

HAWAIIAN ISLANDS AND PACIFIC ISLANDS  
NATIONAL WILDLIFE REFUGE COMPLEX

ANNUAL NARRATIVE REPORT

CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

ANNUAL NARRATIVE REPORT

CY 1976

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ANNUAL NARRATIVE REPORT  
CY 1976

~~(staff photos)~~

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~~Review and Approvals~~

Submitted by	Date	Area Office	Date
Hawaiian Islands Refuges		Regional Office	Date

HANAIEI NATIONAL WILDLIFE REFUGE

Hanalei, Kauai, Hawaii

ANNUAL NARRATIVE REPORT

CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

A portion of Hanalei Refuge and surrounding mountains.  
Taro in this form provides year-round waterbird habitat.  
Hawaiian gallinules, coots, and ducks seek cover and  
food beneath the large heart-shaped leaves.

The Hawaiian stilt prefers the open paddies after  
the taro has been harvested. This habitat is also  
utilized by the gallinule, coot, and duck.

## I. GENERAL

### A. Introduction:

The 917-acre Hanalei (Ha-nah-lay) Refuge is located in the lower portion of the Hanalei Valley on the north shore of the island of Kauai (Cow-á-ee), Hawaii. Passing northward through the refuge, the Hanalei River provides cool, clear water from the flanks of 5,000-foot high Mount Waialeale (Why-ah-lay-ah-lay), the wettest place in the world. The stream provides sufficient high-quality water for the irrigation of 82 acres of taro (tear-o) on the refuge. Taro (maturing in 12-15 months) is grown standing in about 2 inches of water which constantly flows through the paddies at a rate averaging 30,000 gallons per acre per day. It is this "agricultural marsh" that provides excellent habitat for Hawaii's four endangered species of waterbirds within the refuge.

### B. Climatic and Habitat Conditions:

When drought occurs, wetland habitat of Kauai becomes extremely limited. Areas such as old fish ponds, sugar cane irrigation reservoirs, estuaries, and taro paddies become concentration areas for waterbirds during such periods. Rainfall significantly exceeded the normal monthly amounts only in February and March. January, May, October, November, and December were much (at least 1 inch) drier than normal. November rainfall was only 22 percent of normal. For the year, 70.7 inches were recorded where 95 inches is usually expected.

The average temperature at nearby Kilauea was 74.8°F (range 70.8 in March to 78.8 in September). The annual high of 89°F was recorded on the unlikely date of November 25 and the low of 61°F was recorded on March 14. When it is dry on Kauai, it is even drier on Niihau (Nee-ee-how), a small, privately-owned island 15 miles southwest of Kauai, where Hawaiian coots and stilts normally migrate to more preferred habitat (three shallow saline lakes) when available during the winter and spring months. The birds which returned to Kauai in late June had not begun to move to Niihau as the year ended--it was very dry there.

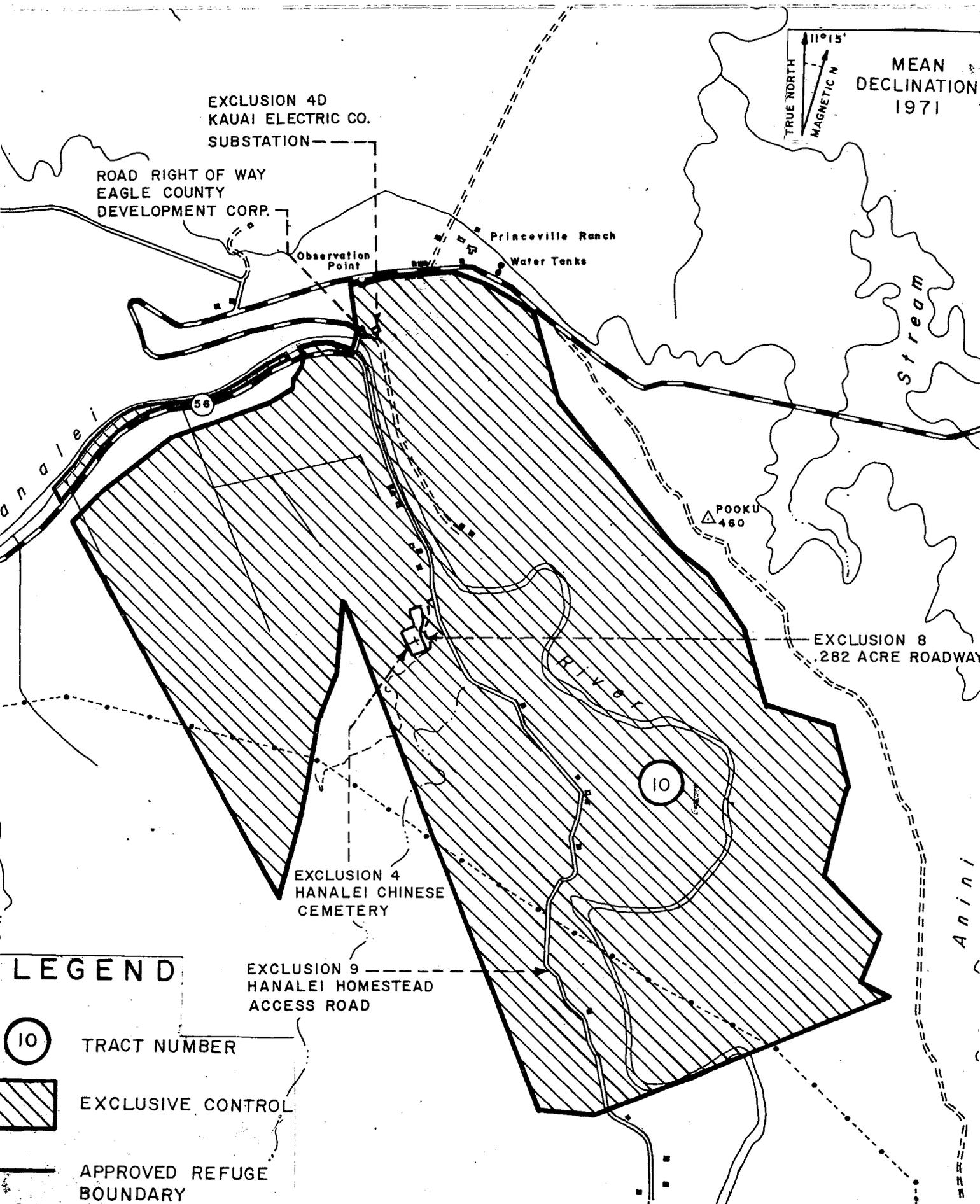
### C. Land Acquisition:

It was discovered during the year that a 0.969-acre parcel of the refuge was still carried on state tax records as private land. The matter was corrected.

### D. System Status:

1. Objectives: Specific Annual Work Plan Advice objectives included participation in the Hawaii Waterbirds Recovery Plan

# KAUAI COUNTY, HAWAII



EXCLUSION 4D  
KAUAI ELECTRIC CO.  
SUBSTATION

ROAD RIGHT OF WAY  
EAGLE COUNTY  
DEVELOPMENT CORP.

Observation  
Point

Princeville Ranch

Water Tanks

58

POOKU  
△ 460

EXCLUSION 8  
282 ACRE ROADWAY

10

EXCLUSION 4  
HANALEI CHINESE  
CEMETERY

EXCLUSION 9  
HANALEI HOMESTEAD  
ACCESS ROAD

## LEGEND

10

TRACT NUMBER



EXCLUSIVE CONTROL

APPROVED REFUGE  
BOUNDARY

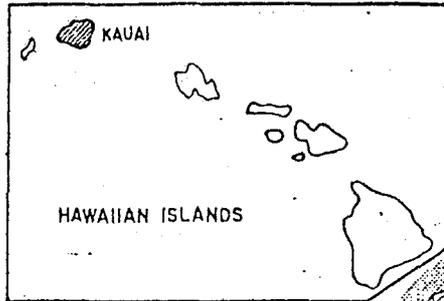
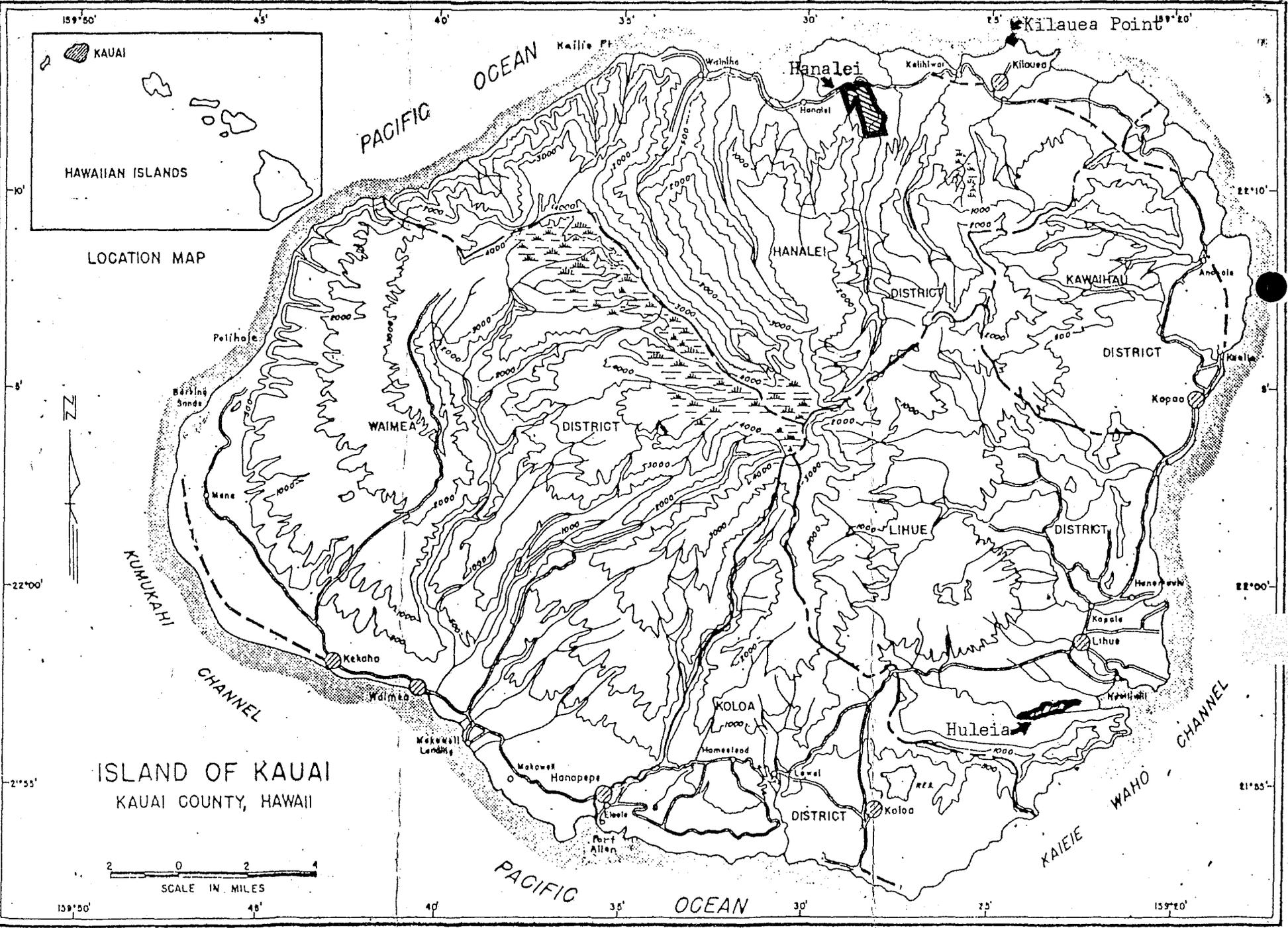


MEAN  
DECLINATION  
1971

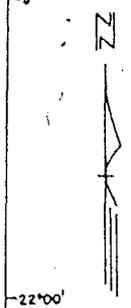
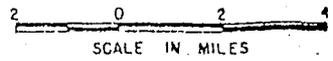
Stream

Anini

NATIONAL WILDLIFE REFUGES OF KAUAI



ISLAND OF KAUAI  
KAUAI COUNTY, HAWAII



Team and the protection, maintenance, and monitoring of habitat for the Hawaiian coot, stilt, gallinule, and duck. Refinements of the initial August 1975 draft recovery plan were begun on February 19. A revised and updated draft neared completion as the year ended. Habitat protection increased during the year through additional boundary and regulatory signing, farm cooperator coordination, the removal of four feral dogs and 11 feral cats, and the replacement of some herbicide applications with mowing operations. Habitat maintenance included mapping of habitat units which allowed modified irrigation water distribution to taro lands previously receiving too little or too much water, and mapping and inspection of irrigation water delivery ditches to document flow patterns and problem areas which allowed for maintenance and a rehabilitation project design. Habitat monitoring included constant communication and observation of 20 taro farmers on ten leases, monthly habitat condition surveys, weekly bird population censuses, and nest monitoring including Cornell University N.A. Nest-Record Card reporting. PFMIS and PPBE output reporting was refined and applied throughout the year. No refuge activities were determined to be out of phase with approved objectives.

2. Funding: Funding is almost entirely from the Endangered Species Program. The remainder from the Interpretation and Recreation Program.

## II. CONSTRUCTION AND MAINTENANCE

### A. Construction:

No construction was accomplished during the year. There was an immediate need to rehabilitate irrigation water supply ditches and distribution structures to provide for the maintenance of current habitat. There is also a potential and need for the development of additional habitat on the refuge. Those areas of potential habitat are currently in low-grade pasture or brush fields of introduced plant species. Refuge objectives can be met when the water systems and habitat development programs are completed.

