

KILAUEA POINT
NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT
Calendar Year 1987

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

Review and Approvals

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8-16-89

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1. Richard Bottomley, WG-5, TFT, Maintenance Worker
2. Noreen Bautista, GS-5, PPT, Clerk-Typist
3. Dan Moriarty, GS-11, PFT, Park Ranger

INTRODUCTION

Kilauea Point National Wildlife Refuge is located on a rugged coastal peninsula at the northern tip of Kauai. It has become one of the most visited sites in Region 1. Considered a window to the northwestern Hawaiian Islands, Kilauea Point offers the public the only opportunity to view an incredible array of Pacific wildlife not seen anywhere in the inhabited Hawaiian Islands. Visible from the Refuge are the following species: red-footed boobies, Laysan albatross, wedge-tailed shearwaters, white- and red-tailed tropicbirds, great frigatebirds, American golden plovers, Pacific green sea turtles, spinner dolphins, and humpback whales. The endangered Hawaiian monk seal were seen consistently during the summer months.

Kilauea Point was a commissioned U.S. Coast Guard light station from 1913 to 1976, guiding shipping and aviation across the Pacific on the great circle route. From 1976 to 1985 the area was managed by the U.S. Fish and Wildlife Service (Service). In 1985, the property was conveyed to the Service from the General Services Administration. It was then formally designated the Kilauea Point National Wildlife Refuge.

In the 10 years of Service management, fencing has been erected to protect the seabird colony from predators. The grounds have been completely landscaped with reintroduced coastal native plant species. A Coast Guard radio beacon building has been renovated to accommodate a modest Visitor Center.



Kilauea Point National Wildlife Refuge

A very active volunteer group provides interpretive service for visitors and a cooperating association called the Kilauea Point Natural History Association (Association) offers quality natural history publications relative to the Hawaiian ecosystem.

Association profits have been used to fund an educational publication called the Hawaii Nature Focus, which is sent to every fifth grade student in the state of Hawaii (15,000 copies).

The Refuge is open to the public Monday through Friday from 10:00 a.m. to 4:00 p.m.

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K. FEEDBACK

A. HIGHLIGHTS

The firm of Wilson Okamoto and Associates began design of the new visitor facilities funded in 1986. A low-profile interpretive display/education building will be constructed. It will feature exhibits on Hawaiian wetlands, the northwestern Hawaiian Islands and Hawaiian forest birds as a focal point with attention also being focused on a wildlife diorama and National Wildlife Refuge laser disc exhibit. The lower floor of the proposed building will be designed to be used for group meetings, presentations and environmental education, with a capacity of 125 persons. In conjunction with the visitor facilities improvement project, the roadway to the lighthouse was repaved, eliminating a hazardous, badly deteriorated foot path. Work was begun to relocate the badly deteriorated overhead wiring to underground service. The visitor center at the point will also be remodeled and upgraded to provide better facilities for personal interpretation for the visiting public.

On July 21, 1987, the Kilauea Point volunteers were awarded a special commendation award in the national "Take Pride in America" campaign.

An endangered Hawaiian monk seal has been resident in the Refuge offshore waters from May to September.

Law Enforcement staff were required to warn off a rubber-inflatable boat flotilla on the waters near the Point. The group took advantage of the calm sea conditions at the time to view the area which was abundant with dolphins and monk seal.

The Kilauea Point Laysan albatross colony continues to expand. The small colony which started forming in 1984 has gone from 3-4 nesting attempts to 13 attempts in late 1987.

The Kilauea Point Natural History Association loaned the San Francisco Bay National Wildlife Refuge \$1,000.00 as seed money to start up their own cooperating association.

The Kilauea Point Natural History Association produced three issues of the Hawaii Nature Focus, a fifth grade level Hawaiian natural history publication. The five-page pamphlet is distributed to every fifth grader in the state of Hawaii. In addition to the Hawaii Nature Focus, an illustrated student checklist of wildlife and plants found at the Kilauea Point National Wildlife Refuge was produced and distributed by the Association.

After four years of preparation, the Kilauea Point Natural History Association produced its first book, a 114-page publication called, Kilauea Point Lighthouse, the Landfall Beacon on the Orient Run. The author, volunteer Ross Aikin contributed over 2000 hours to guide the book to completion. The book was released in time for the 1987 Christmas Sale.

A community group called the Crater Hill Coalition consisting of a number of local individuals and citizen groups seeking protection of the adjacent Crater Hill/Mokolea Point property was formed. The coalition has produced a quality pamphlet and has initiated a letter writing campaign to Hawaii's Washington delegation. The group is seeking federal acquisition of the Crater Hill/Mokolea Point parcels adjacent to the Refuge. Acquisition would provide protection for the remainder of the seabird colony along the flank of the dormant Kilauea Crater.

A fee collection program was put into operation at Kilauea Point on September 15, 1987. The single visit permit entry fee was set at \$2.00. To accommodate the program, an appropriate fee collection booth was designed and constructed, a fee collector manual developed and two fee collectors (Rangers) recruited and trained. Considerable staff time was allocated to alerting the public to the fee program. The transition was very smooth with more positive than negative comments received by the staff.



First Entrance Fee paying visitors.

B. CLIMATIC CONDITIONS

The year, 1987, was typical for Kauai throughout the winter and spring. Summer was wetter than usual. Heavy rains fell at the close of the year causing minor erosional damage to the Refuge.

Weather data for 1987 is as follows:

	<u>Rainfall</u> <u>(inches)</u>	<u>Avg. Daily Temp.</u>		<u>Wind (MPH)</u>
		<u>High</u>	<u>Low</u>	
January	2.32	77.2	66.0	11.6
February	5.39	80.8	62.0	11.6
March	1.74	77.8	64.7	9.4
April	5.31	77.3	67.6	15.0
May	6.38	77.5	66.4	12.9
June	5.14	81.9	71.8	14.0
July	8.80	83.2	74.6	15.1
August	4.06	86.9	74.3	9.3
September	7.97	84.5	74.1	9.5
October	8.33	82.6	73.9	10.3
November	7.88	80.8	71.9	13.5
December	26.19	79.2	69.7	7.2

C. LAND ACQUISITION

3. Other

The Crater Hill coalition, a broad community group whose membership includes County Councilmember JoAnn Yukimura; businessman Gary Smith; the Kilauea Neighborhood Association; the Kauai Chapter of the Sierra Club and assorted groups such as the Chamber of Commerce and the Hawaii Visitors Bureau, was established in 1987 to promote the acquisition of Crater Hill by a public agency. The group sought the support of the Trust for Public Lands (Trust), a non-profit public lands advocacy based in San Francisco, to assist with their efforts. The Trust quickly obtained an option to purchase the 38-acre Mokolea Point parcel for a price in the vicinity of \$1.5 million and began negotiations with the Crater Hill landowners for a donation of the 96-acre parcel to the Service.

D. PLANNING

4. Compliance With Environmental and Cultural Resources Mandates

This year's publication of Ross Aikin's book, Kilauea Point Lighthouse the Landfall Beacon on the Orient Run was the culmination of four years of research and oral history delving into the history of the Kilauea Point Lighthouse. The entire area, including the lighthouse, is on the National Register of Historic Sites and to many, is the symbol of the area.

In addition to the resulting compilation of existing historical documents, the book will provide an excellent vehicle to train volunteers and staff to correctly interpret this important cultural resource.

5. Research and Investigation

During 1987, the following research and investigations were conducted:

For the second year, staff and volunteers worked in conjunction with Paul Sievert of the National Wildlife Health Laboratory, Madison, Wisconsin to monitor the incidence and type of plastics found in wedge-tailed shearwaters at Kilauea Point. Comparisons will be made with the incidence of plastics found in albatross on Midway Atoll.

D. Moriarty, R. Bottomley, K. Paik: Laysan Albatross Nesting Attempts at Kilauea Point, Kauai, HI.

D. Moriarty, R. Bottomley, K. Paik: Laysan Albatross Nesting Attempts at Pacific Missile Range, Mana, Kauai.

D. Moriarty, A. Bills, R. Bottomley: Red-footed booby utilization of coastal plant species in nest construction.

E. ADMINISTRATION

1. Personnel

Dan Moriarty, GS-11, PFT, Park Ranger
Noreen Bautista, GS-05, PPT, Clerk-Typist
Richard Bottomley, WG-05, TFT, Maintenance Worker (transferred to Dworshak NFH, Sept. 87)
Kevyn Paik, WG-02, TFT, Maintenance Worker (EOD Aug. 87)
Joyce Peio, GS-03, TPT, Park Ranger (EOD Sept. 87)
Carol Goo, GS-03, TPT, Park Ranger (EOD Oct. 87)
Annabel Castro, GS-03, TPT, Park Ranger (EOD Sept. 87, resigned Sept. 87)

2. Youth Programs

The Youth Conservation Corps (YCC) program was not funded in FY87. This is a severe loss to Refuge operations as the infusion of a dozen eager young people to the staff allowed for completion of a multitude of important maintenance projects.

4. Volunteer Programs

With a small staff and growing public interest in the Refuge, a volunteer program was started in 1984.

Although volunteers are utilized throughout the year and in a wide variety of projects, a formal training program is required of those interacting with the public at the Visitor Center. The training consists of a 25-hour training course which starts the third Wednesday in January. Training continues weekly every Wednesday from 9:00 to 11:00 am for approximately 10 weeks.

Subject matter covered in the training included: Orientation to the U.S. Fish and Wildlife Service; Hawaiian seabirds; geology of the Kilauea Area; archaeological and historical land use; introduced birds commonly observed at Kilauea Point; wildlife of the surrounding ocean; the historic Kilauea Lighthouse; understanding maritime weather; Kauai's wetland refuges; Kilauea Point policy and emergency procedures.

In 1987, 39 persons completed the training program.

The majority of the volunteers work in the Visitor Center interpreting the area's wildlife and cultural resources, assisting the public with general directional and information questions and staffing the Kilauea Point Natural History Association sales outlet. The Visitor Center is entirely staffed by volunteers.

In addition to Visitor Center duty, volunteers assist in a wide-range of Refuge functions including such tasks as maintaining the Refuge plant nursery which produces a wide-range of coastal native plants; restoration of the Refuge grounds by planting and maintaining native plants; and writing, editing and producing publications for students, residents and visitors. The specific publications included: Kilauea Pointers, Hawaii Nature Focus, Student Checklists, and Ross Aikin's publication, Kilauea Point Lighthouse - the Landfall Beacon on the Orient Run.



Volunteer Ben Winningham (on roof) helps Kip Bottomley construct fee booth.

In 1987, over 164 persons contributed volunteer service for the Refuge. The following volunteers were awarded certificates of appreciation at the annual volunteer party:

100 Hours

Nancy Bryant
 Judy Buckley
 Donna Genuth
 Linda Goodman
 Jean Gregg
 Valerie Hannon

Diane Hofler
 Mary Ishida
 Shirley Johnson
 Ferne Orlik
 Ted Yamate
 Scot Anderson

200 Hours

Bill Davis
 Charlene Dyer
 Carolyn Rasmussen
 Barbara Stuart
 Jim Towar
 Julie Towar

300 Hours

Mickey Aikin
 Alma Playle
 Lorena Wada

400 Hours

Mary Jane Moore
 Phyllis Davis
 Fran Powell

800 Hours

Joyce Peio

900 Hours

Ross Aikin

6. Safety

Richard Bottomley is the Refuge Safety committee. He conducts regular monthly safety briefings. A safety portion of the bulletin board contains a safety poster which is rotated periodically.

Twice a year, safety inspections scrutinize all areas of the Refuge. Fire extinguishers, unsafe equipment and unsafe conditions are noted during the inspection. All problems are then rectified as quickly as possible.

Chainsaw safety, use of roadside barriers, injured person safety, safe operation of sanders and grinders, disposal of herbicide containers, and dust reduction were some of the topics covered in sessions throughout the year.

All volunteers are provided copies of written emergency procedures. No injuries were reported in 1987. This good record may be attributed in part to Bottomley's active safety program.

7. Technical Assistance

Bird-Air strikes: U.S. Navy, Pacific Missile Range Facility

The Service provided technical assistance to the Navy installation at Pacific Missile Range, Mana, Kauai, regarding Navy concerns over a small Laysan albatross colony which they perceived as a potential bird-air strike hazard. Albatross eggs were sent to Dr. Causey Whittow of the University of Hawaii, to be used in studies to determine physiological conditions of hatching eggs. No eggs were to sent to Sea Life Park.

State of Hawaii, Department of Transportation, Division of Airports worked with Tim Ohashi of the U.S. Department of Agriculture, Animal Damage Control, to construct a holding facility to hold and feed Laysan albatross courting birds found at Hawaii's airports. A plan was developed and a holding facility constructed to hold the birds. However none were sent to Kilauea Point in 1987 as the hazing program was relatively effective.

Newell's shearwater - Sheraton Princeville

The lighting of the Sheraton Princeville Hotel at the Hanalei River estuary has continued to attract a large number of fledging Townsend's (Newell's) shearwater, a threatened species. Refuge staff continued to work with hotel employees to reduce all unnecessary exterior lighting during the October-November fledging period. Early results show this effort reduced "fallout."

The Sheraton staff was extremely helpful and in many cases re-wired entire electrical circuits to reduce lighting.

18. Cooperating Association

The Board members of the Kilauea Point Natural History Association for 1987 consisted of Nick Beck, Ryan Jimenez, David Kawate, Julia Neal, Herman Texeira, Barbara Steenhof, Jim Towar and Dan Moriarty (ex-officio).

Shop sales increased from \$38,843.12 in 1986 to \$42,791.58 in 1987. One-hundred-seventy-five items were available for sale in 1987. These items include 105 books and publications, 4 postcards, 33 maps and 24 tee-shirts.

During the year, the Association sponsored three educational lectures and partially hosted the annual volunteers birthday party.

The Association again produced and distributed 15,000 copies of the Hawaii Nature Focus to all 5th graders in the state of Hawaii.

In 1987, the members of the Association were solicited for membership renewal. A very high percentage renewed their membership, many upgrading their level of membership contribution. Membership revenues amounted to \$4,147.00 during the year.

The Association's annual Christmas sale was open to the public. Members of the Association received a 20% discount on items purchased at the shop.

A \$1,000.00 scholarship was awarded by the Association to University of Hawaii student Lorena Wada during the summer of 1987.

The Association loaned the San Francisco Bay Wildlife Society \$1,000.00 to help them offset some of their expenses in starting their cooperating association.

The Association purchased several binoculars, fans and slides for a teacher's packet to be used for Refuge projects.

The Board discussed the possibility of hiring a person to assist with shop activities. The Board determined that hiring a person at this time would exhaust a considerable amount of their profits. At this time it is not possible to hire additional help.

F. HABITAT MANAGEMENT

1. General

Commencing with early management of Kilauea Point in 1979, a concentrated effort was undertaken to restore the native coastal plant species. Historical land use patterns in Hawaii indicate that the Hawaiians and early European settlers burned off and destroyed much of

the native vegetation and replaced it with various economically profitable plants to be utilized for a range of activities including grazing and crop production.

