1960s - 1980s
GEORGE BALAZS
KAULA FILE

U.S. NAVY BOMBS WASHINGTON WILDERNESS

The Copalis National Wildlife Refuge off the Washington Coast -- tiny rock islands inhabited mainly by sea lions and nesting birds, including the bald eagle -- is being used by the U.S. Navy for mock aerial bombing and strafing practice. The Navy does not use real bombs, but rather detonator charges that give off a puff of smoke for marking purposes.

Although the Fish & Wildlife Service became aware of the situation only recently, the Navy has been using parts of the refuge for target bombing ever since World War II, and the war games were never brought up when Congress designated the area a wilderness. The Fish & Wildlife Acting Regional Director in Portland says that the bombing runs are "not consistent with the Wilderness Act."

Recently the Navy requested permission to expand its range to include part of the Quillayute Needles National Wildlife Refuge, also designated wilderness.

The situation has sparked a battle within the Fish & Wildlife Service. Officials in Washington, D.C., are purportedly ready to approve the Navy's request over the objections of its Portland office. "We haven't authorized it or not authorized it," said Robert Gilmore, Associate Director of the Fish & Wildlife Service in Washington, D.C. He added that the agency will study the Wilderness Act "before we make a decision, precipitous or otherwise." An environmental impact statement on the Navy's bombing is now under review in Portland.

Sierra Club National News Report 12 October, 1979

UNITED STATES PACIFIC FLEET
COMMANDER THIRD FLEET
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
FF/3
11015.4A
Ser 01K/ 415
27 MAR 1981

Hawaii Audubon Society
Post Office Box 22832
Honolulu, Hawaii 96822

Gentlemen:

I apologize for the delay in answering your letter of 29 January 1981 concerning the status of Navy and Fish and Wildlife Service negotiations relating to Kaula Island. The Navy is in the process of resolving details of a proposed study that is to take place on Kaula Island. Once the requirements for the study are resolved, the Department of Interior will issue a two year special purpose Migratory Bird Treaty Act permit to the Navy for continued use of the island.

An Environmental Impact Statement (EIS) has not been prepared for Kaula Island. Upon completion, the study will be made public. If an EIS is required, it will be prepared.

If I can be of any further assistance, please do not hesitate to write.

Sincerely,

J. T. Carson

J. T. CARSON
Captain, U.S. Navy
Kahoolawe Project Officer

FORUM

the Readers' Page

Bombing Birds

It might be hilarious if it wasn't so insidious—the Navy's request to "accidentally" kill birds while bombing Kaula Rock, which lies 20 miles southwest of Niihau and is part of a state seabird sanctuary with prohibitions against killing or disturbing birds, nests and eggs.

I can't help but praise the scientists and environmentalists whose valiant attempts to halt the Navy's destruction of Kaula have resulted in the Interior Department's denial of the Navy's request to continue its carnage.

But a hollow victory is no victory at all. Anyone naive enough to believe that environmental acts and concerns can overrule national security concerns is either blind, ignorant or brainwashed.

In light of the current Iran and Afghan crises, the mounting worldwide tensions and the war hysteria that is sweeping across America, the Department of Defense mania for military preparedness and national security is at an all-time high. And since the naval command center here at Pearl Harbor has insisted that the practice bombing of Kaula and Kahoolawe are absolutely and irrevocably indispensible, any attempt to interfere with the Navy's "mission" is a threat and thus bound to fail.

The Migratory Bird Species Act, the Marine Mammal Protection Act and the Endangered Species Act are all federal laws prohibiting the destruction of birds, whales, turtles, porpoises and any creatures considered endangered.

But legality or illegality notwithstanding, when it comes to national defense, the Navy and its mission sit above the law

It comes as no surprise then that the Hawaii state wildlife chief admits the impossibility of enforcement of the judgment against the Navy. And Navy spokesmen freely admit that there will be no immediate change in the Navy's bombing operations, thus allowing time for the Navy lawyers to tangle up the ruling in court.

It's about time people wake up to the fact that compared to military preparedness and national security, environmental concerns mean absolutely nothing. Killing birds, whales, porpoises and islands is about as significant to the military brass as crushing a filthy cockroach.

Where that leaves us, the people of Hawaii who still hold reverence, compassion and respect for all living things in our hearts, is frustrated, alienated, and above all, furious.

Wayne Westlake

Saturday, February 23, 1980 Honolulu Star-Bulletin A-7

FORUM

the Readers' Page

The Navy's Bombing of Birds

Wayne Westlake's letter of Feb. 9 deploring the Navy's continued bombing of seabirds at the Kaula Rock sanctuary focused necessary attention on a question basic to our democratic way of life in the United States.

That is, does the civilian sector really have control over our military at the present time? Can high ranking officers of the Navy and other armed forces decide which civilian laws they will and will not obey during peacetime?

The clearly unlawful practice of bombing birds at tiny Kaula may seem like a small issue, given the other problems presently confronting the nation. Nevertheless, it is representative of a dangerous and increasing trend within our military — a trend that should be brought to an abrupt halt starting with the Kaula situation.

Linda Evans

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

APR 16 1965

APR 15 1965

Dear Mrs. Mink:

We appreciate receiving your memorandum with a copy of a letter from Mrs. Thelma H. Hadley, Secretary of the Hui O Laka of the Kokee Natural History Museum in Kauai, recommending that the island known as Kaula Rock be preserved as a bird sanctuary.

The island has impressive values as a nesting area for certain sea birds including the sooty tern, noddy tern, Necker Island tern, shearwaters and petrels. Consequently, it is highly desirable that the island of Kaula be considered for National Wildlife Refuge status as an addition to the Hawaiian Islands National Wildlife Refuge.

Presently a study is underway to determine the administrative status of the island. As soon as the study is completed, we will do everything possible to have the island added to the Hawaiian Islands Refuge.

Sincerely yours,

Robert M. Paul

Deputy Assistant Secretary of the Interior

Hon. Patsy T. Mink
House of Representatives
Washington, D. C. 20515

Monday, March 16, 1981 Honolulu Star-Bulletin A-13

National Wildlife Week

WHALES, PORPOISES, green sea turtles, monk seals, seabirds, and other creatures connected with the ocean receive attention this year as Hawaii joins in observance of National Wildlife Week, March 15-21.

"Protect Hawaii's Ocean Wildlife" is the theme chosen by the Conservation Council for Hawaii, a modification of the "We Care About Oceans" theme of its affiliated National Wildlife Federation.

Material for use in schools has again been prepared and distributed by the Conservation Council.

Another feature of the week will be the talk at 7:30 p.m. Thursday at the Waikiki Aquarium, 2777 Kalakaua Ave., by the marine biologist, Sylvia S. Earle, of the World Wildlife Fund.

Earle, subject of an article March 7 in the *Star-Bulletin*, will speak on "Caring for Hawaii's Oceans" and show underwater movies and slides of whales and other ocean creatures. She has spent more than 4,000 hours underwater researching ocean wilderness systems.

Hawaii's participation in National Wildlife Week.

Her talk is sponsored by the World Wildlife Fund and the Friends of the Waikiki Aquarium.

FOR DISTRIBUTION in schools, a publication with much information on the Northwestern Hawaiian Islands has been prepared by David Boynton, Kauai environmental science teacher.

The small parcels of land and many square miles of reefs in the islands are home to millions of seabirds.

HE QUOTES MASAKI about the importance of seabirds. "The birds know more about fish than any fisherman in Hawaii," Masaki said. "Without these birds, fishermen can't locate schools of fish or know when the current changes. No birds, no fish!"

Boynton's publication also contains an ocean quiz and word scramble on the Hawaiian Islands. Art work was by Sheryl Ives Boynton, while Steve Montgomery coordinated the project for the Conservation Council.

Co-sponsors included Friends of the Waikiki Aquarium, Hawaii Audubon Society, Hawaii Science Teachers Association, Hawaiian Botanical Society, Hawaiian Malacological Society, Waimea Arboretum Foundation, Sea Life Park, and Sierra Club, Hawaii Chapter.

For its poster the National Wildlife Federation has a picture of the sea otter, now making a comeback along the California coast after its population was decimated by slaughter in the 18th and 19th centuries for the fur trade.

baby seals were being skinned alive.

This action was taken involving the hunt off Prince Edward Island, he said, where the hunt quota was 10,000.

On the first day of the hunt 2,900 seal pups were killed, and then the hunt was shut down, which resulted in saving more than 7,000 seals, he said.

Environmental activists with the Fund for Animals managed to put dye on some of the seals, thus making their furs worthless, before the hunt was shut down, he said.

Hunting was continuing off the Labrador coast, where the quota was 78,000, he said, but the prospects were that hunters would fall short of their quota because the ice was breaking up.

Watson, who lived in Hawaii in 1978, has been active for several years trying to stop killing of the baby seals.

In 1979 he led a trip aboard the ship Sea Shepherd, with Keith Krueger of Honolulu as a member of the party. Krueger returned to the hunt area last February to spray dye on baby seals, was arrested and jailed briefly for violating Canadian law.

Watson said that this year a Canadian photographer was arrested while filming the hunt and that the *Vancouver Sun* published an editorial, "The Bloody Hunt."

He said there will be a demonstration in Toronto March 25 protesting the hunt.

Boynton describes the albatrosses or "gooney birds," which are numerous on Midway and have also been seen at Kaena Point, Oahu. The natural environment at Kaena Point and habitat for some rare coastal flowering plants are being destroyed by motorcycles and dune buggies, however.

Boynton said that some albatrosses also nested near the seabird sanctuary at Kilauea lighthouse on Kauai, but many of them were killed by dogs and their nesting site was partially bulldozed when the landowner widened a dirt road. This year no albatrosses were found there, he said.

Most of the Northwestern Hawaiian Islands are in the Hawaiian Islands National Wildlife Refuge set aside in 1909 by President Theodore Roosevelt.

Several islets off the main Hawaiian Islands are included in the state seabird sanctuary, but Boynton notes that the largest islet in the sanctuary, Kaula, 50 miles off Kauai, is also used as a bombing target by the Navy.

He tells about the efforts, over many years, by Koichi Masaki, veteran Kauai fisherman, to stop the bombing.

One ship loaded with otter skins and under the command of Capt. Henry Barber was wrecked off the coast of Oahu, thus giving the captain's name to a geographic feature.

Weeks

IN ADDITION to being National Wildlife Week, this is American Energy Week, but we haven't heard of any special observances being planned.

President Reagan, however, has proclaimed Thursday as National Agriculture Day. He said, "The efficiency of the American farmer is the envy of the world. With the profit motive and freedom of enterprise, these businessmen of the soil have supplied this nation with an abundance never before witnessed in the history of man."

Seals

PAUL WATSON, of the Fund for Animals, phoned from Vancouver, B.C., to say that this year for the first time the harp seal hunt was shut down by the Canadian government after proof was given that

Tree

THIS WEEK'S exceptional tree is the red hala, Pandanus odoratissimus, at Swanzy Beach Park, Kaaawa, Windward Oahu.

Red hala is rare in Hawaii, the name coming from the red fruit which differs from the orange drupes more common in hala in Hawaii. The red drupes were used in making leis for the alii.

Red hala tree. — Photo by Robert Mizuno, city Department of Parks and Recreation.

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

April 11, 1979

MEMORANDUM

TO: Kenji Ego, Director, Division of Fish and Game

FROM: Ronald L. Walker, Chief, Wildlife Branch

SUBJECT: Report on Trip to Ka'ula Island, March 6-8, 1979

Introduction

Pursuant to a letter dated February 8, 1979 from Commander T. C. Kelley, Department of the Navy, to Susumu Ono, Chairman, Department of Land and Natural Resources requesting participation in a biological inspection of Ka'ula Island, the undersigned visited the island on March 6th, 7th and 8th, 1979 in the company of the following:

Thomas Telfer	District Wildlife Biologist, Island of Kauai
Darrell Herbst	Botanist, U.S. Fish and Wildlife Service
Vernon Byrd	Wildlife Biologist, U.S. Fish and Wildlife Service
George Balazs	Marine Biologist, Hawaii Institute of Marine Biology
John Naughton	Marine Biologist, National Marine Fisheries Service
Robert Iversen	Marine Biologist, National Marine Fisheries Service
David Grooms	Geologist Graduate Student, University of Hawaii
Scott Hamilton	Ecologist, Naval Facilities Engineering Command
E.O.D. Specialist	U.S. Navy
Photographer	U.S. Navy
Corpsman	U.S. Navy
George Tullos	Air Operations Officer, U.S. Navy

On Tuesday, March 6th, all in the above party except Mr. Tullos met at the Barking Sands Air Station on Kauai and departed by helicopter for Ka'ula at 0915, arriving on the island at 0955 (Mr. Tullos arrived by helicopter later in the day). A total of 53 hours was spent on the island. Departure was at 1425 on Thursday, March 8th arriving at Barking Sands, Kauai at 1510 hours.

Activities

After setting up camp in the cave, the E.O.D. specialist gave the party a briefing on avoiding unexploded ordnance and I briefed the party on the status of Ka'ula Island as a State Wildlife Refuge. The entire party then walked the length of the island for orientation purposes and the E.O.D. specialist pointed out ordnance to avoid. Walker, Telfer and Byrd then conferred to plan the wildlife survey and blocked the island off into three sectors for seabird inventory purposes. The remainder of the day was spent plotting sooty tern colonies, making notations on the status of seabird species, noting evidence of bird and egg mortality due to bombing activities and setting up a plot to determine seabird abundance. Seabirds were banded in the evening by Telfer and Byrd. On Wednesday, March 7th, Walker, Telfer and Byrd conducted the seabird inventory, each estimating the number of seabirds by species within their assigned sector. Byrd worked up a technique of random sampling of Sooty tern eggs within the colonies from which more accurate population estimates could be derived and the method was implemented during the latter part of the day. The study plot established by Walker was checked twice. During the evening hours, Walker, Telfer and Byrd censused night-time seabird populations and banded birds. On Thursday, March 8th, supplementary biological information including the location of barn owl caves, barn owl breeding status, polynesian rat abundance and the incidence of shorebirds on the island was collected.

Findings

Table I summarizes the observation of seabirds in terms of species noted, numbers estimated and breeding status. Table II shows a comparison of estimates of seabird numbers for previous years and the current survey. Figure I is a map of Ka'ula island showing the survey sectors, location of the seabird study plot, sooty tern colony areas and pertinent landmarks. Appendix I is a short report prepared by Vernon Byrd, "Estimation of the Breeding Sooty Terns at Ka'ula Rock, Hawaii". Appendix II provides photographs taken during the survey.

A comparison of the total number of birds estimated for all species during the March 1978 and March 1979 surveys indicates a significant overall decrease. This is almost solely due to the much lower estimate of sooty tern numbers in 1979 (50,000) than in 1978 (130,000). Observation of the habitat on Ka'ula during this trip indicated that the torrential rains which occurred in late February and early March may have caused heavy mortality on sooty tern eggs and thus affected the number of adults present. There were several gaps in the distribution of sooty terns in what appeared to be similar habitat along the top of the island and in some areas "windrows" of broken eggs were noted in the lower portions of the slopes. The runoff water apparently had washed down significant amounts of soil and with it, the eggs. Lacking a suitable substrate in these areas, re-nesting by the terns may not have been possible and thus

fewer adults were noted. Mortality on sooty tern eggs due to predation was also noted, although not enough to account for the lower adult population. The predation was attributed to ruddy turnstones which frequented the upper portion of the island.

A 50 by 100 yard study plot was marked off near the helicopter landing site on the North end of the island (see map) to determine changes in red-footed and masked booby numbers over a daily period with the following results:

Date	Time	Red-footed Boobies	Masked Boobies
3/6/79	1630	5	2
3/6/79	1845	14	112
3/7/79	0730	17	79
3/7/79	0930	14	8

Although the number of red-footed boobies remained fairly constant during the observation period, early evening and after dark populations of masked boobies increased significantly.

No new species of birds were recorded during the survey, but Christmas Island shearwaters, white-tailed tropic birds, ruddy turnstones, Pacific golden plover, a wandering tattler, barn owls and house finches were noted. These species were not seen in March 1978. Birds seen in March of 1978 but not during this trip included the Hawaiian noddy and fairy tern.

Seabird mortality directly attributable to bombing activities was noted, primarily in or near the bombing target area on the extreme Southeast tip of the island. Several fairly recent craters rimmed with carcasses of sooty terns and broken eggs were located and it is possible that more could have been found with additional searches. However, the mortality probably did not exceed one (1) per cent of the total population of sooty terns on the island.

Two active barn owl caves were noted along the upper central portion of the East face of the island and several other caves were found which were being used by these owls. An enormous quantity of feathers, bones and decapitated carcasses of sooty terns and grey-backed terns littered the floors and entrances of these caves. The owls for some reason seemed to favor the latter species as in a small sampling, the remains were 75% grey-backed terns. This is interesting when the ratio of sootys to grey-backs present on the island is considered (see Table I).

Only a few polynesian rats were noted which may have been due to the abundance of green vegetation present. The rats did not need to expose themselves as they do during drought periods when they have to seek out food over a larger area.

RONALD L. WALKER, Chief
Wildlife Branch

Attach: Tables
Map
Appendix

Table I

SEABIRD OBSERVATIONS

Date: March 6-8, 1979 Area: Ka'ula

Time: From 10:00 a.m., 3/6 To 2:30 p.m., 3/8

Weather: Partly cloudy, occasional showers and very high winds late 3/7 and 3/8

Species	Adults	Immatures	Chicks	Eggs	Nests	Total (Est.) Population	Comments
Laysan Albatross	x		x	x		100	Chicks 1/3 grown
Black-footed Albatross	x		x	x		75	Chicks 1/3 grown
Christmas I. Shearwater	x					25	Copulating, some pairs
Red-tailed Tropicbird	x					40	In crevices; aerial displays
White-tailed Tropicbird	x					2	Offshore
Masked Booby	x					400	Paired
Brown Booby	x					200	Paired
Red-footed Booby	x	x		x		400	10% on eggs
Great Frigatebird	x	x		x		250	20% on eggs
Golden Plover	x					2	On crest of island
Ruddy Turnstone	x					24	On crest of island, sea ledge
Wandering Tattler	x					1	On sea ledge
Sooty Tern	x			x		50,000	10% egg mortality
Grey-backed Tern	x					300	Beginning tc settle
Common Noddy	x					1,000	Flocked
Barn Owl	x		x			6	1 Chick, 2 weeks old
House Finch	x					6	On crest of island

BIRD SURVEYS (ESTIMATES) - KAULA ISL

	COMMON NAME
1.	Black-footed Albatross
2.	Laysan Albatross
3.	Wedge-tailed Shearwater
4.	Christmas Island Shearwater
5.	Bonin Island Petrel
6.	Bulwer's Petrel
7.	Red-tailed Tropic Bird
8.	White-tailed Tropic Bird
9.	Masked Booby
10.	Brown Booby
11.	Red-footed Booby
12.	Great Frigate Bird
13.	Pacific Golden Plover
14.	Ruddy Turnstone
15.	Wandering Tattler
16.	Grey-backed Tern
17.	Sooty Tern
18.	Blue-grey Tern
19.	Common Noddy Tern
20.	Hawaiian Noddy Tern
21.	Fairy Tern
22.	Barn Owl
23.	White Eye
24.	House Finch
25.	Kentucky Cardinal
26.	Mockingbird
27.	Ricebird

Total Numbers
Total Species

*Caum et al.

Table II

\ND, U.S. NAVY/D.L.N.R.

Aug. 16-19* 1932	Aug. 17-18 1971	Jan. 20-21 1976	Sept. 14-15 1976	Mar. 7 1978	Aug. 21-22 1978	Mar. 7 1979
1 old egg	—	100	—	75	—	75
—	—	150	—	100	—	100
2, many burrows	4,100	—	4,000	—	800	—
—	450	—	250	—	100	25
1 old egg	—	—	—	—	—	—
Several	100	—	100	—	50	—
Rather common	950	—	450	60	100	40
—	3	1	1	—	1	2
Rather common	1,000	300	1,200	125	200	400
Very common	1,700	50	1,000	75	60	200
Not uncommon	1,300	100	150	85	200	400
Very common	950	250	800	400	250	250
Several	—	10	14	—	1	2
—	50	5	20	—	4	24
—	—	5	1	—	1	1
Not common	2,800	—	250	1,250	50	300
Rather common	16,800	2,500	1,000	130,000	2,500	50,000
Small colony	—	—	200	—	—	—
Most numerous	67,700	—	7,000	7,000	10,000	1,000
—	100	20	100	75	200	—
Not common	10	10	200	40	10	—
—	1	3	3	—	1	6
—	—	2	3	—	—	—
—	6	15	40	—	20	6
—	2	—	7	—	—	—
—	—	—	2	—	—	—
—	—	—	20	—	—	—
—	98,022	3,521	16,811	139,285	14,548	52,831
15	18	16	24	12	19	17

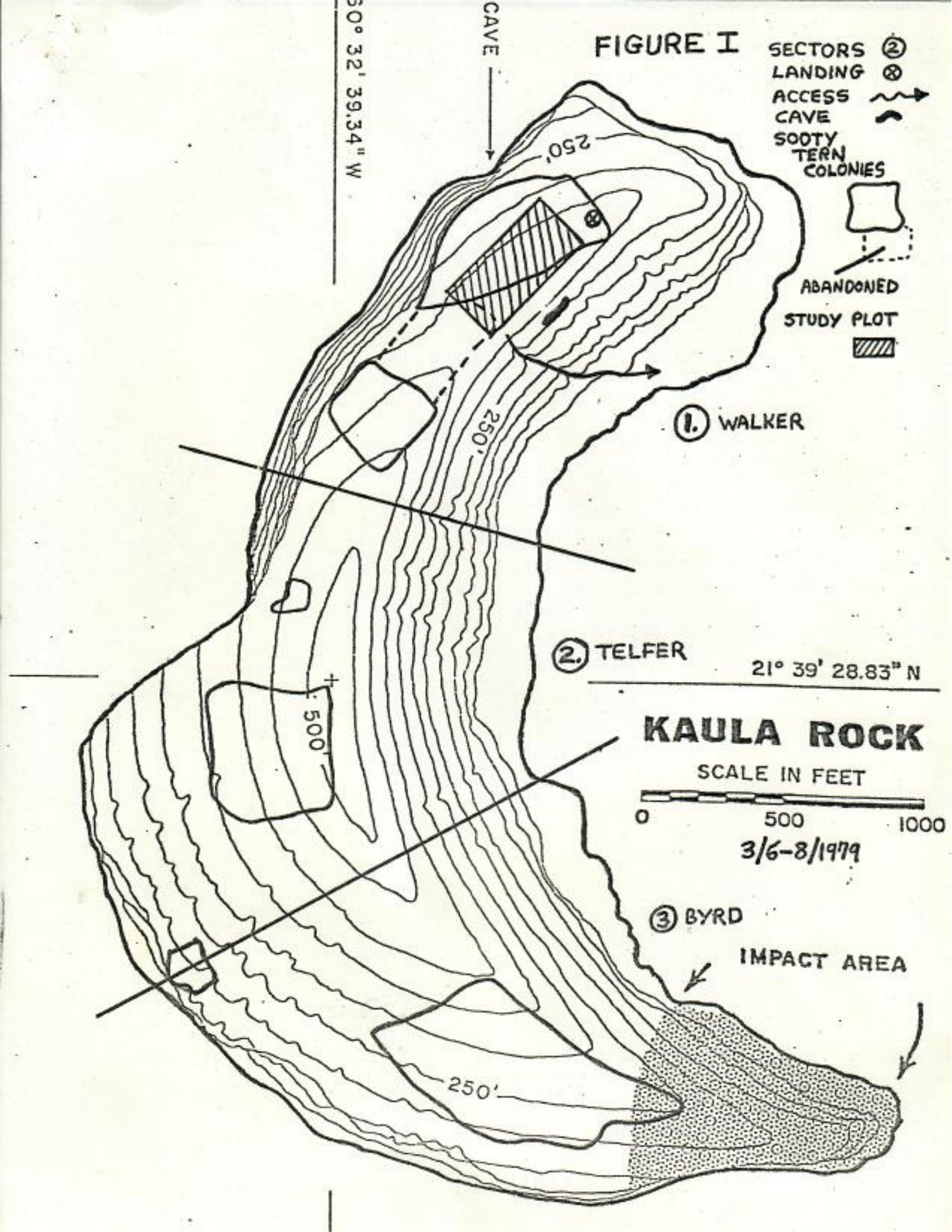
FIGURE I
SECTORS ②
LANDING ⊗
ACCESS
CAVE
SOOTY TERN COLONIES
ABANDONED
STUDY PLOT
CAVE
160° 32' 39.34" W
250'
250'
500'
1. WALKER
2. TELFER
3 BYRD
21° 39' 28.83" N
KAULA ROCK
SCALE IN FEET
0
500
1000
3/6-8/1979
IMPACT AREA
250'

Estimation of the Breeding Sooty Terns at Kaula Rock, Hawaii

During the period March 6-8, 1979 Ron Walker, Tom Telfer, and Vernon Byrd visited Kaula Rock (21°39'N, 160°32'W) to estimate populations of birds, part of the semi-annual inventory program established by Walker. By far the most abundant breeding species was Sooty Tern. The birds occupied six distinct colonies with small scattered groups outside the main colonies (Fig.1). The Sooty Terns nested on the base plate which formed a 20-25 slope away from the old volcanic cone's center. Scattered small rock particles and vegetation over the plate's surface provided wind protection for the eggs. Nesting birds apparently avoided areas where wind protection was lacking, but non-incubating terns and other species used these areas for roosting.

Because of the difficulty of specifying the accuracy of "guesstimates" of the number of Sooty Terns seen at Kaula Rock, we decided to use a simple random sampling scheme to estimate the number of eggs present. Less than 1% of the clutches contained two eggs; the remainder had one egg. Most eggs had apparently been laid within the past two weeks and no chicks were found.

Methods:

The boundaries of major tern colonies were established by pacing from established points on the island(e.g. the old light house marked + on Fig.1). Three 5m. wide strip transects were then randomly selected in each of the five largest colonies. Eggs were censused in the two smaller colonies. A line was stretched across the colony to delineate the transect center, and Telfer and Byrd counted eggs 2.5m. each side of the line. Counts were converted to eggs/m^2 and recorded. The three estimates for each colony were averaged to provide an estimate of the eggs/m^2 in each colony. Calculation of the standard

error for a "t" distribution at the 0.1 level provides an estimate of the interval within which the population mean falls.

Results:

Tern egg density within colonies A-D varied from .32 to .08 eggs/m^2 (Table 1), but intra-colony variation was relatively low (standard errors .035-.05). Variation in density between colonies seemed to result more from the percentage of unoccupied areas in a colony than it did from differences in nearest neighbor distances (Table 2).

Colony X seemed to have been abandoned. About 300 eggs were present on March 9 after a strong wind had blown for 12 hours. Two or three times as many eggs had been present March 6, but many were cracked or pecked and the wind blew the egg shells away. Probably flooding was a factor in the colony desertion, since heavy rain occurred in mid-February. Balazs (pers. comm.) saw waterfalls coming from Kaula Rock Feb. 18, 1979 when he was aboard a vessel nearby. Many eggs appeared to be partially burried in rocks, suggesting flooding. Probably the abandoned eggs were the earliest eggs laid this spring and the attended eggs we found were laid after the heavy rains.

The small colonies (E and F) were censused, but exact colony sizes were not determined.

In the active tern colonies on Kaula Rock we estimated that around 15,000 eggs were present March 6-8, 1979. We have no way of determining how many non-breeding terns were present in the area, but the eggs represent about 30,000 breeders.

Vernon Byrd
March 1979

Table 1. Sooty Tern eggs at Kaula Rock March 6 to 8, 1979

Colony	Area (m^2)	Average eggs/m^2	Standard Error (±)	Estimated Total Eggs
A	15,156	.32	.04	4,850 ± 600
B	7,344	.08	.05	588 ± 360
C	17,656	.14	.035	2,472 ± 618
D	29,531	.22	.04	6,497 ±1,186
Sub-Total				14,407 ±2,764
E				351
F				375
Total				15,133 ±2,764

Table 2. Nearest-neighbor distances in Sooty Tern colonies at Kaula Rock March 1979.

Colony	Mean distance to nearest egg(mm)	Confidence interval (±)
A	46.2(35)[1]	3.4[2]
B	53.8(52)	3.8
C	50.9(39)	5.8
D	52.9(43)	4.5

[1]Number of eggs in sample( )

[2]95% confidence level

FIGURE 1. SOOTY TERN COLONIES ON KAULA ROCK
MARCH 6-8, 1979

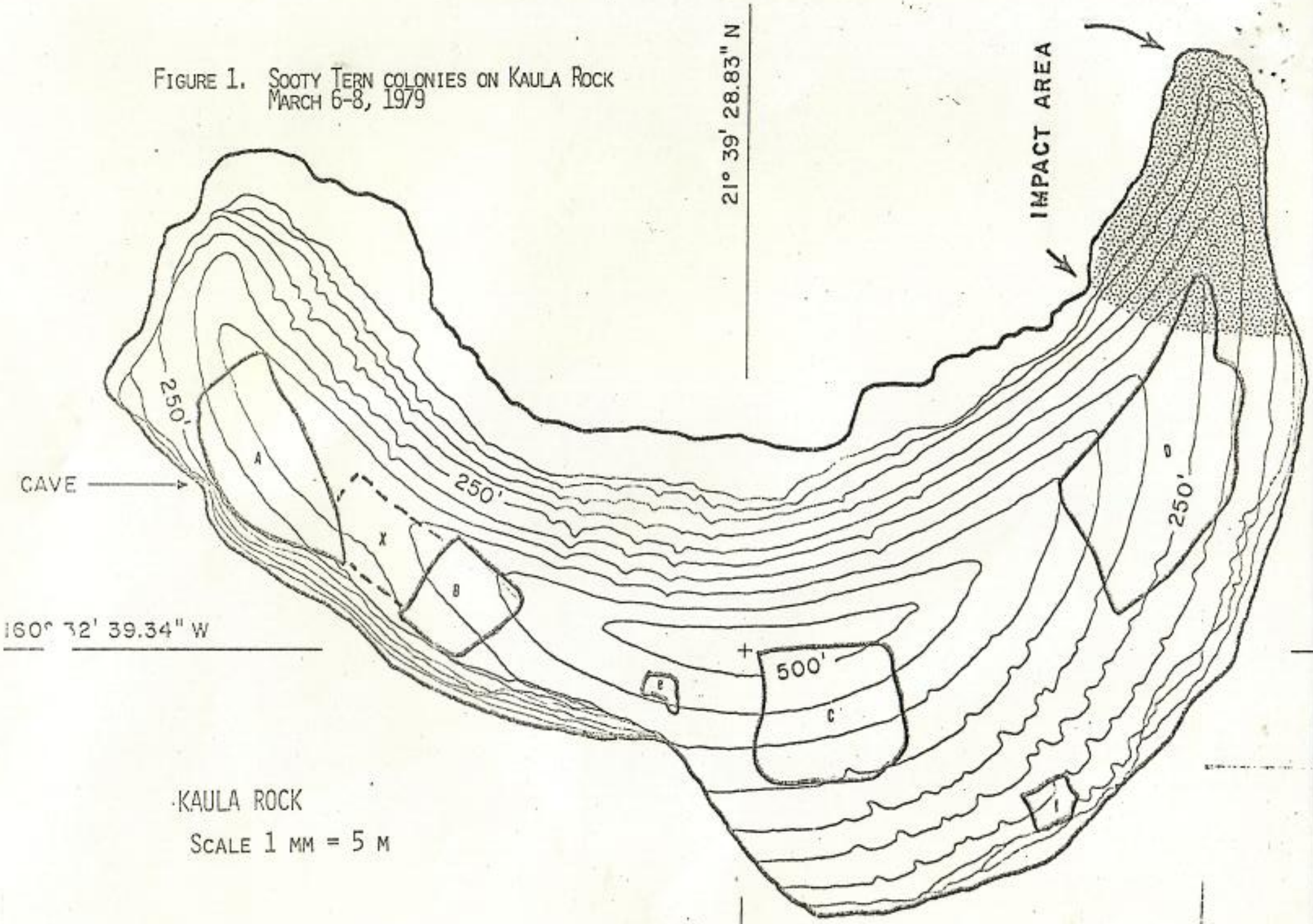

Photo #1
Survey Party on Ka'ula, March 6-8, 1979. Left to right: George Balazs, Scott Hamilton, John Naughton, (Corpsmen, rear), Robert Iversen, Vernon Byrd, Darryl Herbst, David Grooms (rear), Thomas Telfer, Ronald Walker, George Tullos (foreground).

Photo #2
Southeast Point, Ka'ula, March 6, 1979. Walker in colony of sooty terns at edge of bombing impact area.

Photo #3
Summit, Ka'ula, March 7, 1979. Left to right: Robert Iversen, John Naughton, George Balazs observing whale activities off the island.

Photo #4
Bomb crater, Ka'ula, March 8, 1979. Note dead sooty terns and broken egg on edge of crater.

Photo #5
Young Barn owl, Ka'ula, March 9, 1979. Located in shallow cave on Eastern slope.

Photo #6
Laysan Albatross and chick, Ka'ula, March 8, 1979.

Mink has this info

11432 copy

HEADQUARTERS
FOURTEENTH NAVAL DISTRICT
BOX 110
FPO SAN FRANCIS O 96610

IN REPLY REFER TO:
48:114:GS:cak
Ser 2969
25 NOV 1975

From: Commandant, Fourteenth Naval District
To: Chief of Naval Operations

Subj: Congressional Inquiry - Kaula Rock (Island) Hawaii

Ref: (a) CNO ltr ser 515F/120868 of 5 Nov 1975
(b) Endangered Species Act of 1973
(c) Federal Register, Volume 40, No. 127, Part V, of 1 Jul 1975

Encl: (1) Hawaiian Islands Map
(2) Kaula Rock (Island) Map

1. As requested by reference (a) the following information is provided for reply to subject inquiry:

a. In 1971, at the request of the Navy, the island was inspected by a task force of professional conservationists from the Navy and from State and Federal Agencies. Enclosures (1) and (2), prepared as a result of the 1971 inspection, indicate the location of the island and the actual ordnance impact area. The impact area, which has been reduced to rubble by the effects of ordnance, represents approximately 8 percent of the island, and shows no indication of attempted bird nesting. On the remaining 92 percent of the island reproduction appeared to be normal and there were no indications of abandoned eggs or young.

b. Observations during the 1971 inspection indicated three explosions had occurred outside the impact area during the previous year, and that approximately twenty to fifty birds were killed in each explosion. In addition, there was evidence of a fire, apparently caused by a flare amid the low vegetation, which probably killed approximately twenty birds within a small area.

c. After being used as a target for some 19 years, the inspection indicated an estimated daytime population of 98,000 birds of various common species on the island. This population would increase at night with the return of birds which were at sea fishing during the day, and would be subject to seasonal fluctuations according to the reproductive cycles of the various species of birds.

2. None of the wildlife species listed as endangered or threatened pursuant to reference (b), nor any of the plants proposed as endangered or threatened in reference (c) occur on Kaula Rock (Island). Therefore, reference (b) does not apply.

R.S. Wentworth.

Copy to:
COMNAVFACENGCOM
COMPACNAVFACENGCOM

SPARK M. MATSUNAGA
HAWAII

WASHINGTON OFFICE:
362 Russell Building
Washington, D.C. 20510

HONOLULU OFFICE:
3106 Prince Kuhio Building
Honolulu, Hawaii 96850

United States Senate

WASHINGTON, D.C. 20510

CHIEF DEPUTY
MAJORITY WHIP

CHAIRMAN, SUBCOMMITTEE ON
TOURISM AND SUGAR
COMMITTEE ON FINANCE

RANKING:
COMMITTEE ON ENERGY AND
NATURAL RESOURCES

COMMITTEE ON
VETERANS' AFFAIRS

September 29, 1980

Mr. George H. Balazs
992-A Awaawaanoa Place
Honolulu, Hawaii 96825

Dear Mr. Balazs:

Re: Bombing at the Hawaiian Seabird Nesting Site of Kaula Islet

This is just to acknowledge receipt of your recent communication addressed to Mr. Lynn A. Greenwalt and sent to Senator Spark Matsunaga.

Please be assured that the Senator will be responding to you at the earliest possible moment.

Yours Truly,

Cherry Matano

Cherry Matano (Ms.)
Administrative Assistant
to Senator Matsunaga

A-12 Saturday, June 2, 1979 HONOLULU ADVERTISER

letters

Wildlife

Kaula Rock & Kahoolawe

I would never have believed it possible, but according to authorities with our State Fish and Game and Federal Fish and Wildlife Service, exploding bombs and nesting sea birds can coexist just fine out at tiny Kaula Rock (Advertiser, 5/28).

This is indeed really good news, because many of us thought that bombs killed and maimed most living things. If a delicate creature like a nesting bird can thrive among such explosions, then I can see no reason why Hawaii's people should be prevented from using the far larger island of Kahoolawe in conjunction with practice bombing at that location.

DALE KAWAMOTO

tar-Bulletin

wspaper

Friday, April 24, 1981 52 Pages

Home

★★★★

Oahu—25 Cents
Neighbor Islands—30 Cents

STAR WARS—Pfc. Richard Harkness, above, fires a laser beam from a training device during practice sessions at Schofield Barracks yesterday. At left, Harkness displays the system that can sense if a blank round would have hit the target had a real bullet been used. Below, he takes aim with the laser device attached to a rifle. The 25th Infantry Division is the first unit of its size to be equipped with the laser system. —Star-Bulletin Photos by Craig T. Kojima.

COMMITTEE ON
WAYS AND MEANS

SUBCOMMITTEES:
HEALTH
OVERSIGHT

CECIL "CEC" HEFTEL
1ST DISTRICT, HAWAII

Congress of the United States
House of Representatives
Washington, D.C. 20515

WASHINGTON OFFICE:
1030 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515
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DISTRICT OFFICE:
300 ALA MOANA BOULEVARD
ROOM 4104
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HONOLULU, HAWAII 96850
(808) 546-8927

April 16, 1981

Mr. George Balazs
Hawaii Audubon Society
P. O. Box 22832
Honolulu, Hawaii 96822

Dear George:

Thank you for your letter requesting my assistance with your request for certain documents from the U.S. Fish and Wildlife Service (FWS).

I have contacted officials at the FWS to express my interest in this matter. Presently, the Navy's application for a special purpose permit is pending. FWS officials assured me that when a decision is made, they will send you copies of the Navy's research proposal and of the special permit.

George, I hope you find this information useful. Thank you again for writing. If I can be of further assistance to you in this or any other matter, please do not hesitate to contact me again.

With warm aloha,

CEC HEFTEL

CH:wcs

AUDUBON
The magazine of the National Audubon Society

March 25, 1981

Mr. George H. Balazs, President
Hawaii Audubon Society
992-A Awaawaanoa Place
Honolulu, HI 96825

Dear Mr. Balazs,

First, my apologies for the delay in getting back to you on the matter of Kaula. George Laycock sent me the materials you had sent to him, for use in my column of news updates in AUDUBON.

Since the correspondence and clippings you sent are now a few months old, I'm wondering if there are new developments to be reported. Has there been any change in the permit status or in plans for the study? What about resolutions or other action by Hawaii Audubon?

I'd appreciate it if you'd call me (collect) at your convenience for an update on the current situation. My deadline for the next issue is the first of May.

Thanks for your help.

Yours,

Ruth Norris

Ruth Norris
associate editor

950 Third Avenue • New York, N.Y. 10022 • (212) 832-3200

For the Protection of Hawaii's Native Wildlife

HAWAII AUDUBON SOCIETY

P.O. BOX 22832
HONOLULU, HAWAII 96822

March 26, 1981

Mr. Richard J. Myshak
Associate Director
Fish and Wildlife Service
Washington, D.C. 20240

Dear Mr. Myshak:

Thank you for your letter of March 5th responding to our inquiry about the seabird breeding site of Kaula Island which was transmitted to your office by our Corresponding Secretary, Ms. Marilyn Milberger.

At the earliest date possible, the Executive Board of the Hawaii Audubon Society would like to receive a copy of the Navy's formal research proposal that has been approved by your office. In addition, we would also appreciate a copy of the "special purpose permit" that you issue to the Navy under the Migratory Bird Treaty Act that will allow the killing of seabirds at Kaula when live bombing resumes in May of this year.

As you are aware, the Hawaii Audubon Society has a long-standing record of firm opposition to the live bombing of this small Hawaiian island. We are especially dismayed by the actions that you and former director Greenwalt have taken with respect to reversing the formal decision by regional authorities of the Fish and Wildlife Service to deny the Navy such a permit. We deeply regret that you have not seen fit to require the Navy to first demonstrate, within the content of an Environmental Impact Statement, that live bombing at Kaula is indeed absolutely essential for our national defense purposes.

Sincerely,

George H. Balazs

George H. Balazs
President

cc Dr. Richard Martyr, Western Regional Representative
The Honorable Cecil Heftel, Member of Congress
Sierra Club, Hawaii Chapter
Greenpeace Hawaii

For the Protection of Hawaii's Native Wildlife

P.O. BOX 22832
HONOLULU, HAWAII 96822

HAWAII AUDUBON SOCIETY

May 1, 1981

Ms. Ruth Norris
Associate Editor
Audubon
950 Third Avenue
New York, N.Y. 10022

Dear Ruth:

As you will see from the attached copied correspondence, the Hawaii Audubon Society has still not been able to obtain up-to-date information on the status of Navy and US Fish & Wildlife Service plans for continued practice bombing at Kaula Island. To my knowledge, the State of Hawaii (Dept of Land & Natural Resources) has also not been contacted about the State permit that is (apparently) required along with the FWS permit.

I have copied all of these various letters on Kaula to Dr. Richard Martyr in California, but unfortunately have heard very little from him on this important issue since I assumed presidency of our Society in January. I plan to write to him again in the very near future.

Thank you again, and aloha, for your continuing interest in this conservation issue relating to Hawaiian seabirds.

Sincerely,

George H. Balazs
President

For the Protection of Hawaii's Native Wildlife

P.O. BOX 22832
HONOLULU, HAWAII 96822

HAWAII AUDUBON SOCIETY

May 2, 1971

Dr. Richard Martyr
National Audubon Society
Western Regional Office
555 Audubon Place
Sacramento, California 95825

Dear Dr. Martyr:

I thought that you would be interested in the enclosed copied correspondence. I would be most appreciative if you would provide me with any up-to-date information you may have with respect to actions taken by the Washington Audubon office on the Kaula problem. We have had a very difficult time in getting any sort of meaningful response from either the Navy or the Fish & Wildlife Service on what the future holds for practice bombing at this seabirds breeding site.

Thank you in advance for any help that you can provide.

Best regards and Aloha,

George H. Balazs
President

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

April 10, 1981

Mr. George H. Balazs
Hawaii Audubon Society
P.O. Box 22832
Honolulu, Hawaii 96822

Dear George:

Thanks for your note and the copy of your March 26, 1981 letter to Richard Myshak of the U.S. Fish and Wildlife Service regarding live bombing of Kaula Rock. We were apprised of the problem earlier by Donald White of Greenpeace and sent the attached letter to Harry Akagi of OEQC requesting clarification of Federal-State jurisdictional laws. You should have received a copy. To date we have not received a response to this request.

Please keep us informed of the outcome of your letter to Mr. Myshak and any other correspondence on the subject that comes along.

Thanks again,

Jackie

Jacquelin Miller
Associate Specialist

cc: Diane Drigot
Keith Kruger

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

March 13, 1981

Mr. Harry Akagi
Acting Director
Office of Environmental
Quality Control
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Mr. Akagi:

Bombing of Kaula Island

We were recently contacted by Greenpeace Hawaii regarding the proposed resumption of bombing of Kaula Island. The organization expressed concern over the probable impacts of the bombing on wildlife, air and water quality.

We are requesting clarification from OEQC as to: 1) whether Federal and State environmental laws and regulations have been complied with? 2) if standards for air and water quality will be violated? 3) does the state have jurisdictional rights with regard to enforcement of regulations?

We would appreciate a response to our questions at your earliest convenience.

If you prefer to respond directly to Greenpeace, please forward a copy of your response to our office.

Sincerely,

Diane C. Drigot

Diane C. Drigot, Ph.D.
Acting Director

LMU

cc: Jacquelin Miller
George Balaz ✓
Greenpeace Foundation
Sheila Conant
Lou Herman

THE INTERNATIONAL COUNCIL FOR BIRD PRESERVATION

Smithsonian Institution
Washington, D.C. 20560

May 5, 1978

Mr. George Balasz
Hawaii Institute of Marine Biology
P.O. Box 1346
Kaneohe, Hawaii 96744

Dear George:

Many thanks for the clippings on Kaula. I've sent copies to the Director of U.S. Fish and Wildlife Service and the Editor of Audubon Magazine. A couple of years ago when Patsy Mink was a Congressperson we caught her attention on this issue, but didn't generate quite enough momentum to get any action. One of the problems of course is a suitable alternate site--I would prefer Kahoolawe again but I'm sure the residents of Maalaea and the new resort up the coast of Maui would have fits. It would serve the goats right though.

I'm pleased to receive clippings or suggestions from you on any issue you think deserves greater attention in Washington.

Sincerely yours,

Warren

Warren B. King
Executive Assistant to Dr. Ripley

DANIEL K. INOUYE
HAWAII

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(808) 546-7550

United States Senate

ROOM 105, RUSSELL SENATE BUILDING
WASHINGTON, D.C. 20510
(202) 224-3934

November 10, 1980

Mr. George H. Balazs
992-A Awaawaanoa Place
Honolulu, Hawaii 96825

Dear Mr. Balazs:

I wish to acknowledge receipt of a copy of your correspondence with the Fish and Wildlife Service.

While I will be making my own inquiries about this situation, I would appreciate your sharing with me any response that you receive to your latest letter.

Thank you for bringing me up-to-date on your efforts in this matter.

Aloha,

DANIEL K. INOUYE
United States Senator

DKI:mcb

Kaula Island

KAULA

by Donald White

"Wanalia was the man
and Hanala'a was the woman;
Of them was born Niihau, a
land, an island.
There were three children of
them
Born in the same day,
Niihau, Kaula, ending with
Nihoa.
The mother then conceived no
more.
No other island appeared
thereafter."

-Mele composed by
Kauhakuikamoana;
as recorded by
Fornander

Kaula is a small, isolated, idyllic, crescent shaped island which lies about 20 miles southwest of Niihau; about 150 miles northwest of Honolulu. Its remoteness and

themselves on the black rock of Kaula. Again the scream of jets on afterburner; lower this time for accurate release of their cargo. Twelve 500 pound bombs tumble lazily towards the island, scatter; practically invisible. Concussion. Shock. Deafening noise. Flying rocks. Confusion. Three of the packages land short of the island, in the fecund waters. Three separate curtains of spray rise into the air, as the concussion of 1500 pounds of high explosive rips through the reef community; killing; deafening; frightening. The trade winds pull the rising column of poisonous black smoke towards the southwest. The birds fly screaming. Fish and other sea life float slowly to the surface, unmoving. The jets pass again, emptying the cannons and machine guns

noise really "big" bombs made when they dropped them on Kahoolawe, the major Hawaiian island which has been set aside as a sacrifice to target practice. The "big" bombs were henceforth saved for Kaula.

In 1976 the Navy filed an Environmental Impact Assessment which indicated that, in their opinion, this activity did not have an "adverse impact" on the island, as none of the birds on the island are members of endangered species. Since they were not aiming at the seas around the island, they did no assessment of the effects there. The attack continued, centering fire on the southeastern tip of the island. Yet the very nature of "practicing" at sonic speeds has led to margins of error larger than the whole island. Divers

face a possible court injunction, the Navy temporarily halted the use of live ammunition while studies of the humpbacks in the affected area were undertaken.

These studies showed that the areas were used extensively by humpbacks: at no time during the study were there fewer than five whales visible around the small island, and sometimes as many as nine were in close – as near to the target as 100 feet. Even a calf was present. Based upon these data, the NMFS recommended, pursuant to section seven of the Endangered Species Act, that all bombing with live ammunition be suspended from December 1979 to April 1980, roughly the whale season. This was done, and for the first time in 28 years, Kaula enjoyed a break in the attack.

"Kaula has been under seige for decades..."

steep, virtually unscaleable cliffs have served, for the most part, to spare it from man; it has been a natural sanctuary for countless seabirds since its formation millions of years ago. The waters around the small island are a favorite stopping place for migrating humpback whales each winter, and many pods of dolphins make the clear coastal waters their home. Island fishermen have learned to favor these same waters for their unspoiled fishing. Kaula is that rare thing, a natural paradise. For thousands of years, only the songs of whales have touched the island. Until 1952, that is.

Orange dawn rises over the Kaula nesting grounds. Trade winds. Suddenly, the ominous shriek of a formation of three jet fighters on a low-level attack. Six incendiary phosphorus rockets draw yellow lines from the sky to the ground—ground which is covered, literally beak to back, with nesting seabirds. Simultaneous muffled thuds, and blue-white burning powder flies from six separate impacts, sticking to whatever it touches, cooking living tissue in seconds. Millions of birds take to the air at once; colliding; falling; some forced directly into the flames they are trying to escape by the pressure of the others. Fledglings are left to fend for against imaginary communists on the scarred island. Finally they peel off for the short flight back to Oahu. The island of Kaula is once again left alone with its own noises for a time; its inhabitants never knowing that they were being killed for "practice."

The U.S. Navy and Marine Corps started using Kaula as a convenient target for naval shelling and air bombardment in 1952. In the absence of rules, none were followed. The very remoteness which had, in the past, protected the islet from man's depredations now served to shield the military's actions from annoying public exposure. Even so, public pressure against the bombing was building, since Kaula is part of the state of Hawaii, and respect for the land is a Hawaiian tradition. Much of this pressure was rendered ineffective in 1965, however, when the Coast Guard transferred control of Kaula to the Navy.

Though the sea-borne artillery barrages ceased shortly thereafter, the tiny island came under increasing aerial bombardment as people on Maui complained about the report that the waters surrounding Kaula are literally strewn with unexploded shells.

On November 14, 1978, Dr. Ed Shallenberger, a marine scientist and director of the Sea Life Park Oceanarium, pulled his boat into Kaula waters in the early morning to fish for yellowfin tuna, only to be repeatedly assailed by the noise of low-flying attack aircraft bombarding the island. His anger rose rapidly as he watched the jets dropping their high explosives into the pristine near-shore waters, some missing the island by as much as half a mile. He observed a pod of bottlenose dolphins in the immediate area, and though seeing no whales, knew that they frequented the area.

He sent a stinging report to the National Marine Fisheries Service (NMFS) that set the ball rolling. Greenpeace and other concerned members of the public demanded that the bombing be stopped immediately, under provisions of the Endangered Species Act, pending studies on the use of nearshore Kaula waters by humpback whales. Finally, in February of 1979, rather than

This may prove to be a short reprieve. At the end of April the onslaught may begin again, for even though the bombing violates the Endangered Species Act on two other counts, one being a plant and the other a turtle, no studies had been done, or planned, to take them into account. The bombing also seemed to violate the Marine Mammal Protection Act (dolphins), National Environmental Policy Act, the Migratory Bird Treaty Act, the Natural Historic Preservation Act, Hawaii's "Wild Bird" law, and the Hawaii state Seabird Sanctuaries Act. Military authorities took a hard line against such talk, maintaining that the use of Kaula was necessary for "national security" reasons.

In the Greenpeace office, a campaign was planned. If the attack on Kaula was not called off, we would intercede to stop it in the most effective manner at our disposal. The whales, dolphins, turtles, and other endangered species had suffered enough at the hands of man . . . and, for that matter, so had the seabirds, officially endangered or not.

photog

GREENPEACE EXAMINER Vol. V, NO. 1 APRIL

But an unexpected card was played. Jack Downs, special agent of the U.S. Fish and Wildlife Service, acting in late January of 1980, denied the navy a permit for "accidental" destructions of birds, eggs, and nests; saying "The very nature of the activity 'practice bomb' does not lend itself to a disciplined, controlled take of birds, eggs, or nests. We are unable to reconcile our commitment to protect migratory birds with a proposed activity that has such a potential for mass destruction of these birds . . ." We in the Greenpeace office were thunderstruck. This was a complete departure from the usual rubber-stamping of permits by government agencies; it meant that it was now officially illegal for the Navy to continue bombing. Agent Downs let us know that he was going to stick by his decision regardless of pressures that might be applied against him. The birds, it seems, have won.

It may be a hollow victory, though; for under provisions of the Migratory Bird Act, the Navy may argue "compelling justification"; presumably contending that the island sanctuary must be continually bombarded to prevent the spread of world communism. This combined with the fundamental difficulty of *proving* that animals are being killed makes any enforcement uncertain. Ronald Walker, state wildlife chief, has lamented that "you have to see a bird actually *being bombed* to have *prima facie* evidence . . . otherwise, how can you prove it didn't die of a natural accident or old age?"