### B. Maintenance:

Minor maintenance accomplishments on the refuge included the conversion of dike maintenance from exclusively herbicide control (the way it was done for generations) to a program stressing the health, ecological, and economical benefits of mowing. Due to initial equipment costs, the ten taro lessees are being convinced gradually to convert from herbicide spraying to mowing. Two lessees converted to tractor-drawn mowers which were

used on all dikes wide enough to accommodate the equipment. Health benefits, monetary savings, dike firming, bird grazing, and aesthetic improvements were realized by those participating. An additional farmer worked with a hand-held lawnedger to maintain all narrow dikes and the edges, at least, of his broader dikes. Others continued to use traditional herbicide applications in accordance with our pesticide plan. There is still much room for improvement in application methodology, however. The State of Hawaii initiated a certification program for taro farmers late in the year, a step in the right direction.

### C. Wildfire:

Fire has not been a problem in this lush, humid environment, but flood has. Fortunately, due to generally drier than normal conditions throughout the wetter parts of the year, no flooding occurred.

## III. HABITAT MANAGEMENT

### A. Croplands:

A major portion of refuge wetland habitat is provided on croplands. Taro (grown primarily for the root used in the commercial production of poi, a Hawaiian staple) is cultivated in "patches" or paddies requiring a constant supply of fresh water flowing over the plant roots for a period of 12 to 15 months. Water is maintained at a depth of about 2 inches except when drawn down to facilitate hand broadcast fertilization, during cultivation, or paddy bottom tilling between crops. Taro is grown year-round, each farmer maintaining a rotation system allowing the planting of "new" plants (the upper portion of the root and the leaf stalks) immediately after the harvesting of mature plants. There are 12 taro lessees maintaining about 82 acres of actual habitat (not including dikes, ditches, roads, building sites, etc.) within the refuge. If water supplies had allowed, an additional 21 acres was available for management within the leases. Planting, maintenance and harvesting is performed by hand. Once a taro "patch" (averaging 1/2 to 1 acre in size) is left fallow, it can be completely overtaken by introduced grasses and weeds in a matter of a few months. Unmaintained areas support 6-8 foot high, rank Panicum grass after as little as one year. Through the cooperation of the taro lessees, predator control, public use manipulation, and other programs, bird use of the habitat increased dramatically over 1976.

Herbicide usage is a major program for taro farmers with both pre-emergent and post-emergent chemicals being used. Such application has been necessitated to control the myriad of plant invaders

introduced to the Hawaiian Islands. These plants, including grasses and flowering species from around the world, grow at accelerated rates in the tropical climate. They are capable of rapidly overtaking the taro plants and result in shading problems as well as water and nutrient competition. No herbiciding is conducted in the flooded portions of the paddies. Weeding there is performed by hand. Convincing old-time taro farmers that they can substitute other techniques for herbicide application is a continuing long-term effort. Nearly 900 pounds of active ingredients from dalapon, 2,4-D, and sodium cacodylate were applied during the year to approximately 144,000 linear feet of dikes, roads, and ditchbanks. Some mowing was initiated during the year which will hopefully offer benefits (including monetary after the initial purchase of equipment) to all refuge cooperators in the near future.

Taro leases (to be converted to special use permits in 1979) honored since refuge purchase in 1972 produce \$25 per acre per year on 142.54 total acres. Nearly 100 percent of those portions of the leases under cultivation this year were utilized throughout the year by four endangered species and 18 other species of waterbirds, waterfowl, and shorebirds.

B. Grasslands:

Two special use permits were issued for the grazing of 230.6 acres of refuge bottomlands to retard the growth of Panicum, brush and trees. A total of 2,595 AUMs was accumulated at \$1.25 each.

C. Wetlands:

The Hanalei River provides the only natural wetlands through the refuge. It is a free-flowing stream. A management problem may be developing as introduced hau trees along the river spread. The refuge "agricultural marsh" is discussed under cropland.

D. Forestlands:

Only noncommercial woodlands primarily composed of introduced species occur on refuge uplands. They are not known to be utilized by native fauna and are not managed.

E. Other Habitat:

Nothing to report.

F. Wilderness and Special Areas:

A search for any historically significant sites within the refuge resulted in a determination that none are known to occur.

G. Easements for Waterfowl Management:

None.

IV. WILDLIFE

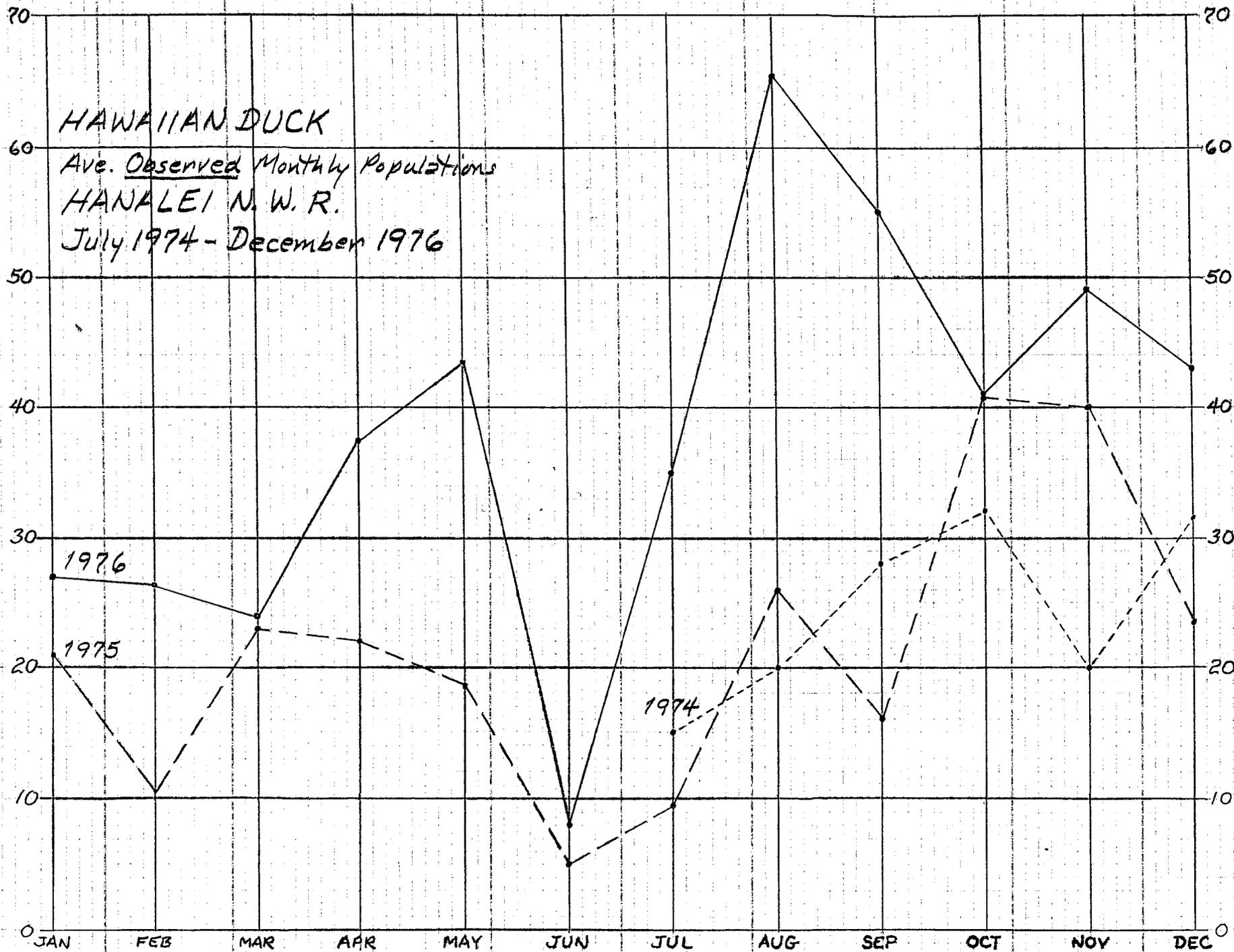
A. Endangered and/or Threatened Species:

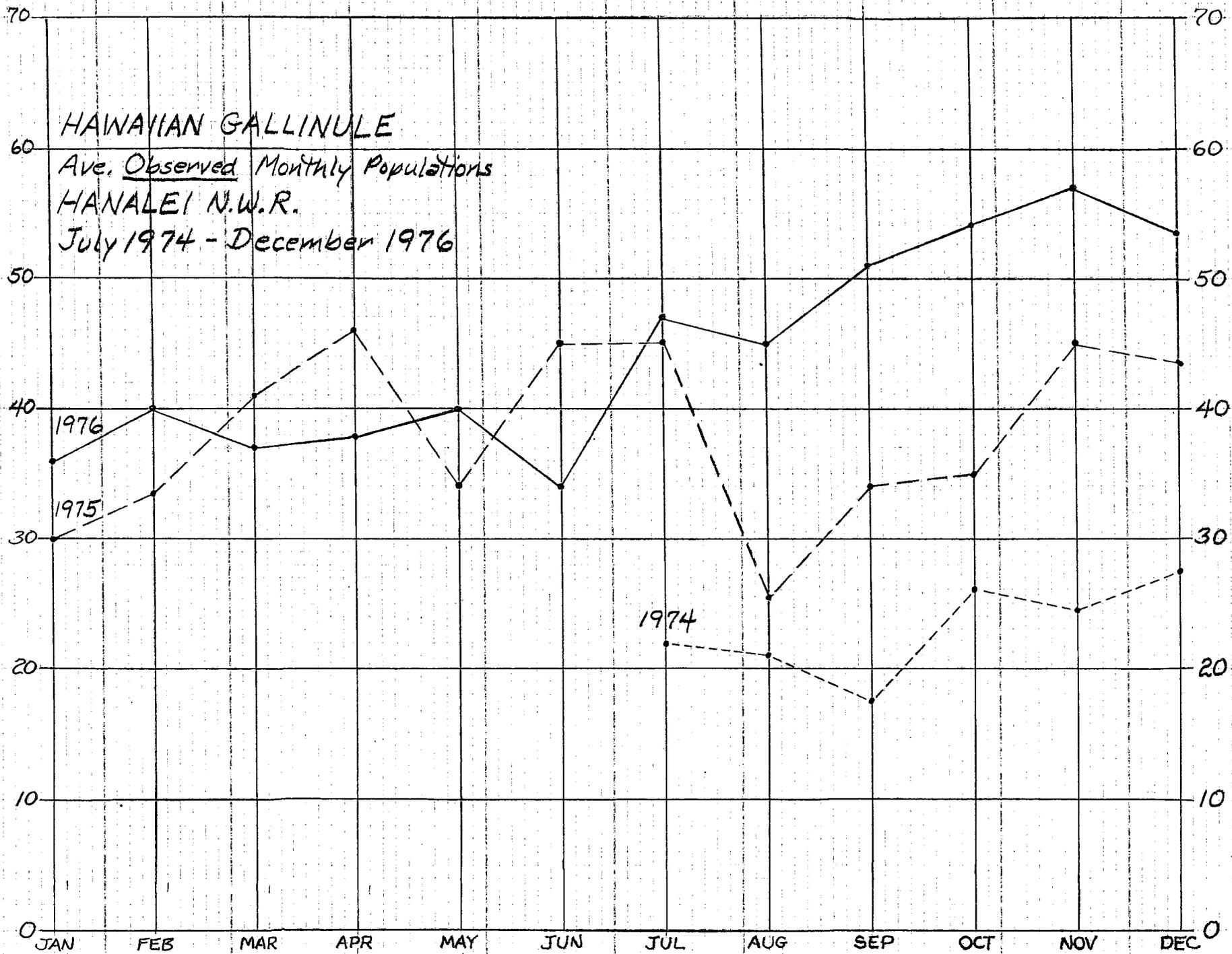
Four endangered species regularly visit the refuge. The Hawaiian duck, Hawaiian gallinule, Hawaiian coot, and Hawaiian stilt are year-round residents, although most coot and stilt seek habitat away from the island of Kauai during the nesting season (January to June). Waterbird censuses were conducted weekly. Such census required about two hours to complete.

