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University of Hawaii
Sea Grant College
Program

MAKAI

"Toward the Sea"

Vol. 5, No. 12
December
1983

THE CASE OF THE DISAPPEARING HAWAIIAN ISLANDS

by Susan Pirsch

The Hawaiian Archipelago would stretch almost all the way to the Pacific coast of the Soviet Union if coral could grow in cold water according to research recently completed by Dr. Richard Grigg of the Hawaii Institute of Marine Biology.

Since coral does not grow in water much colder than 20°C, the Hawaiian Archipelago ends at Kure Atoll in the northwest, which is close to the northernmost location that coral can grow.

Although the archipelago ends at Kure Atoll, the Hawaiian Island chain continues on underwater as submerged seamounts and drowned coral atolls called guyots. These seamounts and guyots make up the Emperor Seamounts.

Until Grigg did his coral research in the Northwestern Hawaiian Islands, no one knew for sure what led to islands sinking below sea level at the latitude near Kure Atoll. Grigg discovered it was due to a decrease in coral growth that was related to decreases in temperature and light. He gave the threshold point for island formation the name Darwin Point in honor of Charles Darwin. Grigg's research was part of a five-year study of the living resources in the Northwestern Hawaiian Islands sponsored by the University of Hawaii Sea Grant College Program, the Hawaii Department of Land and Natural Resources, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Ocean Resources Office (formerly Office of the Marine Affairs Coordinator) of the Hawaii Department of Planning and Economic Development.

Grigg said that 10 years ago his research on the Darwin Point would not have been possible because too little was known then about the various stages of island evolution.

It is now a widely accepted theory that the Hawaiian Islands formed over a volcanic "hot spot" located at about 20° north latitude, just south of the island of Hawaii. Researchers think that Loihi, which is now just a seamount over the hot spot, is in the process of forming and may someday be another Hawaiian island.

The hot spot has probably remained fixed at the same place for the past 70 million years. It sits under the Pacific plate, which is moving to the northwest about eight centimeters a year. As the plate moves to the northwest, islands that formed over the "hot spot" move with it.

As the islands move northward into cooler water, they gradually begin to sink from their own weight and gradually erode from weathering processes. Eventually the combination of these factors cause islands to reach sea level. At this point, coral growth keeps the islands at sea level because, as the last piece of lava sinks beneath the water, a ring of coral may form around islands and give rise to atolls, Grigg said.

If coral growth did not keep islands at sea level, the last island in the archipelago would be Gardner Pinnacles, which is just north of the French Frigate Shoals. Gardner Pinnacles is the last island in the chain where lava is above sea level, Grigg said.

Darwin was the first to propose the theory that islands sink from their own weight thereby providing a foundation for coral islands. In his April 12, 1836 journal entry he wrote," . . . Under this

(Continued on page 3)

Necker Island is one of the northernmost islands in the Hawaiian Island chain that still have lava poking above the surface of the water. Just a few hundred miles north of Necker, the last bit of lava sits above the ocean on Gardner Pinnacles.
—Richard Grigg photo

Marine Bills Digest

by Patty Moore-and Peter J. Rappa

In the November issue of *Makai* the biennial operating budget was presented. In this final installment of "Marine Bills Digest" the biennial capital improvement budget is presented.

The capital improvement budget is used for projects such as constructing new buildings and refurbishing old ones.

CAPITAL IMPROVEMENT BUDGET

ECONOMIC DEVELOPMENT

Hawaii Deep Water Cable Program (PED 120, AEB 001) $3,000,000 (general obligation bonds); line item A.9; expending agency: Department of Planning and Economic Development.

Funds for planning studies, assessments, and preliminary design, including tests for a deep water electrical transmission cable connecting Oahu to other islands.

TRANSPORTATION FACILITIES

Improvement to the Facilities of Piers 19-34 at Honolulu Harbor (TRN 301, J 02) $1,578,000 (special funds); line item C.19; expending agency: Department of Transportation.

Improvement of facilities including demolition of portion of Pier 33 shed and lighting, paving, and constructing connecting piers at Pier 34.

Miscellaneous Improvements to Existing Pier Facilities at Honolulu Harbor (TRN 301, J 03) $195,000 (special funds); line item C.20; expending agency: Department of Transportation.

Miscellaneous improvements to existing piers, sheds, and yard facilities, and other facilities at Honolulu Harbor.

Improvements to Fort Armstrong Facilities (TRN 301, J 04) $1,225,000 (revenue bonds); line item C.21; expending agency: Department of Transportation.

Reconstruction of fendering system at Piers 1 and 2.

Waterfront Development, Honolulu Harbor (TRN 301, J 05) $1,631,000 (revenue bonds); line item C.22; expending agency: Department of Transportation.

Design and redevelopment of existing facilities between Piers 2 to 18.

Improvements to Piers 39-40 Complex, Honolulu Harbor (TRN 310, J 20) $1,026,000 (revenue bonds); line item C.23; expending agency: Department of Transportation.

Shed renovation and pier and yard improvements at Piers 39-40.

Barbers Point Deep Draft Harbor Improvements Oahu (TRN 303, J 11) $250,000 (special funds); line item C.25; expending agency: Department of Transportation.

Development of Barber's Point Harbor including fencing, clearing, grubbing and constructing of pier, yard, shed facilities, and utilities.

Kewalo Basin Improvements, Oahu (TRN 305, J 12) $4,750,000 (general obligation funds); line item C.26; expending agency: Department of Transportation.

Improvements at Kewalo Basin including construction of new catwalks, utilities, lighting, and other shoreside improvements.

Hilo Harbor Improvements, Hawaii (TRN 311, L 01) $352,000 (special funds); line item C.27; expending agency: Department of Transportation.

Miscellaneous improvements at Hilo Harbor including clearing, grading, and fencing of harbor properties.

Kahului Harbor Backup Improvements, Maui (TRN 331, M 01) $162,000 (special funds); line item C.28; expending agency: Department of Transportation.

Clearing, grading, and fencing of harbor properties and installation of security fences and gates and other improvements.

Container Facilities at Kahului Harbor (TRN 331, M 06) $1,690,000 (revenue bonds); line item C.29; expending agency: Department of Transportation.

Design and construction of pier facility at end of Pier 1 including fill and other improvements.

Kaunakakai Harbor Improvements, Molokai (TRN 341, LS 006) $593,000 (special funds); line item C.30; expending agency: Department of Transportation.

Reconstruction of facilities at Kaunakakai Harbor.

Small Commercial Boat Facilities at Nawiliwili Harbor, Kauai (TRN 361, K 05) $145,000 (special funds); line item C.31; expending agency: Department of Transportation.

Construction of facilities for small commercial and fishing boats in the northwest end of Nawiliwili Harbor.

Statewide Harbor Planning (TRN 395, I 01) $110,000 (special funds); line item C.32; expending agency: Department of Transportation.

Continuing harbor studies, research, and advance planning of harbor and terminal facilities on all islands.

Miscellaneous Improvements to Facilities at Neighbor Island Ports (TRN 395, I 03) $195,000 (special funds); line item C.33; expending agency: Department of Transportation.

Improvements to yard areas, sheds, piers, utilities, water areas, and other facilities.

CULTURE AND RECREATION

Kealakekua Bay (LNR 801, F 14) $600,000 (general obligation bonds); line item H.4; expeding agency: Department of Land and Natural Resources.

Funds for acquisition, planning, re-

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Jack R. Davidson, Director **Richard Klemm, Editor**

search, and design for a park at Kealakekua Bay. Planning and research will be followed by development, continued research, and interpretive facilities.

Sand Island Recreation Area (LNR 806, F 70) $690,000 (general obligation bonds); line item H.10; expending agency: Department of Land and Natural Resources.

Funds for development of a beach park at Sand Island, Oahu.

Kaena Point State Park (LNR 806, F 72) $710,000 (general obligation bonds); line item H.11; expending agency: Department of Land and Natural Resources.

Acquisition of land, development of beach parks from Makua to Mokuleia, and funds for temporary shoreline management.

Hapuna Beach State Park (LNR 806, F 75) $220,000 (general obligation bonds); line item H.12; expending agency: Department of Land and Natural Resources.

Funds for plans and construction, including acquisition of land, as per master plan.

Na Pali Coast State Park (LNR 806, F 80) $50,000 (general obligation bonds); line item H.13; expending agency: Department of Land and Natural Resources.

Provision for camping and hiking facilities, protection and interpretation of historic and archaeological sites, and planning for public use of the area.

Waimea Pier (LNR 806, F 82) $25,000 (general obligation bonds); line item H.14; expending agency: Department of Land and Natural Resources.

Plans for and the reconstruction and development of Waimea landing for recreational purposes.

Rainbow Bay (LNR 806, F 83) $450,000 (general obligation bonds); line item H.15; expending agency: Department of Land and Natural Resources.

Background investigation and planning for conversion of Aiea Bay into "Rainbow Bay" park. Funding includes anticipated first phase of development of land area bordering Aiea Bay.

Kona Airport Park (LNR 806, H 47) $480,000 (general obligation bonds); line item H.17; expending agency: Department of Land and Natural Resources.

Incremental design and construction for shoreline park development as determined by master plan.

SCORP (Statewide Comprehensive Outdoor Recreational Plan) (LNR 809, F 05) $50,000 and $50,000 (federal funds); line item H.22; expending agency: Department of Land and Natural Resources.

Updating comprehensive statewide recreation plan.

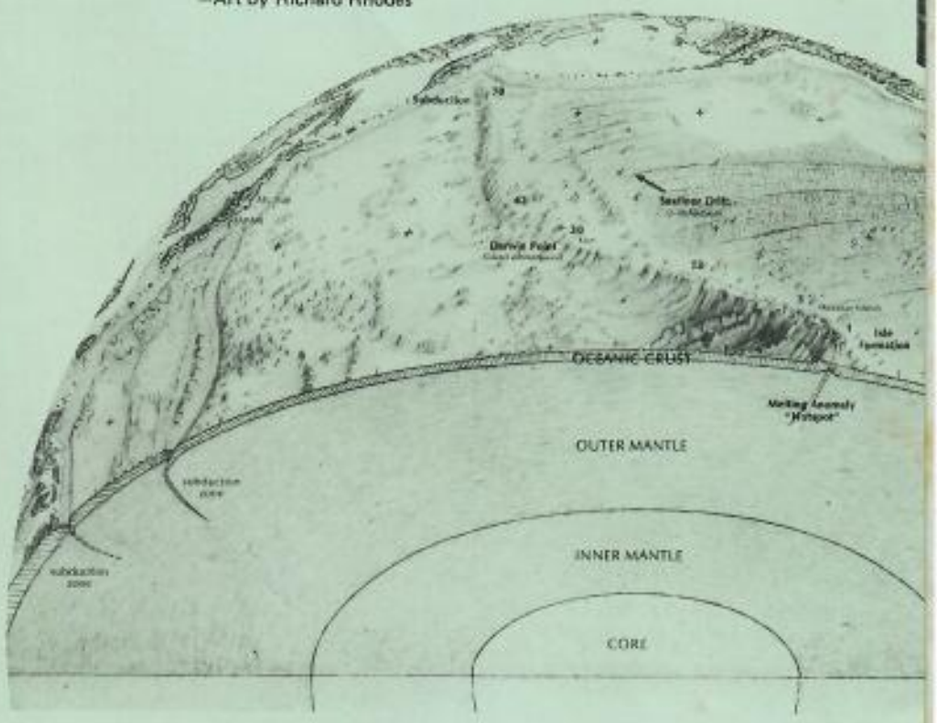
DISAPPEARING HAWAIIAN ISLANDS *(Continued fr*

A cut away view of the earth shows the processes involved with island evolution. Islands form over the "hot spot," drift northwestward, pass the Darwin Point, sink beneath the ocean, and finally, slide into the Aleutian Trench where they become magma.

—Art by Richard Rhodes

A lava flow streams into the ocean, making the Big Island of Hawaii a little bit bigger. This is also the first step in island creation.

—Richard Grigg photo



Act 283 — Relating to capital improvement projects and making appropriations therefor.

County of Hawaii

Fin-fish rearing facility. $50,000; item I.C.1.; expending agency: Department of Land and Natural Resources.

Funds for a fin-fish rearing facility in Hilo, Hawaii.

Floating fish pen. $10,000; item I.C.2.; expending agency: Department of Land and Natural Resources.

Funds for a floating fish pen to be tested in a freshwater pond near Hilo, Hawaii.

Kawaihae Boat Harbor and/or Puako Ramp. $30,000; item II.D.2.; expending agency: Department of Transportation.

Funds for comfort station facilities.

Comfort stations at Kawaihae Boat Harbor and/or Puako Ramp. $30,000; item D.3.; expending agency: Department of Transportation.

Funds for construction of comfort stations.

County of Maui

Boat ramp, Molokai. $35,000; item 5.; expending agency: Department of Transportation.

Site selection study for boat ramp on east end.

City and County of Honolulu

Aiea Rainbow Bay State Park. $50,000; item III.C.1.; expending agency: Department of Land and Natural Resources.

Funds for construction of a fishing pier and boat launching ramp.

Ala Wai Canal. $50,000; item III.C.2.; expending agency: Department of Land and Natural Resources.

Funds for repair and improvement.

...m page 1)

view we must look at a lagoon island as a monument raised by myriads of tiny architects to mark the spot where a former land lies buried in the depths of the ocean."

When Grigg first went to the Northwestern Hawaiian Islands to conduct his coral research, he was prepared to test Darwin's theory further by finding out the point at which coral growth could no longer keep pace with the rate of island sinking.

At first he thought coral species would gradually "drop out" around islands in the northwestern part of the Hawaiian island chain. Instead, he discovered that most coral species found in the main Hawaiian islands extend all the way to Kure. The major difference was not the absence of species but the rate at which they grow in the cold, northern water. In the northern part of the chain, coral growth slows to a point where it eventually can no longer keep pace with the rate of sinking and erosion, so an island drowns.

"Actually the Darwin Point is not an exact geographic location; it's the result of a process — like the edge of the polar ice sheets. It's defined by ongoing processes. It isn't static. If the water gets cooler, the Darwin Point could drift south," Grigg said. Right now the Darwin Point is somewhere between Kure Atoll, the last atoll above sea level and Hancock Seamount, the first of the Emperor Seamounts, he said.

The ongoing processes that create the Darwin Point are coral erosion caused by wave action and island sinking. Grigg said coral erodes about one to two millimeters a year, while islands at the latitude of Kure Atoll sink about one-twentieth of a millimeter a year. When these factors equal or surpass the rate of coral growth, an island sinks below sea level.

To find the rate of coral growth at the Darwin Point, Grigg collected coral samples from the same water depth and habitat from every island in the archipelago. Because coral, like trees, lay down growth bands that represent one year of growth, Grigg was able to determine how fast coral grew on each island.

Near the island of Hawaii, coral grows about 14 millimeters a year. Long days promote photosynthesis and warm water favors growth, he said. In contrast, coral growth on Kure Atoll is about one to two millimeters a year, which is close to the rate of island sinking and erosion.

Although the coral growth rate is very close to equaling the rate of erosion and sinking, "Kure is doing okay. It's making it. Beyond Kure, coral growth is less than the rate of erosion and sinking so islands drown. Kure has several million more years or so before it becomes a guyot, Grigg said.

The time frame involved with island evolution goes back to at least Meiji Seamount, the last guyot, or seamount, in the Emperor Seamounts. About 70 million years ago Meiji was over the hot spot where Hawaii and Loihi now sit. After Meiji formed it began to weather and started to sink. Perhaps about 30 million years later, Meiji passed the Darwin Point and became a guyot. Now, 40 million years later, Meiji sits on the edge of the Aleutian Trench where in another several million years or so it will slide beneath the Asian continent to become molten rock again in the mantle of the earth.

This sequence of events, Grigg said, will probably be followed by every island in the Hawaiian chain. Unless of course a new species of coral evolves that decides it likes cooler water and dimmer days. Also, the ocean could heat up and the Darwin Point could move further north but, Grigg said, that is a problem for future oceanographers — perhaps in the year 70,000,000. □

Fort Armstrong-Kewalo (Kakaako) shorefront park. $250,000; item III.C.5.; expending agency: Department of Land and Natural Resources.

Funds for development of oceanfront park and facilities.

Queen's Beach. $100,000; item III.C.9.; expending agency: Department of Land and Natural Resources.

Funds for acquisition of Queen's Beach, Waikiki, Oahu.

Keehi Boat Harbor. $160,000; item III.D.8.; expending agency: Department of Transportation.

Funds for construction improvements including paving, lighting, and trailer parking.

Canoe Facility, Waimanalo. $50,000; item III.U.6.; expending agency: City and County of Honolulu.

Funds for canoe storage, facility repairs, and equipment.

Waikiki Natatorium. $100,000; item III.U.40.; expending agency: City and County of Honolulu.

Funds for an environmental impact statement for the demolition of the Waikiki Natatorium.

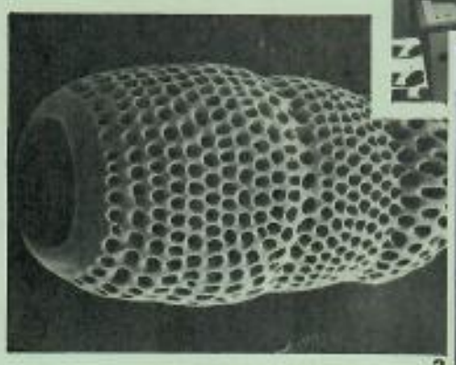
Waikiki War Memorial Park and Natatorium. $100,000; item III.U.41.; expending agency: City and County of Honolulu.

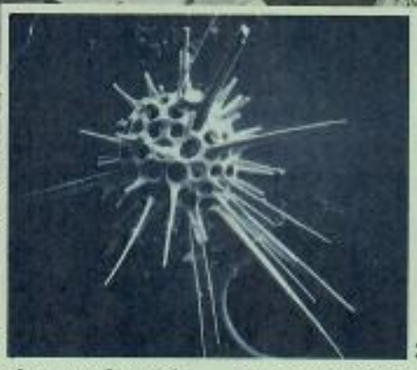
Development of peninsula park area at existing natatorium site, including saltwater swimming and water sports facility. County of Kauai

Poipu Beach Park. $160,000; item IV.X.1.; expending agency: County of Kauai.

Funds for the construction of Poipu Beach Park Extension; provided that funds shall not be made available under this request unless the County of Kauai provides $160,000 as matching funds. □

UH Researchers Have Powerful Eyes for Detail





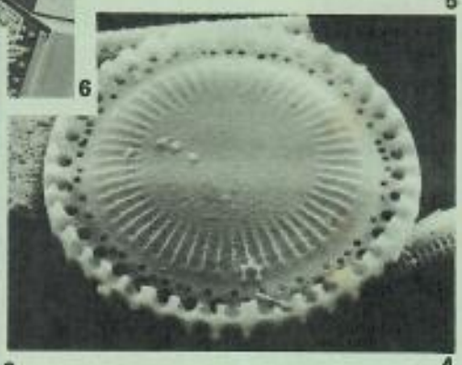


Photo 1. *This prehistoric planktonic radiolarian was found in a deep sea sediment core and magnified 320 times using an electron microscope. Radiolarians are microscopic marine organisms with skeletons made of opal. They are generally well preserved on the sea floor.* **Photo 2.** *Another prehistoric planktonic radiolarian taken from a deep sea core and magnified 250 times.* **Photo 3.** *This may bear a resemblance to a mace head, but is actually a prehistoric planktonic radiolarian found in a deep sea sediment core. This one was magnified 320 times.* **Photo 4.** *This is a planktonic diatom from a soil sample. Diatoms have skeletons made of opal, and are very common in oceans and fresh water lakes. This particular one has been magnified 3,750 times.* **Photo 5.** *This coccolithophorid, a protozoan, is sitting on a chip of paint from the bottom of a ship. Its skeleton is made up of calcium carbonate. This picture was taken at a magnification of 10,000 times.* —UH Electron Microscopy Laboratory photos

Photo 6. *Randi Schneider analyzes the chemical composition of a specimen using the Cambridge Steroscan electron microscope.* —C. Agegian photo

by Susan Pirsch

Early scientists had few tools they could use to study samples in great detail. A significant advance was the development of the microscope, a scientific tool that has led to the creation of more and more powerful "eyes" to see increasing detail in study samples. Today, scientists at the University of Hawaii have a variety of equipment to study even minute samples in great detail.

At the university's Manoa campus in Honolulu, the Electron Microscopy Lab was recently established in the new Marine Science Building making available to all researchers these technological advancements, said Randi Schneider, one of the lab's technicians.

Machines such as the Cambridge Steroscan S4-10, a scanning electron microscope, allow researchers to see great detail of samples under study and to see that detail in a three dimensional image, she said. Electrons are focused down on a sample to scan its surface. The sample then emits secondary electrons that are focused on a screen so photographs like those seen in this issue can be taken.

In addition to the Cambridge Steroscan, the lab also houses a Hitachi H-600 analytical electron microscope, which operates in either a scanning or a transmission mode, and a Cameca Camebax electron microprobe.

Schneider said the Hitachi H-600 can magnify samples up to a theoretical limit of 300,000 times. It does this by sending a beam of electrons through a thinly cut sample. When the beam of electrons passes through a sample, the image is focused on a fluorescent screen and recorded by a camera.

The Cameca Camebax electron microprobe is used by researchers when they want to know the precise amounts or percentages of specific chemical elements comprised by a sample under study, Schneider said. The sample is "bombarded" with electrons, which cause it to give off x-rays. Because each element has characteristic x-ray emissions, researchers can quantitatively analyze the sample, she said.

These microscopes have applications in every field of science and are used by a number of UH departments as well as by state and federal agencies, Schneider said.

The Cambridge Steroscan, for example, has been used by researchers analyzing sediment cores taken from the ocean floor. They have discovered a striking difference between present day radiolarian skeletons and those of their prehistoric ancestors. □

MARINE MISCELLANY

AQUACULTURE COMMITTEE FORMED

Governor George Ariyoshi announced the appointment of 13 people to the newly formed Aquaculture Industry Development Committee during an aquaculture land use seminar held August 31, 1983 in Honolulu.

The appointees are **William Rowland,** Oceanic Institute chairman; **Gilbert Ayres,** Hawaii Production Credit Assoc.; **Roger Coryell,** Marine Culture Enterprises; **Hideto Kono,** former director of the Hawaii Department of Planning and Economic Development; **Dr. Aaron Lim,** Brigham Young University-Hawaii; **Dr. Ed McSweeny,** Amorient Aquafarms; **Dr. Ronald Nolan,** Orca Seafarms; **Dr. Robert Ota,** Bank of Hawaii; **Wayne Richardson,** ABA International; **Bruce Smith,** Kahuku Prawn Company; **Cyrus Tamashiro,** Tamashiro Market; **Glenn Tanoue,** Tropic Fish and Vegetable Market; and **Dr. James Wyban,** Northshore Fish and Produce.

The committee will serve as an advisory body to offer recommendations and plans for further development of Hawaii's aquaculture industry.

CZM REPORT AVAILABLE

A new Hawaii Coastal Zone Management Program report will help government agencies with coastal zone management and improve coordination among government agencies that issue permits. *H-Pass, Hawaii Planning Activities Support System,* describes a multi-year research and demonstration project set up to improve management capabilities of nine state and county agencies. The report details the use of a computer-based processing system that provides access to a shared data base of planning, land use, and permit information. The new system should reduce the redundancies in permit processing for developers. Copies of the report are available at the Department of Planning and Economic Development at P.O. Box 2359, Honolulu, HI 96804.

BOAT LOANS STAY AFLOAT

Boat loans are safe and profitable, according to a National Marine Bankers Association (NMBA) report. The NMBA report compares boat loans to overall installment loans for 1978 through 1982 and is the only such report on marine lending issued in the U.S. by banking or lending associations.

Of the $6.5 billion in consumer loans held by associated members, $1.1 billion are for recreational boat loans, according to the report. The report also indicates that recreational boat lo loans have a lower delinquency rate and an almost nonexistent charge-off rate. □

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Cooper, Yee Named to Fishery Panel

Fisherman Alika Cooper of Hilo and business executive Wadsworth Yee have been appointed to the Western Pacific Fishery Management Council for three-year terms to start in August.

Yee, president of Grand Pacific Life Insurance Co., a former state senator and owner of several charter fishing vessels in the past, has been a member of the council since its inception and chairman since its first meeting in 1977.

Cooper, a Big Island fisherman and fish processor, has been an adviser to the council since it was formed.

A pioneer of "ika shibi" handline fishing for tuna around the Big Island, Cooper also operates the 26-acre ancient Hawaiian fish ponds at the Mauna Lani Resort as well as an orchard and flower farm.

The two were appointed to the council by Commerce Secretary Malcolm Baldridge.

The Western Fishery Management Council is responsible for the biggest area of the eight regional councils set up by a 1976 law to prepare management plans for fish stocks in their areas.

Its territory covers Hawaii, Guam, the Northern Marianas, American Samoa and the U.S. possessions of Wake Island, Johnston Atoll, Kingman Reef and the Howard, Baker and Jarvis islands.

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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

MINUTES OF THE SEVENTEENTH HAWAII FISHERIES COORDINATING COUNCIL MEETING

DATE: May 18, 1984
TIME: 12:30 p.m.
PLACE: KALANIMOKU BUILDING
DLNR BOARD ROOM
1151 PUNCHBOWL STREET
HONOLULU, HAWAII

The 17th Council meeting was called to order by Vice-Chairman Frank Goto at 12:44 p.m. for Chairman Ono who was delayed by another meeting.

Members present:
Susumu Ono (Chairman)
Frank Goto (Vice-Chairman)
Bob Agres (representing Fred Matsumoto)
William Choy
Bruce Combs (representing Jerry Norris)
Winfred Ho
Stuart Kearns
Craig McDonald (representing Kent Keith)
Peter Milone ~~(representing Doyle Gates)~~
Asahi Okamoto
Dave Parsons
Rose Pfund (representing Jack Davidson)
Richard Uchida (representing Richard Shomura)
Doyle Gates

Members absent:
Louis Agard
John Craven
James Kurita
Joseph Makua
Wadsworth Yee

Staff:
Henry Sakuda, Division of Aquatic Resources
Alvin Katekaru, Division of Aquatic Resources
Walter Ikehara, Division of Aquatic Resources

Others present:
George Krasnick
Janet Swift
Brooks Takenaka

I. CALL TO ORDER/OPENING

Meeting was called to order by Vice-Chairperson Frank Goto.

II. APPROVAL OF 16TH (MAY 18, 1984) COUNCIL MINUTES

Mr. Winfred Ho moved for acceptance of the minutes. The motion was seconded and unanimously approved by the Council.

III. SUMMARY OF FISHERIES RELATED LEGISLATION (1984 Session - Handouts)

Mr. Henry Sakuda described briefly the Bills and Resolutions passed by the 1984 Legislature and answered questions from the Council.

IV. REPORT OF AD HOC COMMITTEE - NMFS FEDERAL LAW REVIEW

The Ad Hoc Committee (appointed by Mr. Ono) consisting of Mr. Alika Cooper, Mr. Frank Goto, Mr. Winfred Ho, Mr. Louis Agard, and Mr. Doyle Gates met with Howard Silva of Hawaiian Tuna Packers (HTP) to consider some of the federal law review problems, particularly the Nicholson Act amendment. The Council is seeking a 2-year trial exemption to the Nicholson Act, allowing foreign vessels to offload albacore at HTP. However, an analysis of the amendment's benefits to HTP is needed. DAR and NMFS staff agreed to collaborate to obtain the necessary information for the analysis. The major question to be answered is, could the Nicholson Act amendment keep the cannery in operation if it was threatened with closure? The committee is in favor of amending the Nicholson Act if it will save the cannery, but the HFCC wants Castle & Cooke's support on record.

For NMFS to move ahead on the amendment of the Nicholson Act will require: (1) the support of Castle & Cooke, (2) strong economic proof that a Nicholson Act exemption would ensure economic viability of the cannery and will lead to its continued operation, and (3) the support of the Governor.

The Ad Hoc Committee also viewed amending the coastwide shipping laws to allow Hawaii fishermen to use foreign-built vessels in the fishery conservation zone. However, the committee felt the HFCC should devote its attention to the Nicholson Act amendment. Thus, the coastwide shipping laws issue was temporarily deferred.

V. FY 1984 S-K PROJECTS

Peter Milone of National Marine Fisheries Service reported that NMFS is reviewing this year's Saltonstall-Kennedy Fisheries Development projects. Within the southwest region, NMFS received 72 proposals with a total funding request of $7.5 million; however, only $10 million is available nationwide. Of the 72 proposals, 45 proposals came from the Western Pacific island area requesting approximately $5.3 million. Of the Hawaii proposals, 8 were submitted through PFDF (proposals reviewed and ranked by HFCC) and NMFS also received 5 other proposals not ranked and reviewed by HFCC.

The NMFS regional office plans to convene a review panel on May 29 in Honolulu, with representatives from each of the Pacific Islands, to review all projects from the Pacific. The panel will rank them in priority order and make recommendations on the funding level for these projects. Another review panel is also being convened in California to similarly review the

West Coast projects. When both panels have completed the review process, a combined meeting will be held to make a single list of recommended projects for the entire region which will be sent to Washington for final review. Applicants receiving funds will be notified by July 1, followed shortly by the funding awards.

The Hawaii review panel consists of: Charlie Spinney (Hawaii), Felix Azuzu (Northern Marianas), Paul Stevenson (Samoa), Harry Kami (Guam), and Michael Kol (Trust Territory). The review panel meeting will be open to anyone, but spectators may not speak at the meeting.

Mr. Uchida commented that the Honolulu Laboratory received 44 projects to review and recommended grouping the projects into similar classes so the review would be easier. Mr. Goto asked if the Council had any input in the ranking process. Mr. Milone explained that the Council reviews the projects, then submits them to PFDF which sends the projects to NMFS.

Mr. Cooper questioned the project ranking process. He was concerned that the fishing industry was not benefitting from the S-K projects, due to the selection process. Mr. Goto explained that the projects come from various areas and the Council can't rank those from the Marianas, Samoa, etc. Mr. Milone added there is a limited amount of funding available which can be shared among the various applicants throughout the country. Last year, $8 million was available nationwide but requests totaled $73 million.

Mr. Kearns inquired if there were a possibility for the rankings by HFCC to be reversed or altered in the process. According to Mr. Milone, NMFS isn't bound by the Council's or PFDF's ranking, but the rankings they provide are the Council's expression of what is most important.

Mr. Ho also expressed dissatisfaction with the review process, feeling that the council's ranking is being overlooked. Mr. Goto said the council's ranking gives a lot of weight and it does have some meaning, but is no guarantee. Mr. Milone believes the proposals generated through this peer review lead to good proposals which usually fare well in the selection process.

VI. STATUS: SEA FOOD PRODUCTS PROMOTION

The high priority for activity B.T. & Associates is to obtain nominations for membership on the seafood promotion committee. They have some nominations and wish to conduct more interviews. Mr. Krasnick pointed out that members could submit more than one name, and nomination forms will be supplied. They want representation from the neighbor islands too. Nominations will be closed May 31.

Mr. Krasnick distributed copies of B.T. & Associates' Year 2 PFDF proposal to Council members. Considering the resource base and marketing situation in Hawaii, Mr. Krasnick said the idea is to emphasize the specialness of Hawaii products and high quality. To do this, they plan to:

1. Produce high profile promotional materials. For example, produce a high quality seafood calendar with information useful to buyers including seasonal availability of species, marketability, and substitution potential.

2. Produce a quality control manual describing seafood handling and processing techniques used in Hawaii as well as evaluating new techniques of quality assurance.

Mr. Krasnick mentioned that the Friends of East West Center plan to present a cooking demonstration focusing on seafood this year. They requested B.T. & Associates' assistance in contacting suppliers to provide raw materials. In exchange, the suppliers and the committee would be acknowledged in the brochure with their products presented at the demonstration. Mr. Krasnick feels it is a way to obtain visibility in the community without any direct expenditure of funds. Mr. Takenaka introduced ideas for use by the committee, for example, marketing tools to help sell fish, such as species descriptions including major fish names together with their pictures, pictures of loins, percentage yields, cross section of cuts, etc., and recipes.

Mr. Kearns asked if the Council would explore institutional use of local fish, for example in schools (DOE), hospitals, and prisons. Mr. Takenaka agreed that it offers opportunities for marketing.

Opportunities exist in working with organizations, such as Sea Grant, on a more coordinated and concerted effort. B.T. & Associates can provide guidelines and some basic informational material and have already approached and discussed their ideas with many of the organizations. Mr. Cooper commented that it is a shame to sell fish at low cost to the cannery when the yellowfin and tonbo are abundant. The Council could consider utilizing the surplus fish in the institutional systems.

Mr. Choy suggested that filets could be labeled as a specific fish to be used mainly in restaurants.

B.T. & Associates approached restaurants and other people in the business who have indicated they would like a workshop where their chefs and buyers could see the type of fish they are buying, and how it can be presented such as loin, steaks, etc.

Mr. Ho said the "opala" (rubbish) fish should also be considered. Promotion could be given to opala fish to make it attractive to a point where people want it. He said that the general demand is for fish that are in low supply and because the taape is available all year round, the fish is considered "rubbish."

VII. DETAILS OF SEAFOOD PRODUCT PROMOTION

Mr. Sakuda explained that at the time the Council was reviewing PFDF projects for Hawaii, the proposal for the seafood product promotion committee was incomplete, and an arbitrary budget of $50,000 was used. PFDF completed the proposal, distributed it to Council members, and sent it to NMFS as a top priority project. Since B.T. & Associates have now completed the budget of the proposal, they reviewed it for the Council.

NMFS provided the funding for Year 1 (FY1983) separate from S-K funding. The proposal for Year 2 (FY1984) is to go through PTDF for S-K funds with a total amount of $76,015. For Year 3 and 4, possible funding sources include DPED, Agriculture, and National Fisheries Institute, to match S-K and NMFS funding. They hope to get off Federal funding as soon as possible. Contributions from industry are a possibility.

VIII. OTHER

1. Midway Islands Albacore. The final report of the Midway Islands Albacore Tuna Fishery Feasibility Study was distributed to Council members, the Governor's office, the president of the Senate, Speaker of the House, and BLNR. Mr. Alvin Katekaru said the recent decision by Bumble Bee Seafoods not to purchase domestic albacore tuna from Midway puts a damper on establishing the Midway Island base.

2. Pohoiki Bay. While on a site visit to Pohoiki Small Boat Harbor, Mr. Kearns said that congestion and lack of space were still problems. Although the county has made some improvements, conflicts between fishermen and other users, such as swimmers and surfers, still occur. Mr. Kearns asked for an outside review of the situation for any temporary measures that could be instituted before real problems arise.

   Mr. Parsons said DOT is aware of the problem and the district manager will contact the Hawaii County Police Department to work out some assistance for additional patrols, especially during the heavy fishing seasons. More signs will be put up and DOT will try to solicit the cooperation from the local people who do use it, and stress that boats entering and leaving the facility have and must be given the right of way.

   Mr. Choy also mentioned the problem of no parking for fishermen at Maalaea Boat Harbor on Maui. Mr. Parsons said they will try to institute permit parking where the boatowners will be given a permit.

   Mr. Cooper questioned the utility of the proposed small boat harbor within Hilo harbor and asked the Council to push the Corps of Engineers to try to get the Cape Kumukahi boat ramp going as soon as possible. Mr. Parsons said the Hilo small boat harbor was not an alternative to Kumukahi and that it was for recreational boatowners. Mr. Goto suggested that the issue be listed on the agenda for the next meeting and have some of the Corps' engineers attend to answer questions. Staff should look more at the Kumukahi and the Kaulana ramp.

3. Update of Kaulana. Mr. Parsons reported on a lawsuit pending against the State and Federal government concerning the Kaulana project. The State and Federal government attorneys and the plaintiffs met to attempt to come up with an agreement to drop the suit against the Federal government and DOT. It's a question of whether or not Hawaiian Home Lands had the legal right to issue the DOT a lease. They may submit the question directly to the State Supreme Court. Mr. Parsons had not heard of the outcome of the meeting.

   The Corps of Engineers' Kaulana project concerns the breakwater and the basin. The lease with Hawaiian Home Lands concerns the State's backup facility behind it. Mr. Parsons said they plan to build a one lane launching ramp because of funding constraints. Mr. Cooper feels one ramp will not be sufficient.

4. DLNR Administrative Rules. a) Manele Harbor: BLNR amended Chapter 53, regulating fishing in Manele Bay on Lanai, to separate pole and line and throwmet fishermen; b) Spiny Lobster: Chapter 89 amended -

the wording was changed to concur with the federal Western Pacific Regional Fisheries Management Council Fishery Management Plan. c) Fishing in Northwestern Hawaiian Islands: Chapter 46 amended so that anyone with the NWHI permit must land their catch in the State; d) Gold-Spot Herring: Chapter 72 amended to add the gold-spot herring to the list of tuna baitfish; e) Regulating Fishing in Kailua Bay: Chapter 52 amended to regulate halalu fishing along the Kailua-Kona seawall.

5. Public Meetings. a) Kawaihae Harbor: Mr. Bill Akau, Kawaihae Harbor Master, reminded participants that he had authority to prohibit all fishing within the harbor. The people compromised as they did not want any administrative rules and will try to work it out among themselves. b) Puako Shoreline: The Puako House Lot Community Association and other residents asked for a prohibition on crossnetting and gillnetting in the area. The residents asked the State to establish a marine life conservation district (MLCD). Mr. Sakuda said proposals will be mailed to those who attended and another meeting will be held.

Mr. Cooper objected to a MLCD for the area, saying that it was a traditional fishing ground. Mr. Goto suggested that Mr. Cooper be present at the public hearing to make his feelings known and to take a contingent of people who share similar views.

6. National Marine Sanctuary for Humpback Whales. Dr. McDonald reported that a decision on the Humpback Whale Sanctuary has not yet been made. John Byrne, Administrator of NOAA, is expected to decide in June, hopefully in consultation with the Governor.

Mr. Sakuda mentioned that a new twist had been added to the sanctuary proposal in that if the State does not want the sanctuary, the sanctuary group may declare a sanctuary in federal waters outside of State waters. Staff was asked to look into the issue a little further.