Early photographs (1924) of Kilauea Point indicate a denuded landscape devoid of any vegetation. Later photographs indicate a new Hawaiian flora consisting of a wide-range of introduced cosmopolitan weed species dominated by species such as the Christmas berry (Schinus terebinthifolius) and lantana (Lantana camara).

Fortunately, many of the native plant species persisted on the rocky cliff face out of the reach of man and animals. Using seeds from these remnant plants, a modest green house and nursery operation was able to propagate thousands of seedlings to be returned to the landscape.

Existing weedy species were cut down and burned. Native plants were immediately re-established in their place. Watering, fertilizing and especially weed control were very important in the successful re-establishment of the original native landscape. After nine years of management, the area has been successfully returned to its original flora.



Sierra Club volunteers plant newly cleared area for fee booth.

G. WILDLIFE

2. Endangered and/or Threatened Species

Townsend's (Newell's) shearwater

A threatened species once found on all major islands, the Townsend's (Newell's) shearwater presently survives only on the island of Kauai in colonies at elevations of 800-1500 feet. Refuge staff assists in the recovery of the species through two programs.

A. Townsend's (Newell's) Shearwater "Fallout" Recovery Program

Each fall, the fledging Townsend's (Newell's) shearwaters leave their mountain burrows and attempt to fly to the ocean. The intensity of lights in the densely populated coastal areas appear to attract and disorient the fledglings causing many to fall to the ground in a confused state and become unable to take off. Many of the downed birds are struck by cars or killed by dogs and cats.

Commencing in 1976, a joint State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife and U.S. Fish and Wildlife Service effort ended in development of a Shearwater Aid Station recovery program. Through the media and other educational channels, citizens are instructed to take "fallen" birds to aid stations located at fire stations throughout the island and a few convenient locations in nearby towns.

The program has been very successful, saving from 1000 to 1500 shearwaters annually.

In 1987, 529 birds were recovered by Refuge personnel alone on Kauai's north shore.

The program salvaged a total of 2095 birds on Kauai.

B. Cross Fostering Project

Between 1978 and 1980, ninety Townsend's (Newell's) shearwater eggs were taken from three mountain colonies and placed under wedge-tailed shearwater adults. Ninety-four percent of these cross-fostered chicks were reported to have fledged.

Though vocalizing Townsend's (Newell's) shearwaters have been reported during the night in the vicinity of Kilauea Point National Wildlife Refuge, in the last four years, no such vocalizing was noted on the Refuge grounds. During this period, three cross-fostered banded individuals were recovered--one attracted to a lantern at Anini Beach Park and two below an exterior garage light on the Refuge itself.



Townsend's (Newell's) shearwater.

However, on August 30, 1987, Moriarty observed an instance of terrestrial vocalization (on the ground as opposed to such vocalizing in the air) by a Townsend's (Newell's) shearwater. He reports that the observation occurred at about 9:00 pm, coming from a thick growth of akoko (Euphorbia sp.) along the west side of the trail approximately 300 feet south of the lighthouse. Moriarty was able to catch the bird and found it was tagged with the U.S. Fish and Wildlife Service band #584-17175. The bird was released and the next day, Moriarty conveyed the identification to state of Hawaii Wildlife Biologist Tom Telfer. Telfer confirmed the bird was one of about 100 cross-fostered chicks (eggs hatched by other than the parent shearwaters) which fledged Kilauea Point in October 1980.

This instance is the first observed evidence of terrestrial vocalization of the Townsend's (Newell's) shearwater at the Refuge--though an increase of circling and aerial vocalizing has been noted in recent years.

5. Shorebirds, Gulls, Terns and Allied Species

Pacific Golden Plover

From 10 to 20 plovers winter in the large open, grassy area of the Refuge. During the last week of April, the Pacific golden plover departs Hawaii for its summer breeding ground in the arctic.

Ruddy Turnstone

From 5 to 20 birds have been seen to frequent the open grassy areas of the Refuge and adjacent residences. There seems to be a pronounced increase of this species, possibly due to the creation of large open areas to attract Laysan albatross.

7. Other Migratory Birds

Laysan Albatross

Prior to 1977, Laysan albatross were not known to nest on Kauai. In that year, two nesting attempts were recorded on the east flank of Crater Hill and the other at Mana, Kauai. Additional attempts were reported on Kauai in following years, most were unsuccessful. A summary of the sites monitored on Kauai are as follows.

A. Kilauea Point National Wildlife Refuge

Prior to 1983, a few birds reportedly had landed on the land fronting the lighthouse. However, they moved on quickly.

In 1983, a large wooded hillside to the west of Kilauea Point was cleared of vegetation and grassed. In 1984, courtship activity, involving up to six birds, was observed in the area. Two birds attempted to nest in December of 1984, however both nests failed.

In the late fall of 1985, there were four nesting attempts, three of those nests were successful--fledging three young in July 1986. Thus, 1986 represents the first successful nesting of Laysan albatross on the Refuge. The developing Laysan albatross colony at Kilauea Point also provides a rare occasion to study the dynamics of the formation of a new seabird colony.

During the 1987 season, 43 Laysan albatross were banded at Kilauea Point.

B. Northeast Kauai

In 1987, 82 Laysan albatross were banded on northeast Kauai:

East Crater Hill - 3
Mokolea Point - 38
Kepuhi Point - 41

C. Pacific Missile Range

A total of 26 Laysan albatross were banded at several locations on the Navy base at Mana.

Safety concerns by the Base Command diminished as the albatross population decreased to small numbers.

Red-footed Bobby

A colony of 500 to 700 breeding pairs is found on the hillside adjacent to the Refuge. A few pairs nest on the Refuge. The colony was first noted in the late 1950s when biologists Richardson and Bowles reported 30 to 40 nesting pairs at Kilauea Point. In 1982, Hurricane Iwa caused the birds to move several hundred feet to the east.

Dogs which had presented problems in the past by taking a number of birds in low-growing vegetation, were less of a problem in 1987. The removal of several aggressive offenders and an awareness campaign to educate the nearby community about the destructiveness of free-roaming dogs to wildlife accounted for the decrease in predation.

Brown Booby

Seen in nearby waters, the brown booby does not nest on Kauai. However, in recent years, four roosting sites have been observed; two sites on the Napali Coast, one at Mokuaeae Island (a small island north of Kilauea Point, presently a state of Hawaii bird refuge) and one on a ledge at Crater Hill.

Wedge-tailed Shearwater

The Kilauea Point National Wildlife Refuge contains 300 to 500 breeding pairs of wedge-tailed shearwaters. The actual colony extends to the two adjacent parcels where the species is showing significant declines as the result of dog, cat and rat predation, human intrusion and the collapse of the burrows by grazing cattle and horses.

Management efforts on the Refuge over the last few years have concentrated on fencing and predator control within the Refuge.

In 1987, 425 wedge-tailed shearwater chicks were banded at the Refuge.

Dark-rumped Petrel

The dark-rumped petrel is an endangered species presently found only on upper slopes of Haleakala National Park. It is considered to possibly exist in remote areas of Kauai. Several fledglings were recovered at Newell's Shearwater Aid Stations in early December. In 1987, a total of 9 dark-rumped petrels were recovered at the Kauai Aid Stations.

9. Marine Mammals

Hawaiian Monk Seal

There were several sightings of this endangered species in the off shore waters near the Point. Reports of Hawaiian monk seal sightings on Kauai were reported to the National Marine Fisheries Service.

Humpback Whales

Humpback whales were seen regularly in the waters off the Refuge during the months of December through May.

Volunteers interpret whale activities to Refuge visitors. The presence of staff at Kilauea Point provides considerable protection of this species from harassment as a vast expanse of coastline is visible from the Point.

Several cases of boat harassment were forwarded to the Enforcement Division of the National Marine Fisheries Service.

During the spring, the whales migrate to feeding grounds in Alaska.

H. PUBLIC USE

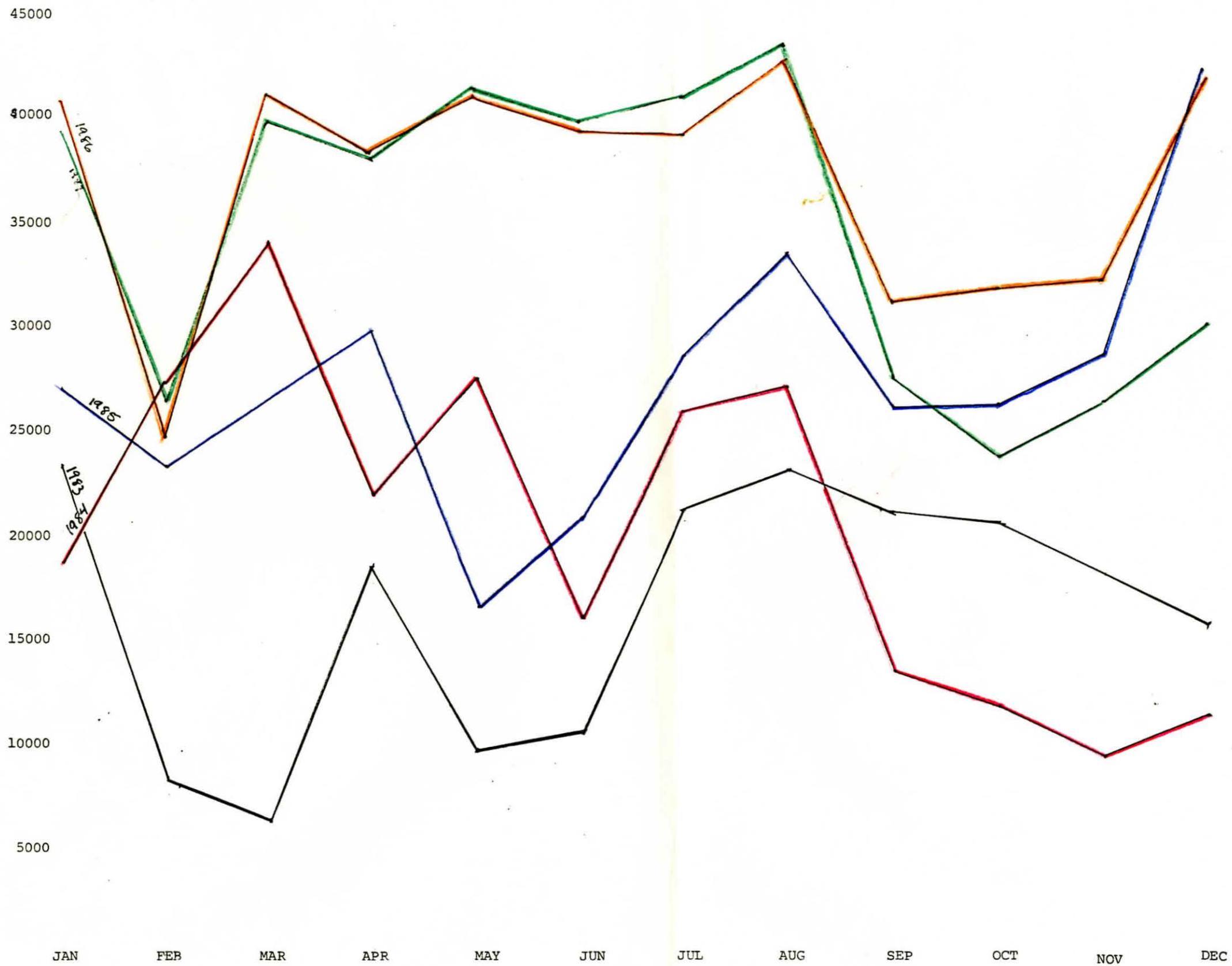
1. General

In addition to the regular volunteer programs, the Refuge has been successful in utilizing community groups under volunteer agreements to assist with Refuge projects.

In 1987, those groups included: (1) the Kilauea Cub Scout Troop; 2) the Kilauea Boy Scouts; 3) the Kapaa Boy Scouts and 4) the Kauai Chapter of the Sierra Club.

Managing such a large group of persons and being sensitive to the preference of each group takes much time and sensitivity.

The formation of the volunteer program has contributed immeasurably to the popularity of the Refuge. One problem that needs to be addressed is the lack of a building on the Refuge large enough to contain the entire group. The annual awards dinner, held in April, was held under a rented tent.



11. Wildlife Observations

The Refuge attracted 418,898 visitors during 1987. This is the only area in the inhabited islands where Pacific wildlife can be readily observed. However, the visitors also are provided with the opportunity to view the historic lighthouse and the beautiful north shore coastline. The following graph depicts the visitor count for the past five years.



Visitors watching albatross.

I. EQUIPMENT AND FACILITIES

1. New Construction

The lower parking lot, the existing parking lot, and the path to the Point, including the visitor access area were paved in Fiscal Year 1987 by Niu Construction.



Visitor access area at the Point being paved.

J. OTHER ITEMS

1. Cooperative Programs

Refuge staff and volunteers assisted the state of Hawaii with two semi-annual waterbird census.

2. Other Economic Benefits

The Refuge sustains a sizeable tourist industry. The Refuge is mentioned in all tourist guides in the state of Hawaii and the Hawaii Visitors Bureau literature. Kilauea Lighthouse and the Kilauea Point National Wildlife Refuge have emerged as a major tourist stop. Tour companies utilizing 14-16 passenger vans visit the Refuge daily.

The visitors also use the Refuge restrooms since they are the only convenient restrooms on the north shore.

Realty brochures often mention proximity to Kilauea Point National Wildlife Refuge.

Sales in the cooperating association provide some income for small businessmen such as book wholesalers, t-shirt manufacturers and handicraft makers.

3. Items of Interest

Regional Director Rolf Wallenstrom visited the Refuge on January 16, 1987.

The Refuge programmatic evaluation was performed on the last week of February.

Christian News Network filmed operations at the Refuge in March.

A committee was formed to plan the 75th anniversary of the Kilauea Point Lighthouse.

Jeff Phillips of SUNSET magazine visited the Refuge. An article on the Refuge is scheduled for early 1988.

Bottle-nosed dolphins were seen in off shore waters of the Refuge in August.

In August, a group of 13 Boy Scouts completed a native planting project at the Refuge. The project resulted in scout Matt Gonsalves earning his Eagle Scout Merit Badge.

Congressman Daniel Akaka visited the Refuge in August.

The Refuge staff presented a Revenue Sharing check to Mayor Tony Kunimura in August.

Russ Miller and Julie Swanberg of the Regional Personnel Office met with staff members at the Refuge to discuss personnel questions.

Refuge staff participated in the stilt recruitment census in September.

Refuge staff met with Marguerite Rho and Larry Ikeda of Alexander and Baldwin. An article on the Refuge is scheduled to appear in the Alexander and Baldwin publication in 1988.

Regional Fee Collection Coordinator Ed Murczek visited Kilauea Point in October to go over fee collection procedure with Kilauea Point staff.