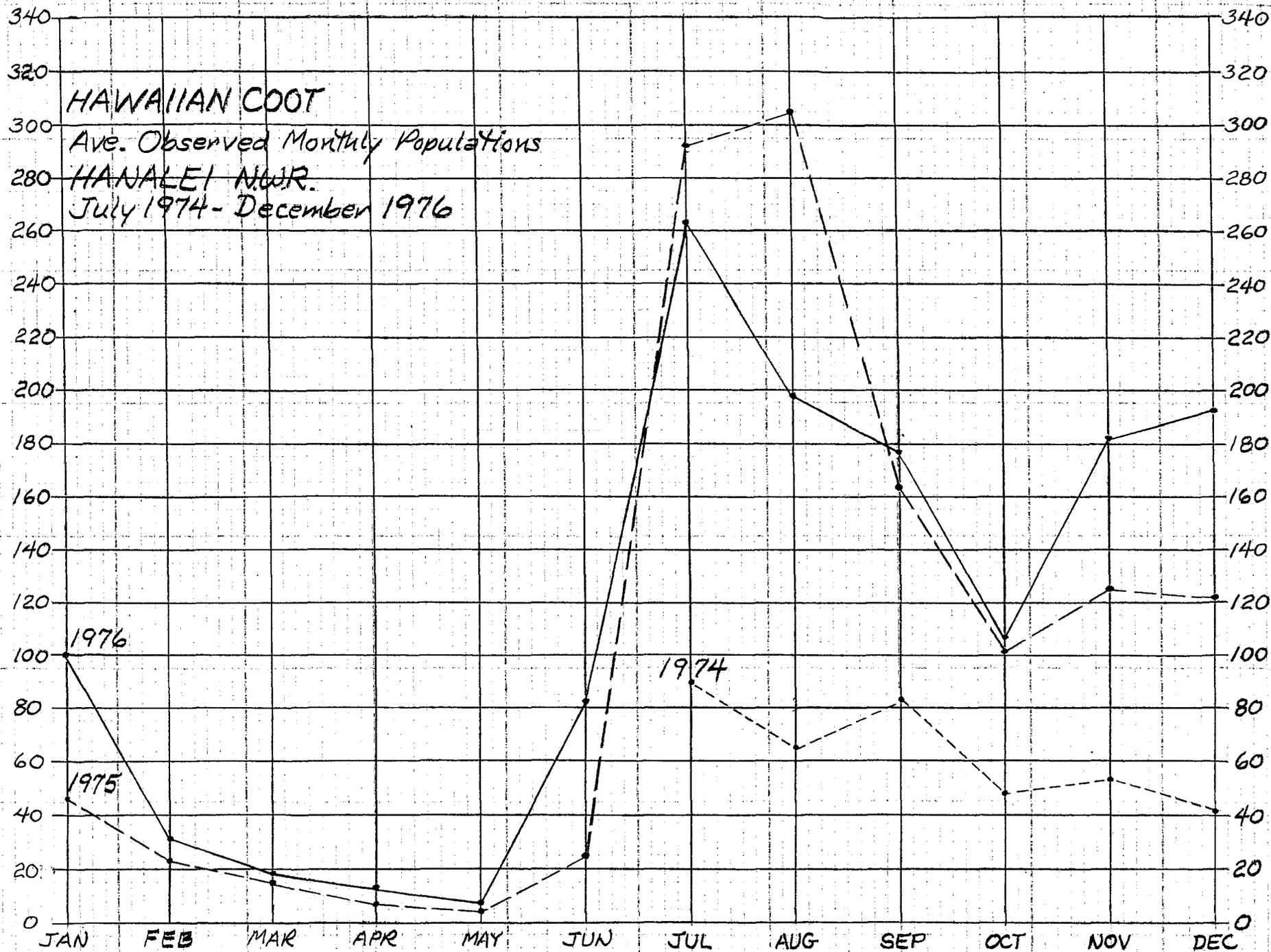
The Hawaiian duck, or koloa (co-lo-ah), is restricted in the wild as a self-sustaining species to the island of Kauai. It is believed that the presence of the introduced mongoose on other islands within the bird's original range has caused its extinction on Hawaii, Maui, Molokai, and Oahu. The Kauai population has been estimated to be 3,000 birds. The peak refuge population of 91 occurred August 27. Refuge use in 1976 was estimated to total 15,240 use days, a 67 percent increase over the estimated 9,120 use days of 1975. The significant increase can at least partially be contributed to decreased human harassment on the refuge and dry conditions elsewhere on the island. The refuge population is considered to be 20 percent higher than numbers observed during censuses.

The Hawaiian gallinule, or 'alae 'ula (ah-lie oo-lah), currently occurs only on Kauai and Oahu. Again, the mongoose is thought to be a major factor in the bird's loss from other islands. Most of the estimated 1,000-bird population occurs on Kauai. The peak refuge population of 110 occurred November 24. Refuge use in 1976 was estimated to total 32,280 use days, a 39 percent increase over the estimated 23,290 use days of 1975. The species is very sedentary, although known to walk long distances between habitats. Reduced human harassment on the refuge, increased nest protection, predator control and dry conditions elsewhere on the island are thought to have contributed to the increase. The refuge population is estimated to be 50 percent higher than observed numbers.

The Hawaiian coot, or 'alae ke'oke'o (ah-lie kay-o-kay-o), still occurs throughout its original range--all the main Hawaiian islands except Lanai. The entire population is estimated to be about 2,500 birds. It is a highly mobile species within and between islands. Most of Kauai's birds fly to Niihau during the nesting season when natural, seasonal marshes (shallow saline lakes) are available there. The peak refuge population of 330







occurred on July 11. Refuge use in 1976 was estimated to total 50,430 use days, a 22 percent increase over the estimated 41,290 use days of 1975. Reasons for the significant increase include reduced human disturbance and predator control on the refuge and drought conditions elsewhere on Kauai and on Niihau during the last half of the year. No nesting occurred on the refuge. The refuge population is estimated to be 20 percent higher than observed numbers.

The Hawaiian stilt, or ae'o (eye-o), like the coot, is highly mobile and still occurs on all islands of its original range. Its entire population is thought to be about 1,500 birds. Many of Kauai's birds fly to Niihau during the breeding season when habitat is available there. The peak refuge population of 181 occurred September 3. Refuge use in 1976 was estimated to total 28,920 use days, a 50 percent increase over the estimated 19,230 use days of 1975. Observed counts are considered representative of the refuge population.

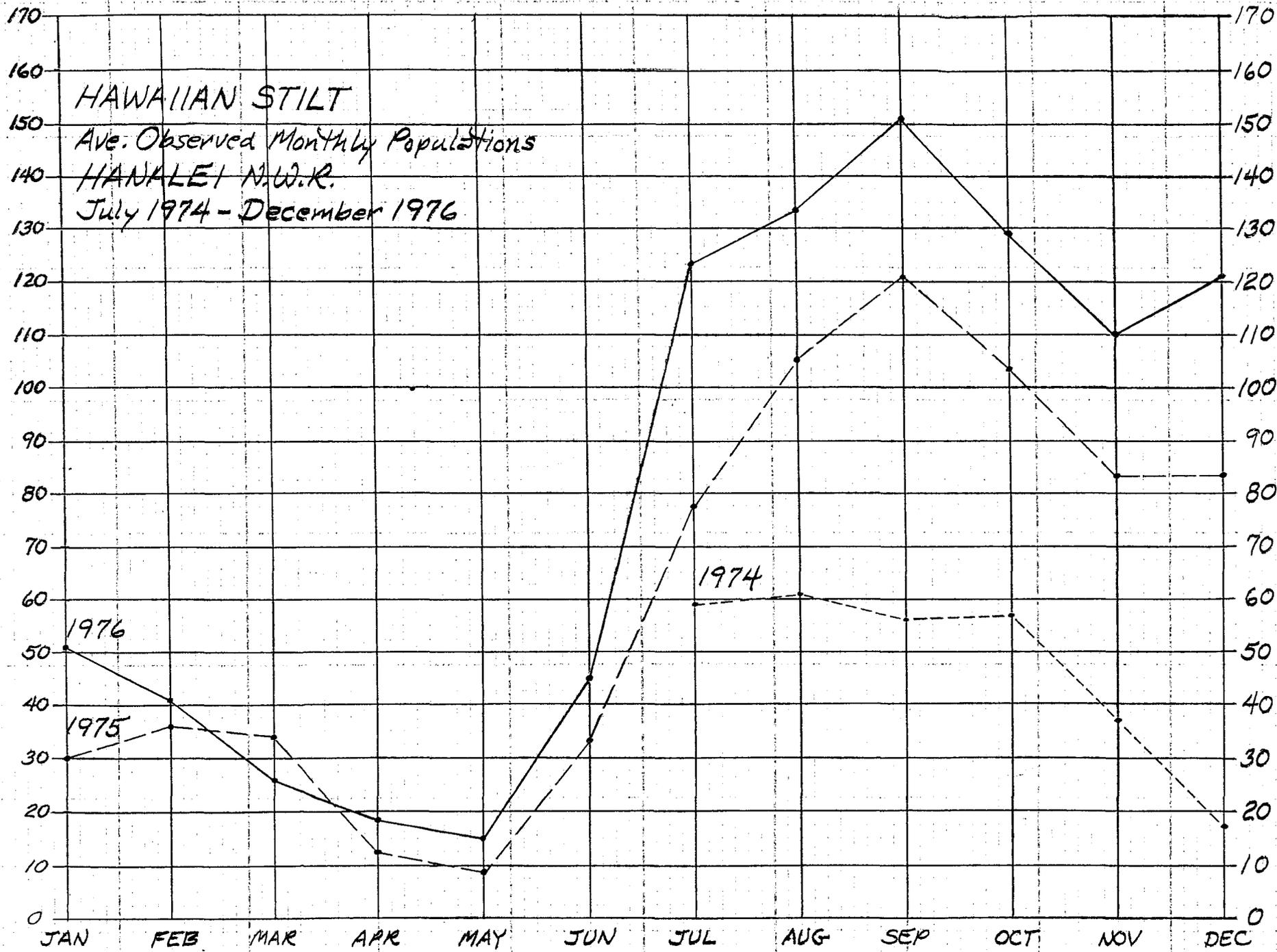
#### B. Migratory Birds:

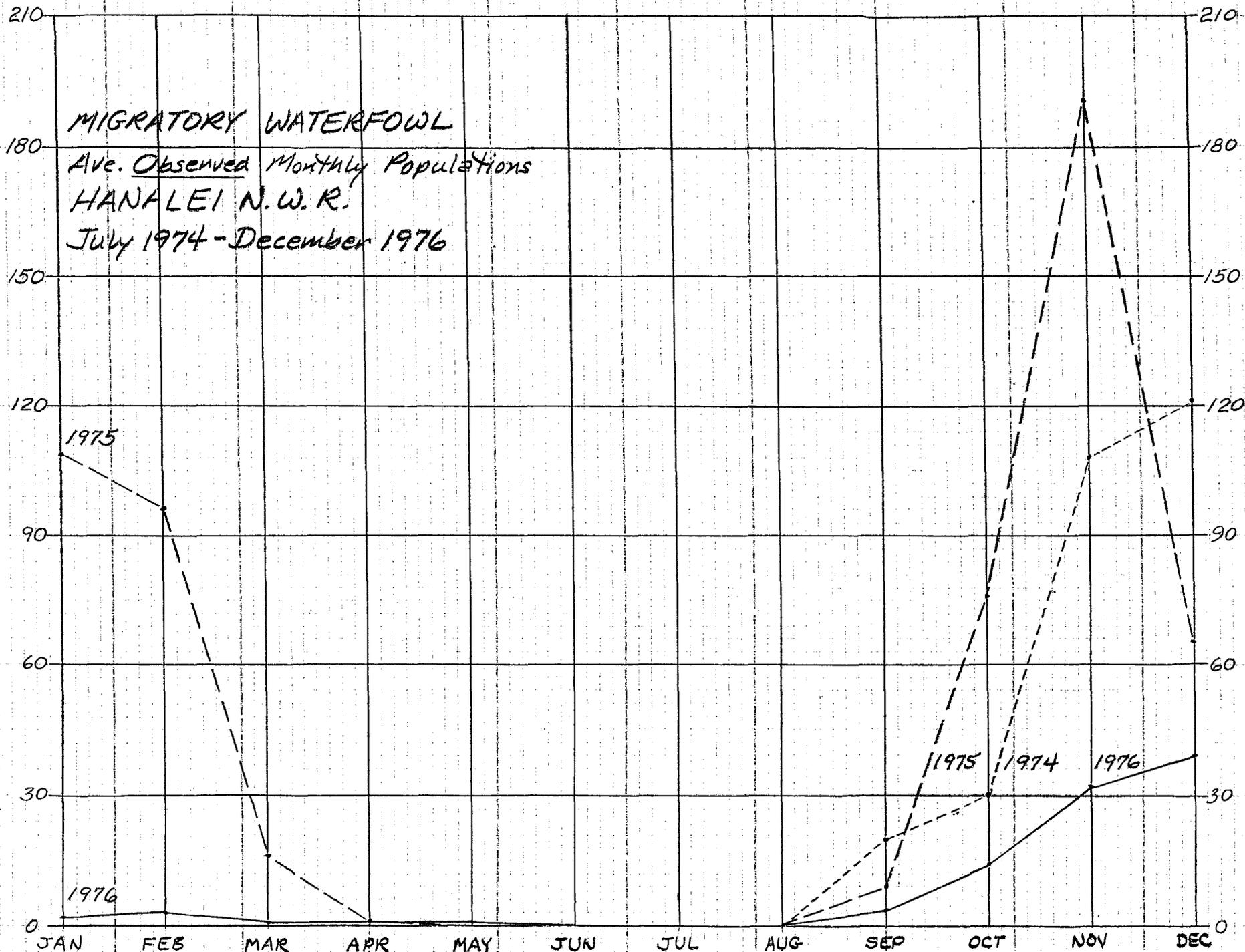
1. Waterfowl: The 4,410 use day total in 1976 was only 26 percent of the level recorded in 1975. A Canada goose (30 UD), mallards (240 UD), pintails (1,860 UD), green-winged teal (150 UD), blue-winged teal (60 UD), cinnamon teal (30 UD), a garganey (30 UD), and Northern shovelers (540 UD) visited during their non-breeding seasons. The lone Canada goose reported by a refuge taro farmer in November was a first for the refuge, as was the garganey teal found in November and December.

2. Marsh and Water Birds: In addition to the endangered gallinule and coot, the introduced cattle egret (20,310 UD) and the indigenous black-crowned night heron (11,460 UD) regularly visited the refuge. The Kauai egret population continued to expand and refuge use increased 40 percent over 1975 usage. The more stable heron population utilized the refuge 19 percent less in 1976 than in 1975. Population peaks were 170 egrets on September 22 and 72 herons on July 1.

3. Shorebirds, Gulls, Terns, and Allied Species: In addition to the endangered stilt, American golden plovers (14,040 UD), common snipes (60 UD), wandering tattlers (1,290 UD), sharp-tailed sandpipers (60 UD), pectoral sandpipers (240 UD), a Western sandpiper (5 UD), and sanderlings (10 UD) visited the refuge. The sharp-tailed and Western sandpipers were detected for the first time. Total use was 14 percent below the level recorded in 1975.

4. Raptors: The introduced barn owl (550 UD) and the indigenous short-eared owl (600 UD) occasionally visited the refuge.





5. Other Migratory Birds: None.

C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: Feral pigs occasionally visit the refuge.