According to the State constitution, Mr. Parsons said the State claims the archipelagic waters including the channels between the islands, however, as the Federal government sees it, the State boundary is the 3-mile limit, so there may be a legal conflict. Also, Mr. Parsons pointed out that the proposed sanctuary is from the shoreline out to a hundred fathoms, thus along the Kona coast where there is a sudden drop to about 100 fathoms from the shore, there would be no sanctuary in those areas according to the rumored change. The problem is with the banks between Maui, Kahoolawe and Lanai.

7. Notice of Kahoolawe. The notice announcing the opening of the Kahoolawe safety zone to fishing should be put up sooner because people are already around the island when they receive it. The staff will inquire: (1) DOCARE to provide more advance notice of the opening on the island and when received, it be put up immediately. (2) the Navy to open Kahoolawe more often.

8. Big Island Tuna Conference. Mr. Katekaru reported on the Big Island Tuna conference held on May 15-16 with 150 participants composed of fishermen, researchers, scientists, and representatives from agencies, i.e., WESPAC, DLNR. Mr. Cooper represented the HFCC.

Mr. Cooper was concerned that the industry wasn't well represented and their problems not aired at the conference. Mr. Goto explained that he was invited to the conference to represent the industry sector and to make a presentation, but he was unable to attend. The conference could be improved and the Council should have some suggestions should other conferences come up again.

9. Ika on Waianae Coast. Mr. Choy inquired about ika (squid) found on the Waianae coast by the University of Hawaii during a research assignment. He said Dr. Young of the University of Hawaii caught squid off Waianae about 3 miles off shore and found an area populated with squid. Mr. Sakuda will obtain more information. The research team also wrote another proposal for next year to conduct more research on squid and gave it to Mr. Cooper. A copy of the proposal will be sent to the Council. The Council might consider inviting Dr. Young to report his findings and discuss them at the next meeting.

10. Proposals. Ms. Rose Pfund of UH Sea Grant said the closing time for Sea Grant pre-proposals for FY85-87 was that week. If the Council is interested, Sea Grant could send pre-proposals to Mr. Sakuda to look over.

IX. NEXT MEETING

Staff will suggest a date and notify Council members.

The 17th Hawaii Fisheries Coordinating Council meeting was adjourned at 3:05 p.m.

Respectfully submitted,

DEBRA NANOD, Secretary Pro-tem

APPROVED:

SUSUMU ONO, Chairperson

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

June 15, 1984

Hawaii Fisheries Coordinating Council Meeting

DATE: Friday, June 29, 1984

PLACE: Department of Land and Natural Resources Board Room
Kalanimoku Building, 1151 Punchbowl St., Honolulu

TIME: 12:30 p.m.

AGENDA

CALL TO ORDER

I.	Opening	Chairperson
II.	Approval of Minutes	Chairperson
III.	HFCC Membership	Chairperson
IV.	US/Japan Cooperative Fisheries Oceanography Cruise - University of Hawaii and Hokkaido University Research on Squids and Tunas in Waters of Hilo and Waianae	Dr. Rick Grigg/ Dr. Richard Young
V.	U.S. Army Corps of Engineers' Study on Craft Facilities in the State	U.S. Army Corps of Engineers
VI.	Status of Seafood Product Promotion Project	B.T. & Associates
VII.	Other	Staff
VIII.	Next Meeting Date	

ADJOURNMENT

Water, water everywhere,

from the sea

mike markrich

A successful marketing executive for a local airline grew up on the Big Island and, like her friends, spent a lot of free time near the ocean.

But she did not go in because like most young people in this island state she never learned to swim.

A 1974 study by the Honolulu City and County Parks Department found that 70 percent of the 4,500 children tested between the ages of 7 and 14 were not able to swim 150 feet along a measured course at Kualoa Beach Park.

This study (the only one of its kind ever done in Hawaii) was considered so significant that the data was included in the 1980 Hawaii State Master Plan for Marine and Aquatic Education — a plan that was drafted but never implemented by the Legislature.

Jim Shon, a teacher and curriculum writer at the University of Hawaii who wrote the plan, said the "extensive statistical study" of the children involved supported what he said "water safety experts had been telling us for years . . . that we had a serious problem with our young people not being prepared to interact with the ocean safely."

City lifeguard chief Ralph Goto said there are indications that the situation has not changed significantly since then. The drowning rate has been increasing slowly for the past 10 years and one of the problems is that many children in Hawaii do not get proper training.

"People don't just know how to swim — somebody has to teach them." Goto said. "The myth of the Polynesian who learns to swim with nature doesn't exist anymore. There are so many different kinds of people here now."

The National Safety Council has reported that drownings are the second leading cause of accidental death among young people on the Mainland. (Auto accidents are first). Although no such information exists for Hawaii, a recent study published in the June Hawaii Medical Journal of 154 people hospitalized for near-drowning on Oahu from 1970-80 were "predominately male, young and of Caucasion or Asian ancestry."

During the 10-year period, there were also 314 drowning deaths on Oahu, according to Honolulu chief medical examiner Charles B. Odom. (A released but unpublished U.H. Sea Grant analysis of drowning cases between 1975-1980 produced similar findings, with the greatest risk group in Hawaii being males between 15 and 24 years of age.)

YWCA swimming teacher Henry Kamaka said he thinks one of the reasons so many Hawaii children are so unprepared is that many of their parents do not have time to work with them in the water.

Kamaka, 58, recalled how he learned. "When I was little . . . my father used to go out and look for squid and he would take me out and let me swim in shallow water. After a few months, I learned to swim from doing the dog paddle."

Later, Kamaka took lessons and learned proper swimming strokes.

But he said conditions today are different. In many households, both parents work or there is only a single parent and many children get neither the time nor the attention needed to gain confidence in the water.

Kamaka, who has taught swimming since 1953, said getting that confidence is an important part of learning to swim, but parents are sometimes so worried about their children that they instill fear of the ocean in them that may last all their lives.

One University of Hawaii student — despite having been born and raised in Hawaii — said she didn't learned to swim until she was in her mid-20s. She said it took her that long to overcome her childhood fears of the ocean.

Kamaka said another way children develop fear of the water "is when they are forced" into the water by well-meaning parents or friends.

But he added that sometimes the children who fear the water are safer than those who are willing to follow their friends into the water. He said children who learn on their own sometimes never learn the proper swimming strokes — and learn instead to depend on things like elastic surf leashes to keep them with their boards. The young people know that the surf boards will always float in an emergency. They are less certain that they can.

but not a lot can swim

Advertiser photo by Charles Okamura

Confidence in the water: Henry Kamaka gives 6-year-old Tyler Imbo a swimming lesson.

UH Scientists to Probe Ocean Environment

By Helen Altonn
Star-Bulletin Writer

Hawaii scientists will leave Monday for a month-long expedition to French Frigate Shoals to study the undersea environment that would be affected by ocean mining in Hawaiian waters.

It will be the most remote operation ever conducted by the Hawaii Undersea Research Laboratory (HURL), operated by the University of Hawaii under an agreement with the National Oceanographic and Atmospheric Administration (NOAA).

Involved will be HURL's two-man research submersible Makali'i, the vessel Kila, which is part of the UH fleet, and a brand new submersible that has been leased for the project from Can-Dive Services Ltd. in Canada.

The Deep Rover — the most advanced development in one-man submersibles — was tested here over the weekend by Can-Dive and HURL submersible pilots.

Gary McMurtry, University of Hawaii geochemist and HURL science director, said the new submersible has a certified depth capability of 3,300 feet. But the deepest it had been until the past weekend was 45 feet. "Part of the deal we struck with them was that our guys would help check it out to depth," he said.

HE SAID the submersible "has the famous Hawkes arms — incredible mechanical arms...that can pick up a raw egg without breaking it." The manipulators are named for the designer, Graham Hawkes, president of Deep Ocean Engineering Inc., Oakland, Calif.

The Deep Rover, costing $1,600 a day, will be used as a backup system and rescue vehicle in case of trouble with the Makali'i, which has a 72-hour life support system, McMurtry said.

He said the U.S. Interior Department's Minerals Management Service and NOAA are funding the $200,000 research undertaking to obtain information for an environmental impact statement.

The EIS will be prepared for potential sale of leases by the Minerals Management Service for ocean mining of cobalt-rich manganese crusts within the 200-mile Exclusive Economic Zone (EEZ) surrounding the Hawaiian Islands.

John Wiltshire, geological oceanographer and ocean resources manager at the state Department of Planning and Economic Development, will be chief scientist for the EIS investigations.

OTHERS participating will be Charles Morgan, with DPED; Steven Dollar, researcher at the University of Hawaii Institute of Marine Biology, who will be the science coordinator; Fred Mackenzie, UH oceanographer and geochemist; Richard Grigg, marine biologist with the Institute of Marine Biology, and Steve Ralston, with NOAA's fisheries program.

McMurtry said at least 10 dives will be made with the Makali'i — which can go down to 1,200 feet — to collect data describing the environment and biota that could be affected by mining.

He said French Frigate Shoals was chosen for the study because it is less remote than other areas and it is a marine sanctuary. "All the things we worry about that could be affected (by ocean mining) are there. It's the worst case scenario."

It is known that manganese crusts contain a large amount of cobalt, which is in big demand for steel and has to be imported by the United States, he said. But he said general knowledge about the crusts is scanty.

He said the Deep Rover was leased for emergency use during the study because "essentially there is no support up there — not even a dock to pull up to."

HE ALSO hopes to use the "state of the art" submersible after the French Frigate Shoals expedition to look at Loihi, an active submarine volcano about 22 miles south of the Big Island that may become a new Hawaiian island.

McMurtry said the top of Loihi is less than 3,000 feet from the surface so the Deep Rover "could just get to it" for observations and to collect samples of what may be hydrothermal deposits on the ridges.

He said HURL also is talking to the Deep Rover's designers about the possibility of building a two-man version that could dive to 5,000 feet.

The submersible is like a helicopter in terms of maneuverability and vision, he said. "It can turn on a dime," he said. And it has an observational chamber instead of little portholes like the Makali'i. "The vista you get must be absolutely astounding," McMurtry said.

He said Hawkes, the designer, demonstrated the submersible's dexterity by drawing a crustacean with a pencil in its arms.

"If we could get a two-man sub along these lines, it would be the only sub in the world with that capability," he said. "We would really be in the driver's seat with high technology."

Honolulu Star-Bulletin 8-31-84

HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE

PLANNING UPDATE

No. 4

August, 1984

GREETINGS:

This is the fourth in a series of Planning Updates concerning the development of a Master Plan/Environmental Impact Statement (EIS) for the Hawaiian Islands National Wildlife Refuge (HINWR). The purpose of this Planning Update is to: 1) share with you the highlights of our most recent public involvement efforts; 2) provide a summary of the U.S. Fish and Wildlife Service's (FWS') preferred management alternative for the HINWR and its associated environmental consequences; 3) direct you to locations where the Draft Master Plan/EIS is now available for public review and comment; and 4) invite you to participate in our second master planning workshop, scheduled for September 12, 1984.

RECENT PUBLIC INVOLVEMENT EFFORTS

In March 1984 we distributed the third Planning Update to over 550 concerned individuals, agencies and organizations. Additionally, a public workshop was conducted on March 20, 1984. The purpose of the workshop was to obtain comments and suggestions to the objectives and management alternatives presented in the third Planning Update. Although turnout was relatively small, we found the input provided by workshop participants to be extremely useful in refining management objectives and alternatives. Preliminary strategies were critically evaluated and rationale was presented to validate the process. Collectively, the input from the third Planning Update and the public workshop were largely responsible for 1) reducing the number of management alternatives under consideration; 2) making minor changes in the refuge output list priorities; and 3) refining several key strategies in various management alternatives. Most importantly, this input provided valuable assistance in the development of the FWS' Preferred Alternative.

ALTERNATIVES AND THEIR CONSEQUENCES

In developing management alternatives for the HINWR, the FWS considered a broad range of demands for human utilization of the natural and cultural resources of the HINWR while planning for the protection and preservation of those resources. The result of this effort is an array of management alternatives that varies in emphasis toward resource preservation or resource utilization. In all, five different management alternatives were considered for the HINWR. The following is a brief conceptual discussion of each alternative. The charts on pages 4 and 5 include management strategies associated with each alternative.

No Action Alternative

The No Action Alternative (NAA) is essentially management of the refuge as it presently exists. ("No Action" refers to "no change" from current management direction or intensity.) The description of the "present course of action" is needed to provide a reference point from which to compare and evaluate environmental effects of other alternatives under consideration. The NAA includes a number of strategies intended to enhance populations of threatened, endangered, and sensitive species as well as other fish and wildlife species such as seabirds. Research and monitoring will continue under the NAA. Limited off-refuge environmental education and interpretation will be provided, as will limited logistical support for commercial fishery operations (radio support, use of emergency mooring buoy, medical assistance, etc.). In documenting the NAA, it became apparent that current management falls short of accomplishing all refuge objectives at a minimally acceptable level. This is primarily due to insufficient human and financial resources. The primary areas where the NAA (present management) fails to meet objectives is in securing additional layers of protection for refuge resources and in environmental education and interpretation.

Baseline Alternative

The Baseline Alternative (BA) includes management strategies needed to address each of the refuge objectives at a minimally acceptable level. As the BA addresses the full range of refuge objectives, it is clearly a multiple-use alternative. It seeks to create a balance between resource preservation and resource utilization needs. The BA builds on the NAA, adding various management strategies to minimally satisfy refuge objectives.

Resource Preservation Alternative

This alternative includes additional strategies beyond those included in the Baseline Alternative, which would further address refuge objectives. Just as the strategies in the Baseline Alternative could be considered "must do" strategies to minimally satisfy refuge objectives, it was possible to portray "enhancement" alternatives that emphasize either

resource preservation or resource utilization. The Resource Preservation Alternative (RPA) is one such enhancement alternative that contains strategies directed towards an even greater degree of fish and wildlife preservation.

Resource Utilization Alternative

The Resource Utilization Alternative (RUA) is another enhancement alternative that goes beyond the NAA and BA and directs greater emphasis towards achieving educational, recreational, and other public and economic use objectives.

Preferred Alternative

The Preferred Alternative (PA) is a hybrid alternative, drawing strategies from both the RPA and RUA. The Preferred Alternative represents the FWS' recommended action for the management of the HINWR.

Green sea turtle–about 200 nest annually at French Frigate Shoals in the HINWR.

It should be understood that each of the three "enhancement" alternatives builds upon and incorporates all of the strategies that comprise the Baseline Alternative, which in turn builds upon and incorporates the No Action Alternative. Each enhancement strategy goes beyond the NAA and BA to include a mix of strategies that enhance either preservation/protection of refuge resources or utilization of refuge resources.

Throughout the development of management alternatives for the HINWR, the FWS has maintained that continued operation of the Tern Island field station is a necessary component of each alternative. It was concluded that many of the strategies in the NAA, BA, and the three enhancement alternatives, including the PA, are dependent upon the continued existence of the field station at Tern Island. However, because of the costs associated with the operation at Tern Island and the possibility of future budget constraints that could dictate a reduced level of operation at Tern, a trade-off analysis is presented in the Master Plan/EIS in the event that the FWS is forced to abandon Tern Island.

EACH OF THE THREE ALTERNATIVES LISTED BELOW BUILDS UPON THE NO ACTION AND BASELINE ALTERNATIVES DESCRIBED ON THE PRECEEDING PAGE. THE RESOURCE PRESERVATION ALTERNATIVE (RPA) CONTAINS STRATEGIES DIRECTED TOWARDS A GREATER DEGREE OF FISH AND WILDLIFE PROTECTION. THE RESOURCE UTILIZATION ALTERNATIVE (RUA) DIRECTS EMPHASIS TOWARD ACHIEVING EDUCATIONAL, RECREATIONAL, COMMERCIAL AND OTHER PUBLIC USE OBJECTIVES. THE PREFERRED ALTERNATIVE (PA) IS A HYBRID OF STRATEGIES DRAWN FROM THE RPA AND RUA AND REPRESENTS THE FWS' RECOMMENDED ACTION.

RESOURCE PRESERVATION ALTERNATIVE (RPA)	PREFERRED ALTERNATIVE (PA)	RESOURCE UTILIZATION ALTERNATIVE (RUA)
Regulate and monitor nearshore vessel traffic. Conduct lower priority research and management action in recovery plans. Establish additional populations of endemic land birds.		Monitor nearshore vessel traffic. Monitor impacts of commercial fishery on listed species. Conduct limited additional research as in recovery plans.
Designate critical habitat for all threatened/endangered species.		
Nominate HINWR as World Heritage Site/Biosphere Reserve/Natural Landmark.	Further evaluation before nominating as in RPA.	
Pursue overlay NWR status for Midway Atoll.		
Nominate HINWR lands/waters to Wilderness System.	Nominate HINWR lands. Evaluate and, if appropriate, nominate waters.	
Conduct historical survey; nominate sites to State/National registers.		
	Permit limited access to cultural sites for religious purposes.	
Monitor and control disease in resident seabird populations. Regulate and monitor nearshore vessel traffic. Monitor distribution and abundance of native terrestrial species. Map and ground truth terrestrial and marine ecosystems.		
	Monitor the effects of the commercial fishery and other human activities on "other fish and wildlife."	
Conduct annual aerial photo survey.	Conduct biannual aerial photo surveys of HINWR islands and atolls.	
Conduct extended field camps and/or semi-annual boat surveys. Conduct comparative monitoring studies on Midway and Kure.		
Conduct limited nature tours/environ. education at Midway and Kure.	Conduct limited nature tours/environ. education at Midway.	
Facilitate photography, journalism and art visits to Midway and Kure.		
	Facilitate limited, supervised photography, journalism and art visits to the HINWR. Conduct limited nature tours/environmental education at Tern Island.	
Regulate and monitor nearshore vessel traffic. Encourage/facilitate installation of multi-species fishery mooring buoy outside HINWR boundary.		Monitor nearshore vessel traffic. Permit use of existing emergency mooring buoy within HINWR boundary for multi-species fishery.
	Provide recreation, storage and emergency use of Tern Island in support of multi-species fishery.	

THE FOLLOWING IS A SUMMARY OF THE STRATEGIES ASSOCIATED WITH THE NO ACTION ALTERNATIVE (NAA) AND BASELINE ALTERNATIVE (BA). BY DEFINITION THE NAA REPRESENTS REFUGE MANAGEMENT AS IT PRESENTLY EXISTS. THE BA, WHICH BUILDS UPON AND FULLY INCORPORATES THE NAA REPRESENTS A LEVEL OF ACTIVITY NECESSARY TO MINIMALLY SATISFY REFUGE OBJECTIVES. TOGETHER THE NAA AND BA PROVIDE A FOUNDATION FOR THE ENHANCEMENT STRATEGIES ON THE NEXT PAGE. ALL OF THE STRATEGIES LISTED BELOW ARE INCLUDED IN THE NAA EXCEPT WHERE FOOTNOTED.

NO ACTION ALTERNATIVE AND BASELINE ALTERNATIVE

VULNERABLE SPECIES:

- Implement high priority research and management tasks in recovery plans.[1]
- Monitor populations and habitats.[1]
- Prevent/monitor/control harmful exotics.[1]
- Restrict access to islands/atolls.
- Enhance public awareness.
- Identify/protect candidate and sensitive species.

ENVIRONMENT:

- Conduct archaelogical survey; nominate sites to State and National registers.
- Nominate emergent lands for wilderness status.[2]
- Evaluate Marine Sanctuary status for HINWR.[2]
- Provide research opportunity consistent with Research Natural Area (RNA) criteria.
- Seek legal resolution of boundary dispute.

OTHER FISH AND WILDLIFE:

- Monitor seabird/other migratory bird populations.
- Restrict access to seabird colonies.
- Develop/implement oil spill contingency plans.
- Prevent/monitor/control harmful exotics.[1]
- Enhance public awareness.

SCIENTIFIC AND PROFFESSIONAL SERVICES:

- Utilize field camps/annual boat surveys to monitor populations and habitat.
- Produce/distribute research publications.
- Monitor human activities and effects.
- Provide logistical support for monitoring activities at Tern Island.

EDUCATION/INTERPRETATION:

- Develop off-refuge exhibits and programs.
- Develop/assist in publications and audio-visual materials.
- Develop curriculum materials for school system.[2]
- Encourage off-site photography, journalism and art (P/J/A) activities.[2]
- Develop educational/interpretive materials for Midway and Kure personnel.[2]

OTHER PUBLIC USES:

- Provide recreational opportunity for authorized personnel at Tern Island.
- Provide logistical support for NWHI commercial fishery operations (including use of existing emergency mooring buoy).
- Monitor logistical support activities for effect on fish and wildlife.

1 Strategy included in NAA and expanded or enhanced in BA.

2 Strategy not included in NAA but included in BA.

FWS' PREFERRED ALTERNATIVE

The Preferred Alternative (PA) places strong emphasis on protecting and enhancing fish and wildlife values of the HINWR. Continuing efforts would go into research and management efforts intended to recover endangered and threatened species. Monitoring of wildlife populations and their habitats would continue to receive high priority. Seabirds would be the primary focus of attention, but endemic marine and terrestrial species would not be ignored, as changes in distribution and abundance of these species are key biological indicators of ecosystem changes.

Laysan duck–endemic to Laysan Island.

While access to the refuge would continue to be restricted through a permit system, human activity levels on and around the refuge would likely increase beyond current levels. The continuing high priority efforts devoted to wildlife research and monitoring activities will mean the influx of greater numbers of researchers and agency staff personnel to Tern Island. Archaeologists and historians will be included in this influx, but their activities will be directed at studying the cultural resources on Nihoa and Necker Islands. Public use on the refuge will also likely see increases over the next 10-20 years, as demand for directly experiencing the unique resources of the refuge increases. While the Preferred Alternative would seek to enhance public awareness of refuge resources primarily through off-site activities, limited supervised on-site opportunities would also be provided to accommodate wildlife photographers, wildlife journalists and wildlife enthusiasts interested in nature tours.

The PA would support the State's current proposal to moor a mothership at French Frigate Shoals, just outside the Refuge boundary. The mothership would provide a support base for a fleet of catcher vessels which would fish for several commercially important fish and shellfish species. Under the PA, the FWS would continue to provide emergency logistical support to the multi-species fishery, and also provide storage space on Tern Island for fishing gear. In addition, Tern Island would be available on a regulated basis for rest and recreation by fishing crews. Related to the support for the commercial fishing industry, the PA includes a number of strategies designed to monitor support activities to ensure they remain compatible with refuge objectives over time.

With the increases in levels of human activity in and around the HINWR, the risks to wildlife resources will also increase. To reduce those risks to an acceptable level, the FWS will place increased emphasis on ensuring that all research and staff personnel take adequate precautions to ensure they are not unwitting carriers of exotic organisms which could devastate native floral and faunal communities. Increased efforts

will also be directed toward regulating and monitoring nearshore vessel traffic to minimize the risks of accidental groundings, oil spills or spills of hazardous materials. Finally, the PA calls for the FWS to develop procedures for carefully monitoring research activities, the commercial fishing industry, nature tours and other human activities that would be permitted under the PA, for possible adverse effects on wildlife. The basic concept would involve the development of monitoring systems sufficiently sensitive to detect at an early stage any harmful disruptions to the ecosystem. Corrective actions would be implemented quickly if the full cooperation of federal and state government agencies and private parties, could be secured. The PA would seek to create the level of public and private sector cooperation that would be required to successfully implement this alternative.

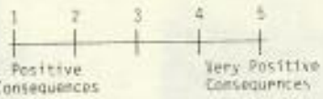
Monitoring wildlife populations

Masked boobies

Implementation of the PA will not be realized without a significant price tag. It is estimated that annual operation and maintenance (O&M) costs of the PA will double current O&M costs of $305,000 and development costs could range from $2 to $4 million. The O&M cost increase reflects primarily the increased research and education initiatives contained in the PA. Development costs are primarily related to rehabilitation of the deteriorated sheet pile sea wall that protects the island. Cost-sharing arrangements for the operation of the Tern Island facility can reduce FWS costs, as can the role of mothership-supported fishing vessels willing to facilitate refuge research projects. The accompanying chart on Environmental Consequences compares costs relative among the various alternatives. While the ratings are judgmental, they do provide a relative indication of how the alternatives compare with one another. Using those relative ratings, the FWS has concluded that the PA is, on the whole, superior to any other alternative considered. The PA is therefore the recommended course of action which the FWS will seek to implement over the 10-20 year time frame of this Master Plan/EIS.

COMPARISON OF ENVIRONMENTAL CONSEQUENCES

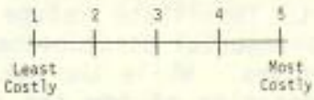
Key Outputs	No Action Alternative (NAA)	Baseline Alternative (BA)	Resource Preservation Alternative (RPA)	Preferred Alternative (PA)	Resource Utilization Alternative (RUA)
Vulnerable Species	1	2	5	5	3
Cultural Resources	1	2	4	5	3
Seabirds	1	2	5	5	3
Other Terrestrial/ Marine Species	1	2	5	4	3
Education/ Interpretation	1	2	3	5	4
Commercial Fishing	1	1	2	3	4



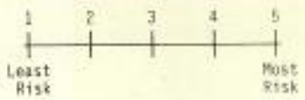
NOTES:

1. Positive consequences are actions that result in a net benefit or gain for listed outputs.
2. Each of the alternatives have been structured so as to exclude any significant negative consequences.

Other Planning Issues	No Action Alternative (NAA)	Baseline Alternative (BA)	Resource Preservation Alternative (RPA)	Preferred Alternative (PA)	Resource Utilization Alternative (RUA)
Cost to Implement Refuge Programs	1	2	4	5	3



Degree of Risk to Wildlife Resources	3	3	1	2	5



MASTER PLAN/EIS AVAILABLE FOR PUBLIC REVIEW

The 160 page Draft Master Plan/Environmental Impact Statement for the HINWR is currently available for public review at local libraries and government offices. You are invited to review the plan and are encouraged to comment on the document.

The comment period is from August 31 to October 31, 1984. Please send comments to:

Refuge Manager
Hawaiian Islands National Wildlife Refuge
P.O. Box 50167
Honolulu, Hawaii 96850

Copies of the Draft Master Master Plan/EIS are available for review at the following public libraries:

Hamilton Library, University of Hawaii
2550 The Mall
Honolulu, HI 96822

Legislative Reference Bureau Library
State Capital Building
415 South Beretania
Honolulu, HI 96813

Hawaii State Library
478 S. King Street
Honolulu, HI 96813

Copies of the Draft Master Plan/EIS are available for review at the following government offices:

National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96812

State of Hawaii
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

"Loaner" copies of the document are available at the U.S. Fish and Wildlife Service, Pacific Islands Office located at the following address. Please call in advance to reserve a copy.

300 Ala Moana Blvd.
Room 5302
Honolulu, Hawaii 96850
808-546-5608

PUBLIC MEETING SCHEDULED

We have scheduled a public meeting for Wednesday, September 12, 1984, in Honolulu at the McCoy Pavilion in Ala Moana Park at 7:00 p.m. The purpose of the meeting is to explain the planning process which we have utilized over the past year and the important product which has emerged from that process--a preferred alternative for the management of the Hawaiian Islands National Wildlife Refuge.

Your participation in this important public involvement effort will be appreciated. Aloha.

FROM:

UNITED STATES
DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Pacific Islands Office
300 Ala Moana Boulevard
Room 5302
Honolulu, HI 96850

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saturday
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AFTER 3-4PM
(1500 HOURS)
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988-7439
(IF YOU ARE IN THE GRAVEYARD YOU'VE GONE TOO FAR. TURN RIGHT FAST!)

NIHOA • NECKER • FRENCH FRIGATE SHOALS • LAYSAN • LISIANSKI • PEARL & HERMES • MIDWAY • KURE • SAUDI ARABIA • ESTONIA

HONORING PARTICIPANTS IN THE GALA 1983 AND THE EQUALLY SPENTUBULOUS 1984 FIASCO OF THE FIELD!!!

FEATURING:

THE EVER POPULAR: CHICKEN WATCHING !

BROUGHT BACK BY POPULAR DEMAND: DOG BARKING

MISCELLANEOUS FELINE FESTIVITIES

FOO! (BABY NEEDS NEW SHOES)

POTENTIAL VOLLEYBALL (UNLIKE KENETIC VOLLEYBALL) SWIM MEETS

MARBLES
(ALL MARBLES MUST BE RETURNED — ie. NO lost MARBLES, 2 pieces of I.D. required for MARBLE CHECKOUT)

ANIMAL CALL CONTEST

BREAK DANCING

DRESS CODE (RADAR ENFORCED !!)

FIELD REGALIA ONLY; ENTRY LIMITED TO APPROPRIATELY DRESSED PERSONNEL

PRIZES AWARDED FOR MOST AUTHENTIC FIELD DRESS

ATTN: PANTS OR SHIRT REQUIRED

X-RATED (WELL, MAYBE R)

HIGHLIGHT OF THE EVENING: FLICKS!

REQUIRED ADMISSION: 20 COMPROMISING SLIDES OF CAMPMATES

CUM & MINGLE WITH

WILD BILL GILMARTIN WILL PERFORM BUDGET MANIPULATIONS, FEARLESS FISHER FEFER (THE ORIGINAL OLD MAN OF THE SEA), FOR COVALENT BONDING SEE P30 (ADULT & RECENTLY MOLTED, FORMER EDITOR OF PIEDERSON'S PAPER), R. MORROW WILL HOLD SEMINARS ON OUTBOARD REPAIRS (WITHOUT PANTS), HOSTED BY THE (ONE AND ONLY) TURTLE MAMA, MOONSCAPES BY R. SAITO, STRIP CHECKERS BY WHISKEY YANKEE ROMEO 5317, MASTER BAITER D. ALCORN, NODDY NAUGHTON SINGING HER SWANSONG PRIOR TO HER FALL MIGRATION, GUSTATORY LECTURES BY H. FORTNER → LADY OF LIMU, A. KAM'S AGE CLASS CHANGE, THEA JOHANOS CONDUCTING ASSOCIATION RESEARCH, J. HENDERSON WITH ARBOREAL KARATE TIPS; R. EASTLAKE GIVING RENTAL TIPS !!! AND ALL OTHER KINDS OF PEOPLE WE DIDN'T THINK OF ANYTHING CLEVER ABOUT!

MENU:

OUR MOTTO: "BRING SOMETHING YOU LIKE TO EAT AND DRINK OR YOU WON'T GET ANY !!"

BALLET PARKING BY MONTESSORI GRADUATES

RETAIN THIS STUB TO CLAIM A CAR

GUESTS IN ABSENTIA WHO WE KNOW WOULD BE HERE:
LT. CMDR BIG MAC
GAIL FAIRAIZL
STEVE FAIRAIZL-
R. WATSON
E. KNUDSEN

FEATURED ENTERTAINMENT:
FIRST HAWAIIAN RECORD OF THE SPATULATED GODWITS

FUNDING PROVIDED BY: THE MEISTERBRAW FOUNDATION OF MILLWALKIE AND YOUNG REPUBLICANS FOR FERRARO AND FASTFOODS AND THE PROTECTION OF FIBRULATED GLANDSPINES

George

A Trip to Some Outer Islands

8-3-85 A-7 HSB

I'm tired of seeing my name bandied in newsprint and hearing it repeated on TV news in regards to the City Council trip to the Northwestern Hawaiian Islands.

I now fully believe the rumors regarding the demise of responsible journalism, at least in Hawaii. Not one reporter has ever bothered to inquire about my credentials.

Councilman Rudy Pacarro asked me to represent his office because he knew of my qualifications. He took the time to ask and did not pick me just because I am the husband of a Council research assistant. He felt that I would be the one most qualified to relay back information and observations critical for his decision making. Pacarro is the chairman of the Land Use and Controls Committee.

I have visited several of the Northwestern Hawaiian Islands and have assisted the Smithsonian Institute's 1960s expedition which studied pelagic and indigenous birds.

As a member of kamaaina family, I have been privy to a vast array of unpublished diaries, logs, letters and oral history describing life and conditions on these Islands in question.

My great-grandfather, William Kinney, who owned Palmyra, traveled to these Northwestern Islands from Kauai with his wife and groups of over 50 laborers to mine guano which was used to fertilize the sugar fields of Hawaii. They lived on Laysan Island for months at a time.

The contention that the recent group of 20 was well-rounded is very misleading. Examining the list we find:

- 7 persons from the media (more than enough to cover a presidential election).
- 9 or 10 from various City departments.
- 1 representative from the state Department of Land and Natural Resources.

We are all very familiar with the good works of Life of the Land, the Outdoor Circle, Greenpeace, Sierra Club, Audubon Society, etc. But I have never heard of Hawaii's Thousand Friends. I would be interested to hear what it has done to better our fragile ecology. The other organizations' performances speak for themselves.

Also, no one bothered to ask any of the native Hawaiian organizations, the Bishop Museum, any noted Hawaiian historian, or even a representative from the fishing industry. I am sure that one of them would have been interested in attending.

If it were not for King Kalakaua's laying claim to Kure Atoll and the other Northwestern Islands, they might now be English, French or German possessions. My great-grandfather was one of those persons responsible for persuading him to do this.

The handling and processing of this trip was very slipshod. The DLNR Kure Atoll permit list contained only 19 names. Some Council members had a list which contained 20 names. There were apparently two lists — one with 19 names and one with 20 names.

The staffer responsible for coordinating the trip kept putting me off until the deadline passed. Six different attempts were made prior to July 18.

I was led to believe everything would be taken care of as I was told to be at the airport in the morning. However, upon my arrival, Muriel Seto was there with her luggage. I overheard conversation that she had actually been notified the night before that she would be going instead of me. Even though I was not entirely bumped off the trip, I would have had to remain aboard the aircraft for the entire four hour stopover on Kure Atoll.

It's a shame this has become a political football. It was my understanding that I was to make the trip based on my qualifications. It was my intention to provide Pacarro with an unbiased report based upon these qualifications.

Harvey David Dukelow

Star-Bulletin Tuesday, October 29, 1985

OPIHI

By Carol Nakagawa
Star-Bulletin Writer

The slimy black creatures, with butter-yellow insides succulent and rubbery, are like black gold.

Opihi has become a precious commodity in the Islands, and pickers are finding fewer and fewer of the limpets that encrust windward shores of the Hawaiian Islands.

The meat of the opihi, eaten raw by connoiseurs, is encased in a cone-shaped shell that ranges in size from a pin-dot at birth to about 2¼ inches. The organism latches onto rocks on the shoreline where the surf pounds. This makes them difficult to harvest, and many pickers have been swept out to sea while trying to pry them loose.

Yet there are those who risk their lives to collect the Hawaiian delicacy, which is also enjoyed by other ethnic groups.

"Who wants to sit in a corner and rot?" says Raybern Freitas, who picks opihi with three or four friends a few times a year. "You're not going to gain anything if you don't go after what's worth getting. And I think opihi is worth getting."

In 1900, about 150,000 pounds of unshelled opihi were sold in Honolulu for about 15 cents per pound.

Today, a pound costs about $4.30. A gallon of shelled opihi sells for about $150, according to price quotes from various Oahu fish markets. It takes 35 to 40 pounds of unshelled opihi to make one gallon, according to Rachel Haili of Haili's Hawaiian Foods at Ala Moana Farmer's Market.

"The fishermen are asking more this year," she says, about $10 more per gallon.

Most people buy these gallons for big parties of 300-400 people, she said. Others who need just a bite to satisfy a very costly craving can buy a 2- to 3-ounce serving for $3.95, she said.

Haili says she gets her opihi from markets in Hilo, as does the Hanapaa fish market in Wahiawa. "It's very scarce," says an employee at the Wahiawa store. "Ours comes from the Big Island, and sometimes it takes two months to come after we order it."

A worker at Awili store in Hilo says they hire people to pick by hand. "Some go by helicopter or hike lots of miles."

A protectiveness creeps into his voice when asked about who did the picking and where they found opihi. "We wouldn't want to tell you that," he says.

Freitas says he and his friends pick only for their own enjoyment and for that of their families and friends. Armed with

Section B

sharp tools, cloth sacks, ropes and an ice chest for the spoils, they venture to places unknown (Freitas is tight-lipped about the picking sites, though he did say that they are not on Oahu).

Since 1965, the primary source of opihi has been Maui and Hawaii. Their main habitat is windward coastlines, such as Hamakua, Hilo, South Point, North Kohala and Kalapana on Hawaii; the Cape Halawa and Moomuni beach coasts of Molokai; the Hana coast and Cape Kinau coast of Maui; and both major shorelines of Niihau, according to state Division of Fish and Game statistics.

The supplies are dwindling, according to figures provided by the state Land and Natural Resources department. In 1960, there were 13,872 unshelled pounds landed on all the Islands. In 1983, 8,994 pounds were collected.

The opihi are also getting smaller. In the 1950s, the median shell size of opihi collected was 1½ inches; in 1981, about 1¼ inch.

Says Freitas: "Pretty soon not going get."

He speaks vehemently about pickers who do not appreciate the scarcity of the limpet. "You gotta think about tomorrow. The way we were brought up, we don't waste.

"You can leave it for the next day."

He says the best time to pick

Turn to Page B-3

Top left, Lorrine Haili of Haili's Hawaiian Foods displays a single serving of opihi, which sells for about $3.95.—Star-Bulletin photo by Terry Luke. Below, a polished opihi shell. Bottom left, a fisherman is poised on a rough shoreline, a perilous site for opihi pickers.

Opihi...

Continued from Page B-1

opihi is "in the early morning—at night they climb on the rocks onshore, then at daybreak, they glide slowly back onto the shorebreak," he said.

The pickers use a sharp tool to pry the unsuspecting opihi off the rocks. They have to work quickly and accurately, though, because once on opihi senses an intruder, it sucks on so hard to its home that it is difficult to grasp.

"You gotta whack 'em all one time, otherwise you know what going happen," says Freitas.

"I use a gasket scraper," he says. "Some guys use screwdrivers, but they're too narrow. I drill a hole in the handle and string a cord through so it won't get lost."

Freitas uses a Bank of Hawaii money sack, with a pebble tied in the corner to anchor it, because a bigger sack "will weigh you down."

A powerful-looking man, 6-foot-3, 220 pounds, he speaks with respect for the ocean.

"You have to watch the ocean ... you cannot take chances."

Freitas remembers a close call of one of his friends. "He was picking on a pinnacle away from shore. We're big and tall guys; he's not. We warned him, but he didn't know the water was going to rush around the pinnacle and pull him down.

"As he leaned over for the big ones he got swept out into the water—it was boiling ... all white. A swell took him under a ledge and pounded him on it two times.