The first albatross of the 1987-88 season was seen on November 10th by Pat Longstreth.

Park Ranger Moriarty spoke to Kauai Police Department recruits in December.

4. Credits

This narrative was written by Dan Moriarty and edited by Noreen Bautista and Jerry Leinecke.



HAWAII NATURE FOCUS



NATURE STUDIES FOR CHILDREN

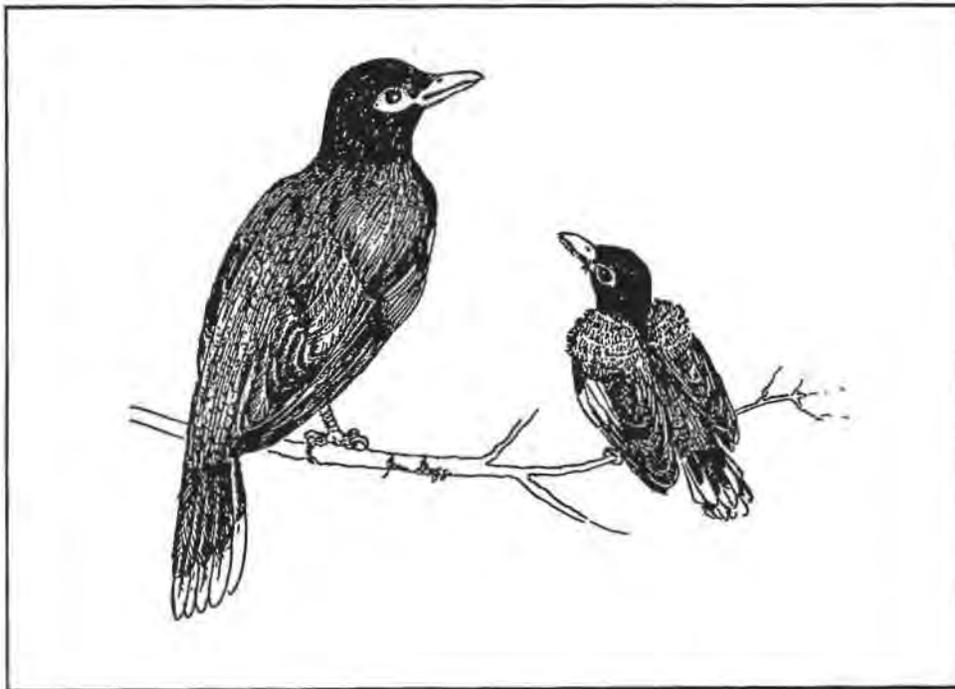
Sponsored by the Kilauea Point Natural History Association
Box 87, Kilauea, Kauai, HI 96754

No. 5

THE COMMON MYNA

The myna bird that is so familiar in Hawaii is the common myna or house myna. We see these noisy rascals hopping across our roads, bathing in puddles and strutting like royalty, ruling our lawns and teasing our pets. We often see them in loud groups where they seem to be discussing important matters. Many of us have been awakened too early in the morning by myna birds.

Common mynas are natives of India, Sri Lanka, Pakistan and Nepal. They were brought to Hawaii in 1866 by Dr. William Hillebrand to control army worms and cutworms which were destroying sugar cane and pastures.



The common myna is known as an “urban” bird because it is often seen in residential areas. The mynas inhabit all the main Hawaiian Islands, and since they do not migrate, they can be seen year around.



APPEARANCE

The common myna's head and neck are black. The back and breast are brown. It has white tail tips and wing patches that flash when the bird flies. The beak, legs and skin patches behind the eyes are dark yellow. The male myna bird is about nine inches long. The female's plumage is the same as the male's, but she may be smaller and paler in color.

HABITS OF THE COMMON MYNA

In the evenings common mynas gather in large flocks to roost (rest or sleep), usually in banyan or monkeypod trees. Their noisy calls continue until dark. They begin their calling in the morning before dawn and stay in the roosting tree for a time before they leave to begin feeding.

Mynas feed in pairs or in small flocks. They are omniverous feeders-- they eat both plant and animal material.

NESTING

Common mynas begin nest-building in late February and March. The nests are often found in houses or buildings, in the rafters, eaves, drain pipes, on top of windows or on ledges. Twigs, grass and leaves are used to build the nests, as well as cellophane, string and paper.



Besides eating insects and worms, they also eat fruit, grain and food scraps.

While the common mynas are very helpful in controlling insects, they do cause some problems. They damage crops, spread weeds and often spread mites (tiny parasites) to other birds and to homes where mynas nest. They sometimes interfere with the nests of native birds such as the wedge-tailed shearwater.



Nests are sometimes built in trees, especially in coconut and date palms. In India, snake skin is sometimes draped around the nest to scare off enemies.

Both male and female mynas help build the nest. When courting, the male brings nesting material and places it in front of the female, who adds it to the nest. Nests may be used more than once and new nests may be built on top of old ones. The mynas are aggressive in defending their nesting territory from other birds or predators.

Egg-laying takes place between March and July. Each nest has two to five eggs, which are a blue to blue-green color. Both adults take turns to incubate, or sit over the eggs.

The chicks hatch after 13 to 18 days.

They are fed and brooded (protected in the nest) by both parents. They are fed insects and earthworms for the first ten to 12 days, and each chick must be fed as often as 15 times every hour.

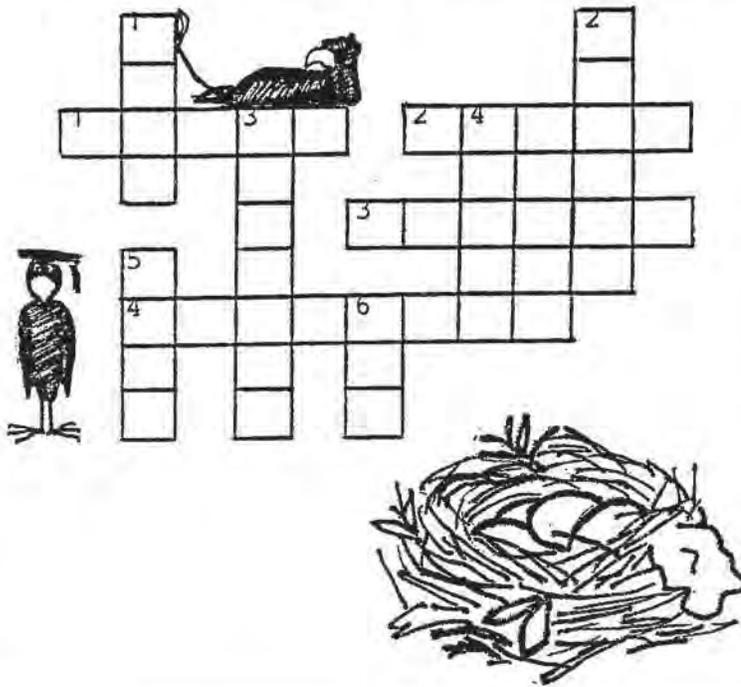
At about one month of age the young birds, called fledglings, are able to fly and are ready to leave the nest. They spend another month with the parents, being fed occasionally and learning to feed themselves.

THE COMMON MYNA: -- AN URBAN PEST CONTROLLER



Common mynas have adapted very well to life in Hawaii. They are able to live and find food in the city, in towns or in farming areas. The myna is a neighbor to all of us. Its importance to Hawaii in devouring insects of all kinds makes it a valued pest controller.

MYNA BIRD CROSSWORD PUZZLE



H	BAT
E	BROODED
L	CHICKS
P	CUTWORMS
F	FLOCKS
U	FRUIT
L	INCUBATE
H	INDIA
I	INSECTS
N	MITE
T	MYNA
S	NEST
	OMNIVEROUS
	PEST
	ROOST

ACROSS

1. Common mynas are natives of this country.
2. The myna eats this for some meals.
3. Mynas feed in pairs or in small _____.
4. Both adults take turns to _____ the eggs.



DOWN

1. _____ birds sometimes interfere with nests of native birds.
2. The _____ are fed and brooded by both parents.
3. The myna helps control pests by eating many of these.
4. In the evenings, mynas gather in large flocks to _____.
5. The myna spreads harmful weeds and this tiny parasite.
6. This mammal flies like a bird.

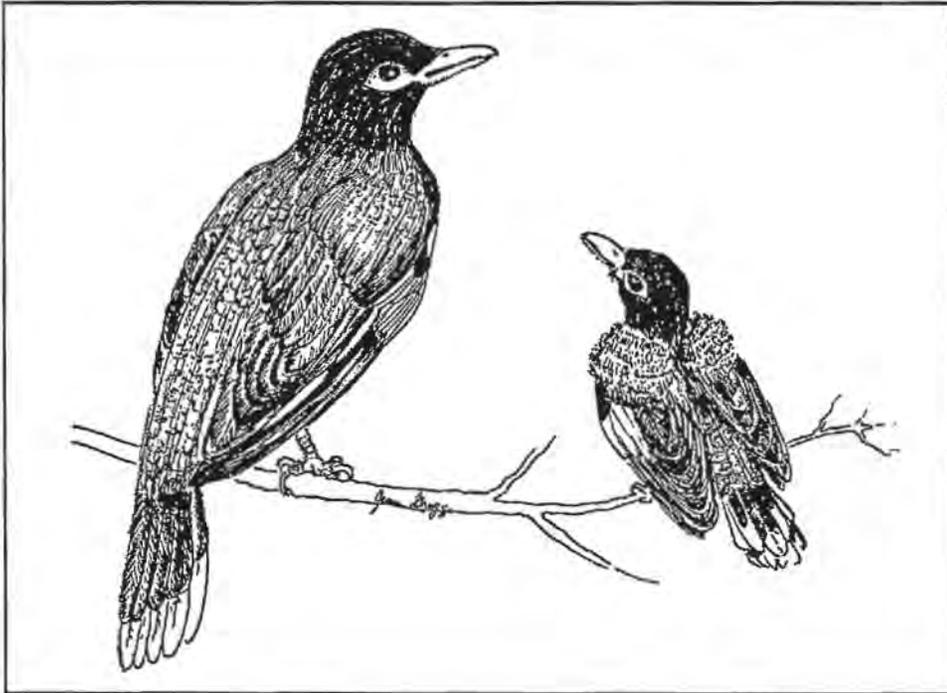
WHAT'S IN A NAME??

Myna comes from an ancient Indian word meaning "delightful or joyful."

The Hawaiian name for the common myna is "piha-'ekelo," which means "full of 'ekelo sounds," referring to the myna's calls. Do the mynas in your neighborhood call, "'ekelo"?



THE COMMON MYNA



Established on all main Hawaiian Islands, the common myna (*Acridotheres tristis*), is perhaps the best known bird in the state. Considered an "urban" bird, it is found most frequently in the vicinity of habitation, a preference also noted in its native India. There are few open lawn areas in Hawaii that don't have a number of myna residents.

These birds are in the family *Sturnidae*, which includes the European starlings. They were introduced from Europe to North America in the early 1890s when several were set free in New York's Central Park. In the last 75 years the starling has become well established throughout North America and has become a nuisance by roosting in urban buildings and eating millions of dollars of fruit. This aggressive bird also steals the nests of other birds. On the positive side, starlings destroy a large number of crop-damaging insects.

The myna was introduced to Hawaii in 1866 by Dr. William Hillebrand to control army worms and cutworms which were destroying sugar cane and pasture grass. Dr. Hillebrand is very notable in Hawaiian history. He was a German national and a physician. In 1859 he was sent to Asia by the Hawaiian sugar industry to contract and procure for import into this kingdom laborers from China and India. In China he contracted 522 laborers. In addition to recruiting labor, he brought back plants and animals which he thought would benefit the Hawaiian

Islands. The grounds around Dr. Hillebrand's residence in Honolulu, filled with his many plant introductions, are now known as the Foster Botanic Gardens. His book, *Flora of the Hawaiian Islands* published after his death in 1888, is an epic in Hawaiian botany.

Success with the myna bird was to open a new era of agricultural pest control, presently called biological control. Introduction of the myna can be considered one of the first attempts in this new science. The Hawaiian sugar industry was to dominate this new field for the next century.

OTHER MYNA BIRDS

The common myna's relatives include the crested myna (*Acridotheres cristatellus*). This bird was introduced to North America but failed everywhere except in Vancouver, Canada, where it is sometimes seen as an escaped cage

bird. Another relative, the talking myna (*Gracula religiosa*), a common cage bird which may be taught to mimic and whistle, is often encountered in local pet shops.

DESCRIPTION

The common myna, also known as the house myna, is about nine inches long. The female is smaller than the male. The head and neck are dark black, while the back and breast are dark brown. The beak, legs and triangular-shaped patches of skin behind the eyes are dark yellow. White wing patches, appearing in flight as bright flashes, possibly serve to confuse the perception of onrushing predators.

FEEDING

An omnivorous feeder, the myna eats both insects and fruits. Its impact on native species is controversial. At Kilauea Point, unattended wedge-tailed shearwater eggs are often pecked open by mynas. Up to 20% of the eggs laid here have been lost because of myna predation. Since the myna has a preference for urbanized areas, the potential for direct conflict with the endangered forest birds in remote higher elevations appears to be minimal. As a vector of weedy plant species and avian disease, the myna may be a more serious threat.

During the day, mynas feed in pairs or small flocks. In the evening, they return to communal roosts, frequently in large banyan or monkeypod trees. Aggression among the birds is not uncommon, as most Hawaii residents know. The myna is exceptionally quick to vocalize and a myna roost is a center of aggressive activity which lasts throughout the night.

NESTING

Nest site selection begins in late February and March. The myna seems to prefer to nest in buildings rather than trees. We may expect to find nests on ledges, under rafters, on top of air conditioners, in drain pipes and in the cavities and forks of trees. Coconut and date palm trees seem to be preferred for natural nest support. Nest sites range from six to 36 feet above ground.

The male arrives at the nesting territory first, followed by the female a few days later. Once the site is established, the pair vigorously

defends its territory, driving away any intruders. Nests are constructed by both sexes. Mynas defend their nest-gathering territory, where they collect a wide assortment of natural and man-made materials, including feathers, grass, twigs, leaves, plastic, paper, cigarette filters, cellophane and string. In India, snake skin is often arranged on the exterior of the nest in a manner to discourage potential predators. Material is added to the nest throughout the incubation and chick-rearing stages. Nest sizes vary greatly according to support structure. In addition, birds often build nests in succession on top of older nests.

EGG-LAYING & INCUBATION

Egg-laying occurs between March and July, with most activity taking place in May. Two to five eggs are laid at intervals of 24 hours. Eggs are a blue-blue/green color. Both parents participate in incubation; changes are frequent throughout the day. It has been reported that pieces of green leaves are often added to the nest during incubation, perhaps to increase humidity in the nest. Incubation of the clutch takes 13 to 18 days. If the nest fails, a second and possibly a third or fourth may be undertaken in the season. Robert Eddinger, who studied the myna in Hawaii (August 1967 *Elepaio*, Volume 28, No. 6), felt that the bird here produced a single brood only.