The Navy may now bow to public sentiment and halt the bombing, or it may opt to continue the bombing in April while law enforcement is still snarled in red tape. If the attacks on Kaula resume, Greenpeace Hawaii is committed to stopping them, using whatever nonviolent means are necessary. There are few enough places left on earth which are unpolluted by man, and also remote enough to serve as sanctuaries for wild animals. Kaula has been under siege for decades; now the bombing must end.

raphs by Dr. Ed Shallenberger

1980

Note

MAY 14 '80

On 05/09/80, a discussion was held in the MBMO Conference Room about the U.S. Navy's request to use Kaula Rock in the Hawaiian Islands as a bombing target. In attendance were:

Navy	DOI/SOL	DOI/FWS
CDR Dave Albrecht	Don Barry	Richard Myshak
CDR Jack Balaun	Frank Ruswick	John Rogers
LCDR Greg Radlinski	Brenda Washington	George Brakhage
E.O. Johnson		Mark Shaffer

The Navy representatives described their need of Kaula Rock and the history of its use. An EIS dated February 20, 1980 was made available at the meeting for later review; it provides detail about the site, the environmental and other impacts of using Kaula Rock as a bombing target, and the alternatives considered by the Navy.

The meeting was intended by the Navy to be a briefing of the situation, and also to alert FWS of a formal request coming from the Deputy Under Secretary of the Navy for reconsideration of the January 22 denial by the Portland Regional Office for a Special Purpose Permit to use Kaula Rock as a target.

Uncertainty exists about the magnitude of bird losses resulting from bombing about 9 acres of Kaula Rock. This should be determined before a decision is made whether to authorize operational use of the site by the Navy.

Future staff contacts on this issue will be among Brenda Washington (SOL), Ed Johnson (Navy) and George Brakhage (FWS).

(sgd.) George K. Brakhage

George K. Brakhage

cc:
SAC Jack Downs Portland
Dale Coggeshall, Hawaii
Dick Bauer, Portland
Brakhage, MBMO
MBMO

FWS/MBMO:GKBrakhage:pah:5/14/80

DANIEL K. INOUYE
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United States Senate

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July 24, 1980

Mr. Gary L. Naftel
1050 Koloa Street
Honolulu, Hawaii 96816

Dear Mr. Naftel:

I wish to share with you a copy of a letter that I received from the Chief of Naval Operations.

I believe that the letter is self-explanatory but should you have any further questions, please feel free to contact me.

Aloha,

DANIEL K. INOUYE
United States Senator

DKI:bhm
Enclosure

April 1980
ALOHA

HAWAII'S SEABIRDS

Story and photos by Robert J. Shallenberger

Seabirds predate by several thousands of years the arrival of the first Polynesian canoe. Quite likely, the occupants of that canoe knew that landfall was near before they could actually see it. They would have recognized familiar seabirds that fed near land in their home islands of the South Pacific.

Twenty-two species of seabirds are known to breed in the Hawaiian archipelago. The statewide population of seabirds probably numbers more than 10 million birds, although only a half dozen species account for the vast majority of this population. All of the seabird species in Hawaii are found on and around many other Pacific islands, and the range of some species circles the globe. Only two species of Hawaiian seabirds are clearly unique to Hawaii, and, tragically but not surprisingly, both are now in danger of extinction.

Hawaii's seabirds come in all shapes and sizes, and exhibit a remarkable diversity of habits as well. Birds of the seabird order *Procellariiformes* have slender hooked beaks and tubular nostrils. This order is represented in Hawaii by ten species ranging in size from the diminutive petrel to the unchallenged king of the ocean, the albatross. All of the petrels, and their larger relatives, the shearwaters, visit their breeding colonies under the cover of darkness. Most nest in burrows or crevices, rarely visiting the ground surface by day. The burrows provide a stable climate for their occupants, a means to minimize predation and add convenient extra space in an already crowded colony. The nocturnal "songs" of the petrel and shearwater have been described as: "a deafening concert of witches, burning at the stake. . . ." "a bedlam of weird screaming, wild howling and crying of insane spirits . . . . . like the growls and snarls of fighting cats." Evidence suggests that chicks and adult birds of at least some species are able to sort out individual calls to recognize each other and to locate nesting burrows in the dark.

In contrast to their smaller relatives, Laysan and black-footed albatrosses are conspicuous in their colonies by day. For a bird that weighs more than five pounds, the task of raising a young bird is long and arduous. Albatrosses arrive in their remote colonies in the fall of the year. Each pair tends a single large white egg for more than nine weeks and parents share in care of a chick until midsummer when the young bird is left to fend for itself. Those young birds that learn to capture fish and squid at sea and successfully avoid the sharks that await offshore, will not

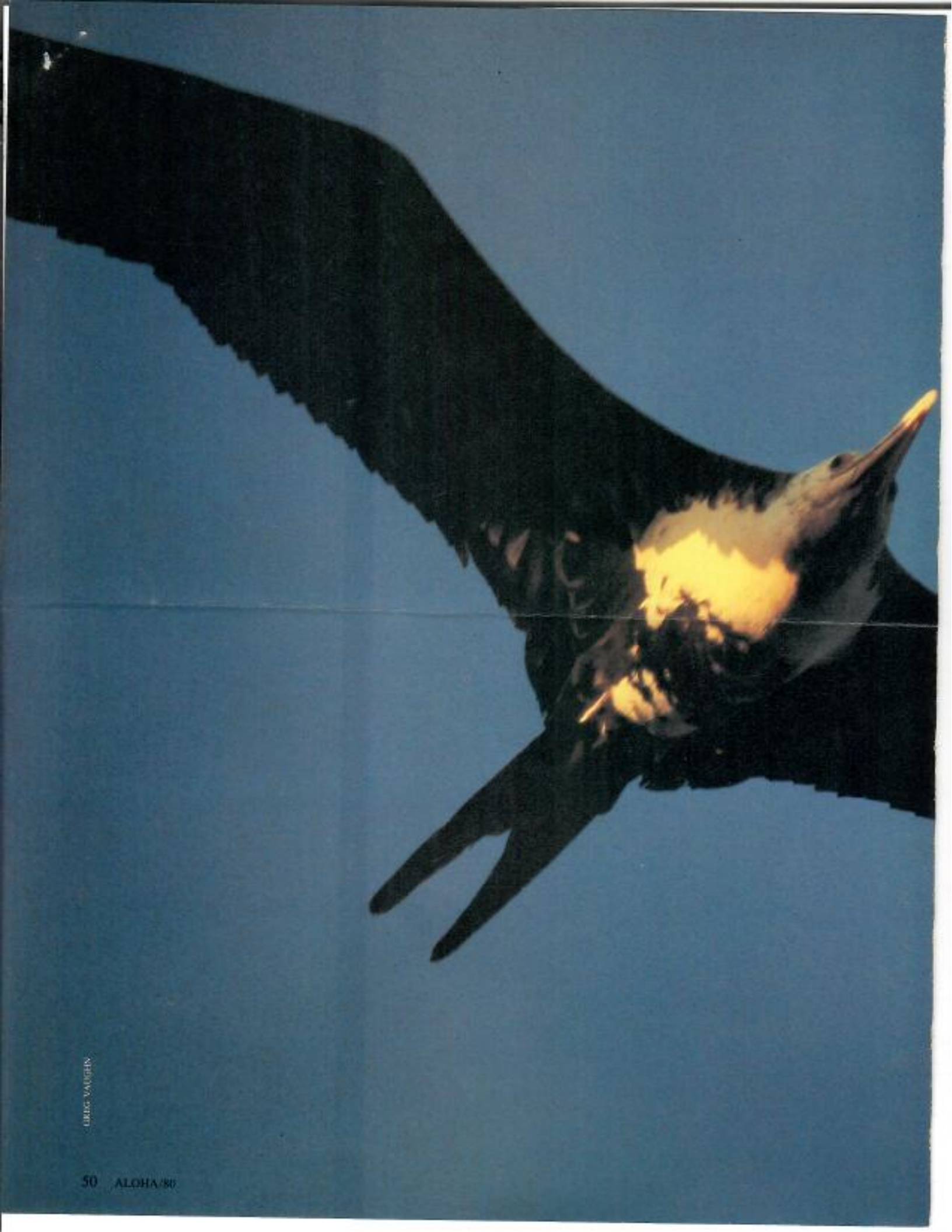
return to their nesting colony for three years, and they will not breed for seven or more years after hatching.

Pelecaniformes is the name scientists attach to a second diverse order of seabirds, represented in Hawaii by boobies, tropicbirds and frigatebirds. Red-footed boobies *(Sula sula)* are most frequently observed in waters near Oahu, as they continue to nest successfully in a colony that is precariously perched adjacent to a firing range at Kaneohe Marine Corps Air Station. Actually the indirect protection afforded this colony by its location has insured its future and has earned KMCAS nationwide recognition for its conservation programs. Biologists at Sea Life Park have successfully capitalized on the proximity of this colony by capturing and rearing young boobies at the park and then providing the birds with a continuing supply of free fish to keep them around. A free-flying colony of boobies now breeds successfully within park boundaries, providing residents and visitors with a rare educational and research opportunity.

Brown boobies *(Sula leucogaster)* and blue-faced boobies *(Sula dactylatra)* are common on and around several remote northwestern islands. Unlike the red-footed booby, they nest only on the ground. All boobies rear a single chick that hatches bare of down and totally dependent upon the care of its parents to protect it from the hot sun. Both adults and older chicks also withstand the soaring daytime temperatures by facing away from the sun and by rapidly vibrating the loose skin of the throat, permitting additional cooling by evaporation. The breeding antics of all the boobies in Hawaii are characterized by elaborate postural displays, highlighted by a variety of calls. The calls of the blue-faced booby are particularly interesting, as the female's loud low-pitched guttural notes are clearly distinguishable from the high-pitched nasal whine of the male.

Also in the order *Pelecaniformes* are two species of tropicbirds that call Hawaii home. The white-tailed tropicbird *(Phaethon lepturus)* is most familiar to visitors at the Big Island's Hawaii Volcanoes National Park or Waimea Canyon on Kauai, where these graceful aerobats have taken up residence in the steep cliffs of the volcanic craters and mountain valleys. Very little is known about the breeding habits of this species, in large part because their nesting sites are rarely accessible to even the most daring biologists. The closely related red-tailed tropicbird *(Phaethon rubricauda)* is less often seen in the main islands, but is common on sandy atolls of the northwest island chain. The remarkable courtship flights of red-tailed tropicbirds may involve a half dozen or more birds in a stunning display of maneuverability and grace. Yet, this bird, so magnificent in flight, is incredibly awkward on land. Hind legs adapted for propelling the bird through the water are so far to the rear of its body that it cannot even hold itself upright on land.

The remaining member of the order *Pelecaniformes* in Hawaii is the largest and most conspicuous. Great frigatebirds *(Fregata minor)* are masters of aerial lift, able to soar to great heights on tapered wings. Although frequently observed in the main islands, they are far more abundant in the northwest is-



GREG VAUGHN

lands. Each spring, the red throat pouches of male birds are inflated in brilliant display to prospective mates. Nests are built in shrubs and trees, where landing and takeoff can be easily accomplished. Most of the anecdotal literature about frigatebirds focuses on their ruthless feeding habits. Groups of frigatebirds hover in the wind over the colonies as the shearwaters and boobies return to their nests laden with food. Then begin the aerial dogfights in which the frigatebird is most often the victor. Frigatebirds have every advantage, including size, persistence and surprisingly great maneuverability. Eventually the incoming birds give up their hard-earned catch and regurgitate into the air or onto the ocean surface. Often the frigatebird catches the food before it hits the water. Scientists,in their eagerness to categorize natural phenomena, have given this behavior the appropriate name "kleptobiosis."

The third order of breeding seabirds *(Charadriiformes)* in Hawaii is represented by a relatively small variety of birds with incredibly large populations of some individual species. Dense colonies of nesting terns are found on offshore islands of the main group and on atolls throughout the archipelago. The most abundant species is the sooty tern *(Sterna fuscata)*. Each pair tends a single camouflaged egg on the ground surface and the total population of each colony can be staggering. Brown noddies *(Anous stolidus)* nest more commonly on rocky slopes or ledges. Noddies often collect twigs or pebbles that may aid in preventing their eggs from rolling down their steep nesting slopes.

The black noddy, or Hawaiian noddy *(Anous tenuirostris)*, commonly nests on rock ledges near the shore of volcanic islands, but will also build substantial nests in shrubs or trees on atolls in the northwest islands. Unique among all the Hawaiian seabirds, the white tern *(Gygis alba)* nests in trees or shrubs, but gathers no nest material at all. Incubating an egg and rearing a chick on a narrow branch is a feat that is accomplished with surprising success. White tern chicks have the longest claws of any of the tern species, an obvious adaptation to their precarious perches. White terns also differ from other terns in their method of carrying food to the chick. Small fish are captured at the ocean surface and carried crosswise in the bill, occasionally numbering a half dozen or more in one load. Other terns swallow their food at sea and feed their young by regurgitation. Although white terns are most common in the northwest islands, a small population can be found in the Diamond Head area of Oahu.

This brief overview of Hawaii's resident seabird population raises an interesting question: How can so many species make their living in the same place? Actually, the variety of seabirds that inhabits more productive temperate waters is much greater than in Hawaii. Most of the seabirds that nest in Hawaii migrate out of Island waters during their non-breeding season. Staggered nesting cycles spread the demand for food throughout the year. Also, selec-

PAGE 50-51: Frigate bird riding the air currents.

BELOW RIGHT: Great frigate bird bringing home "the bacon."

BELOW LEFT: Red-footed booby in nest.

tion of different feeding areas within the archipelago allows the different species to divide up the available food resources. Even when several species feed together in mixed flocks, they will often use different techniques to capture food. Some pick up prey as it is forced to the surface by feeding tuna, while others may dive deeply from several feet in the air, or swim just under the surface. Feeding at different times of day and night also serves to spread the wealth, or more accurately, stretch the limited food resource.

Hawaii's seabirds also share a limited nesting habitat by staggering their nesting seasons and by selecting different nesting sites. One can visit a single colony and find petrels and shearwaters underground, terns and albatrosses on the surface, boobies and frigatebirds in the shrubbery and white terns and noddies in the trees. Use of the habitat is further subdivided by species that visit the colony at night and others that are present in greatest numbers by day.

The principal nesting areas for Hawaii's seabirds are the small offshore islets in the main group and the volcanic islands and sandy atolls in the northwest portion of the archipelago. Oahu's most famous offshore islet, Manana or Rabbit Island, alone supports nearly 200,000 breeding seabirds each year. The most diverse seabird colony in the main islands is found at Kaula, a 108-acre island 19 miles southwest of Niihau. The seabird islets in the main group illustrate a diverse geological history, including remnants of earlier lava flows, tuff cones, raised coral reefs and sandy atolls. Seabird nesting habitats in the northwest islands include tall volcanic islands (Nihoa and Necker), and a wide variety of sandy atolls, with total land area less than 2,000 acres.

Seabirds of the northwest islands share their habitat with a unique assemblage of land birds and other wildlife. Laysan Island's unique avifauna is known to have included a rail, a warbler, a duck and two species of the Hawaiian honeycreeper family, *Drepaniidae*. The Laysan duck, confined to its 1,100-acre home, has the smallest range of any waterfowl in the world. Two unique varieties of land birds also evolved on Nihoa Island. The Hawaiian monk seal *(Monachus shauinslandi)* and green turtle *(Chelonia mydas)* also frequent the sandy atolls and inshore waters of the northwest islands.

The names given the seabirds reflected the early Hawaiians' ability to distinguish the many varieties by their calls, their colors, and their behavior. Iwa, meaning "thief," was the name given the great frigatebird for its food stealing behavior. U'au (dark-rumped petrel), O'u (Bulwer's petrel) and A'o (Newell's shearwater) are thought to be names derived from the mysterious calls of these nocturnal birds. The red tail feathers of Koae-Ula (red-tailed tropicbird) distinguished this bird from its close relative, Koae Kea (white-tailed tropicbird). One species, Pakalakala (grey-backed tern), was given a name identical to a fish known well to early Hawaiians.

The use of seabirds as food is well documented in Hawaiian history. The earliest settlers were intimately familiar with the breeding habits of those species most sought after for food and conducted regular visits to large colonies that were timed to coincide with egg production and chick development. The burrowing dark-rumped petrel or Ua'u was among the most prized of all, and its chicks were said to be reserved for chiefs. Birds were captured with nets as they flew into the colonies at night, or the downy chicks were pulled from burrows using forked sticks. For repeated annual capture of chicks vertical holes were dug into the nest chamber from above, the chicks removed and the holes plugged with tree fern stems.

The feathers of birds were the most valued possessions of the ancient Hawaiians. Although the colorful forest birds were most sought after, the feathers of several seabird species were incorporated into various types of adornment or emblems of royalty. The tail plumes of the red-tailed tropicbird are seen in some of the earliest capes. The black feathers of the great frigatebird were used in the making of kahili and in decorating the makahiki idol. The white feathers of boobies also appear in some of the Hawaiian feather garments.

The full impact of the earliest Hawaiians on seabird populations will

lands. Each spring, the red throat pouches of male birds are inflated in brilliant display to prospective mates. Nests are built in shrubs and trees, where landing and takeoff can be easily accomplished. Most of the anecdotal literature about frigatebirds focuses on their ruthless feeding habits. Groups of frigatebirds hover in the wind over the colonies as the shearwaters and boobies return to their nests laden with food. Then begin the aerial dogfights in which the frigatebird is most often the victor. Frigatebirds have every advantage, including size, persistence and surprisingly great maneuverability. Eventually the incoming birds give up their hard-earned catch and regurgitate into the air or onto the ocean surface. Often the frigatebird catches the food before it hits the water. Scientists,in their eagerness to categorize natural phenomena, have given this behavior the appropriate name "kleptobiosis."

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PAGE 50-51: Frigate bird riding the air currents.

BELOW RIGHT: Great frigate bird bringing home "the bacon."

BELOW LEFT: Red-footed booby in nest.

BELOW LEFT: Fairy tern minding eggs.

LEFT: The red-footed booby.

The albatross mating dance.

Fairy tern chick.

ANNABEL SHALLENBERGER

never be known with certainty, but it is likely that they made serious inroads into the most accessible colonies. It is doubtful, however, that the impact of several hundred years of Hawaiian culture can hold a candle to the effect of a short, but devastating period near the turn of the twentieth century. Guano diggers and plume hunters raided the northwest island colonies in force. Albatross eggs were gathered in wheelbarrows. A party of poachers arrested on Lisianski Island in 1905 had killed over 300,000 birds, mostly albatrosses. Visitors to Laysan Island after a similar incident described the horrible evidence of ruthless slaughter. Rabbits introduced to Laysan and Lisianski Islands denuded the vegetation within a few short years, and ultimately contributed to the extinction of three land bird species on Laysan, and ruined the seabird nesting habitat.

Recognizing the inevitable result of continued disturbance to this unique natural area, President Theodore Roosevelt established the Hawaiian Islands Reservation in 1909, which later became the Hawaiian Islands National Wildlife Refuge. Similar protective measures were implemented by the territorial government, when Manana and Moku Manu islets were declared seabird sanctuaries. Strict federal regulations including treaties with other countries were developed to protect seabirds from further exploitation. Yet, the Second World War took its toll of seabirds, and practices that began shortly after the start of the war continue to some degree to this day. Tern Island, at French Frigate Shoals, was developed into an airfield, and subsequently into a Coast Guard Loran station. Midway and Kure islands were also intensively developed in the war effort. Many islands, including Necker, Kaula, Manana and Molokini, among others, were used as bombing, strafing or artillery targets. Bombing of Kaula continued until early 1979, when growing protests regarding the impact of the activity on seabirds and whales caused the military to stop the bombing. Kaula is one of 31 islands and offshore islets that were included within the Hawaii State Seabird Sanctuary regulation passed in 1978.

Two species of Hawaiian seabird, the dark-rumped petrel and Newell's shearwaters that nested in the volcanic slopes of the main islands, fell victim to rats, mongooses and cats and both species are now in danger of extinction, and have been given protective status under the Federal Endangered Species Act.

It is ironic that the industry most dependent upon the seabirds for survival is the industry that conceivably could have the most direct impact on the future status of wildlife resources in the northwest islands. Hawaii's most successful fishermen share in common with the earliest Hawaiians a familiarity with the habits of seabirds. Fishermen have learned to associate types of seabirds with different species of fish. The fanciest electronics and the most sophisticated fishing tackle do not replace the important cues that these birds provide. It comes as no surprise to the skilled fishermen when scientists stress the dependence of our seabird resource on the entire ocean ecosystem. Growing pressure to aggressively exploit the fishery resources in the inshore waters

of the northwest islands carries with it the risk of adversely impacting the seabirds and other wildlife resources. The need for caution is the fundamental impetus behind an ongoing cooperative study of this rich natural area, to determine if an expanded fishery is viable and if it can be accomplished without compromising the other resources we are committed to protect.

For most of us, the Hawaiian Islands National Wildlife Refuge will always be a rich natural area we know is there but cannot touch. However, with a little effort, we can experience Hawaii's rich seabird resource in our own backyard. For all but the few migratory species that visit Hawaii only in the winter, the best time to head for the field in search of Hawaiian seabirds is spring, summer and fall. An evening cruise off Waikiki, or a day off the leeward coast of Oahu in a charter fishing boat can turn up several species, often including the black-footed albatross. White terns are a regular at Kapiolani Park, and frigatebirds are a special treat as they regularly visit Kawainui marsh and Mokapu canal to drink and seek fish.

An evening trip to the Blowhole will often turn up a variety of boobies, shearwaters and terns as they pass by enroute to their offshore nesting colonies. An advance call to the public works office at Kaneohe Marine Corps Air Station may make possible a trip into the base booby colony, but it would be wiser to contact the Hawaii Audubon Society (P.O. Box 22832, Honolulu, Hawaii 96822) to tag along on one of their field trips to watch seabirds. The society also conducts an educational trip to Rabbit Island each August. On Kauai, the seabird colony at Kilauea Point is a must; on Maui, try Kanaha Pond, Ka Elia Pond and, if you get the chance, Pauwalu Point on the northeast shore. A spring or summer trip to the Haleakala Crater lookout before dawn, or a campout at Holua Cabin in the crater, will provide the ambitious with a chance to hear, and possibly see, the rare dark-rumped petrel. On the Big Island, check out the white-tailed tropicbirds at Hawaii Volcanoes National Park and the black noddies almost everywhere along the rocky east shoreline. Go for the birds. ALOHA

BOTTOM LEFT: Black footed albatross at French Frigate Shoals. Note Hawaiian monk seal on the beach.

BOTTOM RIGHT: Brown booby in flight.

Bulwer's petrel chick.

Kaula bombing halted to protect whales

By DALTON TANONAKA
Advertiser Staff Writer

The live bombing of tiny Kaula Island was halted this week as the result of a temporary agreement between the Navy and a federal marine agency trying to protect humpback whales spotted in the area.

An annual census of humpback whales in Hawaiian waters was completed last week by the Honolulu branch of the National Marine Fisheries Service (NMFS). The census turned up the "highest count to date" — 427 whales in waters stretching from Kaula, 20 miles southwest of Niihau, to the Big Island.

"And in the Kaula area alone we counted 12 humpbacks, including three which were 150 to 200 yards from the island," said John Naughton Jr., an NMFS fishery biologist who was on the research vessel chartered for the six-day census-taking.

"The Navy was very cooperative. They have agreed to suspend the use of live ordnance on Kaula Island until we have completed a study on the use of the shallow waters surrounding the island by the humpback whales. This will probably take until mid-May," Naughton said.

Humpback whales are protected under the Endangered Species Act and the Marine Mammal Protection Act, and it is the duty of the NMFS to enforce these acts. Naughton said this is the fourth year of the NMFS census.

Navy spokesman Lt. Jamie Davidson confirmed that now only inert or "puff" bombs will be used during training missions on the 108-acre island. He said the Navy has been working closely with the NMFS and has pro-

protect whales

HONOLULU ADVERTISER Monday, Feb. 26, 1979 A-9

vided equipment and manpower for earlier NMFS surveillance of the area.

"From March 5, 6 and 7 we'll close down all operations again and fly representatives from the NMFS, the U.S. Fish and Wildlife Service and (state Department of) Land and Natural Resources onto the island to observe from shore," Davidson said.

In April of last year, a citizen filed a complaint to the Fish and Wildlife Service which asked for a halt to the live bombing of Kaula because it was killing seabirds in violation of a federal act.

The citizen, Gary "Skip" Naftel, was also captain of the vessel that took NMFS officials on the humpback census last week. Upon his return, he threatened to seek a court injunction if the Navy did not stop the bombing.

The Navy was not aware of Naftel's intentions, according to Davidson.

Davidson explained that Kaula is used "primarily as a backup to the Kahoolawe (bombing) operation."

Davidson said there were 157 training missions over the island during 1978.

Note

MAY [illegible] 1980

On 05/09/80, a discussion was held in the MBMO Conference Room about the U.S. Navy's request to use Kaula Rock in the Hawaiian Islands as a bombing target. In attendance were:

Navy	DOI/SOL	DOI/FWS
CDR Dave Albrecht	Don Barry	Richard Myshak
CDR Jack Balaun	Frank Ruswick	John Rogers
LCDR Greg Radlinski	Brenda Washington	George Brakhage
E.O. Johnson		Mark Shaffer

The Navy representatives described their need of Kaula Rock and the history of its use. An EIS dated February 20, 1980 was made available at the meeting for later review; it provides detail about the site, the environmental and other impacts of using Kaula Rock as a bombing target, and the alternatives considered by the Navy.

The meeting was intended by the Navy to be a briefing of the situation, and also to alert FWS of a formal request coming from the Deputy Under Secretary of the Navy for reconsideration of the January 22 denial by the Portland Regional Office for a Special Purpose Permit to use Kaula Rock as a target.

Uncertainty exists about the magnitude of bird losses resulting from bombing about 9 acres of Kaula Rock. This should be determined before a decision is made whether to authorize operational use of the site by the Navy.

Future staff contacts on this issue will be among Brenda Washington (SOL), Ed Johnson (Navy) and George Brakhage (FWS).

(sgd.) George K. Brakhage

George K. Brakhage

cc:
SAC Jack Downs Portland
Dale Coggeshall Hawaii
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Brakhage, MBMO
MBMO

FWS/MBMO:GKBrakhage:pah:5/14/80

November 16, 1975

KAULA- HAWAII'S FORGOTTEN BIRD ISLAND

By LINDA R. EVANS
Special to The Advertiser

The Island of Kaula was one of the five Hawaiian Islands seen by Captain Cook during his first visit in 1778. Following Cook's death during the second visit in 1779, Kaula was the last island seen when the expedition's vessels departed from Hawaiian waters.

Today, Kaula has been virtually forgotten by the people of Hawaii and remains practically unknown to the outside world. There can be little doubt that the U.S. Navy would like it to stay that way. To them, the island is known as the Kaula Rock Target.

Kaula covers 136 acres (four times the size of Ala Moana shopping center) and is located 20 miles to the southwest of Niihau and 150 miles to the west-northwest of Honolulu. The island rises abruptly to an elevation of 550 feet and has been described as appearing like a huge sea turtle on the horizon.

In 1909, President Theodore Roosevelt set aside nearly all of the small volcanic and coral islands in the northwestern portion of the Hawaiian chain as a sanctuary for wildlife. Millions of migratory sea birds, as well as seals and turtles, depend on these islands for breeding purposes. The result of Roosevelt's farsighted conservation action can be seen today as the Hawaiian Islands National Wildlife Refuge, one of the most outstanding natural preserves in the world.

ONLY TWO OF THE northwestern islands, Kaula and Midway, were not covered by the Presidential Order of 1909. Both of these islands should have been. Apparently there was little reason or incentive at the time to have strategically located Midway officially declared a sanctuary. By 1909 the island had been colonized for some six years by the Commercial Pacific Cable Company. Midway's massive albatross populations were therefore already safe from the Japanese feather poachers that were slaughtering hundreds of thousands of birds on the other small islands in the chain.

The reason for not including Kaula in the sanctuary perhaps will never be positively known. The importance of Kaula as a nesting site for numerous species of sea birds was well-known to the Hawaiian people. Possibly this information was not available to President Roosevelt, thereby causing the island to be simply overlooked and forgotten. Another possibility is that Kaula's steep cliffs may have been regarded as a natural defense against feather poachers. Federal protection may not have been thought necessary in order to ensure the birds' continued well-being.

This explanation would seem to be the most reasonable, as the first known landing on the island by a non-Hawaiian did not take place until 1920. Even then, the individual was unable to reach the summit.

WHATEVER THE ORIGINAL reason for not including Kaula in the Presidential Order of 1909, the result has been, and continues to be, the destruction of nesting sea birds by military bombs and gunfire. The events that brought about this incompatible and intolerable use of public property provide an interesting lesson in land acquisition and environmental degradation.

In December of 1924, Territorial Governor Farrington signed Executive Order 173 which set aside Kaula Island for public purposes as a United States Lighthouse Reservation under the control of the Department of Commerce. During the summer of 1925, personnel of the Lighthouse Service succeeded in building a trail to the island's summit. On the top, two stone structures were found that were thought to be religious shrines. A shelter cave with a low stone wall across the entrance was also discovered.

These findings confirmed the reports of Captain Cook that early Hawaiians periodically made visits to Kaula.

Due to unfavorable weather conditions, Lighthouse Service personnel were not able to make another landing on the island until the summer of 1932. At that time an automatic gas light was constructed and put into service. The first and only published survey of the island's flora and fauna was also conducted in the summer of 1932. Results of this survey appeared in a Bishop Museum report and

revealed that 15 species of plants and 14 species of sea birds were present.

AMONG THE BIRDS in greatest abundance were noddy and sooty terns, red-tailed tropicbirds, blue-faced, red-footed and hooded boobies, and frigate birds. White terns, petrels and shearwaters were also found. The biology of Kaula was clearly typical of the other isolated islands in the northwestern portion of the Hawaiian chain.

Practically no information about Kaula is available for the 25 years following installation of the automatic light. It seems safe to assume that, except for yearly maintenance visits, the island and its sea birds were left in peace. In Washington, however, one significant event did take place during this period that would ultimately affect the island's safety. In 1939, the Lighthouse Service of the Department of Commerce was integrated into the U.S. Coast Guard.

In 1947, 25 years after installation, the Kaula light was permanently closed down. This action extinguished the island's hope for remaining unmolested.

THE FIRST ADMITTED bombing and strafing by Navy and Marine Corps aircraft started in 1952. This was apparently initiated with the blessing of the Coast Guard. However, no records can be found which show that the Territorial Government, Congress or the President ever granted approval for bombing, or was even officially notified of this action. Between 1952 and 1965 the Coast Guard continued to hold jurisdiction over Kaula and, at the same time, apparently raised no objections to the military's delivery of all kinds of ordnance. In addition to the standard bombings, strafings and use of high intensity flares, this ordinance also at time included torpedos and Regulus missiles fired from submarines.

Beginning in the 1960s, residents of Kauai started to voice opposition to this senseless killing of sea birds, many of which are valuable to fishermen for locating schools of fish and detecting ocean current changes. People living on Kauai seemed to be the most concerned, probably because at night they could actually see what the military was doing. For most other residents in the state, Kaula was out of sight, and out of mind. In 1961 the Kauai Board of Supervisors officially asked the Navy to halt the bombing. Their request was promptly and quietly rejected, as many other such requests have been during the years that followed.

IN EARLY 1965, members of Hawaii's congressional delegation were called upon for aid in the matter. In response to an inquiry by Rep. Patsy Mink, the Department of the Interior (administrators of the National Refuge System) stated that Kaula has ". . . impressive value as a nesting area for certain sea birds . . ." and that it is ". . . highly desirable that the Island of Kaula be considered for National Wildlife Refuge status as an addition to the Hawaiian Islands National Wildlife Refuge."

Further, Mrs. Mink was told that everything possible would be done to have the island incorporated into the Refuge. Unfortunately, the Department of the Interior subsequently dropped the matter, after being told by the Navy that Kaula was vital to the war effort in Vietnam. Conservation groups on Kauai also agreed to stop campaigning against the Navy, after being told the same thing.

In March 1965, Rep. Spark Matsunaga publicly announced that jurisdiction of Kaula had been officially transferred from the Coast Guard to the Navy. The island's "give-away" therefore took place without organized opposition, in the name of national security. It is interesting to note that throughout the crisis of World War II, the bombing of Kaula and its sea birds had not been considered necessary by the military for "national security" or "defense readiness."

KAULA WOULD AGAIN have drifted out of public eye after Navy acquisition, had it not been for the pilots of two Skyraiders from the aircraft carrier Ticonderoga enroute to Vietnam. On the night of Oct. 5, 1965 these pilots became "confused" (as it was later explained) and dropped eight 250-pound bombs on Niihau, 32 miles from their intended destination of Kaula. Fortunately, the explosions took place in an unpopulated area.

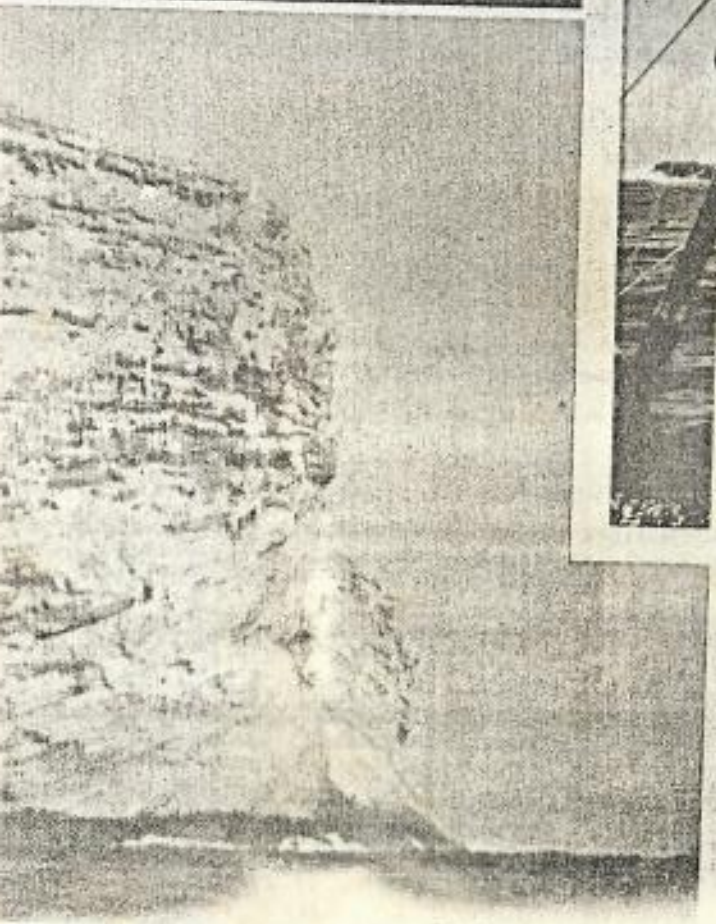
Nearly two days passed before the Navy publicly announced the incident. In the meantime, numbers of Hawaii's congressional delegation were informed through newspaper sources. Senator Hiram Fong accused the Navy of "gross carelessness," and Mrs. Mink renewed her call for an end to bombing, both for the safety of people and the sake of sea-

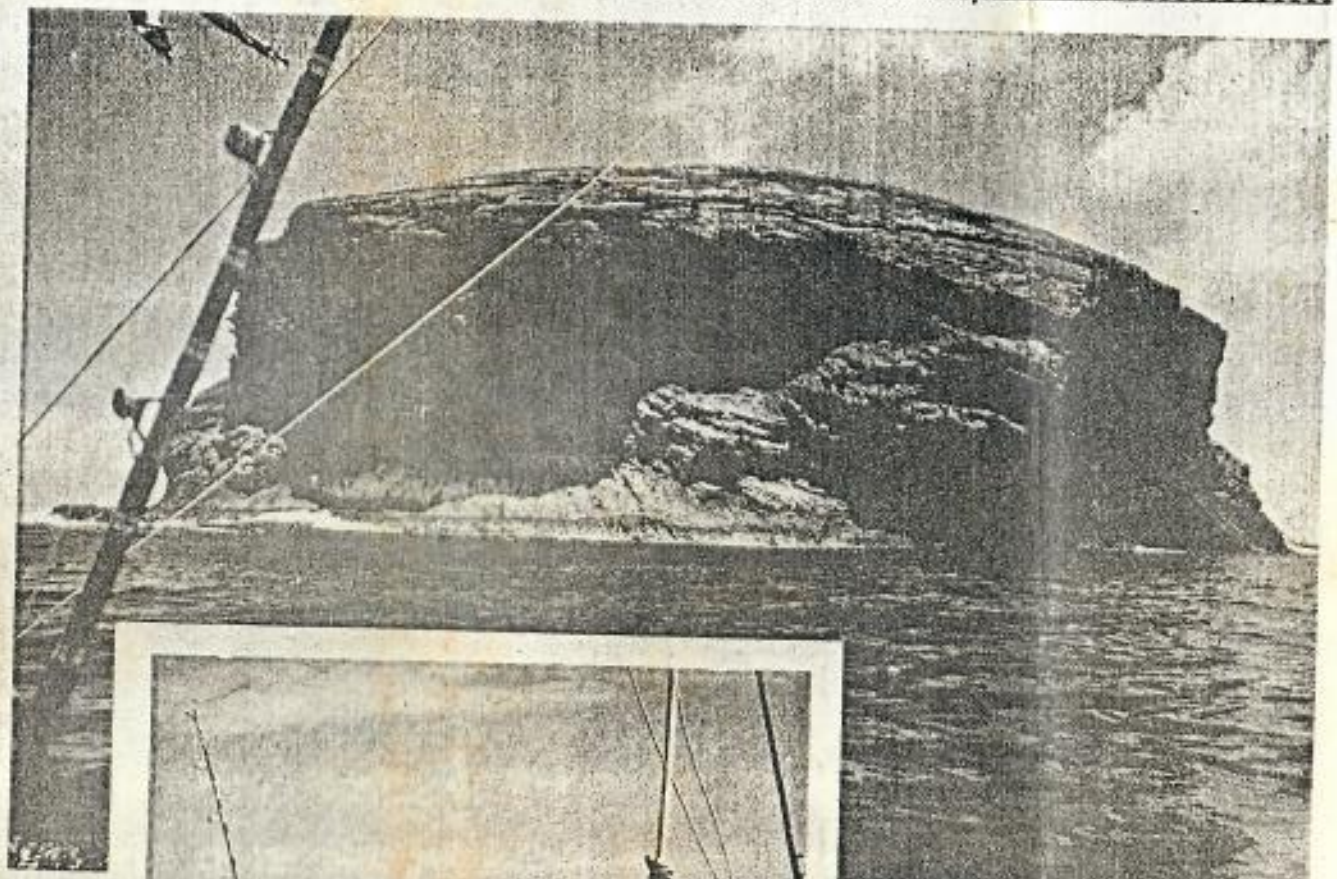
birds. Senator Daniel Inouye expressed "anger and dismay." In the end, however, the Navy refused to halt bombardments, even long enough for an investigation of the incident.

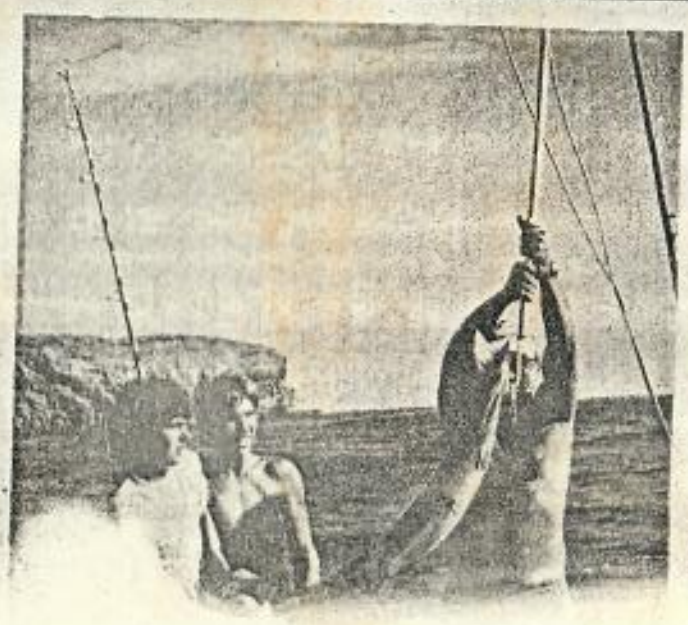
Little else was heard of Kaula until August 1971, when the Navy conducted a two day environmental survey of the island with the help of State and Federal biologists. Rather than reflecting a sudden change of attitude, this survey was prompted by a direct request from former president Nixon. The National Environmental Policy Act of 1969 requires that statements be filed outlining the environmental effects resulting from actions that are federally funded. Military bombardments of islands and sea birds come under this category. A newspaper article announced the completion of the two-day survey; however, in the following months and years no reports were made available and an Environmental Impact Statement was never filed.

ALTHOUGH the exact status of Kaula's environment presently remains a mystery to the public, fishermen in the area report that sea birds still, nest, or at least attempt to nest, on the island. This would suggest that the island is not now, nor has it ever been, the barren or worthless "rock" to which it is sometimes referred.

The recent renewal of efforts to have the bombing of Kahoolawe stopped should also encompass the Island of Kaula. Hawaii's forgotten bird island should no longer continue to be forgotten. A reasonable, but definite, date should be set for halting all bombardments. This should be on or before January 1978, the 200th anniversary of Kaula's European discovery. Following the cessation of destruction, the island should at long-last be transferred to the Hawaiian Islands National Wildlife Refuge where it belongs. This seems the least that could be done after 23 years of military use.







Photos by Stan Wright

KAULA
ISLAND

NEWS FLASH . . . Navy Continues Bombing In Spite Of F

On 17 February, 1978 Captain Skip Naftel of the R/V *EASY RIDER* witnessed and photographed military aircraft bombing Kaula Island. Bombs were not hitting only isolated parts of the island, but were landing amongst large groups of birds and in the water as well. Being an environmentalist and also not one to shy away from a fight, Naftel filed complaints with both the National Marine Fisheries Service and the U.S. Fish and Wildlife Service for violation of the Marine Mammal Protection Act, the Endangered Species Act and the Migratory Bird Treaty Act. Naftel's action again brought to light an issue that has been discussed since 1952 when the Navy first began bombing the island. (The Navy refers to the island as a rock.)

Kaula is not an ordinary island. It is a special island, especially for Hawaii's fishermen and environmentalists. In terms of numbers of bird species, Kaula is the richest of all Hawaii's islets. In terms of numbers of individual birds, Kaula may also be the richest. Unfortunately, no one has made adequate surveys throughout the year to determine just how many birds actually nest on the island. In terms of fish, Kaula is extremely rich. Ahi, ono, marlin and bottom fish abound for those willing and able to make the long trip. Marine mammals are also numerous. Throughout the year bottlenose dolphin feed in the rich waters surrounding the island and during January through May humpback whales (an endangered species) can nearly always be found in the relatively shallow water immediately surrounding the island. Another species protected by the Endangered Species Act, the Green Sea Turtle, can also be found in Kaula's waters.

For me, the continued destruction of this island was clearly demonstrated on a recent fishing trip aboard the F/V *MANTA*. Perry McCord, Charley Espin and I were fishing the nearby waters when military aircraft made pass after pass at the island on two successive days. On many of these passes, bombs large enough to be heard and felt several miles away were dropped. At least six of these bombs missed the island completely, one by at least ½ mile. Our experience was not an unusual one, but one that we share with all fishermen who frequent the island.

Kaula's notoriety is not new, but dates back to 1924 when it was set aside for the Coast Guard to use for a lighthouse. In 1952, the Navy and Marines began using the island as a bombing target. The value of Kaula was already recognized and numerous resolutions were initiated, calling for the Department of the Interior to set aside Kaula as a refuge. In December of 1964, the Coast Guard began preparing to transfer control of the island to the Navy. This transfer was opposed by Patsy Mink, who fought to see that the island received the protection it deserves. Unfortunately this transfer was completed on June 16, 1965. During the next six years, Mink continued her fight to save the island and according to Star Bulletin reporter Linda Evans, in 1971 President Nixon ordered the Navy to assess the problem.

During that year, State, U.S. Fish and Wildlife Service and Navy personnel conducted a two-day survey of the island. Their report was never released to the public. At this time, Mr. Eugene Kridler (USFWS) suggested that if they must bomb, they confine the bombing to the SE tip of the island. This was agreed to by Navy personnel who led him to believe that order would be issued. However, it became clear in a February 1978 meeting, that this order was never issued.

During the next few years the fight continued and in 1973, the Navy told Patsy Mink that Kaula was on active status and would continue to be used for weapons delivery. "It is anticipated that the target requirement will remain as long as Navy and Marine aircraft squadrons are located in the Hawaiian area." During the same year, in an Environmental Impact Statement on Kahoolawe, the Navy said the Kaula was unacceptable as a target island because of five reasons. One of the reasons was that "Kaula is inhabited by 13 species of seabirds with an estimated population of 100,000 birds."

On 27 December 1976, the Department of the Navy finally produced an Environmental Impact Assessment (considerably different than an EIS) on the bombing of Kaula. This EIA was not released to the public. One was obtained with considerable difficulty and only after enlisting the aid of Hawaii's Congressmen. The EIA is woefully incomplete. It's conclusions on bird populations are based on totally inadequate data and the impact of ordnance on the surrounding waters is almost totally neglected. The impact on fishermen is totally neglected. No wonder this document was never released.

Little more was done until the bombing was witnessed and photographed by the crew of the *EASY RIDER*. Another survey of the island was conducted in response to numerous public protests. This survey indicated extensive bombing away from the southern tip. There were indications of bombs landing in areas of greatest bird concentration.

What can we do? Perhaps the most important thing is to voice our opinions where they can be heard. It does no good to complain to each other. Opinions should be voiced to the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the State of Hawaii Division of Fish and Game, our elected officials and the Navy itself.

Kaula is unique and should be saved. It is a very special place.

Edward W. Shallenberger

FORUM

the Readers' Page

The Proper Name of Kaula

Both legally and historically, Kaula has been known as an island, not a rock.

It is therefore disappointing to see several recent news stories use the incorrect place name of "Kaula Rock."

The Navy appears to have been responsible for designating this Hawaiian island as a "rock" by referring to it as its "Kaula Rock Target Complex."

The word rock implies "worthless" and "barren," which is certainly not the case for the important seabird nesting site of Kaula.

In any future news stories on the controversy surrounding the bombing of Kaula, the Star-Bulletin should consider refraining from using the word rock, except as might be included in direct quotations from the Navy.

Linda Evans

Editor's Note: According to the Hawaii State Board on Geographic Names and the U.S. Board on Geographic names, its proper name is Kaula, without an island or rock after it. Kaula is only 280 acres, according to the U.S. Bureau of Census' geography division, and is 550 feet at its highest elevation.

Kaula Rock Focus of Scientific Study

By Helen Altonn
Star-Bulletin Writer

"I'm standing in the middle of a sooty tern colony surrounded by thousands of birds. The ground is literally covered with sooty eggs.... The birds closest to me are giving sharp alarm calls and the noise around me is almost deafening ."

Thus begins a tape-recorded diary of a three-day stay on Kaula Rock, about 20 miles southwest of Niihau, by Ronald L. Walker, chief of the wildlife branch of the state Department of Land and Natural Resources.

Walker and 10 other state and federal scientists and Navy ordnance experts went to Kaula in March to study the birds and mammals in the area.

The Island is the center of a dispute between scientists and the Navy because of the potential destruction of humpback whales and seabird colonies at Kaula by military training missions.

In February, during the height of the whale season, the Navy halted use of live ordnance in the training flights because of the large number of animals in the target area.

NORMAL BOMBING operations were resumed there last Wednesday, but Lt. Jamie Davidson, Navy spokesman, said the Navy is continuing to work with scientists to protect the wildlife as much as possible. "It's a tough problem," he said.

The bombings are confined to a prominently marked area on the southwestern end of the Island which the Navy's Third Fleet commander ordered the training flights in December "not to miss...."

Scientists have filed formal complaints with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service about the danger of the bombings to Kaula's rare and endangered species, protected under federal laws.

Decisions concerning the controversy — being made at the Washington level — are pending more data on the bird and whale populations.

Robert T.B. Iversen, an NMFS official and member of the study group, said nine whales were spotted in the Kaula area at one time during the March visit. Most sightings were on the west side, ranging from a quarter mile to four miles offshore

ALTHOUGH THE height of the whale season is from January to April, Iversen said he considers the season to last from November to June when whales still are seen in the area.

The high number of whales found during the recent survey is expected to have a significant bearing on NMFS recommendations now being drafted for Washington officials on the bombing issue.

The state also is seeking protection of the Island as a seabird sanctuary, although Walker said, "The birds and the bombs appear to be coexisting."

He said a large sooty tern colony on the Island extends about one-fifth of the way into the target area, but there was no evidence the bombing had harmed the birds in any way.

He said the team counted 52,831 birds of 17 species on the Island in March, which appears to be an enormous drop from the previous March count of 139,285 birds of 12 species.

But he said, "I don't believe there has been a real reduction, despite the low count."

THE DROP LARGELY was in the sooty tern population, which numbered 130,000 in March last year and only 50,000 this year, he noted.

However, he said, their nesting time varies from year to year, which could account for the reduced colony at the time of the study. And torrential rains in the preceding weeks before the study may have had something to do with the difference in figures, perhaps washing eggs and soil off the Island.

He said the birds were mating, laying eggs and hatching young, with no apparent problems except from "natural disasters" and predators among themselves.

The ruddy turnstone apparently pecks open eggs for moisture and food, and barn owls prey on terns and shearwaters, he said.

Star-Bulletin

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Star-Bulletin

Section D

Honolulu

Wednesday, May 23, 1979

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The scientists had to compete with the owls and other birds for shelter in the caves during their stay.

ALSO ON WALKER'S taped diary of the Kaula trip, he said:

"I am now standing on the very end of the Island. It is completely barren here except for bomb fragments and a few bunches of grass and patches of pualele; absolutely no bird life whatsoever, eggs or adults."

Encountering George Balazs, University of Hawaii turtle author-

SEABIRD SANCTUARY—Thousands of birds swarm around scientists studying the colonies. In the foreground is inert ordnance from a military training flight.—Photo by Ronald L. Walker.

ity, sitting on the edge of a cliff, Walker said:

"He's been looking for turtles, which is difficult from this vantage point. He believes most of them will be in very close to the Island on the steep side and he has to lay on his belly with his head hanging over the edge of the cliff, which drops directly to the ocean below."

Sitting on the edge of the cliff halfway between the north end landing site and the summit on the west end, Walker recorded: "Down below, the water is a boiling cauldron with a huge white foam slick extending out several thousand yards and contrasting with the dark blue of the ocean water.

"THE NOISE OF the waves crashing against the side of the Island almost drowns out the cacophony of the birds.

"I don't see fairy terns, Hawaiian noddies or any other birds using the cliff face, which appears to have several areas they could nest in...."

He said much erosion occurred during the heavy rains. "Many of the old wedge-tailed shearwater burrows were apparently wiped out in this process....The washouts may have caused the adults to abandon the colony site."

He said sooty terns were the most abundant birds on the Island. The common noddy had the next largest population. The only birds which aren't native to the Island, besides the owl, were house finches.

Entering a good-sized cave on the east end of the Island, Walker found several Laysan albatrosses with chicks and a few adult male frigatebirds and one adult female on an egg.

"While I was watching the frigates a male came in and tried to land on a nest with another male, perhaps to steal the egg or some of the nest material, but the nesting bird drove it off after much clashing of bills," he said in his diary.

"MOTHER 'GOONEY bird,' who got upset when I came into her cave, now is slowly inching over toward my binoculars and camera which I set down about 10 yards from me — very curious about what they are."

Once, he said, he heard loud explosions which sounded like bombs going off. "Then I realized that the booming was coming from behind me out in the ocean...There were two humpback whales slapping their tails on the water about a quarter mile offshore. The marine biologists call the behavior 'lobtailing' which they believe may be a form of communication."

EIS Kahoolawe

2. Specific Sites Evaluated

The Navy has conducted a review of available islands within the Hawaiian group and utilized a criteria of land area, distance, target site requirements, habitation, terrain and climatic conditions, and wildlife refuges as criteria for a target site evaluation. After the initial survey was conducted, specific sites were evaluated in greater detail. These sites include the following:

a. Kaula

Kaula, also known as Kaula Island,is located approximately 18 miles southwest of Niihau Island. The rock is approximately 108 acres and protrudes sharply from the sea to an approximate height of 550 above the sea. It is 0.7 of a mile long by 0.33 of a mile wide at its widest point.

Kaula is used as a target by aircraft to practice specified maneuvers (such as multi-plane attacks, weapons deliveries which are restricted for use on Kahoolawe, and multiple bombs on one run or bombs larger than 500 pounds).