Freitas' eyes grew stormy as he continued:

"He cried, 'Help me help me.' The rest of us had to watch as he struggled. He came up with a bleeding face. But we couldn't help him. We had a rope, but we couldn't jump in.

"Finally a wave came and dumped him up on that ledge. No one said anything. We went straight home.

"My heart pulled as the ocean pulled; but you know if you go after him, you're dead. It's hard. It's your friend."

Freitas says that his group is very careful about their picking. "If one of us looks at the water

and get a negative feeling, we just say so and then we pack up and go back. No sense taking chances."

And they don't take any opihi less than the size of a quarter, he says.

They shouldn't, according to state regulations. The minimum legal size for harvesting is 1¼ inches in shell diameter, or neat ½ inch in diameter.

It's a petty misdemeanor to pick undersized opihi, says Noah Pekelo, chief of support services with the enforcement division of the Department of Fish and Game. The penalty is $500 or 30 days in jail.

Beaches are patrolled, pickers' bags checked, markets are inspected "regularly—almost every day", says Pekelo. Since 1980, there have been five arrests for non-compliance.

But the regulations have not been effective, says Alison Kay, a zoologist at the University of Hawaii-Manoa who has done extensive research on opihi for the state. She noted that the supply and size of the opihi has diminished.

In a 1976 report, "The Biology of the Opihi," Kay and a team of researchers found that at six months, an opihi is about one inch in diameter and has an edible body weight of little more than .03 ounces. If allowed to live six months longer, the shell size would increase to 1½ inches, but the body weight would triple.

"Sometimes you get small kind cause when you look at a bunch on the wall, you gotta decide beforehand what you're going to take," says Freitas. "But once you start taking, you don't have time to decide what to leave behind."

Opihi is shelled, salted and eaten raw, garnished with *limo kohu*, says Freitas. Hawaiians eat it with poi, Japanese relish it on hot rice—appreciation of opihi is cross cultural in Hawaii.

"The best way to eat it is straight from the ocean," says Freitas.

"It tastes sweeter, more crispy—you know, crunchy. More sweet ocean taste.

But you shouldn't eat it at the picking site, he says. "The ocean will get mad at you.

"There's nothing as powerful as the ocean."

Commercial versus

from the sea

mike markrich

Like many Oahu shore casters, fisherman Marco Santiago keeps a small copper bell on his pole to alert him the moment he gets a strike. The 57-year-old retired heavy equipment operator said there have been occasions when the bell rang so many times that he had to stop fishing — he was catching more than he needed.

But those days, less than five years ago, now seem only a memory.

Early one morning, as I waited with Santiago for 4½ hours, the bell rang softly only once. The hook came up empty, and Santiago shook his head.

"I used to come here for an hour and get all the fish I needed. Now I'm lucky to get anything at all," Santiago said.

He thinks the problem is commercial netting directly in front of the place along the Waianae Coast where he goes fishing.

"I've seen them (commercial fishermen) come in here with their planes and their nets and take everything. They come in and lay their nets within five feet of shore. I've even seen them tell swimmers to get out of the water or they'll run them over," he said.

Santiago said he has been met with indifference each time he has called the state Department of Land and Natural Resources to complain. He said the enforcement officers did not seem interested.

(Noah Pekelo of the Land Department's enforcement division said he has no record of any complaint call from the Maili area since January. But he said there is no law that restricts commercial fishermen from fishing close to shore with surround nets. Pekelo said the only laws that restrict commercial netting have to do with the size of a net's mesh squares or specific areas where the nets should not be used, such as inside the harbor at Pokai Bay.)

But legal or not, some others share Santiago's concerns about overfishing and feel that the state's lack of control over commercial fishing is partially to blame for a decline in catch rates. This has been one of the worst years for fishing in recent memory.

"People tell me something has got to be done," says Stan Wright, a fisherman and television personality. "I tell them it's too late. Something should have been done a long time ago."

Wright said the near-shore fishing areas around Hawaii are so depleted that the "Let's Go Fishing" TV program has resorted either to traveling to other places such as Christmas Island or to making extensive use of old footage from Hawaiian waters. Although this gives the false impression that fish are being caught abundantly here, Wright said it is the only way that the show can consistently show people catching fish.

Longtime Hawaii fisherman Jeff Konn said shore casters and commercial fishermen always had a live-and-let-live way of accommodating each other. The commercial boats would do most of their fishing offshore where the shore casters could not go; the shore casters would do their best to stay out of the commercial fishermen's way.

But Mark Suiso, Waianae Sea Grant extension agent said things have changed. "Before there was plenty for everybody and they had no need to compete with each other. But recently the availability of fish has been less, and more and more fishermen have been

shore fishing: Everyone's losing

Marco Santiago waits for a bite on his fishing line.

entering the market."

He said commercial operators that once specialized in certain kinds of fish are unable to find enough fish of one kind to pay their expenses. Because of this, he explained, the commercial operators take whatever they find. He said they fish very aggressively and are not sensitive to the needs of the shore casters.

Suiso said there are three types of commercial fishing operators in the Maili area — aku boats that occasionally net off Maili for small baitfish; akule fishermen who use airplanes to find their fish; and "freelancers," people with other jobs, who jump into the water with nets whenever they see an opportunity. He said the effect of all this fishing pressure with nets has reduced the catch of shore casters such as Santiago to virtually nothing.

Waianae commercial net fisherman Henry Pelekai said that he "feels for" Santiago but there is nothing he can do. He said there is no regulation against taking the near-shore fish with nets; if he doesn't, someone else will.

Pelekai said he is the largest net fisherman on the Waianae Coast and, if there were regulations against fishing near shore, he would abide by them. But he added that for them to work, better enforcement would be necessary. He said it is common knowledge that illegal netting takes place often at Pokai Bay in spite of the complaints of shore casters there.

Pelekai feels that there should be more regulation to protect the rights of everyone.

Some worry that if virtually uncontrolled netting is allowed to continue the schools of ulua, akule and other near-shore species might collapse to the point where it will take them many years to regenerate.

"In terms of orientation, the state policy is geared toward commercial fishing. I think a more balanced approach is needed," said University of Hawaii fisheries expert Karl Samples.

Economically, Samples said, both commercial and recreational fishing "are in the same ball park" with sales impacts of between $20 million and $40 million.

Conservation Line

The Gill Net Menace by Rick Gaffney

■ There is a serious move afoot to ban the use of gill nets in the coastal and inland waters of the United States. HAWAII FISHING NEWS supports that goal.

Local and national attention has been increasingly focused on gill netting thanks in part to the massive increase in the use and abuse of gill nets across the nation. Many organizations are now arguing for new regulations to address the uniquely destructive aspects of this fishing gear. Prominent in these efforts is the National Coalition for Marine Conservation (NCMC).

The unregulated use of gill nets poses a number of serious threats to the ocean and inland waterways of Hawai'i and the nation. Arguably the most negative aspect of the use of these entangling nets is the wasteful killing of nontarget species—fish, birds and mammals that are not the target of the netter—that are of no commercial use whatsoever. Overuse of gill nets in many coastal areas (the south coastal reefs of much of Moloka'i are a good example) has virtually depopulated these areas of all forms of aquatic life.

The unregulated use of gill nets has also led to a phenomenon known as ghost fishing, in which unattended and abandoned gill nets literally go on fishing forever. These nets also tend to foul hook-and-line gear and, they have become a growing menace to boaters for they entangle props and rudders. Much of the netting that Hawai'i's anglers curse when it shows up on their props (and love when it attracts mahimahi) is not "cargo net." It is actually fishing net abandoned by gill or trawl netters.

Recently, a young gray whale washed up on a San Diego, California, beach. The whale was entangled in a halibut gill net and was quite dead. The unhappy event made headlines in local papers. The unknown owner of the net was in violation of the Marine Mammal Protection Act, although it is unlikely anyone will ever be apprehended.

One suggestion to limit the ghost fishing problem is to hold gill netters responsible for the killing of protected mammals, turtles and other species. This would require legislation forcing all gill netters to attend their nets at all times and require that all nets be clearly marked with the name of the owner/operator.

Other suggestions from the NCMC for protective legislation require that all gill nets be attached to floating devices, that gill nets be restricted in total length, that nets only be used in a straight line and that a fisherman who loses all or any part of a net be required to report that loss immediately.

Hawai'i has a number of regulations regarding the use of gill nets, including one that establishes a minimum mesh size and a maximum overall length, but these regulations are routinely ignored, and in any event, Hawai'i's understaffed Division of Aquatic Resources Enforcement Branch is often incapable of keeping up with the violators.

The use of gill nets proliferated in Hawai'i in the early 60s with the availability of monofilament materials for construction of netting. Later, machinemade monofilament gill nets all but replaced handmade linen, cotton and multifilament nets, and this made them far more readily available and much cheaper. This quickly raised the use rate all over the state, much to the detriment of the coastal reefs.

One particularly destructive practice involves the use of "bull pen" nets. These long fence nets intersect the reef and form circular enclosures, which trap virtually every fish traversing the reef area. Conceivably, extensive use of this very effective netting technique could kill virtually everything that swam over a reef, and that is part of the reason this use of gill nets is suggested for outlaw by the NCMC. Anyone familiar with vast portions of the Moloka'i coastal reefs that are now devoid of marine life will appreciate the need for a ban on bull pen fishing methods.

Gill nets are, by their very nature, too productive to be allowed to proliferate. They are far more productive than even the most overzealous commercial fisherman needs to be, and they are so completely detrimental to the environment that they should be banned.

In Hawai'i, a case can, and likely will, be made for the use of gill nets by native Hawaiian fishermen. While there may be a historical, even aboriginal, right for the native people of these islands to use gill nets, it must be remembered that the historical use of gill nets was heavily regulated by *kahu*, who closely monitored the ocean to prevent overharvest. Similar protection must exist today before the "right" to use gill nets can be extended even to the native people of Hawai'i.

Banning the use of gill nets may well prove to be an unpopular solution to the growing abuse of ocean resources of Hawai'i and the nation, but a bitter pill is necessary if we are to assure the protection of our resources and any future for our fisheries.

. . . **Rick**

Hawaii Fishing News Nov 85

Birds are more than nodding acquaintances

By Jan TenBruggencate
Advertiser Kauai Bureau

LIHUE — Campers in Kauai's remote Kalalau Valley have been finding competition for beach and camping space from a persistent flock of Hawaiian noddies.

The nearly black birds have characteristic white foreheads that fade to gray across the top of the head. A flock of about 30 of the birds often stands out on the sand at the south end of Kalalau's beach, fronting one of the several caves the birds use for nesting.

Humans who try to explore the caves often are confronted by birds swooping down from cave ledges where they appear to have nests. The swooping frequently is accompanied by loud screeching.

Andrew J. Berger's "Hawaiian Birdlife" says not much is known about the breeding biology of these birds, which are also known as black noddies, white-capped noddies, lesser noddies and Hawaiian terns. Their Hawaiian name is noio, and scientists identify them as Anous tenuirostris.

At Kalalau and in neighboring sea cave areas, they rest on rocky outcroppings that sometimes show signs of nests made of twigs or bits of dried flotsam. Rocks under the ledges are stained white by their droppings.

The birds are reported to nest on all the Northwestern Hawaiian Islands, on many of the islets off the main Hawaiian chain and in isolated places on the main islands themselves.

The noddies get their name from the way they nod their heads when they're on land.

They have five close relatives nesting in the Hawaiian Islands, all from the bird family Laridae, which includes gulls, terns and noddies. There are no gulls nesting in Hawaii but there are three of each of the others.

Members of this family include some of the most beautiful of Hawaii's seabirds. They are not soaring birds like the albatross or the great frigatebird. The members of family Laridae generally need rapid wing action to stay aloft. Many are capable of hovering over a spot before diving down to snatch a morsel from the surface of the sea. Some can swim. Some get waterlogged and must stay in the air, dipping their beaks into the water for little fishes.

The one closest in appearance to the Hawaiian noddy is the common noddy. The Hawaiian is about 14 inches long with a 28-inch wingspan, while the common noddy, also known as the brown noddy, noddy tern, noio koha and Anous stolidus pileatus, grows to 16 inches and has a 33-inch wingspan. The Hawaiian noddy tends to go from dark gray to black, while the common noddy has more brown.

The blue-gray noddy (Necker Island tern, blue-gray fairy ternlet, Procelsterna cerulea saxatilis) nests across much of the Pacific and on the Northwestern Hawaiian Islands and Kaula Rock, but not in or around the main islands. It's only 10 inches long with a wingspan of a foot and a half.

The white tern or fairy tern (love tern, manu o ku, Gygis alba rothschildi) is pure white with delicate black rings around its eyes. These attractive, curious birds are about the same size as the blue-gray noddies, and nest throughout the Pacific, but infrequently in the main Hawaiian Islands. However, there have been reports of some Oahu nestings, including one in Kapiolani Park in 1970.

The sooty tern and the gray-backed tern both have white undersides and white foreheads and necks. The tops of their heads are black, with a black stripe running back through the eye. They are different in the color of their backs, upper wings and upper tail feathers. In the sooty tern, these are black, and in the gray-backed, they are, predictably, gray.

The sooty tern ('ewa 'ewa, Sterna fuscata oahuensis) is a little larger at 16 inches from beak to tail and a 34-inch wingspan. It is a common seabird, and among the main islands it nests off Oahu at Manana and Moku Manu islets, spending spring and summer there. Wildlife experts don't get much rest around the sooty terns, which are given to loud, constant, day and night screeching through most of the nesting period. For that reason, this bird is also known as the wideawake tern.

The gray-backed tern (spectacled tern, bridled tern, pakalakala, Sterna lunata) grows to 14 inches in length and nearly 30 inches between wingtips. It nests at Moku Manu and Kaula in the main islands, and on several of the Northwestern Hawaiian Islands. It is less common than the sooty, of which more than a million nest at Laysan Island alone.

Since few of the terns and noddies nest on the main islands, and because they spend much of their time miles out at sea, they are regularly seen by few Hawaii residents outside the fishing community.

The noddies, which get their name from the way they nod their heads when they're on land, are nearly black, with characteristic white foreheads that fade to gray across the top of the head. A flock of about 30 of the birds often stands out on the sand at the south end of Kalalau's beach, fronting one of the several caves the birds use for nesting.

Advertiser sketch by Adam Nakamura

Baitfish no longer a worry

from the sea

mike markrich

For years, scientists and state officials have spent hundreds of thousands of dollars trying to renew Oahu's depleted stocks of the prized baitfish known as nehu for use by the aku fleet.

Now, it appears, they may not have to bother. Due to a 700 percent increase in insurance rates, the fleet itself is in greater danger of disappearing than the tiny anchovy.

Rising insurance rates have hurt the boats for a number of years, but the recent drop in catch rates has created a crisis in the fishery. Boat owners say they are no longer able to afford the $100,000 liability insurance required by the Navy to fish for bait in Pearl Harbor, one of two places on the island where the nehu is found in abundance. They say they even can't meet the Navy's offer to set up a joint escrow account on their behalf.

The owners are having so many financial difficulties that four of the 10 boats in the fleet are unable to meet the Navy requirements; some fear that soon half of the boats will be limited to catching their bait in Kaneohe Bay, where no insurance is required. That would put more pressure on the already depleted stocks of nehu there and some boats may be forced out of business.

In response to the problem, the state Department of Land and Natural Resources has temporarily waived its insurance requirement for the boats and written to the Navy asking for a waiver of its insurance requirements for the boats until conditions improve.

The Navy has replied that it is willing to compromise by setting up a liability fund instead of requiring insurance, but a letter by Capt. Paul O'Connor says Defense Department regulations require all civilians operating on federal property to carry insurance.

The boat owners have had to meet some kind of Navy requirement to enter Pearl Harbor for nearly 30 years. Although the Navy insurance requirement was never popular among the owners, catches were high during the the 1960s and '70s and the cost of insurance was low relative to the high profits.

However, in the 1980s things changed: Catches dropped by half and the cost of liability insurance went from $5,000 to nearly $40,000 in five years.

Aku boats gross no more than $220,000 per year, so this doesn't leave much profit after boat expenses, maintenance and labor costs are paid.

Nor does it, according Tuna Boatowners Cooperative Manager John Robey, leave much of an incentive to continue fishing.

"If this keeps on, some of our guys are going to have to make a choice — go fishing and go broke or drop the insurance and hope to God nothing happens," he said.

Robey said the insurance companies require that boat owners carry hull insurance in addition to liability. He explained that this causes hardship for many of the owners whose boats were built in the 1930s and '40s and are therefore more difficult to insure. As a result, he said, two of the five boats in the co-op are uninsured.

David Nottage, general agent for First Insurance, said that he sympathizes with the aku boat owners but that no one could expect the Navy to waive its insurance policy and leave the federal government unprotected against liability claims. Nottage, who has insured aku boats for more than 40 years, said the problem must be considered from a larger perspective.

"We are seeing the demise of a fishing institution by the insurance market," Nottage said.

He said insurance rates are both set and shared internationally. He said the problem began affecting fishing boats all over the country five years ago when the insurance industry started to suffer "tremendous losses" from the sinkings of fishing boats in Alaska and on the Pacific coast. The losses coincided with a dramatic increase in both settlements and attorneys' fees.

Now few companies anywhere are willing to insure fishing boats and those that are writing policies charge between 400 and 700 percent more than five years ago. And on top of that, he said, few of the companies are willing to insure Hawaii's aku fleet.

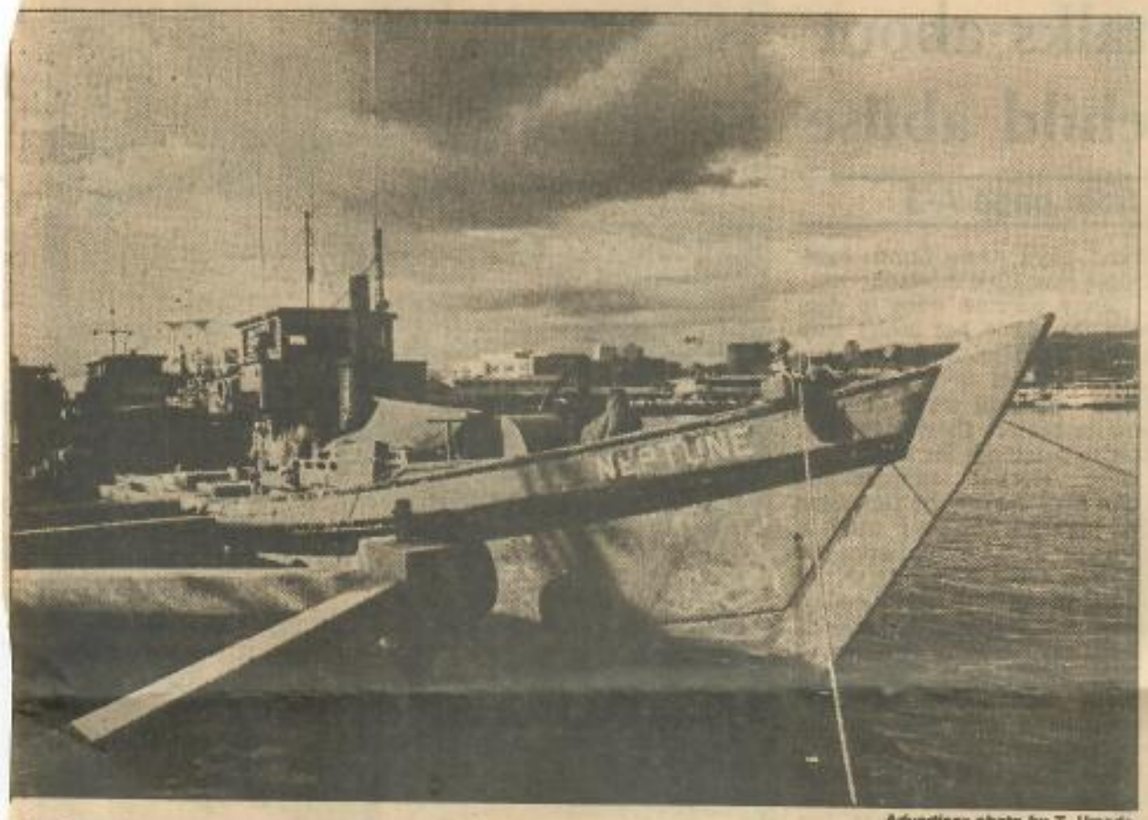
"Lets face it," Nottage said. "Some of the boats are just too damn old."

(According to one state-sponsored study, the average age of the boats is 57 years.)

Nottage said Mainland insurance companies look at a boat built in the '30s and don't care how seaworthy it is. "They say, 'What are we doing insuring a boat this old?'"

Nottage said the case for the aku boats is not helped by their record. He said nearly half of the more than 38 aku boats (nearly the entire fleet) he has

— it's cost of insurance



Advertiser photo by T. Umeda

Aku boat Neptune, tied up at Kewalo Basin.

insured since 1955 sank or were destroyed when run aground by their skippers. (The latest sinking, involving the aku boat Kilohana, took place Thursday off Molokai.)

In any event, even if the boats are allowed to continue going into Pearl Harbor, few owners think that alone is going to solve their problems.

"Right now we are barely making a go of it," said one aku boat captain, thinking of his small catch and his insurance payments. "I don't know how much more of this we can stand."

Foreign fishermen's illegal catch worry owners of small boats her

Big Island fisherman Stanley Huihui knew he wasn't just hearing things when Japanese voices came through his boat's CB radio. But whatever doubts he had, they disappeared when he saw Japanese boats fishing several miles off South Point.

Recent years have not been good for Big Island tuna fishermen — and Huihui worries that things are not going to get better if he and others with small boats must compete for local fish with large, well-equipped boats from foreign countries.

Huihui's concerns about foreign vessels fishing in Hawaiian waters are shared by the Coast Guard and the National Marine Fisheries Service.

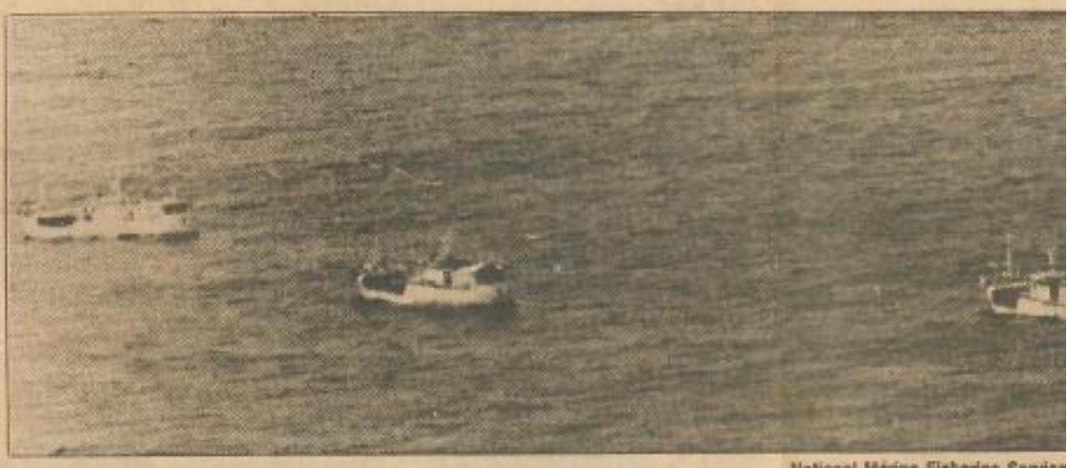
Twice a month, Coast Guard surveillance flights record an average of 80 foreign fishing boats in Hawaiian waters from South Point to the Northwestern Hawaiian Islands. Lt. Cmdr. William Dozier, the Coast Guard intelligence chief in Honolulu, said authorities believe that most of the vessels are just passing through rather than fishing. But six vessels were seized — the latest last June — and the owners of 17 other boats were fined while engaged in the following illegal activities in Hawaiian waters :

● Gill netting — making use of large nets that take large amounts of aku, mahimahi and other fishes indiscriminately.

One vessel, the Shinei Maru No. 21, seized in 1983, listed 69 dead porpoises in its log.

● Coral dragging — when fleets of fishing boats tie stones into their nets and, acting in unison, drag the bottom with them.

The stones break up everything in their path and, in the process, bits of precious coral are caught in the nets, which the boats then harvest. Scientists consider this to be one of the most destructive kinds of fishing because it severely damages offshore fishing grounds.



National Marine Fisheries Service

Fleet of Taiwanese coral-draggers photographed near the Hancock Sea Mount.

section E

Prepared by the staff of The Honolulu Advertiser.

ing to get the Hawaii tuna. Under the rules of the federal law, foreign boats could fish for tuna, but nothing else, in Hawaii so long as they were using pole-and-line methods of fishing.

However, the Coast Guard has such limited resources in Hawaii that it is not able to keep track of what most of the foreign vessels are doing. This has encouraged a number of "outlaw" boats to fish or coral-drag in Hawaiian waters.

(Unfortunately, the problem of enforcement is expected to get worse because, due to anticipated budget cuts, the Coast Guard has curtailed all observation flights since October.)

"It is a very awkward policy," said Van Dyke. "We cannot keep foreign boats from fishing in our waters and, at the same time, we find ourselves having to pay to fish in other people's."

Van Dyke said that as a re-

from the s

mike markric

sult of these and other sures, the United States i ning to negotiate an ar ment to pay Pacific isl for their tuna. Howev said that whatever is dec will not be likely to affe presence of the foreign b Hawaii because the offici position will not change.

● Long-lining — the use of up to 45 miles of baited hooks on long lines to catch ahi and other species.

The subject of foreign fishing in U.S. waters "comes up at virtually every council meeting," said Justin Rutka, staff economist for the Western Pacific Fishery Management Council. "Fishermen come forward and say they have seen foreign boats or heard them (crew members) chatting in a foreign language."

Part of the explanation for the foreign boats, most tuna experts agree, is a 1976 federal law known as the Magnuson Fishery Conservation and Management Act. Under the terms of this act, the United States does not recognize tuna as belonging to any nation but instead classifies it as a free-swimming migratory species belonging to no one. The act permits the entry of foreign vessels to fish for tuna in the U.S. exclusive economic zone, which stretches from the American shoreline to 200 miles out at sea.

(More than 100 nations now make similar claims of all the fish, oil and other materials of commercial value in their economic zones.)

This means that the United States permits any foreign vessel to fish for tuna in its waters without charge and, in return, expects other nations to allow American boats to fish in their waters.

University of Hawaii law professor Jon Van Dyke said that in theory, this policy benefits the United States, with the exception of Hawaii, because there are no large schools of tuna within 200 miles of the West Coast. In the past, this permitted the long-range boats of the California tuna fleet to fish in the rich waters of smaller countries such as Mexico or the Solomon Islands without paying them anything. He said this created ill will among Pacific islanders but enabled the California tuna boats to prosper.

But Van Dyke said the policy created unforeseen problems. The Pacific islanders claimed that, under the United Nations Law of the Sea Treaty signed in 1982, tuna is a legitimate asset to which they were entitled. As a result, several countries began to seize U.S. tuna boats fishing in their waters.

Although the United States does not recognize the treaty, the government — in the interests of international good will — either paid the islanders to release the vessels or encouraged the tuna companies to pay the fines that would get their boats released.

Meanwhile, increasing numbers of foreign boats were com-

Two well-equipped Japanese fishing boats in Hawaiian waters: competition for smaller independent Hawaii boats.

Marjorie Awai explores the 300-year-old coral at West Beach.

Bruce Carlson photo

from the sea

mike markrich

Project a threat to ocean?

Bruce Carlson waited patiently for Marjorie Awai, his dive partner, to come to the surface. At first he could see only air bubbles coming from her scuba equipment. In fact, the water was so grey and murky, he could not see Awai until she was less than a foot away.

The two biologists were diving in the waters off the new deep-draft harbor at Barbers Point to determine the effects of the dredging there on nearby coral and marine life.

Carlson, curator of the Waikiki Aquarium, fears that such murky dive conditions may become increasingly common along this part of the Waianae Coast if the new West Beach development project is built as planned.

The plans call for construction of a 33-acre marina and four lagoons covering 13 acres. These would be interspersed with houses and commercial buildings.

There would be thousands of people coming to live and fish in the area.

Carlson said he has no objection to houses being built, but questions the need for deep lagoons requiring extensive dredging.

"We have coral beds there that are 300 years old and probably the oldest living things in Hawaii. If we allow them to get all covered up with silt, they very possibly may die along with everything else that lives out there."

Carlson's concerns are shared by Waianae fisherman Patrick Gomes. He estimates that at least 10 percent of the people in Waianae depend on fishing to supplement the food they buy and says past dredging in the area has already destroyed the fishing koa (places where certain fish gather) of his father's day.

Gomes used to set traps for crabs on the white sand that covered parts of the coral bottom. But now, he said, the sand is covered with "sticky brown mud" and the crab appear to be gone.

Councilman Leigh-Wai Doo, chairman of the City Council's Zoning Committee that will ultimately decide whether the developers of the West Beach complex get their go-ahead, said he hasn't made a decision about the project.

"It is an unclear issue," Doo said. "The only thing that is clear is that we don't want to make the shoreline worse."

He said it is important to be concerned about the effect of lagoon construction on the nearby reef, but the area has already been affected by construction at Kahe Point Power Station, at the Barbers Point refinery and at the deep-draft harbor.

Doo said fishing is important to many in the nearby community of Waianae, but there are other considerations. He said as communities such as Waianae grow, there will be increasing demands for jobs and housing. But if no effort is made to think ahead, the community will one day have no alternative but to accept growth that is neither wanted nor planned.

As for the proposed 46-acre lagoon-marina complex, Doo said with proper drainage it need be no more damaging to marine life than the lagoon at the Hilton Hawaiian Village.

"Carlson made his point," Doo said, "but he was unable to tell us how much silt it would take to damage the coral beds offshore."

University of Hawaii limu (seaweed) specialist Isabella Abbott said scientists have discovered that if coral gets covered by small particles in the water at a rate of 200 parts per million, the water becomes so cloudy that the limu living below can no longer get the light needed to perform photosynthesis. The limu dies for lack of oxygen and the fish move away.

Abbott wonders how they are going to dig out nearly 50 acres of lava rock and not create a siltation problem.

But Bill Godfrey, an architect with expertise in coastal design from the Alfred A. Yee Division of Theo Davies, a company contracted by developer Herbert Horita to do design work on the West Beach project, said it has been more extensively studied than any previous development project in Hawaii.

He said much of the excavation for the marina takes place well inland of the ocean and efforts will be made to minimize detrimental effects on nearby ocean areas. He said it is in the company's as well as the community's interest that the waters remain clear.

Carlson hopes they are right. "We only have one or two reef areas on Oahu that are rich and productive any more: Hanauma Bay and West Beach. Maybe if we had a hundred here we could afford to lose a few. But we don't have any to lose."

3-20-86
HSB

Dumping of Boulders Off Oahu to Create Fish Havens Proposed

By Leilani Corpus
Star-Bulletin Writer

One rock plus one school of bottom fish may equal one big catch for Oahu fishermen.

Leftover boulders from subdivisions could be the solution to low catches for Oahu fishermen.

A bill to give $30,000 to create artificial reefs out of boulders has been introduced by state House Ocean and Marine Resources Chairman Peter Apo.

The main backer of the bill and lifelong fisherman is Rep. Mike Crozier. "You give a man a fish, he eats for a day; you create a fish habitat, and generations and generations will eat," he said.

"We're talking about boulders," Crozier said, "and they will stay there as long as the pyramids are standing."

The Legislature is looking at dumping the boulders two miles off the Waianae Coast, which is Apo's district.

These reefs would attract fish, according to Mark Suiso, University of Hawaii Sea Grant agent, because "anytime you drop anything in the water, fish are attracted to it."

Rep. Mike Crozier
"We're talking about boulders"

JUNKED CARS, old tires and concrete pipes are some of the things used to attract more fish. However, Suiso said, after a couple of years the junked cars, old tires and concrete pipes lose their attraction to fish and deteriorate into debris.

The Senate and House committees that passed the bill requested that material for the artificial reef be limited to rock, stone and concrete to minimize pollution of the ocean.

The boulders would not only be a haven for fish, but also a source of food. Louis "Buzzy" Agard, member of Western Pacific Management Fishery Council, said the boulders would provide a place for algae to grow.

Crozier said Hawaii is an underwater oasis in the middle of an aquatic desert, "so you've got to create habitats."

Agard agreed, saying the ocean floor around Hawaii "will not grow algae." He said the boulders would permit the growth of algae and provide food for fish.

Commercial fishermen, Suiso said, should be expecting bigger catches in a couple of years. Agard disagreed, saying he doesn't believe commercial fishermen will benefit from the reef because they are not dependent on artificial reefs.

AGARD SAID, "I'm predicting a definite pickup for recreational fishermen."

Trudy Nishimura, director of the Hawaii Fishing Coalition, agreed, saying commercial fishermen look for large numbers of fish and artificial reefs do not yield high volumes.

Crozier said he got the idea from fishing for weke on a Waianae sewer outfall pipe.

He started fishing that day off of Kahe Point, but "only had balloon fish," he said, "so instead of going home 'bolo head', we decided for go fishing in Waianae."

There is a broken sewer line held together by boulders off the Waianae Coast that "had plenty weke," he said. They ended up catching 400 pounds of fish, "which isn't that much," he said.

One day, Crozier was sitting in a committee hearing listening to the problems of fishermen who were going "thousands of miles away for catch any fish; the guys shooting at each other for catch fish," he said.

"All of sudden it hit me that the reason the fish were there (Waianae sewer line) is because of the rocks," he said

He co-sponsored Apo's bill and began mobilizing support from the construction, trucking and shipping industries.

SOME OF the companies volunteered to give boulders or move them at little or no cost to the state. GracePacific Inc. volunteered to give the boulders and R.H.S. Lee Inc. and the Hawaii Transportation Association volunteered to truck them down to the area.

The only thing needed for the project are barges to dump the boulders into the ocean, Crozier said. The boulders will primarily be leftovers from subdivision projects.

He has been such an adamant supporter of the measure that committee members have joked that the new reef should be called "Crozier's Reef."

Other supporters of the bill are divers and boaters in the Hawaii Fishing Coalition. "We are starting with nothing and are going to see something from it," said Nishimura.

STAR-BULLETIN
3-13-86

Experiment on Monk Seal Is Canceled

A controversial research experiment on a Hawaiian monk seal has been canceled, but scientists on both sides of the dispute say the studies are needed.

The research is aimed at learning why 20 to 50 young monk seals are dying annually at French Frigate Shoals.

At issue is a question of how the research should be done and on what seals.

The National Marine Fisheries Service yesterday canceled a plan to move Maka the seal from the Waikiki Aquarium to Sea Life Park for the research after Gary "Skip" Naftel said he was "willing to go to jail" as a private citizen to block the project. Naftel formerly operated research and fishing vessels, including the Easy Rider.

NMFS scientists brought three abandoned pups from French Frigate Shoals two years ago under a permit for research. The aquarium staff and volunteers hand-raised the seals — Maka, Tuffy and Nuka.

THE AQUARIUM agreed to let Maka go to Sea Life Park because NMFS has legal responsibility for the seals. But it opposed the research because Tuffy died from kidney failure after suffering "capture shock syndrome" during a similar experiment in January.

Aquarium Director Leighton Taylor learned of the NMFS decision to leave Maka and Nuka at the aquarium after returning from the Mainland yesterday. "I am pleased that these animals will not be subjected to what I think is a high risk," he said. "However, I am concerned that the research questions still get answered in some way to assure that the species doesn't go extinct in the wild."

While a confrontation has been avoided over Maka, "it doesn't resolve the real problem out in the Northwestern Hawaiian Islands," said NMFS wildlife biologist William Gilmartin.

Gilmartin heads the Marine Mammals and Endangered Species Program, which includes the Monk Seal Recovery Team. Taylor also is a member of the team.

The NMFS scientist said he will request another permit to collect more seals from French Frigate Shoals for research. However, he said it will be another year before the scientists can do field work to evaluate what is causing a large number of young seals there to die.

Commercial gill netting blamed for decline of akule on Kauai reefs

from the sea
mike markrich

WAINIHA, Kauai — Ten years doesn't seem so long ago to fisherman Mike Olanolan as he sits in his small store near Wainiha stream.

Then, people who lived seven miles up the road in Hanalei fished in their area and people who lived in Wainiha fished theirs. There was plenty of fish for everyone, so one fished where they weren't supposed to and everybody was friends.

That was the way it was when Olanolan, 35, was a boy, the way it was for his father and for his father before him.

But as the population of this section of Kauai's north shore grows, the people who live there find themselves having to deal with a problem that now afflicts other areas of Hawaii — too many people fishing for too few fish.

"Before, if you went out with throw net you would catch just enough for one month and when the freezer was full you quit. Now everything is commercial . . . two years ago, a guy came over here and caught thousands of akule in his (gill net). The guy left them in the net too long. They all died and thousands of them washed up on the beach. I think he should have just taken what he needed and let the rest go."

Olanolan said that the people of Kauai's north shore are accustomed to catching "tons" of akule each summer but that the year after this incident the total catch was approximately 1,500 pounds for everyone.

Nobody could scientifically prove that the decline in akule was due solely to overfishing, but most would agree that it had something to do with it.

For the past 10 years the official position of the state Division of Aquatic Resources has been that much of the decline in catch rates has to do with natural biological fluctuations of fish stocks. But recently, as a result of increasing population and pressure on the fishery, the decline around the near-shore reef has become so obvious it has resulted in a change in policy.

"At the present time, our fishing effort is exceeding the biological carrying capacity of most of our near-shore reef," admitted Henry Sakuda, chief of the Division of Aquatic Resources. "As our population increases we are constantly increasing the number of fishermen but we cannot increase the size of our reef shelf (surrounding the Islands) or the number of fish it can support."

Much of the concern has centered on the use of monofilament gill nets. These nets, which are generally placed in the water overnight, are fences sometimes hundreds of yards long. The people who use them place them in shallow areas, and fish, which cannot see the mesh at night, get caught by the gills and drown.

Writer Rick Gaffney of the Hawaii Fishing News charges that the nets are so effective they deprive shorecasters and other pole fishermen of the opportunity to catch any fish at all.

Their effectiveness was underlined by information gathered by the Division of Aquatic Resources in the Diamond Head-Waikiki area. After that area was closed to fishing from 1978 to 1980, the fish population there increased by nearly 300 percent. When the area was opened for pole-and-line fishing in 1981, the number of fish dropped by only 20 percent. But in 1982, within four weeks of the area being opened to gill nets, the number of fish dropped to what one DAR spokesman described as "close to what it was before closure."