Hatching success is very high, reported at 97.77% in an Indian study. Upon hatching, the young are fed and brooded by both adults. One of the first responses of the young is gaping; if one taps the nest, they quickly open their mouths and beg for food. This response changes to fright when the young gain their eyesight after the 10th day. In the first 10 to 12 days, animal food (insects, worms) is fed to the hatchlings. In another Indian study, the first hatchling weighed twice as much as the second, and the second was twice the weight of the third. Feeding is constant, from seven to 15 times per hour. Feathers appear on the young on the sixth day, covering the chick by the 19th to 21st day. In a Hawaiian study, an 86% mortality of young hatchlings was reported. The author indicated poor nest location, unfavorable weather and insufficient food for the young were the main causes of failure. Mortality is much higher for the younger, weaker third or fourth

hatchlings.

The young are ready to leave the nest from 29 to 35 days after hatching. They then spend another month with the parents, being fed occasionally. After this period, they compete with the parents for food.

In Hawaii, the myna is affected by an eye nematode which impairs vision and a mite which proved to be debilitating to the young which were hand-reared.

It is difficult to assess the full environmental impact of an introduction such as the myna within the Hawaiian ecosystem. At present, the ecological dynamics are too complex, constantly adjusting to the influx of plants and animals. Regardless of its impact, the myna is in Hawaii to stay!



Dan Moriarty

IN SYMPATHY--

*To Dan Moriarty
on the recent passing of his Mother.*

*From Staff,
KPNHA Members & Volunteers*

CONGRESSMAN AKAKA VISITS KILAUEA POINT

Thursday, October 30, 1986, Hawaii Congressman Daniel Akaka, accompanied by Clerk of the U.S. House Appropriations Committee, Mr. Fred Mohrman, and Pacific Islands Administrator Al Marmelstein, visited the Refuge. During the visit, wildlife was exceptionally active. Congressman Akaka and Mr. Mohrman inspected the site of a proposed new Visitor Center and observed activity on the west flank of Crater Hill.

The visitors chatted with volunteers on duty, expressed appreciation for their considerable contribution and pledged continued support for the Refuge.

ALBATROSSES THRIVING AT KILAUEA POINT

The first albatross of the 1986-'87 nesting season was seen November 19 at Kilauea Point. To minimize disturbance, the staff waited until January 2 before entering the area to confirm nesting. Four nests were recorded under the ironwood trees behind Albatross Hill, the grassy knoll west of the lighthouse peninsula.

The attraction and eventual nesting of the Laysan albatrosses at Kilauea Point will provide visitors the opportunity to see one of Hawaii's largest and most distinctive seabirds, further developing the Point's interpretive options as a window to the inaccessible Northwestern Hawaiian Islands. Four nests during the 1985-'86 season produced three chicks which fledged in July 1986. This year, in addition to the four nests, 16 to 25 birds were seen daily in courtship displays on the Refuge. Six nesting attempts were reported on the east flank of Crater Hill and three nests at Kepuhi Point, east of Kilauea Point. Twenty-four attempts were reported at Kauai's Pacific Missile Range.

During this considerable activity, several black-footed albatrosses were seen on Mokuaeae Island and in the vicinity of the Refuge during mid-January.



AKAKA GROUP--From left to right: Pacific Islands Administrator Al Marmelstein, Appropriations Committee Clerk Fred Mohrman & Mrs. Mohrman, Refuge Secretary Noreen Bautista, Congressman Akaka and Refuge Staff Member Kip Bottomley



SUCCESSFUL ANNUAL CHRISTMAS SALE

The third annual pre-Christmas sale sponsored by the Kilauea Point Natural History Association was held November 8 at the Point. A bright, sunny day favored the many shoppers who attended. Among the displays were paintings, T-shirts, glazed tiles, wind chimes, stationery, hand-crafted natural material items, jewelry and stitchery, all stressing some phase of Hawaii's natural history.

The KPNHA Visitor Center shop did a brisk business as usual, offering members a 20% discount on all merchandise. Refreshments were available from the West-of-the-Moon Cafe. Chairwoman Mary Jane Moore headed an industrious corps of volunteers and Jean Gregg organized the vendors. Fran Powell and Pauline Street donated three beautiful wind socks with wildlife and lighthouse scenes.

Vendors included: Island Windsounds, the Artisans Guild, Irmalee Pomroy Flowers, Chris Faye, Joslyn Werner, Radiance, Kaila Trace, Jean Gregg, Agape Aloha, Eugene Childress, Pauline Street, Susan Stanger, the Sierra Club and Linda Thompson.

For the first time the sale was open to the public, so attendance was increased, with many mainland visitors as well as Kauai residents enjoying the shopping.

Volunteers who helped make the day a success were: Mickey Aikin, Helen Brooks, Judy Buckley, Lillian Daily, Bill and Phyllis Davis, Mike and Charlene Dyer, Donna Genuth, Linda Goodman, Valerie Hannon, Diane Hofler, Mary Ishida, Dick and Shirlee Johnson, Carol Korman, Bert and Janis Lyon, Fred and Lou Okazaka, Joyce Peio, Alma Playle, Fran Powell, Bud and Dot Powers, Bob and Carolyn Rasmussen, Pauline Street, Bob and Barbara Stuart, Jim and Julie Towar,---Kip Bottomley, Noreen Bautista, Dan and Linda Moriarty and Tap Wada.

Junior volunteers were Mary, Hannah and Donald Moriarty and Rebekah Moore. Special thanks go to Ralph Rubio, Jimmy Ledward and Rob McReynolds for supplying their large tents.



"A TOUR FOR THE BLIND--- -OPENED MY EYES"

by Noreen Bautista

Sunday, October 18, 1986, I had the opportunity to lead 18 members of the State Association of the Blind on a tour of the Kilauea Point National Wildlife Refuge. I was a little apprehensive about it!

After giving the group an orientation about the National Wildlife Refuge System and describing Kilauea Point, the time had come to "show" them around. Every bird I described was compared to a chicken. Every time I mentioned a bird, the first question asked was, "Is it bigger than a chicken?" A wedge-tailed shearwater on the ground next to the Visitor Center provided an opportunity for one person to touch a bird for a few seconds.

The lighthouse was described as a Coke bottle shape, with windows just below the top. The group put their hands on the building and walked around it. One of the women put her face against the building and mentioned that the sun was shining on that side because it was warm there!

I was amazed that they were excited about many things that I casually accept as part of our everyday environment. They would asksomeone to read the interpretive panels for them; their faces lit up when they heard about the seven-foot wingspan of the great frigatebird and of the millions of seabirds in the Northwestern Hawaiian Islands. There were "ohs and ahs" when they heard a great frigate-bird trying to force a booby to release its catch. They cheered every time a big wave hit the face of a cliff. They asked me to face them to the north so they could tell the wind direction. They picked the "half-flower" of the naupaka and felt the milk from the akoko plant. I soon got caught up in their excitement; I told them when a big wave was about to come and alerted them when a bird was flying toward us. The one thing I did not expect when I volunteered was that this group of blind people would "open my eyes" and make me appreciate more keenly the beauty and splendor of an area I have always loved, but have come to take for granted.

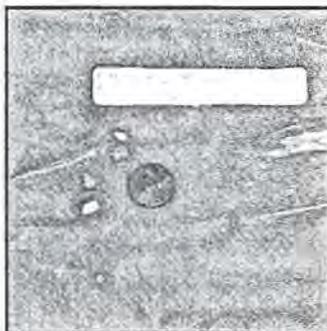


UPDATE ON PLASTICS IN MARINE ENVIRONMENT

BIRD NO.	ONE DAY EACH WEEK, 7/22 THRU 11/13											
1	*		*	*						*		*
2				*						*		
3										*		*
4				*	*	*			*		*	*
5				*				*				
6												*
7			*			*						
8					*	*		*				
9								*				*
10	*											*

Wedge-tailed Shearwater Plastics Regurgitation Study
* Indicates plastics found

In Issue 8 (November 1986) of *Kilauea Pointers*, we reported the summer-and-fall project at Kilauea Point, conducted with volunteer help, to determine the amount of plastics ingested by wedge-tailed shearwaters. The tabulated results of that study are indicated in the chart shown here. Plastic in the regurgitated stomach content of the birds (photo right, showing sample specimens, with a penny for size comparison) was carefully recorded for evaluation by Paul Sievert of the National Disease and Health Lab at the University of Wisconsin. He will study



the impact on Pacific seabirds and attempt to identify the plastic materials. He has conducted extensive studies on Midway Island, where significant quantities of plastics were noted in the Laysan albatrosses nesting there.

Volunteers participating in this project but whose names were not included in the November report are Dave Batchelder, Carol and Wendel Korman, Nancy Norwell, Linn Schewffele and Pete Stys; from the U.S. Fish and Wildlife Service-- Ed Bean.



KPNHA CO-HOSTS FOREST BIRD LECTURE

The Kilauea Point Natural History Association, together with the Kauai Chapter of the Sierra Club, on the evening of January 20, sponsored a lecture by Pete Stine, Recovery Coordinator for the U.S. Fish and Wildlife Service in Hawaii. Speaking to a packed house at Kilauea School cafeteria, Stine told the story of Hawaii's endangered forest birds, illustrating his talk with color slides. He listed the many unfavorable impacts which have so drastically reduced their numbers and, in many cases, caused their extinction. He also described the efforts directed toward their conservation and emphasized the importance of caring for and monitoring the fragile ecosystem of the Hawaiian Islands.



NATIVE PLANT RESTORATION PROJECT

In 1978 the U.S. Fish and Wildlife Service began a program to re-establish the native coastal vegetation at Kilauea Point. There were several objectives for the project, but one in particular was to provide source material for the many birds that prefer these plants for nesting support and nest construction. Red-footed booby nests, for example, are often constructed entirely of *Chenopodium* and *Euphorbia* despite the availability of dozens of other introduced species.

The hala tree (*Pandanus*) offers much better support for the red-footed boobies' nests when compared to exotics such as the ironwood (*Casuarina*) or Christmas berry. After hurricane Iwa destroyed the area's remnant hala trees, the birds had no alternative but to use the more flexible limbs of these exotics. Eggs in nests atop such trees are often tossed out in high winds. Nests in hala trees are well supported by the spiral of the leaves.

Native plant species also hold up well under severe wind or moisture stress, thereby offering better soil support for burrowing seabirds.

In addition to providing better habitat for the seabirds, use of native plants is a conservation effort in itself. The planting also provides educational opportunities for interested visitors. Many homeowners have been impressed by the native species used at Kilauea Point and are now using some of these coastal species in their residential landscaping.

CLEARING THE CHRISTMAS BERRY

When the project was set up in 1978, there were only four naupaka plants on the grounds. Similarly, there were only four hala trees, all of which fell to the fury of Iwa. Where the nursery now stands an area had to be cleared of Christmas berry to provide for construction.

Hiromu Seshiki, Young Adult Conservation Corps leader, was responsible for establishing the new nursery and propagating the first generation of native plants. Hiromu and the YACC crew eradicated most of the Christmas berry trees which once dominated the Refuge grounds. In recent years volunteers have provided the hands to propagate the native plants; summer Youth Conservation Corps (YCC), Kauai Sierra Club, Boy Scouts, Brownies and community groups have done most of the planting. In 1978, less than five percent of the vegetation was considered native; by 1986, with the exception of lawn areas, 80% of the Point's vegetation was in native plant species. It is the Refuge goal to have 100% in native plant cover by 1988, to celebrate the 10th year of the program. We can use your help! If you can contribute any please call the Refuge at 828-1414.



MAHALO, JOYCE!-- Special thanks to super-volunteer Joyce Peio for the many hours she has contributed at Kilauea Point. Joyce, a grad of the '86 volunteer class, has worked diligently for an average of four days a week. Her expertise in bookkeeping and secretarial skills--along with a cheerful enthusiasm--is deeply appreciated by Staff and fellow workers.

A NEW "LOOK" FOR KILAUEA POINTERS

With this issue, we introduce a new design concept, larger typeface for text, revised layout--, all *computerized*. Hope you like it!

The President's Report

Dear Fellow Members:

As you will note from the following comments and attached financial report, 1986 was a good year for the Association. We were able to repay the remainder of the \$2,000 start-up loan generously extended to us by the Arizona Memorial History Association.

During much of the last two years, efforts have been directed toward building up the shop inventory and soliciting members (whose ranks now number almost 500). We make available to the public 105 books, 33 maps, posters, four post cards specifically illustrating Kilauea Point scenes and T-shirts in a variety of sizes and colors. All these items further stimulate interest in Hawaiian wildlife. With the shop well established and adequately stocked, early indebtedness repaid and with a supportive membership, the Association will be able to devote its resources to providing quality educational materials highlighting Hawaii's unique natural history.

ASSOCIATION ACTIVITIES

During fiscal year 1986, the Association sponsored five lectures and helped host the annual Volunteers' Birthday Party. The annual Christmas Sale, in addition to providing a pleasant social atmosphere, allowed members to take advantage of a 20% reduction on shop items.

Publications produced during the year included **Hawaii Nature Focus**, with a 15,000-copy distribution to all fifth-graders in the State of Hawaii. That was our first state-wide educational effort—another milestone for the Association. **A Student's Checklist** for use at Kilauea Point was also produced during the year (your sample copies of both of these publications are enclosed with this mailing). Your **Kilauea Pointers** newsletter (herewith introducing a new, easy-to-read format) was published three times in 1986.

CONTRIBUTIONS

The STEENHOF FUND, monies donated in memory of the late Norm Steenhof, received an additional \$50 in 1986, bringing the fund balance to \$3,000. From the TATMAN FOUNDATION we received \$1,000 committed for publication of **Hawaii Nature Focus**. THE TONY FIFIELD MEMORIAL FUND contributed \$100. Bert Lyon donated a \$2,500 computer with printer and software; Bushnell Corporation donated three pairs of binoculars.

In conclusion, thanks to the very generous contribution of time and money by U.S. Fish and Wildlife Service volunteers and Association members, we look forward to accomplishing a wide array of educational and interpretive projects in the year ahead.