Kaula is well suited as a point bombing aerial target but cannot be used for combined arms training aircraft, ships and troops as can be conducted on Kahoolawe.

b. Pacific Missile Range Facility, Barking Sands

The Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, is an underwater weapons testing range that is currently being expanded from 50 square miles of open ocean to 1,000 square miles of open ocean. The range is instrumented for weapons testing in fleet training exercises.

PMRF cannot provide terrain features necessary for certain aspects of the air-to-surface and surface-to-surface weapons training exercises. PMRF is designated

Bombs:

Bombs found on the target complex range from 2 pounds to 2,000 pounds. The maximum size bomb currently used is MK82 (500 lb.), but larger-sized bombs were used many years ago. The bombs are of various types, including general purpose, anti-personnel, fuel air explosive, and fire bombs (napalm). They contain explosives weighing from .25 lbs. up to 1,000 lbs. Fuzing mechanisms vary and include impact, cocked striker, piezoelectric, time delay, variable delay, variable time and some with anti-disturbance features.

Projectiles:

Projectiles found on the target complex vary from aircraft-fired 20 mm to ship-fired 16-inch projectiles to 81 mm motor rounds. Explosive weights range from 0.017 pounds to 1,900 pounds and the fuzing mechanisms include impact (tail or nose), mechanical time, powder train time and piezoelectric mechanisms.

Rockets:

A variety of rockets ranging from 7.2-inch rocket thrown depth charge, 2.75-inch and 5-inch aircraft launched, and 5-inch shipboard-launched barrage rockets. The explosive weights range from 2.3 pounds to 33 pounds and fuzing mechanisms include impact, variable time, powder time and hydrostatic.

Flares:

Flares have been and are used for illumination during night training activities. Flares are either aircraft dropped or shipboard fired 5-inch star projectiles. The illuminating charge weighs about 17 pounds and the fuzing mechanisms include mechanical and powder train.

C. Unexploded Ordnance (Duds) Hazards

The target complex has been used as a live ordnance target since 1941 and has been contaminated with all types of unexploded ordnance. All such ordnance found on the island was originally delivered as designed and should have theoretically detonated. No deactivating feature was incorporated into the munitions and each piece of dud ordnance must be considered live and therefore considered hazardous.

c. These islands are too far away from Oahu to be economically used by the Mid-Pacific military forces.

2. Specific Sites Evaluated [6.II.A.1]

The Navy has conducted a review of available islands within the Hawaiian group and utilized a criteria of land area, distance, target site requirements, habitation, terrain and climatic conditions, and wildlife refuges as criteria for a target site evaluation. The results of this survey can be found in Appendix J. After the initial survey was conducted, specific sites were evaluated in greater detail. These sites include the following:

a. Kaula

Kaula, also known as Kaula Island, is located approximately 18 miles southwest of Niihau Island. The rock is approximately 108 acres and protrudes sharply from the sea to an approximate height of 550 above the sea. It is 0.7 of a mile long by 0.33 of a mile wide at its widest point.

Kaula is used as a target by aircraft to practice specified maneuvers (such as multi-plane attacks, weapons deliveries which are restricted for use on Kahoolawe, and multiple bombs on one run or bombs larger than 500 pounds).

Kaula is well suited as a point bombing aerial target but cannot be used for combined arms training aircraft, ships and troops as can be conducted on Kahoolawe. Only one single point target is available for aircraft firing; and the height of a target area precludes use for naval gunfire. Kaula is also located approximately 55 nautical miles further from Oahu than is Kahoolawe.

Kaula also is inhabited by 18 species of seabirds, 3 migratory shore birds and 6 common exotic birds. The total number of birds which use Kaula at various times of the year are probably in excess of 200,000. The highest numbers estimated

on-island were 7 March 1978, when more than 139,000 birds were estimated to be on the island. Modifications to the island to create an acceptable target will disrupt this bird population. Target development into a multiple target site would require massive blasting and leveling of major portions of the rock. Addition of targets and target maintenance under present conditions would be difficult, since the only access to the island is by helicopter and no structures are available for target maintenance crews.

b. Pacific Missile Range Facility, Barking Sands

The Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, is an underwater weapons testing range that is currently being expanded from 50 square miles of open ocean to 1,000 square miles of open ocean. The range is instrumented for weapons testing in fleet training exercises.

PMRF cannot provide terrain features necessary for certain aspects of the air-to-surface and surface-to-surface weapons training exercises. PMRF is designated primarily for underwater weapons testing, and not for a land-type target facility. Furthermore, it is approximately 35 nautical miles further from Oahu than is Kahoolawe.

c. Schofield Barracks Range Complex

The Schofield Barracks Range Complex is located on Oahu and is currently used as a U.S. Army Range. The ranges are used for troop maneuvers and for artillery firing.

The range is located several miles inland and is not suitable as an aircraft firing range nor as a naval gunfire range. The use of the range by aircraft would require flying over inhabited areas of Oahu, carrying service ordnance in or out of the target area, thus creating a potentially hazardous situation.

State of Hawaii, target sites outside of the immediate area of the State of Hawaii, as well as artificial and floating targets. These alternatives are each examined in view of the various requirements listed in part B. of this section, to determine if the alternative is acceptable.

1. Kaula Rock.

Kaula Rock is located 18 miles southwest of Niihau Island, State of Hawaii. The Rock is a 108 acre island that protrudes sharply from the sea to a height of approximately five hundred and fifty feet above the sea and is seven-tenths of a mile long by one-third of a mile wide, at its widest point. Kaula Rock is used as a target by aircraft, only, for the the practice of certain maneuvers (such as multi-plane attacks) and weapons deliveries which are restricted from use on Kahoolawe (multiple bombs on one run or bombs larger than 500 pounds). Kaula Rock is well suited as a point bombing target. Kaula Rock is unsuitable as an alternative to Kahoolawe:

a. Target size.

Small size provides insufficient target impact area; provides no room for troop safety zone; artillery fired full-charge projectiles would land in the sea, with no accurate spotting (preparation of artillery emplacements would require blasting an area in the rock); no spotter locations are available; only one single point target is available for aircraft firing; and height, lack of target area, and lack of spotter locations preclude use as naval gunfire range.

b. Target site location.

Only disadvantage in target site location is the distance from the operating bases. Kaula Rock is approximately 55 nautical miles further from Oahu than Kahoolawe.

c. Target site terrain.

In addition to insufficient size Kaula Rock lacks a level area that could be used for an area target, such as a simulated airfield.

d. Climate.

Not a significant factor.

e. Cost factors.

Target development would require massive blasting and leveling of major portions of the Rock to convert it

DEPARTMENT OF THE NAVY

ENVIRONMENTAL IMPACT ASSESSMENT

KAULA ISLAND TARGET

HAWAII

27 DECEMBER 1976

Prepared by Naval Air Station Barbers Point, with the assistance of the Pacific Division, Naval Facilities Engineering Command, for the Commander, Naval Air Forces, U. S. Pacific Fleet, in accordance with OPNAVINST 6240.3D of 24 April 1975, in compliance with Section 102 (2) (c) of the National Environmental Policy Act of 1969.

27 December 1976

ENVIRONMENTAL IMPACT ASSESSMENT

Submitting DOD Component: Department of the Navy

Installation: Kaula Island Target, Hawaii

Project Title: Bombing/Bombardment Range

Date of Submission:

Assessment Authority:

Prepared by Naval Air Station Barbers Point, with the assistance of the Pacific Division, Naval Facilities Engineering Command, for the Commander, Naval Air Forces, U.S. Pacific Fleet, in accordance with OPNAVINST 6240.3D of 2 April 1975, in compliance with Section 102 (2) (c) of the National Environmental Policy Act of 1969.

A. Introduction

1. Project Description

Kaula Island is used in training aviators and surface units in air-to-surface and surface-to-surface weapons delivery. Such a large complex must be located within a radius of 200 miles of the operating base. Kaula Island is not a typical Navy target complex. Except for two 12-foot "bull's eyes" painted on the southern side of the island approximately 200 feet from the southwestern tip as the primary aim point for ordnance fire/release, there are no target facilities.

Primary uses of Kaula Island are Marine and Navy aircraft conducting missions with live or inert ordnance. These include air-to-ground bombing/rocketing exercises, and night illumination/photo flash exercises. Occasionally, attack aircraft from transiting aircraft carriers conduct day and night, visual and radar bombing/rocketing exercises. Ships, on an infrequent basis, use the island for shore bombardment practice.

2. Existing Site Characteristics

a. General Topography

Kaula, also known as Kaula Island or Kaula Rock, is a small rocky islet 19 miles southwest of Niihau Island in the Hawaiian Island chain. It is approximately .7 miles long, with maximum elevation of 500 feet, consisting of 108 acres. The location is North Latitude 21° 39' 29" and West Longitude 160° 32' 39" (See figures 1 and 2).

The island is crescent-shaped with steep slopes and very little level terrain, created as a result of volcanic eruptions and subsequent erosion by wind, waves, and running water. There is a cliff around the island. Access is entirely by helicopter. The island has no human inhabitants and no structures. Visiting scientific teams stay overnight in a small cave.

b. Flora

There are no trees, only low-growing shrubs or herbs which belong to a semi-arid or strand flora, because of the aridity and strong, continuous winds.

Plant specimens were taken from Kaula by Ralph Daehler, District Forester, preserved and forwarded to Dr. Harold St. John, Professor of Botany (Emeritus), Bernice P. Bishop Museum. These specimens, identified by Daehler and St. John, together with previous observations by Caum (1936) show 27 species of plants reported from the island. (Table 1).

At this time, there is no list of plants officially declared to be endangered or threatened species for the Hawaiian Islands, pursuant to the Endangered Species Act of 1973. There is, however, a proposed list.

None of the species of plants proposed as endangered or threatened species, occur on Kaula Island.

c. Fauna

Observations on the wildlife of Kaula for the period August 16-19, 1932, were recorded by Caum (1936). On August 17-18, 1971, January 20-21, 1976, and September 14-15, 1976, the U.S. Navy sponsored inspection trips to the island with wildlife biologists from the State of Hawaii-DL&NR-Division of Fish & Game, the U.S.D.I. - Fish and Wildlife Service and the U.S. Navy participating.

As a result of Caum's records, and the three subsequent inspection trips, eighteen different species of sea birds have been observed on Kaula. These species of seabirds appear to be healthy and are reproducing normally. In addition, four species of migratory waterbirds occasionally stop on island seasonally, and six species of exotic (introduced) land birds are also found on the island in small numbers. (See Table 2).

Caum, E. L. 1936
Notes on the Flora and Fauna of Lehua and Kaula Islands, B.P. Bishop Museum Occasional Paper Vo. XI No. 21.

None of the species of wildlife listed as endangered or threatened species pursuant to the Endangered Species Act of 1973, occur on Kaula Island.

d. Historic Sites

There are no sites on Kaula officially declared state or national historic places in accordance with Executive Order 11593, "Protection and Enhancement of the Cultural Environment."

According to Bryan (1939) "There are a few legendary accounts of Hawaiians who visited the island, but no evidence of extensive human habitation is known. The lighthouse men, when they finally succeeded in reaching the summit, in July 1925, found on the northern part of the crest the remains of two stone structures, which might have been heiaus (temples). On the concave (east) side just below the summit, they also found a shelter cave across the mouth of which was a low wall, suggesting that it too had been used by visiting Hawaiians."

There was apparently some doubt as to the validity of the heiau sites even at the date of the initial observation. These sites were located and photographed. The remains of what may have been heiaus, if not intact, at least apparently remain as they were when first reported in 1925 and recorded by Bryan in 1939. The shelter cave remains intact. The 1971 and 1976 inspection teams stayed in the cave, which is the only accessible shelter on the island.

The island is currently under study by the State of Hawaii, Department of Land and Natural Resources - Historic Sites Branch.

B. Relationship of proposed Location to Land Use Plans Policies, and Controls for the Affected Area.

There is no land use plan for Kaula Island. There are no beaches or safe means of landing water craft, no natural sources of fresh water aside from rainfall, and very shallow topsoil. It appears to have limited potential for human use.

C. The Probable Impact of Proposed Action on Environment.

1. Positive and Negative Effects.

The shore bombardment and aerial bombing of Kaula Island isolates such activity from the populated Hawaiian Islands.

Air. The explosion of ordnance releases chemicals into the atmosphere and are carried in a southwesterly direction from land masses with prevailing winds 95% of the time.

Bryan, E. H. Jr. 1939
Kaula - An Island of Hawaii. Paradise of the Pacific Vol. 50 No. 4., April

Noise. There are no known complaints from Niihau (19 miles) or from Kauai (50 miles) concerning noise/ reverberations.

Terrain and Surrounding Ocean Waters. The target is the southwestern tip of the island. Explosions tend to crack rock and spray the immediate area with shrapnel. Explosions in surrounding waters as a result of amiss may release chemicals into both air and water, affecting nearby fish and marine life.

Water. There is no known fresh water source on the island.

Wildlife. All personnel participating in the 1976 inspection trips, including five wildlife biologists, representing three different government agencies,* agreed that there was no evidence to indicate that military use was adversely affecting bird populations on the island. The species of seabirds appear to be healthy and are reproducing normally.

Marine species around Kaula are presumed to be the same as those surrounding the other Hawaiian Islands. Marine life is affected only temporarily by misses. Surrounding waters are deep and are routinely fished when the area is declared open.

2. Secondary or Indirect Consequences

The waters surrounding Kaula are closed to civilian entry for fishing or other purposes during operations.

D. Alternatives

The expanding human populations on Hawaii's inhabited islands and the classification of all other (some 98) uninhabited islands in the Hawaiian chain except Kaula and Kahoolawe as State or Federal Wildlife refuges has limited the alternatives to use of Kaula Island as a bombing/ bombardment target.

1. Live Ordnance Alternative

Live ordnance is a primary requirement although inert ordnance is frequently used. However, Kaula is used as a target for large aerial bombs (above 500 lbs) as a training exercise.

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*State of Hawaii - Dept. of Land & Natural Resources
Division of Fish & Game
U.S. Dept. of the Interior - Fish & Wildlife Service
Pacific Division - Naval Facilities Engineering Command

A major part of the training exercise involves ordnance handlers, loaders, fuzers, and others involved in assembly of the bomb. The present Navy inventory does not include large inert aerial bombs that can duplicate all characteristics of live ordnance.

2. Alternative Sites

Navy-controlled Mid-Pacific sites include Kahoolawe Island and Pacific Missile Range Facility (PMRF) Barking Sands, Kauai. Army-controlled sites include Schofield Barracks Range Complex (Oahu), and Makua Valley Impact Area (Oahu). On the Island of Hawaii there is the Pohakuloa Training Area (PTA).

a. Kahoolawe Island

This is an ideal Navy target complex, and target facilities have been constructed to meet Navy and Marine Corps needs. However, because of complaints of the noise from Maui citizens, no explosives above 500 lbs are detonated on Kahoolawe.

b. PMRF Barking Sands

This procedure involves electronically scoring "hits" rather than dropping live ordnance. While such simulation is useful for certain underwater ordnance, it would not provide the realism of dropping live ordnance. (Transportation, arming, fuzing, release, etc.).

c. Army-Controlled Sites

The Oahu sites are not approved for close air support training. Aircraft would be forced to carry live ordnance over heavily populated areas, thus creating a safety hazard. Shore bombardment would mean firing projectives over inhabited areas and would be unacceptable. On the Hawaii Island site, 36% of the time, there is a ceiling at less than 10,000 feet during the day, thus seriously restricting all high dive ordnance delivery training.

3. Construction of Artificial Islands

While no artificial islands have been constructed as floating targets, estimates were prepared for an artificial island on Barriles Reef and Grampus Shoals in the waters around Culebra. The cost 5-6 years ago was $272 million for Barriles Reef and $456 million for Grampus Shoals. Allowing for inflation in construction costs, such a project would not be economically feasible, even if the state-of-the-art made it technologically possible.

E. Any Probable Adverse Environmental Effects which Cannot be Avoided should the Proposal be Implemented

The temporary environmental effects of noise, air and water pollution from detonations have been previously discussed. The permanent adverse effects are the shattering of rocks in the explosion and the possibility of inert ordnance (duds) which may remain in the target area. Impact upon bird life, vegetation, or fish life is temporary and repaired as part ~~an part~~ of the life cycle of the species. Only a small section (approximately 8%) of the island is affected in the explosive zone.

F. The Relationship between Local Short-Term use of Man's Environment and the Maintenance and the Enhancement of Long-Term Productivity

Because Kaula Island is volcanic in origin, arid, relatively barren, and composed of steep inclines, the use of one tip for target practice does not cause as much damage as on a flat and more fertile area, environmentally. As there is minimal soil, additional erosion caused by bombardment is minimal. Present use of the island does not preclude any later use for another purpose. Field trips have documented flora/fauna and report that damage is limited to the target area.

G. Any Irreversible and Irretrievable Commitments of Resources that would be Involved in the Proposed Action if Implemented

Any loss to vegetation, bird life, and marine life is replaced in the natural cycle of life. No species present on this island is in danger of extinction. Because there are no beaches, marine mammals cannot utilize the island. The only direct irreversible loss would be dislodged or broken stone that might fall into the sea down the steep inclines.

H. Considerations that Offset Adverse Environmental Effects

In maintaining training for combat readiness, to defend the United States, including the Hawaiian Islands, the southeastern tip of land on this uninhabited island is used as a target, thus removing a "polluting activity" to an isolated area. While there are possible alternatives on Oahu and Hawaii, the environmental problems would be great, while those on Kaula are minimal.

Table 1. Plants Recorded From Kaula Island, Hawaii

COMMON NAME	SCIENTIFIC NAME
Swollen finger grass	Chloris inflata Link
Kukaipua'a	Digitaria setigera R. & S.
Kakonakona	Panicum torridum Gaud.
Jungle Rice	Echinochola colonum (L.) Link
Bristly foxtail	Setaria verticillata (L.) Beauv.
'Ume'alu	Cenchrus echinatus L., var. hillebrandianus (Hitchc.) F. Br.
Australian Salt Bush	Atriplex semibaccata R. Br.
Alaweo	Chenopodium oahuense (Meyen) Aellen
Slender amaranth	Amaranthis viridis L.
	Boerhavia diffusa L.
Purslance	Portulaca oleracea L.
'Ihi	Portulaca villosa Cham.
	Portulaca lutea Solander
Maiapilo	Capparis sandwichiana DC., var. Zoharyi O. & I. Deg.
Koa-haole	Leucaena leucocephala (Lam.) de Wit
Nohu	Tribulus cistoides L.
	Euphorbia celastroides Boiss. in DC., var. moomomiana Sherff.
'Ilima	Sida fallax Walp.
Pa-nini	Opuntia megacantha
'Ilieo	Plumbago zeylanica L.
Koali 'awania	Ipomoea congesta R. Br.
Sweet Koali 'ai	Ipomoea carica (L.)
Nena	Heliotropium curassavicum L.
'Ohelo kai	Lycium sandwicense Gray
Popolo	Solanum nigrum L.
Horseweed	Erigeron canadensis L.
Pualele	Sonchus oleraceus L.

NOTE: None of the plants which occur on Kaula are on the proposed list of endangered or threatened species.

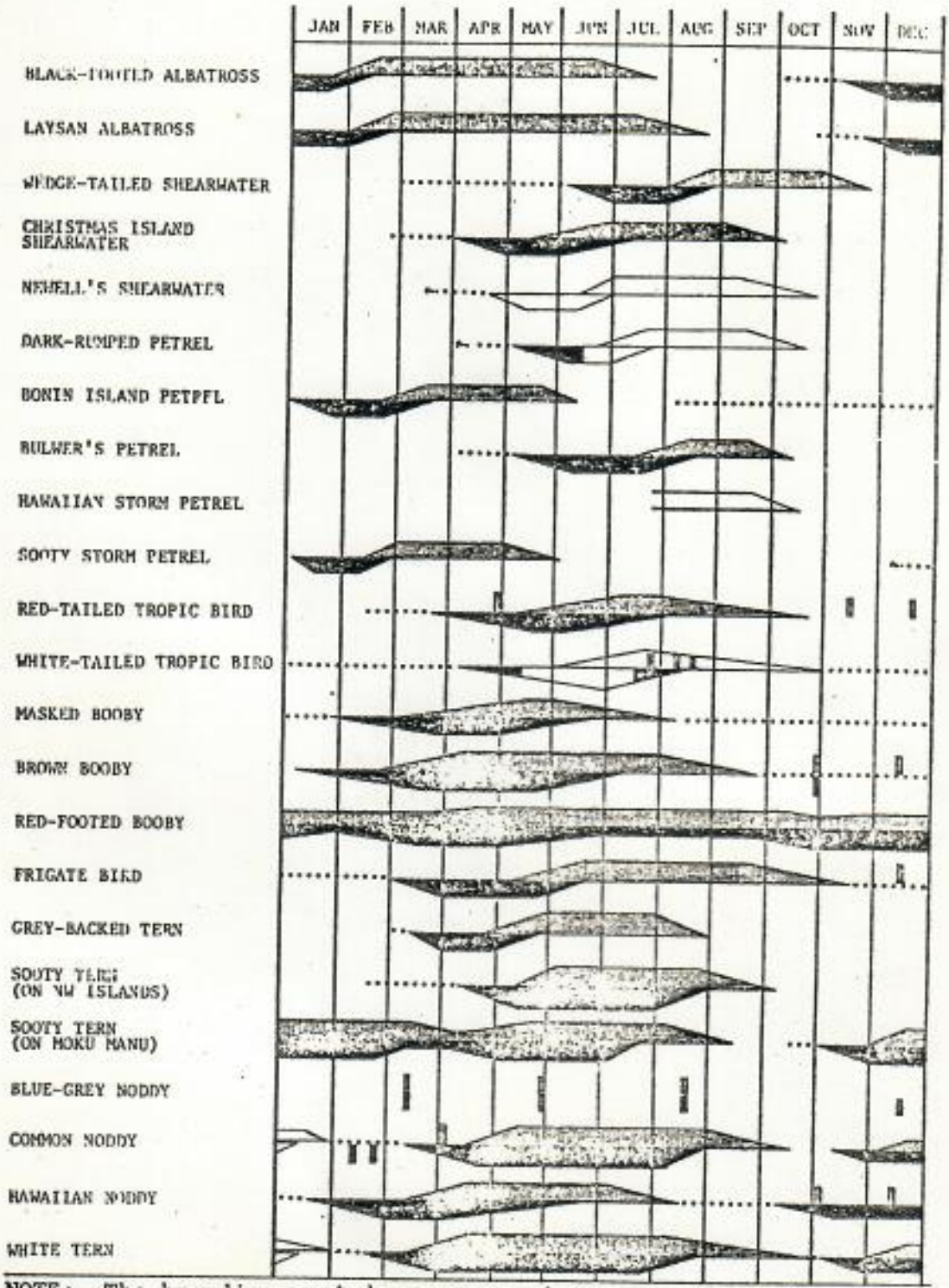
Table 2. Birds Recorded From Kaula Island Hawaii

COMMON NAME	SCIENTIFIC NAME
Black-footed Albatross	Diomedia nigripes
Laysan Albatross	Diomedia immutabilis
Wedge-tailed Shearwater	Puffinus pacificus chlororhynchus
Christmas Island Shearwater	Puffinus nativitatis
Bonin Island Petrel	Pterodroma hypoleuca
Bulwer's Petrel	Bulweria bulweri
Red-tailed Tropic Bird	Phaethon rubricauda rothschildi
White-tailed Tropic Bird	Phaethon lepturus dorotheae
Masked Booby	Sula dactylatra personata
Brown Booby	Sula leucogaster plotus
Red Footed Booby	Sula sula rubripes
Great Frigate Bird	Fregata minor palmerstoni
Pacific Golden Plover	Pluvialis dominica fulva
Ruddy Turnstone	Arenaria interpres
Sanderling	Crocethia alba
Wandering Tattler	Heteroscelus brevipes
Gray-backed Tern	Sterna lunata
Sooty Tern	Sterna fuscata
Blue-gray Tern	Procelsterna cerula
Common Noddy Tern	Anous stolidus pileatus
Hawaiian Noddy Tern	Anous tenuirostris
Fairy Tern	Gygis alba
Barn Owl	Tyto alba pratincola
Mockingbird	Mimus polyglottus
White Eye	Zosterops japonica
House Finch	Carpodacus mexicanus frontalis
Ricebird	Lonchura punctulata
Kentucky Cardinal	Richmondena cardinalis

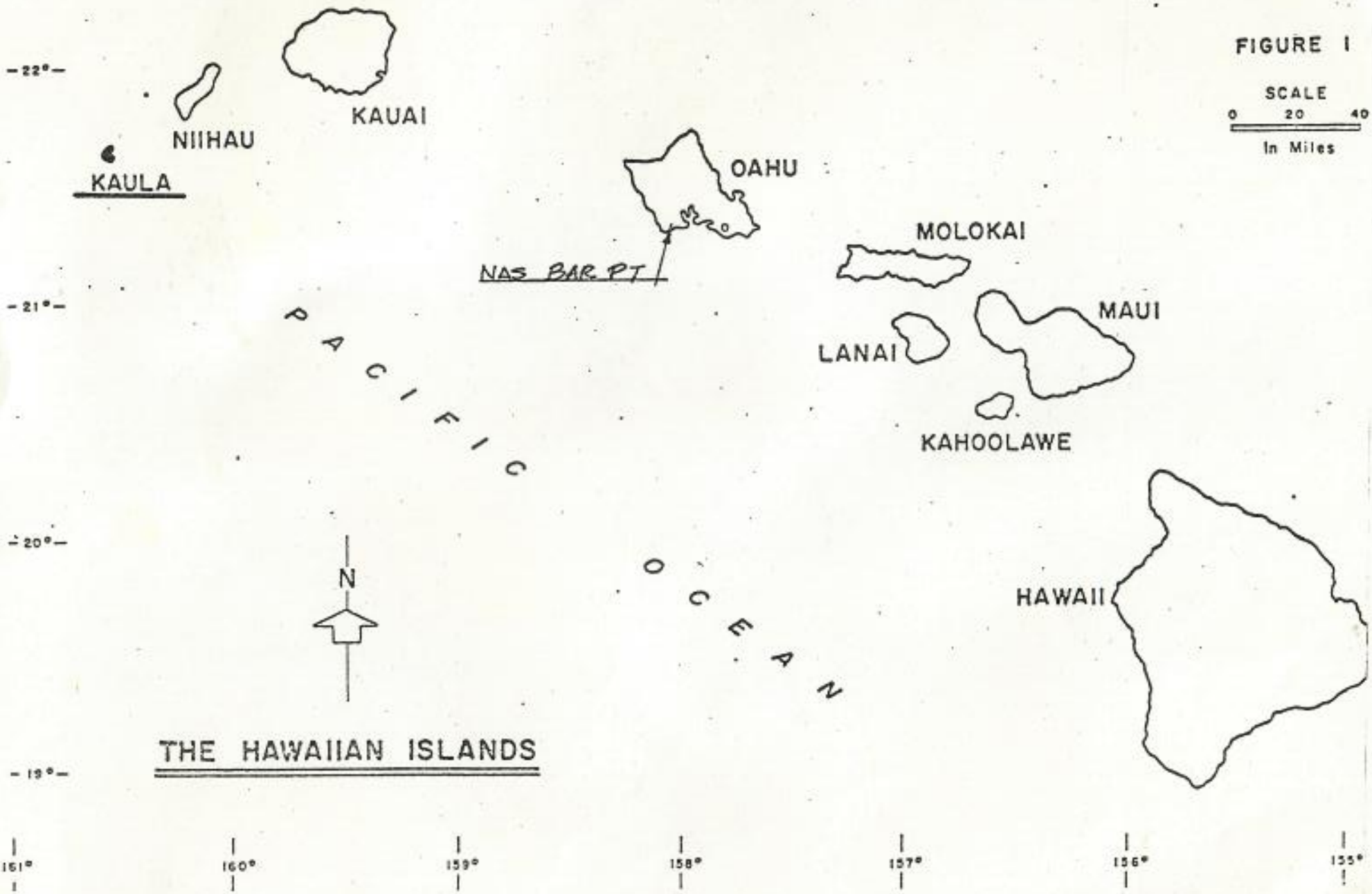
NOTE: None of the birds which occur on Kaula are on the list of endangered or threatened species.

BREEDING CYCLES OF HAWAIIAN SEABIRDS

(From: Richardson, Frank 1957. The Breeding Cycles of Hawaiian Sea Birds Bernice P. Bishop Museum Bulletin No. 218. Honolulu.)



NOTE: The breeding periods vary somewhat among the various islands and also vary somewhat from year to year.
Heavy dotted lines indicate the presence of adults prior to breeding.
Black bars indicate the presence of eggs.
Lined bars indicate the presence of young.
Hollow bars indicate incomplete information.
Thickness of the bars indicates approximate abundance.
Isolated records of eggs or young are indicated by black or lined columns.



THE HAWAIIAN ISLANDS

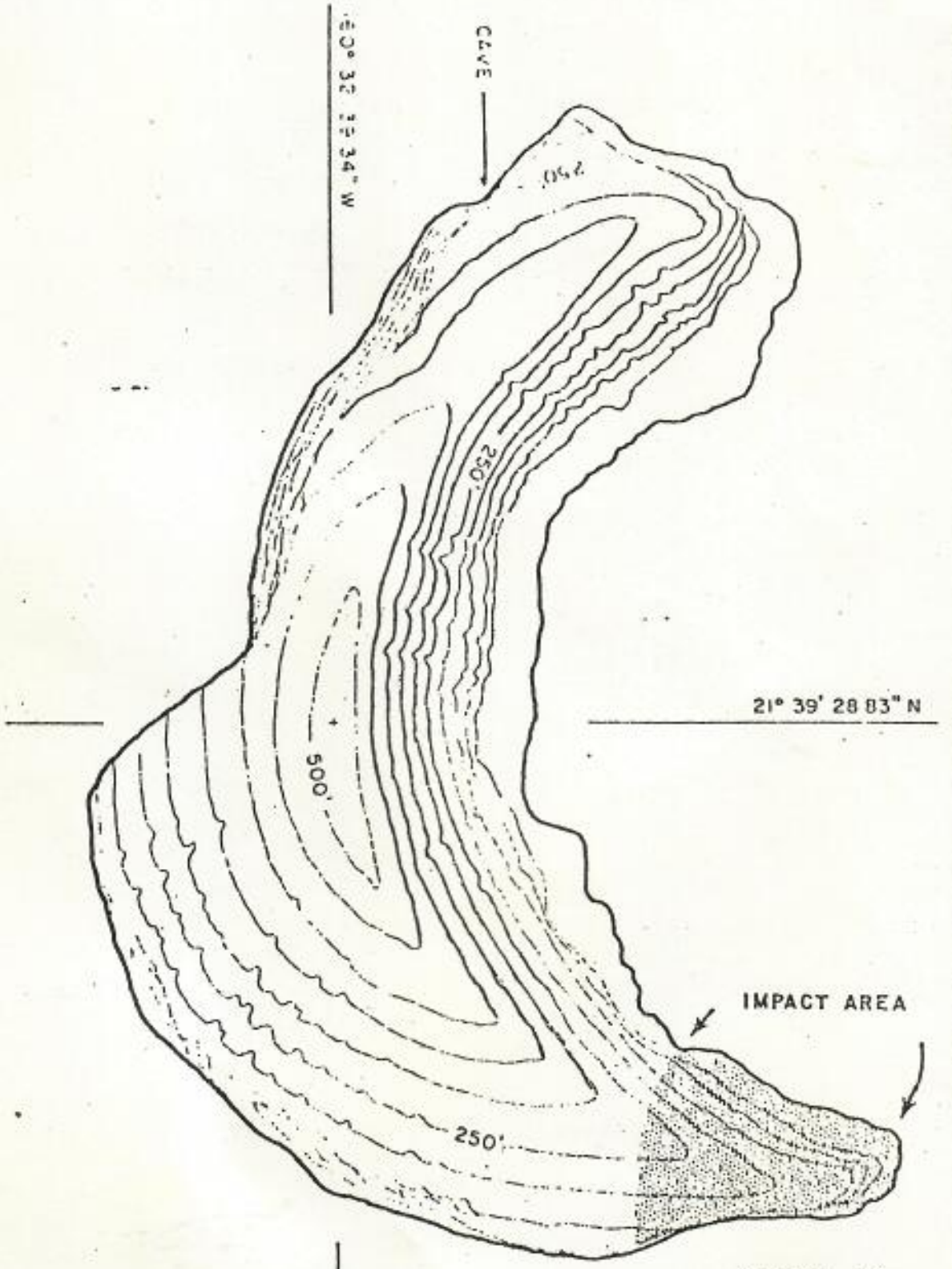

CAVE
250'
250'
500'
250'
21° 39' 28.83" N
IMPACT AREA
KAULA ROCK
SCALE IN FEET
0
500
1000

FIGURE 2


KAULA ISLAND

Kaula bombing halted to protect whales

By DALTON TANONAKA
Advertiser Staff Writer

The live bombing of tiny Kaula Island was halted this week as the result of a temporary agreement between the Navy and a federal marine agency trying to protect humpback whales spotted in the area.

An annual census of humpback whales in Hawaiian waters was completed last week by the Honolulu branch of the National Marine Fisheries Service (NMFS). The census turned up the "highest count to date" — 427 whales in waters stretching from Kaula, 20 miles southwest of Niihau, to the Big Island.

"And in the Kaula area alone we counted 12 humpbacks, including three which were 150 to 200 yards from the island," said John Naughton Jr., an NMFS fishery biologist who was on the research vessel chartered for the six-day census-taking.

"The Navy was very cooperative. They have agreed to suspend the use of live ordnance on Kaula Island until we have completed a study on the use of the shallow waters surrounding the island by the humpback whales. This will probably take until mid-May," Naughton said.

Humpback whales are protected under the Endangered Species Act and the Marine Mammal Protection Act, and it is the duty of the NMFS to enforce these acts. Naughton said this is the fourth year of the NMFS census.

Navy spokesman Lt. Jamie Davidson confirmed that now only inert or "puff" bombs will be used during training missions on the 108-acre island. He said the Navy has been working closely with the NMFS and has provided equipment and manpower for earlier NMFS surveillance of the area.

HONOLULU ADVERTISER Monday, Feb. 26, 1979 A-9

"From March 5, 6 and 7 we'll close down all operations again and fly representatives from the NMFS, the U.S. Fish and Wildlife Service and (state Department of) Land and Natural Resources onto the island to observe from shore," Davidson said.

In April of last year, a citizen filed a complaint to the Fish and Wildlife Service which asked for a halt to the live bombing of Kaula because it was killing seabirds in violation of a federal act.

The citizen, Gary "Skip" Naftel, was also captain of the vessel that took NMFS officials on the humpback census last week. Upon his return, he threatened to seek a court injunction if the Navy did not stop the bombing.

The Navy was not aware of Naftel's intentions, according to Davidson.

Davidson explained that Kaula is used "primarily as a backup to the Kahoolawe (bombing) operation."

Davidson said there were 157 training missions over the island during 1978.

Because of Humpback Whales

Navy Halts Bombing of Kaula Rock

By Helen Altonn
Star-Bulletin Writer

The Navy agreed yesterday to a temporary halt in the use of live ordnance in training missions on Kaula Rock off Niihau because of a number of humpback whales in the target area.

Scientists aboard the research vessel Easy Rider threatened to seek a court injunction to stop the bombing if the Navy took no action.

The vessel took an official party through the Hawaiian chain last Wednesday through Monday for an annual census of the humpback whale population.

John Naughton, with the Honolulu Laboratory of the National Marine Fisheries Service (NMFS), said, "Despite pretty nasty weather, we got the highest count in four years of counting the whales."

HE SAID 427 whales were spotted. About 12 were seen at Kaula Rock, 20 miles southwest of Niihau, including three quite close to the island, he said.

Because of the potential danger to the whales, protected under the Marine Mammal Protection Act and the Endangered Species Act, Naughton said the Navy was contacted and agreed to suspend use of live bombs.

He said the NMFS is undergoing formal consultations with the Navy concerning the impact of the bombing on the whales, and the bombing will be stopped until the assessment is completed.

"We do have the responsibility to protect these animals," Naughton said.

Lt. Jamie Davidson, Navy spokesman on Kahoolawe and Kaula issues, said the Navy will continue its training missions, using inert ordnance, until the facts are compiled on the danger of the bombings to the whales.

HE SAID THE duration of the live ordnance suspension hasn't been determined. "We will negotiate with them (NMFS) for as long as needed to compile the facts, but it looks about mid-May," he said.

As part of the process, he said a survey party will go to Kaula Rock March 6-8 to compile information on the migration of the whales. The study group will include representatives of the NMFS, the state Department of Land and Natural Resources and the U.S. Fish and Wildlife Service.

Naughton said the Navy "has been cooperating with us." For the past two months, he said, the Navy has taken NMFS observers out on helicopters prior to any air strikes to make sure there were no whales in the target area.

GARY "SKIP" NAFTEL, skipper of the Easy Rider, and other scientists filed three complaints in April last year, alleging that the bombings violate the federal Migratory Species Act, the Marine Mammal Protection Act and the Endangered Species Act.

"We put the heat on after the (last) census," he said yesterday. "It's been an entire year since we filed our complaints and nothing was done. After being very patient and going through the system, we decided to bring a court injunction against the Navy. And they decided it was important for them to quit bombing."

Davidson said he did not know of the threatened court action. He said the decision to halt live bombings was made by the commander of the Third Fleet as a result of the census.

THE SCIENTISTS are concerned not only about the whales, in the height of their migration to Hawaii, but about the thousands of seabirds which nest on Kaula, as well as other animals in the area.

Naftel said the survey team on its recent trip saw the spinner porpoise and the beak whale, which is uncommon, around the banks of Kaula. The bottle-nosed porpoise also is known to frequent the waters there.

Edward Shallenberger, Sea Life Park official, asked for "formal consultations" with the Navy at the Washington level concerning the potential harm to the whales after he witnessed military jets bombing Kaula last December.

He said at least six of the bombs missed the island and exploded in the water.

Star-Bulletin
Section C
Honolulu
● Wednesday, Feb. 21, 1979

United States Department of the Interior

FISH AND WILDLIFE SERVICE

LLOYD 500 BUILDING, SUITE 1692

500 N.E. MULTNOMAH STREET

PORTLAND, OREGON 97232

January 22, 1980

Commander Third Fleet
United States Pacific Fleet
Pearl Harbor, Hawaii 96860

Reference: FF/3
11015.1A
Ser 01K/601

Dear Sir:

This is in response to the Migratory Bird Special Purpose Permit application submitted by the Commanding Officer, Naval Air Station, Barbers Point, Hawaii; dated 5/21/79 for the purpose of accidental, occasional taking of migratory birds, their nests or eggs incidental to military training operations.

Our authority to issue Special Purpose Permits is based upon a sufficient showing of benefit to the migratory bird resource, important research reasons, humane, or other compelling justification. Your proposed activity appears to be in direct conflict with these standards.

We are unable to reconcile our commitment to protect migratory birds with a proposed activity that has such a potential for mass destruction of these birds; specifically an activity for which there is no practical means of accurately assessing the destruction, thus precluding any meaningful limitations as a condition of the permit. The very nature of the activity "practice bomb" does not lend itself to a disciplined controlled take of birds, nests, or eggs.

Accordingly, we are denying your request.

Sincerely yours,

Jack E. Downs
Special Agent in Charge
Law Enforcement District #2

GEOLOGY OF LEHUA AND KAULA ISLANDS

By

HAROLD S. PALMER

INTRODUCTION

LOCATION

The islets of Lehua and Kaula are small, uninhabited, and virtually uninhabitable remnants of crescentic rims of tuff craters. Their positions with respect to Kauai and Niihau, the most westerly of the inhabited Hawaiian islands, are shown in figure 1.

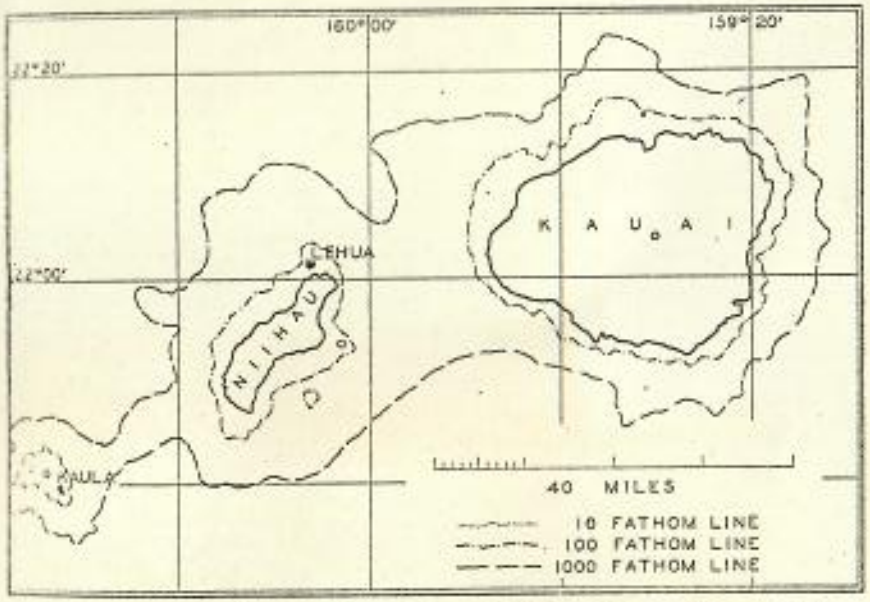


FIGURE 1.—Map showing the positions of Lehua and Kaula with respect to Kauai and Niihau. Based on U. S. Coast and Geodetic Survey, Chart 4117 (Oahu to Niihau), ed. March 1933. Circles indicate assumed position of original summit craters.

Lehua is separated from Niihau by "Lehua Channel", about 3,800 feet wide and navigable by moderately-sized vessels commanded by persons familiar with these waters (18)[1]. From Kauai, Lehua ap-

[1] Numbers in parentheses refer to Literature Cited p. 32.

pears to be several miles from Niihau because the curvature of the earth hides the low northern plain of Niihau. As determined by the U. S. Coast and Geodetic Survey (15, p. 42), the triangulation station on the summit of Lehua lies in longitude 160° 06′ 03.722″ West and latitude 22° 01′ 19.592″ North, "Old Hawaiian Datum". Lehua is readily visible from Kauai as the distance between the two is about 18 land miles. Soundings show a depth of less than 500 fathoms in mid-channel.

Kaula lies about 38 miles southwest of Lehua, or about 23 miles west-southwest of Kawaihoa Point, a recent volcanic cone at the south end of Niihau. Soundings show depths of as much as 877 fathoms between Kaula and Niihau. Kaula has not been occupied as a triangulation station, but the location of its highest point is given by the U. S. Coast and Geodetic Survey (15, p. 44) as longitude 160° 32′ 39.34″ West and latitude 21° 39′ 28.83″ North.

Previous Studies

So far as I know, no intensive study has been made of the geology of either Lehua or Kaula. Brigham (3) apparently confused the islet of Kaula with Kawaihoa Point, for he describes Kaula as seen from Waimea, Kauai, from which place it is not visible. He makes the strikingly good generalization that Kauai, Niihau, and Kaula constitute a single volcanic structure. He also suggests that Niihau was once a part of Kauai and that it was separated from the Napali coast and moved southwestward some 35 miles. Such a horizontal shift seems improbable.

Bishop (2) circumnavigated both Kaula and Lehua and gives brief descriptions of them as remnants of asymmetrical tuff crater rims. He found about 200 degrees of crest line arc surviving on Lehua and about 140 degrees on Kaula. Some of his party rowed 200 feet into the cave on Kaula. Dana (6), Hitchcock (11), and Bryan (4) give abstracts of Bishop's findings but add no new data. Dana (6, pp. 311-312) noted the alinement of the southwest cliffed coast of Niihau with the northwest (Napali) coast of Kauai and thought they were genetically related to a single line along which downfaulting had taken place. There is no evidence that he thought in 1890 that Niihau had been torn from Kauai, though he was of this opinion earlier (6; 10, p. 52; 17, p. 514). The short article by Friedlaender (8) is based on a sketch map and photographs furnished him

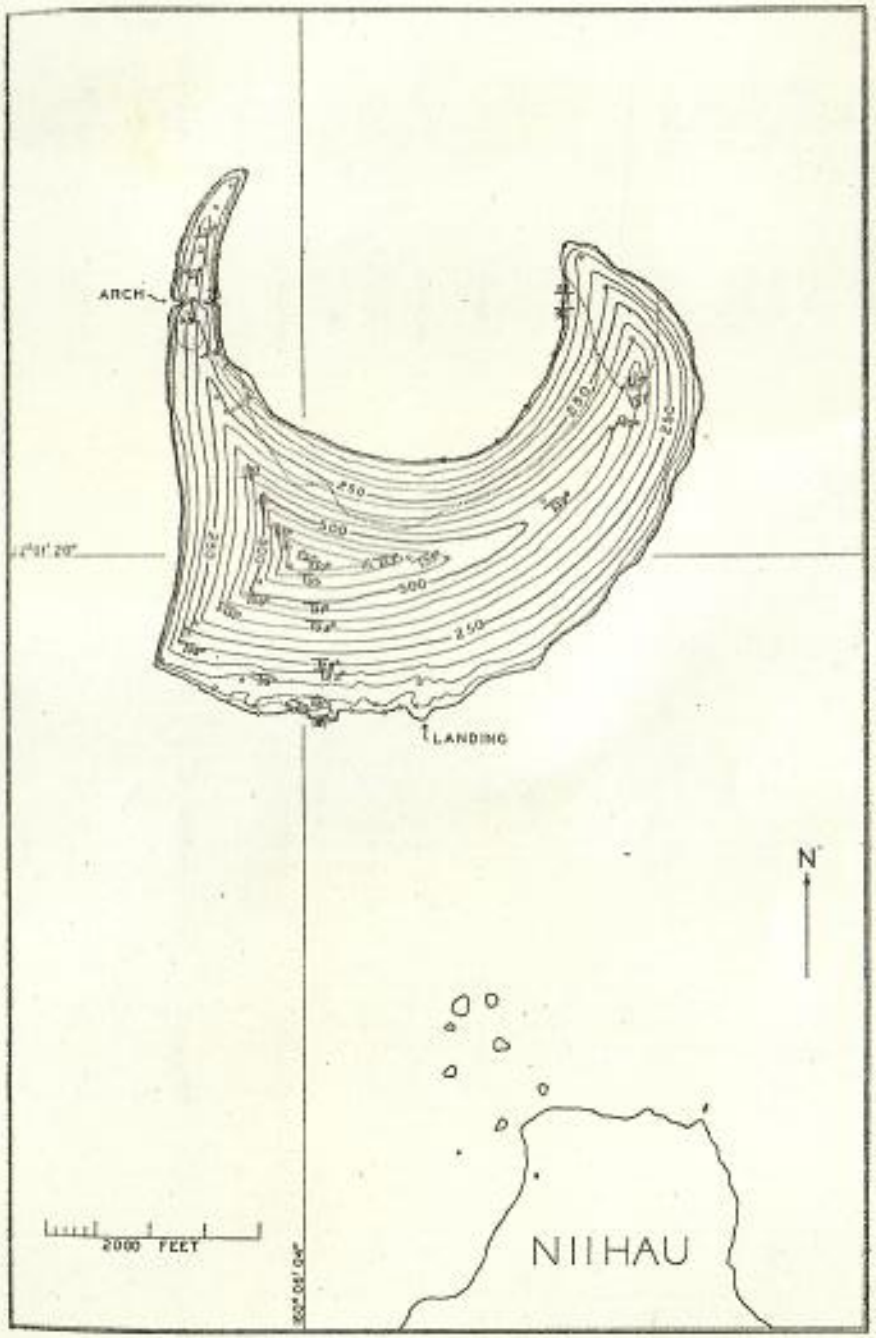


Figure 2.—Map of Lehua. Dotted lines show unconformable boundaries of series of tuffs. Dip and strike symbols show the position of tuff strata.

1936

by Mr. A. E. Arledge, then Superintendent of Lighthouses. Friedlaender speaks of numerous unconformities ("vielfach diskordante Schichten") but there is only one unconformity on Kaula. Palmer (16) circumnavigated and photographed Kaula in 1923, and studied a few rock and soil specimens collected by Mr. Frederick A. Edgecomb and various photographs taken by Mr. Edgecomb in 1925. Relevant data are repeated in the present paper. Hinds (10) shows clearly that Kauai, Niihau, and Kaula are independent volcanic domes, together constituting a unit in the structure of the Hawaiian islands. Although unable to visit Lehua, he describes it briefly and notes the wave-cut bench. The United States Coast Pilot Notes (18) gives a brief description of Kaula and Lehua. The U. S. Coast and Geodetic Survey Chart 4117 shows both Kaula and Lehua, and the 10, 100, and 1,000 fathom submarine contour lines around them.

Maps

For the field work on Lehua a new map (fig. 2) was made by using an 18 by 24 inch plane-table and a light explorer's type alidade.

Orientation was by backsighting on the "Gam" triangulation station 7½ miles away on Niihau. Nine points were located on the inner shore line of Lehua by the depression angle method, working from two points on the crest line. Six points were similarly located on the south outer shore. The rest of the shore line was taken from the U. S. Geological Survey map (Kii sheet) with some adjustment. The contouring of the inner slope and part of the outer slope was controlled by intersections on 12 points and stadia measurements on 27 points. Much of the outer slope is difficult of access and offers problems in visibility because of the pronounced convex curvature; so for this region the contouring was taken from the U. S. Geological Survey map with a few obviously necessary alterations.

The dips and strikes of the tuff beds, the courses of the unconformities and the magnetic declinations were observed independently of the plane-table work and were later tied in by locations based on barometric elevations and by backsights on three or more known points. The bearings thus taken are "magnetic" bearings but application of the "three-point" problem made their conversion to "true" bearings fairly simple.

The map of Kaula (fig. 3) was prepared quite differently.

A vertical airplane photograph was taken by the Eleventh Photo Section, Air Corps, U. S. Army, on July 10, 1924. On the basis of a pantograph enlargement, the study of various other photographs, and some transit work in July, 1925, Mr. Frederick A. Edgecomb prepared a contour map on a scale of 200 feet to the inch with a contour interval of 50 feet. The orientation of this map was determined by bearings taken by the lighthouse tender *Kukui*. This map is in general very satisfactory. However, since a few corrections seemed possible and a circumnavigation of the island showed that the geologic structure was relatively simple, it was decided to devote most of the time available to checking the

topographic map. Flags were set at 11 points including one near the summit on a pipe set in concrete by Mr. Edgecomb in 1925 and one wedged into a crack in the wave-cut bench on the inner side of North Horn. This last flag was not occupied as a transit station, but the other ten flags were, as was also a flagless station. Orientation was by backsighting onto the highest point of Lehua which, unfortunately, was at no time during the work sharply outlined. So far as intervisibility allowed, azimuths and vertical angles were taken from each of the 11 stations to each of the others. The measurement of a base line on the curving rim of a tuff crater is difficult. The procedure adopted was to measure three chords connecting four of the stations and to compute from each short chord the length of the longest chord joining the most remote of the four stations, which was to be used as the final "base line". The length finally adopted

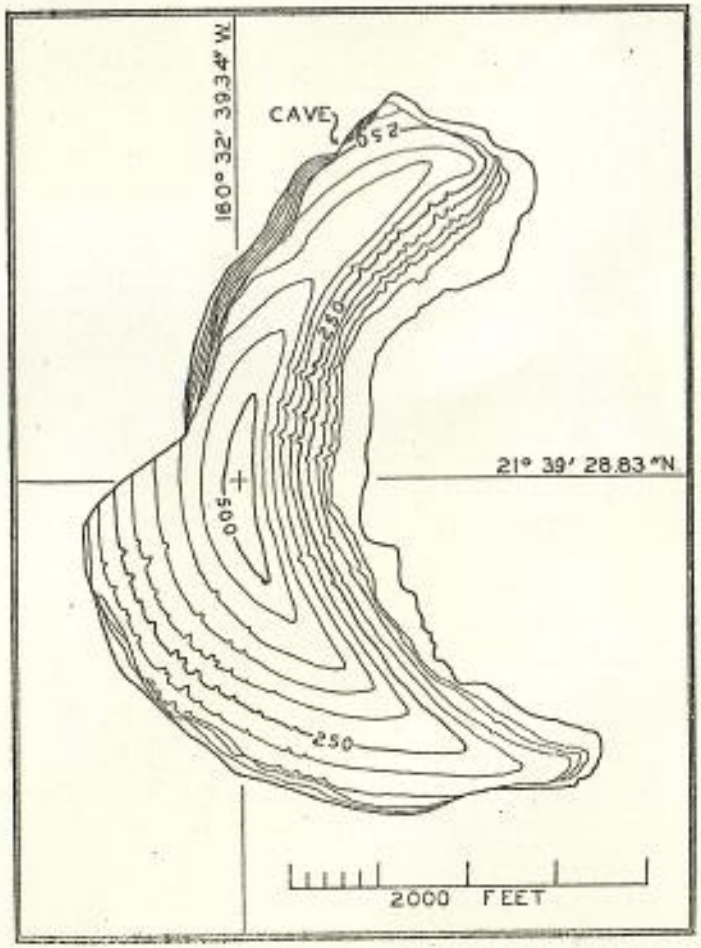


Figure 3.—Map of Kaula.

for this base line was an average gotten by weighting the computed lengths in inverse proportion to the number of times it was necessary to "break chain" in measuring the short chord on which the computed length was based. Working from this base line the latitudes and departures of the 11 flagged stations and the one flagless station were computed in the office. In addition, 29 points along the inner shore of Kaula were located by depression angles working from four crest line stations. The positions of the 11 stations on the crest were plotted on a sheet of drawing paper. A lantern slide had been made from the approximately vertical airplane photograph and was projected onto a drawing board arranged in an approximately vertical position. After considerable adjustment of the stereopticon, the image was made the right size, and further tilting and turning of the drawing board and paper got the image of the crest line into satisfactory agreement with the plotted positions of the crest line stations. In the absence of complicated apparatus this method provided for reasonably good rectification of the photograph. The images of the shore line, crest line, cliff tops, and gulches were then traced off onto the drawing paper. This gave a good rendition of the outlines of Kaula to which the contours of figure 3 were added on the basis of field notes and measurements made on numerous photographs of the islet taken from the *Kukui* as well as from points on the islet.

