied for and received a permit for the disposal of derelict car bodies in waters near Johnston Island. Noncompliance with the terms of COE permit resulted in the permit being revoked. The car bodies were not being dumped at the place indicated in the permit.

The failure to have the COE permit renewed for dumping car bodies and the expected need for additional dumping during the JACADS project prompted the Johnston Atoll command to evaluate the need for a deep water disposal site. Coordination with this office, the COE Environmental Department and NMFS personnel led to the recommendation of two alternative sites for dumping in deep water. Base Engineer Hunecek has been assisted in obtaining information needed for the EPA permit application.

Environmental assessments of the potential effects of building a laboratory and of improvements to the runway on Johnston Island were evaluated and comments were sent to the COE.

The Defense Nuclear Agency notified us in February that a project to demilitarize (incinerate) chemical munitions being stored on the atoll was in the planning process and that a planning meeting was to be held on Johnston Atoll. Ludwig and Shallenberger attended the planning meeting along with many representatives from the various agencies that will be involved in the project. These include the Defence Nuclear Agency (DNA), U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), U.S. Army Corp of Engineers (COE), Holmes and Narver Inc. (base civilian support contractor) and the U.S. Coast Guard (USCG).

A draft environmental assessment for the gas demilitarization plant was also evaluated and comments were sent to Mr. Paul Bergeron of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). This evaluation followed a recommendation by the Washington D.C. USFWS office to USATHAMA to develop the assessment. Ludwig and Shallenberger provided assistance to that office during the preparation of the recommendation. A site evaluation of this project was conducted in July followed by a meeting of several agencies that will be involved in the project. Potential effects of the project were discussed by representatives from USATHAMA, EPA, NMFS, COE and FWS. Assistance has subsequently been given to the COE for the development of an EIS.



JHN-2 - Brown boobies on Sand Island.

GML

5. Research and Investigations.

Ludwig and Shallenberger surveyed and tagged birds and also measured egg volumes during a visit to the Atoll in February. Ludwig also conducted surveys of selected underwater sites within the lagoon at that time. Fefer accompanied Ludwig to the atoll in July along with Dr. James Maragos, head of the Environmental Section of the COE, Pacific Division, and Gene Nitta, Section 7 (Endangered Species Act) consultant for the Honolulu office of the National Marine Fisheries Service. The July survey involved gathering data on marine and terrestrial sites in order that an evaluation of the potential effects of the JACADS (demilitarization of chemical munitions) project on these environments. Fefer and Ludwig assessed bird populations during the July visit. Maragos and Ludwig assessed coral and fish populations respectively at 17 sites representing a wide variety of habitats within the lagoon. Nitta and Ludwig observed and described green sea turtle activities.

The focus of the July environmental evaluation was to determine present condition of the coral reef community in the vicinity of the sewage outfall and in areas that have been affected by dredging and associated siltation. A primary concern about the JACADS project is the possible detrimental effects that an increase in sewage associated with an increase in island populations may have on the coral reefs. Reef areas that are little affected by sewage and silt were also surveyed for comparative purposes.

The survey indicated that the area of the sewage outfall had low visibility (and nosy gray reef sharks), and low coral and fish diversity. A short distance from the outfall there was a luxuriant growth of marine algae, higher fish diversity but low coral coverage. The area of luxuriant algae growth was also the area where green sea turtles were most frequently observed. Up to 30 turtles at a time have been seen grazing in that area within a 200 meter radius of an observer. Except in areas of dredging and associated siltation, the numbers and diversity of corals and fish had a general positive correlation with distance away from the sewage outfall. Differences in position within the atoll in relation to the reef edge, topographical heterogeneity, currents and waves also appeared to affect the coral reef community.

The general conclusions from the surveys were that increased sewage resulting from an increased human population would probably not have a major effect on the reef communities. It would be expected that the area of low diversity in the immediate area of the outfall would be expanded slightly, as would the area of lush algae growth. The expansion of these two habitats would decrease the area of natural communities but it may also increase

the area where green sea turtles forage on algae. Increased human population may also adversely affect the bird communities on the islands due to increased disturbance even though access to areas where the birds breed is controlled. Higher levels of recreational fishing, boating and SCUBA diving may also adversely affect the lagoon environment unless regulations against excessive fishing and coral take are in effect and enforced.



JHN-3 - Surveying coral reefs. GML

A revision of the Memorandum of Agreement between the Department of Defense and the Department of Interior will take the findings of these surveys and and EIS being developed by the COE into consideration.

The Defense Nuclear Agency also continued to conduct surveys of the amount of residual radiation present on the islands from the explosion of two nuclear warhead carrying rockets. These surveys include continuous monitoring of wind-carried dust at specific locations on Johnston Island and the mapping of radiation levels on all of the islands. They also continued monitoring of effects of the leakage of Agent Orange that occurred while it was stored on Johnston Island during the mid-1970's. Details of these investigations are not given to the Refuge. Three areas of Johnston Island are placed off-limits to personnel because of the presumed presence of unacceptable levels of radioactive plutonium. The area of Johnston Island where the Agent Orange

was stored is also off-limits to all personnel, presumably because of dioxin residuals. LTCOL Charles Thalke, Brooks Air Force Base, Brooks, Texas, is coordinating the investigation of the dioxin residual.

E. ADMINISTRATION

4. Technical Assistance.

The command at Johnston Island was advised of the need to obtain permits from the U.S. Army Corps of Engineers for various projects that may affect the marine environment. The command was also advised of areas at the atoll that are particularly sensitive from a fish and wildlife point of view in order to help them in their planning of construction projects.

F. HABITAT MANAGEMENT

1. General

Changes in the terrestrial habitats on each of the islands are being monitored during each field trip. Sand and East Island habitats were photographed. The majority of seabird nesting at this atoll takes place on these two islands.

Regulations governing activities of the residents of the atoll prohibit entrance onto East and North Islands during the principal nesting periods. The nesting areas on Sand Island are off limits at all times. The military command had signs installed on East and North Islands that inform personnel of the regulations.

The commanding officer of the Defense Nuclear Agency was requested to enforce the prohibition against the introduction of cats and dogs onto the atoll. Several residents mentioned that cats were brought onto Johnston Island by new residents. Several feral cats are known to be loose on Johnston Island at the present time.

6. Other Habitats

Twenty areas of the coral reef that make up the majority of the area of this refuge were surveyed for their suitability to be included in an area that would be reserved for non-consumptive recreational uses. The coral reef at Johnston Atoll is now utilized by divers and fishermen for subsistence fishing and for the taking of limited amounts of coral. No commercial take of fish or corals is allowed at the Atoll. The non-consumptive area will hopefully contain areas of the reef that are representative of the variety of habitats found at the atoll. This will also

include a portion of the formerly dredged area in order to provide a site in which the recovery from dredging can be monitored.

These surveys indicated that there are substantial areas of coral growth and high populations of coral reef fish present within the lagoon. Regrowth of coral in the areas of dredging has been found to be variable but in some places the sides of the dredged cuts have now become completely covered with a variety of coral species. Some plate Acroporan corals have grown to four meters or more in diameter since the 1964 dredging occurred. Maragos found annual growth indicators suggesting that Acroporan coral recovery began immediately after the dredging in areas that were subsequently undisturbed. Areas that were subjected to high siltation showed little recovery.

G. WILDLIFE

2. Endangered and/or Threatened Species.

The green sea turtle is the only threatened species at Johnston Atoll. However, Hawaiian monk seals have previously resided at the atoll. The last seal to visit the atoll is believed to have died in 1977 as a result of wounds it received from an outboard motor propeller. Residents often relate sightings of whales and porpoises on the outside of the atoll to refuge personnel.

3. Waterfowl

Although virtually no wetland habitat is present at Johnston Atoll, it is still visited occasionally by waterfowl. Several mallards were observed on Johnston Island during February.

5. Shorebirds, Gulls, Terns and Allied Species.

The four islands in Johnston Atoll provide breeding habitat for at least 11 species of seabirds. Two surveys of the breeding and resident populations of seabirds were conducted on 1982. One was in February, at the beginning of the breeding season for most of the birds, and the other was in July when many of the birds have fledged.



JHN-4 - White tern.

GML

This table indicates estimated population levels for birds that were observed on February and July. Maps of the locations of the nesting concentrations were also prepared during the surveys.

Adult Seabird Population Estimates at Johnston Atoll

	February	July
Wedge-tailed shearwater	0	700-1000
Red-tailed tropicbird	70	136
Brown booby	85	133
Red-footed booby	322	110
Greater frigatebird	100	175
Sooty tern	dense flock	350,000-500,000
Brown noddy	1	1650-2950
Black noddy	1	84
White tern	2	40
Gray-backed tern	0	75
Least tern		1

The population levels of red-tailed tropicbirds, frigates, white terns, and brown boobies were slightly lower and levels of gray-backed terns were slightly higher this year as compared to the levels found in 1981; however a direct comparison of the counts is not valid because of differences in the timing of the counts.

This was the first year on record that sooty terns did not nest on Sand Island. The population of sooty terns nesting on East appeared to have increased by about the number of terns that nested on Sand Island during previous years.