Mahalo,

Nick Beck
President



KPNHA Statement of Assets, Liabilities & Other Sources-of-Funds

September 30, 1986

ASSETS

Cash in Bank---	\$6,357.73	
Time Cert.-----	5,000.00	
Cash on Hand---	287.25	
Petty Cash-----	<u>50.00</u>	
	\$11,694.98	
Shop Inventory	17,695.93	
Prepaid Inventory	913.22	
Equipment	<u>4,222.34</u>	
TOTAL ASSETS	<u>\$34,526.47</u>	

LIABILITIES & OTHER FUND SOURCES

Unrestr. Funds	\$3,400.00	
Restr. Funds		
(Steenhof)	<u>3,000.00</u>	\$6,400.00
Surplus ('84)	3,703.30	
('85)	8,273.18	
('86)	<u>16,149.99</u>	
		<u>28,126.47</u>
TOTAL LIABILITIES/FUNDS		<u>\$34,526.47</u>





HAWAII NATURE FOCUS



NATURE STUDIES FOR CHILDREN

Sponsored by the Kilauea Point Natural History Association
Box 87, Kilauea, Kauai, HI 96754

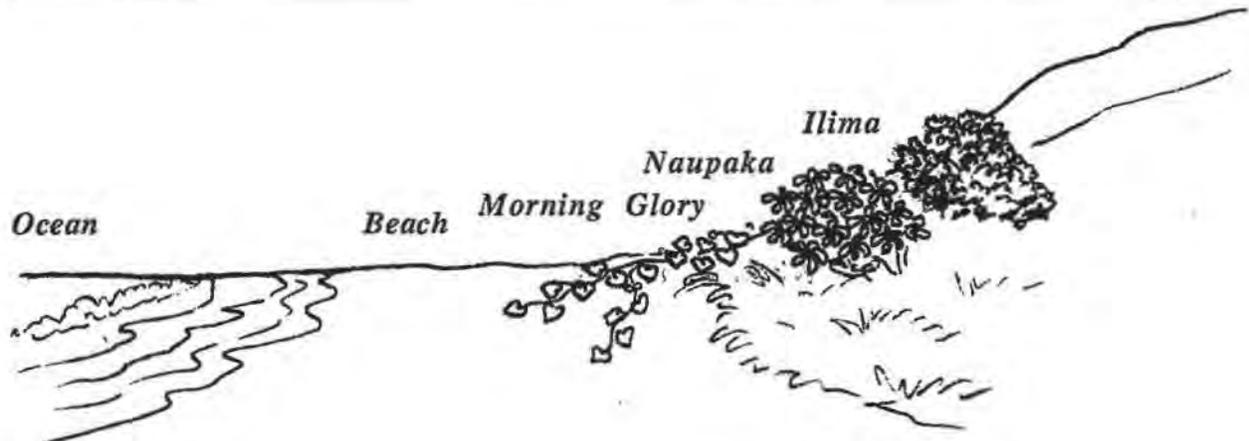
No. 6

HOW PLANTS CAN ADAPT TO UNFRIENDLY LIVING CONDITIONS

Many living things are able to change in order to make themselves more suitable to their environment. This ability to adjust is called adaptation. For example, certain animals hibernate through the cold winter; others grow thick coats of fur to adapt to colder seasons. The cactus, a desert plant, has developed a stem that stores water so that it may continue to live during times of little rainfall.

HAWAII'S PLANTS

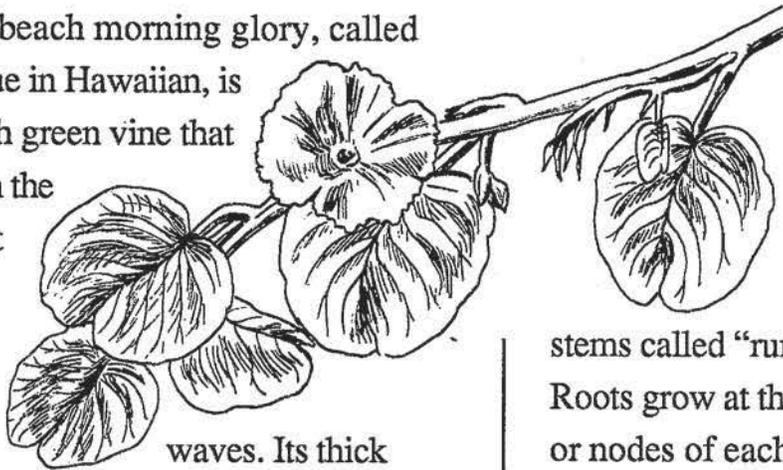
Many plants in Hawaii have made adjustments. Some plants have learned to adapt to the unusual and unfriendly living conditions found on the coast in Hawaii. The beach morning glory, the beach naupaka and the ilima are indigenous (native) plants that have adjusted to living along the sea shore. Each in its own way has adapted to the salt spray, ocean breezes, high surf and intense sunshine found in the beach environment.



THE BEACH MORNING GLORY (POHUEHUE)

The beach morning glory, called pohuehue in Hawaiian, is a smooth green vine that grows in the sand just beyond the reach of the waves. Its thick leaves are two to three inches long. Its pink bell-shaped flower lies close to the ground, which gives it some protection from the wind. It adapts to living in the hot sun and blowing sand by opening its petals only in the cool morning hours.

If the beach morning glory is broken up by storm waves, the whole

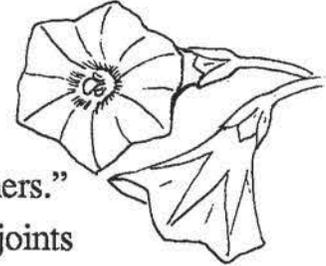


plant need not die. The vine has slender

stems called "runners."

Roots grow at the joints or nodes of each of these runners.

If pieces of the vine are broken off by the sea or wind, new roots can develop at these nodes and take hold in the sand. This adaptation not only helps the morning glory survive in its coastal home, but also gives it the ability to hold sand dunes together, which is very important in stopping erosion of the beaches.



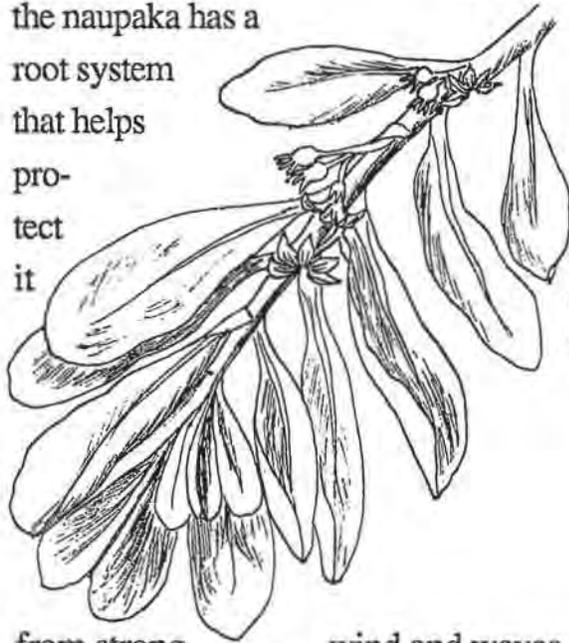
THE BEACH NAUPAKA (NAUPAKA-KAHAKAI)

The beach naupaka grows wild along many Hawaiian shores. It is an attractive shrub with shiny green leaves. It usually grows close to the ground, but it can grow to heights of five to ten feet.

The naupaka has succulent (fleshy or juicy) leaves and fruit; this moisture protects the plant from the intense heat of the sun. The oval-shaped leaves are from three to five inches

long and grow in a tuft or small cluster at the tips of the long branches. These tufts protect the growing tips from harsh sea winds and salt spray. The white berries of the naupaka have become adapted to salt and they can float on the ocean currents. The currents and tides help spread the berries, which contain the seeds of the plant, to other shorelines in the islands. From these seeds, new naupaka plants can

grow. Like the beach morning glory, the naupaka has a root system that helps protect it



from strong wind and waves. If a branch is broken or damaged, new

roots will form near the break to help anchor the plant and keep it growing. This adaptation has made the naupaka a favorite of coastal gardeners, who use it as an ornamental wind-break and for erosion control.

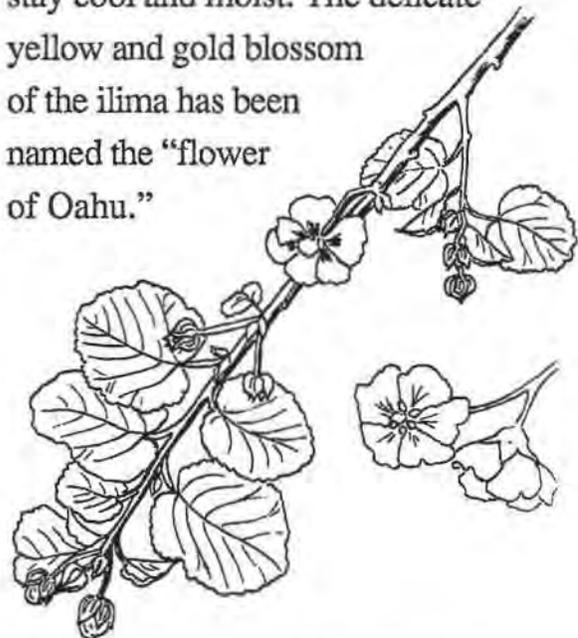


Most people identify the naupaka by its 3/4-inch white flower with purple streaks, which looks like it might have been torn in half. Actually, the five-petaled flower is complete, but its unusual appearance has made it the subject of several Hawaiian legends.

ILIMA

The ilima grows in many parts of Hawaii, from sea level to an altitude of more than 2,000 feet. The plant can grow to be four feet tall, but when it grows along the coast it usually spreads out close to the ground. By keeping a low profile the ilima can protect itself from the salty sea wind. Other adaptations of the ilima are in the leaves. The heart-shaped leaf of the ilima has hundreds of tiny hairs. These hairs help break up the strength of the wind as it blows across the plant. The hairs also keep the salt spray from the surface of the leaf. The leaves' silvery color reflects the

hot rays of the sun, helping the plant stay cool and moist. The delicate yellow and gold blossom of the ilima has been named the "flower of Oahu."



The flowers can be strung into lovely leis which are prized.

CAN THESE PLANTS ADAPT TO MAN?

We have learned how three of Hawaii's coastal plants successfully survive strong sunlight, salt spray, ocean winds, high surf and other unfriendly living conditions Mother Nature sets forth. Unfortunately, they are less successful in adjusting to the special problems caused by man.

Foot traffic, dirt bikes and dune buggies can seriously damage these coastal plants by ripping and tearing the leaves, nodes and root systems. Because these plants are important in stopping erosion of the beaches and sand dunes, we should take care to protect them.



Some Surf History

Ancient Hawaiians slapped the stems of the pohuehue on the ocean and chanted to make sure they had good waves for surfing!

Word Search

R O O T S E V I T A N
T R E N N U R P L A Y
S M I E R S T F U T L
M A N L D R O P I M S
O B D U B O A R A L T
R E I C H K N O A D G
N A G C A O S T B O A
I C E U I S E E D R M
N H N S R P N C O M I
G L O R Y I U T W A L
T R U E V I D S U N I
E L S Y M C O A S T P

Adapt
Beach
Coast
Dormant
Dunes
Erosion
Hair
Ilima
Indigenous
Man
Morning glory
Native

Naupaka
Node
Petal
Protect
Roots
Runner
Seed
Succulent
Sun
Tuft
Vine



KILAUEA POINTERS



KPNHA NEWSLETTER & WILDLIFE REFUGE REPORT
P.O. Box 87, Kilauea, Kauai, Hawaii 96754

No. 10

PACIFIC GREEN SEA TURTLE:—HONU

Dwgs. by Pauline Street

The Pacific green sea turtle, a reptile as we all know, belongs to an ancient group of cold-blooded vertebrates with a protective shell. There are approximately 275 species of turtles which over the last 150 million years have adapted to a wide range of habitat, from the driest of deserts to fresh and salt water environments.

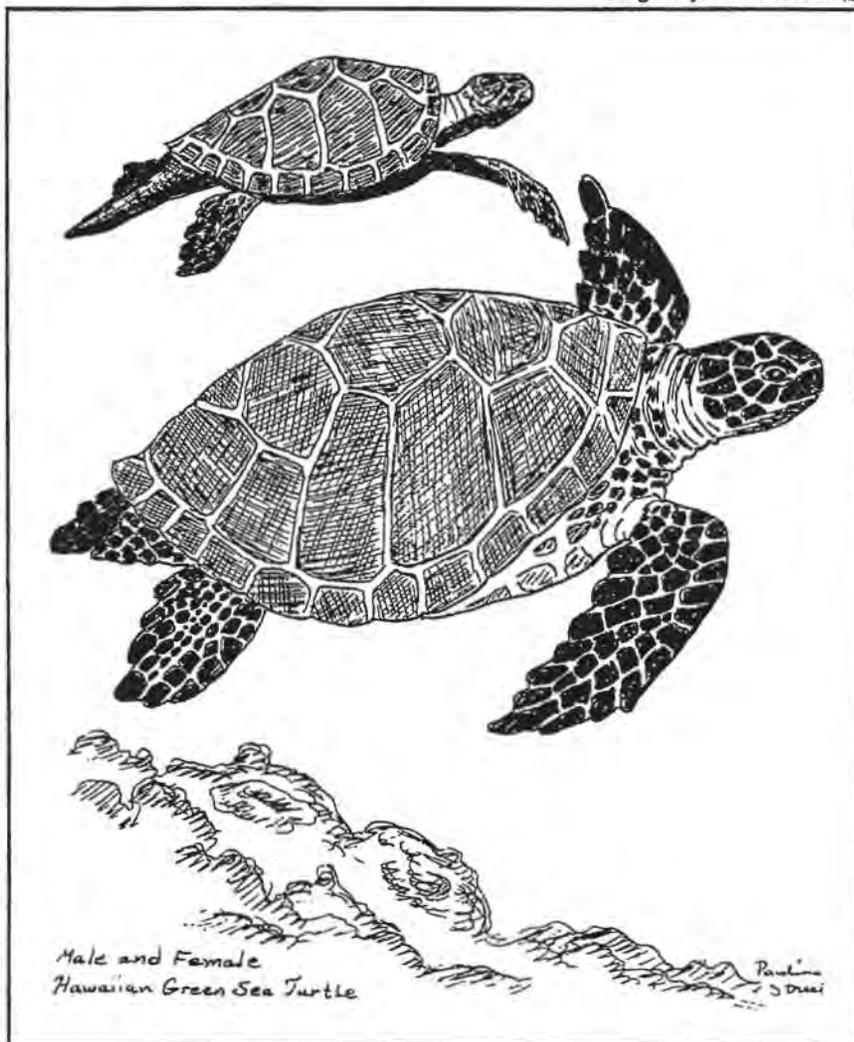
The shell is part of a turtle's skeleton, on the outside of its body. The top portion is called a *carapace*, a fusion of the backbone and ribs. The bottom portion, the *plastron*, is a modified breast bone.

Some land turtles have hinged shells which can be closed, offering exceptional protection when the head and other appendages are withdrawn. Sea turtles, however, are unable to retract their appendages. Aquatic turtles have webbed feet which give them better maneuverability in the water.

Another characteristic of the turtle is its lack of teeth; however, the jagged jaw in some species is equally efficient. Most turtles are omnivorous feeders, eating both plants and animals. Turtles are also egg-layers.

SEVEN PRESENT SPECIES

The Pacific green sea turtle (*Chelonia mydas*) is one of a group of seven species of sea turtles presently found. The group includes the leatherneck, loggerhead, flatback, hawksbill, olive ridley and Kemp's ridley. Many of these species have distinct sub-populations with very specific breeding and



migratory patterns. In general, all seven species are experiencing population declines world-wide. The decline is attributed to harvesting of eggs, accidental trapping during fishing operations, development along beaches used by nesting turtles and the taking of adult turtles for meat, shell, oil and skin for leather.