2. Other Mammals: The introduced brown rat, black rat, Polynesian rat, and house mouse occur on the refuge.

3. Resident Birds: The introduced red junglefowl (Polynesia), ring-necked pheasant (Asia), spotted dove (Asia), barred dove (Asia), greater neck-laced laughing-thrush (Asia), melodious laughing-thrush (China), shama thrush (Malaysia), Japanese white-eye (Japan), common myna (India), Western meadowlark (North America), spotted munia (Southeast Asia), house sparrow (New Zealand), cardinal (North America), and house finch (North America) were recorded during the year.

4. Other Animal Life: Nothing to report.

V. INTERPRETATION AND RECREATION

A. Information and Interpretation:

1. On-Refuge: No self-conducted interpretative media exist on the refuge. Conducted programs included 52 visits on motorized tour routes for 26 activity hours (A/H) and 102 visits for exhibits and demonstrations totaling 185 A/H. Seven hundred YMCA Camp Naue youths received 700 A/H of environmental education during the year and 10 University of Hawaii limnology students with the Hawaii Cooperative Fishery Research Unit received 80 A/H of environmental education on the refuge. Groups receiving guidance included the National Audubon Society International Ecology Workshop, San Diego State University, Kapaa High School, Manoa (Oahu) Elementary School, and YMCA Camp Hawaiian Surf.

2. Off-Refuge: Two news releases and seven personal appearances occurred during the year. All appearances included a narrated slide program. All three Kauai high schools were visited.

B. Recreation:

1. Wildlife Oriented: An estimated 480 fishermen spent 960 activity hours (A/H) along the Hanalei River within the refuge. The native diadromous gobies (o'opu) and introduced tilapia (Africa via Southeast Asia) provided most of the recreation. An estimated 334,335 visitors expended about 55,123 A/H observing wildlife and wildlands from the highway overlook and public roads through the refuge. About 16,715 of those visitors spent about 1,389 A/H at photography. Nonconsumptive visitation increased 8

percent over 1975 while total activity hours increased nearly 40 percent.

2. Non-Wildlife Oriented: None permitted or known to have occurred.

C. Enforcement:

Additional signing to discourage public use of taro farm access roads was accomplished during the year. The crossing of endangered species habitat by fishermen was reduced as a result.

VI. OTHER ITEMS

A. Field Investigations:

A program titled Ecological Studies of Inland Waters and Estuaries by the Hawaii Cooperative Fishery Research Unit was continued during the year. The monitoring of specific taro patch use by endangered waterbirds was also continued.

B. Cooperative Programs:

Refuge personnel worked very close with VTN-Pacific as that company prepared an EIS for the proposed rerouting of a State highway through taro lands adjacent to the refuge. It is hoped that the Department of Transportation will maintain the highway on its present route to save the waterbird habitat. Refuge personnel cooperated in the semiannual Hawaii Waterbird Survey, the annual Kapaa Christmas Bird Count, and the Cornell University Nest-Record Card Program.

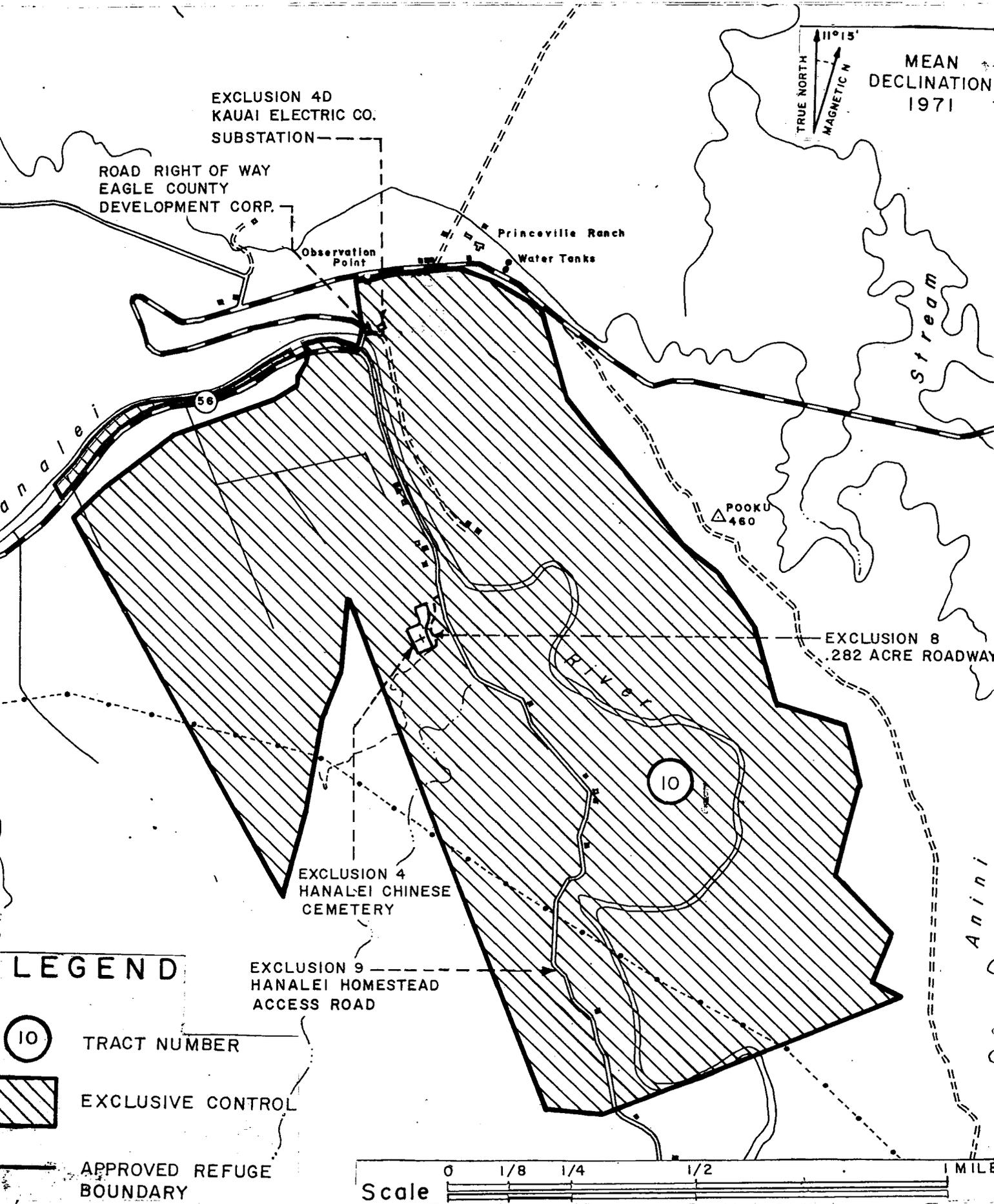
C. Items of Interest:

None to report.

D. Safety:

No safety problems occurred during the year. Several taro farmers working on the refuge became certified at herbicide application.

# KAUAI COUNTY, HAWAII



ROSE ATOLL NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

## I. GENERAL

### A. Introduction:

Rose Atoll National Wildlife Refuge was established by Secretarial Order on April 11, 1974 (39 F.R. 13183) in accordance with a cooperative agreement dated July 5, 1973 between the Government of American Samoa and the U.S. Fish and Wildlife Service.

The refuge contains one of the smallest coral atolls known. The total land surface is about 20 acres. This nearly square, 2-mile wide atoll, is 78 miles east-southeast from the nearest American Samoa island of Ta'u and 150 miles east-southeast of Pago Pago Harbor on Tutuila Island. Coordinates of the atoll are 14°32' S and 168°09' W. Rose Atoll may have derived its name from the rose-pink colored coral composing the atoll. However, another theory holds that it was named by its discoverer, Louis de Freycinct in 1819 in honor of "a lady especially dear" to him.

### B. Climatic and Habitat Conditions:

The nearest weather station to Rose Atoll is located on Tutuila Island at Pago Pago Harbor some 150 miles west-northwest of the atoll. However, Tutuila Island contains some high mountains which drastically alter the precipitation and temperature patterns from those which occur over the drier Rose Atoll. Average daily temperatures at Tutuila range from 78 to 81°F; temperature extremes there ranged from 70 to 95°F. Rose Atoll probably experiences slightly higher temperatures due to the absence of cooling rains. Normal precipitation is thought to be about 20 inches per year, and we suspect that Rose has for the past several years been experiencing drought conditions.

A previously reported dieoff of Pisonia trees has apparently arrested itself and no new dead trees were noted this year during the several visits to the atoll; however, the remaining trees are beginning to show the effect of increased use by roosting seabirds caused by the death of approximately one-half of the grove.

### C. Land Acquisition:

Nothing to report.

### D. System Status:

1. Objectives: Our basic objective for Rose Atoll NWR is the maintenance of the atoll in as near a natural state as possible, holding human intrusion to a minimum in order to encourage greater seabird and turtle use. We also hope to maintain the area

in a natural state for use as a scientific study area as a control for comparison with other atolls which have undergone significant human-caused change.

Due to its isolated location, visits to Rose Atoll are very limited. Monthly surveillance flights over the atoll were started in August 1974. In addition, two trips by boat were made to the atoll during the year using the Government of American Samoa charter vessel ALFONGA. These trips occurred in May and October.

2. Funding: Refuge activities at Rose Atoll NWR are funded out of migratory bird funds allotted to the Hawaiian and Pacific Islands Refuge Complex.

## II. CONSTRUCTION AND MAINTENANCE

### A. Construction:

Nothing to report.

### B. Maintenance:

The only facilities existing on Rose Atoll are one large wooden informational sign and boundary posting. No maintenance was necessary.

### C. Wildfire:

Nothing to report.

## III. HABITAT MANAGEMENT

The objective for Rose Atoll NWR is to allow the island to remain in its natural state. Habitat management consist of protection only.

## IV. WILDLIFE

Data summarized below is from the May-1-7 Environmental Consultants, Inc. reconnaissance visit, the October 19-22 visit by Refuge Manager Sekora, and three reconnaissance flights dated August 17, September 4, and November 11.

### A. Endangered and/or Threatened Species:

Hawksbill turtles are known to visit Rose Atoll especially during the spring breeding season; however, none were seen on the May trip.

B. Migratory Birds:

1. Waterfowl: None occur.

2. Marsh and Waterbirds: The reef heron was first recorded as a breeding species on Rose Atoll in October 1975. Three nests and seven adults (3 white, 3 dark, and 1 intermediate) were observed in May 1976. Seven light-phased and two dark-phased individuals were counted in October.

3. Shorebirds, Gulls, Terns, and Allied Species: During the May Environmental Consultants, Inc. trip, 16 golden plovers, 17 ruddy turnstones, 8 wandering tattlers, and 2 sanderlings were observed. In October, 5 golden plovers, 8 ruddy turnstones, and 6 wandering tattlers were observed. Terns are discussed under seabirds, subparagraph 5 below.

4. Raptors: None occur.

5. Other Migratory Birds: The major wildlife resource of Rose Atoll are the seabird populations which nest and rest there. Population summaries from the May and October visits follow:

Red-tailed Tropicbird	40 (16 nests)	5
Blue-faced Booby	30 (2 nests)	200 (+25 young)
Brown Booby	700 (217 nests)	700 (some nests)
Red-footed Booby	1,000	700 (some nests)
Great Frigatebird	50	750
Lesser Frigatebird	60 (10 nests)*	425 (4 nests)
Sooty Tern	data missing	305 (+4,300 fledgings)
Gray-backed Tern	10,000	0
Brown (Common) Noddy	10	0
Black (White-capped) Noddy	10	5 (2 nests)
White (Fairy) Tern	40	30

\* a nesting range extension

The white-tailed tropicbird is known to occur on Rose Atoll; however, none were seen on either visit.

C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: None occur.

2. Other Mammals: The Polynesian rat was observed on Rose Atoll during the May visit and a trap line was established by ECI as reconnaissance work. Results are not yet available; however, several rats were caught during the October trip. The rat was recorded as extremely abundant on all areas day and night. A total of 250 were observed during daytime and nighttime periods, as compared with 4 and 50 respectively during an October visit of 1974.

3. Resident Birds: Nothing to report.

4. Other Animal Life: Green turtles are abundant in the area of the refuge. Three were observed in the off season of the May visit and a total of 115 sets of tracks indicating at least 67 individuals were noted in October on the two islands of the atoll. Four hundred and six turtle pits were also counted during the October period.

Two lizard species were recorded for Rose Island during the May visit. The Polynesian gecko (gehydra oceanica) represented a new range extension. They were common on Rose Island and ten specimens were collected by ECI personnel. The morning gecko (letidodactylus lugubris) was also observed on the island and noted as uncommon. These species were undoubtedly present, but not noted on the October trip.

V. INTERPRETATION AND RECREATION

No public recreation is allowed. The island serves as an excellent site for study as a scientific research area. Its relatively pristine environment is invaluable in this regard.

VI. OTHER ITEMS

A. Field Investigations:

Environmental Consultants, Inc. began research on the flora and fauna of American Samoa including Rose Atoll in June of 1975. This study was to continue for two years. Upon completion of the research, a comprehensive summary of Rose Atoll wildlife is expected.

B. Cooperative Programs:

Nothing to report.

C. Items of Interest:

Refuge personnel participated in the initial meeting to draft the Pacific Island Issue Paper in December. Rose Atoll is within the area of concern.

D. Safety:

Safety activities and discussions are covered in report for the Hawaiian Islands NWR.

JARVIS ISLAND NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

## I. GENERAL

### A. Introduction:

Jarvis Island National Wildlife Refuge was established by Secretarial Order on June 27, 1974, when full administrative responsibility for the island was transferred from the Office of Territorial Affairs to the U.S. Fish and Wildlife Service (39 F.R. 27930, dated August 2, 1974). The refuge includes the island itself and all surrounding waters and submerged lands within the 3-mile limit.

The refuge is located just south of the equator in the mid-Pacific Ocean ( $0^{\circ}22'30''$  S,  $160^{\circ}01'$  W). As such it is the second southernmost refuge in the System.