Although Johnston Atoll is a very tiny spot in the middle of the Pacific Ocean, it is located by a small variety of shorebirds that migrate from arctic and subarctic areas. Because these birds are constantly fed by personnel on Johnston Island, it is probable that the population is kept at a higher level than it would be without the feeding. Some of the shorebirds remain at the atoll throughout the year.

Shorebird Population Estimates at Johnston Atoll

	February	July
American golden plover	200-250	0
Ruddy turnstone	170	50
Sanderlings	10	0
Wandering tattler	22	0

6. Raptors

Members of the fire department on the island reported seeing several short-eared owls on Johnston Island. A roosting site of one of the owls was located during the February survey, and pellets containing rodent bones were collected.

11. Fisheries Resources

The Memorandum of Understanding with the Defense Nuclear Agency allows for the taking of fish and limited amounts of coral for recreational purposes. Although no accurate estimates of the amount of fish taken by island personnel are available, the amount may be substantial since fishing is a favorite pastime for many people on the atoll. Types of fishing include cast netting from the shores of Sand, East and North Islands; spearfishing; and hook and line fishing from boats and shore within the lagoon. In addition to fishing in the lagoon, Johnston Island personnel also fish for tuna and other pelagic species on the outside of the lagoon (outside Refuge boundaries). Much of the fish caught outside the lagoon is shipped to friends and relatives of the fishermen in the Hawaiian Islands.

Refuge personnel have advised the command that eating fish from within the lagoon may be risky because of the potential presence of the fish poison ciguatera. Fish testing during the mid-60's indicated a fairly high percentage of species contained the poison. A high rate of occurrence at that time may have been related to algae blooms that occurred after the major dredging in the lagoon. Ciguatera has recently been linked to the presence of a dinoflagellate that may bloom after reefs are damaged.

Several species of corals are often taken by island personnel for souvenirs. Divers were observed removing small amounts of acroporan plates and specimens of the small red sidastrean corals that grow beneath rubble at the inner side of the raised edge of the atoll.

Surveys of the coral reef fishes in several areas of the reef indicated that substantial populations of a diverse array of species are present, although their behavior suggests that they are subjected to spearfishing. Over 50 species could be observed in some areas of the reef during the course of an hour scuba dive. Areas of the reef may be set aside for non-consumptive recreational uses.

16. Marking and Banding.

Seventeen brown boobies were banded by Ludwig and Shallenberger during the February field survey.

H. PUBLIC USE

1. General

Approximately 145 military and 200 civilian contractors were stationed at Johnston Atoll during 1982. Many are particularly interested in fishing and recreational diving among the coral reefs. Sailing and water skiing are also popular activities within the dredged areas of the lagoon. Shell collecting, underwater and terrestrial photography and bird, fish and turtle watching are favorite pastimes for many people there. Observing sharks at a place where garbage is discarded is a highlight for many resident and visiting personnel. A golf course is present on Johnston Island. For purposes of reporting, these activities by station personnel are not considered "public" use as no unauthorized visitors are allowed at the station.



JHN-5 - Diver inspecting sea urchin.

GML

I. EQUIPMENT AND FACILITIES

1. New Construction

Holmes and Narver Inc. personnel installed signs on North and East Islands informing personnel that the islands are off limits during the seabird nesting periods.

BAKER/HOWLAND/JARVIS NWR'S

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	
	1
B. <u>CLIMATIC CONDITIONS</u>	
	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	NTR
D. <u>PLANNING</u>	
1. Master Plan	2
2. Management Plan	NTR
3. Public Participation	NTR
4. Compliance with Environmental Mandates	2
5. Research and Investigations	2
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	Complex
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	5
2. Wetlands	NTR
3. Forests	NTR
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	NTR
7. Grazing	NTR
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	5
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1.	Wildlife Diversity	NTR
2.	Endangered and/or Threatened Species	NTR
3.	Waterfowl	NTR
4.	Marsh and Waterbirds	NTR
5.	Shorebirds, Gulls, Terns and Allied Species	NTR
6.	Raptors	NTR
7.	Other Migratory Birds	5
8.	Game Mammals	NTR
9.	Marine Mammals	NTR
10.	Other Resident Wildlife	NTR
11.	Fisheries Resources	NTR
12.	Wildlife Propagation and Stocking	NTR
13.	Surplus Animal Disposal	NTR
14.	Scientific Collections	NTR
15.	Animal Control	NTR
16.	Marking and Banding	NTR
17.	Disease Prevention and Control	NTR

H. PUBLIC USE

1.	General	NTR
2.	Outdoor Classrooms - Students	NTR
3.	Outdoor Classrooms - Teachers	NTR
4.	Interpretive Foot Trails	NTR
5.	Interpretive Tour Routes	NTR
6.	Interpretive Exhibits/Demonstrations	NTR
7.	Other Interpretive Programs	NTR
8.	Hunting	NTR
9.	Fishing	NTR
10.	Trapping	NTR
11.	Wildlife Observation	NTR
12.	Other Wildlife Oriented Recreation	NTR
13.	Camping	NTR
14.	Picnicking	NTR
15.	Off-Road Vehicling	NTR
16.	Other Non-Wildlife Oriented Recreation	NTR
17.	Law Enforcement	NTR
18.	Youth Programs	NTR
19.	Cooperating Associations	NTR
20.	Concessions	NTR
21.	Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

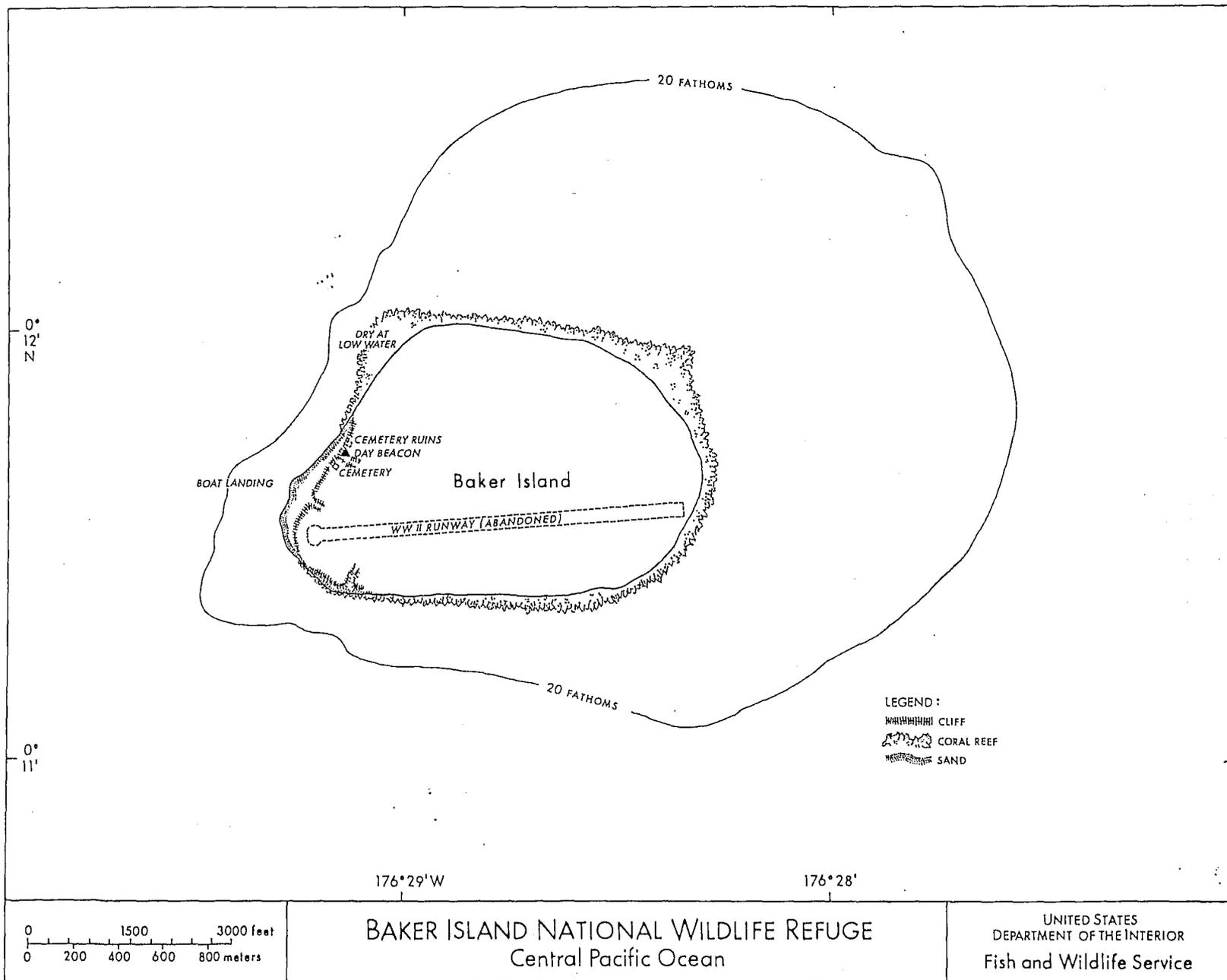
- 1. New Construction NTR
- 2. Rehabilitation NTR
- 3. Major Maintenance NTR
- 4. Equipment Utilization and Replacement NTR
- 5. Communications Systems NTR
- 6. Energy Conservation NTR
- 7. Other NTR