In Hawaii the Pacific green sea turtle is the most common species found; however, the hawksbill is also frequently encountered.

There are green sea turtles 35 degrees north and south of the equator in the Atlantic, Pacific and Indian Oceans. Ecologic and geographic isolation has produced specific subpopulations such as the Hawaiian green sea turtle discussed here. It is referred to as "green" not because of its external coloration (which appears olive-tan), but because of the distinctive green color of the fatty tissue attached to and contrasting with the red flesh.

This turtle is commonly seen along Hawaii's reefs foraging on seaweed, much as cattle graze. Their carapaces range from two to four feet long and adults weigh from 200 to 500 pounds. Individuals taken in the past have recorded weights of over 800 pounds.

NESTING & HAWAIIAN RANGE

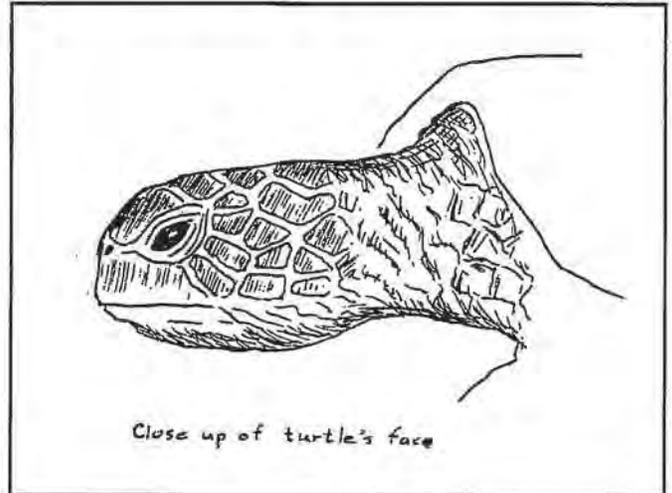
There are occasional reports of nesting from the main Hawaiian Islands; however, studies conducted by National Marine Fisheries Service Biologist George Balazs indicate at the present time 90% of all nesting in the state takes place at French Frigate Shoals, about 550 air miles northwest of Honolulu, on six small islands. Fortunately, French Frigate Shoals is part of the Hawaiian Islands National Wildlife Refuge and the nesting areas there are protected.

Balazs captured and tagged 629 Pacific green sea turtles at 16 different feeding sites in the state of Hawaii, ranging from Kau on the Big Island to Midway. Tagging was done with a numbered alloy tag placed through the trailing edge of the two front flippers. Turtles were measured at time of capture and growth rate information could thus be obtained from subsequent recapturing. In comparing growth rates to the size of turtles found nesting, Balazs estimated it would take approximately 15 years for individuals to reach sexual maturity—, but in some instances the period may be much longer.

THE LIFE CYCLE

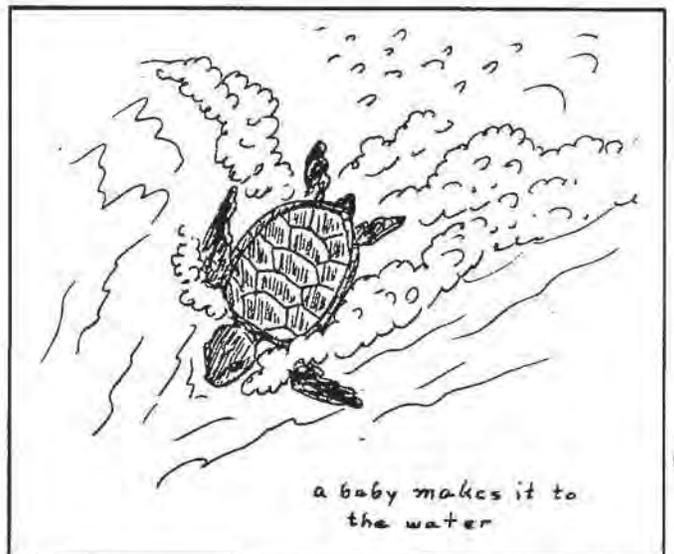
From tags and recovery studies started in 1973 by Balazs, it appears there is an annual migration of turtles from throughout the Hawaiian archipelago to French Frigate Shoals

from mid May to early August. Males and females have been observed copulating in offshore waters; however, fertilization could



be from previous encounters, as females are able to store and retain sperm. Males are distinguished from females by their broad, thick tails. Each year from 95 to 250 females appear at French Frigate Shoals to nest.

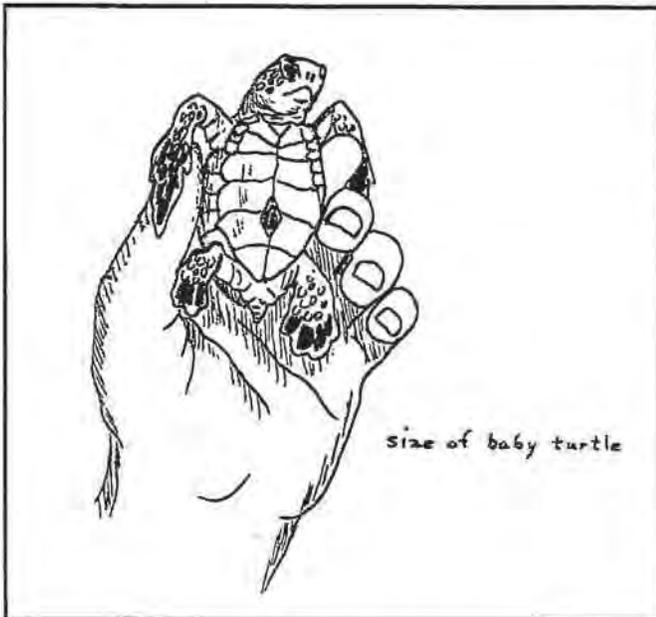
The female moves onto the beach at night, digs a pit with her hind flippers and deposits 90 to 100 golf-ball-size eggs in the pit. The shell of the egg is soft and flexes slightly. After the laying, eggs are covered with sand and left for two or three months to hatch unattended. Females are known to dig false pits—pits with no eggs. More than one clutch of eggs is produced in a season. However, it appears that several years may elapse be-



tween breeding seasons.

The one-ounce hatchlings take several days to reach the surface, when a cooperative effort allows them to break through the sand cover, usually at night. On the surface, they immediately head for the water. Once there, observers have noted a frenzied swimming effort for the first day and a half.

Balazs estimates 25,000 hatchlings are produced at French Frigate Shoals each year; however, a high mortality occurs because crabs, sharks, ulua and other large fish take many of the young before they reach the open ocean. Once ocean-borne, they are assumed to be pelagic—floating in the ocean currents, existing as carnivores, eating marine animals. As they develop, they begin to reappear in the Hawaiian Islands with carapace measurements of 14 inches and larger. It is assumed this growth takes two to four years (based on growth rates of those raised in captivity). There are, however, many questions surrounding their pelagic existence which will remain unanswered until development of a better technology to band or mark small hatchlings.



In Hawaii the turtle feeds on several species of marine algae; bacteria in the intestines facilitate breakdown of the cellulose material. It is said this turtle is as efficient as a cow in the conversion of food materials.

Sexually mature turtles measured at the nesting colony at French Frigate Shoals averaged 36 inches in length. The smallest recorded sexually mature turtle was 32 1/2 inches long.

HABIT AND HABITAT

Pacific green sea turtles are often found in underwater crevices. They have lungs, breathe air and are able to use oxygen very efficiently, allowing them to stay submerged for long periods. Activity dictates the frequency of breathing intervals; five to ten minutes is a commonly observed interval for actively feeding turtles off Kilauea Point. When necessary, they may attain speeds up to 35 miles per hour.

The Hawaiian race of these turtles is capable of migrating all the way from Kau on Hawaii to French Frigate Shoals (an air distance nearly 800 miles), then locating these small islets which are barely a few feet above sea level—a remarkable feat of navigation!

PREDATION AND DECLINE

Sea turtles are subject to predation by the tiger shark, which can easily pierce the shell with its razor-sharp teeth. Portions of large adult turtles are regularly found in the stomachs of tiger sharks. It is speculated that in the 1950s and 1960s the demand for turtle meat by restaurants and for the shell as a tourist souvenir made the animal very attractive economically for fishery. Excessive pressure using nets, readily available SCUBA gear and hunting expeditions to the Northwestern Hawaiian Islands brought the populations crashing down. Thus reduced in numbers, the tiger shark predation plus the loss of nesting sites on the main Hawaiian Islands made population recovery a very slow process. To prevent further decline the Pacific green sea turtle was given federal protection under the Endangered Species Act of 1978, which bans taking and sale of the animal or its parts.

Hawaiian and Polynesian mythologies make numerous references to the turtle

(*honu*). Its flesh was restricted to royalty in some parts of Polynesia; in Hawaii, women were not allowed to eat it. Some Hawaiian families have adopted the turtles as their *aumakua*— family god or totem. An ancient dance called the *honu hula* imitates the movement of the turtle. In the Tokelau Islands and Fiji, there are persons renowned for their ability to call turtles.

Today both children and adults derive great pleasure in watching turtles in our offshore waters. With current conservation efforts and enhanced public awareness, we may be able to restore populations to their turn-of-the-century levels. Without protective legislation, we could have lost this species in Hawaii, depriving future generations of the opportunity to see this unique creature.

Dan Moriarty



REFUGE SUPPORTS "TAKE PRIDE.." EFFORTS



In the fall issue of *Kilauea Pointers* we noted the conservation goals of the "Take Pride in

America" campaign which had been launched to increase public awareness of and support for our nation's natural resources. The device above symbolized the nation-wide nature of the program.

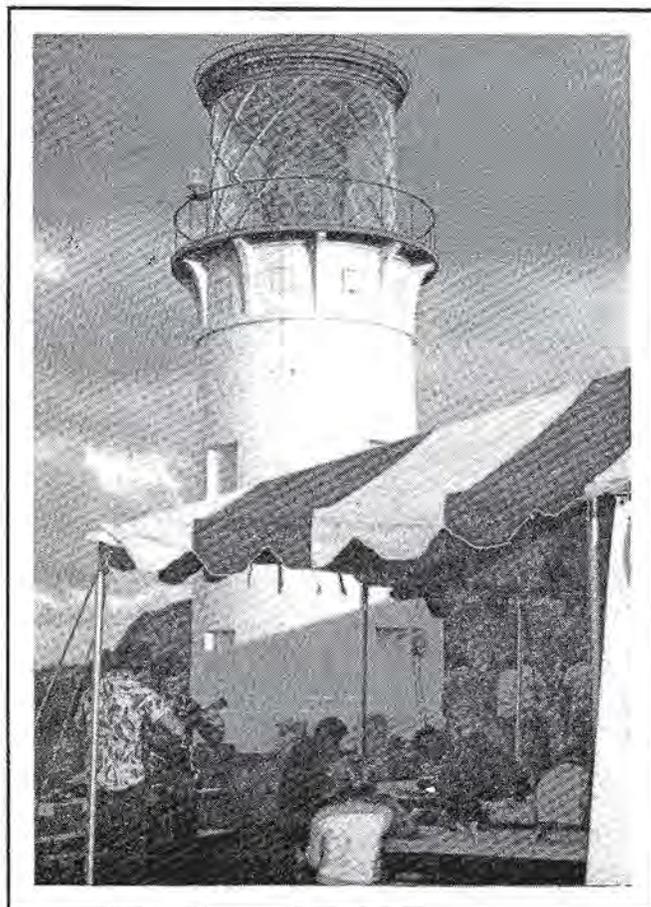
In a show of whole-hearted support for the campaign during its "Awareness Week," Kilauea Point National Wildlife Refuge opened its gates to an unusual Sunday public access May 17 from noon to 4 p.m. In so doing, the exceptionally large number of projects accomplished at the Refuge by individual volunteers, community groups and other dedicated supporters was highlighted. Such projects as hala tree and naupaka planting, painting and maintenance of buildings were pointed out by appropriate signs; the thousands of hours contributed at

the Visitor's Center (book store and interpretive activities) and for natural history related (educational, research and support programs were indicated by a large poster in the Visitor Center.

More than 500 people attended the "open house" function and Jerry Leinecke, Manager of the Hawaiian Islands and Pacific Islands National Wildlife Refuge Complex, flew to Kauai for the day to provide a show of support and assistance. The afternoon event provided an impressive display of the highly successful manner in which Kilauea Point Refuge and its volunteers effectively back the "Take Pride..." campaign year around.



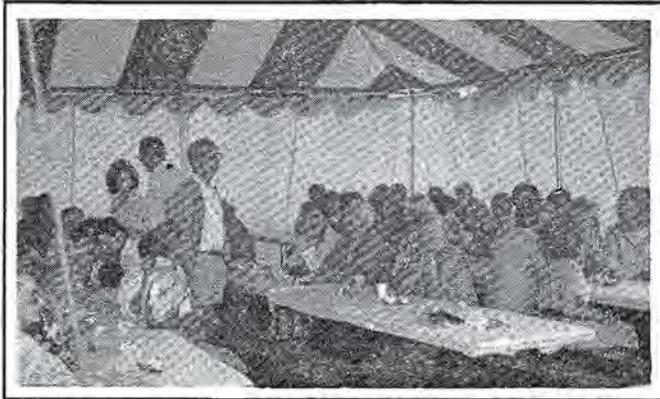
VOLUNTEER AWARDS DINNER AT THE POINT



On a beautiful balmy evening, April 25 (but lots of gusty wind off the northeast

quarter!), the annual "night of awards" was held to honor volunteers whose hours of contribution at Kilauea Point Refuge have ranged from a minimum of 100 to 1,000 or more over the past year (or for cumulative significant achievement over three years).

The event was hosted by Refuge Staff "Chefs" Noreen, Linda, Ed and Dan who had prepared a satisfying dinner of spaghetti, a green garden salad and a selection of delicious cakes. Providing cover was a big tent



which accommodated about 150 volunteers and family members at the rear of the Visitor Center. Whales, albatrosses, shearwaters and other members of the local natural history community regaled the guests with performances befitting the affair!