"It's time to bite the bullet," says state Rep. Peter Apo, who represents North Kauai and Waianae. He introduced a piece of legislation called the "Kapu Bill" that would restrict the use of gill nets in bays and harbors.

Apo said he is aware that many of his constituents gill net for a living. But he asks: "What about the pole-and-line guys? Don't they deserve a break? What we are talking about is restricting a fishing technique that is indiscriminate."

He added that the bill would cover only a small percent of the Hawaii shoreline and if people wanted to gill net in other places they could.

Sakuda said his department is generally for the bill but enforcing it would cost $130,000 for additional personnel and equipment.

Critics charge that is it unfair to single out gill netters for blame for the decline in fishing. They say it is important to consider other factors such as the lack of state enforcement of game and pollution laws.

But Olanolan said he could live with the restrictions so long as he and other Kauai families could catch what they need to live. "When my freezer is full (of fish) that's all I need to feed my family till its empty again. I don't need more than that."

#SB 4-6-86

Troubled waters over Miloli

from the sea
mike markrich

MILOLII, Hawaii — Residents of the village of Miloli yesterday asked five members of the state House Ocean and Marine Affairs Committee to help them protect the fishing grounds that are their main source of livelihood.

In an emotional hearing on the Big Island, the residents testified that if something is not done soon to prevent outsiders from using illegal fishing methods in nearby fishing grounds, what they and others consider to be the last traditional fishing village in the state will be destroyed.

The meeting attracted a fourth of the 300 adult residents of the village and represented years of frustration by villagers who said they have been trying for a long time to get someone in government to help.

They gathered beneath the long, open, grass-roofed structure that serves as the village meeting place and greeted the visiting legislators with leis.

And then they waited patiently for committee Chairman Peter Apo to begin taking testimony on a resolution that calls for the House to look into problems confronting the people of Miloli. With Apo were committee Vice Chairman Jim Shon and members Virginia Isbell, Mike Crozier and Wayne Metcalf.

Rachel Kaulu Grace, 65, was the first of the villagers to speak. She said that for many years the people of the village have depended on opelu (a small mackerel) to survive. The opelu lived in koa (small underwater gathering places) offshore that the villagers had cultivated for generations.

She said that when she was growing up, all the children in the village learned from their kupuna (elders) that the opelu were to be fed by hand in May and June and then fished for in July and August.

"In those days we did not have a problem."

But in anticipation that they might one day have a problem, the 1925 Territorial Legislature passed a law banning the use of any kind of animal or fish feed on Miloli opelu grounds.

(The reason for the ban was that it was known that ground bits of fish would spoil the koa. The "chop-chop" was more effective in catching large numbers of opelu in nets but had the disadvantage of attracting large predatory fish, causing the opelu to

fishing grounds

abandon their koa.)

It was a system that Grace and others who testified said broke down when people were forced to abandon their outrigger canoes (there are only two left in the village) in favor of larger boats that caught more fish.

According to Julia Kaupu, the larger boats put more pressure on all the fishing grounds. This resulted in the rum of a number of opelu koa down the coast and caused five or more large skiffs from down the coast to fish off Miloli. She said the outsiders are Big Islanders who shadow the village boats in order to learn where the opelu are.

Fisherman Steven Kuahuia, 35, said the outsiders use "chop-chop" regularly. As a result, he said, opelu are disappearing.

Less than two years ago, he said, he would catch 1,500 pounds in a day's fishing; he is now lucky to catch 200 pounds. He said the result has been economic disaster because the village depends for a third of its yearly income on the opelu catch at $1 per pound.

Kuahuia said that each time the village called for help from state conservation and resources enforcement agents, the calls have gone unanswered. He said he has already confronted the outsiders over their fishing methods. He added that if something is not done soon, he and other residents may be forced to take action.

(Conservation agency chief Maurice Matsunaka said he had been contacted by Miloli resident William Kaupiko at the beginning of the legislative session but has heard nothing since.)

Apo said he hopes to avoid such potential violence. He said that with the economic life of the village at stake, the state needs to work out some way to solve the problem.

4-27-86 Sunday Star-Bulletin & Advertiser

Have you noticed aku is smaller now?

from the sea

mike markrich

The average skipjack tuna caught on Hawaii aku boats now weighs 2 to 4 pounds. But Richard Shomura, director of the National Marine Fisheries Service office in Honolulu, recalls that not so long ago, the skipjack tuna caught in Hawaii and French Polynesia were the largest aku in the world.

"I remember going down to Tahiti on a research vessel in 1953 and the aku being so big that it took two guys to carry them," Shomura said. "My recollection is that 40- to 50-pound aku down there were pretty common. . . . In Hawaii, it was common to catch seasoned skipjack between 18 and 22 pounds, while in the eastern Pacific or off Japan an 8-pound skipjack was considered large."

Shomura explained that Hawaii and Tahiti skipjack were once thought unique by fish scientists because of their size and advanced age. He said a National Marine Fisheries Service fish-tagging program indicates that Hawaii's aku, or skipjack, originate in the eastern Pacific and then follow prevailing currents until they get here. He explained that so long as nothing intercepted the fish before they moved downcurrent, Hawaii fish remained large.

But as pressure by international tuna-fishing fleets increased in the eastern Pacific, there was a marked decline in the number of large fish making it to Hawaii.

"One can attribute the decline to an overall shift in tuna population away from Hawaii and French Polynesia or to the tremendous increase in fishing pressure put on skipjack tuna in the last decade," Shomura said. (Between 1973 and 1982, the amount of aku caught in the eastern Pacific increased by approximately 157 percent.)

According to Linda Hudgins, a Notre Dame economist who performed research for the National Marine Fisheries Service, the number of large aku — fish weighing more than 15 pounds — caught by Hawaii fishermen has dropped by nearly 30 percent in the past 10 years.

Hudgins' research indicates that between 1964 and 1973, large fish made up nearly 64 percent of the catch — but from 1974 to 1982, the percentage of large aku dropped to 36 percent.

She estimates that the decline in both size and catch rates has cost Hawaii's skipjack tuna fishery nearly $2 million per year.

Many tuna experts believe that there are large amounts of tuna to be exploited in the Pacific. But tuna scientist Bob Skillman worries that the unrestricted fishing of them may be harmful.

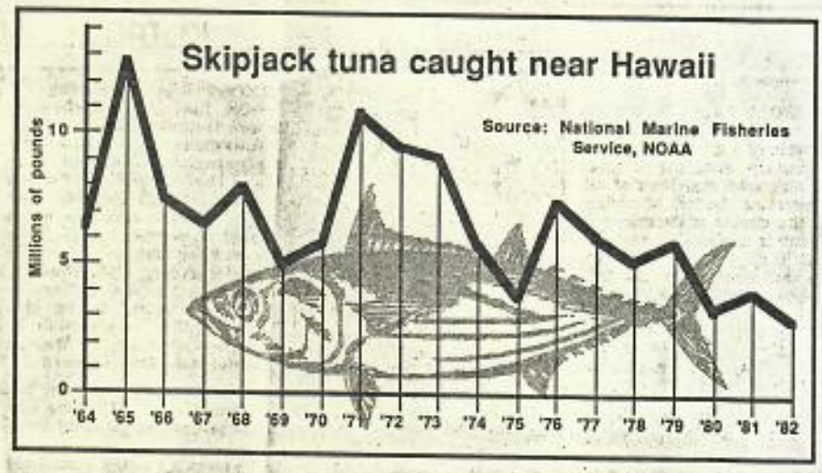
"When a fishery first starts, people tend to think they can increase the fishing pressure greatly without having any impact on the (fish) population. . . . But no matter how large the resource, man has always been able to exert enough fishing pressure to affect the (fish) population. Skipjack is no exception. It may take a lot of fishing effort but we're going to see an effect," Skillman said.

But as Skillman pointed out, no one is quite sure when that point will be reached and there are no treaties regulating the taking of Pacific skipjack tuna.

An additional concern stems from the recent introduction of fish-aggregating devices in the waters off the Philippines. Shomura said commercial enterprises have grown up around these devices that harvest and can skipjack "the size of akule." He said a recent study suggests that the large catch of these small tuna has had an impact on the population.

Shomura said that since many of the things affecting the state's already hard-pressed tuna fishery originate outside Hawaii, it is time for state and fishing industry leaders to find some way to respond to them.

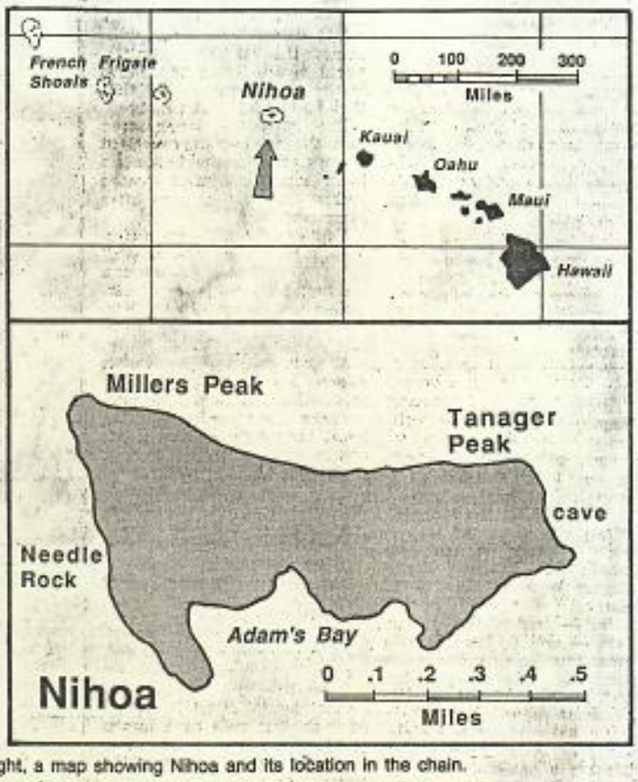
"We can't assume that this is all temporary and that next year is going to be hunky-dory. We have to seriously face the problem and think of some way to deal with it," Shomura said.



Advertiser news graphic

The Western Pacific Fishery Council is having a general meeting on the management of the Northwestern Hawaiian Islands' lobster fishery. All permit holders and interested parties are invited. The meeting is scheduled for 7 p.m. Tuesday at Hawaii Tuna Packers.

The Honolulu Advertiser
Tuesday, September 23, 1986



At left, above, is a photo taken of the Tanager Peak portion of Nihoa. At right, a map showing Nihoa and its location in the chain.

For its sprouting, flapping, scurrying life

Nihoa island a world unto itself

jan tenbruggencate
staff writer

There are plenty of special places in Hawaii, but few so special as to have a nearly complete array of native plants, birds and other creatures.

Nihoa island is such a place.

This 125-acre chunk of land 150 miles northwest of Kauai hasn't been completely isolated from human contact, and some of its creatures may have become extinct because of such contact, but it's clearly special.

"Nihoa remains biotically the 'gem' of the Northwestern Hawaiian Islands . . . It may . . . be one of the only places in the entire Hawaiian archipelago where there is a diverse and relatively intact low-elevation dry-land ecosystem, with its complement of native terrestrial plants, arthropods (things like insects, spiders and crabs) and birds," said zoologist Sheila Conant, chairwoman of the University of Hawaii's Department of General Science.

Conant visited the island four times in the early 1980s, and found there are only 26 different kinds of plants on Nihoa, and only five of them are alien species. Four are endemic, meaning they're found nowhere else in the world. Among these is the island's only palm, the fan palm Pritchardia remota. Seventeen of Nihoa's plants are also found elsewhere, but are believed to have gotten to the island long ago and by natural means rather than by human transmittal.

The island plays host to 17 kinds of seabirds, which use the speck of land for nesting. There are two kinds of land birds found only on Nihoa, the Nihoa finch and the Nihoa millerbird, remnants of Nihoa's distant past as a much larger island.

Conant said the finch is a relative of the Hawaiian honeycreepers, and the millerbird is an "Old World-type warbler, but its call isn't very melodic."

There are six land snails, and at least 35 insects and spiders found nowhere else, and which still haven't been fully studied by scientists.

People lived here once, that's clear from the many agricultural terraces, stone house sites, and the fishhooks and idols that have been found on the island. Archaeologists are fascinated by artifacts that indicate the society here was somewhat distinct from that in the main Hawaiian Islands. By the time Europeans visited the islands, Nihoa had become a place known only in legend, and it was rediscovered in the mid-1800s.

Nihoa today forms the southeastern end of the Hawaiian Islands National Wildlife Refuge, which includes all of the Northwestern Hawaiian Islands except Midway and Kure Atoll.

Nihoa is no paradise. There isn't a great deal of shade, and its few springs provide water that's acrid and barely drinkable, apparently because it's contaminated by the guano from the thousands of seabirds that nest there. No matter which kin of Hawaii's people lived here, the stay was relatively brief, Conant said, and it left Nihoa with most of its unique qualities.

"The scientific value of the island is outstanding," Conant said.

One of the studies possible on a very small island with a relatively intact biology is to get a nearly complete biological picture of an organism. With the small size, and the limited number of creatures, it might be possible to get an understanding of how each of the creatures interacts with the others, in a way impossible in larger places with more variables, she said.

Too, it can be a good place to study the effects of limited resources on creatures. For instance, there are about 300 millerbirds and 1,500 finches. In a good breeding season, the numbers might rise dramatically, but the limiting factors bring it back down. Perhaps food limits them, or perhaps overcrowding, perhaps something else.

It's the kind of study that might be useful to humanity as population increases along with competition for resources.

Nihoa, the stub of an ancient volcano, has 155 miles beyond it a still-smaller islet, Necker, at 67 acres. Conant said Necker has only five species of plants and no aliens. It might be a good place for studies, except that it's so steep and difficult to land there that it's hard to carry on scientific studies, she said.

Marlin-tagging program

section D

The Sunday Star-Bulletin & Advertiser

Honolulu, August 10, 1986

Prepared by the staff of The Honolulu Advertiser.

from the sea

mike markrich

KONA — Captain Wally Kobayashi of the charter boat Sea Spray III has built his career on catching marlin — not letting them go.

But this year Kobayashi finds himself having to make new choices — for he, like the other charter boat captains participating in the Hawaiian International Billfishing Tournament, is being asked to bring small marlin (200 pounds or less) to the side of his boat, tag them with a piece of plastic and then release them.

In return, the fishing team on his boat receives extra points for tagging and releasing the small fish. Although this kind of fishing is now standard in most Mainland marlin tournaments, its acceptance in Hawaii has been reluctant and controversial.

"Our living is partly dependent on what we sell," Kobayashi said. "During the summer when there's a lot of marlin and prices are low, it would behoove us to let them loose and then come back for more next year. But in the winter when prices are like $2 per pound and we catch a 200-pound fish, it's hard for me to tell my deckhand, 'Let this bugger go.' It's like telling him to give his livelihood away."

At present Hawaii is the only place in the United States where virtually all marlin caught in fishing tournaments are killed and sold rather than released. Although the reason for this is that Hawaii is also the only place where marlin is prized as a food fish, (most people on the Mainland think marlin steaks are to tough to eat), tournaments here have been widely criticized for not participating more actively in tag-and-release programs.

It's not a question of morality — it's thinking about the future of the resource."

According to marlin expert Jim Squire of the National Marine Fisheries Service Laboratory in La Jolla, Calif., the tagging of marlin by sports fishermen is the only means scientists have of tracing the patterns of marlin movement so that the fish can be effectively managed.

Squire said that heavy commercial fishing of marlin, mostly by Japanese fishing vessels, has reduced marlin stocks. He said that marlin are thought to make up approximately 18 percent of the catch of the Japanese longline fleet, a type of fishing where long lines extending many miles with baited hooks are set by fishing boats at sea.

editor of the Hawaii Fishing News said, "If you capture a fish and fight with it three or four hours, that fish is going to die. And often they're dead before they get to the boat. I can't see just letting it go to waste. It's different if you catch a 'green' fish (full of fight) and it's just caught in the lip. But most of them aren't like that."

But most of the fish tagged and released in Hawaii are small. Fishery scientist Carol Hopper of the Pacific Gamefish Research Foundation said the survival rate of the tagged marlin is high.

But tagged or not, some people believe it may take many years before fishermen here are comfortable releasing marlin.

"When push comes to shove," said one captain, "the fish is still part of my boat's income."

This is significant because marlin are not thought to be as migratory as once believed and can be targeted by specific fishing gear.

Internationally recognized marlin expert John Mark Dean of the University of South Carolina's Baruch Institute for Marine Biology and Coastal Research believes that because of the fishing pressure, fishermen should do everything possible to see that the big fish survive.

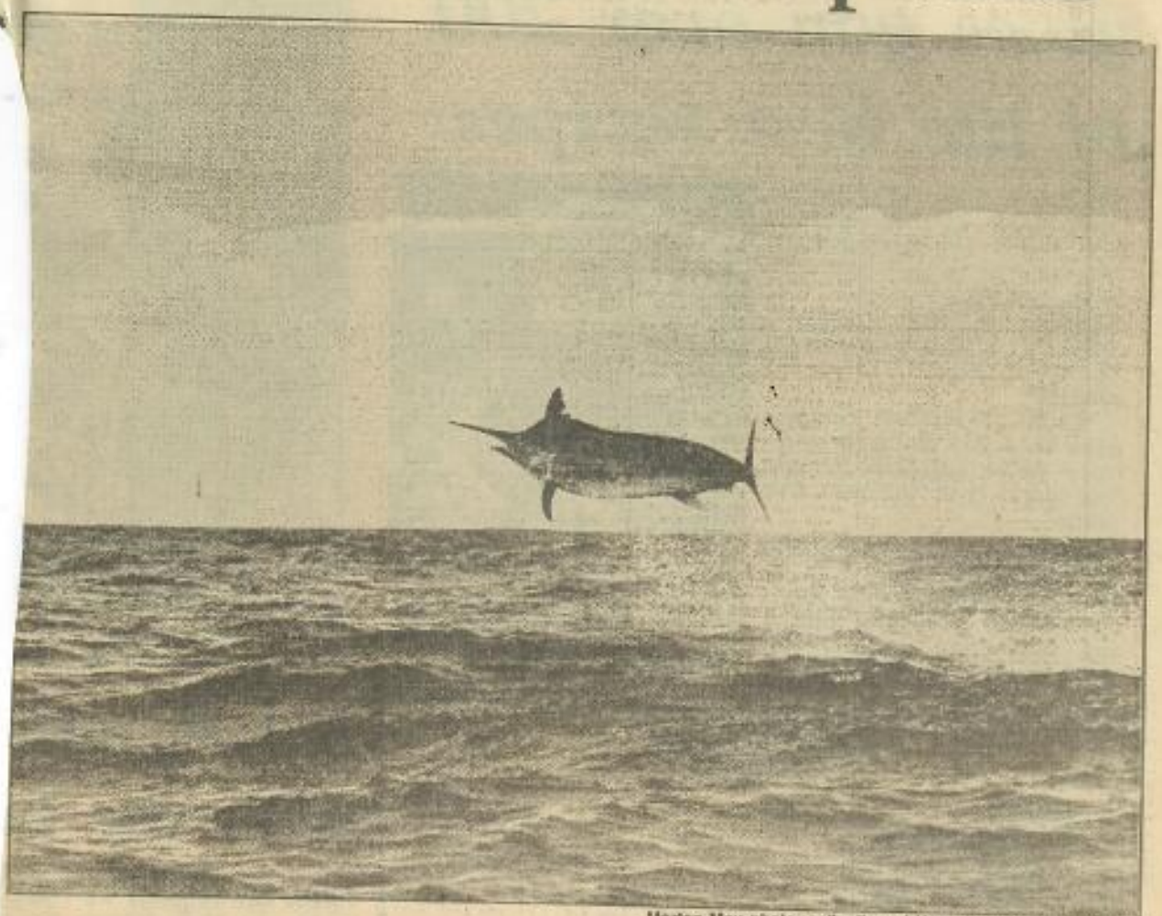
"The fish that are most prized are the reproductive females over 230 pounds. So in those big tournaments when you take those large fish, you are actually taking 90 percent females . . . That's the part I consider inhumane. You can catch the fish and get the satisfaction of capture and then release it. But I see no satisfaction in hanging the thing up and exhibiting it."

But others question the humanity of capturing a large marlin and then releasing it.

Fisherman Chuck Johnston,

What purpose does it serve except as an ego trip?" asks Boston veteran fishing writer Henry 'Hal' Lyman of Saltwater Sportsman magazine, who asked tournament Chairman Peter Fithian to make the change a year ago. "If it's your first fish or a trophy, I can understand why you want to keep it, but if you are a regular fisherman and you've caught marlin, before why keep them? What good does it do? . . . I'm willing to admit Hawaii makes more use of the fish than we do. But by the same token, when you take a fish out of the water, it's not there anymore. As you know, marlin takes quite a while to become mature. And if you kill it, that's the end of that generation . . .

gains reluctant acceptance



Morton May photo: collection of Honolulu Academy of Arts

A Pacific blue marlin, later weighed in at 940 pounds, jumps out of the ocean after being hooked.

Sign of the times: Lifeguards s
of potential beach hazards sho

The Sunday Star-Bulletin & Advertiser
Honolulu, May 25, 1986

This section prepared by the staff of The Honolulu Advertiser.

Honolulu city lifeguards are paid to spend their time on beaches. But these days lifeguards are as likely to find themselves in courtrooms as state, city and visitor industry officials face an increasing number of suits involving water accidents.

from the sea

mike markrich

Part of the problem, according to State Sen. Ann Kobayashi, is that the state has failed to institute either a comprehensive state lifeguard system or an effective means of warning people of the conditions they are likely to find on beaches.

(Now only a small percentage of Hawaii's beaches are guarded; there is no coordination between state and county agencies over water safety; and despite the increasing number of foreign visitors, almost all warning signs on state and county beaches are in English.)

Kobayashi said that the state has a social responsibility to alert the visitors it attracts here about potential hazards.

Lifeguard Rell Sunn agrees.

"It's common courtesy to let people know what's out there . . . A lot of these people (visitors) have used their entire life savings to come over here and enjoy themselves, and it's terrible if they have to cut their vacation short because they or a member of their family gets hurt on a public beach," said Sunn.

City lifeguard chief Ralph Goto agrees. He initiated a project to put up new beach warning signs designed by the U.S. Lifesaving Association, a national professional lifeguard organization (of which Goto is Hawaii chapter president) and the Honolulu Ad Club II as an inexpensive means of informing visitors about beach hazards.

Goto cautions that these signs are not intended to replace a swimmer's common sense, but are an effort to make beach information more easily available to the public.

He said that anyone who does not think that posting proper signage on beaches is important should consider the case of Newport Beach, Calif., where city attorneys are currently appealing a $6.5 million court award to a man who said that the city's failure to warn was responsible for the accident that turned him into a quadriplegic.

But Deputy Attorney General Larry Lau said the situation in Hawaii is different. He explained that Hawaii case law requires the state to warn people about hazards in certain circumstances, but there is no Hawaii appellate case defining what is an adequate warning sign is.

"Just because we put up a sign and the paint wears off doesn't mean we're necessarily liable because a person becomes involved in an accident. If the danger was obvious to the victim then the state would probably not be liable — whether or not we had a sign . . . Everybody has a duty to excercise reasonable care for their own safety," said Lau.

But Newport Beach City Attorney Bob Burnham said his city can no longer afford to wait for legal interpretions on beach safety. As a

State vs. beach-goers in court

Here are the outcomes of some recent lawsuits involving water safety in Hawaii:

- State agreed to pay $270,000 to settle a lawsuit filed after a swimmer at Hapuna Beach on the Big Island drowned while attempting to rescue his daughters. Plaintiffs complained of inadequate warnings and absence of lifeguards.
- State agreed to pay $20,000 to settle a lawsuit after a lawyer went swimming at Hanakapiai Beach, Kauai, despite warning signs and drowned. Plaintiffs complained of inadequate warnings, inadequate lifesaving equipment, and failure to close the beach in winter.
- The state paid $250 to a swimmer at Maili Beach who didn't get out of the ocean fast enough and was knocked against coral by a wave. He received coral cuts as a result. He complained that he was not warned about the undertow.
- The state successfully defended itself in a trial of a lawsuit filed by a man who slipped and fell from the Kuhio Beach breakwater in Waikiki and injured his back. He complained of a failure to remove slick seaweed growing on the steps.
- The state also won a lawsuit filed after a loose sailboard hit a woman wading at Kaanapali Beach on Maui. She contended that board sailors and swimmers should be kept separate.

ay warnings uld be posted

result of the latest court decision (now being appealed), giant signs are posted that list every possible danger that might be experienced while swimming or sunbathing at the beach.

The case that brought the signs involved a man who went out to swim laps at the beach on a day when the waves were 2-3 feet high and hit a sand bar he couldn't see. He claimed that the city had a system of posting red and yellow flags to order to warn people about wave height, but there was no flag to warn him that day.

Burnham said that the city's defense was that California law makes cities and towns immune from accidents that happen due to natural causes. But he said the state court ruled that the previous existence of a sign system on the beach had altered the beach's otherwise natural immunity.

Burnham said the California Legislature has passed a law providing immunity under certain circumstances — specifically for lifeguards as well as signs at public beaches.

But Lau is less confident that there is any one solution for Hawaii.

"The better the warning system, the less likely we are to get sued. But you have to remember that no matter what we do we are likely to get sued anyway."

Sign at Magic Island, a state park. Along Ala Moana Beach Park, a city park, are many lifeguard stands.

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U.S. Deficit Humbles Even Animals

Tern Island Monk Seals, Green Sea Turtles Must Pay Too

By Helen Altonn
Star-Bulletin Writer

The U.S. Fish and Wildlife Service is considering abandoning its only permanently manned station in the Northwestern Hawaiian Islands because of money problems.

The Tern Island station serves as a support base for research throughout the Hawaiian Islands National Wildlife Refuge.

The island, 500 miles northwest of Oahu in French Frigate Shoals, is a habitat for Hawaiian monk seals, green sea turtles and other endangered species.

Two assistant refuge managers live on Tern Island. A biological technician based in Honolulu provides support for the facility and rotates part of the year on the island.

A masterplan recently completed for the refuge says the station "plays an integral part in the achievement of wildlife resource objectives."

However, it says, an "abandonment scenario" has been developed as an option because of "continuously escalating operations and maintenance costs" and "tightening budgetary constraints."

Allan Marmelstein, the service's Pacific Islands administrator, stressed that "no decisions have been made."

HE ALSO SAID, "We're not talking about walking away from Tern Island but considering going from a year-around to a seasonal operation, in the same manner that we exercise our management responsibilities on other islands within the refuge."

Richard Shomura, director of the Honolulu Laboratory, National Marine Fisheries Service (NMFS), said the station is "extremely valuable" from a research standpoint and he hopes it can be maintained.

"If it is abandoned, we would have to revert to the same system we have on other islands, to haul in all of our things and establish camps," he said.

NMFS is responsible for studies and recovery of the endangered Hawaiian monk seal population. There are more animals on French Frigate Shoals than any other islands, Shomura said, and it is also a major nesting area for endangered green sea turtles.

"In the best of all worlds, we might keep the station and improve it," Marmelstein said. "But we have no money at this point to manage everything, and everything is a priority. It comes to a point where we no longer can do more for less."

HE SAID IT COSTS about $200,000 to $250,000 a year to operate the Tern station out of a $900,000 budget for the entire refuge system. The budget was reduced 5 percent last year and further cuts are expected, he said.

His office is responsible for remote wildlife refuges on Johnston Atoll, Jarvis Island, Baker Island, Howland Island and Rose Atoll, as well as the Hawaiian archipelago refuges.

"Our budget is very small considering what we manage," he said. "As the federal deficit grows, we have to look for more efficient ways to spend money and save."

Marmelstein also noted that if the Tern station is maintained, "we are looking at some very long-range maintenance problems." He said the refuge managers already are spending "more and more time on maintenance and less on wildlife management."

He said the seawall hasn't been replaced since 1943 and it costs about $5 million to refurbish it. This must be done every five or six years or big winter storms will wash away the runway, he said. If the runway isn't continuously maintained, "the birds move out on it," he said.

"We had two episodes where waves completely washed over the island the past winter. It took a week to clear the runway."

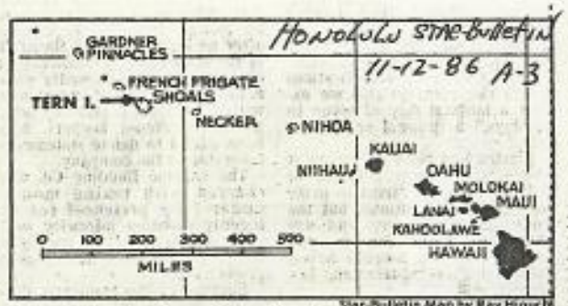
THE BUILDINGS must be reroofed, at a cost of $40,000 to $50,000, and there are other maintenance problems involving the fuel tanks and generators, Marmelstein said.

He said one "school of argument" about the island is to close it completely to prevent human intrusion on the wildlife. Fewer people have been on Tern since the wildlife service took it over from the Coast Guard in 1979 and more turtles and monk seals are appearing, he said.

Others feel that the presence of refuge managers discourages passing vessels and fishermen from disturbing the animals. "If they didn't maintain that place and have some visibility, there is a possibility of people landing on the islands and harassing the Hawaiian monk seals and possibly poaching on the turtles," Shomura said.

He said the manned facility also has been "extremely helpful in emergency situations." He cited a number of instances where injured fishermen have been picked up at French Frigate Shoals.

The masterplan says "perhaps the greatest beneficial impact" of the station is the capability of responding rapidly to accidental groundings, oil spills, spills of hazardous chemicals "or other incidents with potential for adversely impacting the unique terrestrial biota of the Northwestern Hawaiian Islands."



Star-Bulletin Map by Ray Higuchi

Map shows location of Tern Island at French Frigate Shoals.

Fisheries Official Says State ...hould Demand Control of Tern

By Helen Altonn
Star-Bulletin Writer

• The state should "really assert itself" to take control of Tern Island from the federal government, says Wadsworth Yee, chairman of the Western Pacific Regional Fishery Council.

• Tern and other areas of the Hawaiian Archipelago have been entangled in a state-federal jurisdictional dispute.

• Yee said he believes "the state should file suit against the federal government for return of Tern Island because...there are sufficient vacts to show that it belongs to the state and not the Department of Interior. And more so, if the Department of Interior should abandon the Tern Island site."

• The Interior Department's Fish and Wildlife Service is considering vacating its Tern station as one way of meeting increased costs of refuge management with a shrinking budget. Refuge managers then would camp out on the island periodically to carry out their responsibilities.

• TERN ISLAND is in the City and County of Honolulu and the Hawaiian Islands National Wildlife Refuge. It comprises about 21 acres of a total 65 acres in French Frigate Shoals, 500 miles northwest of Oahu.

• The Coast Guard previously occupied the island for a LORAN (long-range aid to navigation) facility under a permit from the Territorial Department of Agriculture. In 1979, the Coast Guard left the island and turned it over to the Interior Department.

Yee, a former Republican state senator, and the state Department of Land and Natural Resources (DLNR) have tried for about five years to get shared use of Tern with the Interior Department for fisheries support.

"It would enhance the fishing activities in the Northwestern Hawaiian Islands if the state took over and operated Tern Island as an emergency base for boats in that area," Yee said.

"It also could be a transshipment point of seafood products from Tern Island to Honolulu, and a place where people could fly into Tern Island for recreational sports fishing...on condition that they do not disturb the wildlife.

"We're all concerned about the preservation of the wildlife, the monk seal and green sea turtles," Yee said.

DEPUTY STATE Attorney General Johnson Wong, who handles legal work involving state land issues, said the state "may have to" file a lawsuit to get Tern Island back.

The state maintains that state land no longer used by the federal government "should be returned to us," he said. "But the federal government is always trying to play games."

Wong cited Fort Armstrong as a "classic example." The land was set aside to the federal government for a public health building, which is no longer in use. But instead of returning the land to the state, the federal government wants to use the area for a parking lot for the federal building, he said.

He said "the same logic" is being applied to Tern Island. That is, if one federal agency doesn't require a particular site, it is made available to another federal agency. "We say, 'You can have such a rule, but don't do it to our land,'" Wong said.

THE STATE submitted a proposal several years ago to the Interior Department for a fishing operation at French Frigate Shoals. It involves use of a mother ship anchored off Tern Island to support a small fleet of catcher vessels.

Action was deferred on the request while a new master plan was being prepared for the wildlife refuge.

"The plan does show the state's proposal as one alternative," said state Deputy Land Director Edgar Hamasu. "If the fishing industry would want to move ahead to implement the plan by having a mother ship out there, it can do so."

"To us, it's a pretty nice thing because this is what we were preaching and proposing for a long time," said Henry Sakuda, director of the land department's Aquatic Resources Division."

However, he said, any fishing operation would require consultation with the national fisheries and wildlife services because the master plan establishes the Northwestern Hawaiian Islands as a critical habitat for monk seals.

He said there is a mooring buoy just outside the refuge boundary at French Frigate Shoals and fishing activity is growing for lobsters and bottomfish. "Two primary fisheries are coming back to Hawaii."

Nov 1986

SIMILAR KIND USED TO HUNT TURTLES!

(L to R) Tony Gomes, Jon Lee, Jay Nakayama and John Gomes with a 38-lb 'ouda.

Capt. Tommy Otsubo with a respectable catch of bugs.

Luckily, the *KIMI II* is also rigged for trolling. Jay gaffed the fish and I swung away with the bat and put the 'ahi right into the built-in fishbox. No way were we going to fit that buggah in the 100-quart cooler.

1 p.m. It was still early, but we had enough fish and, not wanting to risk burning the fish, we headed for home. In need of ice, we asked a couple of guys in an Ali'i Kai if they could spare us some, and they willingly obliged. Sorry we didn't get your names, but we hope you enjoyed the fish and tako. A big mahalo for the ice.

Back in Kane'ohe, we weighed the fish at Jay's house. Everybody was hoping for a 100-pounder, but nobody was disappointed when the scale read 90 lbs. (The 'ahi probably bled 10 lbs off—well, maybe?)

I'd like to thank my dad, Tommy Otsubo, for being a good teacher and for designing my gun. Also to the rest of the gang, Jonathan Lee, Jay Nakayama, John Gomes, Tony Gomes, Sada Uyehara and Bob Hoffman, a big thank you. You guys are the greatest. I'll always have someone to dive and tell fish stories with. Thanks to Chuck and the gang at HFN for letting us share our big fish story with all you fishing and diving enthusiasts out there.

. . . Nathan

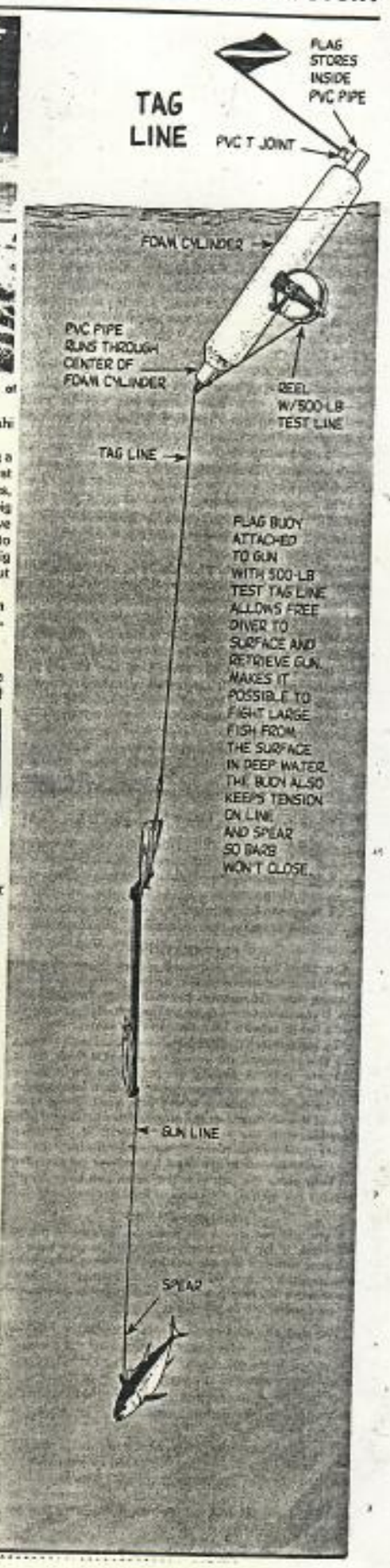
Free Diving

Upper left: Jonathan Lee with a catch of moano and kumu.

Lower left: Nathan with two take in the 8-lb range caught off Molokai's west end.

Upper right: The largest ulua caught by our gang—a 91-pounder shot off Yokohama Beach.

Lower right: A 75½-lb white ulua speared off Kane'ohe Marine Base by Tony Gomes.



Fisheries Resource Use and Management in Hawai'i

by Sylvia Rodgers

Destruction of the Konohiki System

■ The biggest influence of the early Europeans and Americans on native fishing was not in techniques of fishing (of which, as noted last month, the Hawaiians may have been in some ways superior), but rather in policy. That is by bringing a contemporary political system to the islands the foreigners managed to disrupt the successful Hawaiian system of managing their marine resources.

Before the foreigners introduced contemporary political system to Hawai'i, the chiefs of the moku (districts) and the lower chiefs of the ahupua'a were the rulers/owners of the land. The konohiki, being the land agent, managed the lands and the seas of the ahupua'a for the chiefs, maintained and oversaw repairs to royal fishponds and controlled the kapu system that protected fish from being overexploited. Other rules adhered to concerned the use of loko 'umeheki (i.e., who was allowed rights to which lanes during which tides). All the rules were known by the people orally. The Hawaiians did not have a written language.

One of the chief parts of the system brought in by the foreigners was the notion that a law had to be in writing to be valid. So although the konohiki and ho'aina knew that they were allowed certain fishing rights within their ahupua'a, under the new system these rights had to be put in writing if they were to continue to be law.

The official written recognition of the ancient practice of private fishery rights was made by Kamehameha III in 1839 in his "Act to Regulate the Taxes." This act with certain changes became Chapter III of the Laws of 1849, one section of which reads as follows:

> His Majesty the King hereby takes the fishing grounds from those who now possess them from Hawaii to Kauai, and gives one portion of them to the common people, another portion to the landlords, and a portion he reserves to himself.
>
> These are the fishing grounds which his Majesty the King takes and gives to the people: The fishing grounds without the coral reef, viz: the Kilohee grounds, the Luhee ground, the Maloio ground, together with the ocean beyond.
>
> But the fishing grounds from the coral reef to the sea beach are for the landlords and for the tenants of their several lands, but not for others.