Acknowledgments

The field work on Lehua was begun during a reconnaissance on September 22, 1928, and was completed on April 18-24, 1931. The field work on Kaula was done on August 17-19, 1932. I am deeply indebted to the Superintendents of the Nineteenth District of the U. S. Lighthouse Service for the opportunity of visiting Lehua and Kaula and for permission to travel on the tender *Kukui*, engaged in constructing lights on these islets. Mr. R. R. Tinkham arranged for the 1928 work, and his successor, Mr. Frederick A. Edgecomb, for the 1931 and 1932 work. Many favors rendered by various members of the *Kukui's* personnel are gratefully acknowledged. Mr. Edward L. Caum, author of a paper on the botany of Lehua and Kaula (5), rendered valuable help in connection with the mapping and photographing.

Topography

General Features

Lehua and Kaula are barren and possess little economic value, except as lighthouse sites. As described by Caum (5), the vegetation is scanty but the bird life abundant.

On the south slope of Lehua, near the cliff edge at an elevation of 60 or 65 feet, is the platform built of rocks which Mr. Kenneth P. Emory tells me was probably built by bird hunters, possibly by fishermen. No other features of archeologic or ethnologic interest were

seen on Lehua. On the crest of the north rim of Kaula are three or four incomplete, low, stone enclosures, which seem to be windbreaks built and used rather recently, and perhaps still used at times by the fishermen who signal the positions of schools of fish to associates out on the water. On the inner slope, a short distance below the windbreaks, several walls have been built part way across the fronts of caves eroded by wind in weaker beds of tuff. Bits of charcoal indicated occupation of at least one of these caves.

In trade wind weather it is easy to land on the low wave-cut bench on the south side of Lehua. The upper slopes are inaccessible from below, except where small valleys cut down through the cliffs that back all parts of the bench and form the shore wherever the bench is lacking. The cliffs back of the landing are from 30 to 60 feet high. Gulches on the inner side of West Horn permit ascent from the bench to the upper parts of Lehua, but it is probably impossible to land on this part of the wave-cut bench except in southerly weather.

On the west side of Kaula where it is possible to land in steady trade wind weather, the Lighthouse Service has constructed a rough trail of ascent from the fragment of wave-cut bench. Pins have been grouted into the rock and footholds cut in the tuff near the water line. A rough bench at about 100 feet elevation is reached by means of these pins for handholds and, for part of the way, by a heavy chain hanging down a gully in the tuff. The derrick and tank house of the lighthouse installation are on this bench (pl. 4, *B*). A substantial ladder leads from here to the upper slopes. In some weather it is possible to land on Kaula on the inner side of North Horn, whence a strenuous climb leads to the end of North Horn at nearly 300 feet elevation.

An automatic gas light of the U. S. Lighthouse Service was established on Lehua on April 24, 1931, and on Kaula on August 18, 1932. For a good many years before Lehua was transferred by the Territory of Hawaii to the federal government for a lighthouse reservation, it was leased from the Territory by the owners of the island of Niihau who, to a considerable extent, protected the sea birds that nest there, and also eradicated weeds which on migration might damage the grazing lands of Niihau.

Seen from a distance, Lehua and Kaula have unsymmetrical, conical outlines. From nearby, however, each is a crescentic ridge comprising the above water part of the rim of a tuff crater with steep

slopes leading outward to the open ocean and inward to a bay. The original smooth slopes built by constructive volcanic action have been modified by the destructive work of winds, waves, and running water. The average slope of Lehua is about 30 degrees as determined by the method of Finsterwalder (20); if the bordering sea cliffs are excluded the average slope is about 27 degrees. The average slope of Kaula is about 36 degrees or 28 degrees if the sea cliffs are excluded. Corresponding figures for the outer slopes of Kaula are 38 degrees and 21 degrees; for the inner slopes, 33 and 38 degrees. Cliffs modify the values for the outer slopes more than for the inner slopes because the cliffs on the outer side are much higher. Inasmuch as the surface of each island is largely bare rock or only slightly weathered, it is possible to reach all parts of the islets except the cliffs and parts of the wave-cut bench below the cliffs. The steep slopes, however, make the going arduous and in places dangerous.

Lehua

According to the planimeter measurements of the drawing reproduced as figure 2, Lehua has an area of about 291 acres at sea level. With the remarkably great average slope of 30 degrees the total surface, if flattened out, would be about 15 percent (44 acres) greater. The arcuate crest line of Lehua is about 9,250 feet long. The greatest width (about 2,600 feet) lies along a line bearing N. 22° E. through the summit point, the elevation of which is given by the U. S. Geological Survey (Niihau topographic sheet) as 702 feet.

From the summit the crest line extends as two "horns" (fig. 2). West Horn (pl. 3, *A*) extends northward for 4,000 feet. It narrows rather abruptly to a width of about 600 feet and drops rapidly to a crest elevation of 250 feet. It is gashed on its inner or eastern side by several sharply incised, miniature canyons. One of these has cut completely through the ridge leaving a natural bridge or arch with a thickness of about 30 feet and a span of about 25 feet. East Horn of Lehua (pl. 1, *B*) extends eastward from the summit for about 1,750 feet, falling gently in elevation to about 500 feet. Thence it curves through northeast to north for 2,000 feet, with a drop in crest elevation of only 75 or 100 feet. The remaining 1,600 feet of the crest line includes a drop of from 400 feet to sea level. East Horn has a rather uniform width of about 1,500 feet. The tips of the two horns are about 2,900 feet apart, and the reentrant bay extends inward about 2,200 feet from the line joining the tips.

From the summit of Lehua a subsidiary crest line extends 1,650 feet S. 55° W. to the southwest corner of the islet. This subsidiary crest line, which offers the least arduous route to the summit from the south shore, is not part of the crater rim but is a break or topographic unconformity separating two surfaces of quite different origin. Southeast of it is the normal southward sloping depositional surface of the tuff cone. Northwest of it is a surface which has been cut across the bedding of the tuff by some sort of landsliding or faulting process.

Kaula

According to the planimeter measurements Kaula has an area at sea level of about 136 acres. As the average slope is about 36 degrees, the total surface area, if flattened out, would be about 24 percent (32 acres) greater. The summit elevation is about 540 feet.

The curving crest line of Kaula is about 5,500 feet long (fig. 3). The greatest width of the islet (about 1,650 feet) is along a line bearing about N. 78° E. through a point 150 feet south of the summit, which is 56 degrees different from the bearing of Lehua's greatest width. It seems appropriate to speak of a "North Horn" and a "South Horn" on Kaula. North Horn of Kaula extends northward for 2,500 feet from the summit. It drops rather quickly to about 400 feet elevation and then very gently to the 280 foot high cliff that truncates the end. It is similar in formation to West Horn of Lehua. Near the end of the outer side of North Horn is a remarkable sea cave (pl. 4, *C*). South Horn of Kaula extends first southward, then southeastward, and finally eastward for a total distance of about 3,000 feet (pl. 4, *A*). The crest line drops rather uniformly to the top of the terminal cliff, which is about 100 feet high.

The tips of the two horns of Kaula are about 3,200 feet apart, and the reentrant extends inward about 1,200 feet from the line joining the tips.

Kaula lies near the southeast end of a shoal (fig. 1) about 8 land miles long and about 4½ miles wide, bearing west-northwest.

Circularity

As a rapid glance at the maps (figs. 2, 3, 4) suggests that the rims of the craters, or the crest lines of the two islets, approximate arcs of circles, it seemed interesting to try to fit an arc of a true circle as closely as possible to each. The following results were obtained.

The crest line of Lehua is everywhere sharp and distinct. It includes the main curve following the crater rim and approximates an arc of a circle. A trial circle with a radius of about 2,025 feet was selected by inspection in the attempt to fit a circle to the crest line. The inevitable errors were dealt with mathematically, whereby the areas between the crest line and the trial circle were measured by planimeter. Some of these areas lay inside the circle and outside the crest line. These were added and compared with the sum of the areas of the other parts—those lying outside the circle but inside the crest line. In the first trial, the areas inside the circle exceeded those outside by 435,500 square feet, which indicated that the trial circle was too large. The excess of 435,500 square feet was distributed along the 9,250 feet of the crest line, which then gave about 47 square feet of excess area for each linear foot of crest line. Consequently, a circle of 47 feet less radius, or 1,978 feet seemed indicated. As it was impossible to plot very closely, a circle of about 1,975 feet radius was chosen with its center 2,180 feet N. 27° E. of the triangulation station at the summit. The crest line follows this circle closely through an arc of 259 degrees. The departure of crest line from arc averages less than 90 feet and nowhere is as much as 270 feet. The areas outside this second circle exceed those inside by only about 5,000 square feet (396,000 — 390,750 = 5,250 sq. ft.); or 0.57 square feet per lineal foot of crest line.

Similar trials for Kaula led to the selection of a circle with a radius of 1,750 feet, with its center 1,820 feet N. 86° E. of the summit. Such a circle departs on the average about 46 feet from the crest line throughout an arc of 169 degrees. The departure nowhere exceeds 97 feet. The areas outside this circle exceed those inside by 10,560 square feet, or 2.05 square feet per lineal foot of the arc.

Constructional Forms

Constructional surfaces, made by the accumulation of rock, are represented on Lehua and Kaula solely by tuff-built surfaces which follow the upper surface of the sloping beds, such as the smooth parts of the outer slopes of each islet, where falling ash found lodgment on the sloping surface of earlier fallen ash (pl. 3, *B*). There are other constructive surfaces on the inner slopes of these islets where thin veneers of ash found lodgment. In some places on the inner slopes either ash never fell or has since fallen into the bay. There are small areas of inward sloping tuff surfaces on the inner side of East Horn on Lehua (pl. 1, *B*).

Landslide Surfaces

On the west face of Lehua (pl. 1, *A*) the arching beds of tuff are cut off abruptly. It is believed that these arches never extended farther seaward but that support from underneath had been eliminated by earlier downfaulting so that ash found no permanent lodgment and slid off into the sea. Thus the supported parts of the tuff beds have remained to make these astounding arches. On the upper

parts of the inner slopes of Lehua (pl 1, *B*) the edges of many parallel beds of tuff are revealed which have been cut off by landsliding or by lack of lodgment of ash. On Kaula a great joint surface, trending N. 50° E., bounds the southwest side of a reentrant from which a block of tuff has evidently fallen into the sea (pl. 4, *B*).

Wind-cut Surfaces

Wind has produced no major changes on either Kaula or Lehua, but on both it has cut intricate and fantastic details of the rock sculpturing. By abrading weak bits of surface rock wherever they may be, the wind has produced such pits as those shown in plate 2, *B*.

Stream-cut Surfaces

Because the areas of Lehua and Kaula are small and the surface slopes steep and mostly bare of vegetation, the streams are small and strictly ephemeral. The low elevation makes it probable that the annual rainfall is scant, perhaps about 20 inches. Consequently the work accomplished by running water is slight. The only factor favoring active stream work is steepness which gives the streams high velocity. On both islets the outer and the inner slopes have been trenched by radial streams. The largest trench on Kaula heads about 550 feet S. 8° W. of the summit and is about 750 feet long. It is some 30 feet wide and 20 feet deep for much of its length. Lehua is far less trenched than Kaula (pl. 3, *B*).

On the south side of Lehua, the dips of the tuff beds near the shore are decidedly less (20±°) than those higher up (33±°), so that there is a flattening of the slope. Chance irregularities have brought together in one place the flow of several shallow radial streams and diverted them into channels parallel to the shore. These streams have cut gullies from 10 to 20 feet deep. Several such peripheral valleys are indicated by reentrants in the contour lines of the Lehua map (fig. 2).

Wave-cut Surfaces

In general the northeast and east sides of the Hawaiian islands are the most attacked by waves because most exposed to the trade winds. The southerly sides are usually protected, but during the southerly (*Kona*) storms they may undergo very vigorous wave attack for short periods. Lehua is protected from southerly storms by Niihau

and from easterly storms by the broad mass of Kauai, the nearest point of which is only 18 miles away. Kaula is fully exposed. Almost the entire 7,000 foot shore line of the inner curve of Lehua has a wave-cut bench or terrace ranging in height from 5 to 10 feet and in width from 0 to 30 feet (fig. 4, *b;* pls. 1, *B* and 3, *A*) as estimated from points above. About nine tenths of the 4,400 feet of the inner curve of Kaula have similar bench from 10 to 80 feet wide and from 4 to 8 feet high, as estimated from a motor boat at close range (pl. 4, *A*).

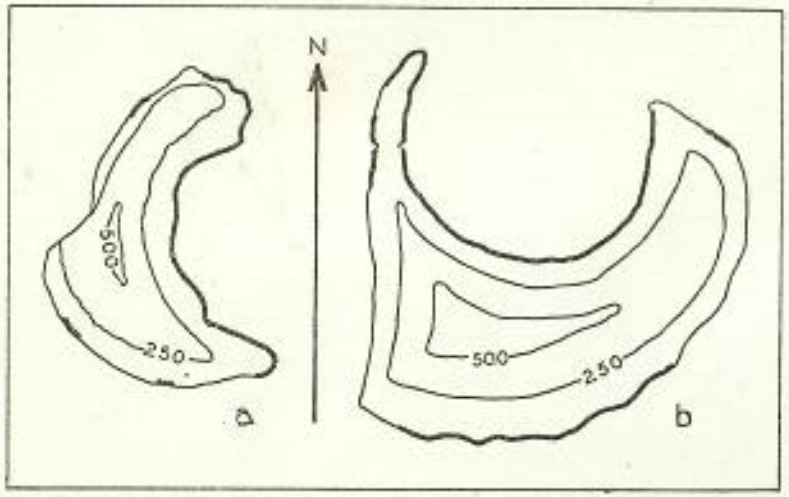


FIGURE 4.—Sketch maps of (a) Kaula and (b) Lehua. The heavy lines indicate parts of the shores with wave-cut bench and the light lines, parts where cliffs plunge directly into the ocean.

Less accurate observations were made on the outer curves of these two crescent-shaped islands. However, there is a similar bench along half or two thirds of the west shore of Lehua, which is some 4,800 feet long. The bench along the northern part of the east shore and the southeast shore is poorly developed and fragmentary for 5,250 feet from the tip of East Horn. From the southwest corner of Lehua eastward for 3,500 feet along the south shore the bench is splendidly developed with an elevation of 2 to 4 feet above sea level. Its width reaches a maximum of about 100 feet. (See pls. 2, *A* and 3, *B*.) In fact, the bench is well developed on all sides of Lehua except that most exposed to the prevailing winds (fig. 4, *b*). The

outer shore of Kaula has very little bench. The best fragment, lying southwest of the summit, is about 150 feet long, 0 to 20 feet wide, and 4 to 6 feet above sea level (fig. 4, *a*). The bench is well developed along the whole length of the inner curve.

It has recently been suggested by Johnson (12, 13, 14) that the classical explanation of exposed wave-cut surfaces, as due to the emergence of submarine benches cut at an earlier time of relatively higher sea level, is erroneous and that they are actually the work of storm waves at present sea level. In other words, Johnson holds that these are not old features being destroyed, but that they are modern features being enlarged.

If the bench is the work of present day storm waves it should be best developed on those parts of the shore line which are most exposed to storm waves and least developed on the sheltered shore lines. If, on the other hand, the bench is an old feature now undergoing destruction it should have survived most on the sheltered shore lines and least on the exposed shore lines. On both islets the bench is nearly or quite continuous on the inner curves but largely lacking on the outer curves. On both, the inner faces have the gentler but far more persistent attack of the trade wind waves. However, as the inner curve is a bay it tends to dissipate the energy of the waves. On Lehua the amount of wave energy crossing 2,900 linear feet (the distance between the two horns) is spread over 7,000 feet of the inner shore line. On Kaula the energy of 3,200 feet of waves is distributed over 4,400 feet of shore line, as pointed out by Davis (7). Thus the energy of wave attack on the inner curve of Lehua is diluted to 41 percent ($2900/7000 \times 100 = 41\%$) and on Kaula, to 73 percent ($3200/4400 \times 100 = 73\%$). This dilution is qualitatively obvious to observers on either islet during trade wind weather; the impact of the waves is not excessive. Thus the sides exposed to trade wind waves are not violently attacked. The sides exposed to the occasional violent southerly storms have suffered more. It therefore appears that storm waves destroy rather than create the bench.

The inner shore lines of Kaula and Lehua are very similar—the benches are much alike—but the outer or southerly exposed shore lines contrast strongly. Kaula, with no protecting island to the south, has very little bench on its southerly shore. Lehua, which is partly protected from southerly storm waves by Niihau, has a wide bench.

So again, storm waves seem to be destroyers rather than creators of these benches.

The level surface of the bench has been determined by some leveling control, and sea level is the only conceivable one. The bench surface in most places cuts across the beds of tuff though in some places the bench follows the bedding of the tuff where a weaker layer has been stripped from a stronger layer. The usual beveling of the tuff beds by the bench is well shown along the south shore of Lehua (pl. 2, *A*). Here the beds strike east-west (parallel to the shore) and dip south (seaward) about 15 degrees.

The upper surface of the bench is in general very smooth, though grooved a little where weaker beds have been more abraded. The seaward edge of the bench is a plunging cliff, rather frayed out in detail. From the way in which waves strike the edge of the bench it appears that it is now being destroyed by wave attack. The behavior of waves approaching shores with steep underwater slopes is as follows:

> As the trough of a wave approaches the bench the water drops and recedes; the succeeding crest, as it approaches, is oversteepened and seems to be tripped up by the receding water of the trough, so that it slides down the incline of the wave front and delivers most of its blow at the base of the plunging cliff, thus tending to undercut the cliff and drive it back. After delivering its blow at the base of the cliff the foamy water surges upward along the cliff and a little froth may fall forward onto the bench. Wave attack on the seaward margin of the bench is helped appreciably by the borings of sea urchins. They cling to the rocks in some way and, by their jaws, or their movable spines, or both, wear small pits and grooves in the tuff. (See pl. 1, *C*.)

Wherever waves cut a bench, they must of necessity also make a cave or a cliff at the back of the bench. At first a reentrant notch or shallow cave is cut. This may be deepened locally, especially if the rocks are of varied resistance, and a rather deep cave formed. Caves at sea level are the deepest of the reentrant notches (pls. 2, *A*; 3, *B*; 4, *C*) particularly where the attack has been localized along weak beds or structures. At a cave on Kaula (pl. 4, *C*) the wave attack has been localized through the weakening by weathering of an older series of tuffs below an unconformity. The broad cave on Lehua (pls. 2, *A* and 3, *B*) is due to localization of wave attack by a weakly cemented bed or group of beds of tuff. On West Horn of Lehua a cave has been developed into an arch or natural bridge due to the narrowness of the ridge and the process of weathering along a major joint.

Cliffs on both islands are prominent features (pls. 1, *B*; 2, *A*; 3, *A*; 3, *B*; 4). Those along the inner curve of Lehua range from 40 to 100 feet high, and those along the outer curve, from 30 to 200 feet. On Kaula the range is 50 to 100 feet on the inner curve and 100 to 160 feet on the outer curve; on the west side where a great joint block has fallen out, the cliffs reach 350 feet (pl. 4, *B*).

Several of the small islets near the north end of Niihau are composed of evenly bedded tuffs that dip very slightly southward. Their flat upper surfaces appear to be original depositional surfaces, but they might conceivably be remnants of a bench cut along a resistant bed when sea level was higher than it is now. These islets are bordered by plunging cliffs, which are now being cut back by wave erosion.

STRUCTURE

Kauai, Niihau, and Kaula

Kauai, Niihau, and Kaula well illustrate the general principles that volcanic centers tend to lie along straight lines and that the spacing between them tends to be uniform. Strong erosion has removed the original summit crater of Kauai, but for the present discussion it is assumed to have been near Waialeale. Downfaulting and wave erosion have removed the original summit crater of Niihau, but it was probably a few miles east of Pueo Point, at the south end of the east coast of Niihau. The original summit crater of the Kaula dome is assumed to have been about the center of the shoal outlined by the 100-fathom line. (See fig. 1.)

A straight line joining Waialeale to the center of the Kaula shoal is 74 land miles long and bears S. 69° W. Pueo Point is 3 miles, N. 57° W., from the middle point of this line. The original summit crater of Niihau is probably as close or closer to the middle point.

Soundings 40 miles or more from the shores of the Hawaiian islands are about 2,500 fathoms, and indicate the depth of the sea bottom platform on which the Hawaiian volcanic structure is superposed. The 1,000 fathom line surrounds Kauai, Niihau, and Kaula in one closed curve, which is separate from the 1,000 fathom line around Oahu. Thus the 1,000 fathom line indicates that these three islands are closely related in origin and are manifestations of a line of weakness bearing N. 69° E., and crossing at an angle of about 40 degrees the general trend of the Hawaiian islands, which is about N. 70° W. The submarine saddle between Kauai and Oahu probably

is crossed by the 1,600-fathom but not by the 1,700-fathom contour line.

The spacings between Kaula and Niihau and between Niihau and Kauai are about 37 miles, which is considerably greater than the 22 to 25 miles which Friedlaender (9) gives for the average in the Hawaiian islands. If a 900-fathom contour line were drawn it would probably connect Kaula to Niihau, for the deepest sounding between them is 877 fathoms. Similarly, a 500-fathom contour line would connect Niihau to Kauai.

Kaula and Its Shoal

As shown in figure 1, Kaula lies near the southeast end of an irregular, oblong-shaped shoal outlined by the 100-fathom line, about 8 land miles long on the west-northwest axis, and 4½ miles wide. About 27 square miles are enclosed by the 100-fathom line, which probably outlines a wave-truncated lava dome and the surrounding bank built of its detritus. The lava dome presumably had a sea level horizontal section some 3 by 6 miles and a height of approximately a thousand feet. On Kauai and Oahu there are tuff cones and craters which are much younger than the lavas forming the bulk of these islands, and which were not erupted until great valleys had been cut. A like length of time would have permitted the complete truncation of the much smaller lava pile of Kaula. Kaula appears to be a secondary tuff structure built on a wave-cut platform rather than on a stream-eroded surface. A single sounding of 5 fathoms rises from the general 35-fathom level at a point about 3 miles N. 60° W. of Kaula and may be either another secondary structure which did not reach sea level or a residual not removed in the planation of the shoal. The bottom at this point is reported as "rock" on the chart. The general depth of 35 fathoms on the shoal surrounding Kaula is perhaps due to wave planation during a low stand of sea level in one or more of the Pleistocene glacial stages.

Among the blocks embedded in the tuff of Kaula are many fragments of reef rock, which would indicate that the shoal had been populated by lime-secreting plants and animals prior to the eruption of the ash. Most of the blocks of basalt in the Kaula tuff are angular and preserve the shapes that they had when torn from the conduit walls by the uprushing gas-charged magma. Some of them, however, are well rounded like beach or stream pebbles. These probably

preserve shapes given them by battering and abrasion by wave work on the shoal. Thus, it may be concluded that the Kaula shoal formerly had a more or less continuous mantle of beach boulders, and that, at some time, it carried more or less reef.

Lehua and Niihau

Lehua lies some 9 miles north-northwest of the supposed position of the original summit crater of Niihau, to which it bears the structural relationship of a secondary tuff crater. Mr. John McCombs, Engineer of the Bishop Estate, reports that Cape Kawaihoa at the south end of Niihau and the hill known as "Kaeo", near the middle of Niihau, are also secondary tuff structures. Lehua Channel, between Lehua and Niihau, is only 3,800 feet wide and some 7 fathoms deep. Tuff from Lehua has made a number of tiny islets close to the north shore of Niihau. According to McCombs, tuff, for which Lehua seems to be the only source, extends several miles south along the west shore of Niihau.

Crater Rim Structure of Lehua and Kaula

Lehua and Kaula have similar origins and therefore have similar, though not identical, structures. Each has been built by explosive volcanic action in which the proportion of gaseous to liquid matter is great. The excessive amounts of gas in their swift uprush break the lava into small particles, which are carried high into the air and which solidify before finishing their descent. Thus such an eruption is a sort of rain of ash or lava particles. The trade winds drift the ash so that there is more accumulation on the leeward side of the vent than on the windward side. In such eruptions the wind also sorts the ash, causing the finer ash particles to drift farther while the coarser fall back near the vent. Varying wind strength and intermittent eruptions both cause variations in the coarseness of the ash falling at any given point and thus give a bedded or layered character to the ash. Bedded in with the ash are blocks of older lavas and other older rocks torn from the walls of the conduit. Sooner or later after the eruption the ash may become cemented to form tuff. On both Lehua and Kaula there were several eruptions so that cones with craters were formed (fig. 5, *b*). However the inner slopes of the craters were so steep that most of the ash falling back (fig. 5, *c*) could not find lodgment above sea level and slid down into the sea-filled

center of the crater. Inasmuch as these islets are distinctly asymmetrical, due to strong wind drifting, the craters have always been open to the sea and waves have entered and removed the ash. There are only thin veneers of small extent on the inner slopes of both Lehua and Kaula (pls. 1, *B*, and 4, *A*).

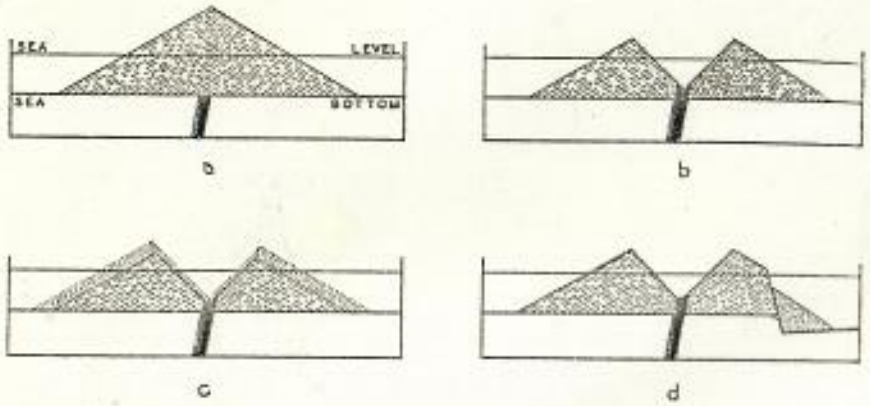


FIGURE 3.—Diagrammatic structure sections of various kinds of pyroclastic cones: *a*, craterless cone formed by the accumulation of ash after a single eruption; *b*, cone with crater blown out by successive eruptions; *c*, depositional anticline or arched structure of bedding formed by ash falling back on both inner and outer slopes of cone; *d*, straight cliff formed by faulting, with slope too steep to allow ash to settle, thus breaking the continuity of the tuff beds.

STRUCTURE OF LEHUA

Lehua is composed of three series of tuff beds. The series which forms the summit of the island and which therefore may be called the "Summit Tuff" has the greatest volume. The Summit Tuff also forms the crest and outer and inner slopes except for small areas. The end of East Horn and the part of West Horn near the "arch" are composed of a younger series of tuff beds, the "Post-Summit Tuff". Parts of the south shore near the landing expose the older "Pre-Summit Tuff" beneath the Summit Tuff.

The various small islets close to the north shore of Niihau are formed of horizontal beds of tuff undoubtedly derived from Lehua as no other possible source is visible. As the Summit Tuff is the most abundant on Lehua it seems likely that the same tuffs would extend farthest and that these islets are of the Summit Tuff series.

The Pre-Summit tuffs are exposed at a number of places in the

wave-cut cliff of the south shore of Lehua. After their deposition they were slightly gullied by streams to depths of 2 to 5 feet and widths of 4 to 12 feet. Eventually the gullies were filled in by the unconformable beds of the Summit Tuff series.

The Post-Summit Tuffs on the end of East Horn lie on and are parallel to a surface which cuts diagonally across this tip of the island. It is obviously not a stream-cut surface, but is presumably due to the slipping off of a block of Summit Tuff that had been undermined by wave erosion. The Post-Summit Tuff of West Horn does not extend to the extreme end of the horn but fills in a broad, westward sloping trough in the Summit Tuffs. (See pl. 3, *A*.) For some unascertained reason the Summit Tuff at this point seems always to have been weak. Earlier in its history considerable slumping took place making the trough which is now filled with Post-Summit Tuff. More recently it has suffered excessive erosion by wave attack from one or both sides of the horn which has been pierced to make a curious arch. The opening of the arch is due to the removal of the locally weak Summit Tuff. The bridge or top of the arch is of the stronger Post-Summit Tuff, which has persisted despite the withdrawal of the support formerly furnished by the underlying Summit Tuff.

The south part of the west side of Lehua exposes a great series of superposed, grandly arching beds of Summit Tuff (Pl. 1, *A*). This face of the islet, broadly regarded, is a slightly concave surface cutting steeply across the depositional anticline with beds sloping both ways from the axis of the crater rim. This steep face trends about N. 16° E. and continues some distance southward under water from the southwest corner of Lehua. The cliff face is not smooth in detail but is deeply gouged by troughs which follow the bedding of the tuff rather than the steepest slope, as do normal stream-cut gullies. This great, steep, west face of Lehua might be regarded either as a fault scarp or as a wave-cut cliff. The under-water, southward extension is difficult to explain on the hypothesis of wave erosion, but a fault would cut the submarine as well as the subaerial parts of the Lehua tuff heap. Therefore it is believed that this straight surface is the result of faulting.

The question next arises as to whether the fault is older or younger than the Summit Tuff which is exposed in it. If younger than the tuff, the fault should have exposed a surface down which

streams would rush at times of sufficient rainfall, following courses perpendicular to the shore line and cutting gullies that follow the steepest slope. However, the gullies do not follow the steepest slope but diverge greatly to follow weak beds of tuff. If faulting had occurred prior to the eruption of the Summit Tuff, a rather straight cliff would have been made, facing westward and overlooking a downsunken block. Both the higher, eastern block and the lower, western block would be composed of Pre-Summit Tuff. On the renewal of volcanic activity the Summit Tuff would fall on both blocks, but more abundantly on the nearer, higher, eastern block. Some of the tuff would find permanent lodgment on the eastern block, but that west of a surface sloping upward at about 35 degrees from the edge of the block would be beyond the angle of repose and would slide down into the deeper water to the west, as suggested in figure 5, *d*. Thus in a section at right angles to the fault line the continuity of the tuff beds would be broken. Parallel to the fault line, however, there would be arched beds if the vent were opposite the fault and not too far away. If the vent were farther away the beds might dip one way or the other instead of in both directions parallel to the fault line. As the trade wind crosses this fault obliquely it has a southerly component of motion parallel to the fault. Therefore more ash would be drifted to the south slope making the beds thicker south of the anticlinal axis than north of it.

The tuff that found permanent lodgment on the higher block would become hardened first, and it is believed quickly on the surface where air and water find most ready access. On the edges of the tuff beds thus exposed above the fault there would be a selection of certain beds for greater hardening and of others for less, depending upon their texture and composition. In the course of time abrasion by wind and by running water would carve most deeply into the less hardened beds regardless of their attitude. The resulting furrows or gullies would not necessarily follow the steepest gradient but would follow the weakest beds.

Such a process has never been observed; it would involve centuries of time. This explanation is, therefore, admittedly largely deductive, but it correlates (1) the straightness of the west shore of Lehua, (2) the gullying following bedding instead of gradient, (3) the view that hardening of ash to tuff occurs soon after deposition, and (4) the view that the hardening is at first surficial.

The tuffs of Lehua are traversed by numerous minor joints for which no regular system of position could be ascertained. There are in addition a number of major vertical joints, most of which are approximately radial in trend. About 12 of the joints are surmounted by mounds 2 to 6 feet high where they cross the crest line of East Horn (pl. 1, *B*). Presumably the joints, by giving air and water better access, have permitted greater hardening of the tuff adjacent to them. The mounds are in turn due to the greater hardness of the tuff. Yet the joints also create regions of weakness which have been eroded out as narrow gashes found along joints that are surmounted by mounds as well as along moundless joints.

Structure of Kaula

The structure of Kaula is more simple than that of Lehua. The tuffs almost universally strike parallel to the surface of the ground, both on the outer and inner slopes. On part of North Horn the crest is smoothly rounded and the beds are nearly horizontal. Toward the bay the beds dip slightly inward until a maximum of about 5 degrees is reached at the brink of the steep inner slope. Outward from the crest the outward dips increase to about 25 degrees and then decrease to about 20 degrees at the brink of the outer cliffs. Most of the crest, however, is sharp and separates the very steep inner slopes, on which edges of tuff beds crop out, from the gentler, outer slopes, which are largely dip slopes. Locally the edges of the tuff beds on the inner slopes are mantled by thin veneers of tuff dipping very steeply toward the bay.

The structure of the middle part of the outer face of North Horn on Kaula and its squarely cut off end is different from that of the rest of the island. Here an unconformity separates the main series of tuff beds from an older series. The older beds seem to have formed a rather flat-topped islet much of which is now buried. The east and south flanks slope eastward and southward, respectively, at about 45 degrees and have been covered by younger tuffs, the lowest beds of which are rather jumbled but which are overlaid by normally arranged tuff beds. Both these boundaries of the islet of old tuff are places of weakness into which caves have been eroded. The weakness is presumably due to the weathering of the older tuff prior to the deposition of the younger tuff. The cave on the end of North Horn is shallow, but the one on the west side is a spectacular cave into

which a whale boat may be rowed for a hundred feet or more (pl. 4, *C*). The mouth of the cave appears to be about 50 feet wide at sea level and 50 feet high above sea level. As seen from a motor boat off the cave's mouth, the water inside appears to be 4 fathoms or more deep.

The older tuff beds are also exposed in a triangular area, 400 feet long at the water's edge and 125 feet high, extending north from the pronounced reentrant on the west side of Kaula. These beds dip southward about 20 degrees. The outcrop is cut off at its northern end by an unconformity that dips about 40 degrees northward. These unconformities crop out on nearly vertical cliffs.

LITHOLOGY

Tuffs

The tuffs of Lehua and Kaula are in general very similar. The included blocks of older rocks, however, differ considerably.

All the tuffs are medium gray when fresh and weather to various shades of brown by the formation of hydrous oxides of iron. As the surfaces are in general well weathered and have scant vegetation, both islets are dominantly a brown color, except for the wave-cut bench and sea cliffs which have the color of fresh tuff. Here and there are white coatings and seams of calcareous matter. Considerable areas on Kaula and smaller areas on Lehua look whitewashed by the excrement of numerous sea birds.

Where small depressions have accumulated soil, derived from disintegrated tuff, it is possible to collect fairly representative material. From one such place on Lehua there were identified palagonitized glass, dark gray, stony basalt, and small grains of olivine. No grains of feldspar, augite, or magnetite were found, nor was magnetite detected by the use of a strong horseshoe magnet.

A similar soil sample from Kaula, collected by Mr. Frederick A. Edgecomb, was sifted and the various grades examined, the coarser with the naked eye or hand-lens and the finer with a binocular microscope.

All the grains were angular. Most of the coarsest grains (5+ mm) were fresh or altered volcanic glass, fine-grained basalt, and fragments of bird bones, along with a few bits of olivine. A count of 669 grains between 0.5 and 2.0 mm gave about 13 percent magnetite, 10 percent olivine, 10 percent bone, 1 percent augite and 66 percent undetermined. It was thought that the undetermined grains were largely basalt and glass. In the finest material only magnetite and olivine were identified. It is not surprising that little augite and no feldspar were identified although these are the chief constituents of the Hawaiian basalts, for they are softer and lighter than the magnetite and olivine, and therefore suffer more wear and are more easily blown or washed away. Moreover the good cleavage of augite and feldspar favor their destruction. The residue, however, suffices to show that the parent material was basaltic in composition.

Further studies of the constituents of the tuffs were made on three crushed samples from Lehua and on six from Kaula. Thin sections were studied for the three Lehua specimens and five of the Kaula specimens.

Olivine was found in all nine specimens, but it was not abundant in any of them. In three there were megascopic grains of olivine. The color ranged from pale yellow to pale green. Limonite rims were fairly common, as were inclusions of magnetite. Some of the olivine grains were themselves inclusions in basalt or in glass, but others were free and probably were ejected as discrete crystals.

Magnetite was separated in small amounts from seven of the eight crushed samples that were tried out with a strong horseshoe magnet. The magnet also pulled out grains of glass, basalt, and olivine which presumably contained inclusions of magnetite. In the thin sections opaque grains, which were undoubtedly mostly magnetite, were seen not only as inclusions, but also as independent grains. All were very small.

Augite was detected in only two of the specimens, and only in the thin sections. It is the usual pale Hawaiian augite. In the section of one specimen it was found in intersertal relation to plagioclase laths in a basalt lapillus. In the other there was a single, independent augite grain.

Plagioclase feldspar with the narrow parallel lamellae of albite twinning was noted only in the specimen with the intersertal augite. No grain was so oriented as to give usable extinction angles.

Non-mineral grains included basalt, glass, and palagonite. Basalt lapilli of various types were found in all the specimens. In the basalt grains plagioclase, augite, olivine, and magnetite were identified. A few basalt grains contained enough magnetite to be moved by the horseshoe magnet. Where the basalt grains are over one or two millimeters in size and are abundant they give the hand specimen a mottled or speckled appearance. Some beds consist chiefly of basalt lapilli.

Basalt glass was found in all the specimens. To the naked eye or under a hand-lens the glass is black, but in thin section it is olive brown, gray brown, dark brown and cloudy with tiny inclusions, pale green or pale olive green. Most of the glass is continuous but some glass grains are vesicular. Inclusions of magnetite and of olivine are not uncommon. Many of the smaller grains are fully palagonitized. Some of the larger grains are fresh throughout, but most are altered to either palagonite or limonite at their rims.

Palagonite was found in all of the specimens, but in varying amounts. It gives the weathered rock its general rusty brown tone. The individual grains are yellow brown, brown, or red brown as seen megascopically. In thin section the palagonite is yellow or yellow-orange. Palagonite has fully replaced the smaller grains of glass, but the larger grains preserve fresh centers inside of palagonite rims.

Calcite is the most common of the secondary minerals, and was found by HCl test in five of the nine specimens. Fillings of vesicles in one specimen

show the high birefringence and cleavage of calcite. Calcite also occurs as fillings of small interstices between grains, and as veins and seams up to 10 mm thick. In three specimens there was noted a mineral occurring as radiating, acicular aggregates. The index is less than that of Canada balsam, the birefringence is low, the extinction is parallel, and the elongation is negative. Some of this is clear and some is milk-white.

One tuff specimen from Kaula had on its surface a number of very perfect though tiny crystals of halite presumably derived from the evaporation of salt spray.

Induration of the Tuff

Three lines of evidence indicate that some time elapsed between the fall of ash and its consolidation into tuff.

1. Depressions made in ash beds by the impact of large bombs or blocks when they fall are common on Lehua and Kaula as shown in such miniature quaquaversal synclines or basins, called "bomb sags" by Wentworth (19), as appear on cliffs and valley sides. In many of these, part or all of the indenting block remains. On dip slopes, due to the differential erosion of the quaquaversally indipping tuffs, they appear as concentric, annular ridges and grooves. Such structures could not be made in firm tuff which yields to the impact of the falling block by fracturing rather than by a sort of flowage. The depressions therefore imply that the ash remains unconsolidated until at least a few beds have fallen.

2. Few of the indenting blocks are broken. In many days field work on these and other tuff structures in Hawaii, I have noted but few indenting blocks that were themselves fractured. These exceptions were probably almost ready to fall to pieces and needed only a small blow, such as loose ash might give, in order to shatter. Non-shattering of the falling blocks, like indentation of the ash, implies looseness of the ash for a time after falling.

3. A third critical point is the presence of crenulated beds of tuff. At various places on Lehua the crests of these miniature folds trend parallel to the strike of the beds. The distance from crest to crest is 5 to 9 inches, and the height of the folds, 1 to 2 inches. In some places the crenulation is restricted to a single bed of tuff not more than 2 inches thick. At one place (pl. 2, *B*) crenulation is seen clearly in three or four thin zones which are separated by less well crenulated or even somewhat jumbled beds. It would appear that when the ash had been slightly consolidated it slipped down slope a little on more rigid beds beneath. The sliding bed must have had some cohesive strength, otherwise it would merely have been badly jumbled. From the crenulations it may be concluded that induration is a process that takes some time and goes on by degrees.[2] Unconsolidated beds would jumble on sliding.

[2] In 1927 I observed that the lapilli at Pompeii erupted by Vesuvius in 79 A. D. are less well cemented than are the tuffs of Lehua and Kaula which are probably older. In answer to a query written for me by Mr. William A. Lessa, Dr. Alessandro Malladra, Director of the Royal Vesuvian Observatory, informed me that the material erupted by Monte Nuovo in 1538 is not perfectly cemented and is more friable than the material at Pompeii. Dr. Harry S. Ladd informed me that shortly after the eruption of Falcon Island, Tonga, in 1927, landing was very difficult because the ash was entirely loose and slid badly. Pompeii, Monte Nuovo, and Falcon Island show increasing induration with age suggesting that induration is progressive. However it is dangerous to collate data from such widely separated places; Falcon Island has been built up by eruptions and destroyed by waves several times, while Monte Nuovo and Pompeii are situated away from wave attack.

and fully consolidated beds would not slide at all. Only beds that were partly consolidated could develop such folds. It may further be concluded that this partial induration occurs soon after the ash has fallen, for if the sliding were delayed it should involve a thick ash bed rather than one of only a few inches.

Induration of ash to tuff seems to be to some extent surficial though by no means exclusively so. Evidence of this is the gouging out of certain tuff layers on the west side of Lehua (pl. 1, *A*). Here it appears that once the edge of a bed outcropping on the steep slope has been removed it is easy for wind and occasional running water to gouge out more of the same bed. Other beds that preserve the case-hardened surface are thus protected and persist. Of course, it is also partly due to differential resistance throughout the beds that some are gouged out and others stand up. Another phenomenon suggesting that induration is in part a surface or shallow process is found at the mounds on East Horn of Lehua (pl. 1, *B*). The mounds are due to greater resistance localized along joints. The explanation is suggested that early in their history the joints permitted air and moisture to get into the ash and to harden it near the joint surfaces. Later, however, some of these and many other joints have permitted air and water to enter to perform destructive work, such as enlarging the joints.

Miscellaneous Features of the Tuff

Search was made for molds of trunks and branches of trees in the tuff just above the unconformities on Lehua. Such molds are very abundant in the unconformity between the two sets of tuff in the Salt Lake Crater region, Oahu, and imply the development of considerable soil and the establishment of vegetation in the time between the two eruptive episodes. No such molds were found on Lehua, which indicates that in its earlier stages Lehua was probably at least as barren as it is now. No molds were visible at the distance from which Kaula's unconformity was seen, but a close examination could not be made. The tuff below each of the unconformities on Lehua appears just as little weathered as that above. The tuff below the unconformity on Kaula has been somewhat weathered so that it has weakened and favored cave excavation.

Blocks

On Lehua rock types noted among the blocks in all three series of tuffs include both porphyritic and non-porphyritic basalts of various shades of gray. Feldspar was the only mineral noted as making phenocrysts. Some blocks were presumably originally parts of dikes or sills, for they were without gas vesicles. More, however, are vesicular; in some the vesicles are nearly spherical as in pahoehoe flows, and in others more or less stretched out as is common in aa flows. Neither frothy pahoehoe nor basaltic glass was seen in Lehua blocks.

Near the base of the Post-Summit tuff on West Horn of Lehua are a number of blocks of reef rock. No reef rock blocks were seen in the Pre-Summit tuffs and only a single one in the Summit series. Such blocks imply that the conduit passed through a layer of reef rock. It therefore appears that the region of Lehua bore no reef till after the eruption of the Summit Tuff, which may have shoaled the crater enough so that the depth was favorable for corals and associated organisms.

The largest block of basalt noted on Lehua has a maximum diameter of about 4 feet. Another block measures about 3½ by 3 by 2½ feet and has a volume of about 13.5 cubic feet and a weight of some 2,100 pounds. The commonly noticed blocks range in size from a hen's egg up to a man's head. However there are many blocks ranging in size from a pea to a walnut which are not conspicuous in the tuff.

The blocks in the tuffs of Kaula show a greater lithologic variety than in those on Lehua. They include many of reef rock, a few of coarse calcareous sandstone, and a few of broken molluscan shells. Many of the blocks are composed almost entirely of olivine, having a coarse granular texture and a skinlike coating of fine-grained basaltic lava. The largest has a diameter of 9 inches. A few blocks have phenocrysts of olivine in a stony basaltic ground mass. Neither feldspar nor augite was noted as forming phenocrysts. Non-porphyritic basalts are common among the blocks and range widely in vesicularity, but none are "frothy". A few blocks are glassy in texture and have fair-sized vesicles with drusy crystalline linings. One block with several red garnets embedded in a stony, basaltic matrix and another block with minute biotite phenocrysts in a similar matrix suggest that at least some of the blocks came from great depths. The rather common blocks composed of aggregates of olivine grains are also very

likely from great depths. Volcanic blocks of other lithologic types are presumably of shallower origin.

Most of the blocks on Kaula are angular, revealing the shapes they had when torn from the walls of the volcanic conduit. A few, however, are well rounded as if they came from a stream bed or a boulder beach. Presumably these were rounded by wave action on the shoal during its cutting, and were torn from about the same horizon as the blocks of reef rock and calcareous sandstone.

Cause of the Pyroclastic Eruptions

In Hawaii pyroclastic rocks made by violently explosive volcanic action may be due to the evolution of great quantities of steam when water and hot magma or lava come in contact with one another or to an unusually high inherent gas content of the magma. The contact of water and heated rock may result from the access of ground water to a deeply receded magma column or from the entrance of a lava flow into the ocean or a stream. On Lehua and Kaula the eruptions were not caused by access of water to a lowered magma column for such an eruption gives almost exclusively stony ejecta. The pyroclastics of both islets include a great quantity of glass and of palagonite.

It is conceivable that liquid lava emerged from submarine vents on the north flank of Niihau or on the wave-planed Kaula shoal and generated great volumes of superheated steam, which rent the lava asunder and hurled the fragments high into the air to fall back and build the craters.[3] If made by this process the tuffs would contain few if any xenoliths. But the numerous blocks included in the tuffs on both islets are certainly the analogues of xenoliths. The inclusion among the blocks of rock that presumably originated in great depths (garnet and biotite bearing basalts and the granitoid textured olivine nodules) implies the existence at great depths of energy enough to tear loose such fragments.

It is probable that the pyroclastics had their source in a magma of initially high gas content and therefore also of high mobility, inasmuch as the gas is supposed to have been inherent in the magma when it formed, it would be available at the right time and at the

[3] A depth of 40 fathoms would produce a pressure of 108 lbs./in², which would raise the boiling point of water to about 332° F. The resulting steam would have considerable superheat which would cause it to expand violently when it rose to higher levels where the pressure was less.

right place to give enough velocity and enough kinetic energy to tear away blocks of rock from the conduit walls to make the analogues of xenoliths.

It appears that in the Hawaiian volcanoes the magmas supplying the usual quiet lava flows rise so gently that they do not have enough kinetic energy to rend fragments from the conduit walls. Hence the usual lack of xenoliths in Hawaiian lava flows.

GEOLOGIC HISTORY

Lehua

The chief events known in the geologic history of Lehua are as follows:

1. Construction of the dome of Niihau by the successive outpourings of many lava flows, the earlier solely submarine, the later largely subaerial.

2. Eruption from a vent on the northern submarine slopes of Niihau of a series of ash beds (Pre-Summit Tuffs) to form for the first time the islet of Lehua.

3. Erosion of this first Lehua to smaller size. Waves must have done most of the eroding, but the only evidence preserved is that of stream-cut gullies on the south shore.

4. Downfaulting of a part of Lehua on the west side of a line bearing about N. 16° E.

5. Eruption from the same vent of a second series of ash beds (Summit Tuffs) to form a far larger island, much like the present Lehua. The total arc was probably of about 275 degrees, leaving about 85 degrees open to the sea on the north. Slumping or landsliding of ash over the fault scarp caused the curious arches on the west side of Lehua.

6a. Reduction of this island by stream and wave erosion, but particularly by the landsliding into the sea of the tip of East Horn and a part of West Horn.

6b. Contemporaneously with this reduction there was some reef growth in the bay between the horns, that is, over the dormant volcanic vent.

7. Eruption from the same vent of a third series of ash beds (Post-Summit Tuffs) which found lodgment in restricted areas, on each horn.

8. Erosion to a slight extent by running water and wind, but strong erosion of a bench and cliff by waves working from a sea level between 10 and 20 feet higher than the present sea level.

9. Lowering of sea level by 10 to 20 feet, so that the wave-cut bench emerged.

10. The present epoch of erosion, moderately by wind and running water but chiefly by waves which are destroying the emerged bench and making a new one below present sea level. The ends of the horns are particularly exposed, and since their construction, East Horn has been cut back about 200 feet and West Horn perhaps 300 feet. From its one time maximum sea level area of 370 acres, Lehua has been reduced to 291 acres (about 79 percent).

Kaula

The geologic histories of Kaula and Lehua include some similar events but also some that are unlike. The chief events in the history of Kaula are as follows:

1. Outpouring on sea bottom of lava whereby a lava dome was built, which it is believed extended 1,000 feet or so above sea level with sea level axes of 3 and 6 miles and an area of some 14 square miles.

2. Beveling by wave erosion, with some help from running water and wind, producing a shoal of some 27 square miles inclusive of the marginal zone of detritus.

3. Growth of a reef on this shoal. (Perhaps not until after event no. 4).

4. Eruption of an older series of ash beds, which now are exposed only in inaccessible parts of North Horn. (It is believed, but not definitely known, that these ash beds contain fragments of the reef.)

5. Erosion, largely by waves, of the tuff made by the induration of the older series of ash beds.

6. Eruption of the younger series of ash beds making a crescentic ridge along about 223 degrees of arc, leaving about 137 degrees open to the sea on the east.

7. Sliding off along a joint surface of a considerable part of the outer slope of North Horn, making a reentrant angle.

8. Slight erosion by running water and wind; strong erosion of a bench and cliff by waves working from a sea level between 10 and 20 feet higher than the present sea level.

9. Lowering of sea level by 10 to 20 feet so that the wave cut bench emerged, simultaneously on Lehua and Kaula.

10. The present epoch of erosion, moderately by wind and running water but chiefly by waves which have destroyed nearly all of the wave cut bench on the exposed outer curve. South Horn has been cut back about 425 feet since its construction and North Horn, about 1,000 feet. The total area at sea level has been reduced from the original 197 acres to 136 acres (about 69 percent).