Due to the remote nature of the island, visits by refuge personnel are infrequent. This year Assistant Manager Giezentanner traveled to Jarvis aboard the U.S. Coast Guard Buoytender BUTTONWOOD on an aids-to-navigation mission to American Samoa. The island was visited from 11:30 A.M. to 5:30 P.M. on November 5, 1976. This was the first visit by refuge personnel since June 16, 1973 although the island was visited by Coast Guard personnel on December 1, 1975 and by University of Hawaii Geophysics personnel in mid-1975. With the exception of possible trespass by fishermen, we know of no other visits to Jarvis Island.

### B. Climatic and Habitat Conditions:

A weather station was established by University of Hawaii Geophysics personnel in mid-1975. Data from this station is summarized below:

<u>Month</u>	<u>1976</u>		<u>Precipitation</u>
	<u>High</u>	<u>Low</u>	
September	90 <sup>o</sup>	73 <sup>o</sup>	4.76"
October	92 <sup>o</sup>	73 <sup>o</sup>	1.94"
November	90 <sup>o</sup>	79 <sup>o</sup>	1.00"
December	90 <sup>o</sup>	77 <sup>o</sup>	4.78"

The weather station was inoperative during other periods, so no other data is available.

The November 5 visit found what must be ideal vegetative conditions for Jarvis. Dense stands of bunchgrass, Lepturus repens, and a low shrub, Sida fallax, were noted in marked contrast to the poor conditions noted in June of 1973. Puncture vine,

Tribulus cistoides, was widespread over all the island except in the central saline flat.

C. Land Acquisition:

Nothing to report.

D. System Status:

1. Objectives: Our basic objective for Jarvis Island NWR is to maintain the island in as near a natural state as possible and hold human intrusion to a minimum in order to encourage greater seabird use for nesting and resting. Past uses of Jarvis Island have exploited the natural resources, particularly guano, with little regard for the welfare of the bird resources. The bird populations were decimated through World War II and have begun to recover slowly.

2. Funding: Activities for Jarvis Island are funded primarily out of migratory bird funds allotted to the Hawaiian and Pacific Islands Refuge Complex.

## II. CONSTRUCTION AND MAINTENANCE

A. Construction:

Nothing to report.

B. Maintenance:

Since the refuge was visited for only 6 hours during the year, only minor maintenance type work was possible. With the assistance of U.S. Coast Guard personnel, eight boundary signs were placed around the perimeter of the island. A 4 feet by 8 feet redwood information/identification sign was erected near the northernmost landing along the western shore. The inscription "NO TRESPASSING" is provided in English, Japanese, Chinese, and Korean. Appropriate sovereignty ceremonies were conducted. Coast Guard personnel also repainted the red and white day beacon tower on the western shore.

C. Wildfire:

Nothing to report.

### III. HABITAT MANAGEMENT

Our objective for Jarvis Island NWR is to allow the island to revert to its natural state following past disturbances by man. As such, habitat management efforts consist of protection only.

### IV. WILDLIFE

Data summarized below is from the 6-hour visit of November 5, 1976. Use data for other seasons is unknown.

#### A. Endangered and/or Threatened Species:

Hawksbill turtles are known to occur in the waters of Jarvis Island. Four turtles (two large, two small) were seen by Coast Guard personnel in November, but no positive identification was made. Green sea turtles also occur in the area.

The sperm whale probably occurs within the 3-mile seaward boundary limits of Jarvis Island Refuge, but no data exist on the frequency of its occurrence.

#### B. Migratory Birds:

1. Waterfowl: The pintail is an occasional visitor to Jarvis but none were seen on the November visit. No other waterfowl are known to visit here.

2. Marsh and Water Birds: Although not actually occurring on Jarvis, a cattle egret visited the island indirectly. At 0800 on November 4, at 3<sup>0</sup>39' N, 159<sup>0</sup>58' W (approximately 240 miles north of Jarvis and some 150 miles southwest of Fanning Island), one tired egret appeared aboard the ship. It stayed aboard for 3 days as we visited Jarvis and proceeded on south. It departed ship on November 7 some 400-425 miles southwest of Jarvis. This event tends to support the theories that cattle egrets have colonized many areas of the western hemisphere assisted by hitchhiking.

3. Shorebirds, Gulls, Terns, and Allied Species: One flock of 35 plovers or sandpipers were sighted on November 5. Species known to visit Jarvis include the ruddy turnstone, American golden plover, wandering tattler, and bristle-thighed curlew. See section 5 below.

4. Raptors: None known to occur.

5. Other Migratory Birds: The major wildlife resource of Jarvis is the seabird population which nests there. This population has shown a gradual but slow recovery following the devastation thrust upon the area during past guano, colonization, and

military operations. A population summary from the November 5, 1976 visit follows (Data Class D):

- White-tailed tropicbird - 3
- Red-tailed tropicbird - 18
- Blue-faced booby - 4,000 with 400 nesting
- Brown booby - 1,000 with approximately 50 nesting
- Red-footed booby - less than 10
- Great frigatebird - 60
- Lesser frigatebird - 25
- Sooty tern - approximately 125,000
- White (fairy) tern - only 10 observed

Most blue-faced boobies were incubating at the time of the visit; only two newly-hatched young were observed. Brown boobies were also incubating; no young were observed.

The seabird populations of Jarvis are undoubtedly much larger than those found. Typically seabirds fly out to sea in the early morning to feed, returning to the island in the evening. During nonnesting seasons, many species remain at sea for months. Sooty terns were probably just beginning their mid-winter breeding season buildup.

Species not observed over the island, but known to occur on and near Jarvis Island include Phoenix petrel, wedge-tailed shearwater, Christmas shearwater, Audubon's shearwater, white-throated storm petrel, gray-backed tern, crested tern, blue-gray noddy, and brown noddy. The Christmas shearwater and several petrels (probably Phoenix petrel) were seen nearby during seabird transects.

C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: None occur.

2. Other Mammals: Pacific bottlenose dolphins are common in refuge waters. An estimated 100 animals "greeted" the ship on arrival on November 5, and several escorted us to shore.

Several house mice were seen. Feral cats still remain from past human activities. Over 50 were seen during the 6-hour visit. Twelve were eliminated. The cats undoubtedly cause a significant drain on the nesting bird population and may be largely responsible for the inability of some former nesting species such as wedge-tailed shearwaters to reestablish nesting colonies there. We plan to eliminate the cats as soon as possible, but poisoning restrictions and limited transportation opportunities are severe limiting factors.

3. Resident Birds: None occur.

4. Other Animal Life: Reef black-tipped sharks are abundant in waters within the surrounding reef. Most are small (less than 5 feet in length). Over 50 were seen on our initial survey around the island.

Red hermit crabs are abundant. It was not uncommon to see several hundred clustered under beach debris. Their presence would complicate any chemical cat control programs. Small miller moths and spiders were common in the Sida fallax association in the center of the island. Spiny lobster shells and large clam shells are common beach litter.

Green sea turtles are known to occur in the Jarvis Island area. It is possible that the four turtles reported under section IV.A. may have been green sea turtles.

## V. INTERPRETATION AND RECREATION

Due to the remote nature of Jarvis Island, no public recreation or environmental education is possible. The island may be used in the future as a scientific study area.

The annual trip with the Coast Guard doubles as an enforcement patrol to record past unauthorized visits to the island.

## VI. OTHER ITEMS

### A. Field Investigations:

A special use permit was issued to Dr. Martin Vitousek, University of Hawaii Institute of Geophysics, on March 14, 1975, for the construction and maintenance of a weather station. Data received is part of the National Science Foundation's North Pacific Experiment, Line Islands Program, a part of the International Decade of Ocean Exploration. The weather study will continue through 1980.

### B. Cooperative Programs:

Nothing to report.

### C. Items of Interest:

Refuge personnel participated in the initial meeting to draft the "Pacific Islands Issue Paper" in December. Jarvis Island is within the area of concern.

### D. Safety:

Safety activities and discussions are covered in the report for the Hawaiian Islands NWR.

HOWLAND ISLAND NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

## I. GENERAL

### A. Introduction:

Howland Island National Wildlife Refuge was established by Secretarial Order on June 27, 1974 when full administrative responsibility for the island was transferred from the Office of Territorial Affairs to the U.S. Fish and Wildlife Service (39 F.R. 27930 dated August 2, 1974). The refuge is located just north of the equator in the central Pacific Ocean at 0°49'N, 176°43'W, and is approximately 40 miles northwest of Baker Island NWR. The refuge includes the island itself and all surrounding waters and submerged lands within the 3-mile limit.

Due to the remote nature of the island, visits by refuge personnel are infrequent. In March of this year, Refuge Manager Sekora traveled to Howland Island aboard the U.S. Coast Guard Cutter, BURTON ISLAND. The island was visited from 5:30 A.M. to 9:30 A.M. on March 20, 1976. This was the first visit by refuge personnel since July 6, 1973. With the possible exception of trespass by fishermen, we know of no other visits to Howland Island since July 1973.

### B. Climatic and Habitat Conditions:

The nearest weather station to Howland Island is located at Canton Island some 450 miles southeast. Data from this station are comparable to Howland Island. Since there are virtually no monthly or yearly weather extremes on these low, equatorial islands, the long-term temperature and precipitation summary as given below for Canton Island is thought to be representative for the region in 1976.

Daily Temperature and Precipitation Averages (1931-1960)  
Canton Island (2°46' S, 171°43' W)

	<u>Maximum</u>	<u>Minimum</u>	<u>High</u>	<u>Low</u>	<u>Precipitation</u>
January	88.4	77.8	98	72	2.61
February	88.2	77.7	96	72	2.13
March	88.5	77.7	96	71	2.49
April	89.3	77.9	97	70	3.62
May	89.7	78.1	98	71	4.35
June	89.5	78.0	96	71	2.65
July	89.4	77.7	96	71	2.59
August	89.3	77.7	97	71	2.50
September	89.5	77.7	97	72	1.24

	<u>Maximum</u>	<u>Minimum</u>	<u>High</u>	<u>Low</u>	<u>Precipitation</u>
October	89.6	77.8	97	72	1.10
November	89.2	77.9	98	72	1.61
December	89.4	77.8	95	71	2.54
Yearly Average	89.1	77.8			29.43

Although found to be quite dry, the island was decidedly more green than Baker Island which was visited the previous day. Howland Island has a much more extensive vegetative cover than does Baker. The island is carpeted with a dense stand of grass, Digitaria, interspersed with large patches of puncture vine, Tribulus cistoides. The perimeter of the island is covered by a belt of bunch grass, Leptulus repens.

C. Land Acquisition:

Nothing to report.

D. System Status:

1. Objectives: Our basic objective for Howland Island NWR is to maintain the area in as near a natural state as possible and hold human intrusion to a minimum in order to encourage greater seabird use. Past uses of Howland Island have exploited the natural resources, particularly guano, with little regard for the welfare of the bird resources. The bird populations were decimated and have recovered slowly since the facilities such as roads, airstrips, and barracks built during World War II were removed. A few feral cats still remain and probably prohibit the reestablishment of some species such as wedge-tailed shearwaters which formerly nested on Howland Island. Transportation to the island is difficult and infrequent.

2. Funding: Activities for Howland Island NWR are funded primarily out of migratory bird funds allotted to the Hawaiian and Pacific Islands Refuge Complex.

## II. CONSTRUCTION AND MAINTENANCE

A. Construction:

Nothing to report.

B. Maintenance:

Since the refuge was visited for only 4 hours during the year, only minor maintenance-type work was possible. Five refuge

boundary signs were installed around the perimeter of the island. With the assistance of U.S. Coast Guard personnel, a 4 feet by 8 feet redwood information/identification sign was erected northwest of the old Amelia Earhart Day Beacon Tower midway along the western shore. The inscription "NO TRESPASSING" is provided in English, Japanese, Chinese and Korean. Appropriate sovereignty ceremonies were conducted.

C. Wildfire:

Nothing to report.

III. HABITAT MANAGEMENT

The objective for Howland Island NWR is to allow the natural resources of the island to revert to their natural state following past disturbances by man. As such, habitat management efforts consist of protection only. Cleanup of remaining World War II debris is desirable, but not feasible due to the difficulties encountered in arranging access to the island.

IV. WILDLIFE

Data summarized below is from the 4-hour visit of March 20, 1976. Data for other seasons is unknown.

A. Endangered and/or Threatened Species: Hawksbill turtles are known to occur in waters near Howland Island; however, no turtle sign was observed.

The sperm whale probably occurs within the 3-mile seaward boundary limits of Howland Island but no data exists on frequency of their occurrence.

B. Migratory Birds:

1. Waterfowl: The pintail is an occasional vagrant visitor to Howland Island but none were seen on the March visit. No other waterfowl are known to visit the island.

2. Marsh and Waterbirds: None known to occur.

3. Shorebirds, Gulls, Terns, and Allied Species: Two American golden plovers and one wandering tattler were the only shorebirds observed on Howland. Bristle-thighed curlews and ruddy turnstones are also known to visit Howland on occasion. Tern observations are summarized under paragraph 5.

4. Raptors: None occur.

5. Other Migratory Birds: The major wildlife resources of Howland Island are the seabirds which nest and rest there. Past visits have reported more birds present on Howland than on Baker Island; however, on the March 1976 trip, the reverse was true. A summary of the populations found on the March 20 visit follows (Data Class D):

Blue-faced booby - greater than 3,400 with 1,675 nests  
Brown booby - 275, no nests found  
Frigatebirds (great and lesser) - 550  
Sooty tern - 3,500

Blue-faced boobies were incubating and few hatchlings or nestlings were found. Frigatebirds were using the remnants of the forest area behind the Amelia Earhart Tower as a roost, but were not nesting.

The seabird populations of Howland Island are undoubtedly much larger than those observed on this trip. Typically seabirds fly out to sea in the early morning to feed, returning to the island in the evening. During the nonnesting season, many species remain at sea for months.