In 1851 a major revision was enacted which unequivocally granted all fishing ground pertaining to any government land or otherwise belonging to the government to the people for the free and equal use of all persons.

Eight years later the Hawai'i Legislature passed the Civil Code of 1859, with the laws pertaining to konohiki fishing rights codified in sections 387 to 395. The laws concerning these rights have undergone little change since, and the main features of the present fishing rights law are as follows:

1. Certain areas of the sea, from the reefs and, where there happen to be no reefs, from the distance of one geographical mile seaward to the beach at low watermark, are the private fisheries of the konohikis.
2. Within these private ocean fisheries, fishing is restricted to the konohikis and the hoa'ainas or tenants of the lands (ahupua'a) to which the fisheries were originally attached.
3. The konohikis can regulate fishing within the fisheries by one of the following two methods:
   a. By setting aside or placing a tabu on one specific type of fish for their exclusive use; or
   b. After consultation with tenants, by prohibiting fishing during certain months of the year and, during the fishing season, to exact from each tenant one-third part of all the fishes caught in the fishery. (Kosaki, 3)

When Hawai'i became a territory of the United States in 1900 there contained in the Hawaiian Organic Act provisions for the registration and subsequent condemnations of the konohiki fishing rights by the territorial government. One of the requirements for maintaining konohiki rights under the territorial government was that the right had to be registered with the penalty of nonregistration being the loss of the right. It is estimated that only 101 of the 300 to 400 konohiki fisheries were registered in accordance with the provision of the Organic Act.

The territorial government ran into difficulty when trying to condemn the 101 legally registered konohikis. These difficulties arose from the uniqueness of the rights, which had no precedent in U.S. law, and with the difficulties of the courts in trying to establish methods of appraisal of the rights. There was also the problem of how to fairly compensate both the tenants (hoa'aina) as well as the landlords (konohiki). Additionally there was the problem of defining which tenants were allowed to enjoy the vested rights of konohiki or its compensation.

Nevertheless, throughout the history of the territorial and then the state government up to the present, sporadic efforts have been made to buy off the registered konohiki. One such concerted effort was made in 1931 when $600,000 surplus was expected in the territorial treasury at the end of the fiscal year. During a campaign to convince the 30 owners of some 100 konohikis to negotiate settlements, Attorney General Hewit sent letters to the konohiki owners, in which he wrote:

> I have discussed fishery matters with various owners; and from many of them have found that this pseudo-feudal system prevailing in respect to private ownership of fisheries is resulting in a source more of annoyance and unpleasantness than profit; that, due to the difficulty of adequately protecting private right, it has been impossible in many instances to maintain leasees in these fisheries or to secure adequate rentals therefor. To my mind, the entire system is un-American and one toward the correction of which we should all cooperate. (Kosaki, 16)

By 1953, as a result of condemnation and also the development of Pearl Harbor as a U.S. Naval base, 37 registered konohiki fisheries were acquired by the territorial government. At present only 42 konohiki fisheries remain, the majority located around O'ahu. Although the rights themselves are not really exercised, there is even today movements within the state to try to condemn these remaining rights.

Major obstacles in condemning the rights have been financial, both due to the cost of new appraisals of the rights and then to purchase the rights from the present owners.

While Attorney General Hewit and others pushed for condemnation, others spoke out against it, saying that konohiki provide for much needed conservation of marine resources. For instance, an editorial in the *Honolulu Advertiser* in April of 1954 read:

> Owners of fishing rights who are far-sighted—and many of them are—do not allow their fishermen to keep inshore fish that have not reached spawning stage . . . . Nearly everyone who has lived in the Islands for three or more decades has noticed the rapid decline of the inshore fish food supply. (Kosaki, 30)

More recently konohiki rights have been viewed as a possible threat to ocean leasing—a concept that the state government has been discussing with entrepreneurs who are considering developing fixed-location technologies in Hawai'i's ocean waters. At present these technologies include mariculture, ocean thermal energy conversion and fish aggregation devices. According to a state report on ocean leasing published in 1981, the following possibilities, as concern konohiki and ocean leasing, are being considered:

> The State is not limited to the alternatives of either prohibiting or allowing ocean leasing within konohiki areas. The State could (1) complete the condemnation program intended in the Hawaii Organic Act of 1900, or (2) attempt to open for public use the remaining konohiki fisheries which have not been policed and used for many years by their owners on the basis of implied dedication or adverse possession by the public. With regards to the first alternative, condemnation of the remaining konohikis would be opportune at this time. The success of the second alternative is in no way assured, but such an approach does bear consideration. (24-25)

Destruction of Fish Ponds

In 1900 the U.S. Fish Commission sent John Cobb to Hawai'i to assess the commercial fisheries, and the first fisheries statistics for the islands were thereby compiled. From comparing Cobb's statistics to present-day statistics, one readily sees how fishponds have been so terribly abandoned since traditional times. In 1901 the total poundage of fish produced in ponds was 680,000, of which 485,000 were 'ama'ama (mullet) and 193,000 were listed as awa (milkfish). The remainder included ahalehole, 'o'opu (gubie) and other less important species. In fiscal 1976, the Division of State Fish and Game recorded mullet production from commercial ponds at 1,200 lbs and the total pond catch for all species at 20,000 lbs. This is about 3 percent of the 1901 total. (Madden and Paulsen, 3)

Historical evidence suggests that between 340 and 360 fishponds existed in Hawai'i prior to the arrival of foreigners. In 1901 when Cobb made his first study, he listed 104 fishponds totaling 2,950 acres that still produced fish on a commercial basis. Incidentally, in 1903 it was reported that the Chinese were the major ethnic group operating fishponds.

The disappearance of over two-thirds of Hawai'i's fishponds from productive activity is a very sad and unfortunate part of Hawai'i's marine history. Madden and Paulsen in their report for the Hawaii Department of Planning and Economic Development (DPED) state the following:

> Factors contributing to the decline in the number and use of fishponds before the turn of the century when Cobb made his review, and then to the present day, are similar. Cobb attributed the decline and disappearance of ponds to natural erosion, conversion to agricultural land, inundation by lava, destruction by tsunamis, and landfilling for shoreline expansion. (3)

In a more cultural/sociological analysis, Apple and Kikuchi in their 1975 report discuss the adverse effects to fishponds by the changing roles of Hawai'i's ali'i:

> None of the courts which surrounded the several high chiefs established a permanent "capital" in the European sense until after the time of Captain James Cook's discovery of Hawaii (1778-1779). Kamehameha the Great consolidated all of the island chiefdoms in the period between 1790 and 1810. Prior to 1812, his growing court became decreasingly mobile. During the mobile period, managers of royal fishponds administered them in the absence of the ali'i . . . . As chiefdoms were consolidated and as courts became less numerous and contained larger numbers of chiefs of various ranks, fishponds probably took on increased political and decreased economic roles in the relation to the needs of the conquering royalty. (12)

Apple and Kikuchi also noted that during the Great Mahele, which started in 1848 and which, among other things, imposed a Western type land registration upon the traditional Hawaiian land ownership pattern, fishpond ownership and high status remained linked.

In their analysis, the decline of fishpond use included population decline, urbanization, change in eating habits, change from barter to cash economies, importation of more convenient or more inexpensive fish products, diverting of streams for agricultural purposes, replacement of traditional taro agriculture by rice, cost of transportation to remote areas, unavailability of ice for preservation of fish in remote areas, changing shoreline use and commercial/resort development along shores.

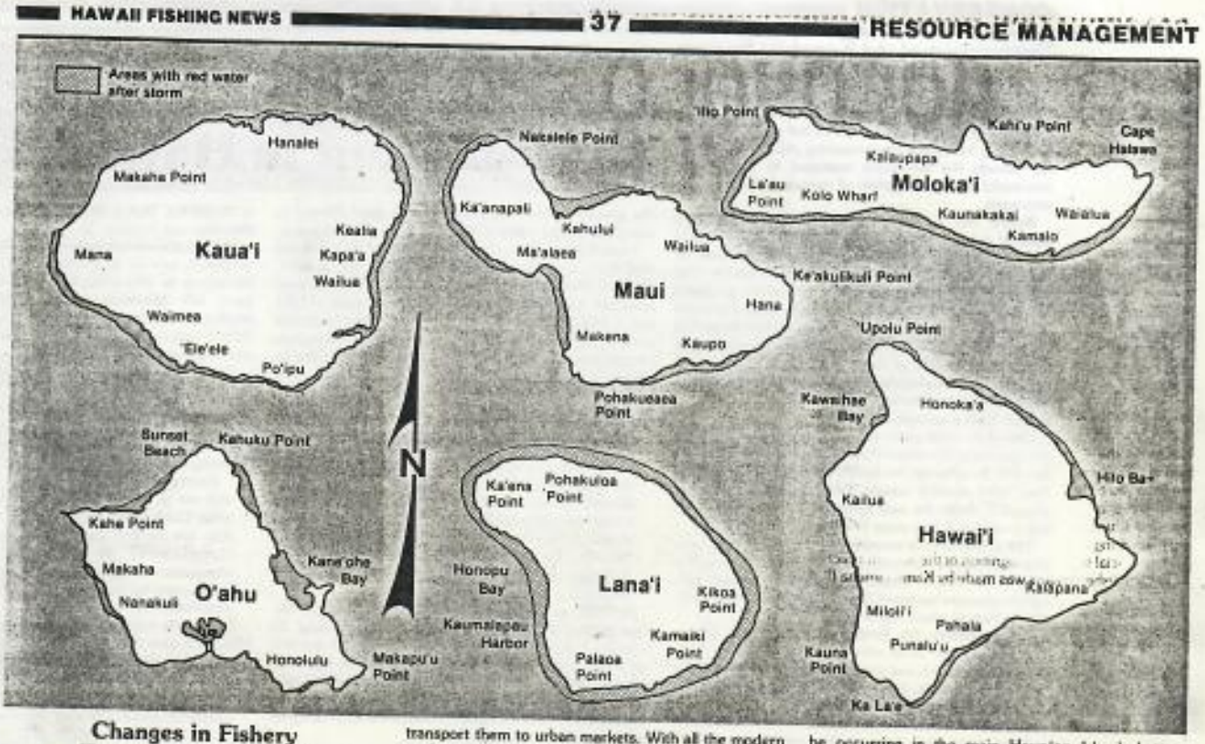
Presently 19 fishponds are used to raise fish in Hawai'i, but of these only three are being worked on a commercial basis. The Twigg-Smith pond, a freshwater pond with good control and intensive management, has produced a maximum yield of 1,500 lbs/acre/year of mullet, while the Kahouna pond, a brackishwater pond that is managed but not fertilized or supplemented with feed, produced 600 lbs/acre/year. In contrast, the yield of fishponds reported by Cobb in 1901 was 176 lbs/acre/year.

In 1977 Madden and Paulsen published a report summarizing the findings of a study of 67 fishponds in Hawai'i to see which would be still suitable for milkfish and mullet production. The findings are as follows:

> Of sixty-seven ponds, twenty-eight were estimated to be suitable sites for productive mullet and milkfish culture. Six were considered to have excellent potential, and 15 good potential. Seven were intermediate with only fair potential, being more suitable for extensive or low level production. The remaining 39 had "poor" or "very poor" potential for mullet or milkfish, due to competing uses or unsatisfactory biological factors, or were totally unavailable. (10)

This latter category includes ponds that have such present-day uses as resort/hotel development, bird sanctuaries, parks and U.S. Navy ownership.

. . . continued



Changes in Fishery Trends and Statistics

When Cobb first arrived to make his study in 1900, he found that Hawaiians predominated the fishery industry, and only one fourth of all fishermen were Japanese. By 1903, the situation had reversed itself with the Japanese the predominant ethnic group. During this same period the Japanese came to be also the principal ethnic group running the fish markets.

The influences of the Japanese to Hawai'i's fisheries are evident even today. For instance, Japanese names for many of the fish became prevalent, as did common English names and scientific names. As a result, many fish of Hawai'i are today known by the local population under any of four names. For example, albecore tuna (English name) is also called 'ahi palaha (Hawaiian name), tombo (Japanese name), and *Thunnus alalunga* (scientific name). Squirrel fish (English name) is also u'u (Hawaiian), menpachi (Japanese), and *Myripristis argyromus* (scientific). Unfortunately though, as the fish acquired new foreign names they soon lost their Hawaiian names for their various growth steges; these fell out of common usage and most residents who know the Hawaiian names for fish know only the name given to the fish when it is at harvestable size.

The Japanese also introduced new fishing techniques to the islands. The cast net, which many people associate as being traditionally Hawaiian or Pacific Islander, was actualy introduced from the Orient. The Japanese also introduced hook-and-line fishing at night for akule and 'opelu, and night handline fishing for 'ahi (*ika-shibi*). In these two fishing methods, fishing is done at night with lights (originally gas lanterns) which are used to attract marine organisms which in turn attract the 'opelu and akule or to attract *ika* (Japanese for squid) which in turn attract the shibi ('ahi).

Technological modernization continued to inundate Hawai'i's fisheries as industrialization arose. These advanced gears and methods have allowed fishermen to catch increasingly more fish per unit of effort. Some of these innovations are monofilament nylon gill nets and fishing line, spear guns (including the Hawaiian three-prong, which uses an elastic material to propel the spear shaft; this was not a traditional fishing spear), metal meshing for traps, dynamite fishing (which was later outlawed), scuba gear, larger boats, boats with diesel and/or gas engines, refrigeration, echo sounders to track bottom fish, radios for marine and ship-to-shore communication, helicopters to track surface schooling fish, fish aggregation devices, artificial reefs, advanced casting reels, and electric winch reels.

With all this modern equipment, and more, fishermen were able to travel farther out to sea, catch more fish with less effort, and store and refrigerate fish in order to transport them to urban markets. With all the modern equipment the fishermen also found themselves needing more money in order to pay boat mortgages, insurance payments, harbor fees, maintenance costs, haul-out fees and fuel costs and to buy more advanced equipment as it became available. The fishing for food in the traditional sense had given way to fishing for money in a cash economy.

The results of this ever-increasing assault upon the fisheries resource is apparent when one compares Hawai'i's first recorded fisheries statistics with those of more recent times. Major changes can be noted in the types and amounts of fish caught.

In 1903 Cobb listed 130 categories (species of products) in his catch statistics. In 1978 only 87 categories were used. This is because some fish, such as malolo (flying fish), have ceased to be taken in commercial quantities.

Many species were landed in much greater quantities at the turn of the century than in 1978, and these include the following: ulua (461,760 lbs versus 121,530 lbs); flying fish or malolo (36,000 lbs versus 0 lb); mullet or 'ama'ama (714,705 lbs versus 17,848 lbs); moana (151,970 lbs versus 7,685 lbs); and moi (109,685 lbs versus 1,934 lbs).

Landings of offshore pelagic fish such as mahimahi, aku and other tuna were less in 1903 than 1978, but kawakawa was caught in greater quantities than in 1978 (165,714 versus 78,506 lbs) as was akule (1,390,229 lbs versus 367,324 lbs).

In the bottom fish categories, 'opakapaka landings in 1978 were 30 times those of 1903, and hapu'upu'u landings saw a tenfold increase. Other bottom fish species (uku, onaga and kahala) did not see a change, nor were there changes in catches of limu, sharks, u'u (menpachi or squirrel fish), weke (goatfish), kala and 'opelu. (DPED, 68-79)

However, when state catch reports from 1970 to 1984 are reviewed, decreased catch rates around the main Hawaiian Islands are found for 'opakapaka, 'opelu, aku, and most other popular table species (except ta'ape—an introduced species which some fishermen find a pest and which commands a low market value). The availability of lobster, opihi and crab around the main Hawaiian Islands has also decreased markedly, and seaweed specialists at the University of Hawaii express concern about the possibility that limu, if it continues to be harvested unregulated as it is presently, may be unable to maintain a parent stock on the reefs. (Hawaii Fishing News, 12)

As for the dramatic increases seen in bottom fish between 1900 and 1978, it appears that this was probably brought about through overfishing, and the situation does not appear as if it will improve any time in the near future. In its 1985 report on bottom fish and ground fish, the Western Pacific Regional Fishery Management Council pointed out that although overfishing is likely to be occurring in the main Hawaiian Islands bottom fishery, under present social and economic conditions it is more important to maintain widespread access to the resource than to achieve the maximum biological production. Overfishing is also likely to be occurring in the Northwestern Hawaiian Islands with 1984 fishing production for the area that is within the fresh fish market harvesting 500,000 lbs per year of bottom fish—which is about equal to the longterm maximum biological yield. (WPRFMC, iv)

Adding to the problem of declining marine resources due to overfishing are changes to the nearshore environment which are adversely affecting the ability of marine organisms to survive and multiply. These environmental changes are the results for the most part of urbanization and industrialization. These cause industrial and human waste pollution to be discharged into the nearshore and near offshore waters. Although some discharge may enhance marine production being that the discharge is a nutrient, too much discharge causes eutrophication (a drastic decline in the oxygen level of the water). Polychlorinated biphenyls (PCBs), heavy metals, pesticides and radioactivity have been found in marine sediments in such places as the Ala Wai Canal, Kapalama Canal, Pearl Harbor and in Hilo Bay. The oysters and clams found in the waters of Kane'ohe Bay and Pearl Harbor are prohibited from being taken due to high bacterial contamination. (DPED, 145)

Changes to the nearshore reef due to large construction projects (such as Hilo Bay, Hanama'ulu, Ma'alaea, the O'ahu reef runway and the deep draft harbor at Barber's Point) have adversely impacted the environment. Concerns have also arisen over the silting of reef areas (which can kill the reefs) and the loss of coastal estuaries and mud flats which function as fish nurseries. (HFN, 12)

Sedimentation also reduces the amount of light that is able to penetrate into the sea and thus affects the amount of photosynthesis that is possible for phytoplankton. The growth of phytoplankton is the first link in the food chain in the marine ecosystem, and a decline in their productivity would produce a decline through the entire system. Sedimentation that remains on the inshore floor is also detrimental to the reestablishment of those marine organisms that require a hard surface on which to attach themselves.

For a dramatic viewing of the extensiveness of silting on Hawai'i's nearshore environment, one should look at the accompanying maps, taken from the *Hawaii Coastal Zone Fisheries Management Study* (1980), illustrating the red water runoff areas for each island after a storm.

Next month, this report concludes with a look at modern management policies—what the state has been doing in attempts to lessen the detrimental impacts of pollution and overfishing. . . . Sylvia

s standardly come with an elastic headband, id many a shore caster sporting this unit orehead. To me, these headbands do not the ideal piece of headgear. The band has stay in place, but it still has a tendency to tip to bob up and down. The band is a t does have a nice feature in so far as you e headgear when its not in use and just let it l your neck—a welcome relief from the band exerts around your forehead.

re casters have removed the lamp from the ounted it on a hard hat. This is more and stable, but the bill on the hard hat can when you want to direct the beam down to s and tackle. The hat also adds extra weight. which type of lamp you use, you will want to anging the bulb from the standard one to an ultra-bright halogen one. These pensive ($4 to $5), but you will value the nfortunately, they also put a quicker drain ries.

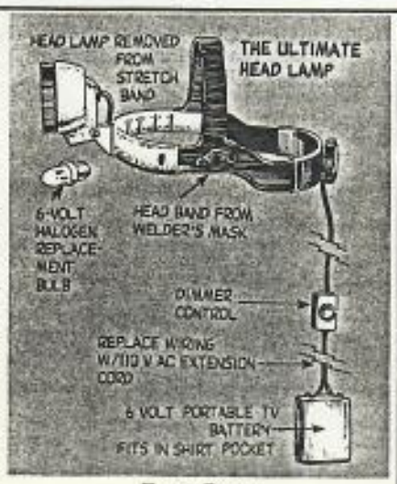
change your bulb to the "hot" halogen- tic lamp-holder ring in most headlamps will ution is to cut a new replacement ring out of It's best to do this before the stock ring expensive lamps come with a melt-proof oesn't require replacement.

eadlamps come with a separate "D" cell Most have a fancy belt clip and are a amps can be wired to work with a variety of s, and custom battery pouches to secure an be purchased. A common pouch used is Army M-1 ammunition pack.

TERIES CAN BE HOOKED IN SERIES

ettery options is great. Some shore casters cell, motorcycle batteries. A rechargeable s to be the most economical in the long run. u'll end up with a drawer full of half-used

Atlapac club member and shorecasting Yu, has assembled the ultimate shore lamp using parts and accessories from half rent sources. We've illustrated this ultimate . The best recommendation is to study the nd put together the combination that fits



Foot Gear

Lava rock is rough on the feet, and, in many areas that offer the best fishing, one slip could be your last—a 30-foot drop into a dark and churning sea.

For protection and sure-footedness on wet and often slippery surfaces, you can't beat the steel-spiked tabis made in Japan. However, the split-toe design has a way of rubbing the skin raw. An alternative is a good pair of running shoes. It's a good idea to have two pairs—one to fish in and a dry pair to put on before you bed down. Otherwise, when the fish strikes and your bell jars you awake, you can lose precious minutes trying to get into your wet pair of shoes.

Talking about bedding down—get yourself a good, lightweight camping cot. You'll need it to get your sleeping bag off the sharp lava and away from the bugs that crawl around a fishing area at night—they're unbelievable.

Next month in Part II, we will study terminal tackle and reveal a few tricks of the trade developed by Hawai'i shore casters. . . . Chuck

Conservation Line

by Rick Gaffney

■ **Elections:** There is a decided difference among the candidates on issues regarding the preservation and enhancement of Hawai'i's marine resources. Know the candidates' opinions on vital matters that affect your fishing grounds, and vote to elect candidates who will do something positive—for a change!

Election Results: Pre-election speculation shows great promise for Hawai'is marine resources regardless of who the next governor of Hawai'i is, although Anderson and Waihee do have different points of view (see October *HFN*). Some insiders see substantial changes in the Department of Transportation Harbors Division and the Division of Aquatic Resources as a result of the November general election.

Gill Nets: Frustrated by the inability of the legislature to pass any protective legislation having to do with gil nets? Talk to your favorite fishing supply dealer!

The perception in the legislature is that fishing supply dealers in Hawai'i oppose any legislation that might curtail the sale of nets. Change your dealer's mind, and we might see some laws enacted to help cut back the gil net slaughter.

In fact, it seems awfully shortsighted for fishing tackle dealers to oppose gil net regulations. With fewer gil nets in our waters there would be more fish, meaning there could be more recreational anglers, meaning the fishing tackle dealers would sell more fishing tackle! The more fishing tackle the dealers sell, the more money they make—and recreational tackle would probably produce a lot more income than the sale of gil nets.

Resource Enhancement: The success of Hawai'i's 48-buoy FAD system and the recently installed 5-mile long "trolling alley" off Wai'anae may lead to new installations in the future.

At the same time, NMFS and University of Hawaii researchers have had some success with the placement of artificial reefs on the Penquin Banks and off Wai'anae. This success could lead to additional installations elsewhere.

NMFS researcher Jeff Polovina has found the Japanese fiberglass artificial reef structure he placed on the Penquin Banks to be quite valuable in attracting various bottom fish into an area previously devoid of fish, while the success of UH marine scientist Dick Brock's work with concrete reef modules off East O'ahu is already the talk of many fishermen who have found the new reef to be teeming with various species previously not found on the once bare bottom.

More, mahimahi culture experiments are now ready for field trials, and it appears highly possible that pen-raised mahimahi could be released into the ocean to enhance the natural resource of that popular food and recreational species.

Save Baby Marlin: There's a new group on the eastern seaboard of the United States advocating the release of all marlin under 200 lbs in weight. The logo of the group depicts a little marlin jumping after a baby's pacifier with the international stop sign (circle with red diagonal) over the whole scene.

They make a good point, one that Hawai'i fishermen have grasped substantially for the first time as a result of the tag and release incentive during the **1986 Hawaiian International Billfish Tournament.**

Interestingly, many local skippers have continued to tag and release fish outside of the tournament, and are actively promoting the release of small fish among their customers. It's a good trend virtually state-wide.

While the release of small (predominantly male) marlin in Hawai'i and other U.S. and international waters is clearly a good idea, it is important to release some of the big momma females, too, and that's a tougher ethic to introduce. Can you imagine anyone releasing a 500-lb marlin?

Why not? There are many times when it makes sense. Anglers who have caught bigger fish already, commercial fishermen pursuing 'ahi for market, fishermen on holoholo trips—they are all good candidates for releasing big fish, which will produce the eggs for those little guys that many people are starting to free. . . . Rick

One Woman, Four Marlin, Four Hours

■ **The First Annual Tag and Release Tournament,** nicknamed TART, held during the first week of September, may have produced an unusual record, and, if so, did it under the oddest of circumstances.

Angler Vanessa Benham outfought four Pacific blue marlin in four hours of fishing on the afternoon of the final day. To the best of our knowledge, that was the first time a lady angler ever "boated" four blue marlin in a single trip. (We said "boated," but, actually, two of the fish were tagged and released.)

Vanessa overcame a special handicap. She was fishing on the press boat, not on a competing boat. She caught her four marlin during lulls in the activity when the five competing boats were not hooked up.

Since tournament action was steady throughout the morning, the press boat didn't get a chance to wet a line until noon. That's when they rigged a live bait and tagged their first marlin.

Vanessa is an experienced angler (a dozen marlin before this trip) and fought this one, as well as the three hooked later, by IGFA rules with no help.

A Brief Pause for Press Time

When filming of the action on other boats allowed another break, they caught a second bait and immediately hooked a second blue. This one was hurt too badly to release, so they boated it. Another lull in tournament action produced the third marlin, and another tag.

By now it was nearly 3:30 p.m. and the press boat had to race to get in position near Honokohau to film the tournament boats returning in single file at the close of the contest.

Press boat skipper Freddy Rice (that's right; him again), decided to toss out a Doornob lure for the run back, just in case.

As they pulled to a stop in shallow water off Pine Trees, the Doornob disappeared in an explosion of white water. Vanessa was back in the harness again. So instead of the press boat filming the final parade, the competing boats circled the *IHU NUI* to watch Vanessa fight her fourth marlin, a 390-pounder brought back for the weigh-in.

Anyone want to dispute the record?

You can't question whether it happened or how it happened. Rob Gault and Linda King of Acme Video have the whole thing on videotape.

But does anyone know of anytime a lady angler has caught four blue marlin on a single fishing trip?

It's a first for Freddy. He's never caught four marlin in one day on the *IHU NUI* before.

For Vanessa, the last fish had very special significance. She's the local representative for Doornob lures.

In at the Start

I had been on the press boat the day before and got the rare chance to watch a marlin hunt down and attack a bait. Freddy had put out a pair of ken-kens on light rods to catch some aku, which we did in short order.

As I reeled in one of the aku, a marlin appeared next to the starboard gunwale—so close we could have free-gaffed him from the deck. He just seemed to be wandering by.

By then, however, I had reeled the aku in sight, and the marlin took off after it like a cheetah chasing an antelope.

Once the marlin snatched the aku, he started wandering off toward the other boats, totally ignoring the light line trailing behind him and up to the rod tip.

I free-spooled line to minimize water resistance. Freddy backed the *IHU NUI* down to keep pace. And, the marlin decided to explore a bait being trolled by the *HOLIDAY*, which carried a competing team.

As the marlin began to chase the second bait, he realized the boat following him was more than just a nuisance. A quick circle, a big jump, and a snapped line put an end to all that nonsense.

You troll for aku without a leader. And without a leader, your line is no match for that sharp pair of nippers that is the corner of a marlin's jaw.

Spaceman, Fisherman, Archer, Too

To the honors accorded astronaut Ellison Onizuka, add a special salute from the American Archery Council (AAC).

The AAC recognized Onizuka because he had "demonstrated his interest in archery and bowhunting often throughout the years."

Archery was a favorite sport of several astronauts. Onizuka and his fellow crew members carried a bowhunting broadhead into orbit aboard the *DISCOVERY* in its successful 1985 flight. On their return, this broadhead was presented to the Fred Bear Museum in Gainesville, Florida.

The AAC resolved to "recognize and thank" Onizuka on behalf of its 2 million members.

Onizuka honored *HAWAII FISHING NEWS* by appearing on the cover of our May 1985 issue.

More on Warm Brains

In September we reported on the research work conducted here this past summer by Barbara Block of Duke University on "brain heaters" in marlin. She wrote us recently from North Carolina to add some comments on her work and her hopes for future studies here.

First, Barbara reminded us that other fish besides marlin are able to warm their brain and eyes.

"The main purpose of this physiological adaptation in the top pelagic predators is to warm the eyes," Barbara noted. "This results in faster processing of visual information.

"The ocean at any depth is dimly lit when compared to the terrestrial environment. You do not have to be swimming at a great depth to require a brain and eye heater.

"Keeping the brain and eye warm is also important for maintaining the central nervous system functions optimally during periods when temperature is changing (during vertical movements). Swordfish do swim at great depths during the day (500 to 600 meters); we know this from sonic transmitter studies."

Knowledge of Marlin Habits Scant

"We know absolutely nothing about what big marlin do. Obviously, given that we catch many on the surface there is no doubt that smaller marlin are cruising in the top 100 meters or so of the water column.

"What larger marlin do is not exactly clear. My guess is that they are quite capable of foraging anywhere they please (from the surface down to 1,000 meters).

"I intend to fill in the gaps with some sonic tracking experiments in Kona during the summer of 1988."

Local support for Barbara's work in Hawai'i is provided by the Pacific Gamefish Research Foundation, now under the direction of Dr. David Grobecker.

The Cost in Licenses, Alone

American sportsmen are paying nearly $600 million for licenses, alone, each year.

A press release from the U.S. Fish and Wildlife Service (FWS) said, "Fishing is up, but hunting is down."

Their summary is based on 1985 license information. And that license data shows an increase in total revenues derived from the sale of angling and hunting licenses, which continue "to climb to record levels," FWS said.

"Statistics compiled from the individual state fish and wildlife agencies show there were 29,673,190 fishing license holders in the United States in 1985—a healthy increase over 1984's total of 29,015,918 licensed anglers. At the same time, however, hunting license sales dropped to 15,879,572 in 1985, from 16,018,250 in 1984."

Despite the drop in numbers of hunting licenses, the revenue for both types of permits increased.

"Revenue from the sale of state licenses and permits jumped to $282,342,746 for fishing licenses and $300,766,158 for hunting licenses in 1985," FWS said.

The State is Supposed To Get It Back

FWS uses those figures to determine how much money each state may receive from the federal government in return for excise taxes collected on sporting goods.

In Hawai'i, most anglers fish only in salt water, for which no license is required. Therefore, funding is based largely on the length of Hawai'i's coastline as compared with that of other states.

Surprisingly, there were 6,907 freshwater fishing licenses issued in the state of Hawai'i in 1985. These produced revenues of $22,199. Few freshwater fishing opportunities exist here. The only major freshwater fishery is on O'ahu in Lake Wilson, an irrigation reservoir.

Since more hunting opportunities exist here, there were nearly twice as many hunting licenses sold during the same period. Hunters purchased 11,425 licenses at a total cost of $83,646.

Gill Nets There, Gill Nets Here

An editorial in the September issue of *California Angler* magazine seems remarkably familiar. Change "California" to "Hawai'i," and see if it fits.

"It is perhaps a major understatement to note that sport anglers have for many years been very concerned about the indiscriminate destruction of some marine resources caused by the use of gill nets in California's coastal waters.

"In particular, anglers have been very alarmed and many of them outraged regarding the effects commercial fishing has on our sport fisheries.

"The issues have often been hotly disputed and have divided California's sport and commercial groups into two feuding camps.

"While the argument over the extent of gill net impacts has continued for many years, most of the fishery resources which both groups harvest have continued to decline."

The *CA* editorial rages on for many more paragraphs, which include lots of statistics showing declines of important species.

Perhaps the most pointed line in the editorial is this one:

"As long as the commercial sector is allowed an unlimited legal harvest, such fisheries cannot be managed to meet the needs of the angling public and the basic inequity of how the public's marine fishery resources are utilized will continue."

The editorial was written by John O. Beuttler Jr., Executive Director, United Anglers of California.

Lightning Not a Fishing Worry

Periodically, it is nice to discover you are at the bottom of some list. From a news release, we learned that Hawai'i is last in deaths caused by lightning. That's encouraging to mariners and fishermen. Many lightning deaths have occurred because the bolt was attracted to a fishing rod held by an angler aboard a boat—the highest point around. Not here though. No deaths attributed to lightning have ever been recorded in Hawai'i.

Great White PR

After the catch of the 3,450-lb great white shark off Montauk last August, we got a call from John Marcone, president of the California Tackle Company. He wanted to be sure we knew the big fish was caught on one of his Sabre rods.

For a tackle manufacturer, there is lots of PR in the capture of a big fish. The Berkley Company, for example, has given out over a million dollars in awards to anglers who have caught IGFA world records on their line. And they've extended that offer to include records caught on their rods.

In the case of Capt. Frank Mundus, the skipper of the boat that caught the giant white, PR has turned him into a cult hero. He was the model for Quint in the movie Jaws. Perhaps that is one of the reasons he is able to charge $1,200 a day for a "monster fishing" charter.

Come to think of it, that daily price tag may explain why Capt. Mundus was out on a holoholo trip the day of the big catch. No one able to pay for the charter.

Mundus advertised shark fishing trips in Kona in mainland magazines last winter. I'm not sure what figure he was asking, but local skippers are hard pressed to get enough charters for marlin at $250 to $500 a day. Then again, what is the value to an inflated ego to say you've fished with the man from Jaws.

It's a bit more of a conversation stopper in Kansas than talking about how high the corn grows.

Kapu plan

Pollution, not overfishing, blamed

By Brian Siler
Star-Bulletin Writer

State fisheries biologists ran into a flood of opposition last night from Oahu fishermen who came to hear about a controversial Department of Land and Natural Resources conservation plan.

The meeting was called to explain a kapu plan for state shoreline waters and to seek comments from fishermen about how and where the plan ought to be instituted.

Biologists Mike Yamamoto and Eric Onizuka of DLNR's Division of Aquatic Resources presented the results of an eight-year study of a pilot kapu area off of Kapiolani Park.

The Waikiki-Diamond Head Shoreline Fisheries Management Area has been closed and open to fishing, on an alternating basis, every two years since 1978. Surveys of fish populations in the area show marked recovery when fishing is forbidden.

Based on the test area, the 1986 Legislature passed an act calling on the department to look into extending the kapu in some form statewide. Last night's meeting was the last of a series of meetings held on Hawaii, Maui, Molokai, Kauai and Oahu.

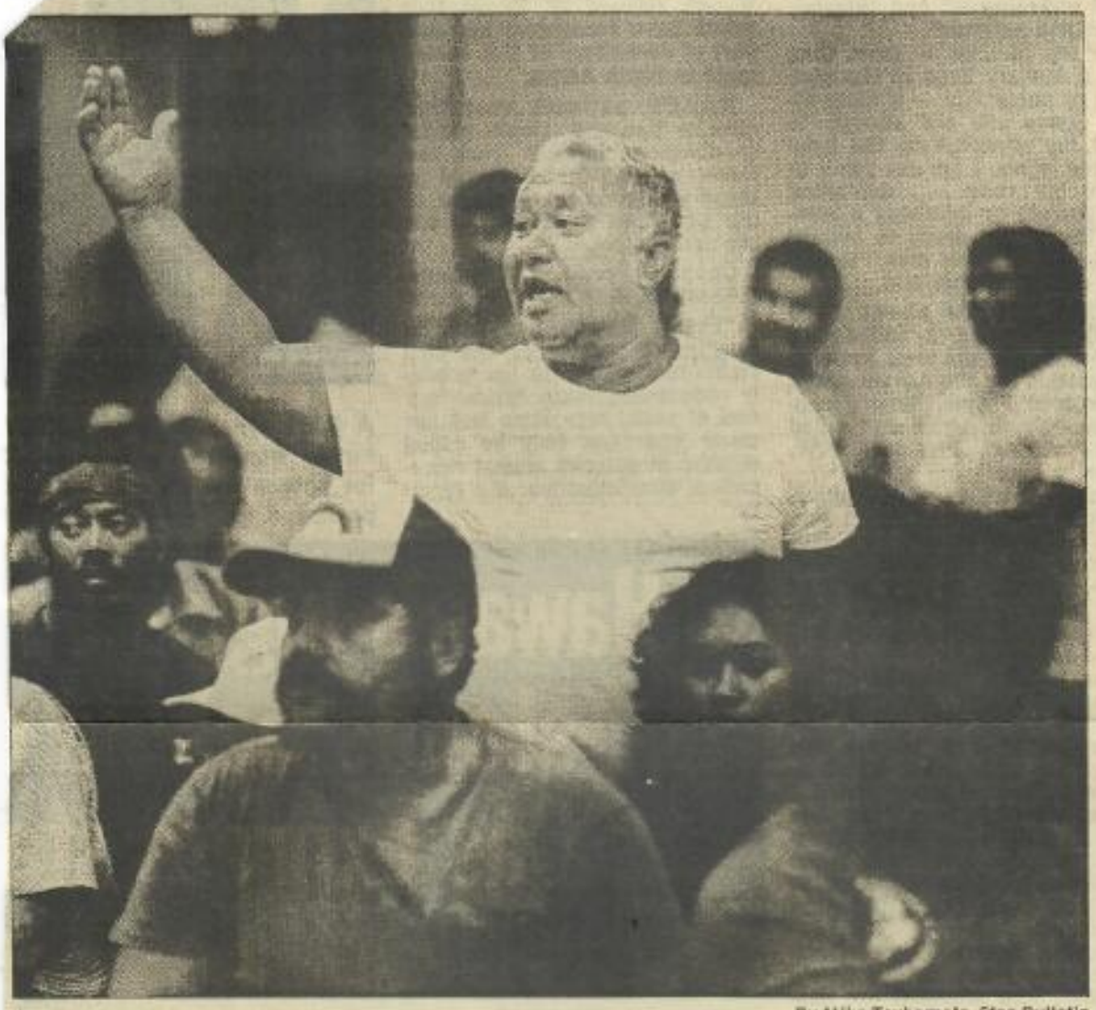
"Ninety percent of the time the state is wrong," said sports fisherman Ben Saito, who questioned whether the department's ideas and data could be trusted. His remark brought a round of laughter and applause from the more than 100 people attending.