These awards (noted below) emphasized the volunteer activities at the Refuge which are in support of aims of the "Take Pride in America" campaign (see previous story):—

CUMULATIVE—1000 HOURS OR MORE OVER THREE YEARS

Aikin, Ross Davis, Phyllis Moore, Mary Jane Powell, Fran Stuart, Barbara

ANNUAL — 1986-1987

900 HOURS +		800 HOURS +		400 HOURS +		300 HOURS +	
<i>Aikin, Ross</i>		<i>Peio, Joyce</i>		<i>Moore, Mary Jane Powell, Fran</i>		<i>Davis, Phyllis Playle, Alma Wada, Tap</i>	
200 HOURS +				100 HOURS +			
<i>Aikin, Mickey</i>		<i>Street, Pauline</i>		<i>Bryant, Nancy</i>		<i>Hofler, Diane</i>	
<i>Davis, Bill</i>		<i>Stuart, Barbara</i>		<i>Buckley, Judy</i>		<i>Ishida, Mary</i>	
<i>Dyer, Charlene</i>		<i>Towar, Jim</i>		<i>Genuth, Donna</i>		<i>Johnson, Shirlee</i>	
<i>Rasmussen, Bob</i>		<i>Towar, Julie</i>		<i>Goodman, Linda</i>		<i>Orlik, Ferne</i>	
				<i>Gregg, Jean</i>		<i>Rasmussen, Carolyn</i>	
				<i>Hannon, Valerie</i>		<i>Yamate, Ted</i>	



KILAUEA POINT REFUGE—WILDLIFE UPDATE

LAYSAN ALBATROSS

The four Laysan albatross nests at Kilauea Point have produced three healthy chicks; a fourth nest failed to hatch. If successful, these chicks will fledge in mid-July.

Up to 30 courting birds were seen during March and April throughout the Refuge, including several outside the fence on the northeast tip of the Point, 50 feet from the lighthouse. It was not uncommon to see groups of up to 50 persons enjoying observations of albatross courtship activity daily.

The six Crater Hill nests failed. Dogs killed most of the birds at Pacific Missile Range; three sole survivors were transferred to Sea Life Park on Oahu in April.

WEDGE-TAILED SHEARWATER

Volunteer Coordinator Judy Buckley is

heading a group to monitor 17 known wedge-tailed shearwater nesting sites on Kauai. They will check the colonies and make comparisons with 1978 and 1985 nest counts. Overall trends for the 17 areas will then be determined.

Kilauea Point volunteers and staff will for a second year conduct a program of monitoring ingested plastics in these shearwaters.

RED-FOOTED BOOBY

Volunteers and staff have begun inspection of red-footed booby nests to determine specific plants used in nest construction. The results will provide important management input for establishing native vegetation which may be used for required nesting materials.



FLASH NEWS ITEM FROM THE POINT!

April 1, 1987-KP News Service- -

After several days of heavy rains and strong winds, the Kilauea lighthouse started to shift on its foundation and tilted several degrees to the west. Some observers even wondered if the historic old beacon tower would become the Pacific counterpart of the Leaning Tower of Pisa!

Such thoughts flashed to mind for Ed Bean, Scot Anderson and Noreen Bautista when they each received an urgent call from Dan Moriarty, relaying the information that he had just looked out the window and noticed the alarming tilt. "It must be the water-logged soil and strong wind!" he exclaimed, adding quickly, "You better get out there!" It was April 1, of course, and Dan's motivation was highly April Fools Day-ish!

Ed and Scot jumped in the truck, picked up Noreen at the office and the trio sped to the lighthouse to survey what emergency measures were needed to shore up the sagging structure. Scot inspected the soil for cracks while Ed checked the angle—, and then reported, "Dan must be nuts--, it looks straight to me!" He later acknowledged (under a bit of influence of the theme of the day himself) that "it might be slightly tilted!"

Noreen, reviewing all this madness and now being the staff member most aware of the chronologic significance of this day and these events, calmly noted that "we have been had!" Though Dan reported he had a good laugh—he now wonders what his three staffers will do to retaliate!



Back "on the level" again!



KILAUEA POINT SCHOOL VISIT PROGRAM

A kickoff teacher's workshop in August 1986 began the Refuge's annual program of school visits to the Point. Dan Moriarty and Tap Wada, volunteer from the University of Hawaii, prepared slides showing the flora and fauna in the area. Mary Jane Moore explained to the teachers that only trained volunteer wildlife interpreters would conduct tours and answer the children's questions.

Copies of a "Student's Check List," previously prepared by Ross Aikin, Jean Gregg and Dan Moriarty, were sent to each school prior to the scheduled visit. Tap Wada produced a "Teacher's Manual" to assist the visiting educators.

Volunteers acting as interpretive guides for these groups are:— *Scot Anderson, Harry Bryant, Nancy Bryant, Lilly Daily, Charlene Dyer, Linda Goodman, Valerie Hannon, Dorteia Hyde, Mary Ishida, Shirlee Johnson, Judy Jordan, Carol Korman, Mary Jane Moore, Alma Playle, Georgia Poppin, Fran Powell, Bob Rasmussen, Margaret Riddle, Pauline Street, Barbara Stuart, Bob Stuart, Jim Towar, Julie Towar and Ted Yamate.*

Dan, Noreen Kip and Ed Bean are always on hand to assist these volunteers when help is needed.

The list of visits this year through late May 1987 follows:—

DATE	SCHOOL	# / GROUP	DATE	SCHOOL	# / GROUP
2-12	Maheolona Head Start	20	3-25	Immaculate Conception	16
2-12	Anahola Pre School	17	4-03	Wilcox Hospital	15
2-20	Hanalei School	60	4-06	Kilauea School	60
3-02	Wilcox School	60	4-09	Kipapa Elementary	200
3-05	Kilauea School	50	4-20	Waimea Canyon	60
3-06	Massachusetts Audubon	21	4-22	Kilauea School	40
3-09	Wilcox School	90	4-23	Keanae School	47
3-10	Kapaa Elementary	100	4-29	Kapaa Elementary	20
3-11	All Saints Pre School	60	5-11	Island School	15
3-12	Kapaa Elementary	100	5-18	Eleele School	68
3-18	Kapaa Elementary	160	5-20	St. Theresa	12
3-19	Kaimuki Christian	30	5-22	Koloa Elementary	47
3-20	Island School	20	5-26	Susie Smalling	4
3-25	Rehab. Unlimited	20			



ANDERSON MERITS AN "A+" RATING

Scot Anderson, a former volunteer at Kilauea Point in 1984, returned for three months this spring as part of a senior year internship at World College. For such requirements he will participate in a wide range of management and "public use" activities to gain a broad base of experience.

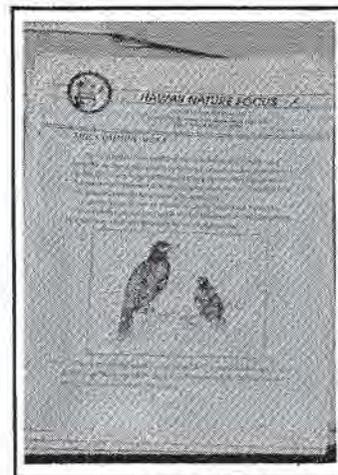
Scot's projects included landscaping the

trail to the lower parking lot, planting ilima at the northeast tip of Kilauea Point and upgrading the nursery. The quality of his work is evident as we look around the grounds!



NATURE FOCUS DISTRIBUTION NOW HANDLED BY A CADRE OF VOLUNTEER WORKERS

With the undertaking last year of state-wide distribution of *Nature Focus* to all fifth-grade students, accomplishing the actual distribution itself (about 15,000 copies) became a major "mailing room" project. It had been decided that the most effective method of accomplishing the task was via regular U.S. mail, so the Kilauea Point volunteer forces were once again marshalled for active service! The "ladies' auxiliary" shown here assembled, packaged and addressed for shipment the entire Mynah Bird issue---, establishing another record for "service rendered beyond the call.."



YOUR HELP NEEDED IN MEMBERSHIP CAMPAIGN

At this time our Association has just under 500 members. We are hoping to break that "barrier" soon. To do it--, we need your help!

Membership Chairwoman Helen Brooks offers the following suggestions:—

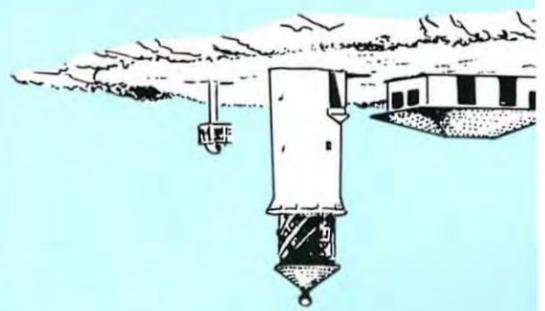
- * Give a gift membership (individual membership is only \$5)
- * Ask friends and neighbors if they are members--and if not, suggest they join!
- * Provide names and addresses of those you think might join; we will send them membership information

Your support has made available a wide range of public benefits, including regular issues of *Nature Focus*., our children's wildlife publication which is sent to all fifth-graders in the State of Hawaii, providing binoculars for use by Kilauea Point visitors, sponsoring evening natural history programs for the public and many other natural history related activities at Kilauea Point.

Your Association has no paid staff, so every dollar contributed is used directly to make available educational and interpretive materials describing Hawaii's very special environment.



Natural history books is offered at the lighthouse. These hours will be expanded as staff and volunteers are available. NWR is open to the public Sunday through Friday. m. These hours will be expanded as staff and volunteers are available.



of wedge-tailed shearwaters and red-footed at Kilauea Point. You may also see other seabird as the Laysan albatross, the great frigatebird, and tropicbird.

located 1 mile north on a paved road from Kilauea highway on the north coast of Kauai, Hawaii.

at Kilauea Point NWR describe some of the wildlife of the five wetlands refuges and the six remote island refuges and their significance are briefly described.

at Kilauea Point NWR describe some of the wildlife of the five wetlands refuges and the six remote island refuges and their significance are briefly described.

es in 1979.

uilt in 1913 and placed on the National Register of scenery and the historic old lighthouse. The light and marine mammals, to photograph and enjoy the visitors come to Kilauea Point each year to view



HAWAIIAN AND PACIFIC ISLAND NATIONAL WILDLIFE REFUGE



A diverse group of migratory shore birds also winters in Hawaii. They visit wetland refuges where suitable mudflats or shallow water habitats are available. Pacific golden plovers, sandpeppings, wandering tattlers and ruddy turnstones are most common.

Black-crowned night herons are common residents of the Hawaiian Islands. They feed on fish and invertebrates but may also take young waterbirds.

More than two dozen species of ducks and geese occasionally migrate to Hawaiian wetlands for the fall to spring seasons. The most common species are pintails and northern shovellers that breed in North America.

Mainland Migrants and Other Residents also Benefit from Hawaiian Wetlands.



- Shorebirds like plover, tattler, turnstones and sandpeppings also make the same annual migration from the mainland that waterfowl do.
- The native birds are joined from September to April by pintails, shovellers and other waterfowl that migrate thousands of miles from Canada, Alaska or Russia.
- The Hawaiian duck, Hawaiian noddie, Hawaiian gannet and Hawaiian booby are found only on the main Hawaiian Islands—they don't migrate to the mainland.

Some Interesting Facts About Hawaiian Waterbirds and Wetlands

All birds using the Hawaiian wetlands need appropriate foods and freedom from disturbance. The endangered waterbirds that only nest in Hawaii also need protection from predators.

A dependable water supply is necessary to support the waterbirds. Controlling water levels in various ponds can create conditions favorable for certain plants, insects and other organisms which in turn are food for the birds.

Creating artificial islands in refuge ponds separates bird nesting areas from dogs, cats and mongoose. Mammal-proof fences afford protection from feral dogs.

Habitats are Acquired and Managed to Enhance Waterbird Use

Formerly more common and more widely distributed, these species have experienced population decline due to continuing loss of habitat, introduced predators and, to some extent, harvest by man. Although celebrated in legends of early Hawaiians, these species were collected for feathers and food, and more recently were hunted for sport until protected prior to World War II. Housing and resorts continue to expand into existing or potential marsh habitat in the Hawaiian Islands. The natural variety of habitats and quality of water and food supply was greater in the past before the wetlands were converted to other uses.

Habitat Loss and Predators Endanger the Waterbirds

THE WETLAND REFUGES



Red-tailed Tropicbird

Baker Island NWR—This island lies just north of the equator approximately 1,600 miles southwest of Honolulu. The 340-acre island is surrounded by 31,397 acres of submerged land included in the Refuge. Like the Hawaiian Islands NWR, Baker Island has a history of commercial guano harvest late in the 18th century and was occupied by American forces during World War II. The island supports four migratory seabird species.

Howland Island NWR—This island is located within 200 miles of Baker Island in the central Pacific. Both islands are vegetated by grasses, prostrate vines and low-growing shrubs. Howland contains 400 acres of emergent land and 32,150 acres of submerged land within the three mile limit of the Refuge. Guano harvest operations ceased in 1878. This island enjoyed some fame this century when an airstrip was built in 1937 for Amelia Earhart's ill-fated flight. Today Howland Island NWR supports eight species of migratory seabirds.

Rose Atoll NWR—The atoll is the easternmost emergent land in the Samoan Archipelago and is among the smallest of all atolls in the world. Two small islets, less than 20 acres in total size, are protected by a square reef, dominated by coralline algae. The largest of the two islets supports a dense forest of *Pisonia* and *Tournefortia* trees, and these trees provide cover and nest sites for 12 species of migratory seabirds. Threatened green sea turtles frequently nest on the two islets and feed in the central lagoon. Among the diverse marine fauna in the lagoon are numerous fish species and a population of giant clams. The Refuge, which includes the islets, the entire lagoon and surrounding reef, was established in 1974. It is managed cooperatively by the U.S. Fish and Wildlife Service and the American Samoa Government. At 14½ degrees south latitude it is the southernmost refuge in the National Wildlife System.

For more information:
 U.S. Fish and Wildlife Service
 300 Ala Moana Blvd., Rm. 5302
 P.O. Box 50167
 Honolulu, Hawaii 96850
 (808) 541-1201



Masked Boobies



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



THE REMOTE ISLAND REFUGES

Some Facts About Remote Pacific Islands and Wildlife

Over 5 million seabirds (18 species) nest on less than 2,000 acres on the northwestern Hawaiian Islands.

Many seabirds roam the Pacific Ocean for several years before returning to remote islands to nest.

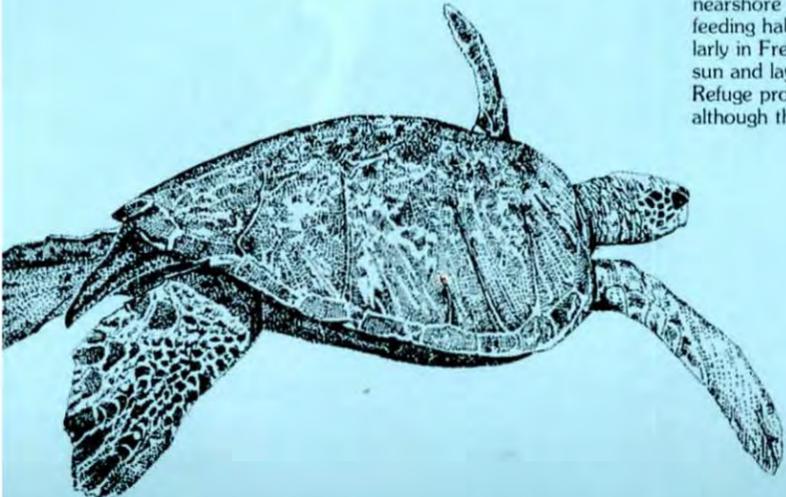
Frigatebirds fly continuously when at sea. Their feathers won't repel water like some other seabirds. To supplement the fish they catch, frigatebirds frighten boobies and shearwaters and take their food. Hawaiians called them Iwa, which means "thief".