Species not observed on the island but known to breed in the nearby Phoenix Island group include the Phoenix petrel, Bulwer's petrel, wedge-tailed shearwater, Christmas shearwater, Audubon's shearwater, white-throated storm petrel, red-tailed tropicbird, white-tailed tropicbird, red-footed booby, gray-backed tern, blue-gray noddy, brown noddy, black noddy, and white tern. With the exception of the petrels and shearwaters, most of the other species are known to nest on Howland at certain times of the year.

C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: None occur.

2. Other Mammals: A few feral cats are still in evidence on Howland Island. During the March trip, one live and one dead cat were noted. Due to the dense vegetation on the island, it is unknown how many cats actually remain. House mice occur on Howland but none were found on this trip.

Pacific bottlenosed dolphins are common in refuge waters within the 3-mile refuge boundary limits at certain seasons of the year; however, no dolphins were observed during the March visit.

3. Resident Birds: None occur.

4. Other Animal Life: Numerous unidentified small, lined skinks were present in March. An unknown species of small ant was observed. No flies or mosquitoes were noted. Red hermit crabs were common throughout the island, especially near the shore.

Green sea turtles are known to occur in Howland Island waters, but no turtle signs were observed.

#### V. INTERPRETATION AND RECREATION

Due to the remote nature of Howland Island, no public recreation or environmental education is possible. The island may be used in the future as a scientific study area. The annual trip with the Coast Guard doubles as an enforcement patrol to record past or unauthorized visits to the island. No recent signs of human use and unauthorized trips were noted on the March visit.

#### VI. OTHER ITEMS

##### A. Field Investigations:

Nothing to report.

##### B. Cooperative Programs:

Nothing to report.

##### C. Items of Interest:

Refuge personnel participated in the initial meeting to draft the Pacific Islands Issue Paper in December. Howland Island was within the area of concern.

##### D. Safety:

Safety activities and discussions are covered in the report for the Hawaiian Islands NWR.

KAKAHAIA NATIONAL WILDLIFE REFUGE  
Molokai, Hawaii

ANNUAL NARRATIVE REPORT  
CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM  
Fish and Wildlife Service  
U.S. DEPARTMENT OF THE INTERIOR

## I. GENERAL

### A. Introduction:

Kakahaia National Wildlife Refuge is located on the south central shore of the island of Molokai, Hawaii. It is 5 miles east of the community of Kaunakakai, whose population is 1,070. The population of the entire 261 square-mile island was 4,900 in 1972. The 15-acre Kakahaia Pond and surrounding buffer zone was purchased to provide habitat for endangered Hawaiian coots and Hawaiian stilts. Several species of introduced upland game birds and song birds also frequent the area.

### B. Climatic and Habitat Conditions:

The southern coast of Molokai receives from 15-20 inches of rain annually, mostly during the winter months. Temperatures range from 60-85°F.

The area is located in a volcanic coastal plain. Soils are poorly drained with a high salt content. The brackish water table fluctuates with the tides. Soil carried seaward from the adjacent mountains as a result of overgrazing has silted in much of Kakahaia Pond, an ancient Hawaiian fish pond.

The pond is fringed with heavy stands of roundstem bulrush (Scirpus sp.). The surrounding upland buffer zone supports a dense stand of kiawe trees or mesquite (Prosopis pallida) and was the headquarters for a kiawe charcoal plant prior to refuge acquisition.

### C. Land Acquisition:

1. Fee Title: An offer to purchase 41.961 acres in and surrounding Kakahaia Pond for \$621,500 was accepted by the owners, Philip P. W. Won and Associates, on July 23, 1975. Following the completion of an Environmental Impact Assessment, the Regional Director issued a negative declaration of the need for a formal EIS. Authority for purchase of the area was granted by the Endangered Species Act of 1973 with funds provided by the Land and Water Conservation Act.

Formal title was filed on April 1, 1976 and title was vested in the U.S. Government on April 2, 1976.

Acquisition of four small kuleanas on the mountain side is continuing.

2. Easements: Nothing to report.

3. Other: Nothing to report.

D. System Status:

1. Objectives: The primary objective of the Kakahaia NWR will be the protection and maintenance of habitat for endangered Hawaiian waterbirds. The area is expected to be designated as critical habitat for Hawaiian coots and Hawaiian stilts under the Endangered Species Act of 1973. Limited interpretive opportunities may be developed in the future.

2. Funding: Activities are funded by the Endangered Species Program.

II. CONSTRUCTION AND MAINTENANCE

A. Construction:

Nothing to report.

B. Maintenance:

Initial boundary posting of Kakahaia NWR was accomplished following the April 2, 1976 transfer. Brush was piled at old entrance roads to the charcoal plant. A 4 foot by 8 foot redwood recognition sign was ordered but has not yet been received. A cleanup of the old charcoal plant and several former inholdings is planned.

C. Wildfire:

Nothing to report.

III. HABITAT MANAGEMENT

The primary objective of Kakahaia NWR is the maintenance of the existing habitat. Some work to deter siltation and bulrush encroachment is planned.

IV. WILDLIFE

A. Endangered and/or Threatened Species:

The Hawaiian coot is the main species found on Kakahaia NWR. The population present varied from a low of six seen on March 9 to a high of 44 observed on December 10; average population was 27 birds. Ten nests were noted and approximately a dozen young were produced.

Although both the Hawaiian gallinule and the Hawaiian stilt have been known to visit Kakahaia Pond; none were observed during 1976.

B. Migratory Birds:

1. Waterfowl: Pintails, northern shovelers, and American wigeon are common winter visitors, with a peak of 61 pintails and 46 shovelers present on November 29. A wigeon was observed on May 7, an extremely late date for a spring migrant.

2. Marsh and Water Birds: Two to five black-crowned night heron were present all year. The only other waterbird known to frequent Molokai is the cattle egret, a few of which were occasionally observed near Kakahaia.

3. Shorebirds, Gulls, Terns, and Allied Species: The deep water of the pond and the absence of adjacent mud flats are not attractive to shorebird use. Golden plovers are occasionally present in winter along the ocean shoreline, but no other species are known to regularly visit the refuge.

4. Raptors: The native pueo (short-eared owl) and the introduced barn owl undoubtedly visit the refuge on occasion.

5. Other Migratory Birds: Nothing to report.

C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: Axis deer are abundant on Molokai and frequently visit the refuge. A dead fawn (cause of mortality is unknown) was found on the refuge in September. No other game mammals are present.

2. Other Mammals: The mongoose is an abundant pest that plays havoc with ground nesting birds. Some control will be necessary within the refuge. The surrounding reservoir of animals is great and will hamper success of any elimination program.

3. Resident Birds: Spotted and barred doves, gray and black francolins, and California quail, all introduced game birds, are present on the refuge. Resident introduced song birds are the mockingbird, common myna, Japanese white-eye, house sparrow, house finch, red-crested cardinal, cardinal, spotted munia, and rock dove. At this point we should note that of the five resident endemic or indigenous birds occurring on the refuge (pueo, aukuu, coot, stilt, and gallinule) the latter three are endangered, and many feel the other two may soon be added to the list.

4. Other Animal Life: Nothing to report.

## V. INTERPRETATION AND RECREATION

### A. Information and Interpretation:

1. On-Refuge: Discussions are underway with the County of Maui, Department of Parks and Recreation, for a county-operated park on the refuge beach frontage across the highway from Kakahaia Pond. Their plans include interpretive overlooks near the pond and informational signs about the birds as well as the usual picnic tables and other primitive facilities.

2. Off-Refuge: Nothing to report.

### B. Recreation:

1. Wildlife Oriented: See V. A. 1. above.

2. Nonwildlife Oriented: See V. A. 1. above.

### C. Enforcement:

Since the refuge is visited only once each month, enforcement of refuge regulations and adequate protection of the birds is a problem. Molokai has a large amount of land open for upland bird and big game hunting. As such, we have noted a much greater frequency of shot-up signs, etc., than on some other islands. The proximity of the pond to the public highway also poses a very real threat of illegal shooting of the birds. Several instances of littering and boundary sign vandalism were noted, but no apprehensions were made. State Fish and Game wardens assist in watching over the area.

## VI. OTHER ITEMS

Nothing to report.

KILAUEA POINT WILDLIFE ADMINISTRATIVE SITE  
(Hawaiian Islands NWR Subheadquarters)  
Kilauea, Kauai, Hawaii

ANNUAL NARRATIVE REPORT  
CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM  
Fish and Wildlife Service  
U.S. DEPARTMENT OF THE INTERIOR

Kilauea Point and the old lighthouse as observed from  
a viewpoint maintained at the station's boundary . . .

and as observed from the air. An aero-beacon installed  
by the Coast Guard in June replaced the 1913 structure.

## I. GENERAL

### A. Introduction:

The 31-acre U.S. Coast Guard Light Station is managed under license by the Service (since October 1974) as a refuge subheadquarters for the island of Kauai (Cow-á-ee) and the protection of a portion of the largest seabird colonies on the main Hawaiian Islands. The area includes the most northerly point of land on the main islands and includes an office building, three residences and two small storage buildings. It is a popular visitor destination due to scenic value, wildlife populations and a deactivated lighthouse which contains the largest clamshell-shaped lens in the world (12 feet tall; 6,700 pounds of glass; 4,800 pounds of brass). Seven species of seabirds, representative of the fauna of the Hawaiian Islands Refuge which is inaccessible to the public, can regularly be observed at this site. An additional seven species appear less predictably.

### B. Climatic and Habitat Conditions:

A weather station is maintained by the National Weather Service on the site. Total rainfall for the year was 40.99 inches, about 82 percent of normal (50 inches). It was particularly dry during the October-December period. The average temperature was 74.8°F (ranging from 70.8 in March to 78.8 in September). The highest temperature for the year occurred on the unlikely date of November 25 while the annual low of 61°F was recorded March 14. Habitat conditions were acceptable for the large red-footed booby and wedge-tailed shearwater colonies, although some shearwater chicks lost their "vegetative burrows" as dense plants they were being raised under began dropping their leaves in October due to drought conditions. The shearwaters fledged successful in late November and early December.

### C. Land Acquisition:

In June an automated beacon replaced the historic lighthouse. It is anticipated that the U.S. Coast Guard will soon declare most of the land within the site excess to its needs. It is further anticipated that the Service will acquire those lands and all buildings except the two lighthouse structures.

### D. System Status:

1. Objectives: There are no specific Annual Work Plan Advice objectives for this site. Maintenance of buildings and grounds for Service use and public visitation was performed during the year. Twelve feral cats were removed. Monitoring of booby and shearwater nests resulted in the completion of several Cornell University N.A. Nest-Record Cards and one



Colonial Bird Register form. PFMIS and PPBE output reporting was refined and applied throughout the year. No activities were determined to be out of phase with approved Kauai objectives.

2. Funding: Funding is from both the Interpretation and Recreation and Endangered Species Program. No breakout is provided for this area.

## II. CONSTRUCTION AND MAINTENANCE

### A. Construction:

None.

### B. Maintenance:

Minor maintenance included installation of flooring in the quarters occupied by the Hawaii Cooperative Fishery Research Unit Leader and his family, complete exterior and interior painting of the two-room office building, continued trash cleanup, additional public use signing, and improvement of electrical wiring in all buildings.

### C. Wildfire:

No natural adversities occurred during the year.

## III. HABITAT MANAGEMENT

### A. Croplands:

None.

### B. Grasslands:

None.

### C. Wetlands:

None.

### D. Forestlands:

None.

### E. Other Habitat:

Some brush removal was accomplished to enhance shearwater nesting habitat and encourage the few native plant species still occurring on the site to increase.

F. Wilderness and Special Areas:

None.

G. Easements for Waterfowl Management:

None.

IV. WILDLIFE

A. Endangered and/or Threatened Species:

A single American peregrine falcon, an accidental winter visitor to Hawaii, resided near the site from November 1, 1975 through January 15, 1976. Single Newell's Manx shearwaters (a threatened species) occasionally land at the site en route to or from inland nesting grounds.

B. Migratory Birds:

1. Waterfowl: None.

2. Marsh and Water Birds: Seabird populations at the site continued to expand as a result of increased protection since October 1974. Black-footed albatrosses (10 U/D), Laysan albatrosses (165 U/D), wedge-tailed shearwaters (1,233,000 U/D), red-tailed tropicbirds (980 U/D), white-tailed tropicbirds (1,080 U/D), blue-faced boobies (20 U/D), brown boobies (1,700 U/D), red-footed boobies (340,500 U/D), great frigatebirds (6,990 U/D), and cattle egrets (410 U/D) were recorded during the year. Total use was 50 percent higher than 1975 use. Production included 1,000 shearwaters, one red-tailed tropicbird, two white-tailed tropicbirds, and 220 red-footed boobies.

3. Shorebirds, Gulls, Terns, and Allied Species: Three or four American golden plovers (870 U/D) and one or two wandering tattlers (360 U/D) over-wintered at the site. A single sooty tern (5 U/D) appeared in early June. Total use was 19 percent above one year earlier.

4. Raptors: The introduced barn owl (450 U/D) and the indigenous short-eared owl (120 U/D) visited the site. Total use was 30 percent above 1975 use.

5. Other Migratory Birds: None.

C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: None.

One of Kilauea Point's 1,100 red-footed boobies  
with its chick in May. An additional 2,000  
birds nest outside the station's boundary.

2. Other Mammals: Spinner dolphins were observed in the lee of the point from late February to mid-October. They were particularly apparent in May and June. Endangered humpback whales visited waters adjacent to the point through early May. Introduced rats and the house mouse occur on the site.

3. Resident Birds: The introduced ring-necked pheasant (Asia), spotted dove (Asia), barred dove (Asia), melodious laughing-thrush (China), mockingbird (North America), shama thrush (Malaysia), Japanese white-eye (Japan), common mynah (India), Western meadowlark (North America), spotted munia (Southeast Asia), house sparrow (New Zealand), cardinal (North America), and house finch (North America) were present throughout the year.