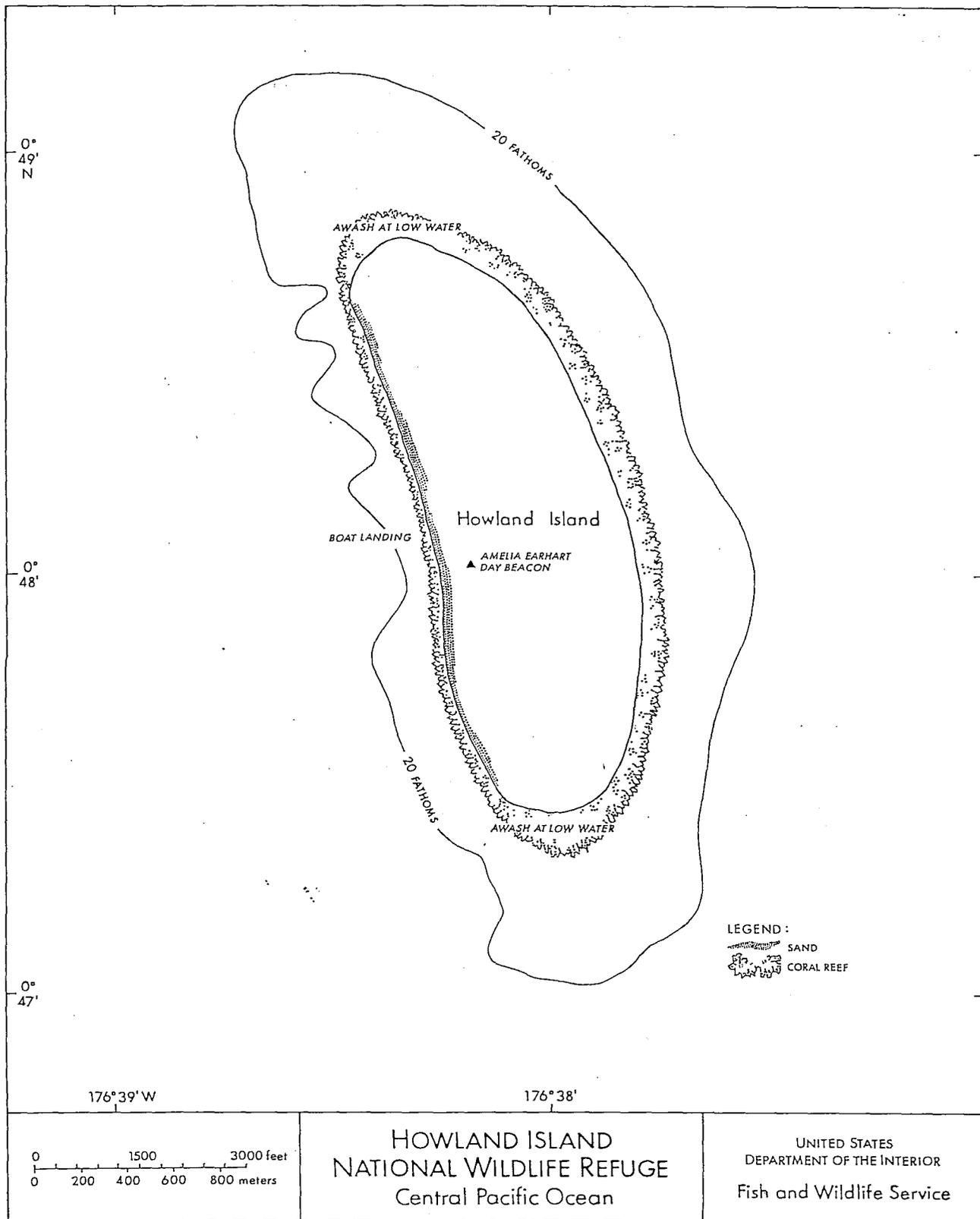
J. OTHER ITEMS

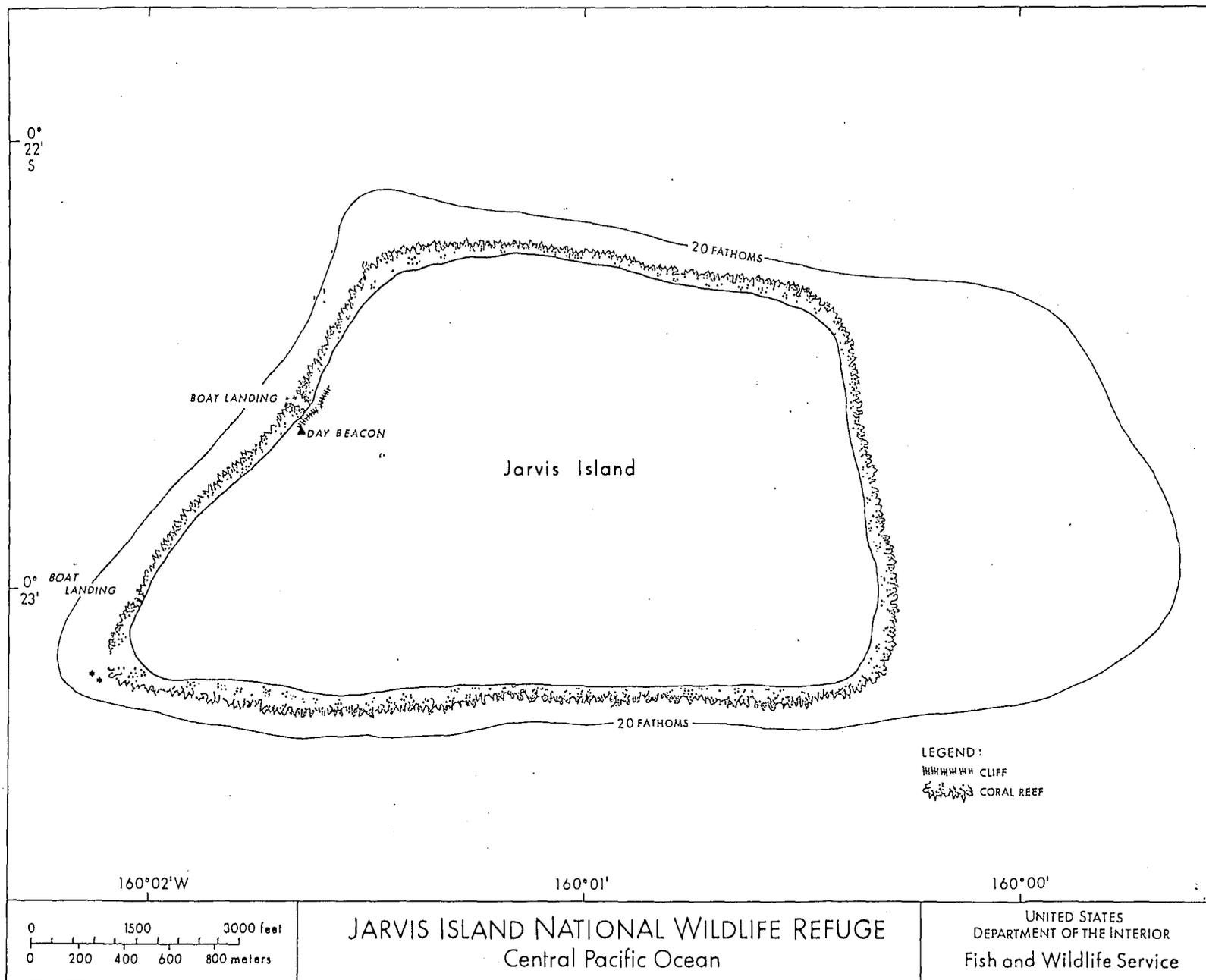
- 1. Cooperative Programs Complex
- 2. Items of Interest 7
- 3. Credits Complex

K. FEEDBACK

NTR







A. HIGHLIGHTS

Two field trips to Jarvis Island took place in 1982. Preliminary results from the trips indicate that feral cats may have been eliminated from the island during the trips.



BHG-1 - Jarvis Island entrance sign and field camp. MR

B. CLIMATIC CONDITIONS

Climatic conditions at Howland, Baker and Jarvis Islands for 1982 are unavailable at the present time. The closest weather station to Baker and Howland Islands was at Canton Island, but that station was closed when the United States relinquished claims to the atoll in 1980 and abandoned the military installation that was there.

Long term weather data are being collected at Jarvis Island by Dr. Martin Vitousek of the University of Hawaii, but these data are not yet available for 1982. Precipitation recorded at Christmas Island (about 200 miles from Jarvis I.) indicated that 1982 was very wet with 72.9 inches of rain. Average precipitation during the previous 10 years was 35.7 inches/year.

D. PLANNING

1. Master Plan

Initial steps in the development of a Master Plan for this refuge are being taken. Information on the history of the island and its acquisition as a refuge was gathered and maps were drafted.