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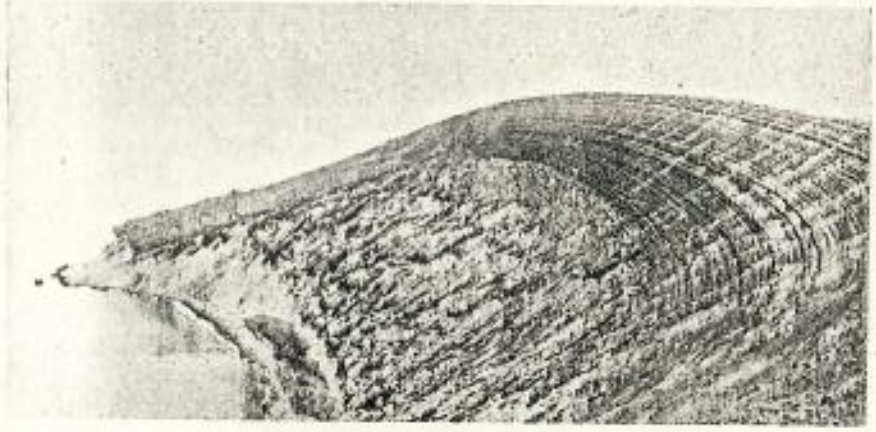
A



B

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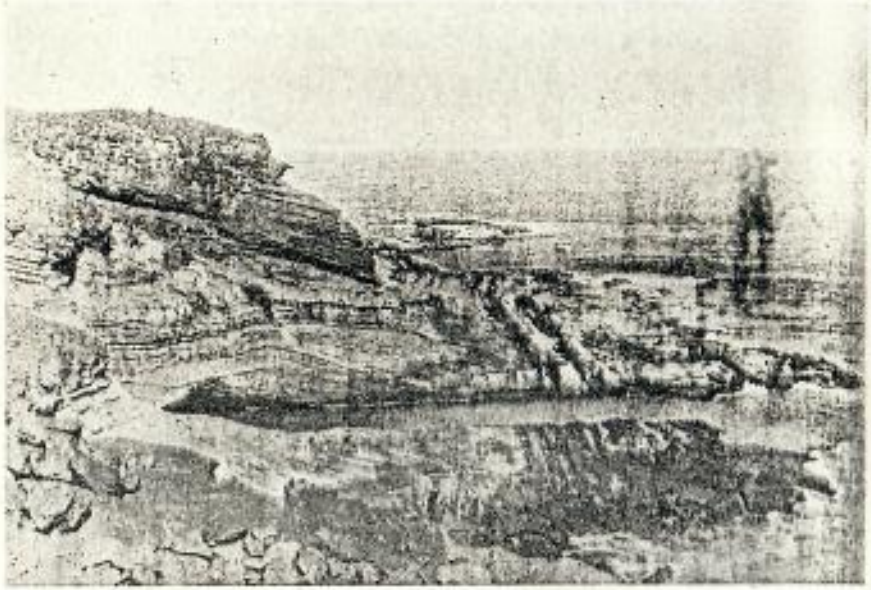
Plate 1.—Lehua: *A*, panorama of southern part of the west side showing depositional anticline of tuff beds; *B*, inner side of East Horn seen from the summit, showing wave-cut bench, uniform bedding of the upper slopes, and mounds on the crest line; *C*, tuff on wave-cut bench of south shore channeled



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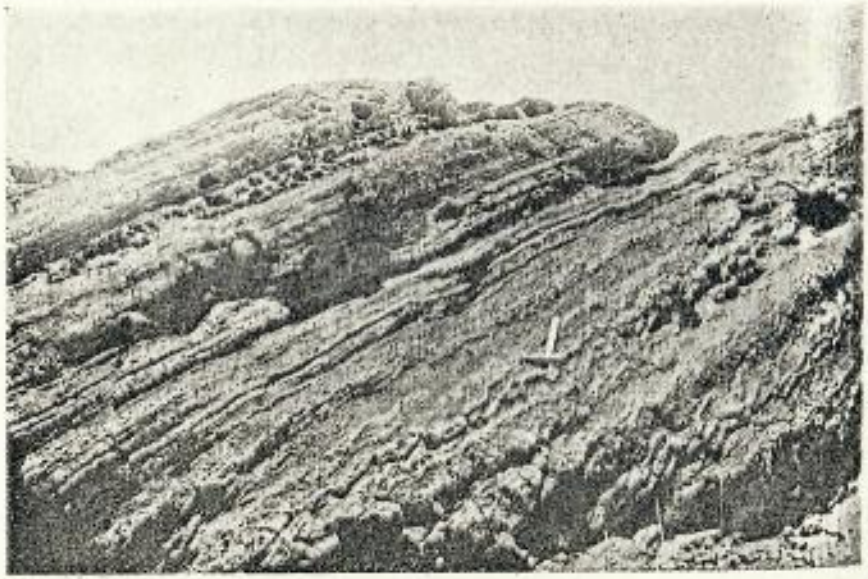


B

PLATE 2.—Lehua: *A*, wave-cut cliffs, bench beveling tuff beds, and cave on south shore; *B*, detail of tuff, showing wind-etched cavities near the top and crenulated beds of tuff near the bottom. (Photographs by E. L. Caum.)

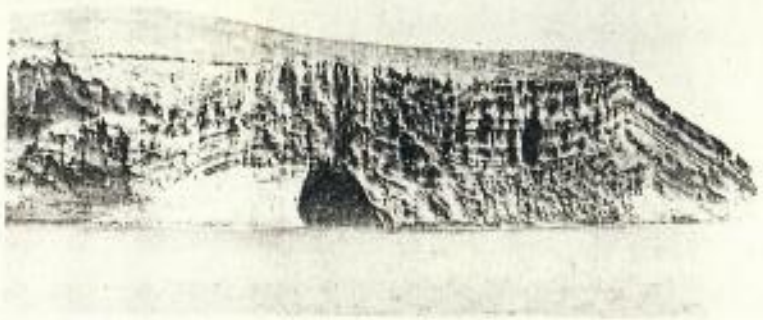
A

B

PLATE 3.—Lehua: *A*, general view of West Horn showing the unconformity between the "Summit" and "Post-Summit" tuffs; *B*, south slope of Lehua from the channel; note the radial gullies, wave-cut cliffs, bench, caves, and remnants of tuff beds; landings are made at the extreme right of the view (photograph by E. L. Caum).

A

B



C

PLATE 4.—Kaula: *A*, inner side of South Horn; *B*, southwest outer sh[ore] showing a block, bounded by joints, which has fallen out; *C*, cave and unc[on]formity at the north end of the outer side of North Horn.

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Quantitative Studies of Copepods in Hawaii with Brief Surveys in Fiji and Tahiti

By C. H. EDMONDSON

INTRODUCTION

The investigations recorded in this paper relating to Hawaii were conducted during the period from September 22, 1931 to September 21, 1932, with the purpose of determining the amount of potential food expressed in numerical quantity of marine free swimming copepods available at certain localities in the shoal waters about Oahu. That the paucity or abundance of copepods might be correlated with insignificant or luxurious growth of other invertebrates which depend largely upon these minute organisms for their subsistence, was also a consideration of the inquiry.

A similar but brief survey was made in Fiji during February 1933 and in Tahiti during April of the same year. These results are presented for comparison with those of Hawaii.

It is generally conceded that marine copepods are an important source of food for many higher animals of the sea, both invertebrate and vertebrate. Ranging in length from a fraction of a millimeter to several millimeters when adult, free swimming copepods are quite universally dispersed in the oceans from the surface to depths of several hundred fathoms. These minute crustaceans exhibit marked tropisms, their response to light having been the subject of much investigation. Copepods are usually repelled by light rays of high intensity but exhibit a positive reaction to weak light. As a result, where depth of water permits, daily vertical migrations may occur, the organisms being less abundant in the upper strata of the ocean

[1] For synopsis of the Hawaiian investigations, see: Hawaiian Acad. Sci., Proc., B. P. Bishop Mus., Spec. Pub. 20, 1932; Fifth Pacific Sci. Congr., Proc., 3:1997-2001, 1934.

UPDATE

LAST SPRING, for the first time in a century, a significant number of Atlantic salmon returned from the ocean intent on spawning in the headwaters of the Connecticut River. New England's largest waterway, U.S. Fish and Wildlife Service officials hail it as one of the most successful fish restoration projects in history. (See *Econotes*, September 1975.)

Atlantic salmon breed naturally in clear, gravel river bottoms with cold, fast-flowing water that is oxygen-rich. The Connecticut River's last major salmon run dates back to George Washington's era, and it dwindled to almost nothing fifty years ago as a result of water pollution and dams that blocked the passage of fish. Over the past decade, water quality in the Connecticut River has gradually but consistently improved. In addition, fish passages have been built, and more are under way.

In May and June, 77 salmon were captured in the fish ladder at the Rainbow Dam in Windsor Locks, Connecticut, and at the Holyoke, Massachusetts, fish lift, 80 miles from the mouth of the river.

The salmon had been raised in hatcheries in 1974. By 1976 they were six- to eight-inch smolts and were ready to enter the ocean. After two years at sea, the four-year-old fish have returned and now weight between eleven and thirteen pounds and measure 30 to 32 inches. Presently they are resting in the Berkshire National Fish Hatchery in Hartsville, Massachusetts. This fall, eggs will be taken from the females and artificial spawning will be performed. The offspring will spend two years in the hatchery and then will be released.

CULVER PICTURES

While a single female salmon produces between 8,000 and 10,000 eggs, the fatality rate from the egg phase to smolt phase and also between smolt and adult is about 99 percent. The 77 fish captured this year were the survivors of 63,000 smolts released in 1976. Of these 77, weakened by the journey upstream, battered by fishermen's nets, and plagued by infections and bloodsucking fish lice, only twelve are still alive. Nevertheless, twelve is a remarkable improvement over two, the number of survivors last year.

GARY NAFTEL, skipper of the *Easy Rider*, a National Marine Fisheries Service vessel, and his crew were doing whale research in Hawaiian waters last February. They were off 120-acre Kaula, an uninhabited crescent-shaped island, when three U.S. Navy bombers roared in over them. While Naftel and his crew watched, the planes made fifteen bombing passes over the island. Three bombs missed the target island completely and dropped into the ocean. Naftel was concerned not only for the seabirds nesting on the island, but also for the safety of the humpback whales in the area.

The incident blew open an old controversy between the military and Hawaiian conservationists. For many years repeated efforts to have the Navy release Kaula back to the state have failed. The Navy insists that use of the rock for target practice is essential. However, the island is also an important nesting area for seabirds, including an estimated 100,000 sooty terns, according to Eugene Kridler, U.S. Fish and Wildlife Service endangered species coordinator. (See "*The Hawaiian Islands of Birds*" by George Laycock, January 1970.)

Kaula is one of two Hawaiian islands used by the Navy for bombing practice. The other, considerably larger, is Kahoolawe, off the southwest tip of Maui. Local resistance to bombing Kahoolawe has recently caused the Navy to shift much of its practice to Kaula, where the great distance from population centers brings fewer complaints, even when large bombs are dropped. But the Navy's case is not helped any by memories of a 1965 incident in which two planes from the aircraft carrier *Ticonderoga* dropped eight 250-pound bombs, not on Kaula but on the nearby inhabited island of Niihau.

Hawaii first handed Kaula to the Coast Guard for use as a lighthouse location. Use of the island as a bombing range began while it was still under Coast Guard control and continued after the Coast Guard transferred it to the Navy in 1965. Various state officials would like to see the island included in the state's system of seabird sanctuaries.

After witnessing the bombing runs, Naftel filed a formal complaint with the Fish and Wildlife Service law enforcement agent in Honolulu. He claimed the Navy had violated the federal Migratory Bird Treaty Act. This led to an inspection of Kaula in March by a party that included six military officials, Kridler, state representatives, and Fish and Wildlife Service law enforcement officers.

When Kridler visited Kaula in 1971 to survey seabirds at the request of the Navy, he recommended that bombing be limited to the southern tip of the island where few birds remain. The recommendation was not being followed during the second inspection. Kridler admits this kind of pinpointing might be difficult. "If they are that good," he says, "who needs practice?"

The field inspection was followed on May 4th by a meeting in Washington, D.C., between the military and the Fish and Wildlife Service. Little was accomplished.

Final action depends on what the Fish and Wildlife Service decides is needed to protect the wildlife that relies on these islands and nearby waters. One possibility is that the service will issue a permit which would, in effect, excuse the Navy from responsibility for killing birds during its practice bombing, but limit its action to the southern tip of Kaula. (The Navy has now instructed its crews to restrict the bombing to this area.) Or the service could turn the ease over to the Justice Department for action. ☼

Audubon. v.80, no.5, Sept. 1978.

Kaula Ruling May Be Hollow Victory

By Helen Altonn
Star-Bulletin Writer

Island scientists have won a victory with the U.S. Department of Interior's refusal to give the Navy a permit allowing "accidental" destruction of birds, eggs or nests during bombing missions on Kaula Rock.

But some sources indicate it may be an empty victory because of enforcement difficulties and probable court battles between Navy and wildlife officials over any violations.

The federal agency's action, disclosed yesterday by the Star-Bulletin, doesn't in itself halt the bombings.

But the law enforcement branch of the Interior Department's Fish and Wildlife Service said in a letter to Vice Adm. Kinnaird R. McKee, commander of the 3rd Fleet:

"The very nature of the activity 'practice bomb' does not lend itself to a disciplined controlled take of birds, nests or eggs."

The letter said, "We are unable to reconcile our commitment to protect migratory birds with a proposed activity that has such a potential for mass destruction of these birds ...."

THE PERMIT WAS denied under provisions of the national Migratory Bird Species Act in response to complaints filed by scientists in 1978 under that law, the Marine Mammal Protection Act and the Endangered Species Act.

Lt. Jamie Davidson, Navy spokesman on Kaula Rock matters, said yesterday that the Navy will continue its bombing practice, at least through April, because it is using inert ordnance.

Meanwhile, he said the Navy's attorneys are meeting with Interior Department officials in Washington to appeal the decision.

The Navy is seeking the permit on the basis of "compelling justification," which is allowed under the migratory bird act.

Davidson said Interior Department officials also may not be aware that the bombings are restricted to the southern tip of Kaula where there are no bird colonies.

A STUDY GROUP monitoring the area has found no damage to birds, he noted.

Officials with the Fish and Wildlife Service's law enforcement office here declined to comment yesterday on the permit denial and what its effect might be, referring queries to district officials in Portland, Ore. They were not available.

Other sources said, however, that attempts to cite the Navy for violations of the act probably would lead to a court clash between the Navy and Interior departments.

Kaula Rock, about 20 miles southwest of Niihau, is part of a state seabird sanctuary with prohibitions against killing or disturbing birds, nests or eggs.

But the state has been unable to enforce its regulations.

Ronald Walker, state wildlife chief, said, "Someone would have to be on the Island and watch a bomb land and kill a bird to have prima facie evidence."

Otherwise, he said, "How do you determine if it died because of a bomb, old age or a natural accident?"

WHILE NAVY and wildlife officials continue to dispute the bird question, efforts to protect humpback whales from the Kaula bombings appear to be successful.

The National Marine Fisheries Service took action to protect the whales under the Endangered Species Act last year after scientists threatened to seek a court injunction to stop the bombings.

"We're fairly happy with the Navy reactions," said NMFS official John Naughton.

The Navy complied with a fisheries service request to stop using live ammunition on Kaula from December through April during the height of the whale migrations.

The Navy also is following an NMFS recommendation to install sonar buoys in two locations near Kaula to record vocalizing whales and keep tabs on their arrival and departure from the waters.

NAUGHTON SAID the Navy will not resume live bombings if whale singing is picked up after April 30 on the receiver, to be located on Kauai, or if whales are still seen in the area.

Scientists also are concerned about porpoises, but Naughton said that has to be handled separately.

Right now, he said, the service is concentrating on Kahoolawe. Officials were there last week setting up observation posts to see how close the whales are to shore.

He said no whales were seen close to shore but it's still early in the season.

In its recommendations to the Navy, the NMFS also asked for a study to determine the effects on whales and other marine animals from bombing activities by surface vessels.

And the Navy was asked to relocate its ordinance jettison area for unexploded munitions, now southwest of Kahoolawe, to a point further offshore in a southerly direction.

Honolulu Star-Bulletin

The Miami Herald Dec. 17, 1979

Man's Inhumanity to Manatees

MANATEES are not good for much. They have built no great cities; they cannot drive cars.

They are docile and do not speak any intelligible language, so clearly manatees are not good for much.

Manatees must be stupid. They are friendly and curious and harmless and defenseless. They swim languidly to welcome any creature or thing that enters their watery world.

Manatees are useless. They have no double-entry bookkeeping system, and those sea cows are so lazy that no human baby was ever reared on manatee milk.

Still, manatees are great orators. Their propeller-scarred backs give eloquent evidence of how thoughtless man can be. The reduction of their number to fewer than 1,000 bespeaks how uneconomic a slaughterer man can be. Most manatee murderers and mutilators get nothing in return but the momentary thrill of spurring a motorboat through warm coastal waters and canals at breakneck speed.

The U.S. Fish and Wildlife Service plans to post warning signs near the South Florida coastal power plants, whose warm-water effluent attracts the lumbering manatee in winter. A mere 13¼ miles of the Florida Intracoastal Waterway have speed restricted for the protection of the manatee. Idling speed is the law along a scant three miles.

But only those who operate speedboats can save the manatee. A command to slow down could come too late for a lolling manatee's benefit.

Thus likely will pass a glory of this world. For though manatees are not good for much, they are good.

22 FEB 1980
MONITOR
package

National Wildlife Week

THE PALILA, the endangered honeycreeper whose only home is in the mamane forest on Mauna Kea, is the featured bird for Hawaii Wildlife Week March 16-22.

National Wildlife Week, sponsored for the 43rd year by the National Wildlife Federation, has as its theme "Save a Place for Wildlife" and a poster depicting two red foxes.

But red foxes don't live in Hawaii, so the Conservation Council for Hawaii, Island affiliate of the federation, chose the palila for its poster.

The poster shows a painting of the palila done by the wildlife artist H. Douglas Pratt.

Education material on Wildlife Week is being sent to schools by David Boynton and Steven L. Montgomery, co-chairmen of the Wildlife Week committee.

Included is a story for students on the palila, written by Boynton, an environmental science teacher. The story relates how birds came to Hawaii, how the palila evolved, and how the mamane trees on which it lives are now threatened by feral sheep that are devouring vegetation on Mauna Kea.

An endangered honeycreeper is the featured bird for Hawaii Wildlife Week.

Students are invited to submit entries in a wildlife contest, with 10 prizes offered consisting of books for classroom libraries.

Joining the Conservation Council in sponsoring the week are the Sierra Club's Hawaii Chapter, the Hawaii Audubon Society, the Hawaii Science Teachers Association, the Hawaiian Botanical Society, and Waimea Falls Park and Waimea Arboretum Foundation.

Conservation

A FAR-REACHING program entitled the World Conservation Strategy was launched last week by the International Union for Conservation of Nature and Natural Resources (IUCN), with help from the U.N. Environment Program and the World Wildlife Fund.

Three Island organizations, the Bishop Museum, the Pacific Science Association, and the Waimea Arboretum, are listed as members of IUCN.

Kaula Island

AN ENVIRONMENTAL impact statement should be prepared and circulated on the Navy's use of Kaula Island for bombing practice, the Hawaii Audubon Society says.

An article in the March issue of 'Elepaio, the society's journal, points to the society's long opposition to bombing of the 136-acre island, 20 miles from Niihau.

The U.S. Interior Department in January denied permission to the Navy for "accidental" destruction of birds and nests during bombing practice, but the Navy is appealing the denial.

Harry Whitten

A scientific team that visited the island in March 1979 found 17 species of birds there.

A Navy environmental impact assessment in December 1976 concluded there was "no evidence to indicate that military use was adversely affecting bird populations on the island."

The Audubon Society says this assessment was faulty and wants an EIS.

The state Department of Land and Natural Resources designated Kaula as a seabird sanctuary in 1977 but has been unable to enforce its regulations.

George H. Balazs, biologist who has studied sea turtles on Kaula and elsewhere, prepared a bibliography, with 211 entries, on Kaula which was published in 'Elepaio in July 1979.

Recycling

IT'S GENERALLY agreed that recycling saves raw materials and has many economic justifications, but that it's hard to persuade people to do it.

Two recent reports indicate that the recycling habit is catching on with more people, however, and the economic benefits are becoming more obvious.

Wendell Hosea, general manager of Consolidated Fibres Inc., Honolulu, says that Oahu residents and businesses earned more than $2.3 million last year by recycling used paper products.

He says that 17,000 tons of used paper products was processed at the company's North Nimitz Highway plant. Since it costs the city $40 a ton to process the waste paper, the recycling thus saved the city $680,000, he said.

About 97 percent of Hawaii's recycled paper is sold overseas, thus helping the balance of payments.

The Recycling Group, 77 Sand Island Access Road, said it paid $449,-145 in 1979 to people who brought in aluminum and steel cans, bottles and newspapers.

The totals: aluminum cans, 1,318,-554 pounds; steel cans, 982,566 pounds; paper, 1,186,126 pounds; bottles, 102,842 cases.

The Reycling Group no longer takes bottles. The paper was sold to Asian countries and the cans were shipped to the Mainland.

Notes

JOHN Y. HONG, a senior at Moanalua High School, has been enthusiastically participating in marine science activities for several years, including much work at the Waikiki Aquarium.

He wants to organize a club of high school students interested in marine science and invites them to call him at 839-1635.

The club's first meeting will be at 2 p.m. Saturday in Lt. Gov. Jean King's office on the 5th floor at the state Capitol. Future meetings will be on the ninth floor at Aloha Tower.

Hong says the club can engage in many ocean-oriented activities, such as visits to laboratories and aquaculture farms, snorkeling, listening to speakers on marine subjects, and doing volunteer work.

A talk on native insects, snails and spiders will be given at 7:30 p.m. Wednesday at the Waikiki Aquarium by Steven Montgomery of the University of Hawaii's entomology department.

The talk is one of the natural history lecture series. It is free, but donations are welcome.

Tree

THIS WEEK'S exceptional tree is the narra, Pterocarpus indicus, also known as Burmese rosewood or padouk. It is on the curve near 3665 Tantalus Drive.

It is more than 100 years old, is 10 and a half feet in circumference, 55 feet high, and has a spread of 80 feet.

This specimen is believed to be the first narra tree on Oahu. The tree is from Southeast Asia and is the national tree of the Philippines. The wood is used for fine furniture.

Narra tree.— Photo by Robert Mizuno, city Department of Parks and Recreation.

FORUM

the Readers' Page

Bombing Birds

It might be hilarious if it wasn't so insidious—the Navy's request to "accidentally" kill birds while bombing Kaula Rock, which lies 20 miles southwest of Niihau and is part of a state seabird sanctuary with prohibitions against killing or disturbing birds, nests and eggs.

I can't help but praise the scientists and environmentalists whose valiant attempts to halt the Navy's destruction of Kaula have resulted in the Interior Department's denial of the Navy's request to continue its carnage.

But a hollow victory is no victory at all. Anyone naive enough to believe that environmental acts and concerns can overrule national security concerns is either blind, ignorant or brainwashed.

In light of the current Iran and Afghan crises, the mounting worldwide tensions and the war hysteria that is sweeping across America, the Department of Defense mania for military preparedness and national security is at an all-time high. And since the naval command center here at Pearl Harbor has insisted that the practice bombing of Kaula and Kahoolawe are absolutely and irrevocably indispensible, any attempt to interfere with the Navy's "mission" is a threat and thus bound to fail.

The Migratory Bird Species Act, the Marine Mammal Protection Act and the Endangered Species Act are all federal laws prohibiting the destruction of birds, whales, turtles, porpoises and any creatures considered endangered.

But legality or illegality notwithstanding, when it comes to national defense, the Navy and its mission sit above the law.

It comes as no surprise then that the Hawaii state wildlife chief admits the impossibility of enforcement of the judgment against the Navy. And Navy spokesmen freely admit that there will be no immediate change in the Navy's bombing operations, thus allowing time for the Navy lawyers to tangle up the ruling in court.

It's about time people wake up to the fact that compared to military preparedness and national security, environmental concerns mean absolutely nothing. Killing birds, whales, porpoises and islands is about as significant to the military brass as crushing a filthy cockroach.

Where that leaves us, the people of Hawaii who still hold reverence, compassion and respect for all living things in our hearts, is frustrated, alienated, and above all, furious.

Wayne Westlake

War Dominated Hawaii Military Life

By Lyle Nelson
Star-Bulletin Writer

VIETNAM dominated military life in Hawaii as no other event in the two decades since statehood.

The Vietnam commitment grew from a tiny peapod of 327 American advisers in Saigon the year after statehood into a monster of multiple sizes and shapes.

First the 1st Marine Brigade at Kaneohe and then the 25th Division departed for the jungles in 1965-66.

Schofield Barracks emptied out for months on end then hosted local men of the Hawaii National Guard's 29th Brigade, and even they were tossed into the pit, one by one.

And when it was over, the Marines and 25th reorganized at "home" and the 29th Brigade returned to Fort Ruger; but 262 killed-in-action from Hawaii did not have return tickets.

Vietnam penetrated Island family life, was on the mind, as military personnel and equipment shuttled to Southeast Asia, a visual happening. We often were the last stop.

Vietnam also meant hosting the VIPs, President Lyndon B. Johnson and his diminutive allies in a series of summits; the frequent trips by Robert McNamara, the secretary of defense; the Declaration of Honolulu which never will rank with the Treaty of Ghent or the Concordant of Worms.

And there were the protesters, marching, bannering, shouting, burning draft cards, devising media events.

Despite the dislocations of Vietnam, military manpower in Hawaii averaged 55,000 over two decades, rising and falling only slightly. Departure of combat troops often was offset by increases in the size of command staffs.

SMALL DETACHMENTS, for training purposes, left Hawaii on special missions, to Thailand to make believe that that country was being invaded and needed an American military defense; "Quick Release," the airlift test to Korea; shotgunners, those hearty volunteers who rode helicopters in Vietnam in the early days, and other war games in the Philippines or Korea.

Despite the movement of men and materiel fed by the Vietnam appetite, relationships between Hawaii's inhabitants, increasing steadily because of statehood and the jet age (and introduction of high-rise living) and the military was uniformly good.

Sure, there was discrimination in housing (mostly against blacks), and drinking fights and even isolated homicides, but mostly there was harmony between the civilian and military worlds on our small island.

The Massie case of 1932-33, the HNA3 sailor riot of 1946, were behind us.

Civilian leaders and generals and admirals and colonels broke bread, and tees, and kept the peace, kept lines of communications open. The civilians even supported the wayward Army doctor who insisted the Island had a rabies problem.

AND Vietnam meant priming the money pump, buying more, hiring more civilians, dispensing a hefty payroll into Oahu's marketplaces.

Friendly liaison happened even though military leaders are transient, good for only two to four years of golf and cocktail parties.

The Pearl Harbor Naval Shipyard, the largest industrial barometer, kept busy, employment around 5,000, and rolling with the Vietnam punch. Submarine overhauls increased and except for the brouhaha over Adm. Hyman Rickover's attempt to sack Capt. Chuck Swanson, the yard remained clear of controversy until the asbestos scare.

Twenty years is long enough to mean changes in military hardware despite the long lead time needed in weapon development.

Remember that in 1959 the DC-4 and DC-6, the M-1 and M-14, Little John and Regulus, and Fletcher destroyer were still with us.

And then came Polaris, M-16, Spruance class DD, the C-141 and C-5A lifters, the Cobra gunship.

AND LIKE A phantom in the night, the battleship New Jersey visited en route to Vietnam, a dinosaur returning to an old feed lot.

And there were secret things: spy satellites and satellite catchers, nerve gas tests in Mauna Kea forests, missile tracking from Haleakala, the Glomar Explorer caper.

The military bases remained stuck in concrete, looking almost the same as before statehood. Hickam was realigned a bit, trees grew at Schofield Barracks, Barking Sands grew. Military houses at Aliamanu aimed at self-sufficiency.

Kahoolawe became the major issue of the late 1970s; Makua and Kaula Rock were minor cousins.

The military came to remote places like South Point, and then vanished, all within 20 years.

Hawaii's own National Guard remained almost the same, not entirely stuck in concrete (the 29th callup was an issue), but almost unchanging. Getting bodies was a chore.

And, with all this, there was nothing the military did in the last 20 years, not even the whole Vietnam scene, the LBJ summits, that made quite the impact of one lone event.

The late night sky of July 8, 1962. The rocket lifted above Johnston atoll in a nuclear test series codenamed Dominick, and a spectacular shot, codenamed Starfish, and then the black turned brilliant white-green, then yellow-red, and then black.

We learn to live with the bomb even if, like isolated pacifists, we don't like it.

by Mr. A. E. Arledge, then Superintendent of Lighthouses. Friedlaender speaks of numerous unconformities ("vielfach diskordante Schichten") but there is only one unconformity on Kaula. Palmer (16) circumnavigated and photographed Kaula in 1923, and studied a few rock and soil specimens collected by Mr. Frederick A. Edgecomb and various photographs taken by Mr. Edgecomb in 1925. Relevant data are repeated in the present paper. Hinds (10) shows clearly that Kauai, Niihau, and Kaula are independent volcanic domes, together constituting a unit in the structure of the Hawaiian islands. Although unable to visit Lehua, he describes it briefly and notes the wave-cut bench. The United States Coast Pilot Notes (18) gives a brief description of Kaula and Lehua. The U. S. Coast and Geodetic Survey Chart 4117 shows both Kaula and Lehua, and the 10, 100, and 1,000 fathom submarine contour lines around them.

Maps

For the field work on Lehua a new map (fig. 2) was made by using an 18 by 24 inch plane-table and a light explorer's type alidade.

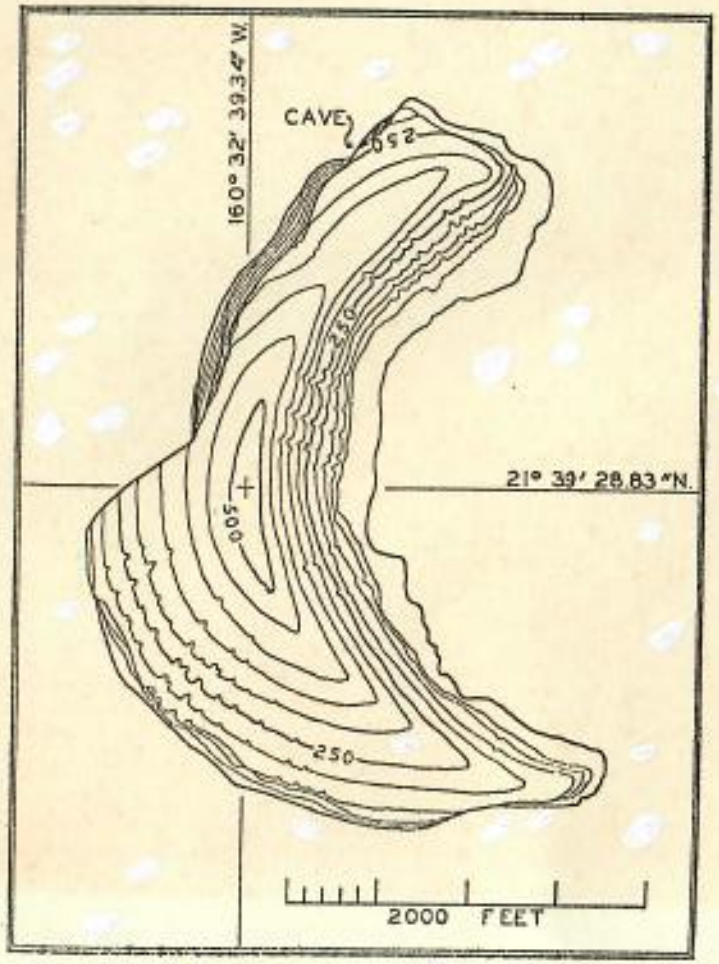
Orientation was by backsighting on the "Cam" triangulation station 2.. miles away on Niihau. Nine points were located on the inner shore line of Lehua by the depression angle method, working from two points on the crest line. Six points were similarly located on the south outer shore. The rest of the shore line was taken from the U. S. Geological Survey map (Kii sheet) with some adjustment. The contouring of the inner slope and part of the outer slope was controlled by intersections on 12 points and stadia measurements on 27 points. Much of the outer slope is difficult of access and offers problems of visibility because of the pronounced convex curvature; so for this region the contouring was taken from the U. S. Geological Survey map with a few obviously necessary alterations.

The dips and strikes of the tuff beds, the courses of the unconformities and the magnetic declinations were observed independently of the plane-table work and were later tied in by locations based on barometric elevations fixed by backsights on three or more known points. The bearings thus taken were "magnetic" bearings but application of the "three-point" problem made the conversion to "true" bearings fairly simple.

The map of Kaula (fig. 3) was prepared quite differently.

A vertical airplane photograph was taken by the Eleventh Photo Section, Air Corps, U. S. Army, on July 10, 1924. On the basis of a pantograph enlargement, the study of various other photographs, and some transit work in July, 1925, Mr. Frederick A. Edgecomb prepared a contour map on a scale of 200 feet to the inch with a contour interval of 50 feet. The orientation of this map was determined by bearings taken by the lighthouse tender *Kukui*. This map is in general very satisfactory. However, since a few corrections seemed possible and a circumnavigation of the island showed that the geologic structure was relatively simple, it was decided to devote most of the time available to checking the

topographic map. Flags were set at 11 points including one near the summit on a pipe set in concrete by Mr. Edgecomb in 1925 and one wedged into a crack in the wave-cut bench on the inner side of North Horn. This last flag was not occupied as a transit station, but the other ten flags were, as was also a flagless station. Orientation was by backsighting onto the highest point of Lehua which, unfortunately, was at no time during the work sharply outlined. So far as intervisibility allowed, azimuths and vertical angles were taken from each of the 11 stations to each of the others. The measurement of a base line on the curving rim of a tuff crater is difficult. The procedure adopted was to measure three chords connecting four of the stations and to compute from each short chord the length of the longest chord joining the most remote of the four stations, which was to be used as the final "base line". The length finally adopted



Isles' Military Stance in 1999?

Picture That's Clouded with

By Lyle Nelson
Star-Bulletin Writer

WHEN Chinese communist artillery opened up on Quemoy and Matsu, two tiny islands off th China coast, in 1958, a year before statehood for Hawaii, Adm. Harry D. Felt, Pacific commander-in-chief, was making a tour of his Far East commands.

The crisis forced him to spend 48 hours in his room at the Sanno Hotel in Tokyo, barking commands to staff members with him and keeping abreast of a serious situation.

China was bellicose; the United States both alarmed and committed to our friends on Taiwan.

Now look at the relationships?

The Formosa Strait today hardly rates a 7th Fleet patrol.

New alliances forge patterns of change in the Pacific.

In 1959 who could foresee 500,000 fighting Americans in the jungles of Indochina?

Who could have envisioned, in the wake of the fall of Saigon, the surfacing of ancient antagonisms the French conquest managed to smother?

So that today it is Vietnam versus Cambodia, Vietnam versus China, Moscow in support of Hanoi, Peking in support of Phnom Penh, Malaysia, Brunei, the Philippines, Hong Kong, all against Vietnam refugees, most of whom appear to be ethnic Chinese.

Just as it was not possible to predict the Vietnam quagmire, and the Communist hostilities among themselves in its aftermath, it is also folly to predict what the American military committment will look like through the next 20 years.

IN THE NEAR term we have the guarantee of Harold Brown, the secretary of defense, here late last year reiterating a familiar theme, that the Carter team has not turned its back on the Pacific Basin.

Brown said things were looking better in Asia, that the China-American friendship package would help limit Soviet "adventurism" in Asia, and that Peking might influence aggressive spirits in North Korea.

Maurice F. Wiesner, CINCPAC, and others throughout 1978 warned about the implications of rising Soviet naval power in the Pacific and what this means to bluewater lifelines. And a resolve that America will remain a Pacific power.

The recent agreement on further use of two bases in the Philippines underline the strategy.

Short-term changes include reducing our 700-man military team on Taiwan to zero within the next few months and pulling a division of ground troops out of South Korea by 1981.

TRYING to finger flash points in the Pacific by 1999 takes real doing, but consider:

—Iran, now in flames, falls to an alien regime that changes the flow of oil to high technology nations, particularly Asian powers such as Japan. What does that mean?

—The Vietnam refugee matter. What if boat people keep coming and oppressed Cambodians learn how to flee by boat?

—How would penetration of Soviet interests in Pacific island nations affect the view from Pacific Command headquarters atop Camp H.M. Smith?

—What if the Pacific becomes as peaceful as its name, eliminating the need for CINCPAC even though the military today is toying with resurrection of the Army's old USARPAC command rather than reducing the layers of military commands in the Pacific? Perhaps a few destroyers will suffice.

—And who can say what the fragmented Trust Territory will look like by 1999, a group of mini-states hostile to American military use?

CONSIDER THESE two: the honeymoon with China could be short, or changed by incoming new leaders in either Peking or Washington, neither able to countenance the views of Teng and Carter.

Or, and the biggest horror of all, a Sino-Soviet conflict in a scenario in which one side turns to a nuclear solution.

How would America remain a neutral spectator?

Changes in the Pacific may be influenced by the way the White House perceives the Pacific.

We know that in the past 20 years several presidents perceived Vietnam as a national security question within American intersts. An earlier decade saw Truman drawing the line in Korea, Dulles talking nuclear use, Congress expending vast energies to determine "who lost China?"

In the near time frame a change in the presidency does not really send ripples across the Pacific. Continuity of policy is more meaningful.

Still, in the near future, current Pacific policy would face adjustment were Ted Kennedy or Ronald Rea-

Questions

gan to become president.

One more thought before turning to the military picture for Hawaii in the next 20 years.

The Glomar Explorer was built to undertake an extremely sensitive adventure. What of the Glomar Explorers of the future, the unexpected technology, or events, such as the Pueblo seizure, that can overnight excite governments. Remember the Maine?

Now Hawaii.

THE most amazing statistic about the military in Hawaii since even the decade before Statehood is the consistency in numbers, always around 55,000, and with dependents, about a family of 120,000.

That probably won't change, but can.

It can and will if the state manages to wrestle Kahoolawe away from the military.

Last February Brown said he saw no change in the status of the Target Island.

Somehow logic, and the light of recent heat on the issue, suggests that the military will not be bombing Kahoolawe in 1999.

The military never stops saying Kahoolawe is essential to training.

But if Kahoolawe is lost to the military the scenario, perhaps in slow motion over a 20-year period, would mean a gradual withering away of Marine air activity at Kaneohe and eventually the removal of the 1st Marine Brigade to California.

ANY MILITARY loss of Kahoolawe would have a ripple effect through Oahu military manpower

Harold Brown

levels and would reduce the military establishment here. To a lesser degree, loss of Makua, Kaula Rock, Barking Sands, other areas would have a similar effect.

This raises the question asked by the Brookings Institute in 1978: Does the military really need both a 25th Division and a 1st Marine Brigade as a Pacific contingency reaction force?

Since much Army training is done at Pohakuloa instead of Kahoolawe, Marines might be the best bet to evacuate Oahu.

Brown said a year ago he saw ahead no joint use by military and civilian aircraft of Barbers Point. If that stance ever changed, and the tilt went toward civilian use, not far behind might come a complete naval pullout at Barbers Point though this is hard to see.

Technological changes, such as in electronics, would impact on the military of the future.

The Coast Guard, for instance, believes that in ocean surveillance and environmental protection, the future may find less need for men and ships because of satellite technology.

This example can pertain to any branch of the military and its weaponry.

Questions of military pay, return of the draft, the cost of pensions, all the manpower issues could impact on the military's future on Oahu.

More certain, the military will not pull its nuclear weapons out of Oahu despite endless well-meaning demonstrations.

DEPARTMENT OF THE NAVY
PACIFIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
(MAKALAPA, HI)
PEARL HARBOR, HAWAII 96860

114:GES:gc
Ser 187

10 JAN 1979

Mr. George H. Balazs
Hawaii Institute of Marine Biology
P. O. Box 1346
Coconut Island
Kaneohe, Hawaii 96744

Dear Mr. Balazs:

Thank you for your letter of December 21, 1978 which forwarded a copy of the bibliography you prepared for Kaula.

Since to date, trips to Kaula have been primarily to review the status of seabirds on the island, no special effort has been made to look for turtles. The steep, rocky nature of the coastline, and the lack of beaches make it highly unlikely that the island provides nesting or even loafing habitat for turtles.

There are no records or recollections among Navy personnel of "turtles" on or adjacent to the island.

You may want to contact Mr. Kenji Ego, Director, Division of Fish and Game, who with one of his fisheries biologists participated in a trip to the island. He maybe able to provide you with information in this regard.

Sincerely yours,

T. C. KELLEY
CDR, CEC, USN
Special Assistant for Ecology

Copy to: (w/copy of basic ltr)
COMTHIRDFLT (01K)
COMFOURTEEN (Operations)

Director, Division of Fish and Game
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl St., Rm 330
Honolulu, HI 96813

University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW

December 21, 1978

LCDR T. C. Kelley
Special Assistant for Ecology
Pacific Division
Naval Facilities Engineering Command
(Makalapa, HI)
Pearl Harbor, Hawaii 96860

Dear LCDR Kelley:

I am interested in learning if any of your personnel have made sightings of sea turtles during the course of visits to Kaula Island. In conjunction with bibliographies I am assembling on each of the Northwestern Hawaiian Islands, I recently had the opportunity to review the available literature on Kaula. Therehave apparently been only two documentations of turtles occurring in the shallow waters adjacent to this small island. However, this could possibly be due to the fact that visitors have either not specifically looked for turtles or perhaps simply failed to record their presence in writing. Nevertheless, for your information and records, I am sending you a draft copy of the bibliography which resulted from my literature search. Your assistance would be appreciated in calling to my attention any information or written reports relating to turtles that I may have overlooked.

Best regards for the New Year.

Sincerely,

George H. Balazs
Assistant Marine Biologist

GHB:md

Enclosure

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
WILLAMETTE VALLEY & OREGON COASTAL
NATIONAL WILDLIFE REFUGE COMPLEX
ROUTE 2, BOX 208
CORVALLIS, OREGON 97330

1/30/79

Dear George -

Thanks for all the info concerning Kaula Rock. Hopefully it's only a matter of time until the Navy finally gives in. Shallenberger's info re whales probably has more significance than anything else. Between you, me and the wall I understand (from sources when in Hawaii) that the Navy is quite reluctant to give it up because it's used by their submarines for target practice using certain types of weapons. Evidently the bombing island near Maui does not provide the type of target needed. Whether all this is fact or fiction I really don't know but the Navy is fighting to keep it and it really seems odd that all aerial bombing can't be done on Kaahoolawe (sp?). Incidentally the submarine use is supposedly conducted at night.

By now you're adapted to getting up at midnight or 3:00 am for the nightly feeding. Better than counting eggs being laid by some turtle, wouldn't you say?

I hear via the rumor mill than Gene Kridler may retire this summer. Also hear that he is super critical of everything. Hope that he does retire before he has a stroke.

Saw the attached article in National Wildlife. Thought you might like a copy in case you don't have the mag. What is the term "friendly" climate. With Kenji Ego and friends I would call it anything but friendly. Heard that Ariyoshi in his State of the State address touched upon 2 areas of economic emphasis - aquaculture and development of the fisheries in the NW Hawaiian Islands.

Oh well - what the hell! Life goes on and on and on.

Best regards,

Palmer

Nat. Wildlife Mag.
Feb-March, 79

WILDLIFE OMNIBUS

Unraveling the snarls at Yosemite

OVERCROWDED Yosemite National Park has long epitomized the crunch that plagues so many U.S. parks these days. In two decades, Yosemite visitors have quadrupled; traffic jams, pollution and crime are now commonplace (see "What's Next for Yosemite?" NW October-November, '77). Last fall, after studying this snarl for years, the National Park Service (NPS) finally came up with some recommendations for unraveling it. The agency's proposals met the key issues head-on.

- Issue: ride vs. walk. Recommendation: all daytime visitors can park their cars outside of the most scenic portions of Yosemite Valley and ride a shuttle bus.
- Issue: live-in vs. live-out. Recommendation: headquarter offices and housing should be moved out of the park.
- Issue: tents vs. hotels. Recommendation: campsites can be increased but hotel and other overnight lodging should be cut back.
- Issue: preservation vs. recreation. Recommendation: facilities that do not blend in with the scenery — including the golf course, tennis courts, beauty parlor and bank — should be removed.

These proposals go to the roots of a traditional NPS dilemma: how to protect a park's fragile beauty while continuing to serve the public. In the past, Yosemite has bent over backward to meet the needs of tourists. If the new recommendations are adopted, protecting the valley's natural environment will take precedence over tourism. The measures may, as a result, endanger the profits of Yosemite's concessionaire. Right now, Yosemite Park and Curry Company is guaranteed, by law, the opportunity to make a "reasonable" profit. Says one NPS planner: "It may be time to change that law."

The Yosemite recommendations, if adopted this year, could be a bellwether for the entire national park system. In the coming months, recommendations are to be made for handling problems similar to Yosemite's at 30 other U.S. parks, including Indiana Dunes National Lakeshore and Redwoods National Park.

— *Mark Wexler*

The Odd Couple

NORMALLY, mammals and reptiles do not socialize with each other. But in Hawaii's Leeward Islands National Wildlife Refuge, monk seals and green turtles can often be seen huddling in pairs on the beach. Scientists are at a loss to explain this strange behavior. Could it be the islands' friendly climate?

Photograph by G.H. Balazs (Hawaii Institute of Marine Biology/Sea Grant)

L WILDLIFE WEEK MARCH 18-24, 1979

raph by John Flannery (Bruce Coleman, Inc.)

Wildlife Week

THE COUGAR glaring out from this poster dramatically symbolizes the theme of 1979's Wildlife Week: "Conserve Our Wildlife." Sponsored by the National Wildlife Federation for the 42nd year, the event will be observed from March 18-24. For a free color copy of the poster shown here, send a postcard to: National Wildlife Federation, Dept. NWP79, 1412 16th Street N.W., Washington, D.C. 20036. For a free teacher's kit, send a card to Dept. NWE79 at the same address.

Cleaning up pays off

HOW MUCH more will people pay to live beside an unpolluted stream? In some parts of Pennsylvania, the answer is at least $1,000 on property that sells for about $11,000, according to two Pennsylvania State University researchers. They studied the sale prices of 212 homes in 11 counties and found that the less acidic a stream is, the more a house and land on that stream are worth.

"Streams appear to have reputations in their immediate areas," says Professor Donald J. Epp, "and we learned that people are very wary of buying property that contains a polluted stream." Acidity not only affects fishing but also how a stream looks and whether or not it can be used for recreation. Although it is only one of many problems that can plague a waterway, high acidity — created in part by drainage from coal mines — appears to be the leading stream pollution problem in rural Pennsylvania.

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

January 24, 1979

Mr. George H. Balazs
Hawaii Institute of Marine Biology
P. O. Box 1346
Coconut Island
Kaneohe, Hawaii 96744

Dear George:

Pursuant to your request for Fish and Game information on turtles at Kaula Island, there is no record of any turtles having been sighted during the marine and wildlife surveys conducted by our fishery and wildlife biologists (1971-76).

Please rest assured that we will notify you if we observe any turtles or if we receive any report of turtles on Kaula Island.

Sincerely,

Kenji Ego

KENJI EGO, Director
Division of Fish and Game

KE:HS:em

See SB Nov 24, 1966
C-6:1

Historical Facts

Creation Chant (sky father) (earth-mother)
Papa and Wakea : have the children Kauai,
Niihau, Lehua (just N of Niihau) and Kaula; Papa gives birth
see Coast Alef

Bryan –
Kaula – 20 nautical miles WSW of Niihau – 150 miles from Honolulu
550 feet high, crescent shaped
known for a long time to Hawaiians – legends,
visited for birds; Shark God legend.
Lighthouse Service reached summit in July, 1925,
found remains of 2 stone structures (heiaus?) +
shelter cave w/wall – used by visiting Hawaiians.
Lighthouse Service visited on vessel Kukui in 1921, but
unable to land. 1923 return of Tanager, few
men succeeded in getting on ledge – no further.
George Gay – credited with being first white
man on Island (several years previous of 1923),
unable to get off – rescued next day by Hawaiians.
Large Sea Cave with Shark God – more Hawaiian legend.
Light Commissioned Aug 18, 1932 [plants & birds, Caums visit]
Vegetation & Bird life (Bird, insect, Botanical)

Lehua Light – 702' high (291 acres Caum) – in service late April, 1931.
Lehua set aside Aug 10, 1928 by Farrington,
accepted by Coolidge Sept 19, 1928.
Sea Birds make their nest in Cliff

Cooks Journals - Hawaiians frequent visit Kaula for Birds
Cook's ships 2 visits: Sighted Tchua at Kaula in 1778 and 1779

SB Aug 29, 1932 Lonely Island of Kaula gets Flashing Light automatic, unmanned; "ancient Hawaiian legends say that rock was abode of Kuhaimoana, king of sharks and husband of Kaapahu (shark queen of Oahu) - Claimed Oahu waters Tapu to man eating sharks."

SB March 19, 1965 Navy Gets 15 let off Niihau for Bombing "Kaula Island, a small rocky island.."

Switched from CG to Navy (Matsuroga). Planes from Barbers Point
For many years the Navy housed it, despite protests of fishermen. Governor set it aside in 1924 for light house purposes. Few have ever set foot on Island. "Kaula lies on the horizon like a huge sea turtle." [1923 news article - "Sea birds, millions of them, swarm in the sunshine"] Kauai fishermen have asked that it be declared a bird sanctuary." "Masaki said 9 years ago (1961) that area is rich with fish..
Kauai Board of Supervisors in March, 1961 asked the Navy to stop bombing. Bureau of Budget approved transfer.

Ad Friday Oct 8, 1965 Navy Planes Bomb Niihau (237 inhab) by Mistake 200 lbs each 2000 lbs 2-A-1 Sky Raiders Dive Bombers - 32 miles off target - 9:15PM Tuesday Oct 5, 1965

but only disclosed Thursday Noon. Near Kii landing. Target Floating in the Sea. (Navy waited 40 hours)

Ad Sat Oct 9, 1965 FRONT PAGE Kaula Bombing to go on, Navy refused to halt Practice pending an investigation- Prepare Ticonderoga for VN duty. Farg wired "gross carelessness" "appalled". MINK renewed demands (due to destruction of Bird Life) that Kaula be abandoned. Matsunaga "awsome" "since it had been agreed it was vital to war effort in VN." Same issue - "TWO Pilots confused Navy says."

SB Oct 8, 1965 Front Page Friday Title Bombing of Niihau Angers Sen. Inoye "dismay and Anger"
Ticonderoga only arrived 48 hours ago from W. Coast.

SB Oct 11, 1965 Hawaii once owned Kaula, Navy's bomb target Isle. "By what authority is Kaula used for target practice?" "a favorite nesting place for sea-birds." Set aside by Farrington Dec 13, 1924. Navy started Bombing in 1952. Light (CG's) house disestablished in 1947. In 1961 State ceded land to CG. In 1961 Navy said used for Navy, Marine, Regulus-firing Submarines. July, 1965 Hui O Laka, a Kauai Conservation Group agreed to stop

campaigning against the Navy, since the Navy convinced the group that was developing in VN necessitated aerial bombing practice.

Ad March 2, 1971 House wants end to bombing on Kaula. House resolution requested Hawaii's Congressional Delegation to ask for bombing END. STOP destruction of Birds - They have been bombing for 18 years.

SB Aug 18, 1971 State, U.S. Scientists Visit, Study Kaula. Wind up a two day survey today of sea birds and marine resources. Making a "preliminary environmental assessment of the rock" [note] for the chief of Naval operations in Wash." N.E.P.A. requires that statements be submitted outlining the effects of bombardment on the environment. Navy recently opened surface danger zone waters around Kahoo, a Kaula during certain periods to fishermen. Takata..."to follow up periodically to determine whether or not there is any changing trends in the populations". Kaula at various times has been proposed as a bird sanctuary, but the Navy has said defense requirements mandated

[note] No report resulted

continued use of the bombing site." In 1965 the CG transferred jurisdiction and control to Navy".

SB aug 19, 1971 Kaula Rock is too small for Targetry, Navy Say. too small to serve as Navy's only bombing target, Navy said. asked about shifting all bombing from Kahoolawe to Kaula. Biggest bombs (500 lbs) are reserved for Kaula. "wildlife survey conducted to determine an environmental impact assessment wanted by President Nixon" Kaula 108 acres, Niihau 72 m^2.

A Pearl Harbor spokesman said other islands in the Leeward Chain between Kaula and Midway also are filled with birds, are unsuitable for bombing because they are out of the range of Oahu-based jet bombers.

A Sept 13, 1971 Spare the birds of Kaula

Laws forbid any persons from destroying these birds -

Dropping flares during night hours

"Please, some are in Hawaii, for the sake of mercy, spare these birds from being slaughtered"

april 7, 1975 Council names Nosaki admiral of 13th Fleet. Planning and legislative committee of the Council ... ask the Navy to quit bombing the birds of Kaula ..

SB July 17, 1975 Navy won't stop Bombing Kaula Rock. Navy turned down a Hawaii Council request to stop bombing practice. Rear Adm. McNamara of 14th District said "a review of the matter has determined there is a continuing need for the island target for live ordinance training." "loss of this bombing target would have a detrimental impact on fleet training and readiness."

Lighthouse Serive integrated into CG in 1939, formerly under US Dept Commerce. CG placed under DOT 1967, formerly under Treasury Dept.