"It will put us out," said commercial fisherman Christopher Gladman of the kapu system. "We have to find new ways of earning a living."

Gladman was one of several commercial fishermen who expressed concern and confusion over the plan. If one area were closed, they said, it might be too expensive to go to another.

5/15/87 HSB

outrages fishermen



By Mike Tsukamoto, Star-Bulletin

KAPU DEBATE—Retired Nanakuli fisherman Walter Kaakana makes a point last night during a packed hearing on the state's fishing kapu plan.

John Kelly of Save Our Surf said the drop in fish populations in island waters is not due to overfishing as the biologists seemed to suggest but to the destruction of natural habitat and feeding grounds through pollution and the silting over of coral reefs by construction-related runoff.

Sports fisherman Ernest Theodore supported Kelly's argument. "What we need is one pollution control management," he suggested, "not fishing management."

"Our whole problem is nobody wants the kapu," said John Kelii Holokai, who said he hadn't caught a worthwhile fish in years. "But we gotta have laws, we gotta have kapu."

No one disputed that there are too few fish in Oahu's waters, but few joined Holokai in his open support of the state's plans.

"The people who fish to put fish on the table cannot stop fishing for two years," said Susie Watson of Kahalu.

Gill nets, which the two biologists said were responsible for about 87 percent of the fish taken in the Waikiki kapu area, were pointed to by many of the sports fishermen present as the villains. Several called for the state to ban them.

Retired commercial fisherman Walter Kaakana of Nanakuli disagreed, saying the state already has enough rules governing the mesh size of nets. He said he believed the state plans to push through its kapu plan regardless of what the fishermen say.

DLNR Chairman William Paty encouraged those attending to get the word out to the island's fishermen that "We gotta do something."

"What we're looking for is your ideas," he said, "and if you're dead against it, okay, then we're probably going to have to figure something else, but I ask you, 'What are we going to do?' "

A-16 Honolulu Star-Bulletin Thursday, March 12, 1987

Tight Lobster Rules

Star-Bulletin Staff

It's now illegal to fish for all species of lobsters in federal waters less than 60 feet deep in the Northwestern Hawaiian Islands and within 23 miles of Laysan Island.

It's the intent of the new rules to protect lobsters from overfishing; provide future stocks; minimize the impact of commercial lobster fishing on endangered Hawaiian monk seals and threatened green sea turtles; and allow assessment of the impact of commercial fishing on lobsters stocks where fishing is allowed.

Agencies come up with ways to keep Tern airfield open

By Jan TenBruggencate
Advertiser Kauai Bureau

The airfield on Tern Island at French Frigate Shoals will be kept open under an agreement between the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

A proposal to close the runway as a cost-saving measure attracted broad criticism from the scientific community. Tern is the only runway between Kauai and Midway, 1,200 miles covering most of the Northwestern Hawaiian Islands.

Most of those islands comprise a national wildlife refuge, and without Tern's runway, access would have to be entirely by boat. That would make more difficult the saving of young seals and the movement of researchers and enforcement personnel through the islands.

The Fish and Wildlife Service, whose budget groaned under the cost of keeping up the former Coast Guard station there, will convert it to a high-tech facility that will dramatically reduce fuel, repair and maintenance costs.

Jerry F. Leinecke, district supervisor for refuges and wildlife in the Pacific Islands Office of the Fish and Wildlife Service, said the roughly $125,000 in conversion costs should save $40,000 to $50,000 annually in maintenance costs.

The changes will also mean biologists assigned to Tern will be able to spend as much as 75 percent of their time on biology and 25 percent on maintenance. Under the existing setup, as much as 55 percent of their time is spent keeping the facility operating, he said.

Much of that time was spent maintaining the big power generators themselves, which run air conditioners, huge walk-in freezers, multiple radios and other gear. The facility at Tern was established for a dozen or so Coast Guard personnel, and so may be more than is needed for the two to four researchers on the island at any given time.

The conversion involves removing the big generators, and replacing them with a single, 3.5-kilowatt generator that would be used in energencies. Regular operational power would come from a rooftop array of solar power cells. They'll be installed on a strengthened roof in the main Tern Island structure, a concrete building on piers that was designed to withstand the storm surf that sometimes washes over the island.

The solar system will run a humidifier to keep one room dry and salt-free. It will also power new communications gear and refrigeration, a few lights and redesigned water delivery system.

The Tern Island facility's water is collected from rainfall on the roofs of buildings and from the surface of an old concrete tennis court. It is treated to make it drinkable.

Leinecke said the service is working with other government agencies to determine what kind of solar installation would work best in the salty air of Tern, what kinds of radios and energy-efficient refrigerators are best and how to set up the drinking water system. The service hopes to have contracts in place by September and to have work completed by the end of the year, he said.

There must be people on Tern Island for an aircraft to land there. That's because seabirds will nest on the runway area if allowed to, and debris collects on it. Before a plane lands, the crew uses a tractor to drag a beam across the runway to clear it.

Leinecke said the tractor and a small, three-wheeled runabout vehicle will be kept on the island, along with the outboard motors needed for boats used to travel around the waters of French Frigate Shoals. They, with the emergency generator, will be the only users of fuel.

The dramatic decrease in fuel needs means a special fueling vessel won't be needed. Gas can be brought to the island in barrels by the Coast Guard, fishing and other resupply vessels that occasionally visit the island, he said. More convenience and less cost.

Members of the scientific community say they are relieved the Fish and Wildlife Service did not shut down the airport and the majority of the facility, though there is concern about whether the service will get the additional money it needs to make major improvements to the runway. The runway, built during World War II, is eroding as the ocean washes through the rusted iron plates that surround it.

"I'm really glad that they're keeping it open," said Sheila Conant, a University of Hawaii scientist who has done considerable study on the Northwestern Hawaiian Islands.

"It's good to have enforcement personnel and researchers there to make sure nobody's bothering" the Hawaiian monk seals, green sea turtles and seabirds that use the sandbars of French Frigate Shoals, she said.

POLICEFIRERE

Cutter en Route to Rescue Sailors

Two Long Beach, Calif., men set out for Hawaii on a 48-foot sailboat named "Joie de Mer III," which is French for "Joy of the Sea". Their trip was anything but.

The Coast Guard cutter Sassafras was en route today to rescue the men who have been adrift in stormy seas for five days off French Frigate Shoals.

A Japanese tanker sighted the disabled Joie de Mer III yesterday at 2:10 a.m.

The sailboat was dismasted and had no mechanical power, according to Coast Guard Petty Officer Dan Waldschmidt

Skipper Mario Silva, 34, and his passenger Laurence Deal, 44, departed Newport Beach on Nov. 11 for Honolulu. Three days out of port, the vessel endured five severe storms that ripped all sails.

The tanker encountered the boat about 560 miles southwest of Hawaii, the spokesman said.

Seas were 10 to 15 feet high with 25-knot winds. The victims had about a six-day supply of food and water left. One of the men had suffered extreme sea sickness.

The Sassafras was expected to reach the sailboat late today or early tomorrow.

Forum Scheduled on Fishery Needs

Hawaii's fisheries and related issues, such as ocean recreation, marine facilities, education and research, will be addressed Sunday by gubernatorial candidates during a two-hour forum.

The event is sponsored by Malama Na I'a (for the Enlightened Stewardship of Fish), formed about eight months ago by individuals and groups committed to the restoration and "proper" management of Hawaii's fishery resources.

Leading candidates for governor have been invited to participate in the forum beginning at 4:30 p.m. at the University of Hawaii Richardson School of Law auditorium.

Former U.S. Rep. Cecil Heftel, City Councilwoman Patsy Mink and Lt. Gov. John Waihee have agreed to participate, according to a news release by Malama Na I'a. Former city Managing Director D.G. "Andy" Anderson has a conflicting schedule but will try to attend, his staff said.

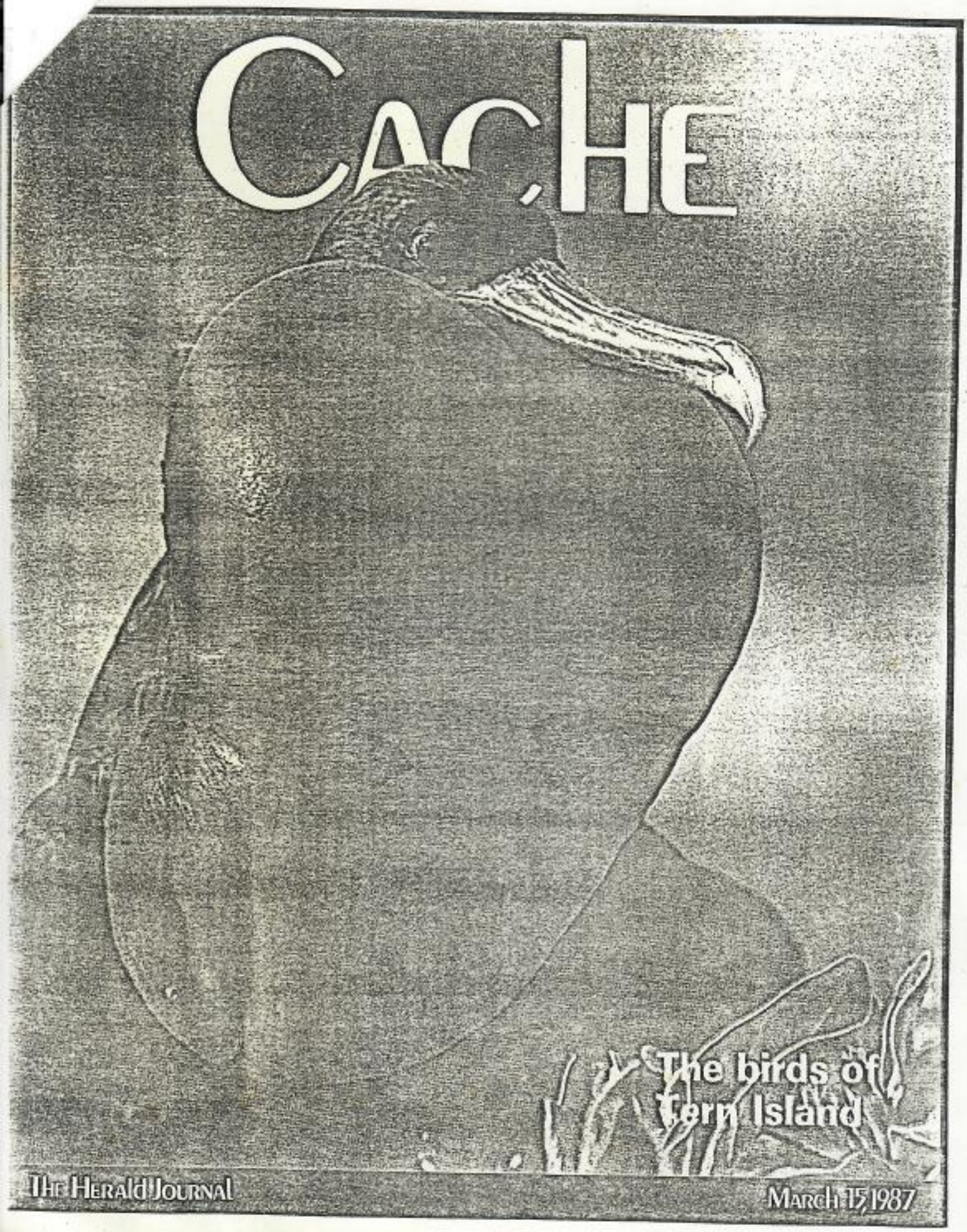
John Craven, director of the UH Law of the Sea Institute, will open the forum. Jim Leahey, Hawaii sports commentator, will serve as moderator.

A panel of specialists on Hawaii's fishery resources will question the candidates.

Michael Markrich, chairman of Malama Na I'a, said it was organized "to call attention to the plight of Hawaii's fisheries" because of overfishing and depletion of near-shore reef areas.

"It is something that anyone who becomes governor will have to come to terms with," he said. "Otherwise, part of the quality of life here, of which our ocean plays a major part, is going to be lost."

CACHE



The birds of Tern Island

THE HERALD JOURNAL

MARCH 15, 1987

CACHE

Lure of the tropics

Every day The Herald Journal gets an incredible volume of mail. We get news releases from all over the world, trade publications, legal notices, letters to the editor, sports information, recipes, bills, payments, books, public relations packages promoting just about every event or product you can imagine and more than our share of just-plain junk mail.

On the editorial side, I seem to end up with the largest proportion of the mail. Along with the title of Cache editor, I inherited the position of business editor, as well as a couple of other titles.

Some days it's a toss-up between business and sports as to who gets the most mail, but business mail usually seems to win out. Because of local-interest and space considerations, I end up throwing out at least 75 percent of the mail I get. I look at it all, but most of it ends up in the garbage, because we rarely use stuff from the Pakistan Embassy or Hong Kong Government Information Services.

I also get the mail addressed to the "Travel Editor." Unfortunately, that's not one of my titles, though I wish it were.

The travel mail advertises cruises and resorts, though no one has yet sent any offers of free travel or free lodgings at some posh watering hole. Policy and ethical considerations would not allow me to accept anything like that, but the tempatation would be great.

For the past few years, I've had this urge to visit the Caribbean or the South Pacific. There are hundreds of places all over the world I'd like to see, but for some reason the lure of the tropics has been strong.

That's why I'd like to be a travel editor. What a job! Spending a week in some far-off place, or cruising on an ocean liner to the Orient, taking a few notes and maybe a few photographs and writing a story about it — and getting paid for the effort.

Palm-fringed, tropical isles with empty, volcanic beaches, blue-green lagoons, waterfalls and long, lazy days have long been the stuff of fantasy. Lately they've captured my imagination.

This week's Cache has something for other people stricken with incurable wanderlust — articles that cover the extremes of faraway places.

Staff writer Cindy Yurth several years ago worked as a shuttle bus driver in Antarctica. In this week's My Turn column, Yurth describes her job and her life in that place most people see as lonely and inhospitable.

But the Antarctic — during the summer season — is a thriving community. Several nations maintain bases and stations from which they conduct a variety of scientific research. Tourists even visit the southernmost continent these days, coming by plane and ship.

Antarctica has not been tamed, however. The continent is still lonely, still inhospitable, and Yurth describes some of the hardships as well as the pleasures of her stay.

In another tale of a visit to a distant — but considerably less forbidding — place, Utah State University Information Services writer John Flannery has provided this week's feature — an account of six weeks he and his wife Annie spent on Tern Island, this country's most remote wildlife refuge.

USU range science graduate Rick Votter is manager of the refuge, where he lives with his wife, Joan Suther. The small island is home to a variety of bird species, and the Flannerys helped survey the different types of wildlife, as well as helping with the day-to-day chores required for survival on the desert island.

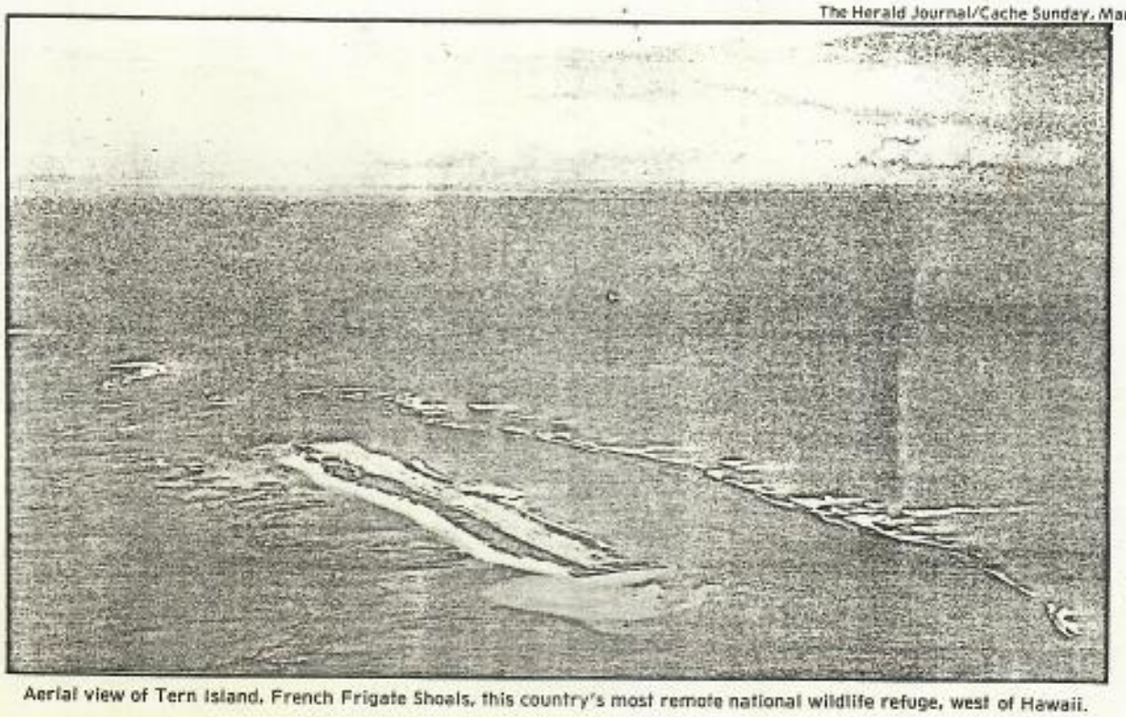
Flannery's article does not describe the kind of tropical island that has held my imagination in recent years. On Tern Island there are only five scattered palm trees, two 60-foot-tall ironwood trees and no waterfalls — in fact there is no fresh water except what the rains bring.

Human existence on Tern Island is not easy. But the Flannerys were captivated by the small island and its many species of birds and other wildlife. They found it difficult to leave.

I think I can understand why.

Pat McCutcheon
Cache editor

ON THE COVER: A male great frigate bird "displaying" during courtship by inflating his red gular sac to attract females to a potential nest site. Photo by John S. Flannery.



Aerial view of Tern Island, French Frigate Shoals, this country's most remote national wildlife refuge, west of Hawaii.

At home on a desert island

Editor's note: In mid-December, 1986, John and Annie Flannery left Cache Valley bound for Hawaii. John is a writer for Utah State University Information Services; Annie is a USU graduate student in wildlife biology. Their final destination was Tern Island, 530 miles west of Honolulu, where their longtime friend and USU graduate Rick Vetter manages a national wildlife refuge. John and Annie spent six weeks as volunteers on the island, participating in a program that brings volunteers to help on many national wildlife refuges.

Below, light green water, a few tiny, widely-scattered sandspits; far ahead, an elongated, near-rectangular small island and off to our left a single rocky promontory jutting 137 feet into the clouded sky.

Minutes later, the Beech 18 skimmed over a low metal seawall, touched down, rolled past white buildings on the coral and clay airstrip and turned around. Our eyes were glued to the windows. Outside the rapidly warming cabin were birds, birds and more birds. The very first I saw was a cattle egret, common enough in Utah, but a rarity on Tern Island, 500 miles west of Honolulu in the middle of the Pacific Ocean.

This would be our home for the next six weeks. A desert island, the most remote national wildlife refuge, where we would be Fish and Wildlife Service volunteers.

The aircraft shut down in front of the living quarters. Longtime friend and refuge manager Rick Vetter sat on a golf cart, wearing tropical uniform. He waved casually, and looked pallid and worn, not at all in character with the ebullient Utah State University range science student who used to bounce energetically across the Logan campus. His wife, Joan, was not waiting to greet us as we had hoped and expected.

Joan was in bed, ill. A quick check of her symptoms, coupled with a rundown of their recent itinerary, spelled malaria. She and Rick had been on a collecting trip in New Guinea for the Bishop Museum in Hawaii. They had been bitten by mosquitoes two nights apart. The airplane that brought the two of us to Tern Island took Joan back to Hawaii and medical treatment.

Our work began as soon as the plane left.

Birds were nesting, eggs were hatching, young were waiting to be measured and banded, 20,000-gallon redwood water storage tanks had to be repaired to stop leaks, then pumped full from the cistern on the abandoned tennis court which served as one of the rainfall catchments on the desert island. The golf cart, used for hauling tools, batteries and pumps was ailing; motors and motorboats, diesel generators, pumps and batteries constantly exposed to high temperatures, high humidity and salt spray needed continual maintenance.

The navigation antennae used by the charter aircraft that came every month or so was broken by a bird strike or from the weight of roosting frigate birds. Stakes to mark nest sites for future studies needed to be painted and numbered, entries had to be made in logs. Reports and narratives had to be updated. The weekly endangered Hawaiian monk seal study had to be continued without Joan's expertise. Weather station information had to be collected and recorded. Forty-hour work weeks grew to 60 and more as the weekend approached.

Biologists Annie Flannery and Rick Vetter.

Normal? Probably, under the circumstances. Terrible? Not really.

Then Rick came down with violent shakes and high fever from the mosquito bites and life was hectic.

A day would go something like this.

The alarm clock would ring about 6:30 and one of us would grope for flipflops, shorts and a jacket, grab a flashlight and stagger through the dark to the generator building, 70 yards away. There would be toggle switches to be thrown, one of two generators to be checked, then fired up, water to be turned on to the remote radiator, more switches to flip, then with power and lights on, voltage and amperage gauges to be read and logs filled out. Switches were next thrown to start the freezer and cooler.

Back in the day room, Rick activated the radios to talk to headquarters back in Honolulu, where it was already daylight. Details and conversations went back and forth repeated and repeated again because of the idiosyncrasies and glitches in atmospheric conditions and marine radios.

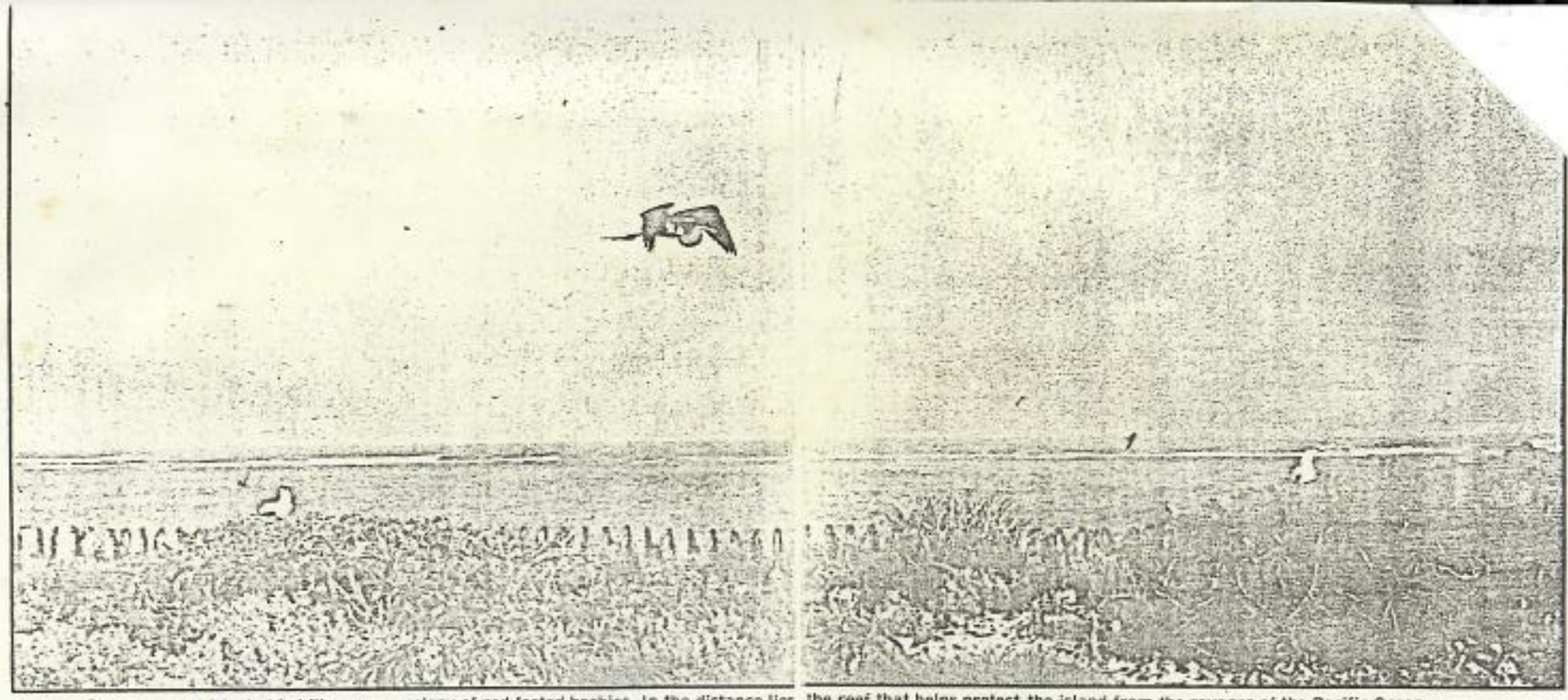
Breakfasts were taken on the run, between other duties, and often were missed. Annie would disappear to read and record tide gauges and weather station information, then grab a clipboard and go out to do black noddy, albatross or other bird studies. Rick would continue the radio discussion and I would resume researching monthly reports for material useful in the preparation of the annual report, or, on better days, go outside to mend or clean up salt-corroded equipment, replace a steering wheel on one of the two Boston Whalers, assist with a bird count or try to find which of the remaining batteries could counted on to start vital equipment.

Mid-morning, the three of us might come together in the dayroom and talk about other tasks that needed to be done. Where repairs were needed, Vetter took the lead. In addition to his expertise in range and wildlife, he can fix or jury-rig anything from a backhoe hydraulic system to the complex circuitry of the dehumidifiers which keep several rooms dry and preserve some of the critical radios and other delicate equipment and supplies which are quickly destroyed by the presence of high humidity.

Invariably, one or two of us would return to studies in the bird colonies for the rest of the morning.

Lunch was leftovers from previous meals, snacks or sandwiches quickly prepared and usually interrupted by a second radio contact when the early morning talk with Honolulu had been interrupted by the high-pitched squeal that was rapidly ruining Vetter's ears.

k seal.



A great frigate bird flies over a colony of red-footed boobies. In the distance lies the reef that helps protect the island from the ravages of the Pacific Ocean.

Evenings meals were more formal. A rotation schedule gave one person responsibility for the particular evening meal and dish-washing. The food supplies were ample and varied, thanks to careful shopping in Honolulu and the walk-in freezer and fridge.

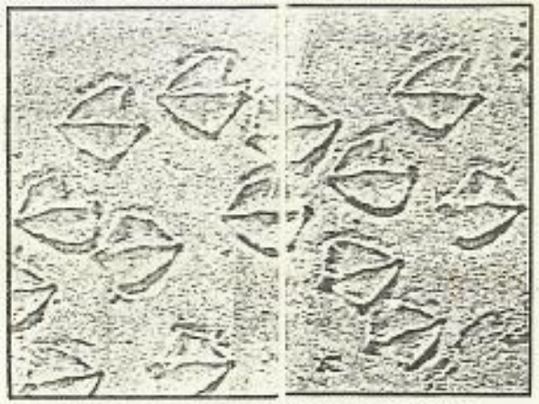
Evenings included a ritual of listening to marine weather. Weather takes on considerable significance when you realize that you are the only people on a tiny island with neighbors ever four hours away — by air.

Twice in recent history, 40-foot breakers have smashed on the reef and put water across the runway, forcing the island's human occupants to seek refuge on the roof of the main building. Vetter was there in the last December storm, and spent weeks afterward clearing huge chunks of coral from the runway. We learned that he hoped in his particularly warped way that we too would get to share a similar experience.

Vetter's malaria continued and his temperature shot dangerously high. Finally the options became two — he could be med-evacuated to Hawaii by aircraft, or medicine would have to be dropped. His removal meant that we would probably be flown out, too. None of the three of us wanted to go, and the choice was made for an airdrop. The U.S. Navy came through, the parachute was on target and the vials of chloroquin were undamaged. The range/wildlife biologist-cum-refuge manager returned to normal in a few days.

He was well enough so the second Audubon Christmas bird count was carried off without mishap. Ilie and Annie counted the tiny island's outlying islands. Regulations required that someone stay on Tern as a backup with a second, completely prepared boat in position on the hoist. I stayed and began that part of the count, counting and recounting Laysan and blackfooted albatross, thousands of frigate birds on the bushes and milling high into the sky, fairy or white terns which normally hovered around our heads but were scarce that day, red-footed boobies and the birds blown to the island by unusual winds — curlews, plovers and the cattle egret.

Rick and Annie returned with more numbers and new species to include in the count. They cont



Albatross tracks decora e a coral sand beach.

ued counting birds on nests, uilding roofs in the twilight, sea around us. We concluded lights, getting a rough idea of s.

while I sat on one of the flat counting birds returning from th the count in pitch dark with flas the nocturnal Bonin petrel numbe

After her malaria was cured, oan was able to find her way back to Tern Island on a fishing oat, and life resumed a more regular pace, though holidays a nd weekends continued to be study days. The only letup in the ield work came when the wind howled and the biologists feared he young birds would be blown off the nests. Those days were spent on reports and reading technical books or popular magazines and paperbacks in the vast library which undoubtedly began when the Coast Guard manned a station at French Frigate Shoals.

During a lull in activities, Vetter took me outside the refuge beyond LaPerouse Pinnacle where, with saltwater tackle, I learned the fighting power of four-foot long Ulua, a marvelous silver fish. Later, with handlines, the two of us simultaneously hooked and landed smaller versions, trolling near a coral head. The filets were a pleasant addition to the menu.

The wonder of Tern Island never ended. Bird sounds were constant, but varied, never boring. The antics of sub-adult albatross — walking, meeting, doing their enthusiastic ritualized dance with clacking bills, honking, making seductive soft whistling calls — kept us laughing and enthralled.

Only those birds blown to the island by accident are wary of man. The rest, like those in the Galapagos Islands, know no fear.

We departed with regret and a feeling of incompleteness. There were new albatross chicks and redtailed tropic birds were just beginning their spectacular courtship flights.

Two new volunteers came to assist, so Rick and Joan weren't left alone. At any rate, the couple is nearing the end of their two-year tour, and as a result of their hardship-duty station the Fish and Wildlife Service will find Vetter another refuge to manage.

Two things are certain, wherever they are assigned. The new post will definitely be a refuge with less water. And, there will certainly be more people around.

TEXT & PHOTOS:
JOHN S FLANNERY

Environmental Update

Hawaii's monk seal faces an uncertain future

Jan Tenbruggencate
Kauai Bureau

Hawaii's seal, whose population continues to decline despite federal protection, is facing a crisis: murder.

Sharks are killing seals, but, worse, other seals are killing seals.

Teams of scientists are working to develop ways to protect the population. There have been some successes, but the situation of the Hawaiian monk seal, *Monachus schauinslandi*, is still critical.

The seals are among the three tropical seal species. Of the other two, the Mediterranean seal is very rare, and the Caribbean seal is believed extinct.

The Hawaiian seals range 1,000 miles from the main islands out along the Northwestern Hawaiian Islands. They are seen occasionally in the main island, and one has been a three-month visitor at the Kilauea Point National Wildlife Refuge. Regular seal visits are made to Niihau and Lehua islands.

The animals don't have the attractive coats of fur seals, but were killed for their blubber during the 1800s.

They have been protected as residents of the wildlife refuge of the leeward islands since the early part of this century, and have had federal protection as marine mammals since 1973 and as an endangered species since 1976. But their population has continued to drop all that time, down by a half to two-thirds since the counts of the late 1950s.

Among the problems are humans. Humans and their cars on beaches of islands like Wake and Midway bother seals. They move from their traditional beaches for raising young and go to less desirable locations, like small sand bars without shelter. Mothers and young seals are forced to spend more time in the water, where they are vulnerable to attack from other seals and from sharks.

Many seals exhibit shark bite marks, and many survive. A healthy seal apparently often can fend off a shark, and can try to protect a younger or weaker seal. But not forever. Doris J. Alcorn and Alan K.H. Kam, of the Honolulu Laboratory of the National Marine Fisheries Service, described in print last year a shark attack at Laysan Island.

A 12-foot tiger shark came after two seals, a healthy six-foot adult and an injured youngster, whose wounds probably were caused by an attack by another seal. The adult seal submerged and apparently fought the shark in a flurry of violent splashing. The shark left.

Minutes later, another shark fin was seen approaching the two. The adult seal swam between the shark and the injured seal, and the shark broke off the approach.

The adult hauled out on the beach while the youngster rested in water 10 to 20 feet deep over a sandy bottom. A large shark approached from below and pulled the youngster under. Other sharks joined in the attack. The young seal was killed.

Perhaps the most distressing factor in the lives of the 1,400 remaining Hawaiian monk seals is something the scientists call "mobbing." It happens at islands where there are many more adult male seals than adult females. Usually during mating time, anywhere from three to 30 males will catch a female in the open, and one after the other will try to mate with her.

The males hold on with their teeth while mating. The female's fur is ripped off, then her skin is torn, then it's down to blubber and finally to muscle. Many females are severely injured, and some die.

Even though it may be only a few cases a year, the continued mobbings guarantee a continued shortage of females, and that seems to lead to more mobbings.

William G. Gilmartin, of the National Marine Fisheries Service's Honolulu Laboratory, said adolescent females and even sometimes immature males are objects of mobbing. He said his agency is conducting a series of programs to try to cut off the chain.

Scientists at Kure Atoll for several years have collected female pups at weaning, and raised them in a fenced enclosure, feeding them live fish so they learn to catch them. The two to five-month protected period carries them through their most vulnerable time, when mother's gone and they still can't protect themselves.

When they are released, survival rates are close to 100 percent. Gilmartin said it's hoped the project will improve the male-female ratio over time.

Scientists in 1988 will begin an intensive program of studying seal behavior to learn more about mobbing and how to stop it.

One theory is that simply removing excess males from a population will do the trick. But before making that drastic move, scientists plan to use hormones. They'll give them to some of the male seals, to make them uninterested in breeding, thus taking them temporarily out of the sexual picture, but not out of the territory.

If evening out the population of breeding males and females reduces mobbings, then perhaps some of those males will be moved elsewhere. It may seem odd to remove some seals to get more seals, but it may be any reduction in mobbings will increase seal production, Gilmartin said. And that's better for the mammals in the long run.

He said the population of monk seals has not appreciably declined, and may have been stable for the past five years. That may be partly due to the Kure female pup project and the reduction in human disturbance because of National Marine Fisheries Service attention, he said.

It's hoped further work will allow the numbers to climb back up.

The Hawaiian monk seal, one of three tropical seal species, remains rare despite efforts to protect it. Recent reports say sharks and members of its own species are responsible for the seal's small population.

Advertiser graphic by Greg Taylor

State ocean resources management plan urged

By Edwin Tanji
Advertiser Maui County Bureau

LAHAINA — State and county lawmakers were told last night the government hasn't been doing enough to control the conflicting uses of the ocean by commercial operators.

During a public hearing called by a House committee on ocean resources, speakers supported a plan for a state ocean resources management plan to control ocean activities. But most also said any rules need to be enforced and chastised the state for not providing enforcement.

Paul Schatzkin, a charter boat operator, cited a complaint he tried to register over a jet ski operation off Launiupoko State Park. State Harbors officials told him it was under the jurisdiction of the Department of Land & Natural Resources, while Land Department officials said it was the reponsibility of the harbors division, he said.

The increasing numbers of commercial activities occurring illegally on the beaches and the conflicts on the ocean "are a distinct outgrowth of the bureaucratic confusion of who's in charge here," Schatzkin said.

He and Jim Coon, another charter boat operator, called for licensing of commercial activities on the beaches and the ocean and urged a halt on taking of coral. Their list of suggestions also included a moratorium on new commercial ocean activities, designation of more marine preserves and providing for one state agency to be in charge of enforcement.

In a similar vein, Tom Roach of the Kaanapali Beach Operators Association said plans for new rules "are fine, but they need enforcement."

Several officials from the Hyatt Regency Maui Hotel at Kaanapali, led by administrative assistant George Sano, cited problems the hotel has had with jet ski and other thrill craft operations in the waters off the hotel. Sano said he had 16 written reports on accidents involving thrill craft in which the hotel assisted the victims.

Wayne Saito, an assistant manager, added that in all 16 incidents, the thrill craft operators did not assist the injured parties, but "left them on the beach for the hotel to take care of."

Others spoke on related issues. Charlie Nalepa of the West Maui Taxpayers Association decried lack of action by state or county agencies in dealing with problems of beach access in West Maui.

Dana Naone Hall and Isaac Hall charged the county has failed to adequately protect the coastline as required by the Coastal Zone Management Act. Dana Hall said there is a problem with loss of beach access for the public, saying the problem is "the county administration ties in beach access to hotel development of the shoreline."

Charles Maxwell, a Hawaiian rights leader, said regulation of ocean activities must allow for traditional native Hawaiian rights. Use of ocean resources is "an integral part of native Hawaiian lifestyles," he said.

The hearing was the first of a series to be called throughout the state by a joint House committee. The panel is headed by Mark Andrews, chairman of the Committee on Planning Energy and Environmental Protection, and Robert Bunda, chairman of the Committee on Ocean and Marine Resources.

A second hearing will be held at 7 p.m. today at Kihei School. Andrews said additional hearings will be held on the Big Island and Oahu.

Study warns of threat to construction

By Robert Engelman
Scripps Howard Service

WASHINGTON — Rising sea levels threaten to wash away new coastal construction over the next century if developers don't plan for them, a National Academy of Sciences panel reports.

"An inappropriate choice (in locating coastal buildings) could be very expensive," said a committee of coastal engineers and geologists studying the impact of expected sea-level changes on coastal construction.

Builders of any structure expected to last 50 years or more should be particularly wary of assumptions that shorelines will stay put, the panel said.

But the committee also concluded that "there does not now seem to be reason for emergency action" and suggested that small structures like beachfront cottages are not much endangered by long-term sea rise.

"Sea-level change during a structure's design service life should be considered along with other factors," the report concluded.

Sea levels have been rising slowly since the Ice Age ended about 18,000 years ago, according to the report, and they moved up between 4 and 12 inches on average over the past century. Each inch of horizontal elevation can drive the ocean 8 feet inland on fairly level sandy ocean beaches.

The change in sea level is uneven, however, since coastal land often moves up or down irrespective of sea level.

The pace of the sea-level rise overall is expected to accelerate over the next

The Sunday Star-Bulletin & Advertiser Honolulu, September 27, 1987 A-27

from rising sea levels

century, however, as the Earth warms because of human activities. This "global warming" is predicted to result from increases in various gases — emitted by industrial processes, automobiles and agriculture — that tend to lock the sun's heat in the atmosphere.