4. Compliance with Environmental Mandates

Shallenberger met with Central Office staff to review cat control options for Jarvis Island. The use of 1080 was one of the options being considered. A section 18 exemption request for use of 1080 was prepared and submitted to the Regional Office and Washington Office for consideration. In view of the status of pending legislation relating to 1080, this request was not forwarded to the EPA for consideration. For this reason, 1080 was not used during cat control programs on Jarvis during 1982.

5. Research and Investigations

JRS-1 Cat Depredation Study

Feral cats on Jarvis Island have impacted the resident seabird population and appear to have extirpated some burrowing species. Previous expeditions to the island have documented predation by the cats although attempts to eliminate the cats from the island during brief trips have been unsuccessful.

After a considerable amount of planning, two field trips to Jarvis Island were undertaken in 1982 to eliminate the cats from the Island. Mark Rauzon, a temporary bio-tech in the Honolulu Office compiled a report in 1981 on the effects of cats on bird colonies, the results of previous cat eradication attempts at Jarvis and other islands, and various methods utilized for feral cat control worldwide. Various chemical methods of control were tested by Larry Pank of the Animal Damage Control Office in Hilo, Hawaii. Richard Vietch, a New Zealand Wildlife Service biologist responsible for cat control on islands adjacent to New Zealand, was also consulted.

The remoteness of Jarvis Island required logistical coordination with the Martin Garnett and Katino Teebaki of the Government of Kiribati on Christmas Island. In addition, boat transportation to the island was coordinated with three oceanographers who are doing research in the vicinity of Jarvis Island. Drs. Martin Vitousek, Eric Firing and Dean Roemmich greatly assisted the project by coordinating transportation to the refuge on the Machias, a vessel that Firing and Roemmich have chartered.



BHJ-2 - Trapped cat at Jarvis Island.

MR

Dave Woodside and Mark Rauzon visited Jarvis I. from June 14 to July 11. By then Rauzon had enrolled in the University of Hawaii Graduate School and planned on using the data collected on the trip as a foundation for his Master's Thesis. While on Jarvis, they experimented with enteritis toxin, C.A.T. poison, trapping techniques and radio telemetry. The radio telemetry work was to determine where the cats moved after they had been infected with the enteritis. After approximately two weeks with virtually negative results with the enteritis toxin, they proceeded to attempt eradication by trapping and shooting. In total, they eliminated 119 cats and estimated that less than 12 were left on the island when they departed. A follow-up trip was immediately planned for the Fall to attempt to complete the eradication effort.

Woodside and Steve Fairaizl returned to the island on the Machias on October 28 and attempted to trap and shoot cats until their departure from the island on November 3. They were able to sight and dispose of three cats. A heavy growth of low vegetation may have hidden some cats; however, repeated all-night searches and daytime surveys failed to reveal additional animals. Mr. Utimawa Bukaireiti of the Christmas Island Wildlife Conservation Unit (Kiribati Govt.) accompanied Woodside and Fairaizl to Jarvis Island. He assisted in the cat eradication effort and gave us extensive information on conservation programs in the Republic of Kiribati.

The continuation of the oceanographic work around the island will allow refuge staff to return to Jarvis Island in the spring of 1983 to evaluate the results of the 1982 trips.



BHJ-3 - Utimawa Bukaireiti, Christmas Island Conservation Unit, on Jarvis Is. MR

JRS-2 Atmospheric-oceanic Interphase Study

During 1982, Dr. Martin Vitousek (Hawaiian Institute of Geophysics, University of Hawaii) continued investigating ocean-atmosphere interaction in the equatorial Pacific through the use of six unmanned observatories as part of the North Pacific Experiment (NORPAX). As part of this program, an observatory was installed on Jarvis Island in 1974. Although the observatory has only provided intermittent data, the observations have helped involved scientists predict the onset of the El Nino, an unusual warming of the ocean off the coast of Peru. This oceanic event has profound effects on the productivity of the coastal waters and severe repercussions on the fisheries and seabird populations along the Western South American coast. The observatory on Jarvis Island measures tidal variation, sea temperature and a variety of weather parameters. Summarization of data has not been done for 1982.

JRS-3. Current Studies at Jarvis Island.

Dr. Dean Roemmich of Scripp's Institute of Oceanography initiated a study on current profiles at Jarvis Island. This work is being conducted in conjunction with the studies of Dr. Vitousek

and with current studies that Dr. Eric Firing of the University of Hawaii is conducting between Jarvis and the Line Islands. Dr. Roemmich installed instruments in the ocean adjacent to the island and anchored the instruments and their recording devices on the island. He also installed targets on the island that were used to determine his distance from shore when he was doing offshore measurements. This study will continue in 1983.

F. HABITAT MANAGEMENT

1. General

Habitat management on each of these islands is based on the philosophy that the resident populations of seabirds and other wildlife will return to a natural state if environmentally destructive conditions resulting from former habitation of the islands are removed or controlled. Control has taken two forms: control of introduced cats and destruction of debris. In addition to restoring the islands to their former state (without destroying historically important artifacts or structures), the natural state of these islands is maintained by a restrictive policy of allowing only activities that would be beneficial to the wildlife populations. The fact that the nearest inhabited island is 240 miles away from Jarvis and 1,321 miles away from Howland and Baker Islands facilitates this type of management.

10. Pest Control

The cat depredation study described under "Research and Investigations" is part of a pest control plan for Jarvis Island. Howland Island also has a small population of feral cats, but there are no plans to control that population in the immediate future because of the prohibitive cost of boat support.

G. WILDLIFE

7. Shorebirds, Gulls, Terns, and Allied Species.

Estimations of the number of seabirds present on Jarvis Island were made during the two field trips that visited the island. The following table summarizes the estimations:

Population Estimate

Species	June 14-July 11	October 28-November 3
Sooty tern	1-1.2 million	0
Brown noddy		2
Gray-back tern	12	6
Fairy tern	12	0
Red-footed booby	2000	100-250
Brown booby	800	50-100
Masked booby	10000	150-200
Red-tailed tropic- bird	2500	2
Lesser frigatebird	1000	9
Greater frigatebird	50	0
Wedge-tailed shear- water	100	20



BHJ-4 - Sooty tern and hermit crab.

MR

The sooty terns, brown and blue-faced boobies and red-tailed tropicbirds were nesting during the earlier visit. A few young masked boobies, red-tailed tropicbirds and lesser frigate birds were observed during the fall visit.

The following shorebirds and their estimated numbers were also seen during the fall visit: golden plovers (24), wandering tattlers (4), bristle thighed curlews (2), sanderlings (2), ruddy turnstones (30).

J. OTHER ITEMS

2. Items of Interest

Aviatrix Amelia Earhart disappeared between New Guinea and Howland Island during her 1937 attempt to fly around the world. Because of this there is continued interest in the island by history enthusiasts. One of these people, Grace McGuire, has obtained the same type of airplane that Earhart was using and would like to attempt to fly the leg between New Guinea and Howland during 1983. We have been coordinating with McGuire to attempt to have the flight take place but without harm to the wildlife species on Howland Island. If the flight does take place it will most likely involve only a fly-over of the island since the landing field there has deteriorated.

ROSE ATOLL NWR

American Samoa

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM



TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	2
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	NTR
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	2
3. Public Participation	NTR
4. Compliance with Environmental Mandates	NTR
5. Research and Investigations	2
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	Complex
4. Technical Assistance	Complex
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	5
2. Wetlands	NTR
3. Forests	6
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	6
7. Grazing	6
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	NTR
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1.	Wildlife Diversity	7
2.	Endangered and/or Threatened Species	7
3.	Waterfowl	NTR
4.	Marsh and Waterbirds	NTR
5.	Shorebirds, Gulls, Terns and Allied Species	8
6.	Raptors	NTR
7.	Other Migratory Birds	NTR
8.	Game Mammals	NTR
9.	Marine Mammals	9
10.	Other Resident Wildlife	9
11.	Fisheries Resources	9
12.	Wildlife Propagation and Stocking	NTR
13.	Surplus Animal Disposal	NTR
14.	Scientific Collections	NTR
15.	Animal Control	NTR
16.	Marking and Banding	10
17.	Disease Prevention and Control	NTR

H. PUBLIC USE

1.	General	10
2.	Outdoor Classrooms - Students	NTR
3.	Outdoor Classrooms - Teachers	11
4.	Interpretive Foot Trails	NTR
5.	Interpretive Tour Routes	NTR
6.	Interpretive Exhibits/Demonstrations	NTR
7.	Other Interpretive Programs	NTR
8.	Hunting	NTR
9.	Fishing	NTR
10.	Trapping	NTR
11.	Wildlife Observation	NTR
12.	Other Wildlife Oriented Recreation	NTR
13.	Camping	NTR
14.	Picnicking	NTR
15.	Off-Road Vehicling	NTR
16.	Other Non-Wildlife Oriented Recreation	NTR
17.	Law Enforcement	NTR
18.	Youth Programs	NTR
19.	Cooperating Associations	NTR
20.	Concessions	NTR
21.	Volunteers Program	NTR