Bureau of the Budget, under Executive office of the President, before 1939 was located in Treasury Dept. Reorganized 1970 and now called office of Management and Budget. Authority: Statement of Function

ORIGINAL intent circumvented

"Rock" "SEALs"

retrace History, compare two islands

(Should be a Refuge)

Warren King

March, 1973 The Wilson Bulletin - Conservation Status of Birds of Central Pacific Islands

"avifauna is typical of the Northwestern chain lists bird species. Isolation is no longer a sufficient deterrent to alteration, in some instances it is a desirable asset. "potentially important bird habitats, but are kept from attaining that importance by one or more factors capable of correction."

To materially improve bird habitats of the Central Pacific, it is recommended:

1. That the U.S. Navy discontinue bombing of Kaula, and surrender jurisdiction of it to the DOI for inclusion in the HINWR.

April, 1936 Notes on Flora and Fauna - Lehua, Kaula

Plant cover (of both) rather extensive (quantity and number) considering adverse climatic, geologic and faunal conditions.

26 plants - Lehua only 6 are common to both

15 plants Kaula.

Most numerous Bird, Kaula - Noddy Tern.

Red Tail Tropic Bird, Lehua.

Lehua 9 birds, Kaula 14 birds

2 types lizard, Lehua; 1 type Kaula

Rabbits - Lehua

SBNOV 24, 66 Hawaii's other Islands C 6:1
widely unknown

Lehua Rock
one mile off northern tip of Niihau, never
been graced with the label "island";
one of the few in the chain not included in HINWR
"Range lattices, install new light, burns 400 days
inhabited by red-footed boobies et al,
"Like its larger companion, Kaula Island, 20 SW
of Niihau, Lehua was visited by the early
Hawaiians for feather and bird hunting and
for overnight camping.

Lehua - no protection
Bombing and strafing - 3 mile danger zone

HINWR - international significance

Exec. orders or Proclamations needed: Kaula, Lehua,
Kure

KAULA- HAWAII'S FORGOTTEN BIRD ISLAND

By LINDA R. EVANS
Special to The Advertiser

The Island of Kaula was one of the five Hawaiian Islands seen by Captain Cook during his first visit in 1778. Following Cook's death during the second visit in 1779, Kaula was the last island seen when the expedition's vessels departed from Hawaiian waters.

Today, Kaula has been virtually forgotten by the people of Hawaii and remains practically unknown to the outside world. There can be little doubt that the U.S. Navy would like it to stay that way. To them, the island is known as the Kaula Rock Target.

Kaula covers 135 acres (four times the size of Ala Moana shopping center) and is located 20 miles to the southwest of Niihau and 150 miles to the west-northwest of Honolulu. The island rises abruptly to an elevation of 550 feet and has been described as appearing like a huge sea turtle on the horizon.

In 1909, President Theodore Roosevelt set aside nearly all of the small volcanic and coral islands in the northwestern portion of the Hawaiian chain as a sanctuary for wildlife. Millions of migratory sea birds, as well as seals and turtles, depend on these islands for breeding purposes. The result of Roosevelt's farsighted conservation action can be seen today as the Hawaiian Islands National Wildlife Refuge, one of the most outstanding natural preserves in the world.

ONLY TWO OF THE northwestern islands, Kaula and Midway, were not covered by the Presidential Order of 1909. Both of these islands should have been. Apparently there was little reason or incentive at the time to have strategically located Midway officially declared a sanctuary. By 1909 the island had been colonized for some six years by the Commercial Pacific Cable Company. Midway's massive albatross populations were therefore already safe from the Japanese feather poachers that were slaughtering hundreds of thousands of birds on the other small islands in the chain.

The reason for not including Kaula in the sanctuary perhaps will never be positively known. The importance of Kaula as a nesting site for numerous species of sea birds was well-known to the Hawaiian people. Possibly this information was not available to President Roosevelt, thereby causing the island to be simply overlooked and forgotten. Another possibility is that Kaula's steep cliffs may have been regarded as a natural defense against feather poachers. Federal protection may not have been thought necessary in order to ensure the birds' continued well-being.

This explanation would seem to be the most reasonable, as the first known landing on the island by a non-Hawaiian did not take place until 1920. Even then, the individual was unable to reach the summit.

WHATEVER THE ORIGINAL reason for not including Kaula in the Presidential Order of 1909, the result has been, and continues to be, the destruction of nesting sea birds by military bombs and gunfire. The events that brought about this incompatible and intolerable use of public property provide an interesting lesson in land acquisition and environmental degradation.

In December of 1924, Territorial Governor Farrington signed Executive Order 173 which set aside Kaula Island for public purposes as a United States Lighthouse Reservation under the control of the Department of Commerce. During the summer of 1925, personnel of the Lighthouse Service succeeded in building a trail to the island's summit. On the top, two stone structures were found that were thought to be religious shrines. A shelter cave with a low stone wall across the entrance was also discovered.

These findings confirmed the reports of Captain Cook that early Hawaiians periodically made visits to Kaula.

Due to unfavorable weather conditions, Lighthouse Service personnel were not able to make another landing on the island until the summer of 1932. At that time an automatic gas light was constructed and put into service. The first and only published survey of the island's flora and fauna was also conducted in the summer of 1932. Results of this survey appeared in a Bishop Museum report and

revealed that 15 species of plants and 14 species of sea birds were present.

AMONG THE BIRDS in greatest abundance were noddy and sooty terns, red-tailed tropicbirds, blue-faced, red-footed and hooded boobies, and frigate birds. White terns, petrels and shearwaters were also found. The biology of Kaula was clearly typical of the other isolated islands in the northwestern portion of the Hawaiian chain.

Practically no information about Kaula is available for the 25 years following installation of the automatic light. It seems safe to assume that, except for yearly maintenance visits, the island and its sea birds were left in peace. In Washington, however, one significant event did take place during this period that would ultimately affect the island's safety. In 1939, the Lighthouse Service of the Department of Commerce was integrated into the U.S. Coast Guard.

In 1947, 25 years after installation, the Kaula light was permanently closed down. This action extinguished the island's hope for remaining unmolested.

THE FIRST ADMITTED bombing and strafing by Navy and Marine Corps aircraft started in 1962. This was apparently initiated with the blessing of the Coast Guard. However, no records can be found which show that the Territorial Government, Congress or the President ever granted approval for bombing, or was even officially notified of this action. Between 1952 and 1965 the Coast Guard continued to hold jurisdiction over Kaula and, at the same time, apparently raised no objections to the military's delivery of all kinds of ordnance. In addition to the standard bombings, strafings and use of high intensity flares, this ordinance also at time included torpedos and Regulus missiles fired from submarines.

Beginning in the 1960s, residents of Kauai started to voice opposition to this senseless killing of sea birds, many of which are valuable to fishermen for locating schools of fish and detecting ocean current changes. People living on Kauai seemed to be the most concerned, probably because at night they could actually see what the military was doing. For most other residents in the state, Kaula was out of sight, and out of mind. In 1961 the Kauai Board of Supervisors officially asked the Navy to halt the bombing. Their request was promptly and quietly rejected, as many other such requests have been during the years that followed.

IN EARLY 1965, members of Hawaii's congressional delegation were called upon for aid in the matter. In response to an inquiry by Rep. Patsy Mink, the Department of the Interior (administrators of the National Refuge System) stated that Kaula has ". . . impressive value as a nesting area for certain sea birds . . ." and that it is ". . . highly desirable that the Island of Kaula be considered for National Wildlife Refuge status as an addition to the Hawaiian Islands National Wildlife Refuge."

Further, Mrs. Mink was told that everything possible would be done to have the island incorporated into the Refuge. Unfortunately, the Department of the Interior subsequently dropped the matter, after being told by the Navy that Kaula was vital to the war effort in Vietnam. Conservation groups on Kauai also agreed to stop campaigning against the Navy, after being told the same thing.

In March 1965, Rep. Spark Matsunaga publicly announced that jurisdiction of Kaula had been officially transferred from the Coast Guard to the Navy. The island's "give-away" therefore took place without organized opposition, in the name of national security. It is interesting to note that throughout the crisis of World War II, the bombing of Kaula and its sea birds had not been considered necessary by the military for "national security" or "defense readiness."

KAULA WOULD AGAIN have drifted out of public eye after Navy acquisition, had it not been for the pilots of two Skyraiders from the aircraft carrier Ticonderoga enroute to Vietnam. On the night of Oct. 5, 1965 these pilots became "confused" (as it was later explained) and dropped eight 250-pound bombs on Niihau, 32 miles from their intended destination of Kaula. Fortunately, the explosions took place in an unpopulated area.

Nearly two days passed before the Navy publicly announced the incident. In the meantime, numbers of Hawaii's congressional delegation were informed through newspaper sources. Senator Hiram Fong accused the Navy of "gross carelessness," and Mrs. Mink renewed her call for an end to bombing, both for the safety of people and the sake of sea

birds. Senator Daniel Inouye expressed "anger and dismay." In the end, however, the Navy refused to halt bombardments, even long enough for an investigation of the incident.

Little else was heard of Kaula until August 1971, when the Navy conducted a two day environmental survey of the island with the help of State and Federal biologists. Rather than reflecting a sudden change of attitude, this survey was prompted by a direct request from former president Nixon. The National Environmental Policy Act of 1969 requires that statements be filed outlining the environmental effects resulting from actions that are federally funded. Military bombardments of islands and sea birds come under this category. A newspaper article announced the completion of the two-day survey; however, in the following months and years no reports were made available and an Environmental Impact Statement was never filed.

ALTHOUGH the exact status of Kaula's environment presently remains a mystery to the public, fishermen in the area report that sea birds still nest, or at least attempt to nest, on the island. This would suggest that the island is not now, nor has it ever been, the barren or worthless "rock" to which it is sometimes referred.

The recent renewal of efforts to have the bombing of Kahoolawe stopped should also encompass the Island of Kaula. Hawaii's forgotten bird island should no longer continue to be forgotten. A reasonable, but definite, date should be set for halting all bombardments. This should be on or before January 1978, the 200th anniversary of Kaula's European discovery. Following the cessation of destruction, the island should at long-last be transferred to the Hawaiian Islands National Wildlife Refuge where it belongs. This seems the least that could be done after 23 years of military use.

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NOTES ON THE FLORA AND FAUNA OF LEHUA AND KAULA ISLANDS

By

EDWARD L. CAUM

INTRODUCTION

Through the courtesy of Mr. F. A. Edgecomb, Superintendent of the Fourteenth Lighthouse District of the United States Department of Commerce, I was given transportation on the lighthouse tender *Kukui* when lights were established on the tiny rocky islets of Lehua and Kaula, in the spring of 1931 and the late summer of 1932. Lehua, 291 acres in extent and 702 feet high, lies just off the north point of Niihau, and Kaula, 136 acres in extent and 540 feet high, is about 23 miles west-southwest of Niihau.

In company with Dr. Harold S. Palmer of the University of Hawaii, geological, botanical, and ornithological surveys of these two islets were made, so far as I know for the first time. The results of the botanical and ornithological investigations are embodied in the accompanying notes. Unfortunately no entomological collections were made on Lehua, but the few insects collected on Kaula were reported on by Mr. R. H. Bryan Jr.[1]

The plant cover of Lehua and Kaula is rather extensive, both in quantity and in number of species, considering the adverse climatic, geologic, and faunal conditions. Only those species can survive that can endure aridity and strong, continuous winds. Consequently with very few exceptions the plants are low-growing shrubs or herbs which belong to a semi-arid or a strand flora. The boobies and frigate-birds, both of which use great quantities of nesting material, are no small factor in keeping down a vegetative cover that is scanty at best, and on Lehua, overrun as the island is by rabbits, the plants have these enemies in addition with which to contend.

The collections on which these notes are based were made during dry seasons. At other times it is not unlikely that the cover would

[1] Haw. Ent. Soc., Proc. for 1932, vol. 8, no. 2, p. 245, 1933.

appear much more extensive in quantity although probably not in variety. On Kaula great areas are entirely barren, but a search among the rocks in apparently similar areas on Lehua usually revealed the presence of grass and sedge stubble, showing that the vegetation there would be far more conspicuous following the rains.

A comparison of the floras of these two islets is interesting. Of the 26 plant species collected on Lehua, only Jacquemontia and Waltheria are of general distribution, the others being more or less localized. On Kaula, on the contrary, localization of species is the exception rather than the rule, 11 of the 15 species found being of general distribution over the islet. Even the 2 plants of Solanum were separated by about 300 feet, and 2 of the 3 plants of Capparis were separated by almost the full length of the islet, with the third about half-way between them. Opuntia appears to be spreading on Lehua, particularly on the outer slope. There are comparatively few plants on the inner side of the crescent. The plants are tall and strong, and in a healthy and flourishing condition. On Kaula this cactus is represented by a clump covering about 300 square feet, at the northwest part of the island. In sharp contrast to the stand on Lehua, the plants are extremely poor, not over two feet tall, with the pads small and thin.

Of the 35 species of plants collected on the two islands, only 6, *Panicum lanaiense, Portulaca oleracea, Opuntia megacantha, Boerhaavia diffusa, Sida fallax,* and *Heliotropium curassavicum* are common to both. It is interesting to note that of these only Panicum makes a comparable growth in both places. Portulaca, Boerhaavia, and Sida are much more common on Kaula than on Lehua, and are more healthy and flourishing. Opuntia and Heliotropium grow better on Lehua. The difference in the number of species collected on these two islets lies mainly in the Monocotyledons, this group being represented on Lehua by four grasses, three sedges, and one fern (included here for the sake of the statistics), and on Kaula by a single grass. Lehua has 18 species of Dicotyledons compared with 14 on Kaula, but most of the species are represented by a greater number of individuals on Kaula than on Lehua. Kaula's one grass will compare in quantity favorably with the same species or with Heteropogon on Lehua.

PLANTS COLLECTED

PTERIDOPHYTA

POLYPODIACEAE

Doryopteris decipiens (Hooker) J. Smith.

Lehua: rare, a few clumps found on the inner slope near the peak, just below the crest of the ridge. Fruiting April 18, 1931, (no. 15)[2].

MONOCOTYLEDONAE

GRAMINEAE

Chaetochloa verticillata Beauvois.

Lehua: very rare, only one clump was found on a tiny ledge near the landing place. In company with Sonchus, it was growing in a soil pocket formed by a small mat of *Heliotropium curassavicum.* This species is probably a recent immigrant from Niihau. Fruiting April 19, 1931 (no. 20).

Heteropogon contortus Roemer and Schlechtendal.

Lehua: common on the outer side of East Horn, and scattering over the eastern half of the southern slope. It grows very sparingly if at all west of the median line. Fruiting April 18, 1931 (no. 8).

Panicum lanaiense Hitchcock.

Lehua: rather common along the crest of the southwest ridge and at the tip of West Horn. Most of the plants found were dead. Flowering and fruiting April 18-19, 1931 (nos. 9, 23). Kaula: of general distribution, the stand heaviest toward the north end, on the western slope. All the plants found were dead. Old fruit August 17, 1932 (no. 9).

Syntherisma debilis (Desfontaines) Skeels.

Lehua: a number of dead plants were found in a small patch near the middle of West Horn, and a single dead plant was on the crest of the southwest ridge. Old fruit April 18-19, 1931 (nos. 10, 24).

[2] Numbers in parentheses refer to field labels. Plants described are in the herbarium of Bernice P. Bishop Museum.

CYPERACEAE

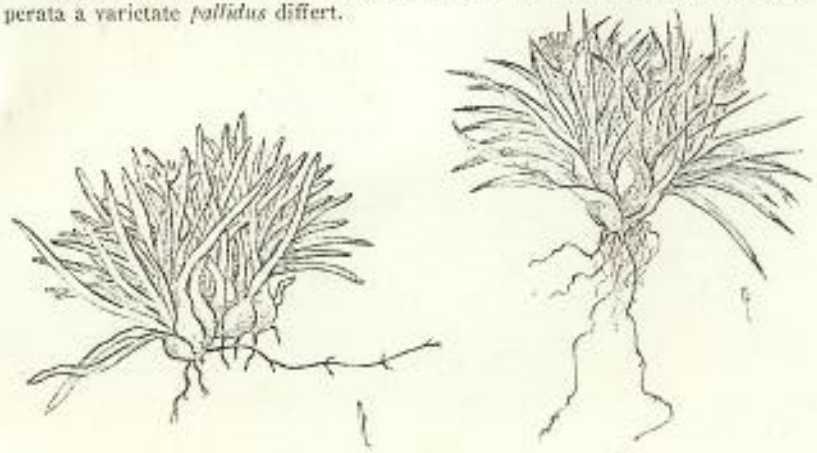
(Determined by Dr. Georg Kükenthal)

Cyperus stuppeus Forster.
(*Cyperus pennatus* Hillebrand.)

Lehua: not uncommon on the outer face of the islet, growing just below the crest near the base of East Horn, in the radial valleys of the southern slope near the cliffs, and just behind the bench to the west of the gas tank houses. In bud and old fruit April 18, 1931 (no. 5).

Cyperus polystachys Rottboell variety **pallidus** Hillebrand form **pornanus**, new form (fig. 1, *a*).

Culmo nunnisi 1 cm alto folia abscondito nec non inflorescentia depauperata a varietate *pallidus* differt.



a *b*

FIGURE 1.—Lehua: *a*, *Cyperus polystachyus pallidus* form *pornanus* Kükenthal (no. 17); *b*, *Fimbristylis cymosa pycnocephala* (Hillebrand) Kükenthal (no. 29). Natural size.

Lehua: a tiny form (the normal variety is 20 to 30 cm tall) found only near the base of East Horn, on the outer side just below the crest. Flowering April 18, 1931 (no. 17).

Fimbristylis cymosa R. Brown variety **pycnocephala** (Hillebrand) Kükenthal.

Lehua: rare, growing sparingly along the crest of the southwest ridge, where it forms mats in the tiny rock pockets. A single very small although fully mature clump was found on the crest of West Horn, well out toward the tip. (See fig. 1, *b*.) In flower and old fruit April 19, 1931 (nos. 7, 29).

Concerning this plant Dr. Kükenthal writes: "Diese Varietät ist durch Übergangsformen deren var. umbellato-capitata (Mann) Hillebr. eng verbunden. Nur der dichtköpfige Blütenstand trennt."

DICOTYLEDONEAE

CHENOPODIACEAE

Chenopodium sandwicheum Moquin.

Kaula: very common and widely distributed. Flowering and fruiting August 17, 1932 (no. 8).

AMARANTACEAE

Amarantus viridus Linnaeus.

Kaula: not uncommon, growing in large clumps 10 to 12 inches in diameter, scattered over the island. Flowering and fruiting August 17, 1932 (no. 2).

NYCTAGINACEAE

Boerhaavia diffusa Linnaeus.

Lehua: very rare, only three tiny seedlings found in the immediate neighborhood of the tank houses. One of these plants bore a single flower. Flowering April 22, 1931, (no. 28). Kaula: not common, growing mainly on the ledges near the derrick. A few very poor plants were found on the inner side of the crescent near the crest. Flowering August 17, 1932 (no. 13).

AIZOACEAE

Sesuvium portulacastrum Linnaeus.

Lehua: a number of large flourishing patches grow along the southern side, in the spray of the surf, and on the crest of West Horn near the tip. Flowering April 18, 1931 (no. 4).

PORTULACACEAE

Portulaca caumii F. Brown.

Kaula: on the ridge, most commonly on the northern half, where mats 12 to 14 inches in diameter were found. This is the first

record of the species elsewhere than on Nihoa, the type locality. Flowering August 17, 1932 (no. 5).

Portulaca lutea Solander.

Kaula: very common and well distributed over the island. On the southwestern slope in particular the species grows in great masses in pure stand. Flowering and fruiting August 17, 1932 (nos. 4, 6).

Two plants of a somewhat different form were found, which on cursory examination seemed to represent a natural hybrid between *P. lutea* and *P. oleracea*. The material available was not sufficient for a detailed examination, and plants grown in Honolulu from cuttings of the supposed hybrid and of the typical *P. lutea* have thus far failed to flower. Vegetatively the plants are very similar, although not identical.

Portulaca oleracea Linnaeus.

Lehua: not common, although scattered the length of the crest from about the middle of the southwest ridge to near the tip of East Horn. In the main, the plants were very small and in poor condition. Flowering and fruiting April 18, 1931 (no. 11). Kaula: common on the western side of the crest, especially at the northern end, where large flourishing mats were found. Flowering and fruiting August 17, 1932 (no. 3).

Portulaca villosa Chamisso.

Lehua: rare, found only in one small stand on the crest of West Horn, near the tip. The plants were all small and in poor condition. Fruiting April 19, 1931 (no. 12).

A root, brought to Honolulu and planted, furnished a basis for the determination of the species. In addition to these plants, three small broken pieces of a Portulaca, well dried, were found lying on the ground about half way out East Horn. Old fruit April 18, 1931 (no. 1). The material collected was entirely inadequate for accurate identification, and seeds planted in Honolulu failed to germinate, but it is probable that the fragments must be referred to this species.

Papaveraceae

Argemone mexicana Linnaeus.

Lehua: rare, two plants were found in a pocket just behind the cliffs on the south side, and two more were seen in a deep gully

on the northern side of the southwest ridge. Flowering April 19, 1931 (no. 6).

This is the species which Degener[8] considers endemic, distinct from the *A. mexicana* of Linnaeus, and which he names, without description, *Argemone glauca*.

Capparidaceae

Capparis sandwichiana De Candolle.

Kaula: rare, only three plants were found, one near each end of the island and one about midway between. They were all small, the stems not more than a foot long, although one had a trunk about 1¾ inches in diameter. Flowering August 17, 1932 (no. 1).

Zygophyllaceae

Tribulus cistoides Linnaeus.

Kaula: rather common on the ledges near the derrick, and scattered elsewhere. In flower and green fruit August 18, 1932 (no. 14).

Euphorbiaceae

Euphorbia celastroides Boissier.

Kaula: well distributed over the island. The plants were all very low and sprawling, with heavy stems. Flowering August 17, 1932 (no. 10).

Euphorbia hirta Linnaeus.

Lehua: not uncommon, scattered along the crest of the island, and very sparingly elsewhere. The plants were all small and distinctly prostrate. Flowering and fruiting April 18, 1931 (no. 13).

Malvaceae

Sida fallax Walpers.

Lehua: rare, two plants were found near the tip of East Horn, on the inner side, and one dead plant and several small seedlings near the tip of West Horn, on the crest. In flower and fruit April 18, 1931 (no. 18). Kaula: not common, and apparently restricted to the northern end. Several plants were found which bore flowers

[8] Degener, Otto, Ferns and flowering plants of Hawaii National Park, Honolulu, p. 164, 1930.

with petals rather narrower at the base and more widely spread apart than is usual. Flowering August 17, 1932 (nos. 11, 11a).

STERCULIACEAE

Waltheria americana Linnaeus.

Lehua: very common in all parts of the islet with the exception of the farther part of West Horn, where it occurs very sparingly. With the exception of Jacquemontia it is the commonest plant species on the island. Flowering April 18, 1931 (no. 3).

CACTACEAE

Opuntia megacantha Salm-Dyck.

Lehua: common on the southern and eastern faces of the islet, and a few scattered clumps on the inner side of the crescent near the base of West Horn. Flowering April 18, 1931 (not collected). Kaula: a single rather small, scrubby patch near the northern end of the island. Flowering August 17, 1932 (not collected).

ASCLEPIADACEAE

Asclepias curassavica Linnaeus.

Lehua: rare, a few plants only having been found in a clump of Opuntia well down on the southern slope, east of the landing. In flower and old fruit April 20, 1931 (no. 25).

CONVOLVULACEAE

Ipomoea indica (Burmann) Merrill.

Kaula: not common, a few rather long-stemmed plants on the ledges near the derrick, and a few very small plants elsewhere. Sterile August 17, 1932 (no. 12).

Ipomoea pes-caprae Roth.

Lehua: rare, only one small patch having been found on the inner side of the base of West Horn, about 200 feet below the summit. Flowering April 22, 1931 (no. 27).

Jacquemontia sandwicensis Gray.

Lehua: the prevailing plant, common in all parts of the island except the tip of West Horn. Flowering and fruiting April 19, 1931 (no. 2).

BORAGINACEAE

Heliotropium anomalum Hooker and Arnott.

Lehua: restricted to the inner side of the crescent. From the base of East Horn westward to about the median line, on the rocks of the pre-summit series, it forms an almost pure stand. From there nearly to the base of West Horn, and above the heavy stand, it grows sparingly. Flowering and fruiting April 18, 1931 (no. 16).

Heliotropium curassavicum Linnaeus.

Lehua: uncommon, growing in a few places on the southern cliffs, in the neighborhood of the landing, just above the water. Flowering and fruiting April 19, 1931 (no. 19). Kaula: very rare, only two plants having been found, well out on East Horn. Flowering August 17, 1932 (no. 7).

VERBENACEAE

Lantana camara Linnaeus.

Lehua: very rare. Only one plant was seen, in a soil pocket on the edge of the southern cliffs, west of the tank houses. This plant was destroyed after specimens had been taken. Sterile April 20, 1931 (no. 26).

Mr. Aubrey Robinson, the owner of the island of Niihau, has for a number of years conducted a systematic campaign of extermination against lantana on Lehua, to prevent the spread of the plant to Niihau.

SOLANACEAE

Solanum nigrum Linnaeus.

Kaula: very rare, only two plants having been found, one on the ledge near the derrick, the other about three fourths of the way up the western face. Flowering and fruiting August 18, 1932 (no. 15).

CUCURBITACEAE

Sicyos sp.

Lehua: rare, found in only one place, in an Opuntia thicket at the foot of a radial valley just to the west of the tank houses. The vines were all dead, cut off at the base apparently by rabbits. They were sterile, and definite determination was not possible. April 19, 1931 (no. 22).

COMPOSITAE

Ageratum conyzoides Linnaeus.

Lehua: uncommon, scattered sparingly along the crest of the islet, and a few larger and more vigorous plants in the deep gulches on the inner side of West Horn. Flowering and fruiting April 18, 1931 (no. 14).

Sonchus oleraceus Linnaeus.

Lehua: very rare, only two plants having been found on a tiny ledge near the landing. Like the Chaetochloa with which it was associated, this plant is probably a recent immigrant from Niihau. Fruiting April 19, 1931 (no. 21).

LIST OF BIRDS

Anous stolidus (Linnaeus) *Laridae*. Noddy Tern.

Lehua: fairly common, nesting in deep caves near the landing, and a few under overhanging rocks in the valleys to the west of the tank houses. Kaula: the most numerous species on the island, distributed everywhere, but centering on the face of the islet toward the southern end.

Gygis alba kittlitzi Hartert *Laridae*. White Tern; Love-bird.

Kaula: not common, a few in the cliffs toward the center of the inner slope of the crescent.

Micranous hawaiiensis Rothschild *Laridae*. Noio; Hawaiian Tern.

Lehua: rather rare, nesting with the noddys in the deep caves near the landing.

Procelsterna saxatilis Fisher *Laridae*. Necker Island Tern.

Kaula: a small colony living in the steep cliffs at the North Horn.

Sterna fuliginosa Gmelin *Laridae*. Sooty Tern.

Kaula: rather common, mainly on the face of the islet, in the central part and toward the south.

Sterna lunata Peale *Laridae*. Gray-backed Tern.

Kaula: not common, mainly on the crest north of the center.

Diomedea nigripes Audubon *Diomedeidae*. Brown Gooney; Black-footed Albatross.

Lehua: only a few birds seen, and none known to be nesting on the islet. Kaula: none seen, but one old egg was found, indicating that the islet is visited.

Pterodroma leucoptera hypoleuca (Salvin) *Procellariidae*. Bonin Island Petrel.

Kaula: one chick, which I believe to be of this species, was found in a shallow cave on the inner slope of the crescent. No adult birds were noted.

Bulweria bulweri (Jardin and Selby) *Procellariidae*. Bulwer's Petrel.

Kaula: several individuals were seen in flight, and one chick which appeared to be of this species was found on a ledge on the outer face of the islet.

Puffinus pacificus cuneatus (Salvin) *Procellariidae*. Uau kane; Wedge-tailed Shearwater.

Lehua: very common, nesting in fault-cracks along the crest of the islet and in the soil in the radial valleys of the southern slope. Kaula: only two individuals were seen, but there were many unoccupied burrows, showing that during the breeding season they visit the island in appreciable numbers.

Phaethon rubricauda (Boddaert) *Phaëthontidae*. Koae; Bos'n; Red-tailed Tropic Bird.

Lehua: probably the commonest species on the islet, nesting in caves and under overhanging rocks everywhere. Kaula: rather common along the inner side of the crescent.

Sula cyanops (Sundevall) *Sulidae*. Blue-faced Booby.

Lehua: only a few individuals seen. Two or three pairs were nesting with the iwa and common boobies at the southeast corner of the islet. Kaula: rather common, mainly along the crest near the East Horn, and at the edge of the high cliff toward the northern end.

Sula piscator (Linnaeus) *Sulidae*. Red-footed Booby.

Kaula: not uncommon, on the inner slope of the islet near the East Horn.

Sula sula (Linnaeus) *Sulidae*. Common or Hooded Booby.

Lehua: not uncommon, a few pairs nesting at the southeast

corner of the islet. Kaula: very common, mainly near the north end and at the extreme tips of the two horns of the crescent.

Fregata minor palmerstoni Gmelin *Fregatidae*. Iwa; Frigate-bird; Man-o'-War Hawk.

Lehua: rare, only a few individuals seen. Two or three pairs were nesting in a patch of Sesuvium on the edge of the cliff at the southeast corner of the islet. Kaula: very common along the inner side of the crescent from the center toward the East Horn.

Pluvialis dominicus fulvus (Gmelin) *Charadriidae*. Kolea; Pacific Golden Plover.

Kaula: several individuals seen on the shelf along the inner curve of the crescent, just above the surf.

Arenaria interpres (Linnaeus) *Charadriidae*. Akekeke; Turnstone.

Lehua: several individuals seen, apparently visitors from Niihau.

Alauda arvensis Linnaeus *Alaudidae*. Skylark.

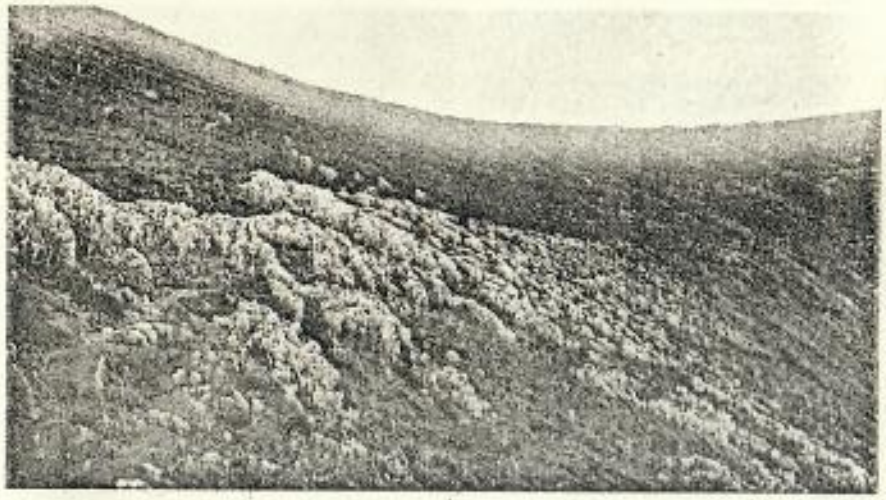
Lehua: rather common. Many are certainly visitors from Niihau, as they were seen to cross the channel between the islands, but a few pairs were nesting in the cactus clumps on the southern slope.

It might be noted that both families of lizards known in Hawaii, the Gekkonidae and Scincidae, are represented on Lehua, but apparently only the geckos have reached Kaula, as no skinks were seen. None were collected, so that no specific determinations were made. The geckos were scarce, only two individuals having been seen on Lehua and one on Kaula, but on Lehua the skinks were common, flashing about among the rocks in all parts of the islet. I saw no mammals of any sort on Kaula, although the lighthouse personnel more recently have reported the presence of a small rat which, from their description, is probably the native Hawaiian rat. Lehua was overrun with rabbits, and I have heard that rats are present there, but I saw no traces of them.

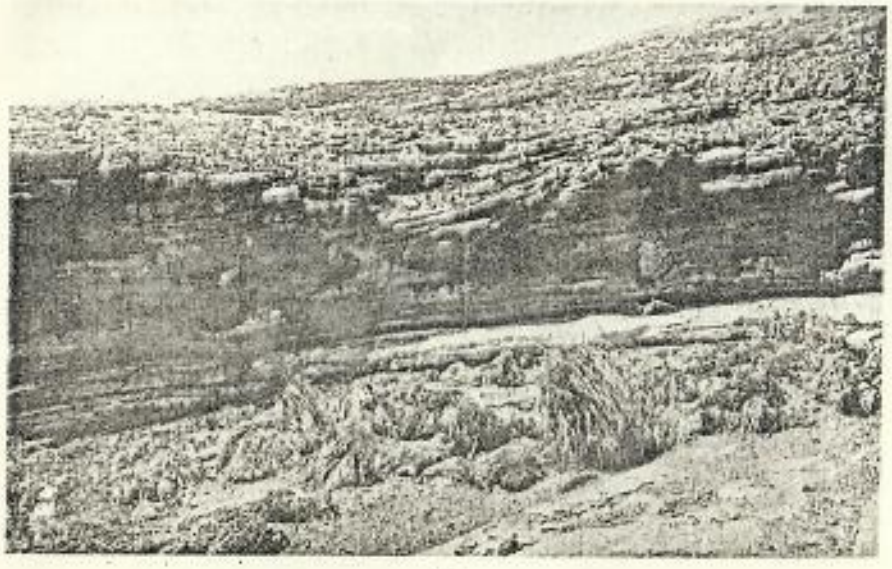
A

B

PLATE 1.—*Opuntia megacantha*: *A*, Lehua, at the foot of a radial valley on the southern slope; *B*, Kaula, stand of *Opuntia megacantha* with a mat of *Portulaca oleracea* in the left foreground and *P. lutea* in the center and to the right.

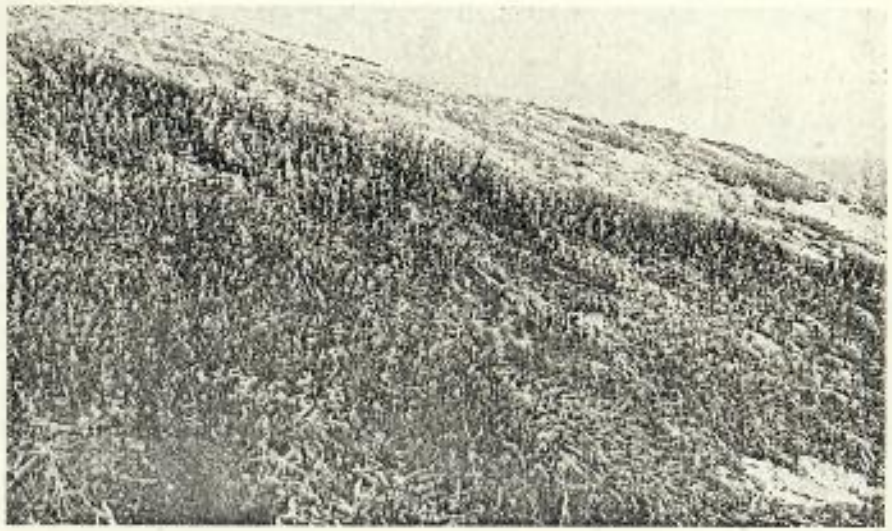


A



B

PLATE 2.—Lehua: *A*, *Heliotropium anomalum* on the eastern half of the inner slope of the islet; *B*, *Cyperus stuppeus* and *Jacquemontia sandwicensis* in a small cove on the southern shore.



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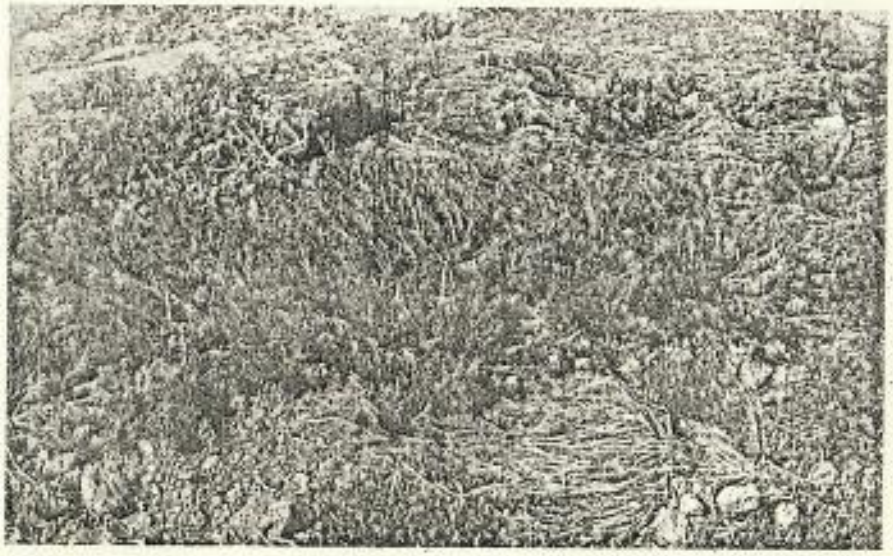


B

PLATE 3.—Kaula: *A*, a heavy stand of *Portulaca lutea*; *B*, *Portulaca oleracea* in the middle foreground, with *Panicum lanaiense* to the right, *Portulaca caumii* in the center, small plants of *Sida fallax* behind.

DANGER ZONE - 3 MILE RADIUS

Paradise of the Pacific April, 1938 NO4

Kaula—An Island of Hawaii

By E. H. Bryan, Jr.

"Wanalia was the man
And Hanala'a was the woman;
Of them was born Niihau, a land, an island.
There were three children of them
Born in the same day,
Niihau, Kaula, ending with Nihoa.
The mother then conceived no more,
No other island appeared thereafter."
(Mele composed by Kahakuikamoana;
as recorded by Fornander, IV:1, page 10.)

KAULA is a small, isolated islet, lying about 20 sea miles or 23 land miles to the west-southwest of the southern end of Niihau, and 150 sea miles west and a little north of Honolulu. Its position is about 21° 39′ North, and 160° 31′ 30″ West. Estimates of its height have been getting progressively smaller, until they are now between 500 and 600 feet, with the U. S. Coast and Geodetic Map of 1934 giving it 550 feet. Estimates of its area likewise very, from 108 to 136 acres. Submarine soundings show that the islet lies near to the southeast edge of a submarine platform having an area of at least 30 square miles, with depths of from 6 to 50 fathoms.

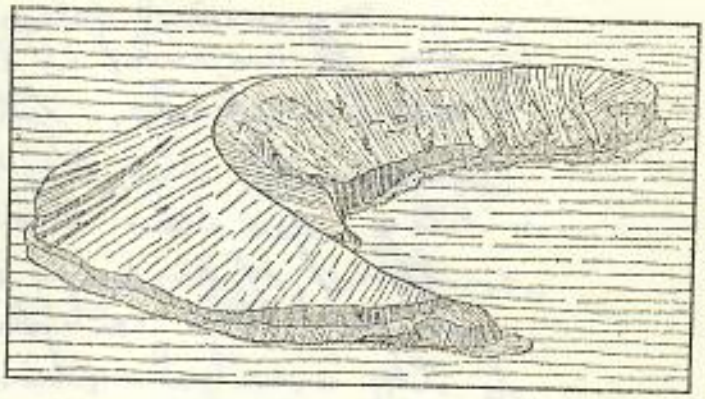
Kaula is crescent-shaped, two-thirds of its ridge having a fairly level crest, but the south end sloping down gradually. The concave side of the crescent is toward the east, from which side, at a distance the island looks likes a sleeping seal with its head to the north. The lower slopes have been cut back into a sea cliff which makes the slopes almost impossible to climb, even after one has succeeded in landing on the wave-cut terrace, which cannot be done unless the sea is moderately calm. The Lighthouse Service has had to blast and build a way to the summit of the convex (west) side, and sometimes it is necessary to land by means of a hoist.

Kaula has been known for a long time to the Hawaiians, its name appearing frequently in the old meles, especially those of Kauai. Reference to the island may signify a place far away, on the very edge of the group of islands, as in the legend of Paka'a. When Kaewenuiaumi said to Pakaa's spirit "I am coming to search for you," the spirit of Paka'a answered, "I am living on Kaula," or in other words, the back of beyond. The islet also must have been visited at times for sea birds, for there are references such as the following, from the legend of Kawelo. That famous warrior chanted to his wife, Kanewahinukiaoha:

"When Hanalei thou shalt possess,
And the mats of Niihau thou shalt wear,
And the birds of Kaula thou shalt eat . . ."

There is another version of how Kaula came to be "born," besides the one at the beginning of this article. It runs as follows: After giving birth to Hawaii and Maui, Papa (the earth-mother) left her husband Wakea (the sky-father) and went back to Tahiti. After a short time wifeless, Wakea took to himself Kaulawahine, who as a result gave birth to Lanai. Tiring of her, he sought the company of Hina, who a little later gave birth to Molokai. Meanwhile Laukaula, the plover, told Papa of her husband's faithlessness. Returning quickly to Hawaii, and learning what he had been doing, Papa deserted Wakea in a fury, and took Lua for a husband. They had a child, Oahu, known as Oahu-a-lua. Finally Papa went back to Wakea, and by him gave birth to Kamawaelualanimoku (the "child of heavenly qualities"—Kauai), Niihau, Kaula, and Lehua. The mele (Fornander, IV:1, pp. 14, 18; V1: p. 360.) runs:

"Papa then went back to live with Wakea,
Papa was restless with child sickness,
Papa conceived the island of Kauai
And gave birth to Kamawaelualanimoku.
Niihau was only the after-birth,
Lehua separated them,
And Kaula was the closing one."

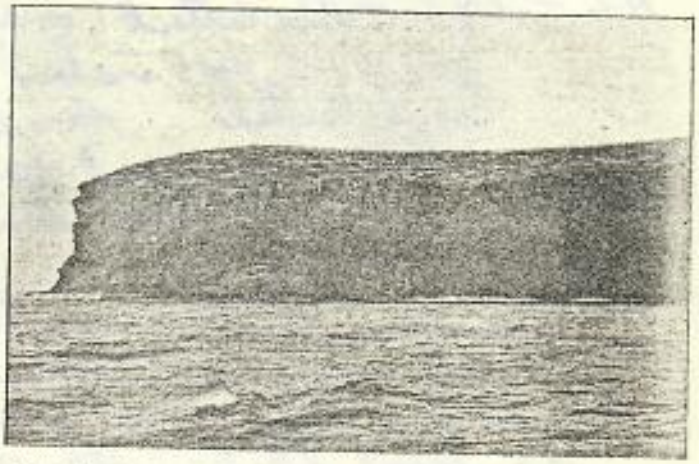


Sketch of Kaula Rock—By H. S. Palmer, Courtesy Bishop Museum

The lighthouse men when they finally succeeded in reaching the summit, in July, 1925, found on the northern part of the crest the remains of two stone structures which might have been heiaus (temples). On the concave (east) side, just below the summit, they also found a shelter cave, across the mouth of which was a low wall, suggesting that it, too, had been used by visiting Hawaiians.

The establishment of a light on the inaccessible summit of Kaula forms one of the most interesting and important events in the history of that seldom visited islet. The need for a light there had been felt for several years, because the island lies close to the direct route of vessels bound for the Orient. In 1921 Superintendent A. E. Arledge visited the

Continued on Page Thirty-eight



Great Sea Cave, Kaula Island—E. H. Bryan, Jr. Courtesy Bishop Museum

KAHOOLAWE - 45 sq. mi. Highest Point - 1,427'
NIIHAU - Mt. Paniau - 1,281'

Advertiser A-16 Wed March 2, 1971

Title: House wants to end bombings on Kaula

a House resolution has requested Hawaii's congressional delegation to ask for an end to Navy bombing for an islet in the Hawaiian chain which is the home of many seabirds. The resolution, introduced by Kauai Democratic Rep. Richard Kawakami, noted that the military has been bombing Kaula - which is 23 miles southwest of Niihau - for the past 18 years.

It said the continued bombing of the islet could lead to the eventual extinction of sea birds which are "essential to the fishermen for locating fish schools and for pointing out changes in ocean currents."

The Advertiser Friday Oct 8, 1965

Top headline title: Navy planes Bomb Niihau by Mistake (Photo of area aerial)

"Two Navy A-1 dive bombers dropped 2,000 lb bombs ... 32 miles off target." — fell on northeast side — occurred at 9:15 PM Tuesday — disclosed Thursday at noon — Kauai county police unaware until contacted by The Advertiser — "The site is near Kii, the landing where boats tie up." — 9 miles from the south point — "single seat propeller planes —

adjacent Title: Boat left area Before Bombing

"Aylmer Robinson, owner of Niihau" said a shuttle boat departed several hours before bombing — Puuwai, Niihau's main village.. and Kiakia the Robinson home, are made than 15 miles from bombed area. "I don't think there was any danger to the people living on the island" Robinson said.

A-1 formerly Navy AD-5

A-6 Title: This "attack" on Niihau is Different

Dec 7-12, 1941 island terrorized by a Japanese pilot who crash landed. Harada helped him get guns, later man named Kanahele, after they shot pilot and threw him against wall. Harada shot himself.

"I'm sure the Navy is taking proper steps to insure that lives are not endangered" Robinson said. "This sort of accident could have happened anywhere, whether they were bombing FFS or a target floaty in the sea."

of Kali's crop this year to be sold with 40 or 50,000 coffee trees and they look very green. So also is Captain Rose's coffee. Why do not the Hawaiians plant coffee? The Elele urges them in this direction, but they do not obey, and only sit around.

L (for Limaikaika—Armstrong.)

"A SILENT CALL TO ARMS"

Continued from Page Twenty-six

service of their fellow citizens. Most of these calls come for the rescue of persons during flood disasters, while the call for riot duty and suppression of civil disorders and maintenance of law and order follow closely the number of calls for rescues from floods and storms. When the Guardsmen respond to an emergency call they do not face the situation in a haphazard manner. This has not always been the case, however, for there were times when considerable efficiency was lacking in the training of the Militia. Those days, we believe, have passed and now all National Guard units have a well-trained, efficiently-organized staff which has prepared plans and is constantly improving them for each type of call that may be made upon the Guardsmen to serve their fellow mankind or their country.

Mr. Average Citizen can take great pride and satisfaction in knowing that the Guardsmen are at all times ready for emergencies and desirous of supporting constitutional law and order. The ideals of this "democracy within a Republic" have their highest type of staunch supporters in the National Guardsmen of this community. The people of the Territory of Hawaii should feel proud of their all too small military force.

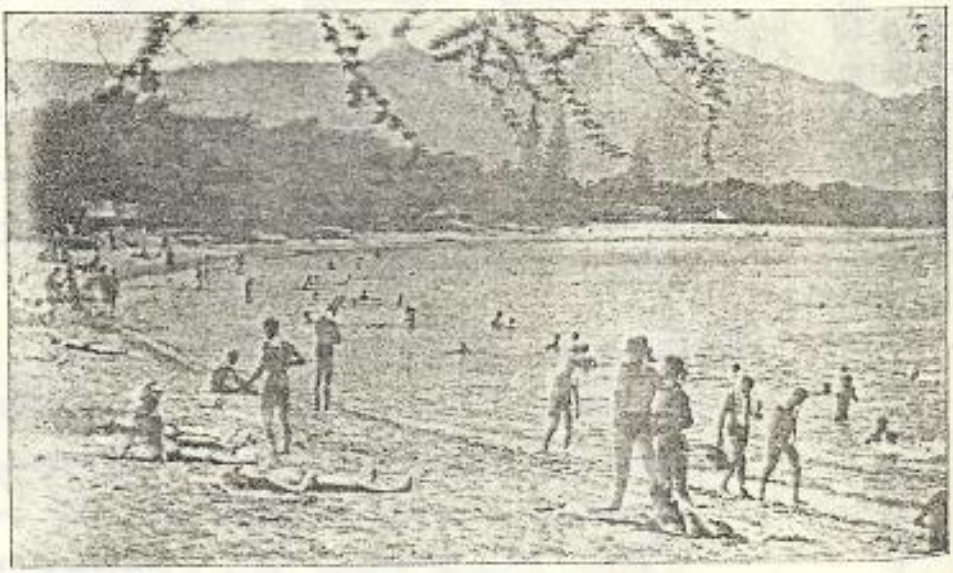
KAULA—AN ISLAND OF HAWAII

Continued from Page Twenty-seven

island on the lighthouse tender *Kukui*, but was unable to find a landing place, although the sea was moderately calm. He gave copies of the pictures which he took at that time to the German geologist, Immanuel Friedlaender, who published a paper on the geology and topography of the island in a German scientific journal. Friedlaender interpreted the photographs as showing that Kaula consists of ash or tuff ejected at two different times, and that it forms about a quarter of the circular rim of a crater, the rest of which has disappeared.

On July 1, 1923, the U. S. S. *Tanager*, returning from a scientific cruise to the northwest Hawaiian islands, circled the island, and a ship's boat rowed along the lee side and into the sea cave at the northeast end. At that time the writer reached his nearest approach to the island by touching the wall of the cave with a boat hook. No official landing was made, although two or three of the more daring members of the party succeeded in getting ashore on a rocky ledge, from which they could only work their way a few yards up the cliff face. A few photographs and longe-range observations were made from the ship.

Superintendent Ralph R. Tinkham also visited the island in 1923, without being able to make a landing. George Gay, manager of the Niihau ranch, is credited as being the first white man to have landed on the island, having swam ashore several years previous. He was unable to get off again through the breakers, and had to remain on the islet over night, until rescued by an Hawaiian crew in an outrigger canoe next day.



Star-Bulletin E-21 Wed March 10, 1965

Title: Navy gets islet off Niihau; used for bombing practice

(includes small chart of Kauai, Niihau & Kaula)

"described thusly in a 1923 newspaper article ....." "Kaula lies on the horizon like a huge sea turtle."

..." switched from the CG to the Navy Representative Spark M. Matsunaga disclosed yesterday in Washington. For many years, the Navy has used the barren 108 acre islet for bombing practice despite the protest of fishermen." "... Kauai fishermen have asked that it be declared a bird sanctuary."

Copied

Kauai board of supervisors in March 1961 asked the Navy to stop bombing operations there. "Matsunaga said the Bureau of the Budget approved the transfer of Kaula from the CG to the Navy."

Advertiser Sat. Oct 9, 1965 Front page

Title: Kaula Bombing to go on -

- Navy refused to halt target practice ... pending an investigation of accidental bombardment of Niihau last Tuesday Night. Image advised practice would have to continue to prepare Ticonderoga for duty off V.N.

Fong wired Navy, accusing "gross carelessness"

8 - 250lb bombs Fong told McNamara he was "appalled" - on Niihau

"Rep Mink renewed her demands that Kaula be abandoned as a bombing target"

Matsunaga called incident "awsome" asked that night bombing stop until investigation completed. "Said he would not recommend abandonment of the range, "since it had been agreed it was vital for the war effort in V.N."

"Mrs. Mink said her original request for a cessation of target practice at Kaula resulted from the destruction

Same Issue -

Title: Two Pilots Explained, Navy Says

In order to learn more of the island an airplane photograph of it was urgently desired. In November, 1923, Brigadier General William Mitchell was in Hawaii inspecting army air corps. He volunteered to get pictures of Kaula. That was before the days of inter-island flights, so the plane was loaded onto the lighthouse tender *Kukui* and transported to Koloa, where it had to be taken apart in order to get it ashore in small boats. Meanwhile Commander John Rodgers, in command of the local navy air service, learned about General Mitchell's plans. That same spirit of rivalry which marks the Army-Navy game made its appearance. Why should the Navy let the Army run off with the honor of being the first to fly a plane over and photograph Kaula? So two navy flying boats were loaded on the *Pelican* and another minesweeper, and they set off for Kauai. There one of the planes was safely launched; and while the army plane was being made ready at a small field near Eric Knudsen's beach house, on the morning of November 8, Lieutenant E. Chourre piloted the navy plane over Kaula so photographer B. L. Houser was able to take the first picture of the islet from the air. Later a number of photographs were made by the 11th Photo Section, U. S. Army, from which Mr. Tinkham was able to construct maps and plans for the development of the light project.

In 1925 a party under the direction of Fred. A. Edgecomb, present Lighthouse Superintendent, succeeded in making a landing on July 10, and worked until the 21st building a trail and ladder to the summit. On August 21, 1931, Lighthouse Engineer Neil W. Wetherby, in making a reconnaissance of the islet, was washed off the cliff from a spot 30 feet above sea level. An old Hawaiian in the party maintained that this had happened because he had not first rowed into the sea cave to pay his respects to the shark god which dwelt there and ruled the islet. In spite of this omission he wasn't seriously hurt, and returned on August 2, 1932, with a carpenter, mechanic, and six laborers, to complete the installation of the derrick, shelter houses, and light. The light was finally put in commission August 18, 1932.