A warmer Earth would raise sea levels because melting polar ice would release water into the oceans and because warm water expands.

The likelihood of rapidly rising oceans means that coastal developers face three options, the NAS panel said: fortify shores with seawalls, jetties and levees; manage them by replacing depleted sand; or "let nature take its course" by building or moving structures well back from the shoreline.

Jetties and seawalls only shift destructive erosion to nearby beaches, while sand management is an expensive stopgap measure, the panel concluded. The scientists called instead for retreat from shorelines "in a planned and orderly fashion," noting that some state policies already restrict new construction on seashores.

Commercial interest exists

9/21/87 A3 HA

Many uses for new ocean pip

By Jan TenBruggencate
Advertiser Staff Writer

The biggest pipeline of its kind, more than a mile long and extending nearly half a mile deep, is in place off Keahole Point.

The pipe, big enough that you could ride a toboggan in it, will be used to pump chilly sea water from 2,150 feet down to the lava flats near the Keahole Airport.

The 13,300 gallons of water per minute will be split between the Natural Energy Laboratory of Hawaii's Ocean Thermal Energy Conversion Project and the state High Technology Development Corp.'s 547-acre industrial subdivision. The subdivision is called HOST Park, for Hawaii Ocean Science and Technology Park.

Bill Bass, executive director of High Technology Development Corp., said the state hopes next year to be leasing sites in the park to commercial ventures with an interest in the cold water.

Already interested are companies that want to grow commercial microalgae like Cyanotech Inc., Maine lobsters like Aquaculture Enterprise and edible shellfish like Hawaiian Abalone Farms.

The cold deep sea water experimentally has been used to chill water that has produced trout and salmon, and the cold water has chilled the soil sufficiently that cold weather crops like strawberries have grown on the Kona lavas.

Neighbor Island News

The pipelihe that makes it all possible is 5,700 feet long, 40 inches in diameter and made of polyethylene.

Its construction is part of a $7.4 million contract between the state and Peter Kiewitt Pacific. Bass said the pipe was put together at Kawaihae and towed, floating, by barge to Keahole. It gradually sank to the bottom as water filled it. Anchors were already attached.

"The deployment of the pipe was the trickiest part," Bass said. At a depth of 600 feet the pipe floats up off the bottom, so it isn't damaged by being rubbed against rocks. Nearer the surface, it enters a channel dug in the lava.

Bass said a pumping station is now under construction on the surface, a 40-inch shallow water pipe is scheduled and the entire system should be complete by early next year.

There is no shortage of pipes into the water off Keahole. The existing Natural Energy Laboratory of Hawaii has a 12-inch deep water pipe and a 15-inch deep water pipe scheduled later this month.

Hawaiian Abalone Farms has a 15-inch deep water pipe. The new 40-incher makes four.

There are two 12-inch shallow water pipes and the coming 40-inch shallow water pipe.

Bass said the warmer shallow water has a range of uses. In Ocean Thermal Energy Conversion (OTEC), scientists us difference in temperatur tween the deep and shallo ter to run a generator produces electricity. Gr will be able to mix water the two systems to get the perature they want.

The state is spending $13 million on the new 4 pipes and the developme the HOST Park, with anoth million coming from the fe Department of Energy an state's Pacific International ter for High Technology search, which is condu OTEC research at the Na Energy Lab.

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Bass said the warmer shallow water has a range of uses. In Ocean Thermal Energy Conversion (OTEC), scientists use the difference in temperature between the deep and shallow water to run a generator that produces electricity. Growers will be able to mix water from the two systems to get the temperature they want.

The state is spending about $13 million on the new 40-inch pipes and the development of the HOST Park, with another $3 million coming from the federal Department of Energy and the state's Pacific International Center for High Technology Research, which is conducting OTEC research at the Natural Energy Lab.

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★★ Monday, September 21, 1987 A-3

Isle wildlife projects get Senate funds

United Press International

A U.S. Senate subcommittee has agreed to expand the Kilauea Point Wildlife Refuge on Kauai, according to Sen. Daniel Inouye.

The Appropriations subcommittee on the interior decided to provide $1.7 million to buy 36-acre Mokolea Point. The refuge has the highest concentration of native seabirds in the major Hawaiian islands.

The subcommittee also set aside $4 million to acquire land on the Big Island to preserve the habitat of Hawaii forest birds at the Kilauea-Keauhou Wildlife Refuge.

Also funded was $1 million for expansion of Haleakala National Park on Maui to complete fences designed to keep wild pigs out.

Other projects approved by the panel were:

- $750,000 more in the operating budget for Hawaii's wildlife refuges, including 24-hour operation of the Tern Island wildlife station.
- $250,000 to help control pigs and for other improvements at Volcanoes National Park.
- $100,000 for research by the U.S. Fish and Wildlife Service into methods of controlling infestation of brown tree snakes on Guam — and keeping them out of Hawaii.
- $500,000 for research into methanol as a fuel.

In another matter, the department has assured Inouye and the subcommittee that it will not issue leases for Pacific Ocean mining rights for at least another year.

Inouye said the one-year delay would allow time to resolve legal issues of concern to the state while allowing environmental impact studies to proceed.

In addition, Inouye said, the subcommittee decided to direct the department to work with the state in promulgating rules affecting ocean seabed mining off the Hawaiian Islands.

The panel also set aside $1.2 million to operate an ocean minerals research center at the University of Hawaii Manoa campus. Another $4 million to build the center are included in a separate bill.

Inouye said Thursday he would ask for the one-year delay in the regulatory process which may lead to mining of the ocean seabed near Hawaii. He said he wanted to make sure that the state has an adequate role in the decisions affecting coastal air and water quality.

Scientists get new lease on Tern Isle studies

Radios, tractor, boat shipped to aid researchers

By Helen Altonn
Star-Bulletin writer

A research station on Tern Island that wildlife scientists feared would be closed has received a batch of long-needed new equipment to keep it going, at least until nature intervenes.

New radios, a solar-energy system, tractor, boat and engines were shipped to the station last month by the U.S. Fish and Wildlife Service in Honolulu.

"The equipment has been installed and has improved the safety and livability of the island," said Allan Marmelstein, Pacific Islands administrator of the service.

Tern Island is 500 miles northwest of Oahu in French Frigate Shoals. It is the only base for researchers in the Hawaiian Islands National Wildlife Refuge. The runway also is used to evacuate ill or injured fishermen from ships working in the northwestern waters.

THE SERVICE was considering closing the year-round manned facility because of high maintenance costs and budgetary problems. With the help of Sen. Daniel Inouye, a $200,000 appropriation was provided to maintain the station and make it more efficient, Marmelstein said.

But if the seawall falls apart or a storm wipes out the runway, "we're out," he said. "That could happen this year, or in 50 years."

Marmelstein said the wildlife service is negotiating with the National Marine Fisheries Service for assistance in maintaining the station. NMFS scientists use the facilities for studies of endangered Hawaiian monk seals and green sea turtles.

George Boehlert, with the NMFS Honolulu Laboratory, said he has written a letter to the wildlife service suggesting that the agencies get together to discuss how they can help one another for research efforts.

He said the laboratory's research ship Townsend Cromwell provides "significant assistance" by transporting people and equipment to Tern.

Tern Island was used by the U.S. Coast Guard for a navigation facility until 1979 when it was turned over to the Interior Department.

The research station is an outgrowth of a state-federal study of the Northwestern Hawaiian Islands' resources and fishery potential, Marmelstein said.

It was decided to keep the facility for wildlife studies, but there was never any appropriation for the operation, he said. "We did it by hook or by crook, within our budget."

HE SAID TWO new biologists recently were assigned to Tern for a two-year term, and it's hoped they will have time for research.

Up to now, biologists stationed there "have been doing 110 percent maintenance," he said. "It was getting harder and harder to find biologists to do maintenance."

Other researchers also will benefit from the new equipment, said Stewart Fefer, manager of the Hawaiian Islands refuge.

The station was using old radios and boats that weren't reliable, and scientists had to be delayed or restricted from doing their research, he said. It seemed like their work was being hampered but it was for their safety, he said. "The new equipment will allow for more cordial relations."

Fefer said the equipment improves communications and will make the Tern operation less costly. In the past, the service constantly had to send tractor, radio and refrigerator technicians there to maintain the equipment, he said.

TWICE THIS YEAR, he said, someone was flown in to work on the tractor, which is essential to keep the runway clear of grass and debris that washes over it in heavy rains. The island is no more than 10 feet above sea level.

Fefer said solar power will eliminate the need to deliver diesel fuel to Tern, which is expensive and dangerous to the wildlife preserve because of possible spills.

Improvements to the building to prevent leaking also are planned, Marmelstein said.

However, he noted that the seawall that went up when the island was constructed by the Navy in World War II is eroding.

If it isn't replaced, the runway could be wiped out, putting an end to the station, he said. But a new seawall would cost about $5 million and involve a lot of heavy equipment, people and disturbance to the wildlife habitat, he pointed out.

"What do we do? There is going to be lots of discussion. . . ."

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Environmental Update

Studies unclear if Isle fisheries affect seabirds

By Jan TenBruggencate
Advertiser Staff Writer

8-1-88

The seabirds of the Northwestern Hawaiian Islands have a broader range of sealife in their diets than many of their relatives in colder climates.

That might mean human overfishing of a specific species would not seriously affect them. Presumably they could make it up by eating other things.

But studies suggest there are already food limitations for some species.

On the other hand there is also a theory that commercial fishing of certain large fish could increase the amount of food available for seabirds by reducing pressure on the smaller fish eaten by both the birds and the big fish.

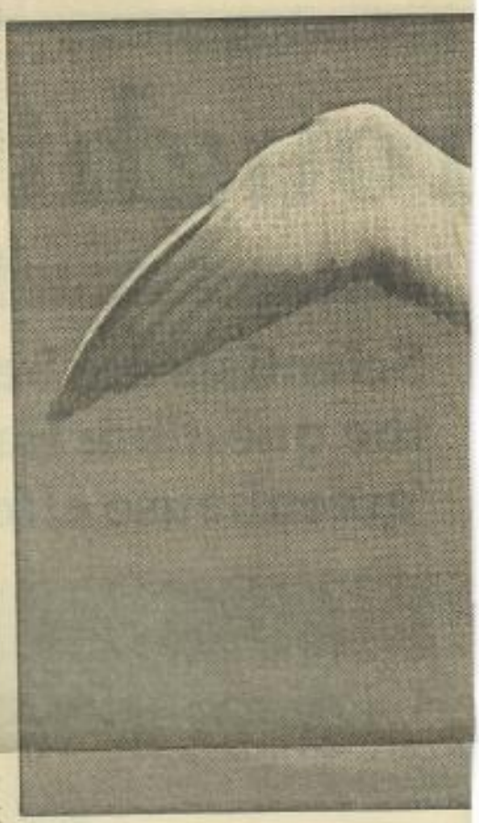
A major study in seabird feeding indicates that the range of foods eaten by Northwestern Hawaiian Islands birds is broad. But the study also shows the behavior of many bird species is affected by the availability of food.

A third of the species can't catch much to eat unless predator fish like tuna are present to drive the food fish to the surface. When the predators are missing, times are hard. Reduce the number of certain migratory tuna through overfishing, and you might damage the birds' food supply.

For several Northwestern Hawaiian Islands seabirds, the biggest part of their diet is made up of squid and *mahimahi* or flyingfish. But during parts of the year, when water temperatures are cooler, some common squid aren't around, and *mahimahi* are scarce.

The study was published in 1983 by The Wildlife Society. It was prepared by scientists Craig S. Harrison, Thomas S. Hida and Michael P. Seki and funded by the U.S. Fish & Wildlife Service and the National Marine Fisheries Service.

The researchers and associates actually captured hundreds upon hundreds of seabirds and forced them to regurgitate their latest meals. The material thus collected was preserved and later identified. In many case, only things like fish bones and squid beaks were left, but the team members often were able to identify at least the family from which food came.



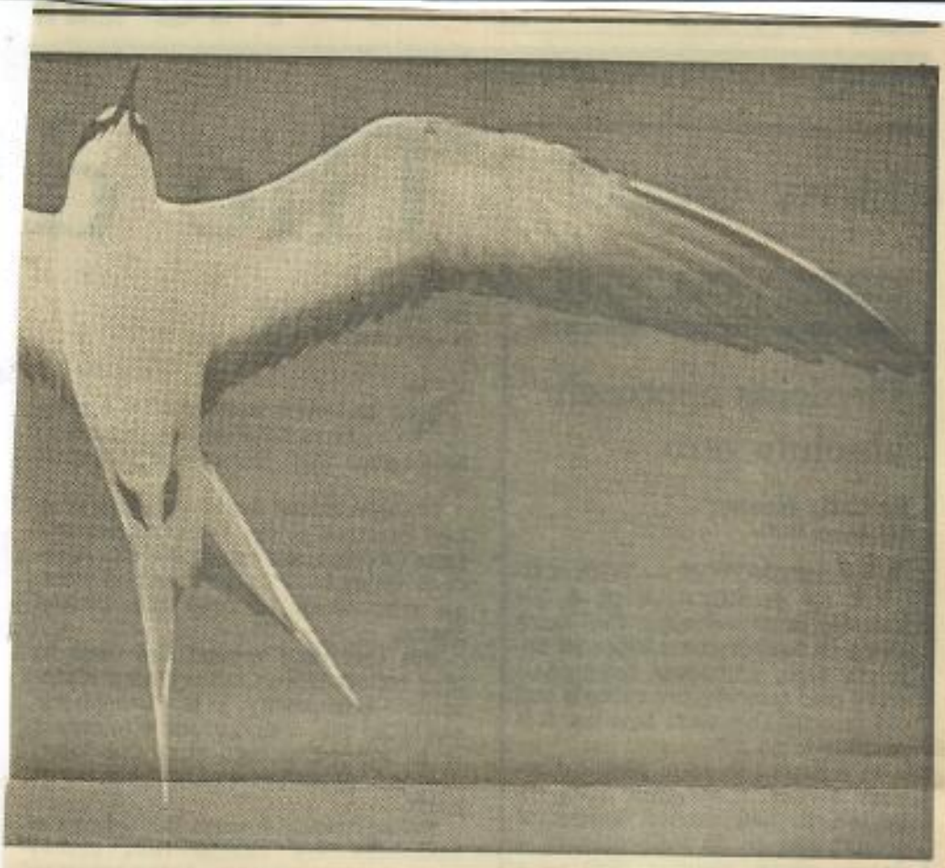
Sooty tern in flight over Laysan Island.

They found that the 18 different kinds of seabirds on the islands out to the west of Kauai and Niihau eat members of 56 families of fish, 8 families of squid and 11 groups of crustaceans.

The birds are numbered in the millions. They include 2 kinds of albatross, 3 petrels, a pair of shearwaters, the red-tailed tropicbird, 3 boobies, 3 terns, 3 noddies and the great frigatebird. Most of them are found on all the sandbars, islands and atolls of the Northwestern Hawaiian Islands, which run from Nihoa, a few hundred miles west of Kauai, to Kure, more than 2,000 miles out and the northernmost coral atoll in the world.

When Hawaii fishing boats encountered reduced yields in the main islands, many moved west, and found lobsters, snappers and other marketable fish in abundance.

There is a complex web of connections in the food chain. Some sea creatures spend their early lives floating as plankton and become the food of many others. Later, those species might become predators themselves. The managers of the Northwestern Hawaiian Islands National Wildlife Refuge worried that fishing pressure



David Marshall photo

Such sea birds will eat anything in the right size range.

could alter the balance of the food chain, and potentially change the biology of the seabirds.

The study found that most of the birds will eat most anything that's available in the right size range, which for most runs from very small up to about a foot in length.

But it also found that the birds are able to find less food in the winter months. Most of the birds don't produce their young during those months.

The authors studied two theories: that most birds nest during the spring to fall because it's when they can get enough food; or that they don't nest in winter because breeding is inefficient during that period.

They concluded that food was the important factor, since a couple of the birds do nest through winter months without much difficulty.

"The surge in available prey during spring-summer because of spawning activities and tuna migration is a controlling factor for the regular spring-summer breeding periods," they said.

For some of the winter-breeding species, it looks like they breed then because it's they only time they can. There is tough competition for nesting space by millions of birds on small islands.

"It is likely that Bonin petrels and sooty storm-petrels are forced to breed during winter because of competition for nest sites by the larger wedge-tailed shearwaters and Bulwer's petrels. Wedge-tailed shearwaters arriving on Laysan in spring kill juvenile Bonin petrels and sooty storm-petrels and cast them from their burrows," the authors said.

They said black noddies appear able to breed throughout the year because they are able to feed in conjunction with inshore predatory fishes that drive smaller fishes to the surface during winter.

In another paper published last year by Cambridge University Press, Harrison and Seki said it's difficult to determine the effect of commercial fishing on seabirds.

One positive sign, noted in studies of birds and fishing in the North Sea, is that there might be more food for the birds if commercial fishing takes large species that eat the same smaller fish the birds eat.

Neither the 1983 nor the 1987 report gives specific recommendations about fishery development, but they form tools decision-makers can use to help determine the effects of promoting specific commercial fisheries.

City hosting marine

By Jim Borg
Advertiser Science Writer

Internationally acclaimed ocean pioneers will gather in Honolulu this week for an unprecedented look at state-of-the-art marine technology and resource development.

The meeting is sponsored by the National Science Foundation, the University of Hawaii College of Engineering and organizations in Europe and Taiwan. It has drawn some of the top names in undersea exploration to discuss sonar mapping, submarine robotic systems, seabed mining and ocean-thermal energy conversion.

The International Ocean Technology Congress will focus on technology available to find and recover resources in the 200-nautical-mile exclusive economic zones claimed by coastal nations.

"As far as I know, this is the first meeting of its kind," said Paul Yuen, dean of the UH College of Engineering. "There have been a number of conferences on ocean science. This is the first one on ocean technology and engineering."

Among the participants will be K.T. Li, credited with leading Taiwan's economic revolution; ocean explorer and author Sylvia Earle; Jean-Louis Michel and other scientists from the French Institute for Marine Research (IFREMER); James McFarlane of International Submarine Engineering, Vancouver; and Dana Yoerger of Woods Hole Oceanographic Institution in Massachusetts, who developed the "Jason Jr." cable-controlled robot camera that explored the Titanic in 1986.

Hawaii participants include Alexander Malahoff, director of the Hawaii Undersea Research Laboratory; John Craven, director of the Hawaii-based Law of the Sea Institute and former chief scientist of the Navy's Polaris and Deep Submergence Systems programs; and Patrick Takahashi and Harry Olson of the Hawaii Natural Energy Institute.

The conference at the Hawaiian Regent Hotel is also sponsored by IFREMER, the European Economic Community and the Industrial Technology Research Institute in Taipei. The Soviet Union, Japan and China also are participating.

Exclusive economic zones extending 200 nautical miles (230 statute miles) from low-tide marks were established by the 1982 U.N. Law of the Sea Convention.

The United States, unhappy with the convention's seabed mining provisions, has not signed the agreement. But in 1983 President Reagan proclaimed U.S. rights to resources within its own 200-mile ocean boundaries.

The U.S. Geological Survey and National Oceanic and Atmospheric Administration have already begun to map the U.S. Exclusive Economic Zone (EEZ), including Hawaii's, with sophisticated sonar.

Hawaii has the second largest EEZ of any state, behind Alaska.

The state and federal government claim that the entire Hawaiian chain, from the Big Island to Kure and Midway atolls to the northwest, is a single huge EEZ that carries exclusive rights to sealife, seabed minerals such as manganese and cobalt and other resources, including energy from ocean heat.

But the 1982 agreement states specifically that "rocks which cannot sustain human habitation or economic life of their own" generate 12-mile territorial seas, not EEZs.

Many of the outcroppings between Niihau and Midway are clearly rocks, according to University of Hawaii law professor Jon Van Dyke.

However, the language of the agreement is confusing, since an EEZ is generated by an island, defined as a "naturally formed area or land, surrounded by water, which is above water at high tide." Many of the Northwestern Hawaiian Islands would qualify as islands under that definition.

If, under one interpretation, an island needs a stable human population to generate an EEZ, only Midway, which has a U.S. naval installation, and possibly Kure and Tern Island would

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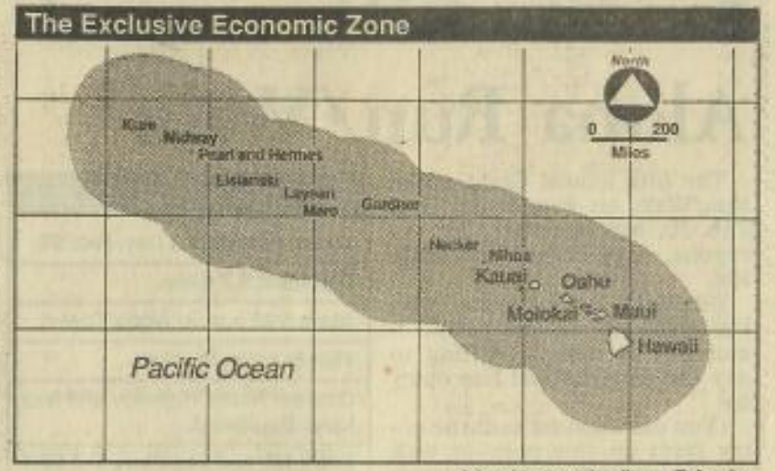
generate EEZs, says Van Dyke. Kure has a Coast Guard navigation station and Tern Island, part of French Frigate Shoals, has U.S. wildlife researchers.

"Although the other islands are visited periodically, no stable populations have lived on any of the others in modern times," Van Dyke wrote in a recent issue of the San Diego Law Review. The article was co-authored with Joseph Morgan, UH associate professor of geography, and Wailuku lawyer Jonathan Gurish.

Even Tern and Kure could be excluded if their populations, supplied by plane, are not interpreted as "stable," they said.

Eliminating 200-mile zones around all the islands but Midway — that is, Nihoa, Necker, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan and Lisianski islands, Pearl and Hermes reefs and Kure — would reduce the northwest Hawaiian EEZ from 587,000 square nautical miles to 167,000, the authors said.



Advertiser map by Jimmy Takamiya

Hawaii's exclusive economic zone is 587,000 square nautical miles.

Coast Guard aids stricken Chinese ship

Associated Press A5 11/14/90 THA

A Coast Guard cutter last night was sailing through stormy winds and 25-foot seas to aid a Chinese cargo ship taking on water at French Frigate Shoals, about 400 miles northwest of Honolulu.

A spokesman said the cutter Firebush was estimated to arrive by mid-morning today.

The Alaska-based cutter was headed north from Hawaii when it was diverted Monday to help the Chinese freighter Mei Gui Hai.

The 635-foot freighter has 39 crew aboard and was carrying 39,000 pounds of the powdery chemical barium sulfate. It reported three hull fractures and had been taking on water for seven days.

The spokesman said the crew was reported in good shape last night despite stormy weather. Once the cutter reached the Chinese ship repair work would wait for better weather, he said.

A salvage tug out of Honolulu, the Tillamook, and the merchant freighter Lucky Field both were standing by near the Chinese vessel to be of assistance in case the situation worsened, said a Coast Guard spokesman.

Coast Guard aids stricken Chinese ship

Associated Press A5 11/14/90 THA

A Coast Guard cutter last night was sailing through stormy winds and 25-foot seas to aid a Chinese cargo ship taking on water at French Frigate Shoals, about 400 miles northwest of Honolulu.

A spokesman said the cutter Firebush was estimated to arrive by mid-morning today.

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POLICE

Kailua man, 36, critical after motorcycle crash

A 36-year-old Kailua man was seriously injured last night in a motorcycle accident at Kuulei Road and North Kalaheo Avenue.

The victim, who was taken to Castle Hospital, is in critical condition with head injuries. Police said speed and alcohol may have been factors in the accident.

The victim's motorcycle apparently skidded out of control after he tried to stop suddenly.

Damaged China freighter anchored 400 miles away

A damaged freighter carrying 39,000 pounds of barium sulfate from China to New Orleans is waiting out a storm at French Frigate Shoals, about 400 miles northwest of Honolulu.

The Mei Gui Hai, with a crew of 39, has three holes in the hull and is taking on 300 tons of water an hour.

Coast Guard Lt. Kent Youel said the ship's pumps are pumping out the water. The 635-foot freighter is anchored near the shoals.

The salvage tug Tillamook from Honolulu and the freighter Lucky Field are close enough to assist the boat.

The Coast Guard's 180-foot buoy tender Firebush, which was on its way back to Alaska after training exercises in Hawaii, is en route to the shoals.

Islands: Northwestern H chain is returning to the h

FROM PAGE 1

forward logistical supply port," and gets a lot of non-military use. It refuels transiting aircraft, and is a central point for ocean rescues and such things as transfers of injured fishermen and sailors.

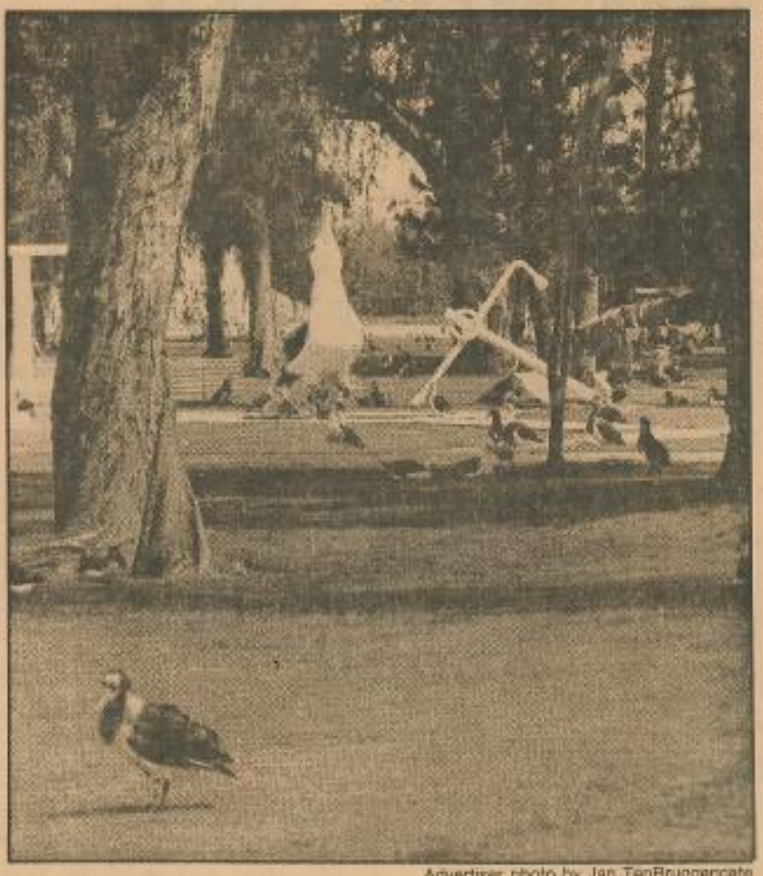
Van De Voorde said it is also an "overlay" wildlife refuge. The Fish and Wildlife Service keeps two people permanently stationed on Midway, who keep track of its bird, seal, turtle and other wildlife populations.

The Fish and Wildlife Service controls all the other islands and atolls between Niihau and Midway. And the remaining Northwestern Hawaiian Island, Kure, beyond Midway, is in the process of being transferred from the Coast Guard to the control of the state Division of Forestry and Wildlife.

Wildlife is the key to the Northwestern Hawaiian Islands.

Indeed, the wings of a bird, or the flippers of seals and turtles may be the most efficient ways to travel to these isolated spots. Most have no airstrips, and some can't even support boat landings.

It's 134 miles from Niihau to the first of these places, Nihoa. Then 180 miles to the next, Necker. Another 100 miles gets you to French Frigate Shoals, 137 more to Gardner Pinnacles



Advertiser photo by Jan TenBruggencate

Layson albatross statue on Midway island.

land being little more than sand bars that change with the seasons. Maro Reef is awash.

Barring the reactivation of Midway by the Navy, the fu-

"We find evidence of campfires. The worst case scenario is the people get out to those islands and run around and crush the (ground-nesting birds') burrows without know-

Hawaii birds

pele native plants, like a bunch grass that native birds use for food and nesting. It also appears to prevent burrowing by birds that produce their young in holes in the ground.

McDermond has teams trying to wipe it out, a tough job since each rain causes new seeds to sprout.

In order to support teams of researchers and to maintain a presence in the refuge, the Fish and Wildlife Service keeps personnel full time at Midway and at Tern Island on French Frigate Shoals.

Tern was a sandbar that was expanded during World War II to hold a small runway and some buildings. Today, the steel plates that were pounded into the sand to support the perimeter of the island are rusting and collapsing, and if Tern Island is to be kept operational, it will need major repairs. Even if the service wanted to walk away from it, it would need major work, since the rusting steel is a hazard to wildlife.

Hawaii birds

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Leinecke said the Corps of Engineers is now considering long-term options, aiming at finding a low-maintenance way to stabilize the island's contours, leaving it accessible to the seals and turtles. No matter what the option is, it is expected to be expensive, and will require strong support from the public and the Congress, he said.

The service sends food, equipment and sometimes rescued wildlife out to Tern every 4 or 5 weeks on a chartered, small two-engine plane. Crews on the other islands are served by boat, either a passing government-owned boat on a scientific mission, or a chartered fishing boat.

As an example of the difficulties in managing such a system, when a scientist recently became ill on Laysan, it took 0 hours to get a Coast Guard hip to the island to pick her p, and deliver her to Tern, here a plane was dispatched make the flight to Honolulu.

The Fish and Wildlife Serce tries to monitor bird popuions at least annually on ch of the islands, and conets full-time reproductive ocess studies at Tern Island.

"When you're monitoring birds, you're really monitorg the health of the ocean to certain extent," McDermond d.

Islands: Northwestern chain is returning to the

FROM PAGE 1

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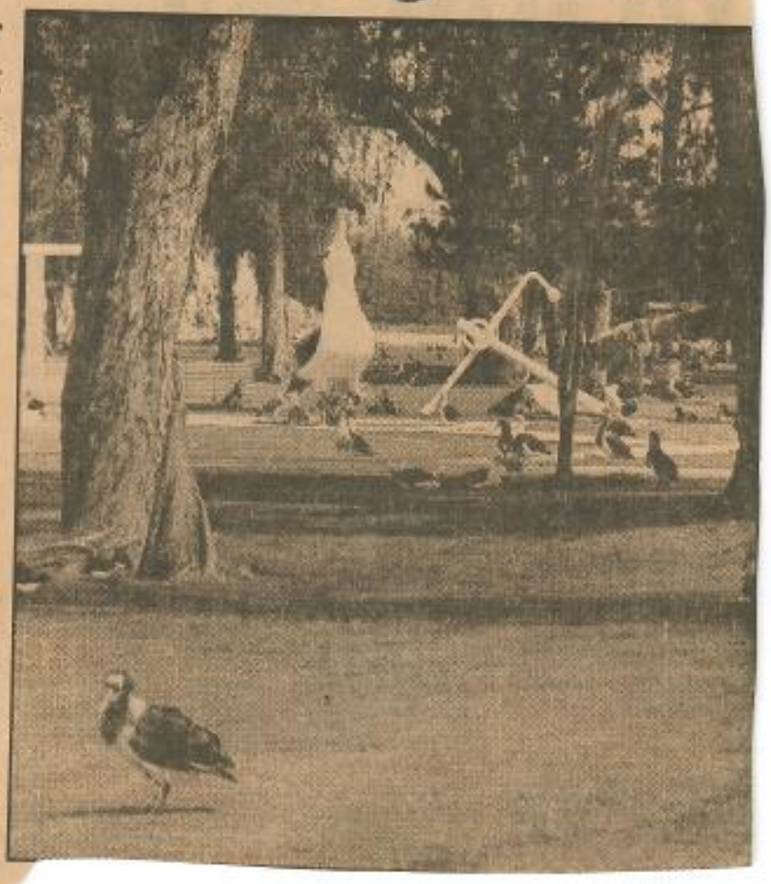


Advertiser photo by Jan TenBruggencate

Layson albatross statue on Midway Island.

It's 134 miles from Niihau to the first of these places, Nihoa. Then 180 miles to the next, Necker. Another 100 miles gets you to French Frigate Shoals, 137 more to Gardner Pinnacles, and 156 to Maro Reef.

From Maro, the channel is 66 miles to Laysan, then 137 miles to Lisianski, 163 to Peark and Hermes Atoll and 87 miles to Midway. From there, it's another 57 miles, just over the horizon, to Kure.

The State of Hawaii maintains that all the islands and reefs except Midway are part of the state. But the state actually owns only Kure. The Navy owns and the federal government maintains political control over Midway. The Fish and Wildlife Service owns the rest, but the state claims it's within state jurisdiction and they fall within the City and County of Honolulu.

This confusing mass of claims covers a little more than three square miles of actual firm land. Nihoa and Necker are small high islands, and there are volcanic rock pinnacles at French Frigate Shoals and Gardner. The rest are atolls, big areas protected by fringing reefs, with the dry land being little more than sand bars that change with the seasons. Maro Reef is awash.

Barring the reactivation of Midway by the Navy, the future of these islets and atolls is the protection of their native inhabitants, the plants, the birds, the fishes, the turtles and seals, and the rest.

Michael Buck, head of the state Division of Forestry and Wildlife, which will have control over Kure, said his concept for its management is to leave it mostly alone. Teams will visit periodically to conduct bird counts and to control the rat population, but Buck said he feels the birds, seals and turtles will benefit most by the absence of humans.

For the most part, the job of the Fish and Wildlife Service is also to see that the creatures are left alone, said Jerry F. Leinecke, deputy complex manager for the service. Unfortunately for the creatures, that means there need to be some managers around, because the service has found that trespassing is a problem if there's no agency presence on the islands. Even with people there, it happens.

"We find evidence of campfires. The worst case scenario is the people get out to those islands and run around and crush the (ground-nesting birds') burrows without knowing what they're doing," said Ken McDermond, manager of the Northwestern Hawaiian Islands National Wildlife Refuge.

The islands and atolls are closed to the public. You need a good reason and a permit to visit, and that pretty much limits things to scientists.

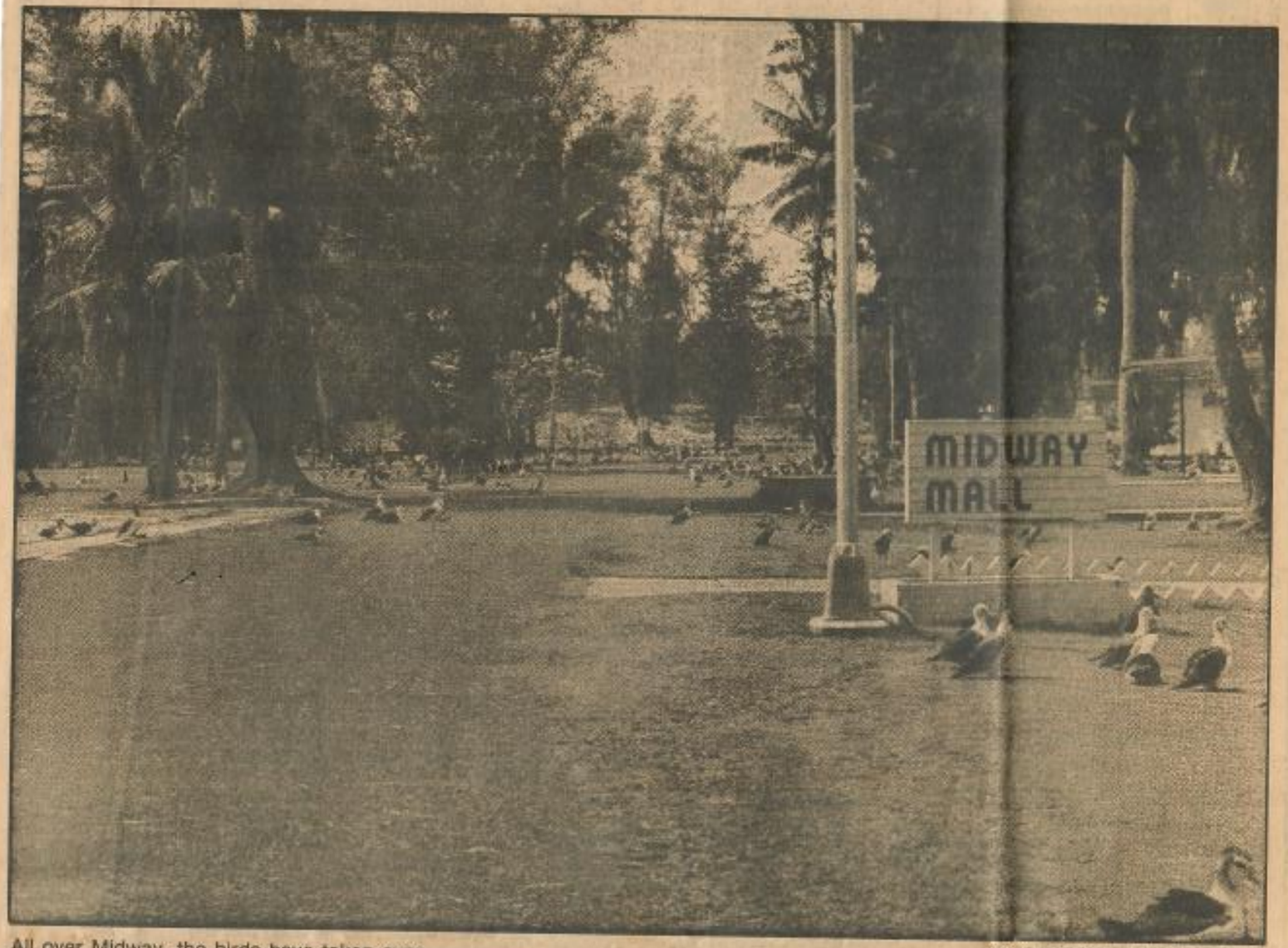
Some, like the teams from the National Marine Fisheries Service, study the endangered Hawaiian monk seal and green sea turtle populations. Others, like professor Sheila Conant, of the University of Hawaii, study birds. Conant left this week for her annual survey of the Nihoa finches.

McDermond said the agency finds itself attempting to cure environmental crises, like the appearance of an aggressive sandburr on Laysan. It may have arrived as a burr stuck to the trousers of a scientist or trespasser, but it's now covering a quarter of Laysan's limited land area.