4. Other Animal Life: Up to four green sea turtles foraged in waters adjacent to the point throughout the year.

## VI. INTERPRETATION AND RECREATION

### A. Information and Interpretation:

1. On-Refuge: An interpretive display with pictures of seabirds and a list of species with periods of occurrence was placed in a window at the office building. An estimated 42,600 people spent about 3,550 hours at this display. Conducted exhibits and demonstrations were received by 222 people for 336 activity hours. Environmental education was received by 179 students for 101 hours of activity. Twenty college students received 110 hours of instruction.

2. Off-Refuge: One news release and seven personal appearances occurred during the year. All appearances included a narrated slide program.

### B. Recreation:

1. Wildlife Oriented: Sixty-five fishermen (who must check in and out) spent 146 hours at saltwater shore fishing during the year. An estimated 84,400 visitors (determined through the use of an electronic traffic counter and periodic vehicle occupancy rate checks) spent about 21,100 activity hours observing wildlife and wildlands within the site. About 8,400 of these visitors spent about 700 activity hours at photography.

2. Non-Wildlife Oriented: None permitted or known to have occurred.

The wildlife interpretative sign placed in a window (safe from the weather) in the office next to the lighthouse on Kilauea Point.

C. Enforcement:

The site is open to public visitation from 12 noon to 4 P.M. daily except Saturday. Access is closely monitored to afford protection to seabird colonies. The site was formerly (prior to 1975) opened to the public during all daylight hours. Several years ago seabird colonies at the site were more extensive. By 1975 public visitation had increased substantially and the birds had moved away from areas constantly influenced by people. Since the restriction of public access to 4 hours/6 days per week, bird populations have responded favorably. People still occasionally attempt to enter past entrance gate signs from time to time, but they are immediately asked to return during posted visiting hours.

VI. OTHER ITEMS

A. Field Investigations:

Shearwater and red-footed booby colonies are monitored throughout their nesting cycles to document phenology, production, and colony location and size.

B. Cooperative Programs:

The Hawaii Cooperative Fishery Research Unit (Leader, Dr. John Maciolek) has established a field station at the site where the leader also resides with his family. The unit has intensified estuarine and inland water studies on Kauai during the year. Hanalei and Huleia Refuge studies will result. Refuge personnel participated in the Kapaa Christmas Bird Count, the Cornell University Nest-Record Card Program, the Colonial Bird Register, and the Hawaii Audubon Society.

C. Items of Interest:

This report was prepared by Assistant Refuge Manager Zeillemaker.

D. Safety:

No safety problems occurred during the year. An electrical inspection was accomplished and corrective action taken where necessary.

HULEIA NATIONAL WILDLIFE REFUGE

Puhi, Kauai, Hawaii

ANNUAL NARRATIVE REPORT

CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

A view of the Huleia Refuge  
bottomlands and nearby mountains.

## I. GENERAL

### A. Introduction:

The 238-acre Huleia (Hoo-lay-ee-a) Refuge is located in the lower portion of the Huleia Valley upstream from Nawiliwili Harbor on the east shore of the island of Kauai (Cow-á-ee), Hawaii. The estuary of the Huleia River runs from west to east through the refuge. Bottomlands once supported rice and taro crops, but have remained as low-grade pasture since the 1930s. Old dikes provide shallow impoundments during wetter seasons of the year. The estuary, old drainage ditches, a small perennial stream, and the seasonally flooded bottoms provide habitat for Hawaii's endangered species of waterbirds.

### B. Climatic and Habitat Conditions:

Only 28 inches of rainfall was recorded at nearby Puhi during the year, 70 percent of the normal 40 inches. February and March were significantly wetter than normal, while January, May, October, November and December were much drier than normal. November rainfall was only 22 percent of normal. The average temperature at nearby Lihue was 76.1<sup>0</sup>F (range 72.5 in March to 79.9 in July). The annual high of 87<sup>0</sup>F was recorded on July 24, August 17, and September 25. The annual low of 57<sup>0</sup>F was recorded on February 2. Much of the refuge bottomlands were choked by a heavy growth of fleabane (Pluchea indica) early in the year. The refuge grazing permittee was having difficulty locating his animals and we felt the conditions did not allow sufficient waterbird use. He obtained a D-4, we set the ground rules, and the brush was cleared from a few areas on an experimental basis during the summer. Shallow impoundments appeared as infrequent rains returned in October. Hawaiian stilts utilized the refuge on a sustained basis for the first time as a result. We hope to expand the program as conditions allow.

### C. Land Acquisition:

Efforts to acquire four kuleanas (inholdings) on the refuge continued during the year. Refuge bottomland development is dependent on the successful completion of the "land swaps" in progress. Completion is expected in CY 1977.

### D. System Status:

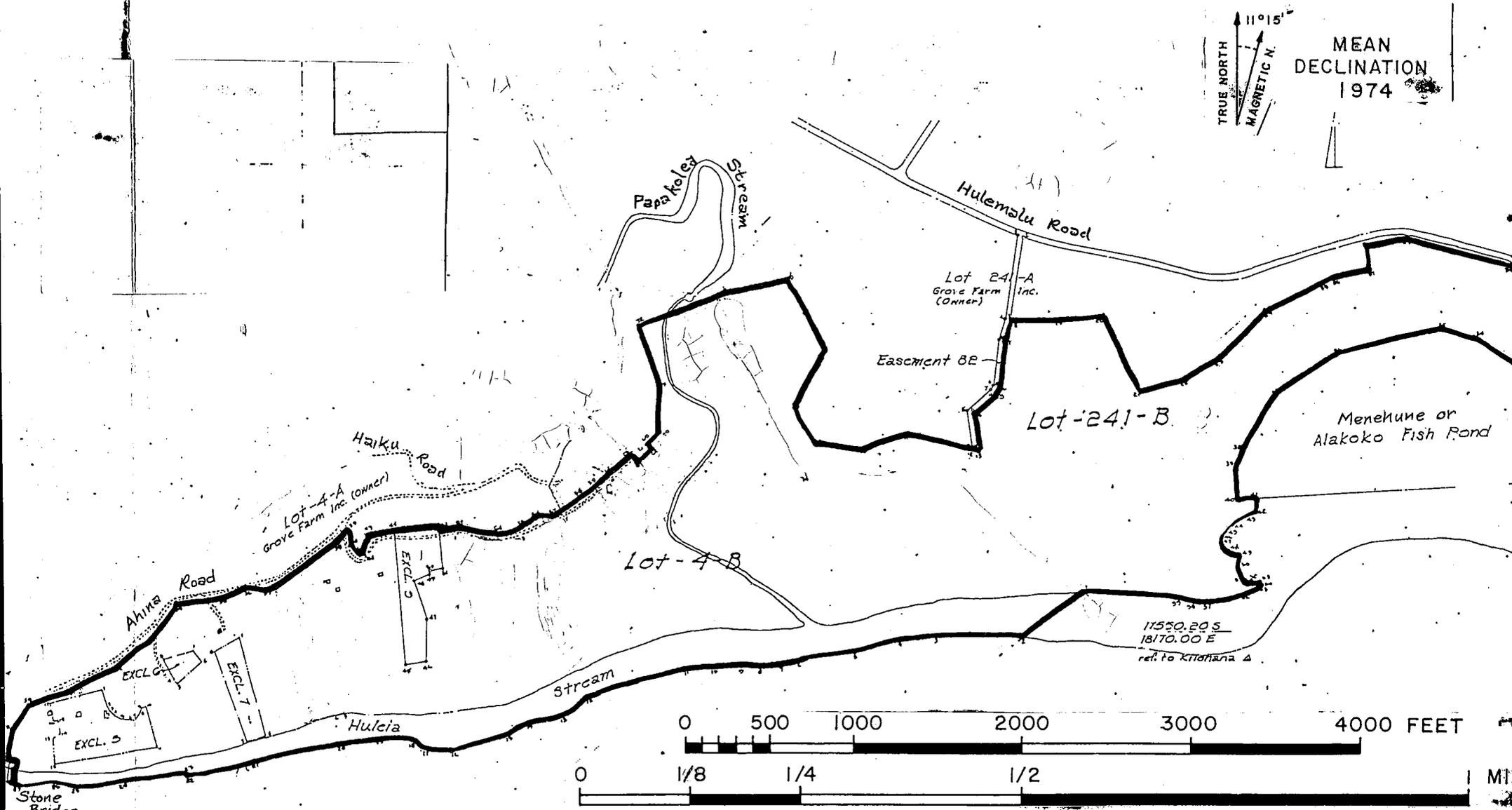
1. Objectives: Specific Annual Work Plan Advice objectives included participation in the Hawaiian Waterbirds Recovery Plan Team and the protection, maintenance and monitoring of habitat for the Hawaiian coot, stilt, gallinule, and duck. Refinements of the initial August 1975 draft recovery plan were initiated on February 19. A revised and updated draft neared completion as

# HULEIA NATIONAL WILDLIFE REFUGE

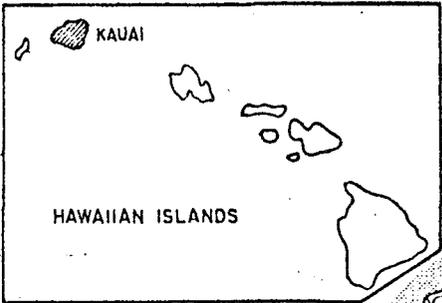
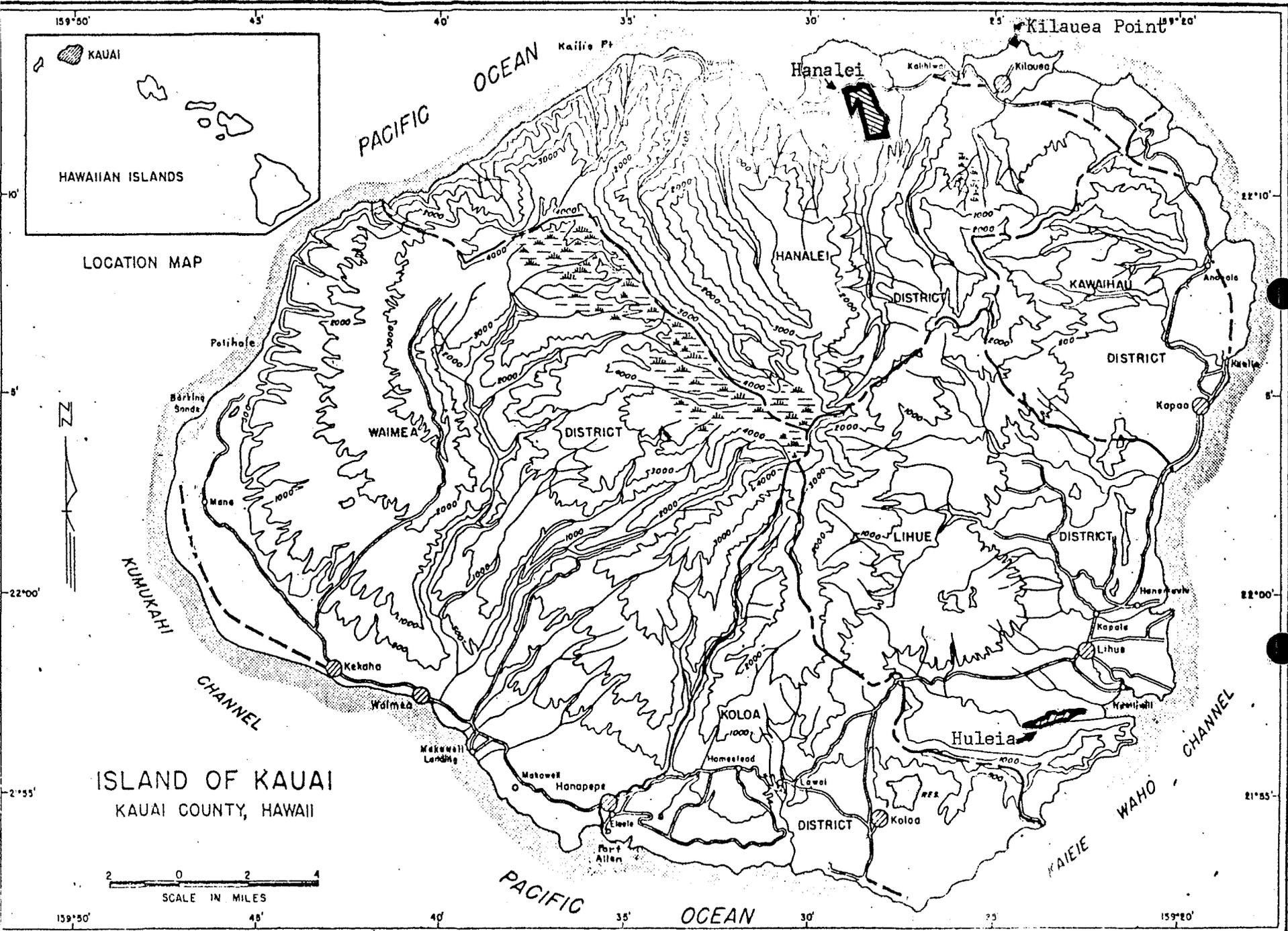
KAUAI COUNTY, HAWAII  
LIHUE DISTRICT



MEAN  
DECLINATION  
1974

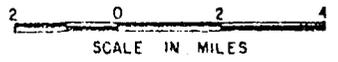


NATIONAL WILDLIFE REFUGES OF KAUAI



LOCATION MAP

ISLAND OF KAUAI  
KAUAI COUNTY, HAWAII



the year ended. Habitat protection increased during the year through additional boundary and regulatory signing, increased communication with all refuge neighbors and additional efforts to effect restraint of dogs kept on or near the refuge. Habitat maintenance included brush removal in bottomlands. Habitat monitoring included irregular patrols and monthly censuses. PFMIS and PPBE output reporting was refined and applied throughout the year. No refuge activities were determined to be out of phase with approved objectives.