At this time, August 16 to 19, Dr. Harold S. Palmer, professor of geology at the University of Hawaii, and E. L. Caum, botanist with the Experiment Station, H. S. P. A., were able to make a study of the geology, plants, and bird life of the island. In a publication (B. P. Bishop Museum Bulletin 35) issued in 1927, Dr. Palmer described the geological formation of the island. He outlines the geologic history of Kaula as follows: First the eruption of volcanic rocks built up the platform upon which the islet stands to about sea level. Then it was eroded away. Then corals grew upon the summit of this planed-off mountain peak. After that there was a second period of volcanic activity and the tuff cone was formed, with its highest side toward the west. This tuff crater-rim was next eroded by wind, waves, and running water, the waves cutting a submarine terrace almost around the island. The level of the sea then dropped about fifteen feet with reference to the wave-cut terrace. And finally the present cycle of erosion took place. It is the wave-cut sea cliff, which turns the stream cut gulches into hanging valleys, that makes the faces of Kaula so difficult to climb.

Mr. Caum, in Bishop Museum Occasional Papers, Vol. XI, No. 21, 1936, discusses the vegetation and the bird life. Fifteen species of plants were found growing on Kaula. This August visit having followed a very dry summer, great areas of the slope appeared entirely barren, which following a rainy period might have supported grass and sedge. A grass, *Panicum lanaiense;* cactus, *Opuntia megacantha;* aweoweo, *Chenopodium sandwicheum; Amaranthus viridus; Portulaca caumii,* a new species of purslane and the commoner *Portulaca lutea* and *Portulaca oleracea;* the puncture vine, *Tribulus cistoides;* and *Euphorbia celastoides* were the most abundant species.

The noddy tern, *Anous stolidus,* was the most numerous species of bird. Other birds were white tern, the Necker Island tern, the sooty tern, the gray-back tern, Bulwer's petrel, wedge-tailed shearwater, red-tailed tropic bird, the blue-faced, red-footed, and common boobys, frigate birds, and the golden plover.

Mr. Caum also collected specimens of 15 species of insects: 2 kinds of ants, 2 wasps, 4 species of flies, 2 species of lady beetles, a moth, a leafhopper, a thrip, the familiar embiid, and some pseudo-scorpions.

The lighthouse personnel have also captured specimens of a rat and a mouse, and report dry wood termites in lumber on the island.

The light atop Kaula is the second highest under the jurisdiction of the United States Lighthouse Service, being 562 feet above sea level. It is exceeded in height only by the Lehua light, 707 feet, off the northern end of Niihau. Lights at such elevations are only possible in regions, such as Hawaii, where there are no fogs. The Kaula light consists of a double 375 mm. acetylene beacon lantern, a type developed in Hawaii by M. Peter, Lighthouse Service mechanic. Each of the two lanterns has a 480 candle power light, visible at least 12 miles. The height is such that, under exceptional conditions of clearness, it might be seen at a distance of 27 miles from sea level. The upper light is automatically turned on when the sun stops shining on it. Should it burn out, the lower light would automatically turn on. The lights are supplied with gas from storage tanks lower down on the west side, where a hoist can lift the heavy tanks from the shore. Two independent pipes, each 1500 feet long, supply the lights. Two tanks each hold enough gas to keep the light burning for 15 months. The light could keep burning for two and a half years without refueling, if necessary.

Gets flashing light S 8/20/32 p8

US Navy gets islet; to be used for bombing practice S 3/10/65 E 21:1

Bombing to go on despite accidental Niihau bombing A 10/9/65 1:1

Have How became Navy property traced S 10/11/65 1:4 ✓ copied 8/8/75

House wants Navy to stop bombing A 03/03/71 A16-5

Have State, U.S. Scientists visit, study S 08/18/71 C5-1 ✓

have Too small for Targets, Navy says S 08/19/71 C2-1 ?

Have Letter - Spare birds of Kaula A 09/13/71 A11-2 ✓

Aug 20, 1932 Star-Bulletin

Title: Lonely Island of Kaula Gets Flashing Light

Photo Caption: Kaula Light Removes Menace to Shipping

- Request for a light since 1921 by shipping interests.
- automatic 600 light
- kukuki called in 1921 and 1923 but too rough to land
- kukuki landed in 1925 headed by Mr. Edgecomb - Assistant Superintendent Trail formed -
- kukuki 1931 but engineer washed off -
- kukuki dispatched Aug 2 - Mr. Edgecomb - favorable winds.

"ancient Hawaiian legends say that the rock was the abode of Kuhaimoana, king of all the sharks and husband of Kaapahau, the famous queen shark of Oahu who proclaimed a law that the waters of Oahu were forever tabu to man eating sharks."

Edward F. Caum of HSPA also went along to study the bird, insect and botanical life of rock.

* The only white man known to have visited the island prior to the arrival of the lighthouse servicemen was George S. Gray, formerly of Niihau - swam ashore, but became stranded

MAY 13 1965

UNITED STATES DEPARTMENT OF JUSTICE

WASHINGTON, D.C. 20530

Address Reply to the
Division Indicated
and Refer to Initials and Number

May 11, 1965

Honorable Patsy T. Mink
House of Representatives
Washington, D.C.

Dear Mrs. Mink:

In your letter of May 3, 1965, to Deputy Attorney General Ramsey Clark, you ask whether transfer of jurisdiction over Kaula Island from the Coast Guard to the Navy would result in a reversion of title to the State of Hawaii.

As stated in your letter, this island was "set aside" for a United States Lighthouse Reservation by Executive Order No. 173 of the Governor of the Territory of Hawaii, dated December 13, 1924. Although the set aside order thus refers to a "Lighthouse Reservation", that designation of a particular purpose did not result in creating a limitation on the Federal Government's right to use of the area. In other words, a reference to the immediate proposed use that occasioned the set aside order is not a limitation on the right of the United States to occupy and control the property for some different purpose. See 48 U.S.C. 511; 37 Op. A.G. 417; 39 Op. A.G. 460, 462; 42 Op. A.G. No. 4, pp. 19-22 (9/12/61). By analogy, the United States does not lose title to property purchased or condemned for a particular authorized purpose when the need to continue the original use terminates.

DANIEL K. INOUYE
HAWAII

PRINCE KUHIO FEDERAL BUILDING
ROOM 6104, 300 ALA MOANA BOULEVARD
HONOLULU, HAWAII 96850
(808) 546-7550

United States Senate

ROOM 442, RUSSELL SENATE BUILDING
WASHINGTON, D.C. 20510
(202) 224-3934

April 21, 1978

Mr. Gary L. Naftel
President
Easy Rider Corporation
1050 Koloa Street
Honolulu, Hawaii 96816

Dear Mr. Naftel:

I wish to acknowledge receipt of your recent letter and the enclosed newspaper articles concerning military bombing practice at Kaula Island.

I noted an April 14th story in the Honolulu Advertiser and another on April 17th in the Honolulu Star-Bulletin regarding the announcement by Assistant U.S. Attorney William J. Eggers that evidence of military bombing of Kaula Island "indicates that the federal law has been violated." I also observed that he has set an informal deadline of 60 days for the Chief of Naval Operations to confer with the U.S. Secretary of the Interior to resolve this conflict between the law and the Navy's mission.

In regard to your request, I would like to point out that an environmental impact assessment differs from an environmental impact statement in that it may not be as complete as an EIS and it may be used primarily as an internal governmental document rather than one that is readily available to the public. However, I believe that a statement of the findings from the Navy's environmental impact assessment of December 1976 on the use of Kaula Island as a bombing target may be available.

You may be assured that I shall request a copy of this environmental impact assessment and/or a statement of its findings. I shall be in communication

with you again as soon as I have had a response to my inquiry regarding this matter.

Thank you for sharing your concerns about the possible adverse impact on the sooty tern population, fisherman who rely on the tern to help them, and Hawaii's humpback whales that may be caused by the use of Kaula Island as a military bombing practice site.

Aloha,

DANIEL K. INOUYE
United States Senator

DKI:vqbf

SPARK M. MATSUNAGA
HAWAII

WASHINGTON OFFICE:
362 RUSSELL BUILDING
WASHINGTON, D.C. 20510

HONOLULU OFFICE:
3104 PRINCE KUHIO BUILDING
HONOLULU, HAWAII 96850

United States Senate

WASHINGTON, D.C. 20510

June 26, 1978

CHIEF DEPUTY
MAJORITY WHIP

CHAIRMAN, SUBCOMMITTEE ON
TOURISM AND SUGAR
COMMITTEE ON FINANCE

MEMBER:
COMMITTEE ON ENERGY AND
NATURAL RESOURCES

COMMITTEE ON
VETERANS' AFFAIRS

Mr. Gary L. Naftel, President
Easy Rider Corporation
1050 Koloa Street
Honolulu, Hawaii 96816

Dear Mr. Naftel:

The Interior Department has furnished the enclosed report in response to my recent inquiry concerning alleged violations of the Migratory Bird Species Act by the Navy in its use of Kaula Island. You will be pleased to note that the matter is still under active consideration within the Interior Department. A number of meetings have been held with representatives of the Navy and the Marine Corps and, as a result, bombing has been restricted to the Southeastern portion of Kaula. In addition, the Interior Department has advised the Navy that it may be required to obtain a special use permit for Kaula.

The Interior Department also plans to consult with officials of the U. S. Department of Commerce to determine whether the Navy's use of Kaula endangers the humpback whale. The Commerce Department has primary jurisdiction over whales under the Endangered Species Act and the Marine Mammal Protection Act.

If, after reviewing the enclosed report, you have further questions, please do not hesitate to write me again.

Aloha and best wishes.

Sincerely,

Spark Matsunaga
U. S. Senator

Enclosure: Letter from the Interior Department dated 6/22/78

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

Honorable Spark Matsunaga
United State Senate
Washington D.C. 20510

JUN 23 1978

Dear Senator Matsunaga:

This responds to your May 9 letter regarding Navy and Marine use of Kaula Island, Hawaii, as a bombing target and its effect on the migratory bird populations there.

This Department is conducting a thorough review of the matter, including its biological and legal ramifications. In this regard, representatives of the Department's Solicitor's Office and the U.S. Fish and Wildlife Service met with representatives of the Navy and the Marine Corps on May 9 to discuss the matter. Navy representatives reported that bombing activities have been restricted to the Southeastern portion of the Island, an action which should alleviate the problem.

The Solicitor's Office advises it will recommend to the Navy that application be made to the Fish and Wildlife Service for a special purpose permit to allow the taking of migratory birds incidental to bombing activities. If such a permit is issued, it will be conditioned on the Navy's efforts to ensure minimal adverse effects to the resource.

It may be necessary for the Fish and Wildlife Service to enter into a Section 7 consultation with the U.S. Department of Commerce, which has primary jurisdiction over whales under the Endangered Species Act and the Marine Mammal Protection Act. The purpose of such a consultation would be to determine whether the permitted activity would adversely affect the humpback whale, an endangered species which frequents the Kaula Island area.

Please be assured that the Service will do everything possible to ensure that the wildlife of Kaula Island is adequately protected. If we can be of further assistance to you, please feel free to call upon us.

Sincerely

Gary R. Catron

Gary R. Catron
Assistant to the Secretary
and Director of Congressional
and Legislative Affairs.

11/14/98

George.....

Attached is a copy of Reg. 7 as requested. It is brief and pretty broad - subject to interpretation by enforcement officers. We can be hard-nosed or liberal. However, it's better than the previous version and has more "NIHO".

I have no formal reports on KAʻULA or LEHUA, but a pile of personal field notes and records etc for both islands. Also plenty pictures, particularly of Kaʻula. Dave has a few notes too, but nothing worthy of a Bibliography. Be glad to let you browse through them. Perhaps we could do a joint paper on the biological findings. The military-political (bombing!) aspects are sensitive as you know, so would want to avoid this angle.

Let me know.

Congrats. on your work in the recent "Honolulu" Magazine!

Aloha,

Ken W.

DEPARTMENT OF LAND & NATURAL RESOURCES
Division of Fish and Game
1151 Punchbowl Street
Honolulu, Hawaii 96813

PRINTED MATTER

better than the previous version and has more "NIHO".

I have no formal reports on KAʻULA or LEHUA, but a pile of personal field notes and records etc for both islands. Also plenty pictures, particularly of Kaʻula. Dave has a few notes too, but nothing worthy of a Bibliography. Be glad to let you browse through them. Perhaps we could do a joint paper on the biological findings. The military-political (bombing!) aspects are sensitive as you know, so would want to avoid this angle.

Let me know.

Congrats. on your work in the recent "Honolulu" Magazine!

Aloha,

Ron W.

DEPARTMENT OF LAND & NATURAL RESOURCES
Division of Fish and Game
1151 Punchbowl Street
Honolulu, Hawaii 96813

PRINTED MATTER

State of Hawaii
Department of Land and Natural Resources
Honolulu

DIVISION OF FISH AND GAME

* * * * * * * * *

The Board of Land and Natural Resources, in conformity with and pursuant to Section 187-3 and Section 195D-6, Hawaii Revised Statutes, and other applicable laws of the State of Hawaii does hereby amend Regulation 7 of the Division of Fish and Game to read as follows:

REGULATION 7. CONCERNING THE ESTABLISHMENT, PROTECTION AND REGULATION OF THE HAWAII STATE SEABIRD SANCTUARY.

SECTION 1. The Board of Land and Natural Resources, hereinafter referred to as "the Board" does hereby declare and establish the Hawaii State Seabird Sanctuary for the conservation, management and protection of indigenous birds and mammals.

SECTION 2. The Hawaii State Seabird Sanctuary shall consist of and include the following listed State-owned or controlled islands, islets, and rocks and whose locations are noted below:

List of Islands

Name of Island	Location
Mokupuku	Off Awini, North Kohala, Hawaii
Paokalani Island	Off Awini, North Kohala, Hawaii
Keaoi	Off Halape, Kapapala, Kau, Hawaii
Alau Island	Off Haneoo, Hana, Maui
Puuku Island	Off Kauiki Head, Hana, Maui
Keopuka Rock	Off Moiki Pt., Honomanu, Hana, Maui
Moku Mana	Off Pauwalu Pt., Keanae, Hana, Maui
Moku Hala	Off Pauwalu Pt., Keanae, Hana, Maui
Papanui O Kane	Off Opana Pt., Opana, Makawao, Maui
Mokeehia Island	Off Hakuhee Pt., Kahakuloa, Wailuku, Maui
Hulu Island	Off Waihee, Wailuku, Maui
Molokini	Off Puu Olai, Makena, Makawao, Maui
Mokuhooniki	Off Moakea, Molokai, Molokai
Kanaha Rock	Off Moakea, Molokai, Molokai
Mokapa Island	Off Waikolu, Kalawao, Molokai
Okala Island	Off Waikolu, Kalawao, Molokai
Huelo	Off Waikolu, Kalawao, Molokai
Mokumanu	Off Pelekunu, Molokai, Molokai
Mokuaeae	Off Kilauea Pt., Kilauea, Hanalei, Kauai
Lehua Island	Off Puu Kole Pt., Niihau, Waimea, Kauai
Kaula Island	Off southwest Niihau, Waimea, Kauai

Kihewamoku Island	Off Makaloa Pt., Kahuku, Koolauloa, Oahu
Mokuauia Island	Off Kalanai Pt., Laie, Koolauloa, Oahu
Pulemoku Rock	Off Laie Bay, Laie, Koolauloa, Oahu
Kukuihoolua Islet	Off Laie Pt., Laie, Koolauloa, Oahu
Mokualai Islet	Off Laie Pt., Laie, Koolauloa, Oahu
Kekepa Island	Off Palikilo, Heeia, Kaneohe Bay, Oahu
Moku Manu	Off Kahekili Leap, Mokapu Pt., Koolaupoko, Oahu
Mokulea Rock	Off Oneawa, Kailua Bay, Koolaupoko, Oahu
Popoia Island	Off Kailua Beach, Kailua Bay, Koolaupoko, Oahu
Mokulua Islands (two islands)	Off Lanikai, Kailua, Koolaupoko, Oahu
Manana Island	Off Waimanalo, Waimanalo Bay, Koolaupoko, Oahu
Kaohikaipu Island	Off Waimanalo, Waimanalo Bay, Koolaupoko, Oahu
Green Island, Kure Island	28° 25' N Lat. 178° 20' W Long.
Sand Island, Kure Island	28° 25' N Lat. 178° 20' W Long.

SECTION 3. Use Restrictions and Prohibited Acts

A. Except for agents or employees of the Board on official duties or those persons authorized by permits of the Board, the following activities and acts are prohibited on the islands of the Hawaii State Seabird Sanctuary:

1. To kill, disturb, destroy, molest, capture or possess any mammal or bird or the nest or eggs thereof.

2. To possess any firearm, bow and arrow, cross-bows, pellet guns, air guns, sling shots, traps, poisons and snares.

3. To introduce or land any plant or animal.

4. To land or operate any aircraft or land vehicle.

5. To damage, destroy or remove any vegetation.

6. To damage, destroy or remove any official sign or marker.

7. To camp or to erect or construct any structure.

8. To trespass into any posted "No Trespassing Area" when such areas have been established upon the islands to protect nesting colonies of seabirds.

9. To dispose of any litter, garbage or trash.

10. To start or maintain any fires.

B. In addition to the above prohibited acts and activities it shall be unlawful for any person to land upon, enter or attempt to enter or remain upon Moku Manu, Manana Island and Mokuhooniki for any purpose whatsoever unless such person has first obtained a permit in accordance with Section 4 of this Regulation.

SECTION 4. Permits

All applications for permission for exceptions to the prohibitions herein established must be submitted in writing to the Board of Land and Natural Resources, and such application must contain a clear statement as to the applicant's reasons and purposes for such entry. Permits to enter or land upon those islands listed in Section 3B will be issued only for scientific, educational or other activities consistent with the purposes of this regulation. Permits shall specify any such terms and conditions as deemed necessary for the protection and conservation of the wildlife and their habitats on the sanctuary. The Board may, at its discretion, cancel any permit issued pursuant to this regulation for any infraction of the terms and conditions of the permit when such fact is made evident to the satisfaction of the Board.

SECTION 5. Penalty

Any person who violates any of the provisions of this regulation or whoever violates the terms and conditions of any permit issued as provided in this regulation shall be guilty of a misdemeanor and upon conviction thereof shall be imprisoned not more than 1 year or fined not more than $1,000.00 or both as provided under Sec. 195D-9, HRS.

SECTION 6. Severability

Should any section, subsection, sentence, clause or phrase of the Regulation be for any reason held by a court of competent jurisdiction to be invalid, such decision shall not affect the validity of the remaining portions of this Regulation.

Adopted this 11th day of August, 1978 by the Board of Land and Natural Resources.

/s/ W. Y. Thompson
Chairman and Member
Board of Land and Natural Resources

/s/ Stanley W. Hong
Member
Board of Land and Natural Resources

Approved this 30th day of

September, 1978.

/s/ George R. Ariyoshi

Governor of Hawaii

Approved as to Form:

/s/ Lester G. L. Wong

Deputy Attorney General

Date August 28, 1978

PUBLICATION OF
NOTICE OF PUBLIC HEARING
Honolulu Star Bulletin/Advertiser - March 22, 1976
Hawaii Tribune Herald - March 22, 1976
The Garden Island - March 22, 1976
Maui News - March 22, 1976

C E R T I F I C A T E

I hereby certify that the foregoing copy of Regulation 7, Division of Fish and Game, Department of Land and Natural Resources, is a full, true, and correct copy of the original which is on file in the office of the Division of Fish and Game of the Department of Land and Natural Resources.

/s/ W. Y. Thompson

Chairman and Member
Board of Land and Natural Resources

IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
CRESCENT LAKE NATIONAL WILDLIFE REFUGE
ELLSWORTH, NEBRASKA 69340

May 10, 1978

Mr. George Balazs
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P.O. Box 1346, Coconut Island
Kaneohe, Hawaii 96744

Dear George:

Thank you for the update on Kaula Island. Yes, I was on the September 1976 trip. My conclusions were that all recent activity had been restricted to the south tip of the island. Due to the thick layer of loose rock particles (like rough gravel) and lack of vegetation there, very little bird use was found on the south tip. All metallic hardware I encountered elsewhere on the island was well weathered, indicating no recent hits outside the south tip area.

My opinion is that if the island is removed from Navy control, greater harm could result to the wildlife on the island due to the present inability of any resource agency to "scare" or otherwise keep people off the island. Human disturbance could easily exceed that created by the Navy if they practiced only on the south tip at infrequent intervals when wildlife populations were low. Bombs dropped into the ocean during periods when whales and porpoises are present is another matter. Such activity is probably more harmful than frequent or constant human presence, although the Maui whale problem may indicate otherwise.

George, I would love to see that island become a unit of the Hawaiian Islands National Wildlife Refuge with strict public entry regulations and a sufficient enforcement program. Unfortunately, the enforcement part of the program seems to be a weakness at both the Federal and State wildlife agency levels due to manpower shortages and budget constraints. May time prove me wrong.

Our best to you in your endeavors.

Sincerely yours,

C. Fred Zeillemaker
Refuge Manager

cc: Brent Giezentanner
Hawaiian Islands Refuge Comp.
300 Ala Moana Blvd.
Honolulu, Hawaii 96850

October 10, 1975

The Honorable Patsy T. Mink
Congress of the United States
House of Representatives
2338 Rayburn Building
Washington, D.C. 20575

Dear Mrs. Mink:

Thank you very much for the comprehensive reply to my inquiry about the conservation of Kaula Island and adjacent waters. My husband and I are researching this subject in order to prepare a factual article for publication in a nationally distributed conservation magazine. We hope that such coverage will stimulate a greater concern for the problem and, eventually, result in the inclusion of both Kaula and Lehua Islands into the Hawaiian Islands National Wildlife Refuge. I am particularly concerned that the Coast Guard will "give away" Lehua as they did Kaula. Your early support in the Kaula endeavor is certainly most encouraging. I will keep you informed of our progress, and would appreciate your continued assistance as to any up-to-date information that is brought to your attention.

Two important questions still seem to remain unanswered.

1. If Federal funds (for bombs) are being spent to alter the environment of Kaula Island, why has an Environmental Impact Statement not been filed as required under the National Environmental Policy Act of 1969?

2. Under what authority did the Bureau of the Budget (as of 1970, Office of Budget and Management) have the power to transfer jurisdiction of Kaula Island from the Coast Guard to the Navy? The list of functions for this Executive Office as set forth in the U.S. Government Organization Mannual certainly does not seem to include such power.

We have lived and worked in Hawaii for 11 years and have supported you on nearly all stands you have taken. Please count on our active support in your next campaign for re-election.

Sincerely,

Linda R. Evans

Linda R. Evans

PATSY T. MINK
SECOND DISTRICT
HAWAII

COMMITTEE ON EDUCATION AND LABOR (ON LEAVE)
SELECT SUBCOMMITTEE ON EDUCATION
GENERAL SUBCOMMITTEE ON EDUCATION
SUBCOMMITTEE ON EQUAL OPPORTUNITIES

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
SUBCOMMITTEE ON TERRITORIAL AND INSULAR AFFAIRS
SUBCOMMITTEE ON NATIONAL PARKS AND RECREATION
SUBCOMMITTEE ON MINES AND MINING, CHAIRMAN

COMMITTEE ON THE BUDGET

Congress of the United States
House of Representatives
Washington, D.C. 20515

OFFICES:
WASHINGTON, D.C.
2338 RAYBURN BUILDING
PHONE: 225-4906

HONOLULU, HAWAII
346-348 FEDERAL BUILDING
PHONE: 531-4602

WAIPAHU, HAWAII
94-801 FARRINGTON HIGHWAY
PHONE: 671-0170

November 20, 1975

Ms. Linda R. Evans
P.O.Box 8195
Honolulu, Hawaii 96815

Dear Ms. Evans:

Thank you for sending me a copy of your article on Kaula Rock. I appreciate your comprehensive commentary on this little island off of Kauai and would hope that negotiations for termination of target bombing on this island will become a reality in the near future.

With warm personal regards,

Patsy T. Mink

PATSY T. MINK
Member of Congress

PATSY T. MINK
SECOND DISTRICT
HAWAII

COMMITTEE ON EDUCATION AND LABOR
SELECT SUBCOMMITTEE ON EDUCATION
GENERAL SUBCOMMITTEE ON EDUCATION
SUBCOMMITTEE ON EQUAL OPPORTUNITIES

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
SUBCOMMITTEE ON TERRITORIAL AND INSULAR AFFAIRS
SUBCOMMITTEE ON NATIONAL PARKS AND RECREATION
SUBCOMMITTEE ON MINES AND MINING, CHAIRMAN

Congress of the United States
House of Representatives
Washington, D.C. 20515

OFFICES:
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2338 RAYBURN BUILDING
PHONE: 225-4906

HONOLULU, HAWAII
346-348 FEDERAL BUILDING
PHONE: 531-4602

WAIPAHU, HAWAII
94-801 FARRINGTON HIGHWAY
PHONE: 671-0170

October 7, 1975

Ms. Linda Evans
P. O. Box 8195
Honolulu, HI 96815

Dear Ms. Evans:

Thank you for calling my Honolulu office requesting information on Kaula Rock. I have tried for more than 10 years to get the Navy to cease disturbing Kaula Rock, not only because of its impact on the wildlife in and around the island, but because of the imminent danger to the people of Niihau.

My official inquiries on this issue began on March 9, 1965. Enclosed for your information are copies of subsequent correspondence on this issue. To my knowledge, an environmental impact statement has not been filed with the President's Council on Environmental Quality.

Although the Navy has not acceded to my pleas, I will continue to press them for a favorable decision. If I can be of further assistance on this matter, please do not hesitate to call on me. Aloha and best wishes!

Very truly yours,

Patsy T. Mink

PATSY T. MINK
Member of Congress

Enclosure

October 18, 1975
P.O. Box 8195
Honolulu, Hi 96815

The Honorable Daniel K. Inouye
United States Senate
Richard Russell Building
Washington, D.C. 20510

Dear Senator Inouye:

It is my understanding that Kaula Island is used by sea birds for nesting purposes. In spite of this fact, the Navy and Marines use the 100 acre island as a target for bombs, gun fire and other types of weapons. An old newspaper article indicated that missiles have also been fired at the island. I believe that the destructiom of Kaula's flora and fauna should at long last come to a halt. The island should be declared a wildlife sanctuary, such as the other small islands in the northwestern portion of the chain. It seems to be an accepted fact that Kahoolawe can never be reclaimed for human purposes. This gives the military 45 square miles of test and practice area. At least 25% of that area should be suitable for dropping larger bombs when one considers the coastal zone facing away from Maui. To my knowledge, Kahoolawe is not used by nesting sea birds or any other delicate wildlife. Therefore, why does not the Navy give up Kaula Island and only use Kahoolawe?

I would like to know how you presently view this entire matter. In 1965 you were concerned when the Navy dropped 8-250lb bombs on Niihau instead of Kaula. At that time the Navy stated that Kaula was vital because of our involvement in the Viet Nam crisis. What reason can now be given for the continued destructive use of Kaula?

Thank you in advance for your assistance in this matter.

Sincerely,

Linda R. Evans

Linda R. Evans

May 11, 1965 abb

Honorable Patsy T. Mink
House of Representatives
Washington, D.C.

Dear Mrs. Mink:

In your letter of May 3, 1965, to Deputy Attorney General Ramsey Clark, you ask whether transfer of jurisdiction over Kaula Island from the Coast Guard to the Navy would result in a reversion of title to the State of Hawaii.

As stated in your letter, this island was "set aside" for a United States Lighthouse Reservation by Executive Order No. 173 of the Governor of the Territory of Hawaii, dated December 13, 1924. Although the set aside order thus refers to a "Lighthouse Reservation", that designation of a particular purpose did not result in creating a limitation on the Federal Government's right to use of the area. In other words, a reference to the immediate proposed use that occasioned the set aside order is not a limitation on the right of the United States to occupy and control the property for some different purpose. See 48 U.S.C. 511; 37 Op. A.G. 417; 39 Op. A.G. 460, 462; 42 Op. A.G. No. 4, pp. 19-22 (9/12/61). By analogy, the United States does not lose title to property purchased or condemned for a particular authorized purpose when the need to continue the original use terminates.

Accordingly, we do not believe that the problem to which you refer, i.e., the use to which Kaula Island should presently be devoted, is one that involves a legal question. Perhaps the relative value of using the area as a bird sanctuary as opposed to its use as a bombing range can be determined by consultation between the Department of Defense, the Treasury Department, and the Department of the Interior.

Sincerely,

J. EDWARD WILLIAMS
Acting Assistant Attorney General
Lands Division

DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20350

OCT 27 1965

25 OCT 1965

My dear Mrs. Mink:

The Secretary of the Navy's message of October 9th, which furnished information on the accidental aircraft bombing of Niihau Island, was sent prior to receiving your October 9th letter on the same subject. On the assumption that that message has provided sufficient information on the chronology and circumstances in connection with this regrettable incident, this letter concerns itself with your query regarding the possibilities of finding an alternate target for Kaula Rock.

The primary live ordnance target in the Hawaiian area is the Island of Kahoolawe. The targets thereon are used for close air support, naval gunfire and training exercises. The volume of activity scheduled on these targets makes an alternate live ordnance target necessary. This dictates a target that is both isolated and free from human habitation. Kaula Rock is the only such target that has been found suitable in the Hawaiian area.

The Navy's other ordnance targets at Kauna Point on the Island of Hawaii and the Kahuku Range north of Oahu are used for loft bombing training and are limited to the expenditure of small practice bombs. Man-made floating targets, such as the Kahuku range buoy and radar reflector target, can only be used for the expenditure of practice ordnance inasmuch as the target would be destroyed by explosive bombs. This type of target cannot therefore meet the live ordnance requirements satisfied by Kaula Rock.

Hawaiian Navy commanders have made exhaustive studies in their search for air to ground ordnance targets in the Hawaiian area which would not only satisfy Navy requirements but which would be acceptable to the residents of the State of Hawaii. To date no substitute for Kaula Rock has been found. The Navy continually reassesses target requirements as training needs change in the light of changing world situations and changing techniques in ordnance delivery. Please be assured that Kaula Rock is not being

retained simply because it is in being and has been available and used for some thirteen years. It just has not been possible, to date, to find a suitable alternate.

I shall be happy to provide any further information you may desire.

Sincerely yours,

Robert H B Baldwin

ROBERT H. B. BALDWIN
Under Secretary of the Navy

Honorable Patsy T. Mink
House of Representatives
Washington 25, D. C.

bombs article 5 Environment impact Expense of Kaula

DANIEL K. INOUYE
HAWAII

United States Senate

WASHINGTON, D.C. 20510

October 28, 1975

Ms. Linda R. Evans
P.O. Box 8195
Honolulu, Hawaii 96815

Dear Ms. Evans:

Thank you for your recent letter expressing concern about the Navy's destruction of flora and fauna on Kaula Island. I am requesting information from the Navy as to the justification for continuing their weapon experimentation on Kaula. I share your interest in preserving the birds and plants that are native to the island.

However, I do not believe that discontined use of Kaula should be at the expense of use of Kahoolawe as a military target either. It is not an accepted fact that Kahoolawe can never be reclaimed for human purposes. Moreover, the environment and wildlife of Kahoolawe deserves protection from unnecessary destruction. The Senate Appropriations Subcommittee on Military Construction at my urging has recommended that the Defense Department conduct a study on the return of Kahoolawe Island to Hawaii within the pending fiscal 1976 Military Construction Appropriations Act. Kahoolawe has been leased to the Navy by the federal government, since 1941 for Army and Navy bombing operations. Hopefully, this abuse of the land, environment, and wildlife will soon be terminated.

I appreciate your position and will investigate the situation on Kaula but I do not think that continued use of Kahoolawe is a viable alternative.

Aloha,

DANIEL K. INOUYE
United States Senator

DKI:bhm

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

JUN 18 1965

JUN 17 1965

Dear Mrs. Mink:

Since writing to you on May 17 we have given further study to the possibility of establishing a National Wildlife Refuge on Kaula Island. Upon reconsideration it has been determined that we would approach the Department of the Navy with a request that they reappraise their operating requirements so as to protect the flora and fauna on the island. A copy of my letter to the Secretary of Navy is attached for your information.

Sincerely yours,

Secretary of the Interior

Hon. Patsy T. Mink
House of Representatives
Washington, D. C. 20515

Enclosure

MAY 18 1965

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

MAY 17 1965

Dear Mrs. Mink:

On March 24 we wrote to you concerning Kaula Island in the State of Hawaii.

We have been in contact with the Coast Guard and the Department of the Navy for the purpose of determining the possibility of establishing a national wildlife refuge on Kaula Island. Enclosed is a copy of a letter of April 23 that we have received from the Department of the Navy which is self-explanatory.

We appreciate your sincere interest in the conservation of our natural resources, but in the circumstances the Department does not plan to pursue this matter further at this time.

Sincerely yours,

Secretary of the Interior

Hon. Patsy T. Mink
House of Representatives
Washington, D. C. 20515

Enclosure

Kaula Is.

19 1971

CHIEF OF NAVAL OPERATIONS

18 May 1971

Dear Mrs. Mink,

Thank you for your letter of April 28, 1971 concerning the Navy's use of the Kaula Island Bombing Target.

The Navy has a continuing requirement for its military units to complete the final stages of their combat readiness training while enroute to the Western Pacific. Kaula Island has met this training requirement since 1952 by providing a live ordnance impact area. Its remote location away from populated areas and air traffic routes has made it particularly valuable for delivery of all types of conventional ordnance.

I fully appreciate your concern and desire for the Navy to cease bombing on Kaula Island in order to provide a bird sanctuary. However, to do so would seriously impair Fleet readiness and would require acquisition of another suitable target of similar characteristics in the area. Acquisition of a new target would be extremely difficult and would certainly raise serious objections from many other sources.

I would like to be helpful in this matter but it is not possible for the Navy to do so and still meet its continuing training requirements. I am sure you will agree that providing the necessary combat readiness for our nation's armed forces is essential to our security.

I hope this information will be helpful and will give you a better understanding of the Navy's position regarding the importance of retaining the few bombing targets still available.

A similar letter has been sent to Congressman Matsunaga in response to the same request.

Sincerely,

E. R. ZUMWALT, JR.
Admiral, U. S. Navy

Honorable Patsy T. Mink
House of Representatives
Washington, D. C. 20515

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO

515/5058

APR 4 1973

APR 7 1973

Dear Mrs. Mink,

Thank you for your letter of March 23, 1973 concerning the status of the Kaula Rock Target. The Chief of Legislative Affairs requested that I respond for him.

The Kaula Rock Target is in active status and continues to be utilized for weapons delivery training. It is anticipated that the target requirement will remain as long as Navy and Marine aircraft squadrons are located in the Hawaiian area.

Your interest in this matter and support of the Navy are appreciated. If we can be of further assistance, please let us know.

Sincerely,

Honorable Patsy T. Mink
House of Representatives
Washington, D. C. 20515

APR 7 1973

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO

Ser 515F/120771

5 JUN 1975

Dear Mrs. Mink,

In further response to your letter of April 29, 1975, concerning the resolution requesting the United States Navy to cease bombing operations on Kaula Rock, Hawaii, let us assure you that the Navy is vitally interested in accommodating the respective requirements for weapons training ranges and civil land use.

To insure the most efficient management and use of its assets, the Navy is continually evaluating its facilities required to support fleet operations. The requirement for the retention of Kaula Rock as a weapons training range has been reviewed and its use is considered essential to the training and readiness of Navy and Marine aviation units stationed in Hawaii and those enroute to the Western Pacific. No other suitable target is available in the Hawaiian area.

A similar response has been provided to Senator Hiram L. Fong.

Your interest in this matter and support of the Navy are appreciated. If we can be of further assistance, please let us know.

Sincerely,

J. S. CHRISTIANSEN
Rear Admiral, USN
Acting Deputy Chief of
Naval Operations (Air Warfare)

Honorable Patsy T. Mink
House of Representatives
Washington, D. C. 20515

PATSY T. MINK
SECOND DISTRICT
HAWAII

COMMITTEE ON EDUCATION AND LABOR
SELECT SUBCOMMITTEE ON EDUCATION
GENERAL SUBCOMMITTEE ON EDUCATION
SUBCOMMITTEE ON EQUAL OPPORTUNITIES

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
SUBCOMMITTEE ON TERRITORIAL AND INSULAR AFFAIRS
SUBCOMMITTEE ON NATIONAL PARKS AND RECREATION
SUBCOMMITTEE ON MINES AND MINING, CHAIRMAN

Congress of the United States
House of Representatives
Washington, D.C. 20515

OFFICES:
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94-801 FARRINGTON HIGHWAY
PHONE: 671-0170

November 4, 1975

The Honorable J. William Middendorf II
Secretary of the Navy
The Pentagon
Washington, D.C. 20350

Dear Secretary Middendorf:

Through correspondence dating back over the past decade, you are aware of my continuing concern over the Navy's bombing of Kaula Rock in the State of Hawaii.

I am aware through correspondence from the Department of the Navy as recently as this past June that the Navy still considers Kaula Rock essential to the training and readiness of Navy and Marine Aviation units in Hawaii and the Western Pacific.

I do have two questions about the island to which I would like answers:

1. Why has there not been an Environmental Impact Statement filed as required under the National Environmental Policy Act of 1969 in connection with the continuing use of the island as a target range?

2. Under what authority did the Bureau of the Budget (Office of Management and Budget) transfer jurisdiction of Kaula Rock from the Coast Guard to the Navy? An examination of the functions for this office as set forth in the U.S. Government Organization Manual would seem to me not to include such authority.

I would appreciate your early attention to these matters. Thank you for your assistance.

Very truly yours,

PATSY T. MINK
Member of Congress

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

NOV 19 1975

IN REPLY REFER TO
Ser 44/111261
14 November 1975

The Honorable Patsy T. Mink
House of Representatives
Washington, D. C. 20515

Dear Mrs. Mink,

The Secretary of the Navy has asked me to advise you that the matter voiced in your letter of 4 November regarding the Navy's use of Kaula Rock is being looked into.

Upon completion of this task, which should take about two weeks, you may expect a reply from the Secretary of the Navy.

Sincerely,

R. F. JORTBERG
Rear Admiral, CEC, U. S. Navy
Director, Shore Facilities Programming Division
By direction of the Chief of Naval Operations

DANIEL K. INOUYE
HAWAII

United States Senate

WASHINGTON, D.C. 20510

November 20, 1975

Ms. Linda R. Evans
P.O. Box 8195
Honolulu, Hawaii 96815

Dear Ms. Evans:

Thank you for forwarding to me your very interesting article in the Sunday Focus section of the Sunday Star-Bulletin and Advertiser I am still awaiting a response from the Department of the Navy to my earlier inquiry. In the meantime, progress has been made in assuring that the needs of the Department of Defense for the use of such facilities for target purposes receives far more detailed attention and scrutiny than has earlier been the case.

Aloha,

DANIEL K. INOUYE
United States Senator

DKI:bhm

DANIEL K. INOUYE
HAWAII

United States Senate

WASHINGTON, D.C. 20510

November 12, 1975

Ms. Linda R. Evans
P.O. Box 8195
Honolulu, Hawaii 96815

Dear Ms. Evans:

I wish to share with you a copy of an interim response which I received from the Department of the Navy in response to an inquiry which I made on your behalf. I believe the communication is self-explanatory and please be assured that I shall be back in touch with you as soon as I have anything further concerning this matter.

Aloha,

DANIEL K. INOUYE
United States Senator

DKI:bhm
Enclosure

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO

OP-515/120867
5 NOV 1975

Dear Senator Inouye,

Thank you for your letter of October 28, 1975, addressed to the Secretary of the Navy, concerning the continued use of Kaula Island as a target for practice bombing. The Secretary has requested that we investigate this matter.

This is being investigated and a complete report will be provided by the Secretary within the next thirty days.

Your interest in this matter and support of the Navy are appreciated.

Sincerely,

W. P. Lawrence
By direction

Honorable K. Inouye
United States Senate
Washington, D. C. 20510

BUREAU OF AIR MAIL.—Created in Interstate Commerce Commission to carry out provisions of Air Mail Act (48 Stat. 933; 39 U.S.C. 469–469s). EO 7959 of Aug. 22, 1938, transferred personnel, property, and unexpended balances of appropriations from Interstate Commerce Commission to Civil Aeronautics Authority (see appendix A).

BUREAU OF ANIMAL INDUSTRY (AGRICULTURE).—Established by act of May 29, 1884 (23 Stat. 31; 7 U.S.C. 391), to deal with prevention, control, and eradication of animal diseases and parasites, conduct research on production of livestock and their products, perform inspection duties, and otherwise seek to protect and develop livestock, meat, poultry, and related industries. Functions transferred to Agricultural Research Service under Secretary's memorandum 1320, supp. 4, of Nov. 2, 1953.

BUREAU OF BIOLOGICAL SURVEY (INTERIOR).—Established by Secretary's order on July 1, 1885, as part of Division of Entomology in Department of Agriculture. Became a separate bureau under Agricultural Appropriation Act of 1905. Transferred, with functions and personnel, from Department of Agriculture to Department of the Interior by authority of Reorg. Plan II, part 1, section 4 (f), (g), (h), effective July 1, 1939. Consolidated with Bureau of Fisheries by section 3 of Reorg. Plan III into Fish and Wildlife Service, Department of the Interior, effective June 30, 1940.

BUREAU OF THE BUDGET.—Created by act of June 10, 1921 (42 Stat. 20; 31 U.S.C. 11–16), and was located in the Treasury Department, but under the immediate direction of the President. Transferred to the Executive Office of the President by Reorg. Plan I, part 1, sec. 1, effective July 1, 1939. Reorganized by Reorg. Plan 2 of 1970 and designated Office of Management and Budget (see text), effective July 1, 1970.

BUREAU OF THE CENSUS (COMMERCE).—Vital Statistics functions transferred from Department of Commerce to Federal Security Administrator by Reorg. Plan 2, effective July 16, 1946, to be performed through Public Health Service or other facilities of Federal Security Agency (see appendix A).

BUREAU OF CHEMISTRY AND SOILS.—Created July 1, 1927, by 1928 Agricultural Appropriation Act (44 Stat. 970). Merged with Bureau of Agricultural Engineering by order of Secretary, Oct. 16, 1938, to form Bureau of Agricultural Chemistry and Engineering. (See Bureau of Agricultural and Industrial Chemistry, appendix A.)

BUREAU OF COMMUNITY FACILITIES (FWA).—Responsibilities placed in the Bureau by Federal Works Administrator pursuant to Reorg. Plan I, effective July 1, 1939, included administration of provisions of title V of War Mobilization and Reconversion Act of 1944 (58 Stat. 791; 50 U.S.C. App. 1671); the Virgin Islands public works program authorized by act approved Dec. 20, 1944 (58 Stat. 827); community facilities program under act approved June 28, 1941 (55 Stat. 361; 42 U.S.C. 1592–1592e), as amended; the Veterans Educational Facilities program under act of Aug. 8, 1946 (60 Stat. 958; 42 U.S.C. 1572, 1574); Disaster Surplus Personal Property Program under act approved July 25, 1947 (61 Stat. 422; 42 U.S.C. 1855–1855g); and Water Pollution Control program under act approved June 30, 1948 (62 Stat. 1155; 33 U.S.C. 466). Transferred to General Services Administration by act approved June 30, 1949 (63 Stat. 380; 5 U.S.C. 630b), where it functioned as Community Facilities Service. Reorg. Plans 15, 16, and 17 provided for transfer of certain of these functions to various agencies, including Department of the Interior, Housing and Home Finance Agency, and Federal Security Agency (see appendix A), effective May 24, 1950.

BUREAU OF CONSTRUCTION AND REPAIR (NAVY).—Established by act of July 5, 1862 (12 Stat. 510), as one of the bureaus replacing the Bureau of Construction, Equipment and Repairs (see appendix A). Abolished by act of June 20, 1940 (54 Stat. 492; 10 U.S.C. 5131, 5132, 5145), and functions transferred to Bureau of Ships (see appendix A).

BUREAU OF CONSTRUCTION, EQUIPMENT AND REPAIRS (NAVY).—Established by act of Aug. 31, 1842 (5 Stat. 579). Abolished by act of July 5, 1862 (12 Stat. 510), and functions distributed among Bureaus of (1) Equipment and Recruiting, (2) Construction and Repair, and (3) Steam Engineering (see appendix A).

BUREAU OF CUSTOMS (TREASURY).—Functions relating to award of numbers to undocumented vessels, vested in Collectors of Customs, transferred to Commandant of Coast Guard by EO 9083 of Feb. 27, 1942. Transfer made permanent by Reorg. Plan III, effective July 16, 1946.

BUREAU OF DAIRY INDUSTRY (AGRICULTURE).—Bureau of Dairying established by act of May 29, 1924 (43 Stat. 243; 7 U.S.C. 401). The name Bureau of Dairy Industry first appeared in the Agricultural Appropriation Act of 1927 (44 Stat. 499). Bureau conducted investigations in breeding, feeding, nutrition, and management of dairy cattle and conducted research on dairy products and dairy byproducts. Functions transferred to Agricultural Research Service under Secretary's memorandum 1320, supp. 4, of Nov. 2, 1953.

BUREAU OF DRUG ABUSE CONTROL (FDA).—Created to carry out functions of the Drug Abuse Control Amendments of 1965 (79 Stat. 226; 21 U.S.C. 360a note). Functions transferred to the Bureau of Narcotics and Dangerous Drugs, Department of Justice (see text), by Reorganization Plan 1 of 1968, effective Apr. 8, 1968.

BUREAU OF EFFICIENCY.—Organized under act of Feb. 28, 1916 (39 Stat. 15), to investigate duplication of statistical and other work in various branches of the Government. Classification Act of 1923 required the Chief of Bureau of Efficiency to serve on Personnel Classification Board. Abolished by section 17 of act approved Mar. 3, 1933 (47 Stat. 1519; see note, 5 U.S.C. 646–651b), effective June 3, 1933. Records transferred to Bureau of the Budget.

BUREAU OF EMPLOYERS' COMPENSATION.—Transferred from Federal Security Agency to Department of Labor by Reorg. Plan 19, effective May 24, 1950.

BUREAU OF EMPLOYMENT SECURITY (LABOR).—Transferred from the Federal Security Agency by Reorg. Plan 2 of 1949, effective Aug. 20, 1949. Abolished by Secretary's order of Mar. 14, 1969 and functions transferred to the Manpower Administration (see text). See also United States Employment Service, appendix A.

BUREAU OF ENGINEERING (NAVY).—Established as Bureau of Steam Engineering by act of July 5, 1862 (12 Stat. 510). Redesignated by act of June 4, 1920 (41 Stat. 828), as Bureau of Engineering. Abolished by act of June 20, 1940 (54 Stat. 492; 10 U.S.C. 5131, 5132, 5145), and functions transferred to Bureau of Ships (see appendix A).

BUREAU OF ENTOMOLOGY (AGRICULTURE).—See Bureau of Entomology and Plant Quarantine, below.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.—Bureau of Entomology and Bureau of Plant Quarantine created by Agricultural Appropriation Act of 1905 (33 Stat. 289) and 1933 (47 Stat. 640), respectively. Consolidated with disease control and eradication work of Bureau of Plant Industry into Bureau of Entomology and Plant Quarantine by Agricultural Appropriation Act of 1935 (48 Stat. 467). Functions transferred to Agricultural Research Service under Secretary's memorandum 1320, supp. 4, of Nov. 2, 1953.

BUREAU OF EQUIPMENT (NAVY).—Established as Bureau of Equipment and Recruiting by act of July 5, 1862 (12 Stat. 510), as one of the bureaus replacing the Bureau of Construction, Equipment and Repairs (see appendix A). Designated as Bureau of Equipment in annual appropriation acts commencing with fiscal year 1892 (26 Stat. 192) after cognizance over enlisted personnel matters was transferred effective July 1, 1889, to Bureau of Navigation (see text, Bureau of Naval Personnel). Functions distributed among other bureaus and offices by authority of act of June 24, 1910 (36 Stat. 613). Abolished by act of June 30, 1914 (38 Stat. 408).

BUREAU OF FAMILY SERVICES (HEW).—Created Jan. 1, 1962 by Secretary's order. Functions redelegated to the Social and Rehabilitation Service (see text) by Secretary's reorganization of Aug. 15, 1967.

BUREAU OF FEDERAL SUPPLY.—Established in Treasury Department as Procurement Division by EO 6166 of June 10, 1933, under authority of act of Mar. 3, 1933 (47 Stat. 1517). Name changed to Bureau of Federal Supply, effective Jan. 1, 1947, by Treasury Department Order 73, dated Nov. 10, 1946. Transferred on July 1, 1949, to General Services Administration (where it functions as Federal Supply Service) pursuant to section 102 of act approved June 30, 1949 (63 Stat. 380; 5 U.S.C. 630a).

BUREAU OF FEDERAL CREDIT UNIONS.—See Federal Credit Union System, appendix A.

BUREAU OF FISHERIES (INTERIOR).—Joint Resolution of Congress, approved Feb. 9, 1871 (16 Stat. 594), provided for appointment of a Commissioner of Fish and Fisheries to head U.S. Fish Commission. On July 1, 1903, when Department of Commerce and Labor was formed in accordance with act of Feb. 14, 1903 (32 Stat. 827; 5 U.S.C. 591, 611), Commission became a bureau in the new department. Act of Mar. 4, 1913 (37 Stat. 736; 5 U.S.C. 611), created Department of Labor, and Bureau of Fisheries was left in Department of Commerce.

Transferred from Department of Commerce to Department of the Interior by authority of Reorg. Plan II, part 1, section 4(e), effective July 1, 1939. Consolidated by section 3 of Reorg. Plan III with Bureau of Biological Survey into Fish and Wildlife Service, in Department of the Interior, effective June 30, 1940 (see U.S. Fish and Wildlife Service, text).

BUREAU OF FOREIGN COMMERCE (COMMERCE).—Established by Secretary of Commerce on Oct. 12, 1953, under authority of Reorg. Plan 5 of 1950, to promote international trade, including export and import of goods and services, investment abroad, international travel, and to administer export controls. Abolished by departmental order of Aug. 7, 1961, and functions vested in two new bureaus—Bureau of International Programs and Bureau of International Business Operations (see appendix A).

BUREAU OF FOREIGN AND DOMESTIC COMMERCE (COMMERCE).—Created by an act approved Aug. 23, 1912 (37 Stat. 407; 5 U.S.C. 597, 15 U.S.C. 171), to foster, promote, and develop foreign and domestic commerce of the United States. Through internal reorganizations, functions of the Bureau reassigned to other offices of the Department.

BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS.—Office of Home Economics became Bureau of Home Economics by Secretary's memorandum 430, effective July 1, 1923, pursuant to Agricultural Appropriation Act of 1924 (42 Stat. 1289). In February 1943 redesignated Bureau of Human Nutrition and Home Economics, in accordance with Research Administration memorandum 5 issued pursuant to EO 9069 and in conformity with Secretary's memorandums 960 and 986. The Bureau conducted research on food, fiber, and other products of agriculture contributing to everyday living, and on economic problems, including housing and household buying, that affect rural families. Functions transferred to Agricultural Research Service under Secretary's memorandum 1320, supp. 4, of Nov. 2, 1953.

BUREAU OF IMMIGRATION AND NATURALIZATION.—Bureau of Immigration established by act of Mar. 3, 1891 (26 Stat. 1085; 5 U.S.C. 342), as a branch of Treasury Department, and transferred to Department of Commerce and Labor by act of Feb. 14, 1903 (32 Stat. 827; 5 U.S.C. 342a). By act of June 29, 1906 (34 Stat. 596; 8 U.S.C. 357), naturalization duties made a part of its functions, and it became Bureau of Immigration and Naturalization. Bureau made separate division after Department of Labor was created by act of Mar. 4, 1913 (37 Stat. 736; 5 U.S.C. 611). Consolidated into Immigration and Naturalization Service, Department of Labor, by section 14 of EO 6166 of June 10, 1933. Transferred to Department of Justice by Reorg. Plan V, effective June 14, 1940.

BUREAU OF INDUSTRIAL ALCOHOL (TREASURY).—Created by section 8 of Prohibition

ecutive Office of the President by
President's Reorganization Plans I
d II, effective July 1, 1939. Execu-
e Order 8248 of September 8, 1939,
ablished the various divisions of the
Executive Office and defined their functions, with the exception of those agencies established in or transferred to the Executive Office by subsequent legislation.