I. EQUIPMENT AND FACILITIES

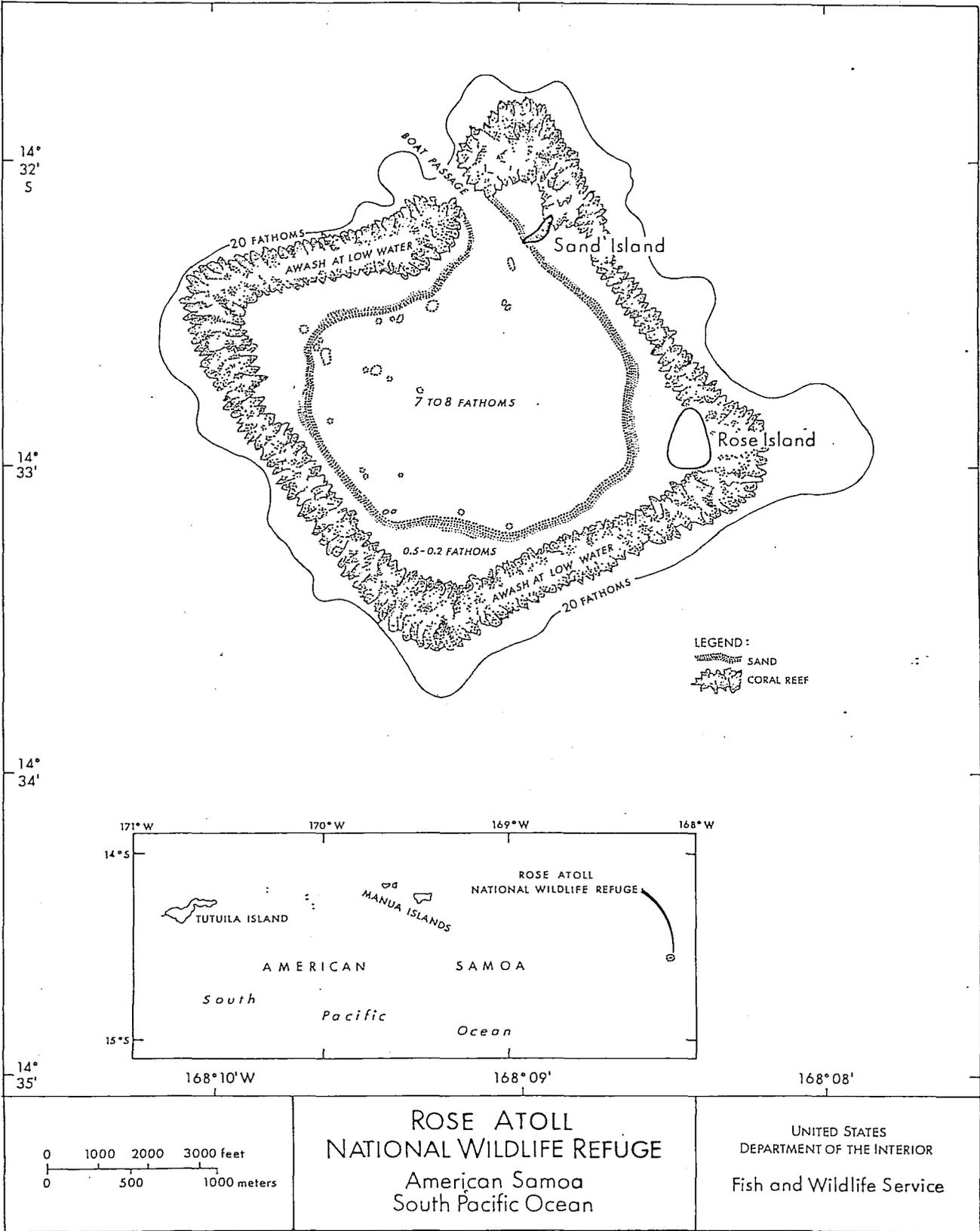
1. New Construction	NTR
2. Rehabilitation	NTR
3. Major Maintenance	NTR
4. Equipment Utilization and Replacement	NTR
5. Communications Systems	NTR
6. Energy Conservation	NTR
7. Other	NTR

J. OTHER ITEMS

1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR



A. HIGHLIGHTS

Rose Atoll National Wildlife Refuge is approximately 150 miles east-southeast of Pago Pago, American Samoa. Because of this extreme isolation, any visit by Refuge personnel or other people may be considered a highlight. Refuge personnel visited the atoll March 21-28 and October 1-15, 1982 along with personnel from the Office of Marine Resources (OMR), and Department of Education, American Samoan Government.



ROS-1 - Rose Island, Rose Atoll NWR.

GML

Rose Atoll, one of the smallest atolls in the world, is administered by the U.S. Fish and Wildlife Service under a Cooperative Agreement with the American Samoa Government. This Agreement was developed at the time the Refuge was established in 1974 and provided for the management of the Refuge through periodic aerial surveys and through the deputization of Samoan officials to enforce National Wildlife Refuge rules and regulations. A change in costs and needs of the Refuge necessitated a revision of the Agreement. This was initiated during 1981 and continued into 1982.

B. CLIMATIC CONDITIONS

The nearest weather station to Rose Atoll is located 150 miles away at Pago Pago on Tutuila Island in American Samoa. There is a very distinct difference between the topography of Rose and Tutuila Islands, so comparisons must be viewed with much caution. Rose Atoll has two low islands; while Tutuila is mountainous and, as a result, has considerably more rainfall. Weather data at Pago Pago have not been summarized for 1982.

D. PLANNING

2. Management Plan

A draft revision of the Memorandum of Agreement between the U.S. Fish and Wildlife Service and the American Samoa Government for management of Rose Atoll NWR was reviewed by the regional office. Further work on the agreement is being delayed until the completion of an assessment of the giant clam resources at the atoll.

A fisheries stock assessment for the harvest of giant clams (Tridacna maxima) at Rose is being developed from data gathered during 1982 and previous field trips. This assessment is in response to a request by the Office of Marine Resources to open up the refuge for take of this clam. They sent us a preliminary plan for managing the clam fishery but indicated that the data they used may not be sufficient to accurately assess an optimum sustainable yield. We agreed and have gathered data to supplement what they had presented.

5. Research and Investigations.

Research at Rose Atoll has consisted principally of surveys of terrestrial and marine fauna and flora during the brief visits to the atoll.

The March 21-28, 1982, visit by Ludwig and Fefer also included Dr. Richard Wass, Fishery Biologist, and Mr. William Pedro, Fishery Assistant. Wass and Pedro are with the Office of Marine Resources, American Samoa Government. Mr. Richard Davis of the American Samoa Department of Education also accompanied us to the atoll.

The second trip to the refuge included Ludwig, Pedro, Davis, Ropeti Tofeano (a high school student from Samoa) and George Balazs from the National Marine Fisheries Service. The purpose of that visit was to gather information on clams, birds and turtle nesting and to help develop a program on the refuge for Samoan high school students.

ROS-1 Rose Atoll Aerial Mapping

Another aerial photographic survey was done for us by Mr. Gene Whitham, a law enforcement agent for the National Marine Fisheries Service. Mr. Whitham did the survey in April while doing surveillance flights to detect illegal fishing within the 200 mile economic zone. A U.S. Coast Guard plane conducts the flights about twice a year.

Prints of the photographs were used during the October field trip to map locations of transects of clam abundance. The prints were also used by HIG Graphics to draft a map of the atoll. Attempts to obtain vertical LANDSAT, and EROS satellite photos and high altitude U-2 photos of the refuge were not successful.

ROS-2 Tridacna Clam Survey

ROS-2 - Tridacnid clam, Rose Atoll
NWR. GML

Ludwig, Wass, Pedro and Davis obtained data on clam distribution, population density, size frequency distribution, growth, size at sexual maturity and age and growth relationships during 1982. Ludwig also observed the clams spawning during the October survey.

Advice on how to estimate population levels at the atoll was obtained from Dr. Michael Scott (SE,USFWS). As a result of his advice 98 fifty meter transects were conducted in three types of habitat during the October field trip.

Dr. Richard Radtke of the University of Hawaii used electron microscopy and X-ray analysis to determine the ages of 20 clams of assorted sizes. A relationship between age and growth will be developed from this work. Dr. Allison Kay of the University of Hawaii was consulted on how to determine the sex and size at time of sexual maturity for the clams. One of her graduate students, Robert Shimizu, analyzed the sexual maturity of 61 clams.

ROS-3 Rose Atoll Fish Studies

Dr. Richard Wass continued to survey the fishes of Rose Atoll during the March field trip. He concentrated on the outside of atoll this time. Ludwig, Pedro and Davis assisted him as diving partners. Wass reported that the reef front habitat consisted of an irregular and often steep slope to a depth of about 50 meters. The upper portion may be bisected by ridges and surge channels. In some areas a narrow terrace with little slope occurs at 5-20 meters before the bottom plunges steeply to great depth. The irregular substrate is calcareous and compacted with coralline algae predominating. Corals are profuse and species of invertebrates are diverse. The habitat is different than that found at similar depths on the main Samoan Islands in that the reef front at Rose is dominated by coralline algae and lacks table and staghorn acroporan corals.