2. Funding: Funding is almost entirely from the Endangered Species Program. The remainder is from the I&R Program.

## II. CONSTRUCTION AND MAINTENANCE

### A. Construction:

No construction was accomplished during the year.

### B. Maintenance:

Refuge maintenance was restricted to sign maintenance and roadside vegetation control.

### C. Wildfire:

No fires or floods occurred during the year.

## III. HABITAT MANAGEMENT

### A. Croplands:

None.

### B. Grasslands:

One special use permit was issued for the grazing of 158 acres of refuge bottomlands to retard the invasion of former rice and taro lands by brush and trees until those lands can be converted into wetland. A total of 704 AUMs were accumulated at \$1.25 each. The grazing permittee experimentally cleared about 10 acres heavily infested with fleabane brush.

### C. Wetlands:

The Huleia River estuary and Papakolea Stream represent the only permanent wetland. They are free-flowing streams through the refuge. Temporary wetlands occur during periods of rainfall as remnant rice and taro dikes contain shallow ponds. Most of this

habitat is heavily vegetated by 6-10 foot tall fleabane brush. Some clearing by the grazing permittee during the summer allowed increased waterbird access during the remainder of the year.

D. Forestlands:

Only noncommercial woodlands composed completely of introduced species occur on refuge uplands. They are rarely utilized by native fauna and are not managed.

E. Other Habitat:

Nothing to report.

F. Wilderness and Special Areas:

A search for any historically significant sites within the refuge resulted in a determination that none are known to occur.

G. Easements for Waterfowl Management:

None.

#### IV. WILDLIFE

A. Endangered and/or Threatened Species:

Prior to October only the Hawaiian duck, coot, and gallinule utilized refuge habitat. Following brush clearing in a few lowland areas, the Hawaiian stilt also used the refuge. Waterbird use occurred throughout the year.

The Hawaiian duck, or koloa (co-lo-ah), is now restricted as a breeding species to the island of Kauai. The world population is estimated to be 3,000 birds. It is the most common native species utilizing the refuge. The peak observed population of 15 occurred November 22. Refuge use in 1976 was estimated to total 2,760 use days, a 23 percent decrease from the estimated 3,600 use days of 1975. Continued habitat deterioration during the first three quarters of the year was thought to be a major contribution to the decrease. Improved habitat conditions and use occurred as the year ended. The refuge population is estimated to be 50 percent higher than the numbers observed during monthly censuses.

The sedentary Hawaiian gallinule, or 'alae 'ula (ah-lie oo-lah), currently remains only on the island of Kauai and Oahu. Most of the estimated 1,000-bird population occurs on Kauai. The peak resident refuge population was four birds. The estimated 970 use days in 1976 was a decrease of 32 percent from the

1,430 estimated in 1975. Continued habitat deterioration was thought to cause the decline.

The Hawaiian coot, or 'alae ke'oke'o (ah-lie kay-o kay-o) still occurs throughout its original range--all the main Hawaiian islands except Lanai. The entire population is estimated to be about 2,500 birds. The peak refuge population was 12 on July 28. The estimated 1,240 use days in 1976 was only half of the 2,500 days estimated in 1975. Continued habitat deterioration was thought to cause the decline.

The Hawaiian stilt, or ae'o (eye-o), had not been reported on the refuge prior to October 21, 1976. That date six birds were found utilizing habitat created by brush clearing and recent rains. Use continued through the remainder of the year resulting in 270 use days.

#### B. Migratory Birds:

1. Waterfowl: A Northern shoveler (30 use days) visited the refuge in October.

2. Marsh and Water Birds: In addition to the endangered gallinule and coot, the introduced cattle egret (4,260 use days) and the indigenous black-crowned night heron (790 use days) regularly visited the refuge. Only 25 egret use days were recorded in 1975. Heron use was 16 percent below the 940 use days of 1975. Population peaks were 100 egrets on May 15 and four herons on April 14.

3. Shorebirds, Gulls, Terns, and Allied Species: In addition to the endangered stilt, American golden plovers (2,190 use days), ruddy turnstones (360 use days) and wandering tattlers (100 use days) visited the refuge. Total use was 210 percent above the 1975 level.

4. Raptors: The introduced barn owl (360 use days) and indigenous short-eared owl (360 use days) occasionally visited the refuge.

5. Other Migratory Birds: None.

#### C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: Feral pigs occasionally visit the refuge.

2. Other Mammals: Introduced rats and the house mouse occur on the refuge.

3. Resident Birds: The introduced red junglefowl (Polynesia), ring-necked pheasant (Asia), spotted dove (Asia), barred dove

(Asia), greater necklaced laughing-thrush (Asia), melodious laughing-thrush (China), shama thrush (Malaysia), Japanese white-eye (Japan, common myna (India), Western meadowlark (North America), spotted munia (Southeast Asia), house sparrow (New Zealand), red-crested cardinal (South America), cardinal (North America), and house finch (North America) were recorded during the year.

4. Other Animal Life: Nothing to report.

## V. INTERPRETATION AND RECREATION

### A. Information and Interpretation:

1. No self-conducted interpretative media exist on the refuge. No conducted programs were requested. Ten University of Hawaii limnology students with the Hawaii Cooperative Fishery Research Unit received 20 activity hours of environmental education on the refuge.

2. Off-Refuge: None.

### B. Recreation:

1. Wildlife Oriented: An estimated 485 fishermen spent about 970 activity hours (A/H) along the Huleia River estuary within the refuge. An estimated 31,650 visitors expended about 5,275 A/H observing wildlife and wildlands from a county road overlook at the adjacent Alekoko (Menehune) Fish Pond and a public road adjacent to the refuge. About 600 of those visitors spent about 50 A/H at photography.

2. Non-Wildlife Oriented: None permitted or known to have occurred.

### C. Enforcement:

No violations known to have occurred.

## VI. OTHER ITEMS

### A. Field Investigations:

None.

### B. Cooperative Programs:

None.

C. Items of Interest:

Nothing to report.

D. Safety:

No incidents occurred during the year.

BAKER ISLAND NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

CY 1976

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

## I. GENERAL

### A. Introduction:

Baker Island National Wildlife Refuge was established by Secretarial Order on June 27, 1974 when full administrative responsibility for the island was transferred from the Office of Territorial Affairs to the U.S. Fish and Wildlife Service (39 F.R. 27930 dated August 2, 1974). The refuge includes the island itself and all surrounding waters and submerged lands within the 3-mile limit.

The refuge is located in the Central Pacific Ocean just north of the equator at  $0^{\circ}13'30''$  N,  $176^{\circ}43'$  W. It is the third southernmost refuge in the National Wildlife Refuge System. Due to the remote nature of the island, visits by refuge personnel are infrequent. Refuge Manager Sekora traveled to Baker and Howland Islands aboard the U.S. Coast Guard Cutter BURTON ISLAND in March of 1976. Baker Island was visited from 12:35 P.M. to 6:30 P.M. on March 19. This was the first visit by refuge personnel to Baker Island since May 18, 1973, and the first visit since the island establishment as a national wildlife refuge. With the possible exception of trespass by fishermen, we know of no other visits to Baker Island since 1973.

### B. Climatic and Habitat Conditions:

The nearest weather station to Baker Island is located on Canton Island some 400 miles southeast. Data from this station are comparable to Baker Island. Since there are virtually no weather extremes monthly or yearly on these low, equatorial islands, the long-term temperature and precipitation summary as given below for Canton Island is thought to be representative for the region in 1976.

Daily Temperature and Precipitation Averages (1931-1960)  
Canton Island ( $2^{\circ}46'$  S,  $171^{\circ}43'$  W)

	<u>Maximum</u>	<u>Minimum</u>	<u>High</u>	<u>Low</u>	<u>Precipitation</u>
January	88.4	77.8	98	72	2.61
February	88.2	77.7	96	72	2.13
March	88.5	77.7	96	71	2.49
April	89.3	77.9	97	70	3.62
May	89.7	78.1	98	71	4.35
June	89.5	78.0	96	71	2.65
July	89.4	77.7	96	71	2.59
August	89.3	77.7	97	71	2.50
September	89.5	77.7	97	72	1.24

	<u>Maximum</u>	<u>Minimum</u>	<u>High</u>	<u>Low</u>	<u>Precipitation</u>
October	89.6	77.8	97	72	1.10
November	89.2	77.9	98	72	1.61
December	89.4	77.8	95	71	2.54
Yearly Average	89.1	77.8			29.43

Baker Island was found to be quite dry during the March visit with very little green vegetation in evidence. Puncture vine (Tribulus cistoides), an introduced pest, was the only green vegetation showing.

C. Land Acquisition:

Nothing to report.

D. System Status:

1. Objectives: Our basic objective for Baker Island NWR is to maintain the island in as near a natural state as possible and hold human intrusion to a minimum in order to encourage greater seabird use. Past usages of Baker Island, particularly by the military, have exploited the natural resources with little regard for the welfare of the birds. Bird populations were decimated during and following World War II, and have only recently begun to recover. Feral cats were eradicated on Baker in 1964, and since that time the bird population has shown a slow but steady increase.

Much debris remains on the island from past military activities.

2. Funding: Activities for Baker Island NWR are funded primarily out of migratory bird funds allotted to the Hawaiian and Pacific Islands Refuge Complex.

## II. CONSTRUCTION AND MAINTENANCE

A. Construction:

Nothing to report.

B. Maintenance:

Since Baker Island NWR was visited for only 6 hours during the year, only minor maintenance type work was possible. With the assistance of the U.S. Coast Guard personnel, five boundary signs were installed around the perimeter of the island. A 4 feet by 8 feet redwood information/identification sign was erected near the Day Beacon Tower along the central, western coastline. The inscription "NO TRESPASSING"

is provided in English, Japanese, Chinese, and Korean. Appropriate sovereignty ceremonies were conducted.

C. Wildfire:

Nothing to report.

III. HABITAT MANAGEMENT

The objective for Baker Island NWR is to allow the island to revert to its natural state following past disturbances by man. As such, habitat management efforts consist of protection only.

IV. WILDLIFE

Data summarized below is from the 6-hour visit of March 19, 1976. Data for other seasons is unknown.

A. Endangered and/or Threatened Species: Hawksbill turtles are known to occur in waters around Baker Island. However, no turtles, turtle pits, or tracks were observed during the visit.

The sperm whale probably occurs within the 3-mile seaward boundary limits of Baker Island Refuge but no data exist on frequency of their occurrence.

B. Migratory Birds:

1. Waterfowl: The pintail is an occasional visitor to Baker Island but was not seen on the March visit. No other waterfowl are known to occur.

2. Marsh and Waterbirds: None known to occur.

3. Shorebirds, Gulls, Terns, and Allied Species: All four of the shorebirds species known to occur on Baker were present in March: 14 bristle-thighed curlews, 9 wandering tattlers, 2 American golden plovers, 16 ruddy turnstones. Tern observations are listed in paragraph 5 below.

4. Raptors: None occur.

5. Other Migratory Birds: The major wildlife resources of Baker Island are the seabirds. These populations have shown a gradual but slow recovery following World War II activities from the March 19, 1963 visit follows (Data Class D):

Blue-faced booby - 125 with less than 50 nests  
Brown booby - 375 with some nests  
Great frigatebird - 750 with 350 nests  
Lesser frigatebird - 1,550  
Sooty tern - 2,795  
Brown (common) noddy - 375  
Blue-gray noddy - 25  
White tern - 5 with 1 nest

The blue-faced booby nests contained eggs as well as newly hatched and nearly fledged young. Other seabird species not seen but known to occur on Baker Island include the red-footed booby, gray-backed tern, and red-tailed tropicbird. The seabird population of Baker Island is undoubtedly higher than that observed during the March visit. Typically seabirds fly out to sea in the early morning to feed, returning to the island in the evening. During the nonnesting season, many species remain at sea for months.

C. Mammals and Non-Migratory Birds and Others:

1. Game Mammals: None occur.

2. Other Mammals: Porpoise: Pacific bottlenose dolphins are known to occur within the 3-mile limit of Baker Island. None were observed on the March visit, possibly since entry onto the island was by helicopter rather than by small boat. When landing by the latter means, porpoise become quite evident as they greet the landing party and escort the boat ashore. House Mice: House mice are present on Baker Island and may account for the numerous burrows seen. Feral cats were eliminated in 1964. Two were reported in 1966 but never seen again and it is thought that they are no longer present on Baker Island.

3. Resident Birds: Nothing to report.

4. Other Animal Life: One striking characteristic of Baker is the presence of large numbers of red hermit crabs throughout the island. Previous reports have noted crabs piled up to 6 feet deep inside the Day Beacon Tower. On this visit however, only about 100 were seen inside the tower itself. Lined skinks are common on the island. No flies or mosquitoes were noted.

V. INTERPRETATION AND RECREATION

Due to the remote nature of Baker Island, no public recreation or education is possible. The island may be used in the future as a scientific study area. One request from a private individual was received to take oysters from waters within the 3-mile limit boundary of the refuge. No other public requests were received for access. The annual trip with the Coast Guard

doubles as an enforcement patrol to record past unauthorized visits to the island. On March 19, 1976, one old fire site and six beer cans were noted near the Day Beacon; no other human trespass was evident.

## VI. OTHER ITEMS

### A. Field Investigations:

Nothing to report.

### B. Cooperative Programs:

Nothing to report.

### C. Items of Interest:

Refuge personnel participated in the initial meeting to draft a Pacific Island Issue Paper in December. Baker Island is within the area of concern.

### D. Safety:

Safety activities and discussions are covered in a report for the Hawaiian Islands NWR.