The White House Office

1600 Pennsylvania Avenue, NW., Washington, D.C., 20500.
Phone, 456–1414

cial Assistant to the President	McGeorge Bundy.
cial Assistant to the President	Horace Busby, Jr.
cial Assistant to the President	S. Douglass Cater, Jr.
cial Assistant to the President	Richard N. Goodwin.
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s Secretary to the President	George E. Reedy.
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slative Counsel	Jake Jacobsen.
cial Assistant to the President—Director, Food r Peace	Richard W. Reuter.
cial Assistant to the President on the Arts	Roger L. Stevens.
isor for National Capital Affairs	Charles A. Horsky.
tary Aide to the President	Maj. Gen. Chester V. Clifton, USA.
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onal Secretary to the President	Mrs. Juanita Duggan Roberts.
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al Secretary	Mrs. Bess Abell.
utive Clerk	William J. Hopkins.
f Usher	J. Bernard West.

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he staff of the President facili- and maintains communication the Congress, the individual bers of the Congress, the heads of executive departments and agencies, the press and other information media, and the general public.

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Bureau of the Budget

1965-66 (1964-65)

Executive Office Building, Washington, D.C., 20503. Phone, 382–8421

Director	Charles L. Schultze. Kermit Gordon
Deputy Director	Elmer B. Staats. Same
Assistant Director	William M. Capron. Schultze
Assistant Director	Henry S. Rowen.
Executive Assistant Director	(Vacancy).
Special Assistant to the Director	William D. Carey.
General Counsel	Roger W. Jones.
Assistant to the Director	Arthur B. Focke. Same
Assistant to the Director	Robert Amory, Jr.
Administrative Assistant to the Director	Joseph Laitin.
Assistant Director for Budget Review	E. Charles Woods.
Assistant Director for Legislative Reference	William F. McCandless. Same
Assistant Director for Management and Organization	Philip S. Hughes.
Assistant Director for Statistical Standards	Harold Seidman.
Chief, Office of Financial Management	Raymond T. Bowman.
Chief, Commerce, Housing and Transportation Division	William J. Armstrong.
Chief, Education, Manpower and Science Division	Sam R. Broadbent.
Chief, General Government Division	William B. Cannon.
Chief, Health, Welfare and Veterans Division	Hirst Sutton.
Chief, International Division	Irving J. Lewis.
Chief, Military Division	James W. Clark.
Chief, Resources and Civil Works Division	Ellis H. Veatch. Same
	Carl H. Schwartz, Jr. Same

CREATION AND AUTHORITY.—The Budget and Accounting Act approved June 10, 1921 (42 Stat. 20; 31 U. S. C. 11–16), provided that the President shall transmit to Congress the proposed annual budget of the United States, together with other budgetary information. The same act created the Bureau of the Budget, locating it in the Treasury Department, but placing it under the immediate direction of the President. Under Reorganization Plan I of 1939 (5 U.S.C. 133t, note), the Bureau was transferred from the Treasury Department to the Executive Office of the President, established at the same time.

In addition to being the Federal Government's budget agency, the Bureau serves as the President's staff for the improvement of management and organization in the executive branch, for the improvement of financial management and accounting systems in the Federal agencies, for the coordination and clearance of legislative proposals and Executive orders, and for the coordination and improvement of the Government's statistical activities.

In preparing the budget, the Bureau has authority "to assemble, correlate, revise, reduce, or increase the requests for appropriations of the several departments and establishments." Under the Government Corporation Control Act of 1945 (59 Stat. 598; 31 U. S. C. 847), similar authority was given the Bureau with respect to the preparation and review of budgets for wholly owned Government corporations.

The Budget and Accounting Procedures Act of 1950 (64 Stat. 834; 31 U. S. C. 18a, 18b) amended the Budget and Accounting Act by revising and simplifying budget and accounting procedures and by clarifying the Bureau's responsibilities with regard to statistical information and the development of better organization, coordination, and management of the executive branch. The act of August 1, 1956 (70 Stat. 782), amended both the Budget and Accounting Act and the Budget and Accounting Procedures Act, mainly to improve further governmental budgeting and accounting methods and procedures.

Section 3679 of the Revised Statutes, as amended (31 U. S. C. 665), prescribed procedures by which the Director of the Bureau apportions appropriations, made agency systems of administrative control of funds subject to the Director's approval, and authorized the setting of budgetary reserves.

Under Executive Order 9384 of October 4, 1943, the Bureau reviews agency reports on Federal public works and improvement projects.

Under the Federal Reports Act of 1942 (56 Stat. 1078; 5 U. S. C. 139–139f), the Bureau coordinates Federal reporting and statistical services to eliminate duplication, reduce the cost, and minimize the burdens of furnishing information to Federal agencies. By Executive Order 10033 of February 8, 1949, the Director of the Bureau was given authority to coordinate the provision of statistical information to intergovernmental organizations. Executive Order 10253 of June 11, 1951, authorized the Director to develop programs and issue regulations for the improvement of Federal statistical activities.

Additional statutory authorities conferred upon the Director require his approval of the printing of periodicals from appropriated funds and of agency regulations dealing with overpayments to Government employees. The Director also has authority to issue regulations in such fields as travel on Government business and allowances for uniforms. On appeal of an agency, he makes final decisions with respect to the establishment of motor vehicle pools.

STATEMENT OF FUNCTIONS.—Executive Order 8248 of September 8, 1939, establishing the divisions of the Executive Office of the President and defining their functions, sets forth the Bureau's functions as follows:

1. To assist the President in the preparation of the budget and the formulation of the fiscal program of the Government.

2. To supervise and control the administration of the budget.

3. To conduct research in the development of improved plans of administrative management, and to advise the executive departments and agencies of the Government with respect to improved administrative organization and practice.

4. To aid the President to bring about more efficient and economical conduct of Government service.

5. To assist the President by clearing and coordinating departmental advice on proposed legislation and by making recommendations as to Presidential action on legislative enactments, in accordance with past practice.

6. To assist in the consideration and clearance and, where necessary, in the preparation of proposed Executive orders and proclamations, in accordance with the provisions of Executive Order 11030 of June 19, 1962.

7. To plan and promote the improvement, development, and coordination of Federal and other statistical services.

8. To keep the President informed of the progress of activities by agencies of the Government with respect to work proposed, work actually initiated, and work completed, together with the relative timing of work between the several agencies of the Government; all to the end that the work programs of the several agencies of the executive branch of the Government may be coordinated and that the moneys appropriated by the Congress may be expended in the most economical manner possible with the least possible overlapping and duplication of effort.

ORGANIZATION

The Bureau is headed by the Director who, in his general supervision, is assisted by the other principal officials of the Bureau.

OFFICE OF BUDGET REVIEW.—This office coordinates the review of Government programs and financial plans, the preparation of the budget and supplemental estimates, the system of apportioning appropriations, and the use of financial reports in budgeting. It prepares fiscal analyses, recommends budget policies and guides, and plans improvements in the budget process and structure.

OFFICE OF FINANCIAL MANAGEMENT.—This office brings about better financial management throughout the executive branch and works cooperatively with the executive agencies in the improvement of governmentwide financial management practices and procedures. Through this office the Bureau participates in the Joint Financial Management Improvement Program which is carried out together with the General Accounting Office and the Treasury Department under the Budget and Accounting Procedures Act of 1950.

OFFICE OF LEGISLATIVE REFERENCE.—This office coordinates and clears, for conformity with the program of the President, recommendations of the various agencies with respect to proposed legislation and enrolled bills; makes recommendations to the President thereon; and participates in the development of the President's legislative program.

OFFICE OF MANAGEMENT AND ORGANIZATION.—This office provides guidance and coordination in Bureau activities toward better agency management and organization; conducts organizational studies; coordinates the Bureau's governmentwide cost reduction and management improvement efforts; and conducts studies to improve governmentwide management practices and procedures.

OFFICE OF STATISTICAL STANDARDS.—This office is charged with the Bureau's responsibilities for the improvement, development, and coordination of Federal statistical services under section 103 of the Budget and Accounting Procedures Act of 1950, and for minimizing reporting costs to the Government and the public under the Federal Reports Act of 1942. It serves as the focal point for United States participation in statistical activities of international organizations and maintains surveillance over the publication of statistics in the interests of national security.

THE DIVISIONS.—Each division is concerned with a broad segment of the Government's program. The divisions are responsible for the Bureau's functions other than those assigned to the offices described above. The divisions are: Commerce, Housing and Transportation; Education, Manpower and Science; General Government; Health, Welfare and Veterans; International; Military; and Resources and Civil Works. Each division, for its program area, examines agency requests for funds and for apportionment of appropriations, gives continuing attention to the execution of the budget, reviews and develops recommendations on proposed legislation, stimulates and assists the agencies in the improvement of management and organization, and undertakes special projects, including those relating to long-range budgetary and fiscal analysis and organizational planning.

Approved.

CHARLES L. SCHULTZE,
Director.

Council of Economic Advisers

Executive Office Building, Washington, D.C., 20506. Phone, EXecutive 3-3300

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Member . . . . . OTTO ECKSTEIN.
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Assistant to the Chairman . . . . . LEWIS J. SPELLMAN.

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Physician to the President	Rear Adm. William M. Lukash, MC, USN.
Chief Executive Clerk	Robert D. Linder.
Chief Usher	Rex W. Scouten.

This Office serves the President in the performance of the many detailed activities incident to his immediate office.

The staff of the President facilitates and maintains communication with the Congress, the individual Members of the Congress, the heads of executive departments and agencies, the press and other information media, and the general public.

The various Assistants to the President are personal aides and assist the President in such matters as he may direct.

Formerly - Bureau of the Budget

Office of Management and Budget

Executive Office Building, Washington, D.C. 20503
Phone, 202–395–3000

+ James Lynn

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Executive Assistant to the Director	J. Patrick Garner.
Deputy Director	(Vacancy).
Special Assistant to the Deputy Director	Betty McCormick.
Special Assistant to the Deputy Director for Federal Drug Management	Edward E. Johnson.
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Deputy Associate Director, National Security Division	David Sitrin.
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Deputy Associate Director, National Security and International Affairs Management Division	Donald G. Ogilvie.

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Associate Director for Human and Community Affairs	PAUL H. O'NEILL.
Deputy Associate Director, Human Resources Division	C. WILLIAM FISCHER.
Deputy Associate Director, Community and Veterans Affairs Division	DONALD A. DERMAN.
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Associate Director, Natural Resources, Energy and Science	FRANK G. ZARB.
Deputy Associate Director, Natural Resources Division	DONALD E. CRABILL.
Deputy Associate Director, Energy and Science Division	HUGH F. LOWETH.
Deputy Associate Director, Natural Resources, Energy and Science Management Division	JOHN A. HILL.

The Office of Management and Budget was established in the Executive Office of the President pursuant to Reorganization Plan 2 of 1970, effective July 1, 1970.

By Executive Order 11541 of July 1, 1970, all functions transferred to the President of the United States by part I of Reorganization Plan 2 of 1970 were delegated to the Director of the Office of Management and Budget. Such functions are to be carried out by the Director under the direction of the President. The Office's functions include the following:

To aid the President to bring about more efficient and economical conduct of Government service;

To assist in developing efficient coordinating mechanisms to implement Government activities and to expand interagency cooperation;

To assist the President in the preparation of the budget and the formulation of the fiscal program of the Government;

To supervise and control the administration of the budget;

To conduct research and promote the development of improved plans of administrative management, and to advise the executive departments and agencies of the Government with respect to improved administrative organization and practice;

To assist the President by clearing and coordinating departmental advice on proposed legislation and by making recommendations as to Presidential action on legislative enactments, in accordance with past practice;

To assist in the consideration and clearance and, where necessary, in the preparation of proposed Executive orders and proclamations;

To plan and promote the improvement, development, and coordination of Federal and other statistical services;

To plan and develop information systems to provide the President with program performance data;

To plan, conduct, and promote evaluation efforts to assist the President in the assessment of program objectives, performance, and efficiency;

To plan and develop programs to recruit, train, motivate, deploy, and evaluate career personnel;

To keep the President informed of the progress of activities by agencies of the Government with respect to

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work proposed, work actually initiated, and work completed, together with the relative timing of work between the several agencies of the Government all to the end that the work programs of the several agencies of the executive branch of the Government may be coordinated and that the moneys appropriated by the Congress may be expended in the most economical manner with the least possible overlapping and duplication of effort.

Sources of Information

CONTRACTS

Contact the Assistant to the Director for Administration, Office of Management and Budget, Executive Office Building, Washington, D.C. 20503.

PUBLICATIONS

The U.S. Budget in Brief, The Budget of the U.S. Government, The Budget of the U.S. Government, Appendix, Special Analyses of the United States, and *Catalog of Federal Domestic Assistance* are for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

EMPLOYMENT

Various civil service examinations and registers are used for filling positions, such as economist, operations research analyst, etc. Inquiries on employment and the college recruitment program should be directed to the Personnel Office, Office of Management and Budget, Executive Office Building, Washington, D.C. 20503.

For further information, contact the Assistant to the Director for Administration, Office of Management and Budget, Executive Office Building, Washington, D.C. 20503. Phone, 202–395–4790.

Approved.

ROY L. ASH,
Director.

Council of Economic Advisers

Executive Office Building, Washington, D.C. 20506
Phone, 202–395–3000

Chairman	ALAN GREENSPAN.
Member	WILLIAM J. FELLNER.
Member	GARY L. SEEVERS.
Special Assistant to the Chairman	JOHN M. DAVIS, JR.

The Council of Economic Advisers was established in the Executive Office of the President by the Employment Act of 1946 (60 Stat. 24; 15 U.S.C. 1023). It now functions under that statute and Reorganization Plan 9 of 1953, effective August 1, 1953. The Council consists of three members appointed by the President by and with the advice and consent of the Senate. One of the members is designated by the President as chairman.

The Council analyzes the national economy and its various segments; advises the President on economic developments; appraises the economic programs and policies of the Federal Government; recommends to the President policies for economic growth and stability; and assists in the preparation of the economic reports of the President to the Congress.

For further information, contact the Council of Economic Advisers, Executive Office Building, Washington, D.C. 20506. Phone, 202–395–5084.

Approved.

ALAN GREENSPAN,
Chairman.

National Security Council

Executive Office Building, Washington, D.C
Phone, 202–395–3000

NE

The President	
The Vice President	
Secretary of State	
Secretary of Defense	

OFF

Assistant to the President	
Staff Secretary	

The National Security Council was established by the National Security Act of 1947 (61 Stat. 496; 50 U.S.C. 402), amended by the National Security Act Amendments of 1949 (63 Stat. 579; 50 U.S.C. 401 et seq.). Its function is to advise the President with respect to the integration of domestic, foreign, and military policies relating to the national security.

The Council is composed of the President, the Vice President, the Secretary of State, and the Secretary of Defense. The Council is located within the Executive Office of the President.

Central Intelligence Agency

Washington, D.C. 20505
Phone, 202–351–1100

Director	
Deputy Director	

The Central Intelligence Agency was established under the National Security Council by the National Security Act of 1947 (61 Stat. 497; 50 U.S.C. 403). The Director and Deputy Director are appointed by the President by and with the advice and consent of the Senate.

For the purpose of coordinating the intelligence activities of the several Government departments and agencies in the interest of national security, the Agency, under the direction of the National Security Council:

Advises the National Security Council in matters concerning such intelli-

KAUAI-NIIHAU VOLCANO

A study of the hydrographic charts of Kauai and Niihau shows that these two islands are the summits of a compound volcano, one of the mountains in the Hawaiian range, which extends from an unnamed shoal 280 miles west-northwest of Ocean Island 1900 miles southeastward to the island of Hawaii. On the basis of existing data, the submarine contours cannot be drawn with sufficient detail to indicate whether or not submerged major eruptive centers exist, though there are certain indications that such is the case. As on Oahu, Maui, and Molokai, the western member (Niihau) of the pair of domes first became extinct. Whether Kauai and Niihau ever were united above sea level cannot be determined. Since downfaulting has caused the disappearance of the eastern half of Niihau, the islands were once more nearly contiguous than at present, but I do not think that exposed connections ever existed between them. The original relations probably were similar to those now existing between Maui, Molokai, Lanai, and Kahoolawe—these four sections of a single huge volcano are separated from each other by narrow channels of relatively shallow depths.

The submarine connection between Kauai and Niihau is shown by map and cross section (Pl. X; figs. 11, 12). The contours have been plotted from

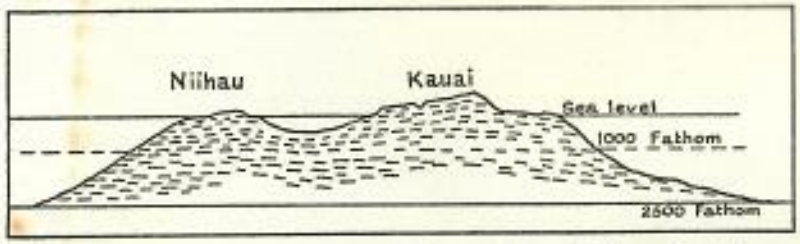


FIGURE 11.—Cross-section of the Kauai-Niihau volcano. Horizontal scale: 1: 1,950,000; vertical scale: 1/10 inch=5000 feet.

data given on Hydrographic Chart 4117, published by the United States Coast and Geodetic Survey, and extend to depths of 1000 fathoms; beyond this limit, only a few scattered soundings have been made. While the floor of the ocean about the mountain averages nearly 2,500 fathoms in depth, it is probable that the form of the volcano does not change greatly below the 1000-fathom line. The soundings at lesser depths are too few to permit an exact delineation of the submarine relief, but the general relations are evident. Soundings off shores of Niihau are fewer than off Kauai, hence the contouring of the submerged slopes of that mountain is incomplete, especially on the southern side. It is impossible, for example, to determine the relation of

Niihau to the small tuff cone, Kaula, which lies 19 miles to the southwest. Kaula certainly cannot be a parasitic tuff cone on the submerged flank of Niihau, since, if the slope of that dome be more or less uniform, Kaula would rise from a depth of over 2,000 fathoms. It is reasonable to postulate that the cone rises from a third dome whose presence has not been recognized because of the scarcity of the soundings. If the summit of this dome approached fairly close to sea level, the height and mass of Kaula would not be very different from similar dimensions of other cones in the archipelago.

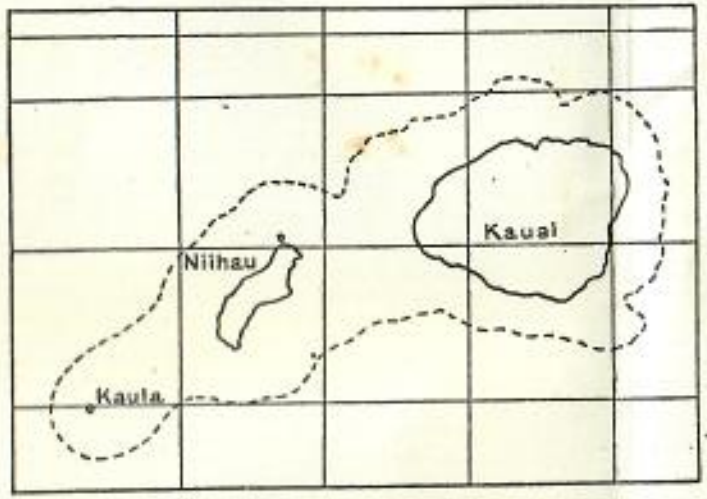


FIGURE 12.—Ground plan of the Kauai-Niihau volcano at a depth of 1,000 fathoms. The submarine connection of the submerged platform upon which the tuff cone, Kaula, is imposed is shown by the dotted line. Scale: 1: 1,800,000.

Kaula has been described in some detail by Palmer (48, pp. 6-10), and a survey of the island and surrounding waters was made recently by Captain C. L. Garner of the U. S. Coast and Geodetic Survey. The survey shows that the tuff cone surmounts the eastern edge of a submarine platform which has an area of approximately 30 square miles. The depth of water over the platform varies from 27 to 53 fathoms, while away from its margins, the depths exceed 200 fathoms. At a point about 3 miles northwest of Kaula, a rocky pinnacle extends to within 38 feet of the ocean surface. This survey confirms the view that Kaula was imposed upon a submerged dome. This mountain very likely once rose above sea level, and has long since been destroyed by erosion. Palmer has found that a reef grew up on the submerged platform, and that through this the materials of the cone were erupted. The mountain represented by the submerged platform undoubtedly is a part of the Kauai-Niihau volcano.

Honolulu Star-Bulletin
BOX 3080, HONOLULU, HAWAII 96802

Jan. 2, 1976

Linda Evans:

I had a call today from Navy Public Affairs Office, 14th Naval District, Pearl Harbor, concerning your recent Letter to the Editor.

You are asked to phone:
Ross Rothrock, in the office, at 474-8147 or 474-8139.

Very truly yours,

Harry Whitten

Harry Whitten
Assistant Editor

Response to Whitten
1/5/76 - Agreed to call N.P.R. - Ask them to respond to public via New Paper or directly to Mink OR Inouye who are investigating Kaula.

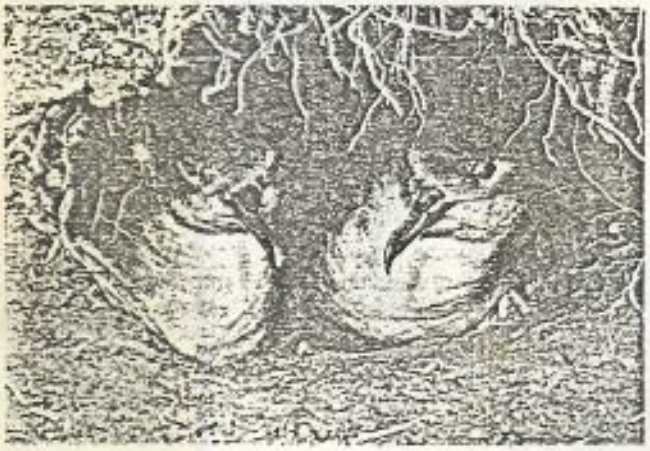
NAVY'S USE OF KAULA ISLAND DEEMED "IN CONFLICT"

The Fish and Wildlife Service, by letter on 22 January 1980, denied the U.S. Navy permission to kill nesting seabirds on Kaula Island during bombing activity. This ruling, pursuant to the Migratory Bird Treaty Act, comes less then a year after the Navy agreed to comply with a National Marine Fisheries Service Request to stop the use of live ammunition on Kaula from December through April. This was to avoid adverse impacts on Humpback Whales known to frequent the waters around the island. The FWS letter, from Mr. Jack E. Downs (Special Agent in Charge, Law Enforcement District #2), indicated that the "authority to issue Special Purpose Permits is based upon a sufficient showing of benefit to the migratory bird resource, important research reasons, humane, or other compelling justification." He noted that the proposed bombing "appears to be in direct conflict with these standards." Downs' letter went on to say, "We are unable to reconcile our commitment to protect migratory birds with a proposed activity that has such potential for mass destruction of these birds; specifically an activity for which there is no practical means of accurately assessing the destruction, thus precluding any meaningful limitations as a condition of the permit. The very nature of the activity 'practice bomb' does not lend itself to a disciplined controlled take of birds, nests, or eggs."

It is apparent, however, that the issue of bombing at Kaula is not settled for good. Bombing with inert ordnance will continue while Navy attorneys meet with Interior department officials in Washington to appeal the permit denial. Lt. Jamie Davidson, a Navy spokesman, has been quoted as saying that the Navy will seek the permit on the basis of "compelling justification." He also noted that bombing is restricted to the southern tip of the island where birds do not nest and that field studies at Kaula found no damage to birds. However, it should be noted that it was repeated observations of bombs exploding far from the target area on the southern tip that originally led scientists aboard the research vessel Easy Rider to threaten a court injunction to stop the bombing. Also, contrary to Lt. Davidson's quoted remarks, state and federal bioligists did document seabird mortality directly attributable to bombing during a March 1979 survey of the island.

One astute observer has asked the question, if the Navy can successful restrict its ordnance to the small southern target area, as they contend, then why do they have to practice?

The Society has a long history of documented opposition to the continued bombing of this valuable nesting island and is in strong support of the FWS denial of the Special Purpose Permit. The Navy has yet to fully assess the adverse impacts of this activity, or to make the complete results of preliminary surveys available for public review. A Navy EIA, dated 27 December 1976, concluded that there was "no evidence to indicate that military use was adversely affecting bird populations on the island," although it was not mentioned that no surveys prior to that date had been conducted during the peak nesting season of the most abundant bird, the Sooty Tern. The EIA also wrote off a list of potentially viable alternatives apparently with little evaluation. An Environmental Impact Statement has not been prepared and circulated for public review, and the Society feels that the failure to do so is in direct conflict with the National Environmental Policy Act. We will continue to oppose the misuse of this island through efforts in Hawaii and in Washington, with the assistance of the National Audubon Society. Any participation from the membership would be welcomed.



THE NAVY'S TARGET?? *Nesting seabirds have been killed by "practice" bombs on Kaula Island.*

Saturday, February 2, 1980 Honolulu Star-Bulletin A-3

Kaula Ruling May Be Hollow Victory

By Helen Altonn
Star-Bulletin Writer

Island scientists have won a victory with the U.S. Department of Interior's refusal to give the Navy a permit allowing "accidental" destruction of birds, eggs or nests during bombing missions on Kaula Rock.

But some sources indicate it may be an empty victory because of enforcement difficulties and probable court battles between Navy and wildlife officials over any violations.

The federal agency's action, disclosed yesterday by the Star-Bulletin, doesn't in itself halt the bombings.

But the law enforcement branch of the Interior Department's Fish and Wildlife Service said in a letter to Vice Adm. Kinnaird R. McKee, commander of the 3rd Fleet:

"The very nature of the activity 'practice bomb' does not lend itself to a disciplined controlled take of birds, nests or eggs."

The letter said, "We are unable to reconcile our commitment to protect migratory birds with a proposed activity that has such a potential for mass destruction of these birds ...."

THE PERMIT WAS denied under provisions of the national Migratory Bird Species Act in response to complaints filed by scientists in 1978 under that law, the Marine Mammal Protection Act and the Endangered Species Act.

But the state has been unable to enforce its regulations.

Ronald Walker, state wildlife chief, said, "Someone would have to be on the Island and watch a bomb land and kill a bird to have prima facie evidence."

Otherwise, he said, "How do you determine if it died because of a bomb, old age or a natural accident?"

WHILE NAVY and wildlife officials continue to dispute the bird question, efforts to protect humpback whales from the Kaula bombings appear to be successful.

The National Marine Fisheries Service took action to protect the whales under the Endangered Species Act last year after scientists threatened to seek a court injunction to stop the bombings.

"We're fairly happy with the Navy reactions," said NMFS official John Naughton.

Lt. Jamie Davidson, Navy spokesman on Kaula Rock matters, said yesterday that the Navy will continue its bombing practice, at least through April, because it is using inert ordnance.

Meanwhile, he said the Navy's attorneys are meeting with Interior Department officials in Washington to appeal the decision.

The Navy is seeking the permit on the basis of "compelling justification," which is allowed under the migratory bird act.

Davidson said Interior Department officials also may not be aware that the bombings are restricted to the southern tip of Kaula where there are no bird colonies.

A STUDY GROUP monitoring the area has found no damage to birds, he noted.

Officials with the Fish and Wildlife Service's law enforcement office here declined to comment yesterday on the permit denial and what its effect might be, referring queries to district officials in Portland, Ore. They were not available.

Other sources said, however, that attempts to cite the Navy for violations of the act probably would lead to a court clash between the Navy and Interior departments.

Kaula Rock, about 20 miles southwest of Niihau, is part of a state seabird sanctuary with prohibitions against killing or disturbing birds, nests or eggs.

The Navy complied with a fisheries service request to stop using live ammunition on Kaula from December through April during the height of the whale migrations.

The Navy also is following an NMFS recommendation to install sonar buoys in two locations near Kaula to record vocalizing whales and keep tabs on their arrival and departure from the waters.

NAUGHTON SAID the Navy will not resume live bombings if whale singing is picked up after April 30 on the receiver, to be located on Kauai, or if whales are still seen in the area.

Scientists also are concerned about porpoises, but Naughton said that has to be handled separately.

Right now, he, said, the service is concentrating on Kahoolawe. Officials were there last week setting up observation posts to see how close the whales are to shore.

He said no whales were seen close to shore but it's still early in the season.

In its recommendations to the Navy, the NMFS also asked for a study to determine the effects on whales and other marine animals from bombing activities by surface vessels.

And the Navy was asked to relocate its ordinance jettison area for unexploded munitions, now southwest of Kahoolawe, to a point further offshore in a southerly direction.

Navy Loses a Round in Bid to Bomb Island

By Helen Altonn
Star-Bulletin Writer

The U.S. Interior Department has denied a Navy request for permission to kill birds accidentally or occasionally during military training operations on Kaula Rock, which could put an end to practice bombing there, the Star-Bulletin learned today.

However, the training flights, which are not using live ordinance temporarily, are expected to continue

Kaula Rock, about 20 miles southwest of Niihau, is part of a state seabird sanctuary system with regulations prohibiting any activities that would destroy birds or mammals.

But the state has been unable to enforce its regulations because of a state-federal jurisdictional battle over Kaula, as well as Kahoolawe and Hawaii's Northwestern Islands in the national Wildlife Refuge.

THE PERMIT WAS denied by the Interior Department under provisions of the Migratory Bird Species Act.

Local scientists filed complaints in 1978 alleging that the bombings violate that act, the Marine Mammal Protection Act and the Endangered Species Act.

Scientists aboard the research vessel Easy Rider threatened to seek a court injunction last year to stop the bombings if the Navy took no action to protect the migrating humpback whales.

The Navy agreed in February last year to halt the use of live ordinance in Kaula training missions from December through April to protect the whales. The agreement is still in effect.

THE INTERIOR Department's action was based on its authority to issue migratory bird special purpose permits "upon a sufficient showing of benefit to the migratory bird resource, important research reasons, humane or other compelling justification."

"Your proposed activity (on Kaula) appears to be in direct conflict with these standards," Jack E. Downs said in a letter last week to the commander of the 3rd Fleet at Pearl Harbor.

Downs, based in Portland, Ore., is special agent in charge of law enforcement for the Interior Department in this district.

HE COULD NOT be reached today for comment, but his letter to the 3rd Fleet commander said:

"We are unable to reconcile our commitment to protect migratory birds with a proposed activity that has such a potential for mass destruction of these birds; specifically an activity for which there is no practical means of accurately assessing the destruction, thus precluding any meaningful limitations as a condition of the permit.

"The very nature of the activity 'practice bomb' does not lend itself to a disciplined controlled take of birds, nests or eggs."

Navy spokesman Lt. Jamie Davidson said there will be no immediate change in the Navy's bombing operations because inert ordinance is being used through April.

This allows time for Navy attorneys to discuss the matter with the Interior Department, he said.

THE NAVY IS arguing its case for the permit based on the act's provision for "other compelling justification."

Davidson pointed out that the permit was sought "to cover us in case of an accident."

Honolulu Star-Bulletin 10/22/77

Seabird Refuge Established

By Helen Altonn
Star-Bulletin Writer

A Hawaii State Seabird Sanctuary has been established by the State incorporating 36 islets and rocks from the Big Island to Kure, in the leeward chain, and excluding two controversial islands in Kaneohe Bay.

Ahu O Laka and Kapapa islands were omitted from the seabird refuge system because of "overwhelming opposition" to their inclusion, said Ronald L. Walker, chief of the Wildlife Branch of the State Division of Fish and Game.

Kaneohe residents use the islands for recreation and fishing and maintain them.

They say that historically the islands were part of the ahupuaa (ancient Hawaiian land division from mountains to sea) and the residents had fishing rights.

WALKER SAID THE regulations governing the sanctuary system also were amended to alleviate concerns of Bruce Robinson of Kauai regarding whether fishermen would be allowed on Lehua Island off Niihau.

He said signs will be posted only around seabird colonies.

There will be no restrictions against people landing on any of the islets except Moku Manu, off the Marine Corps Air Station, Manana (Rabbit) Island off Sea Life Park, and Mokuhooniki, off Molokai, which already are barred to trespassers, Walker said.

"ALL IT MEANS is that after you land on an island (in the sanctuary) there are certain things you can't do, and if we post signs around the seabird colonies, you can't walk through them," he said.

The State Board of Land and Natural Resources has adopted the regulation, which has been several years in the making to protect seabirds frequenting the Hawaiian Islands and keep their habitats safe from disturbance.

The sanctuary includes:

Mokupuku, Paokalani and Keaoi off the Big Island.

Alau, Puuku, Mokeehia and Hulu Islands, Keopuka Rock, Moku Mana, Moku Hala, Papanui O Kane and Molokini off Maui.

MOKUHOONIKI, Kanaha Rock, Mokapa Island, Okala Island, Huelo and Mokumanu off Molokai.

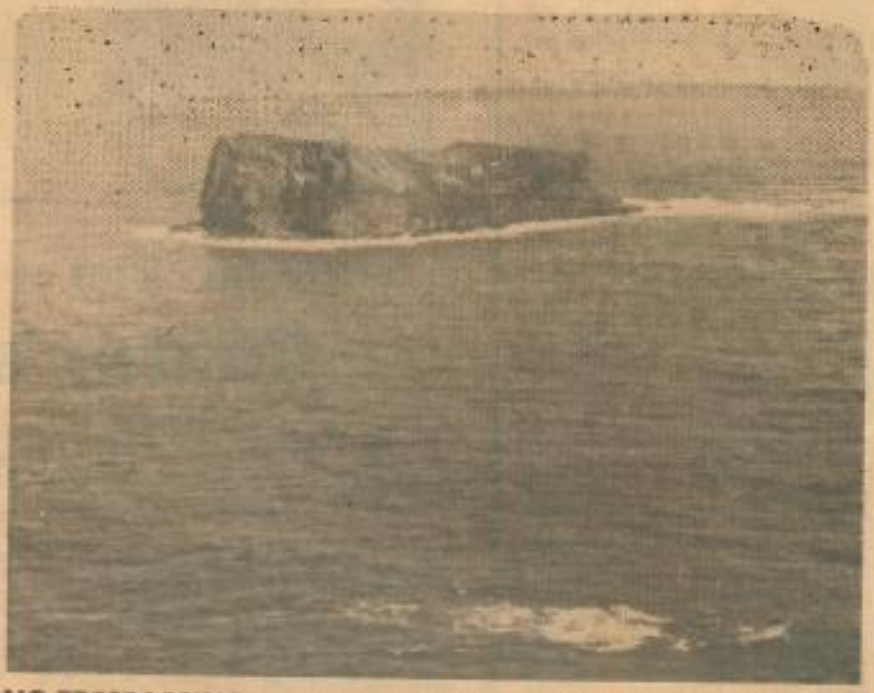
Mokuaeae, Lehua and Kaula Islands off Kauai.

Kihewamoku and Mokuauia Islands, Pulemoku Rock, Kukuihoolua and Mokualai Islets, Kekepa Island, Moku Manu, Mokulea Rock, Popoia Island, Mokulua Islands, Manana Island and Kaohikaipu Island off Oahu.

Green Island and Sand Island at Kure.

Persons landing on any of the islets or rocks are prohibited under the regulation from capturing or disturbing the birds or nests, operating any aircraft or land vehicle, introducing any plants or animals, removing any vegetation or signs, erecting any structure, starting fires or disposing of litter.

"We hope we can have enforcement through public support," Walker said. "We're taking the education approach, explaining not only that it's a refuge, but why the birds are important."



NO TRESPASSING— Moku Manu, off the Marine Corps Air Station, is one of three islets in the Seabird Sanctuary off limits to the public.

DOUBLE PROTECTION—Molokini Island off Maui's southwest coast is a Seabird Sanctuary and Marine Life Conservation District, providing protection for its birds and marine resources.

Executive Order No. 173

Setting Aside Land for Public Purposes

I, Wallace R. Farrington, Governor of the Territory of Hawaii, by virtue of the authority vested in me by paragraph q of Section 73 of the Hawaiian Organic Act, and every other authority me hereunto enabling, do hereby order that the following described public land be and the same is hereby set aside for public purposes, to-wit, for United States Lighthouse Reservation for Lighthouse Station to be under the management and control of the Department of Commerce.

Island of Kaula, Territory of Hawaii, situate about twenty (20) miles southwest of the Island of Niihau, the highest point of said Island of Kaula being approximately 550 feet, the approximate position of which being North Latitude 20° 39' 30" and West Longtitude 160° 32' 30", and containing an approximate area of 108 acres.

21° 39' 30"

In Witness Whereof, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol at Honolulu this 13th day of December, Nineteen Hundred and 24.

W R Farrington

By the Governor:

Secretary of Hawaii.

APPROVED AS TO FORM:

1st Deputy Atty. General.


High Cliff
Cave
Ledge
Landing in Westerly weather
Ledge
Landing in Easterly weather
Some blasting necessary to make ledge accessible
ISLAND OF KAULA
Territory of Hawaii
Scale 1 in = 400 ft. (Approx.)
Area (Top of Bluff) 93 Acres
(Cliff) 15 "
Total " 108 "
Surveyed Jan. Dec 11/1924
Steep slope to water line
Approx highest point
Contours indicate only approx. slope
True North (Approx)
Deep Gullies
Low Cliff
Approximate position of highest point of Island (elevation 550 ft.):
North Lat 21° 39' 30"
West Long. (from 32° 30'

OCT 20 1965

TREASURY DEPARTMENT
UNITED STATES COAST GUARD

Address reply to:
COMMANDANT (FS-6)
U.S. COAST GUARD
WASHINGTON, D.C. 20226

11011
19 OCT 1965

Honorable Patsy T. Mink
House of Representatives
Washington, D. C. 20515

Dear Mrs. Mink:

The Honorable Herbert C. Bonner, Chairman, Committee on Merchant Marine and Fisheries, has furnished me with a copy of a letter from Mr. Lansing A. Parker, Acting Director of the Bureau of Sport Fisheries and Wildlife, concerning the continuing interest of his Bureau in Kaula Island, Hawaii.

After your expression of interest in the Island as a wildlife refuge, Coast Guard action was suspended while I awaited replies to a request I made to the Chief, Bureau of Yards and Docks, Department of the Navy, and the Director, Bureau of Sport Fisheries and Wildlife, Department of the Interior, for their joint resolution of the problem. On 10 May 1965, Mr. A. V. Tunison, Acting Director of the Bureau of Sport Fisheries and Wildlife, advised me that his Bureau would not pursue the matter further as a result of facts presented by the Department of the Navy. Acting on this statement, I proceeded in my transfer action to the Navy and that Department accepted Kaula Island on 16 June 1965.

I appreciate and understand the interest of the Department of Interior in the preservation of Kaula Island as a wildlife refuge; however, the Coast Guard's control over the Island ceased on 16 June 1965 and its future disposition must be the decision of the Department of the Navy.

Sincerely yours,

E. J. ROLAND
Admiral U. S. Coast Guard
Commandant

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
LLOYD 500 BUILDING, SUITE 1692
500 N.E. MULTNOMAH STREET
PORTLAND, OREGON 97232

January 22, 1980

Commander Third Fleet
United States Pacific Fleet
Pearl Harbor, Hawaii 96860

Reference: FF/3
11015.1A
Ser 01K/601

Dear Sir:

This is in response to the Migratory Bird Special Purpose Permit application submitted by the Commanding Officer, Naval Air Station, Barbers Point, Hawaii; dated 5/21/79 for the purpose of accidental, occasional taking of migratory birds, their nests or eggs incidental to military training operations.

Our authority to issue Special Purpose Permits is based upon a sufficient showing of benefit to the migratory bird resource, important research reasons, humane, or other compelling justification. Your proposed activity appears to be in direct conflict with these standards.

We are unable to reconcile our commitment to protect migratory birds with a proposed activity that has such a potential for mass destruction of these birds; specifically an activity for which there is no practical means of accurately assessing the destruction, thus precluding any meaningful limitations as a condition of the permit. The very nature of the activity "practice bomb" does not lend itself to a disciplined controlled take of birds, nests, or eggs.

Accordingly, we are denying your request.

Sincerely yours,

Jack E. Downs
Special Agent in Charge
Law Enforcement District #2

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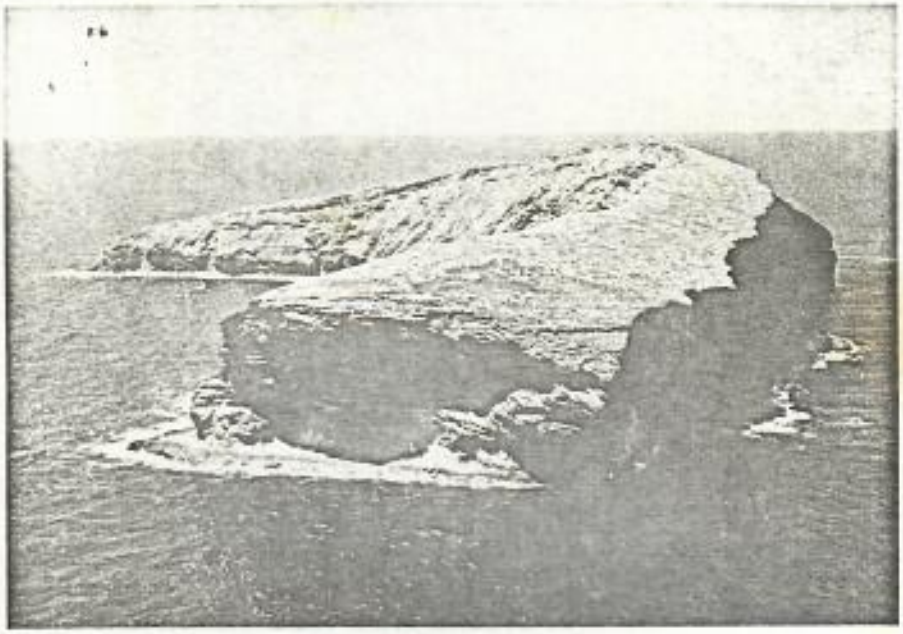
THE FLOWERING PLANTS OF KA'ULA ISLAND, HAWAIIAN ISLANDS

Harold St. John [1] and Ralph E. Daehler [2]



Ka'ula Island, seen from the north.

Ka'ula Island, a small, remote islet of the main Hawaiian Group, lies 23 miles west-southwest of Ni'ihau Island. Ka'ula, historically uninhabited by man, is a rugged, windswept, inhospitable crescent of basalt and volcanic tuff. Two thirds of the ridge of the basaltic, 136 acre islet has a fairly level crest that reaches 540 feet in height. The upper southwestern end is the broadest, most gradually sloped area, but it is predominantly a smooth rock surface. The concave side of the crescent, which faces eastwards, is the most heavily weathered surface of the island. It contans the most cracks and pockets of soil that are hospitable enough for the plant life of Ka'ula to survive in them. The island's convex west side is a jagged, precipitous cliff that contains a large sea cave. From a distance, the island looks like a giant sea cucumber.

Because the rocky island was dangerous to ships, a light house with an automatic beacon was put in service on it in August 1932. It was maintained until 1947. Since 1952 portions of Ka'ula have been used as a bombing target by military airplanes. Management of the island was transferred in 1965 from the U.S. Coast Guard to the U.S. Navy.

Bird life, today and during ancient Hawaiian times, has been the major important

1. B.P. Bishop Museum, Honolulu, Box 19000A, Hawaii 96819, U.S.A.
2. District Forester, Dept. of Land and Natural Resources, Lihue, Kauai, Hawaii, 96766, U.S.A.

as a source of food in the underdeveloped countries of Africa, as a source of gum which natural feature of the island. Today birds, feeding on fish, lead fishermen to productive fishing grounds. In olden times the birds themselves and their eggs provided a source of food for the Hawaiians.

Ka'ula Island was first botanized by Edward L. Caum in August 1932, a dry season when the island was brown and sere. He published (1936) an account of its plant life and bird life. His report on the phanerogamic flora included 11 indigenous species and 5 adventive weeds. In August 1971 and again in September 1976 Daehler, the junior author, visited Ka'ula and studied and collected its flora. These visits, also, were in the dry season. During January 1976 Daehler again investigated the flora of the island, but this time it was green, with a vigorous vegetation. From August 21-22, 1978, Daehler and D. Herbst spent a total of one day exploring the island. The entire upper part was thoroughly explored, as well as much of the western slope. A single, stunted *Thespesia* tree was found on the lower, midwestern slope. This species had not been previously reported from the island. This visit was also during a dry season. Herbst spent March 6-8, 1979, on the island, shortly after heavy rains. All but the steepest part of the eastern side was explored. The vegetation was green and relatively abundant, but no additional plants were found.

These trips have given a greater knowledge of the flora and vegetation of the island, so this account has been prepared to record it. Below are tabulated the species of flowering plants on the island, there being no ferns or fern allies.

The frequency of the individual species is represented by the following symbols:

A. common, well distributed.
B. frequent, widely distributed.
C. occasional.
D. few, 4 to 10 specimens observed.
E. rare, 3 to 1 specimens observed.

NAME	STATUS	FREQUENCY
Gramineae		
Cenchrus echinatus L. var. *Hillebrandianus* (Hitchc.) F. Br., 'Ume'alu	Introduced	C
Chloris inflata Link., Swollen finger grass	Introduced	A
Digitaria setigera R. & S., Kukaepua'a (*D. pruriens* (Fisch. ex Trin.) Buse)	Introduced	C
Echinochloa colonum (L.) Link, Jungle rice	Introduced	C
Panicum torridum Gaud., Kakonakona	Endemic	A
Setaria verticillata (L.) Beauv., Bristly foxtail	Introduced	A
Chenopodiaceae		
Atriplex semibaccata R. Br., Australian salt bush	Introduced	E
Chenopodium oahuense (Meyen) Aellen., Alaweo (*C. sandwicheum* Moq.)	Endemic	A
Amaranthaceae		
Amaranthus viridis L., Slender amaranth	Introduced	A

Nyctaginaceae		
Boerhavia diffusa L., Alena	Indigenous	D
Found only by Caum, at two localities.		
Portulacaceae		
Portulaca cyanosperma Egler, 'Ihi	Edemic	B
P. lutea Soland., 'Ihi	Indigenous	C
Collected only by Caum.		
P. oleracea L., 'Ihi	Introduced	A
P. villosa Cham., 'Ihi	Endemic	C
(P. Caumii F. Br.)		
Capparacea		
Capparis sandwichiana DC. var *Zoharyi*	Endemic	E
Deg. & Deg., Maiapilo		
Leguminosae		
Leucaena leucocephala (Lam.) deWit, Koa-haole	Introduced	E
Zygophyllaceae		
Tribulus cistoides L., Nohu	Indigenous	C
Euphorbiaceae		
Euphorbia celastroides Boiss. in DC., var. *moomomiana*,		
Sherff. 'Akoko	Endemic	A
Restricted to Ka'ula and one beach area on Moloka'i.		
Malvaceae		
Sida fallax Walp., 'Ilima	Indigenous	B
Thespesia populnea (L.) Soland ex Correa, Milo	Polynesian introduction	B
Cactaceae		
Opuntia megacantha Salm-Dyck, Pa-nini	Introduced	E
Recorded and pictured only by Caum.		
Plumbaginaceae		
Plumbago zeylanica L., 'Ilieo	Indigenous	D
Convolvulaceae		
Ipomoea brasiliensis (L.) Sweet, Pohuehue	Indigenous	C
I. cairica (L.) Sweet, Koali'ai	Indigenous	B
I. congesta R. Br., Koali'awania	Indigenous	B
Boraginaceae		
Heliotropum curassavicum L., Nena	Indigenous	E
Solanaceae		
Lycium sandwicense Gray, 'Ohelo kai	Indigenous	E
Solanum nigrum L., Popolo	Introduced	C
Compositae		
Erigeron canadensis L., Ilioha	Introduced	B
Sonchus oleraceus L., Pualele	Introduced	C

The flora totals 30 species, containing 6 that are endemic, 10 indigenous, 1 Polynesian introduction, and 13 introduced ones.

The agencies of dispersal that evidently brought the flora to Ka'ula are principally

Cliffs on the east side. Lower left, *Euphorbia celastroides*, var. *moomomiana;* center, *Atriplex baccata.*

Cliffs on the east side.

The solitary tree of Thespesia populnea; the grass is *Chloris inflata.*

(Photos by Ralph Daehler)

the natural ones, water, wind, and animals, that is especially the birds which nest there in quantity. The wind accounts for 3 species, common ones, with winged seeds. Sea flotation and drift delivered 2 species, both halophytes. Birds evidently brought in 18 species, and either birds or man 5 more, totalling 23 species. Two plants, the *Leucaena* and the *Thespesia*, must have been carried in by man, either intentionally or accidentally. Hawaiian boatmen have long frequented the island, when fishing or birding for food. Recently lighthouse people and yachtsmen have been there.

One variety, *Euphorbia celastroides*, var. *moomomiana*, occurs only on Ka'ula and on Moloka'i. The other 29 species all occur on Kaua'i. All but 4 also are found on Ni'ihau, which lacks the *Euphorbia*, *Cenchrus echinatus* var. *Hillebrandii*, *Portulaca lutea*, and *P. villosa*.

TRANSPORTING AGENTS

Birds

Edible

Echinochloa colonum
Atriplex semibaccata
Chenopodium oahuense
Amaranthus viridis
Portulaca cyanosperma
P. lutea
P. oleracea
P. villosa
Capparis sandwicensis var. *Zoharyi*
Euphorbia celastroides var. *moomomiana*
Opuntia megacantha
Ipomoea cairica
I. congesta
Lycium sandwicense
Solanum nigrum

Wind

Panicum torridum
Erigeron canadense
Sonchus oleraceus

Birds or man

Burrs

Cenchrus eachinatus var. *Hillebrandii*
Setaria verticillata
Tribulus cistoides

Awns

Chloris inflata

Hooks

Sida fallax

Adhesive

Digitaria setigera
Boerhavia diffusa
Plumbago zeylanica

Man

Leucaena leucocephala
Thespesia populnea

Sea Drift

Ipomoea brasiliensis
Heliotropium curassavicum

Literature Cited

Caum, Edward L. 1936. Notes on the flora and fauna of Lehua and Kaula Islands. B.P. Bishop Mus., Occas. Papers 11 (21): 1-17, pl. 1-3.

Protests grow over use of Kahoolawe in naval drill

Honolulu Advertiser
Saturday, March 20, 1982 A-3

By Sandra S. Oshiro
and Edwin Tanji
Advertiser Staff Writers

The Senate is to vote Monday on whether to call on the Navy to stop an international naval exercise that could include the bombing of Kahoolawe.

Meanwhile, protests of the coming exercise continued on Maui, where a whale-research group joined the Protect Kahoolawe Ohana in calling for a halt to the bombing of the island.

The Navy and the state have an agreement that allows the use of the island as a target area, but also provides for the preservation of certain archaeological sites.

Susumu Ono, state land board chairman, has questioned whether that agreement allows other nations to use the island and expressed his doubts to the Senate Ecology, Environment and Recreation Committee.

"In regard to the use of Kahoolawe as a bombing target for the nations of Japan, Canada, New Zealand and Australia during the upcoming RIMPAC '82 exercises, your committee is offended with the Department of Navy's disregard of the concerns and the feelings of this state's citizenry on this matter," the committee members said in a report.

The committee is recommending that the Senate adopt a resolution calling on the use of Kahoolawe as a bombing target to be stopped and that invitations to the exercise scheduled to begin Monday be withdrawn.

Adoption of the resolution, said the committee, "will advise the Navy of our continued commitment to achieving a reduction of military activities on Kahoolawe and facilitate the return of the island to the state of Hawaii."

Controversy over the resolution may result in its being pulled back into committee, according to Senate Clerk David Woo. In the meantime, it is scheduled for a vote Monday.

In a press conference held in Kihei yesterday, the Pacific Whale Foundation reported on a study it had conducted since 1980 on sightings of humpbacks from a vantage point atop the Puu O Lai cinder cone at Makena. Paul Forestell, a researcher, said the study involved visually tracking whales between Kahoolawe and Maui in a seven-mile-wide arc using a transit-type device.

According to Forestell and foundation president Gregory Kaufman, sightings of humpbacks fell during bombing of the island, evidenced by the researchers hearing bombs or seeing smoke or dust there.

On the average, they said, there were 25 percent fewer sightings of whales in the area during the bombing. They said in 1980 an average of 21 whales was sighted on days when there was no bombing and 17 whales sighted on days when there was bombing.

For 1981, the averages were 17 whales on non-bombing days and 13.6 on bombing days; for 1982 so far, the average was 32 whales on non-bombing days and 22 on bombing days, they said. Kaufman said the study provided only "distribution data" and did not involve any study of whether there were "behavioral changes" as a result of the bombing.

Still, he said, he felt the data the foundation had gathered indicated "the shelling of Kahoolawe had an adverse impact on the humpback whales by driving the whales out of their selected breeding grounds into less suitable areas."

He also noted that the National Marine Fisheries Service had concluded that bombing of Kaula Rock off Kauai adversely affected whales. He said the service should review again whether restrictions on bombing should be placed on Kahoolawe.

Other organizations joining the protest were the Sierra Club, the Friends of Maui (a Quaker organization) and Maui Zendo (a Maui-based zen training center).