Wass found a total of 105 species of fish in the reef front habitat. The predominant species belong to the surgeonfish, butterflyfish and damselfish families. The damselfish and parrot fish species composition was less diverse than that found in the larger islands. A higher number and diversity of top predators was also present at Rose than in other parts of Samoa. Unexpectedly, very few sharks were observed on the outside of the atoll. Previous surveys near the entrance to the lagoon had noted concentrations of gray reef sharks present.

Wass added six species to the list of lagoon fishes present at Rose Atoll. In addition, he noted that five of the fish species that have been observed there have not been recorded elsewhere in Samoa

Samples of bottom sediments were collected during the March trip for analysis of micromolluscs by Dr. Allison Kay of the University of Hawaii. Samples of coralline algae collected during the October trip were sent to a UH graduate student, Kathrine Agegian, for identification.



ROS-3 - Richard Davis surveying Tidacnid
clams. GML

F. HABITAT MANAGEMENT

1. General

Rose Atoll, one of the smallest atolls in the world, is composed of a coralline algae reef that encloses a 50 foot deep lagoon. There is one opening from the lagoon to the sea and, this is only deep enough for small boats to enter at high tide. The atoll is unusual for its square configuration and the high density of coralline algae that comprises nearly all of the top of the reef. The atoll is about two miles across diagonally and the lagoon is about one mile across.

Patterns in the gravel and debris lines indicated that Rose and Sand Islands had been swept over by high waves a short time before the March visit. A large typhoon that had passed south of the island about five weeks before probably caused the disturbance to the ground cover. One advantage of this type of

disturbance is that it erases evidence of previous turtle nesting and allows an assessment of how much nesting has occurred during a known period of time.

3. Forests.

Rose Island is dominated by a Pisonia forest on the south side of the island and groves of Tounefortia bushes on the east and north sides of the island. In addition, there is a small grove of coconut palms in the center of the island. The palms were introduced during visits of American Samoan officials during the first half of this century. A die-off of Pisonia trees that was reported by visitors to the island in the mid-1970's was found to have recovered with trees in the area of the die-off showing rapid growth.

The Pisonia trees appeared to have suffered from high wind damage during the period preceding the October visit. Leaf density was much lower than was noted during previous visits. There seemed to be more debris on the forest floor, and there was a notable lack of black nobby nests in the trees.

The Tournefortia forest has increased in size from a few plants in the early 1970's to the point where most of the northern and eastern part of the island is covered by this bush. The bush provides nesting habitat for red-footed boobies and frigatebirds. The waves that had overrun the island before our March visit uprooted an estimated 20-30 Tournefortia trees.

6. Other Habitats

The principal type of marine habitat at Rose Atoll is the coralline algae dominated reef crest that forms an approximate square with a single opening to the sea. The outside of the reef descends to great oceanic depths and is composed of an extremely diverse coral reef complex. The inside of the reef crest at first descends gradually into a rubble dominated reef flat that contains numerous patch reefs composed of coralline algae, coral and a diversity of other sessile invertebrates including the small giant clam, Tridacna maxima. The rubble reef flat descends abruptly to about 50 feet and forms the bottom of a one mile (diagonal) wide lagoon. The bottom of the lagoon is principally composed of rubble, silt and small coral patches. Occasional patch reefs reach the surface. A high diversity of reef fishes are present within the lagoon. The diversity of fishes and invertebrates is greater on the outside of the atoll.

7. Pest Control.

All visitors to the atoll report the presence of Polynesian rats on Rose Island. No attempts to control the animal have been instituted although it is possible that the presence of the rats

may relate to the absence of subterranean nesting birds. Although the rat population is very high, as indicated by the ease with which they can be sighted by visitors, the actual density has not been determined.

G. WILDLIFE

1. Wildlife Diversity

Wildlife resources at the atoll include nesting and resident seabirds, nesting endangered or threatened sea turtles, rats and a low diversity of terrestrial invertebrates (several species of hermit crabs and insects). Diversity of species varies during the year because of the seasonal nature of the use of the atoll by nesting birds.

2. Endangered and/or Threatened Species

Rose Atoll contains a resident and possibly a visiting population of nesting endangered Hawksbill turtles and threatened green sea turtles. All previous visitors to the island reported the presence of green sea turtles and in most cases have reported seeing evidence of or actual nesting activities on Rose and Sand Islands.

Surveys of turtle nesting were conducted during both trips to Rose Atoll. The previously noted high wave action before the March trip erased all evidence of former turtle nests. Surveys during that trip did not reveal any nesting activity on Rose Island and only three nest pits (probably false nests) dug by a single turtle on Sand Island. Several turtles were seen within the lagoon during diving operations.

Balazs, Pedro, Ludwig and Davis had more success during the October trip. Balazs found 27 pits on Sand Island but felt that only one of them had eggs. He felt that it is very likely that the large rubble that composes most of that island may greatly hamper successful nesting. Balazs also thought this was true of the northern end of Rose Island.

During the ten days that the field party was at the refuge, Balazs tagged four turtles and Ludwig and Davis tagged three that had come onshore at Rose Island for nesting. Evidence of several other turtles coming onshore during the stay was observed.

Ludwig and Davis observed turtles about 20 times during their diving activities. On two occasions turtles were seen mating in the lagoon.

Balazs and Pedro visited Tau, Ofu and Olasanga Islands where they interviewed the residents to find out if they utilized turtles

for food or other purposes and if they felt that Rose Atoll was within their fishing territory. They did not admit to utilizing turtles and did not look upon Rose Island as being a possession.

A humpback whale was seen along the northwest side of the atoll as the field party left the refuge in October.

5. Shorebirds, Gulls, Terns and Allied Species.

Eleven breeding species of sea birds comprise the most prominent group of wildlife within this refuge. Counts of these birds were made during both field trips. The following table summarizes the number of adult birds seen on these surveys.

	March	October
Red-tailed tropicbird	8	1
White-tailed tropicbird	2	0
Masked booby	75-100	25
Brown booby	700-800	300
Red-footed booby	400-500	500
Greater frigatebird	60-75	40-50
Lesser frigatebird	8	10-15
Blue-grey noddy	1	0
Brown noddy	400-500	1
Black noddy	2160	48
White tern	600	382
Sooty tern	1500-2000	800-1000

Nearly all the seabirds present at the atoll were observed on the vegetated Rose Island. There were several brown noddy dozen carcasses on Sand Island during our stay in March. It appeared that high waves had flooded their nests. In October sooty terns were observed roosting on Sand Island but they did not nest there.

Surveys of marsh and water birds that were conducted during the March and October field trips indicated the following species present:

	March	October
Golden plovers	8	14
Ruddy turnstones	25	20
Wandering tattlers	15	5
Bristle-thighed curlew	5	4
Reef Herons	1	1

9. Marine Mammals

The presence of a humped-back whale was noted under the endangered species category.

10. Other Resident Wildlife

Rose Atoll has a wide variety of invertebrate species that are typical of those found on and within coral reefs of the southern Pacific Ocean. The reefs within the lagoon and on the outside of the atoll appeared to be in a healthy condition during the time of the March trip.

Grapsid and hermit crabs were frequently observed along the shore or within the forest on Rose Island. Rats are also very common within the Pisonia forest.

Crown-of thorns starfish were much more abundant on the reef in October than had previously been noted. These large starfish were seen on about 1/5 of the transects that were done on the clam survey. They were also observed moving over the sandy areas of the reef on several occasions. Damage to corals that was caused by the starfish was evident in many parts of the reef.

11. Fisheries Resources.

The fishery resources within the refuge include a wide variety of reef fishes, many resident and migratory pelagic fish, and the tridacnid clams. Both of these resources are covered in the Research section of this report.

Although there was a noticeable reduction in the number of sharks found outside the reef (reported above) in March, the number of black-tipped reef sharks inside the lagoon seemed higher than usual in October. At times it was unnerving to be walking in shallow water along the reef and discover that these sharks had approached to within a few feet. The high percentage of specimens under two feet long suggested that the black-tips were probably pupping within the lagoon.



ROS-4 - Black-tipped shark.

GML

The waters around Rose Atoll contain a number of species that have commercial value. These include various tuna, jacks, surgeonfish and a variety of bottom dwelling reef fish. The quantity of fish that is obtained from these waters each year is unknown, but approximately 1,000 pounds were caught by the crew of the boat that brought the Refuge party to the atoll in March.

16. Marking and Banding.

One hundred forty-four brown boobies and four masked boobies were banded during the March field trip.

H. Public Use

1. General

Because of the small size of the refuge, the presence of threatened green sea turtles and endangered hawksbill turtles, and the susceptibility of the island environment to noxious species introductions, public access to the refuge is restricted to all but persons conducting activities that will be beneficial to the refuge.

A leaflet that describes the importance of Rose Atoll NWR and the fact that entrance to the atoll is prohibited was distributed to the Korean, Taiwanese and Japanese fishermen that ply the waters around American Samoa.

3. Outdoor Classrooms--Teachers

Mr. Richard Davis, Science Coordinator for the American Samoa Department of Education, participated in the March and October field trips to Rose Atoll NWR. He is developing a teaching unit on the Refuge which he brings to each of the secondary and primary schools in American Samoa. Davis assisted with all aspects of the field work on the trips and wrote up information for use in his project. Ludwig supplied him with additional information and with photographs.