Albatrosses don't nest until they are about seven years old. They will choose their mates and nest together each year for life. They may live over 30 years.

250,000 acres of submerged reefs surrounding 1,800 land acres of the remote Hawaiian Islands NWR provide habitat for fish and other life which in turn feed millions of seabirds.

Green Sea Turtles that nest on Pacific islands may roam several hundred miles in search of feeding areas.

As an experiment albatrosses were flown blindfolded to Alaska, San Francisco, Los Angeles, Australia and other points. Upon release they flew back to Midway Island (1,500 miles west of Honolulu) within 10 days.



Remote Island NWRs—Tiny Wildlife Oases in the Vast Pacific Ocean

Mere dots in the vast ocean, the remote mid-Pacific islands host breeding monk seals, turtles and millions of seabirds. They nest on rocky islands and islets among coral atolls.

The marine environment on the remote island refuges is largely undisturbed by commercial exploitation and consequently many species are unusually abundant. The relatively pristine nature of the nearshore waters and the importance of this habitat to seals, turtles and seabirds led to the inclusion of large bodies of protected lagoon and nearshore waters into the boundaries of various remote island refuges.

There are more than 14 million seabirds of 18 species on the Hawaiian Islands NWR alone. Sooty Terns are the most abundant nesters on the remote islands. Also common are albatrosses, shearwaters, petrels, tropicbirds, frigatebirds, boobies, and noddies.

The terrestrial habitat of the Hawaiian Islands National Wildlife Refuge is shared by endemic land birds on the small islands of Nihoa and Laysan. The Nihoa finch and Laysan finch are representatives of the unique Hawaiian honey creeper subfamily that includes several more species in the main Hawaiian Islands. The Nihoa millerbird is an endemic representative of an old world warbler family confined in distribution to this 168 acre island. A close relative formerly found on Laysan Island is now extinct, as is a flightless rail and honeycreeper that inhabited the same island. All three birds were indirect victims of a short but devastating period of human exploitation for guano and feathers which was stopped early in this century when this refuge was established. One additional species, the Laysan duck, barely survived this period and has made a significant comeback.

The Hawaiian monk seal is another endangered species confined in distribution to the Hawaiian Islands NWR. Beaches and rocky shelves on several islands provide space to haul out and rear their pups, while nearshore waters within and adjacent to the Refuge provide critical feeding habitat. These seals share the beaches of sandy islets, particularly in French Frigate Shoals, with green sea turtles that bask in the sun and lay their eggs in sand pits during the summer months. The Refuge provides the primary breeding habitat for the green sea turtles, although the species ranges widely into the main Hawaiian Islands.

Managing Remote Islands for Wildlife.

The remote island refuges are manipulated only where it is necessary to control predators, exotic plants or other factors adversely affecting the habitat or resident wildlife. Public access is severely restricted because of the history of abuse and slow recovery of these vulnerable areas when disturbed. Even research activities are closely scrutinized to minimize unnecessary disturbance and are confined largely to projects likely to yield important management data. A refuge field station is operated at Tern Island in the French Frigate Shoals, Hawaiian Islands NWR.

Remote Island Refuges

Hawaiian Islands NWR—This Refuge, the oldest and largest in the complex was designated in 1909 by President Theodore Roosevelt. The Hawaiian Islands NWR includes all the emergent rocky islands, sandy islets and major atoll lagoons between Nihoa Island and Pearl and Hermes Reef in the northwestern portion of the Hawaiian Archipelago. In total, nearly 1,800 acres of emergent land and over 250,000 acres of submerged land are included. Remnants of prehistoric occupation by early Polynesians are also protected on Nihoa and Necker Islands.

Johnston Atoll NWR—This Refuge is located 825 miles southwest of Honolulu. The Refuge is managed cooperatively with the Defense Nuclear Agency. Twelve species of seabirds breed on four islands within the atoll. The reef community in the lagoon supports diverse marine life including green sea turtles. The atoll was first protected as a federal bird refuge in 1926, although it has been used extensively as a military installation since 1939.

Jarvis Island NWR—Jarvis is part of the Line Islands Archipelago and is located just below the equator, 1,300 miles south of Honolulu. The island is about 1,100 acres in size. The Refuge also includes 36,419 acres of adjacent submerged lands. Like Baker and Howland the island is believed to have been discovered by European sailors early in the 18th century and was also exploited for its guano resources. Eight species of migratory seabirds are known to nest on Jarvis Island. Feral cats were at one time found on all three of the equatorial refuges where they preyed heavily on nesting seabirds. They were successfully eradicated from Baker in 1964 and Jarvis in 1983. All three islands were designated as National Wildlife Refuges in 19

Four Endangered Waterbirds are Found on the Wetland Refuges

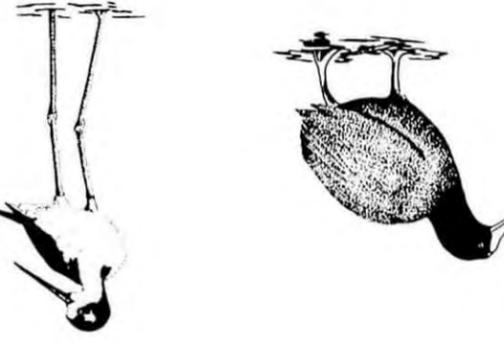
Wetland refuges on the main islands support four endangered waterbirds that are unique to Hawaii.



Hawaiian Duck or Koloa Maoli—is similar to though smaller than the common mallard. **Koloa Maoli** are most common on Kauai where they inhabit natural and artificial ponds, streams, ditches and marshes.



Common Moorhen (Hawaiian Gallinule)—is related to the coot and is found in similar habitats. It is distinguished by its bright red bill and forehead. Its Hawaiian name is **'Alae Ula**.



American (Hawaiian) Coots—are easily recognized by their white floating nests built from aquatic vegetation. Their Hawaiian name is **'Alae Keokeo**.



James Campbell NWR (Oahu)—This Refuge was established in 1977 through the lease of 142 acres of land in two major parcels from the James Campbell Estate. The Refuge includes the spring-fed Punamano Pond and a series of remnant cane wash water settling basins known collectively as Kii Unit. Prior to the closing of the Kahuku Sugar Mill in 1971, these settling basins provided important habitat for stilts, coots, and gallinules. This habitat is being restored and enhanced through major modifications to the impoundments and water system to provide manageable nesting and feeding areas. The Refuge is open to the public on certain weekends and at other times by special permit.

Pearl Harbor NWR (Oahu)—This 40-acre Refuge was established in 1977 on Navy lands in an effort to compensate for loss of still feeding habitat when a reef runway was added to the Honolulu International Airport. The Honolulu Unit was constructed at the site of remnant salt evaporation ponds through the excavation of new ponds with several nesting islets. Similar habitat was created for the Waiawa Unit at the northwest side of Waiawa Peninsula. These units were created primarily for Hawaiian Stilt, but other resident and migratory birds use them also. The Refuge is open by special permit only.

Public Uses are Limited by Size of Refuges

Public use of wetland refuges is limited because the areas are small and human visitors can disturb the endangered birds.

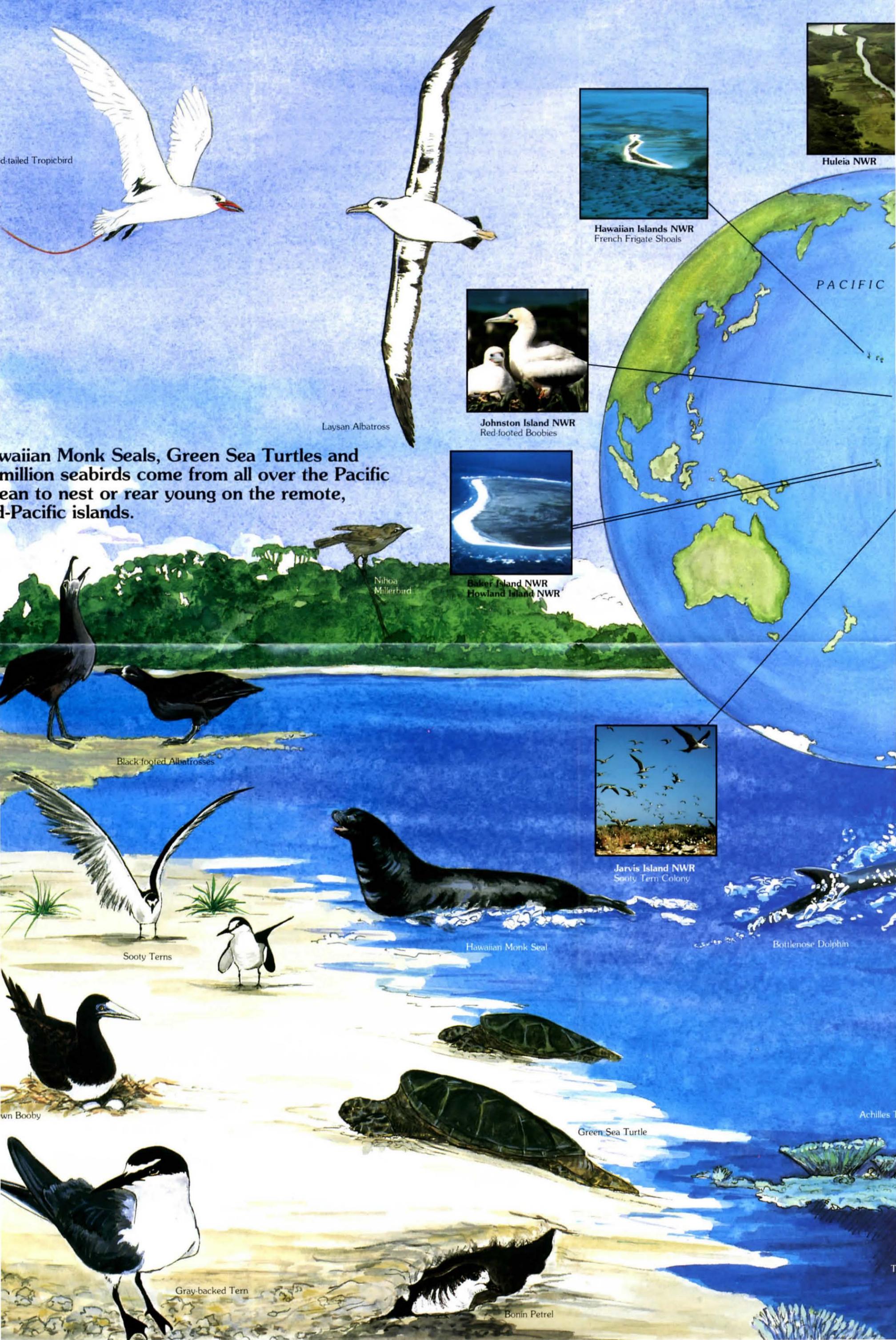
Wetland Refuges

Hanalei NWR (Kauai)—This Refuge established in 1972 includes 917 acres of the lush Hanalei valley. Taro is commercially raised on a portion of the Refuge by permittees. A by-product of this system is good habitat for all four endangered waterbirds. A new taro system replacing the historic hand-dug irrigation ditches has limited the acreage of taro and other wetlands to increase. The Refuge is not open to the public. An interpretive overlook on the state highway north of the Refuge explains the Refuge values and affords a spectacular view.

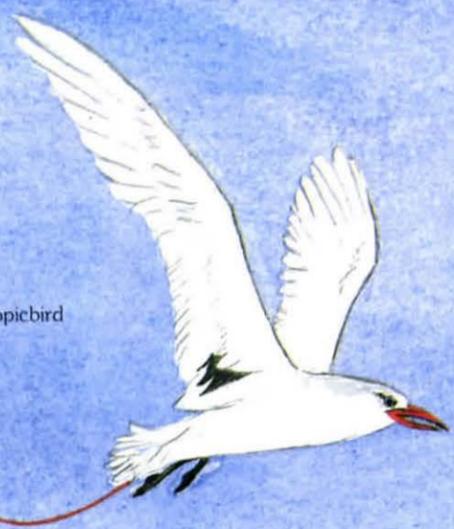
Huleia NWR (Kauai)—In 1973 approximately 240 acres of rippled slopes and bottom lands along the Huleia River were purchased to provide additional waterbird habitat. The Refuge includes ponds formerly in taro and rice that will be modified extensively to attract endemic waterbirds to new breeding and feeding areas. The Refuge lies adjacent to the famous Menehune Fish Pond, a registered national historic landmark. The Refuge is not open to the public. It can be seen from the Menehune overlook along the road.

Molokai NWR (Molokai)—This Refuge, established in 1976, includes a remnant inland freshwater fish pond along the south coast of Molokai. This pond was expanded in 1983 to enhance habitat for and coots. The county of Maui operates a small beach park on

HAWAIIAN AND PACIFIC ISLAND



Red-tailed Tropicbird



Laysan Albatross



Hawaiian Islands NWR
French Frigate Shoals



Huleia NWR



Johnston Island NWR
Red-footed Boobies

Hawaiian Monk Seals, Green Sea Turtles and million seabirds come from all over the Pacific Ocean to nest or rear young on the remote, island-Pacific islands.



Baker Island NWR
Howland Island NWR



Nihoa Millerbird



Black-footed Albatrosses



Jarvis Island NWR
Sooty Tern Colony



Sooty Terns



Hawaiian Monk Seal



Bottlenose Dolphin



Brown Booby



Green Sea Turtle

Achilles T



Gray-backed Tern



Bonin Petrel

S NATIONAL WILDLIFE REFUGES



Hanalei NWR



Kilauea Point NWR



James Campbell and Pearl Harbor NWRs



Kakahaia NWR

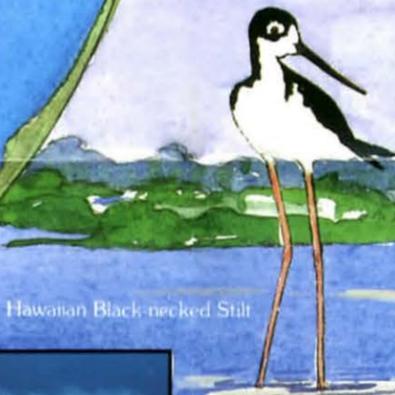


Great Frigatebird



Northern Pintails

Marshes and ponds on the main Hawaiian Islands support endangered resident waterbirds and migrating waterfowl and shorebirds from the North American mainland and other continents.



Hawaiian Black-necked Stilt



Rose Atoll NWR



Pacific Golden Plover



Sanderlings



Wandering Tattler



Common Moorhen (Hawaiian Gallinule)



Hawaiian Coots



Hawaiian Duck (Koloa Maoli)



Black-crowned Night Heron



Acropora Coral



C. HOLLEN