Ropeti Tofeano, an American Samoan student, participated in the October field trip, as part of an expansion of Davis's educational program. Davis would like to have talented students have the chance to see an environment that has been little altered by human activities. The potential effects of an expansion of this program on the refuge are being evaluated.

KILAUEA POINT WILDLIFE ADMINISTRATIVE SITE

Kilauea, Hawaii

NARRATIVE REPORT

Calendar Year 1982

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	1
B. <u>CLIMATIC CONDITIONS</u>	1
C. <u>LAND ACQUISITION</u>	
1. Fee Title	See Complex
2. Easements	NTR
3. Other	2
D. <u>PLANNING</u>	
1. Master Plan	Complex
2. Management Plan	NTR
3. Public Participation	NTR
4. Compliance with Environmental Mandates	NTR
5. Research and Investigations	2
E. <u>ADMINISTRATION</u>	
1. Personnel	Complex
2. Funding	Complex
3. Safety	3
4. Technical Assistance	Complex
5. Other Items	Complex
F. <u>HABITAT MANAGEMENT</u>	
1. General	4
2. Wetlands	NTR
3. Forests	NTR
4. Croplands	NTR
5. Grasslands	NTR
6. Other Habitats	NTR
7. Grazing	NTR
8. Haying	NTR
9. Fire Management	NTR
10. Pest Control	4
11. Water Rights	NTR
12. Wilderness and Special Areas	NTR
13. WPA Easement Monitoring	NTR

G. WILDLIFE

1.	Wildlife Diversity	NTR
2.	Endangered and/or Threatened Species	4
3.	Waterfowl	NTR
4.	Marsh and Waterbirds	NTR
5.	Shorebirds, Gulls, Terns and Allied Species	5
6.	Raptors	NTR
7.	Other Migratory Birds	NTR
8.	Game Mammals	NTR
9.	Marine Mammals	5
10.	Other Resident Wildlife	NTR
11.	Fisheries Resources	5
12.	Wildlife Propagation and Stocking	NTR
13.	Surplus Animal Disposal	NTR
14.	Scientific Collections	NTR
15.	Animal Control	NTR
16.	Marking and Banding	6
17.	Disease Prevention and Control	NTR

H. PUBLIC USE

1.	General	6
2.	Outdoor Classrooms - Students	6
3.	Outdoor Classrooms - Teachers	6
4.	Interpretive Foot Trails	NTR
5.	Interpretive Tour Routes	NTR
6.	Interpretive Exhibits/Demonstrations	NTR
7.	Other Interpretive Programs	7
8.	Hunting	NTR
9.	Fishing	7
10.	Trapping	NTR
11.	Wildlife Observation	7
12.	Other Wildlife Oriented Recreation	NTR
13.	Camping	NTR
14.	Picnicking	NTR
15.	Off-Road Vehicling	NTR
16.	Other Non-Wildlife Oriented Recreation	NTR
17.	Law Enforcement	NTR
18.	Youth Programs	7
19.	Cooperating Associations	8
20.	Concessions	NTR
21.	Volunteers Program	8

I. EQUIPMENT AND FACILITIES

1. New Construction	8
2. Rehabilitation	8
3. Major Maintenance	10
4. Equipment Utilization and Replacement	NTR
5. Communications Systems	10
6. Energy Conservation	NTR
7. Other	NTR

J. OTHER ITEMS

1. Cooperative Programs	Complex
2. Items of Interest	Complex
3. Credits	Complex

K. FEEDBACK

NTR

A. HIGHLIGHTS

Kilauea Point is a U.S. Coast Guard Lighthouse site which has been managed as a seabird refuge by the Service since 1975. The property is in the process of being transferred to the Service, but in the interim it is managed as the Kilauea Point Wildlife Administrative Site under permit from the Coast Guard.

Five members of the BBC television film crew visited Kilauea Point on January 26, 1982, to shoot the production "The World About Us". The film crew took shots of the Laysan albatross, red-footed booby and cattle egret colonies. Once the film has been edited, it will be shown in England and also broadcasted over WGBH Boston "NOVA" program.

A film crew from WCCO TV visited Kilauea Point on April 15 and 16 to shoot a wildlife segment for PM magazine. Stephen Doyle, Co-host/Producer, spent a total of 14 hours filming the wildlife of Kilauea Point, the interpretive program of Kilauea Point and the lighthouse. The 6½ minute segment will air in Minneapolis during the third week of June, 1982.

Hurricane Iwa hit the islands of Niihau, Oahu and Kauai on November 23 with sustained winds over 90 mph and 30-40 foot seas. Rainfall associated with this storm was light. Although damage estimates exceed \$200 million for these islands, damage at the refuges was mostly limited to vegetation and the loss of utilities for several days.

Major rehabilitation of the buildings at Kilauea Point and the construction of a visitor restroom and cesspool were completed in 1982.

B. CLIMATIC CONDITIONS

Kilauea Point received a total of 15.6 inches of rain between March 25 and 29 which washed out the roadway and forced the closing of the Point to visitors for 6 days. Strong winds, peaking at 36 knots during this period blew out 2 windows at the exhibit center.

Hurricane Iwa hit Kauai on November 23 with winds over 100 mph and damaged the roofing of all buildings at the Point and toppled many trees in the area.

Kilauea Point is an official weather recording station for the National Weather Service. An automatic reporting station was constructed at the Point in April, 1978, and was operational in July, 1978. The following station summary for January-October, 1982, reflects the climatic conditions of the refuge:

	<u>Average</u>	<u>Extremes (dates)</u>
Temperature	76° F.	-
Wind Speed	18 mph	Hurricane Iwa (11/23)
Rainfall	70" total	-

C. LAND ACQUISITION

3. Other

The excess property board of survey report for Kilauea Point was sent from the 14th Coast Guard District to the Commandant of the Coast Guard in Washington, D.C. on May 20. The cover letter for this document mentioned the USFWS interest in this excess property and requested that the matter be expedited through the U.S. Coast Guard and GSA.

Refuge staff prepared a draft report in July to justify transfer of Coast Guard lands at Kilauea Point to the Fish and Wildlife Service. The report was prepared in view of growing concern that the property, when exccessed by the Coast Guard, may be offered up for public sale as part of the current Administration's effort to reduce the national debt.

Further progress was made in October on the resolution of the Kilauea Point excessing threat when Director Jantzen sent the Commandant of the Coast Guard a letter requesting a long-term (30+ years) permit to use Kilauea Point as a FWS facility. Jantzen agreed for FWS to maintain the old lighthouse. Hopefully, this will avoid the possibility of excessing and sale to the public.

D. PLANNING

5. Research and Investigations

The following papers resulting from earlier studies at Kilauea Point were accepted for publication in 1982:

Breeding Biology of Wedge-tailed Shearwaters at Kilauea Point.
Condor.

A Cross-fostering Experiment with Newell's Manx Shearwater.
Journal of Wildlife Management.

Growth Rates of Wedge-tailed Shearwaters at Various Locations
in Hawaii. Auk.

KPW-1: Newell's Shearwater Transplant/Fallout/Retrieval Study - Brady monitored the shearwater colony for indications of returning Newell's shearwaters. Several Newell's shearwaters were heard in the vicinity of Kilauea Point in June and July. The Earthwatch volunteers collected, banded and released over 160 birds this year. One dark-rumped petrel was also banded and released by the Earthwatch volunteers.

KPW-2: Laysan Albatross Colony Establishment Study - Richard Podolsky, Earthwatch Project Leader, met with Shallenberger and Coleman regarding the Laysan albatross transplant study. Podolsky began the preliminary

work involving site preparation at Kilauea Point in September. The volunteers constructed and set out albatross decoys and vocalization speakers on November 26. This combination has already attracted several albatross to these areas within Kilauea Point. Response to these devices has been great. Courtship behaviors were frequently observed between 2 or 3 live birds in the study areas and some nest building behavior was observed although no eggs were laid this year.



KPW-1 - Laysan albatross and decoys used to attract these birds to Kilauea Point. Future albatross nesting is hoped for. RP

E. ADMINISTRATION

3. Safety

On June 24, 1982, a 22 year old Hanalei man fell from the rocks near the Kilauea Point Administrative Site, and was washed out to sea. He was fishing illegally (without permit) on the refuge at the time of the incident. His companions spent 20 minutes searching before finding the body in about 10-15 feet of water. The victim was transported to Wilcox Hospital where he was pronounced dead on arrival. The incident was officially declared an accidental death by the Kauai Police Department.

F. HABITAT MANAGEMENT

1. General

The vegetation at Kilauea Point was mostly introduced shrubs and other noxious weeds at the beginning of 1979. To restore native plants in the area, a joint YACC/YCC project was initiated in 1979 to construct a greenhouse, grow a stock of native plants from seeds, remove exotic plants and plant and maintain native plants. This project was continued in 1982 with good results. Nine species of native plants have been reestablished and the Point is beginning to look like a natural coastal seabird habitat for the first time in over 50 years.

10. Pest Control

The severity of the wedge-tailed shearwater egg predation by the common myna became more apparent during a shearwater nesting study at Kilauea Point in 1978. About 21% of the eggs monitored were pecked open, allegedly by the common mynas. Chicken eggs, injected with ammonia, were again used as a taste deterrent in 1982 with limited success. In early May, chicken eggs were injected with ammonia, sealed with clear paraffin and placed near burrow openings scattered throughout the colony. Many of these eggs remained untouched in late June. Twenty four common mynas were also collected at the Point during the shearwater incubation period.

G. WILDLIFE

2. Endangered and/or Threatened Species

Newell's Manx Shearwater - Refuge personnel participated in the cooperative salvage, banding and release program with the State Division Fish and Game. Many young shearwaters, after leaving their burrow nests in the central mountains, would become disoriented by bright lights along the coastal roadways as they headed to sea. These shearwaters would fly into powerlines and buildings and end up on the ground, unable to regain flight. Local citizens would take these downed birds to holding areas to await pickup by State or Federal biologists. The refuge staff assisted with these pickups and banded the birds before releasing them at Kilauea Point. The following table indicates the great success of the Newell's Manx shearwater retrieval program:

<u>Year</u>	<u># of Shearwaters Retrieved and then Released</u>
1978	867
1979	1,377
1980	1,358
1981	1,123
1982	1,412

Green Sea Turtle - Four to six threatened green sea turtles are regularly seen in the waters surrounding Kilauea Point. None were observed hauled out on the rock ledges, as they do on the uninhabited islands further west of Kauai. In September, young sea turtles were released in the cove on the east side of the Point. These turtles, raised in captivity, were salvaged from nests at French Frigate Shoals, approximately 500 miles northwest of Kilauea Point.

5. Shorebirds, Gulls, Terns and Allied Species

Wedge-tailed shearwaters are the most numerous bird species at Kilauea Point. Approximately 4,000 shearwaters inhabit the site from mid-March to November. During a nest survey in September, 1978, 1,671 nesting burrows were located at Kilauea Point. About 54% of these burrows were considered to be active.

The red-footed booby colony of 800-900 birds nests primarily on the eastern edge of the refuge. The colony location was gradually moving further east and off the refuge as the trees and other vegetation which supported the nests began to dieback. This dieback appeared to be associated with the heavy bird use and accumulation of bird feces. Hurricane Iwa (November 23) inflicted further damage to these trees which will probably accelerate the eastward relocation of this booby colony.

An estimated nesting population of 12-16 white-tailed tropicbirds and 12-20 red-tailed tropicbirds is also found at the Point. Another common seabird, seen over this site, is the great frigatebird, with high summer counts of 40-200 birds. Laysan albatross were more commonly seen in November-December, perhaps in response to the albatross decoys and vocalization recordings at the Point. There were uncommon sightings of sooty tern, Newell's Manx shearwater, brown booby, black noddy and black-footed albatross.

9. Marine Mammals

Humpback whales are sometimes seen from the Point as they migrate to and from their winter calving area between the main islands.

Spinner dolphins are often seen in the quiet water in the lee (west side) of the Point.

11. Fisheries Resources

The clear ocean waters surrounding the Point contain a wide assortment of reef and shore fishes typical of remote coastal areas in the main island group. No qualitative or quantitative studies have been made to further assess this resource.

16. Marking and Banding

A total of 542 young wedge-tailed shearwaters were banded at Kilauea Point just prior to fledging. Of these, 500 were double-banded using an incoloy band on the right tarsus and a monel band on the left tarsus to study the differential wear patterns of these burrowing seabirds.

Refuge personnel also assisted with the banding and release of Newell's Manx shearwaters during 1982 (see Section G. 2).

H. PUBLIC USE

1. General

During the period 1978 to 1980 visitors to Hawaii increased at a rate of about 20% per year, however, 1981 showed a decline in this visitor trend. Visitation in 1982 was back to the 1980 level with the exception of late November and December when visitation was very low in response to the November 23rd Hurricane damage.

Kilauea Point Visitors

<u>Year</u>	<u># of Visitors</u>
1978	116,258
1979	137,505
1980	140,857
1981	107,968
1982	154,071

The hours open to public visitation were noon to 4:00 p.m., Sunday through Friday, throughout the 1982 period (holidays included).

2. Outdoor Classrooms - Students

Kilauea Point is a popular outdoor classroom site to illustrate seabird ecology, marine biology, botany and oceanography. The historic lighthouse, built in 1910, is also a point of interest.

A large regional YMCA camp, located 10 miles west of Kilauea Point, conducted 18 field trips a year to Kilauea Point (25-30 students/visit). Approximately 10-12 local school groups also visited the Point.

3. Outdoor Classrooms - Teachers

Three YMCA counselors and several Boy Scout leaders were instructed by refuge personnel on how best to use the Kilauea Point area for their field trips and conservation projects.

In March, Brady met with Nick Beck (Principal) and 15 teachers from the Hanalei and Kilauea Elementary Schools. The meeting was to discuss an environmental education plan that would be used when the teachers brought the students to Kilauea Point and Hanalei on field trips.

7. Other Interpretive Programs

Moriarty attended the American Society of Landscape Architects on November 20-21. Moriarty presented a paper on the revegetation of native plants at Kilauea Point.

Many church groups, school groups and scout troops received conducted tours of Kilauea Point and viewed films on the Hawaiian Islands NWR.

A shearwater watch program continued in May, 1982. Groups of 15 viewed a film on the Hawaiian Islands NWR and then spent several hours after dark observing the shearwaters on the ground around the Point.

9. Fishing

Local citizens from Kilauea have been fishing at Kilauea Point for many years. This fishing access was continued after the Service acquired the use of Kilauea Point in 1972. However, fishermen are required to request permission from the resident Refuge Manager and must also notify the Manager when they depart the area. Only 4 or 5 fishermen visited the site each month during 1982. The steep cliff-side trail, used by these experienced fishermen, does not lend itself to an expanded fishing access program.

11. Wildlife Observation

In addition to the numerous general public visitors to the Point, several special interest groups conducted regular excursions to this site. The Sierra Club and the Audubon Society brought several groups on special birding trips. A few other small private birding tours also visited the Point.

18. Youth Programs

An eight-week non-residential YCC camp was held at Kilauea Point during the summer. Five enrollees and one YCC group leader worked on various habitat improvement projects at Hanalei NWR but spent most of their time at Kilauea Point. Major projects completed by this work force included: replacing all residence window screens, planting native vegetation on the grounds of the headquarters and painting the exterior of the three residences. Environmental education programs for these camps focused on seabirds, marine biology and the endangered Hawaiian waterbirds.

19. Cooperating Associations

Moriarty attended a Cooperating Association Conference in St. Louis, Missouri, between October 18-22 with Ed Murček (ARW-I&R). The Conference, sponsored by the National Park Service, provided a timely introduction to the problems and opportunities associated with establishing a coop association.

21. Volunteers Program

An Earthwatch program, under the direction of Richard Podolsky, began operation at Kilauea Point on October 17. The program involves volunteers working on a project to attract Laysan albatross to nest at Kilauea Point. They will also be working on several refuge projects, including retrieval of downed Newell's shearwaters, banding of wedge-tailed shearwaters and site maintenance. Between 4-6 volunteers in groups will be at the site for 2-week periods through November. Three more groups will work at the site in the spring, 1983.

I. EQUIPMENT AND FACILITIES

1. New Construction

A simple visitor restroom and cesspool was constructed at the Point in the fall but was not officially opened until January, 1983. This small facility was necessary to accommodate the increasing visitation and the longer visitor stay.

2. Rehabilitation

The exhibit building next to the lighthouse was remodeled in the fall with a new tile floor, louvered windows, new trim and removal of the central dividing wall.

The road within the Kilauea Point facility was repaved by Hawaiian Bitumals on June 21. The site preparation work was initiated and completed by Ron's Construction. The YCC enrollees participated in some of the landscaping activities following the completion of the paving.

Ron's Construction used some heavy equipment to remove the noxious vegetation from the hill behind Quarters 2 at Kilauea Point. The 4 acre area that was opened up will be seeded with grass and used in the Laysan albatross experiment this fall. Ron's Construction also removed the vegetation from the hill behind the greenhouse at Kilauea Point.

Rosa Roofing was contracted to reroof Quarters 1 and 2 and the shop building in August. Electrical inspection and repairs for all buildings at the Point were completed in September. The visitor safety fence was repaired in August.



KPW-2 - Repairing of the access roadway in June, 1982, was long overdue and will be enjoyed by the ever increasing public use programs at Kilauea Point. BB



KPW-3 - Four more acres of noxious weeds and shrub vegetation was cleared at Kilauea Point in September, 1982, to create potential nesting habitat for Laysan albatross. BB

3. Major Maintenance

Grounds maintenance tasks for the visitor areas at Kilauea Point continued to grow during 1982. Watering the newly planted native shrubs and grass areas and mowing the increased lawn areas was very time consuming. Enrollees in the youth program were a great help in these tasks.

Major repairs to the electrical system in the three residences, shop and exhibit building were made in 1982.

5. Communications Systems

A single side-band radio was borrowed and installed in Quarters #3 in 1979 to communicate with the Tern Island staff, Hawaiian Islands NWR. Daily communications with Tern Island were made through June, 1982, when the radio was returned to Alaska.