The burr appears to outcom-

Health/Science

Prepared by the staff of The Honolulu Advertiser



All over Midway, the birds have taken over.

Advertiser photo by Jan TenBruggencate

SUNDAY, Aug. 9, 1992
Sunday Star-Bulletin & Advertiser

The ghostly northern islands of Hawaii

THE MEDICINE CHEST

Advertiser News Services

Why it's not a good idea to sunbathe without a top

"Don't do it," pleads dermatologist Dr. Michael Jacobs, addressing all you women who are planning to whip off your bikini top to get that all-over sun-kissed glow.

The main argument, predictably, is a heightened vulnerability to skin cancer.

Says Dr. Darrell Rigel, an associate professor at New York University Medical Center: "Skin that has not been previously exposed is much more sensitive, more prone to burning and therefore a high risk area for skin cancer."

Rigel drives home his advisory note ("medical, not moral") by describing the pain, discomfort and irritation most women can expect from allowing the ultra-violet light penetrate this virgin territory.

"Many women notice that the parts of their body that tend to burn most are those right next to the edges of their bathing suit, where the skin usually isn't exposed to the sun.

"When you expose a very sensitive area, like your breasts, you'll need the highest protection factor you can find. But think about your nipples — they're even more sensitive than the rest of the breast because of the many nerve endings located there. You'll need to have a wall — as opposed to a filter or block — to protect them.

"If you don't use a barrier on your nipples, like zinc oxide, you may suffer from swelling, and even blistering."

To the undaunted — who, despite probable pain and possible illness, still plan to go for gold on top, both dermatologists suggest a sun protection factor of 30.

They also advise women to cover up between the hours of 10 a.m. and 3 p.m., when the sun's rays are most intense.

Finally, if you are sunbathing topless, make sure that, in addition to checking your breast tissue for lumps, you check your breast skin for any change in the shape or size of moles, freckles or skin discoloration which often signal the onset of skin cancer.

For information on skin cancer, you can call the American Cancer Society at 1-800-ACS-2345.

French Frigate Shoals, above, and Kure Atoll, below, remain little more than landing strips for wayward planes. Kure was recently closed and abandoned to the birds.

Advertiser graphic by James Takamiya

Advertiser photo by Jan TenBruggencate

Laysan albatrosses remain the biggest traffic hazard on abandoned Midway roads.

By Jan TenBruggencate
Advertiser Environment Writer

MIDWAY ATOLL, Northwestern Hawaiian Islands — It's downright ghostly, walking down the paved streets of Midway.

Here are the apartments, the offices, the barracks, the Midway Mall, the bowling alley, the golf course. This place has all the facilities of a bustling, tropical military base.

But where are the people?

The apartments, offices, barracks, the mall, golf course and all the rest of the island are covered by birds. The only endangered species appears to be humans.

Midway is looking more and more like the rest of the Northwestern Hawaiian Islands, that string of islands that extends 1,200 miles beyond Kauai and Niihau. Every one of them is now, under one jurisdiction or another, a wildlife refuge.

Midway gained fame in World War II as the site of one of the war's biggest air and sea battles. It became a major mid-Pacific Navy base, housing thousands of troops, and ships, and planes.

Today, the base is a ghost town.

Navy Lt. Jim Van De Voorde, assistant resident officer in charge of Midway, said the island remains a naval air facility, but is minimally staffed. There are eight military personnel and about 200 employees of contractor Base Services Inc., a subsidiary of ITT. The contractor maintains the base, fuels visiting aircraft and performs other services.

"Midway is still valuable as a

See Islands, Page 3

A refuge for wildlife in the outermost islands

by Sally-Jo Bowman
Special to The Times

Biologist Beth Flint sat on the fat bow of a Zodiac, watching for the right swell.

She had already spent 20 hours on an 80-foot fishing vessel, so a few more minutes bobbing in the little rubber boat hardly mattered. As a wave receded she leaped for the rocky shore.

Her landfall was Hawaii. But the island is Nihoa, 175 miles beyond the farthest Hawaiian shore most travelers ever see.

The major populated islands of Hawaii are household names – from the Big Island of Hawaii to Kauai 300 miles northwest.

But beyond lies a 1,200-mile string of atolls, shoals and pinnacles called the Northwestern Hawaiian Islands. Eight of them, with the waters around them for 50 miles, form the Hawaiian Islands National Wildlife Refuge.

On both Nihoa and Necker, closest to Kauai, the remains of ancient houses, terraces and temples attest to a time when Hawaiians visited or lived on the steep, rocky islands. Now they're rookeries for dozens of species of birds.

French Frigate Shoals, at an elevation of 6 feet, is the only place in the Northwestern islands with buildings and a landing strip, leftovers of the military. Here the endangered Hawaiian monk seals give birth to their pups and the rare green sea turtles nest.

Only Nihoa, highest at 910 feet, has a Hawaiian name. The islands beyond commemorate sailing disasters or sea captains: Gardner Pinnacles, Maro Reef, Laysan and Lisianski Islands, Pearl and Hermes Atolls.

The atolls are nearly flat, the pinnacles are terribly steep.

Geologically they are the oldest Hawaiian islands, volcanoes that breached the sea surface some 25 million years ago but are now worn down to nubs by the grinding forces of wind and sea.

The treeless havens for seabirds, seals and turtles are among the most isolated spots of land in all the world.

> 'These specks of land support birds who spend most of their lives over a million square miles of deep water. But they have to breed on land. And here – 200 acres total – is where they come.'
>
> **Beth Flint**

Beth Flint, a wildlife biologist for the U.S. Fish and Wildlife Service which shares jurisdiction for the islands with the U.S. Marine Fisheries Service and the state of Hawaii, calls the Northwestern Hawaiian Islands "the ultimate wilderness."

Her respect for their biological function as a breeding ground for many species that multiply nowhere else in the world is boundless.

Flint has a pair of boots she uses only on Nihoa, lest she carry a foreign seed on the soles. Before a trip to any of the islands, she freezes her clothes and equipment for days to ensure no outside insects will live to hitch a ride.

"These specks of land support birds who spend most of their lives over a million square miles of deep water," she says. "But they have to breed on land. And

Please see next page

Continued from previous page

here – 200 acres total – is where they come."

The islands are so tiny "there are animals everywhere. To walk even a few steps is not without consequence. You step on eggs and flush birds from nests without meaning to. You can block a burrow or the path to a nest with your tent."

And it's noisy. "The birds call all night," Flint says. "They moan, clack, wail, yap. Eventually you habituate to the noises."

On East Island at French Frigate Shoals, the spring turtle nesting season from April through June coincides with monk seal birthing.

Though the turtles spend much of their lives at sea, to lay eggs the females seek sandy beaches where they can dig suitable pits. In years gone by they nested on the major Hawaiian islands, but have been driven northwest by encroaching civilization.

The monk seals are loners – some say their hermit-like habits account for their name. But although they are aloof from other seals, on East Island they often snuggle ashore with turtles.

The seals – and the sharks – play an important role as top predators in the fragile island ecosystem, says Bill Gilmartin of the National Marine Fisheries Service in Honolulu.

"Disturbing the islands in any way affects the whole environment," he says.

With only about 200 seals left, he's concerned. His program carefully monitors births and moves females to encourage healthy mating.

Other seal problems Gilmartin faces include fishing nets and a crumbling sea wall at French Frigate Shoals. Seals get caught in both.

But what is saving the habitat is that the Northwestern Islands are so far from developed Hawaii they aren't an economical commercial fishery. And the seals are an attractive species that the public willingly supports.

Gilmartin makes the arduous trip from Honolulu by small plane or chartered boat at least once a year.

"It's hot. There are flies and ticks. There's no shade, " he says. Landings are precarious, sometimes impossible.

Gilmartin could sit in his Honolulu office and let someone else go monitor seals. But the Northwestern Hawaiian Islands are remote and alluring. What Gilmartin loves best: "You can sit and really think."

■ Sally-Jo Bowman is a freelance writer from Eugene, Ore.

Travel trivia

Q. What U.S. city is on almost the same latitude as Mexico City?

A. Hilo, on the Big Island of Hawaii (19 degrees 42 minutes North). Mexico City's latitude is 19 degrees 25 minutes.

Kauai refuge offers a glimpse of islands' wildlife

by Sally-Jo Bowman
Special to The Times

Travel to the Northwestern Hawaiian Islands is by special permission, for education or research only.

But visitors to Hawaii can see and learn about many of the Northwestern islands species at Kilauea Point National Wildlife Refuge on the craggy, northernmost tip of the island of Kauai.

At the refuge, visitors can get a rare, close-up look at some of the Pacific's seabirds.

HAWAII '92

Large colonies of wedge-tailed shearwaters and red-footed boobies nest around the refuge.

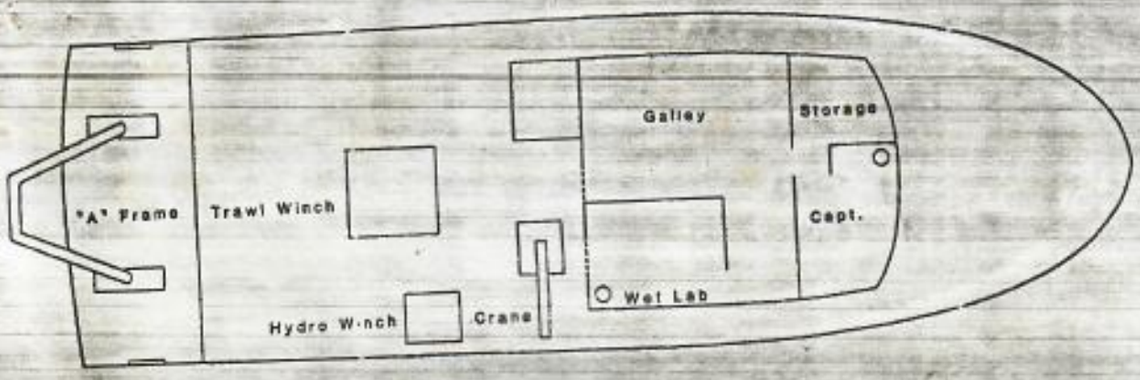
Other species in the area include the Laysan albatross, the great frigatebird and the red-tailed tropicbird.

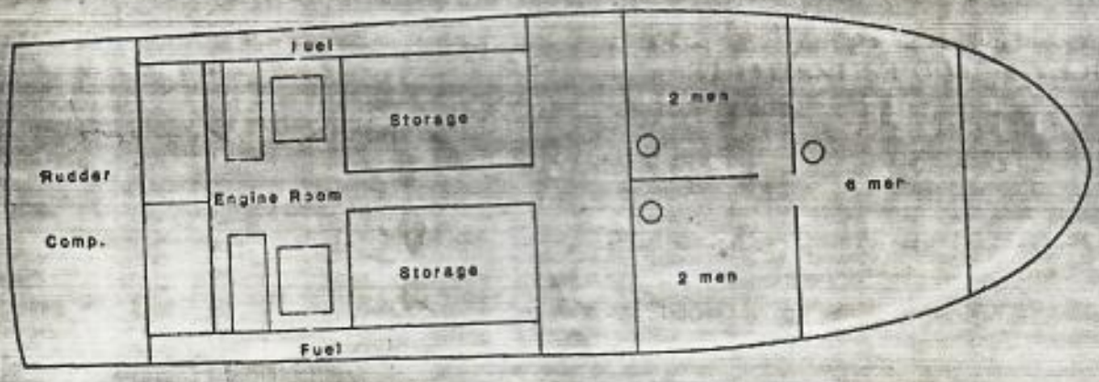
The Kilauea Point lighthouse (no longer in use) was built in 1913 and is on the National Register of Historic Places.

Hours are 10 a.m. to 4 p.m. daily. Cost is $2 per family.

A two-hour guided hike along the Crater Hill coastline is available Monday through Thursday at 10 a.m. Group size is limited.

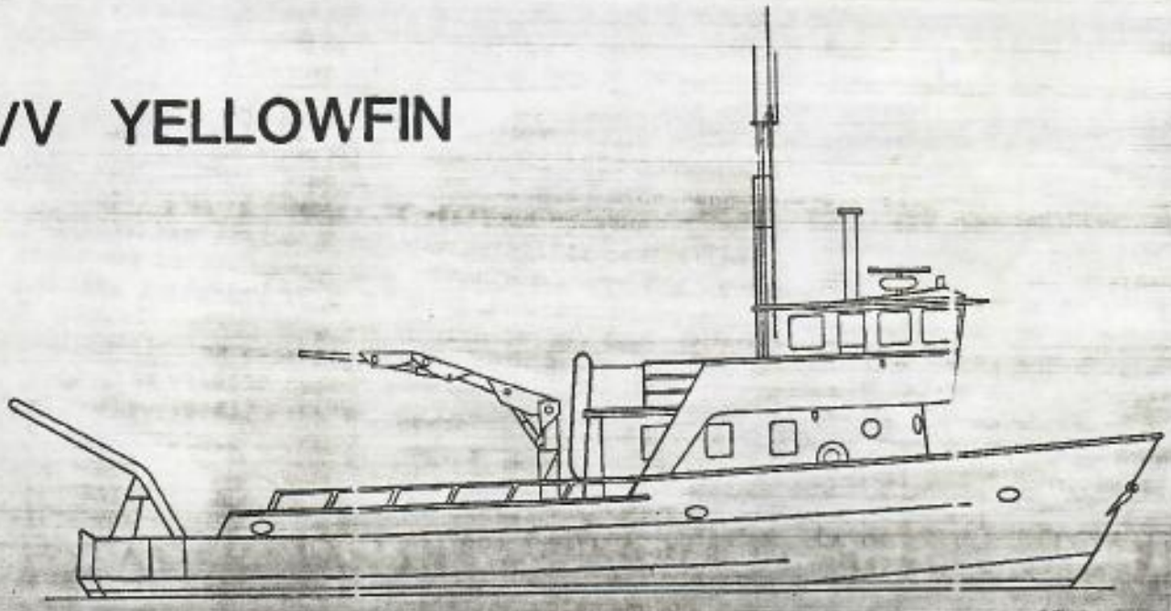
Call the visitor center at 1-808-828-1520 for more information.

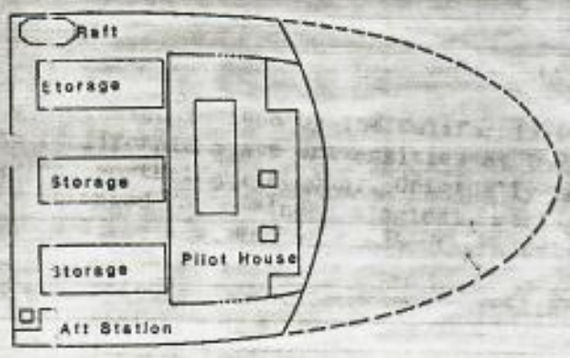




THE R/V YELLOWFIN is designated an oceanographic research vessel by the U. S. Coast Guard and is documented for coastwise and registry trade. The crew holds U. S. Coast Guard and FCC licenses.

R/V YELLOWFIN





LENGTH: 76 feet BEAM: 24 feet DRAFT: 8.5 feet
CRUISING SPEED: 8.5 knots FULL SPEED: 10 knots DISPLACEMENT: 123 long tons
FUEL CAPACITY: 4,000 gallons RANGE: 2,000 nautical miles ENDURANCE: 10 days
COMPLEMENT: 5 crew, 6 scientists GALLEY: Seating for 6

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ENGINES: Two 871 GMC d[illegible]sel engines
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COMMUNICATION: Stephe[illegible] 222 single side band radiotelephone; Raytheon 53 VHF radiotelephone; public [illegible]dress loud speaker
NAVIGATION: Magnavox Sa[illegible]-fav satellite navigation; Furuno LC90 Lora[illegible] C; Raytheon 64-mile radar with varia[illegible] range marker; JRC Color Echo Sounder (990 fathoms); autopilot; recording fa[illegible]ometer; magnetic compass
HOISTING GEAR: Drag W[illegible]ch with 15,000 feet of 7/16" 3x19 torque balanced wire rope (winch lifting capacity [illegible],000# at mid-drum); Hydrowinch with 5,000 feet of 5/32" wire rope and 1,600 feet [illegible]f 12mm 14-conductor electromagnetic cable (winch lifting capacity 500#); Hiab 55 [illegible]rane with lifting capacity 2,400# at 16.5 feet; Stern A-frame (maximum lifting [illegible]acity 2,400#) with 15 foot vertical and 9 foot horizontal clearance
LABORATORY: Running sea[illegible]er facilities; freezer
AFT SPACE: Working spa[illegible]e aft 600 square feet; 2 live wells, each with 1,200 gallon capacity
SCIENTIFIC EQUIPMENT: Multi-parameter probe system (conductivity, salinity, temperature, depth, di[illegible]solved oxygen, pH, turbidity, redox potential); Rosette sampler; MiniRover MKI [illegible]otely operated vehicle

The **YELLOWFIN** was purchased in 1986 by The California State University for the Ocean Studies Institute (California State Universities at Dominguez Hills, Fullerton, Long Beach, Los Angeles, Northridge, Pomona). Originally designed for fisheries research, the vessel is equipped for marine biological, geological and oceanographic sampling missions in the nearshore waters of the Southern California Bight.

The Ocean Studies Institute is committed to maintaining and improving the vessel's capabilities to assist OSI members and non-member users in utilizing advanced instructional and research technology.

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Journal of the
Hawaii Audubon Society

For the Protection of
Hawaii's Native Wildlife

VOLUME 46, NUMBER 2

AUGUST 1985

Observations of Hawaiian Monk Seals on Necker Island, Northwestern Hawaiian Islands

by Sheila Conant

The Hawaiian Monk Seal *(Monachus schauinslandi)* is an endangered species, endemic to the Hawaiian archipelago and limited in its breeding distribution to the Northwestern Hawaiian Islands (Kenyon and Rice 1959). Studies of the species in recent decades have reported major breeding populations or colonies on the six outermost islands: Kure, Midway, Pearl and Hermes Reef, Lisianski, Laysan, and French Frigate Shoals, and a small number of records of pups from Nihoa Island (Kenyon and Rice 1959, Kenyon 1972, Clapp, Kridler and Fleet 1977, Gilmartin 1983, Conant unpubl. data). Pups had not been reported from Necker Island until 1978 (DeLong 1978), although Clapp and Kridler (1977: 80) speculated "that the seal might breed there." This paper documents recent records of Hawaiian Monk Seals pupping on Necker Island.

In June of 1982 I spent 20 to 25 June on Necker Island sampling vegetation and censusing seabirds. I was accompanied by Patrick Conant who collected terrestrial arthropods. Our objectives on the trip were to conduct studies of terrestrial plants and animals and to make incidental observations of monk seals and Green Sea Turtles *(Chelonia mydas)*.

Numbers and Locations of Seals

Although we did not conduct systematic seal censuses, I took notes on the numbers and locations of seals hauled out on the island's rocky beaches. Figure 1 shows place names and indicates the locations at which I recorded seals. Table 1 shows the largest number of seals recorded at each of the locations monitored, on each of 4 different days. Because I was a relatively inexperienced observer, I did not distinguish between adults, subadults and juveniles on most counts. However, I did keep counts of nursing pups separate from adults.

Clearly, site 3 accommodated the largest numbers of seals, including females with pups. The largest number of animals recorded at site 3 was 20, and the largest number of animals observed at all sites combined was 32. Site 3 is an extensive basalt ledge about 10 m by 25 m, which received relatively little wave action beyond its shoreward edge during our visit. This site had the greatest density and numbers of animals even though other haulout sites (e.g., sites 1, 2, 4) appeared suitable for higher densities of animals than I observed in those areas. Site 3 always had some animals present. In contrast, the other sites sometimes had no animals present, except site 5, where there was always a mother and pup. Like site 3, sites 1 and 5 are also rocky benches with at least some area out of reach of major wave action all the time. Sites 2 and 4 are "beaches" of large, loose rocks. Site 2 had a small area above major wave action all the time we were present and site 4 was generally awash at high tide or during high wind or swell

Table 1. Monk Seal Observations on Necker Island, June 1983. (P = nursing pup, I = immature, A = adult.)

Date	Site Number					
	1	2	3	4	5	Total
20 June 1983	1 I	1 A/1	14 A+1	—	—	16
21 June 1983	—	4 A+1	17 A+1 3 P	—	7 A 1 P	32
22 June 1983	—	3 A+1	8 A 3 P	—	7 A 1 P	22
23 June 1983	—	2 A	7A 3 P	2 A 1 I	2 A 1 P	18

conditions. Morrow and Buelna (1985) identified 43 individual seals during a two-week survey in 1983, and they also found the largest numbers of seals and pups at site 3.

Pup Numbers and Locations

When we went ashore at 1100 hrs. on 20 June 1982, we found two females with small, black-coated, nursing pups at site 3. At that time I also noted a female animal with a large fresh wound on her back at this site. The following day we saw the wounded animal again at 1700 hrs., this time nursing a newborn pup (Figure 2). On 21 June I observed a fourth pup with its mother at site 5. This pup was much larger than the pups at site 3, and appeared to be close to weaning. Its coat was the silver color of a weaned or close-to-weaning pup, rather than the glossy black of younger pups.

In 1983 Morrow and Buelna (1985) observed two nursing pups at site 3 and one weaned pup at site 5, and reported a sighting of one dead black pup on 20 April 1983. Estimated dates of birth for the nursing pups observed by Morrow and Buelna were 4 and 9 July. They also found a dead, pregnant female at site 5 on 28 July

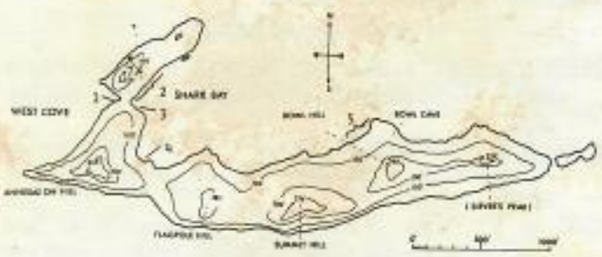

Figure 1. Map of Necker Island (After Judd in Palmer 1927), showing locations at which monk seals were sighted and censused.

1983. In late June of 1984 Morrow and I spent from 20 to 28 June at Necker. At that time there was one female with a young, black pup at site 3. Another pup was born at site 3 on 2 July 1984 (S. Fefer pers. comm.).

Conclusion

Although Hawaiian Monk Seals have been regularly observed at Necker Island (Gilmartin 1983), pups were reported only once before our 1982 visit. Whereas Necker Island had previously been reported primarily as a haulout site for small numbers of non-breeding seals, records of four pups in 1982, five pups in 1983 (including one dead pup and one dead fetus), and two pups in 1984, as well as increased numbers of seals recorded in censuses by National Marine Fisheries Service researchers, now clearly indicate that this small, high island is a more important seal habitat than formerly believed. It is probable that the limiting factors for the seal population at Necker are haulout space and pupping areas.

Figure 2. Monk seal mother and pup. Note large, fresh wound on the adult's back.

ACKNOWLEDGEMENTS

I particularly thank William G. Gilmartin of National Marine Fisheries Service for encouraging me to record and publish these observations, and for sharing information collected during research conducted under his direction. Patrick Conant assisted with observations and logistics. I thank the crews of the *Feresa* and the NOAA Ship *Townsend Cromwell* for their assistance with logistics and field support. Observations were made during a study conducted under contract with the U.S. Fish and Wildlife Service, which also provided research support.

LITERATURE CITED

Clapp, R.B. and E. Kridler. 1977. The natural history of Necker Island, Northwestern Hawaiian Islands. Atoll Res. Bull. No. 206.

Clapp, R.B., E. Kridler and R.R. Fleet. 1977. The natural history of Nihoa Island, Northwestern Hawaiian Islands. Atoll Res. Bull No. 207.

DeLong, R.L. 1978. Investigation of Hawaiian Monk Seal mortality at Laysan, Lisianski, French Frigate Shoals and Necker Island, May 1978. Interim Rept., Marine Mammal Division, Northwest and Alaska Fisheries Center, Natl. Marine Fish. Serv., Seattle.

Gilmartin, W.G. 1983. Recovery plan for the Hawaiian Monk Seal, *Monachus schauinslandi*. National Marine Fisheries Service, Southwest Region. Terminal Island, California.

Kenyon, K.W. 1972. Man versus the monk seal. J. Mammal. 53: 687-696.

Kenyon, K.W. and D.W. Rice. 1959. Life history of the Hawaiian Monk Seal. Pacific Sci. 13: 215-252.

Morrow, R.J. and E.K. Buelna. 1985. The Hawaiian Monk Seal and Green Sea Turtle on Necker Island, 1983. Draft NOAA Technical Memorandum, Southwest Fisheries Center, Honolulu Laboratory, National Marine Fisheries Service, Hawaii.

Palmer, H.S. 1927. Geology of Kaula, Nihoa, Necker and Gardner Islands and French Frigate Shoals. B.P. Bishop Mus., Bull. 35.

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Honolulu, Hawaii 96822

FUNDING APPROVED FOR UPPER HAKALAU FOREST

The House Appropriations Committee rejected the Administration's proposal for a three year moratorium for land acquisition and included $6.0 million for the Upper Hakalau Forest Preserve.

In approving this funding, the Committee has balanced land acquisition needs with fiscal restraint. The proposed three year moratorium in acquisition would likely result in the loss of critical habitats which would further endanger threatened species and slow down the momentum that has been established.

Having testified in April on the need for the acquisition of the Upper Hakalau Forest, Congressman Daniel Akaka was pleased with the Committee's action. Said Akaka, "The Upper Hakalau Forest, on the slopes of Mauna Kea, is one of the most richly diverse and unique tropical forests in the world" At least five of Hawaii Island's seven federally-listed endangered forest bird species and the endangered Hawaiian Hoary Bat, Hawaii's only terrestrial mammal, are found in this forest. According to the U.S. Fish and wildlife Service Recovery Plan, the area is considered to be essential habitat for four of the endangered forest birds of Hawaii.

Last year, Congress appropriated $4.41 million, which allowed for the first phase of land acquisition for this project.

Excerpted from News Release

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CALENDAR OF EVENTS

Aug. 11 (Sun.)Field trip to Makiki Environmental Education Center on Makiki Heights Dr., Honolulu. See page 16. Ray Tabata, trip leader (988-2958).

Aug. 12 (Mon.)7:00 pm HAS Board meeting at the home of Dr. Conant, 3663 Alani Dr., Oahu. Call Dr. Conant for information.

Aug. 17 (Sat.)Paste-up of the **'Elepaio** beginning at noon. Call 533-7530 for information.

Aug. 19 (Mon.) 7:30 pm general meeting at McCully-Moiliili Library, 2211 S. King St. with Dr. Fern Duvall on **"The Endangered Alala."**

Sept. 8 (Sun.)"Behind-the-Scenes" trip to Sea Life Park. See page 16.

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Vol. 46, No. 2, August 1985

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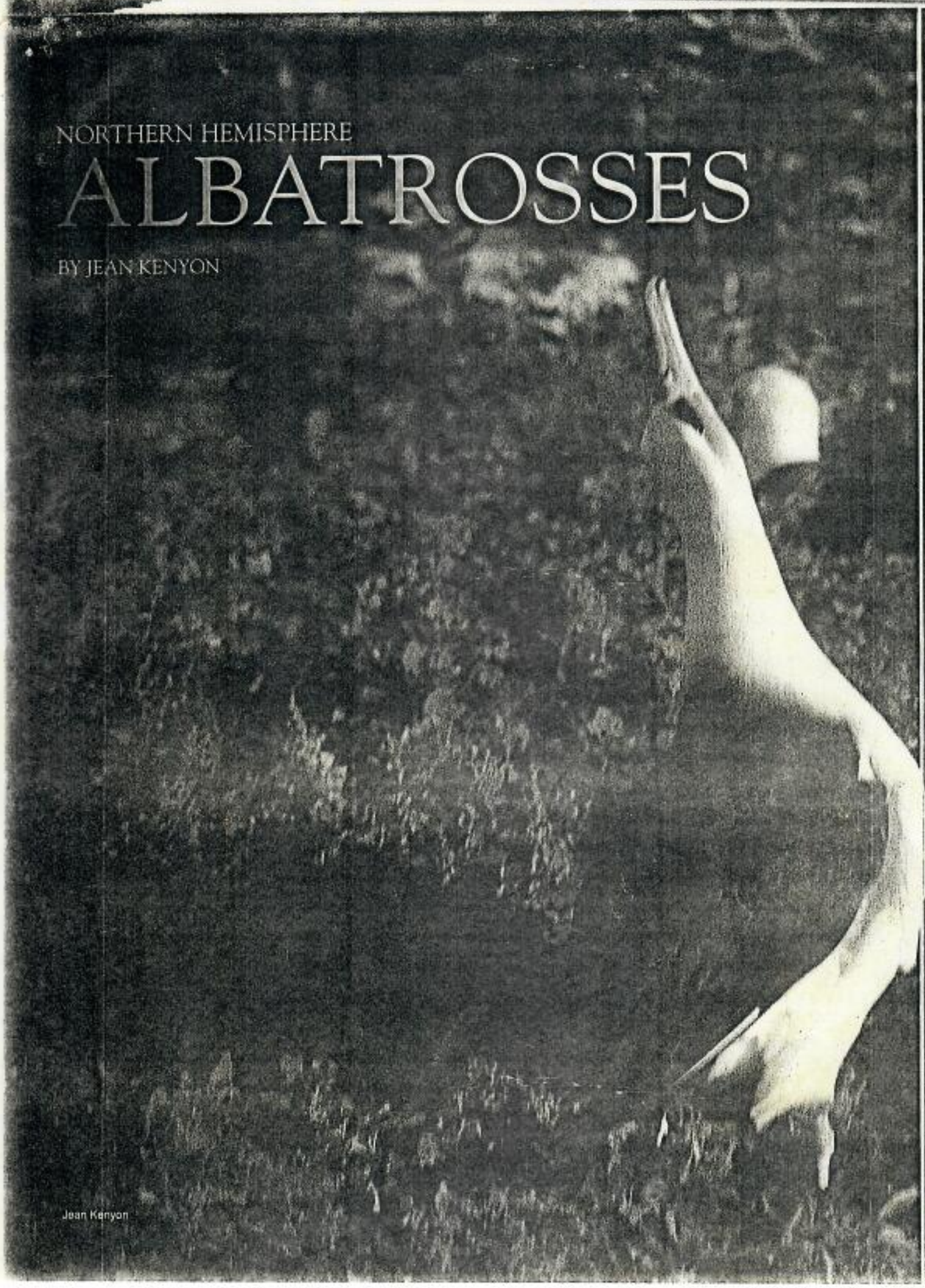
D

NORTHERN HEMISPHERE

ALBATROSSES

BY JEAN KENYON



Jean Kenyon

To the ancient Hawaiians the sighting of an albatross at sea was a propitious omen, sent as a messenger from gods who controlled the forces of the sea. The more modern conception of albatrosses by offshore commercial fishermen as "feathered pigs" scarcely bespeaks a comparable reverence. Somewhere between honor and contempt lies a more appropriate perspective. The subject of both fact and fantasy, these magnificent seabirds have long captured the attention of mariners with their undeniable grace and power.

Nine of the world's 13 species of albatrosses are found only in the southern hemisphere, chiefly the "Roaring Forties" and "Furious Fifties" of higher latitudes. One—the waved or Galapagos albatross (*Diomedea irrorata*)—breeds exclusively on Hood Island in the Galapagos, its range usually limited to the equatorial waters off western South America. Three species reside within the northern Pacific, their evolutionary ancestors having penetrated the windless equatorial doldrums, which even today largely prevent albatrosses from traveling be-

Courtship dances of Laysan albatrosses feature species specific footwork, wing flapping, and head and bill gyrations such as sky-pointing. These dances are repeated year after year even though bird pairs are believed to mate for life.

tween hemispheres. As evidence of their origins, the northern-hemisphere species retain the spring and summer breeding schedules of their southern-hemisphere relatives.

All three northern-hemisphere species—the Laysan albatross (*D. immutabilis*), the black-footed albatross (*D. nigripes*), and the short-tailed albatross (*D. albatrus*)—have suffered from a history of human exploitation and short-sighted interference by now so sadly familiar. Factors contributing to the reduction in numbers and breeding range of these species are feather hunting (to satisfy the demands of late nineteenth-century fashion); introduction of pigs, goats, dogs, and rats onto formerly predator-free breeding islands; devegetation of breeding habitat by the rabbits; and deliberate large-scale albatross killing to reduce interference with commercial and military air traffic. Today, significant breeding habitat of both the Laysan and black-footed albatrosses is largely restricted to the northwest Hawaiian Islands, fortuitously set aside as the Hawaiian Islands National Wildlife Refuge by Theodore Roosevelt in 1909.

Laysan albatross population levels have increased dramatically on Midway Island over the past 20 years, thanks to protection and human-created breeding habitat extension. Recent reports of more numerous sightings at sea in the eastern Pacific, plus indications of breeding sites on islands off the Mexican mainland, provide evidence of Laysan recovery and range extension.

The third species in the northern hemisphere is not so fortunate. Protection of remaining breeding habitat for the short-tailed albatross on Japan's volcanic Torishima Island in the 1930s perhaps came too late: once widespread throughout the western Pacific, only about 400 birds are currently estimated to remain. Management efforts are in progress, however, to establish accessory nesting sites on other islands.

Close relatives

The similarities in the life histories of Laysan and black-footed albatrosses are reminders of their family relationship with southern and equatorial species, while their differences, be they striking or subtle, bespeak evolutionary divergences that maintain their separation in the face of coexistence.

Jean Kenyon

Nowhere are these points of overlap or separation more striking than at their breeding colonies, where ground nests of both species appear to be freely interspersed, and the nest of a black-footed may lie no farther from that of a Laysan than the distance a bill can poke.

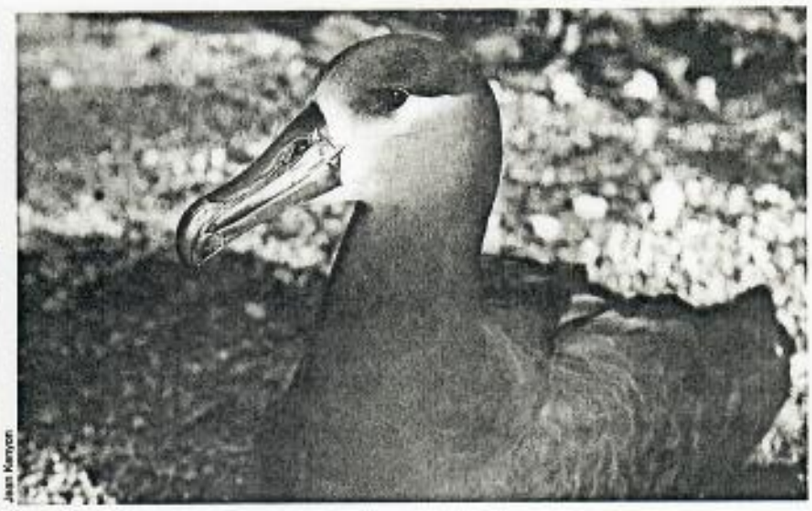
A more discerning look, however, reveals a tendency for the black-footed albatross to nest in somewhat more exposed locations than the Laysan albatross. Return to nesting colonies begins two weeks earlier, on the average, for black-footed than for the Laysan albatross, with males arriving several days prior to females in both.

Pair-bond formation among animals in general tends to be of a more enduring nature for those species in which both parents play an important role in rearing the young. Though difficult to verify precisely, such long-term studies as exist suggest that albatrosses form pair bonds for life, a mated pair returning each year to the prior season's nest site. Courtship dances, highly developed among the albatrosses, may serve a variety of functions, including species recognition, mate selection, reinforcement of the pair bond in mated birds, or synchronization of reproductive readiness. Moreover, when both sexes are externally similar in appearance as in the Laysan and black-footed albatrosses, courtship behavior may provide a means of sexual recognition.

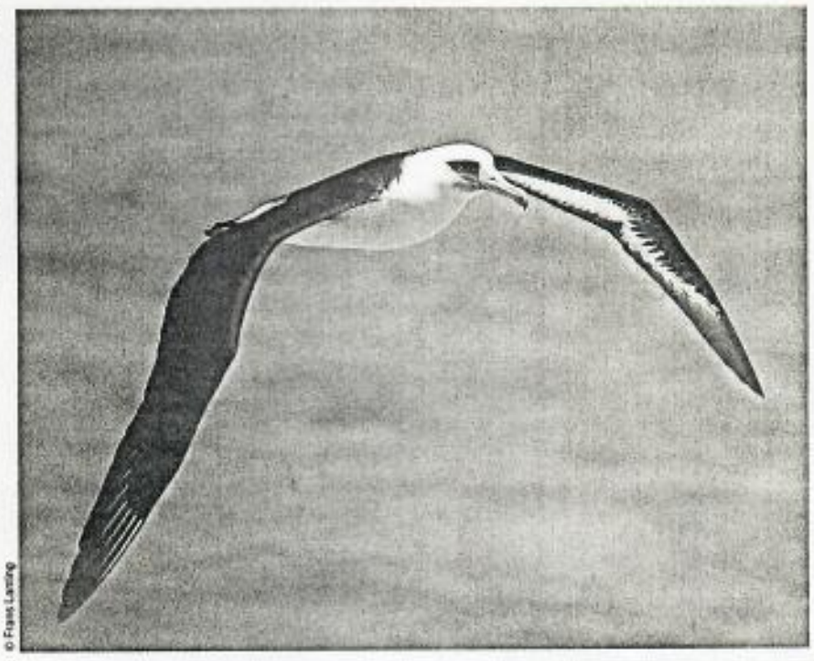
Although black-footed and Laysan albatrosses may not attain sexual maturity until seven and eight years of age, respectively, juveniles return two to three seasons in advance of their own first breeding, engaging in vigorous courtship dances with a multitude of partners.

"Walkers," as non-incubating birds are called, crisscross the colony day and night, gingerly billing other birds encountered to test their receptivity, ultimately participating in the varied high-pitched movements and calls of the courtship dance with numerous others. Through some unknown albatross chemistry, a stable partner eventually emerges, and an "engagement" period of a year or longer begins, during which the pair keeps company, dances, establishes a territory, and even builds mock nests. Such a long engagement period prior to physical union may serve to promote the enduring conjugal state, renegotiated only should a member of the pair die or disappear

The courtship dance of black-footed



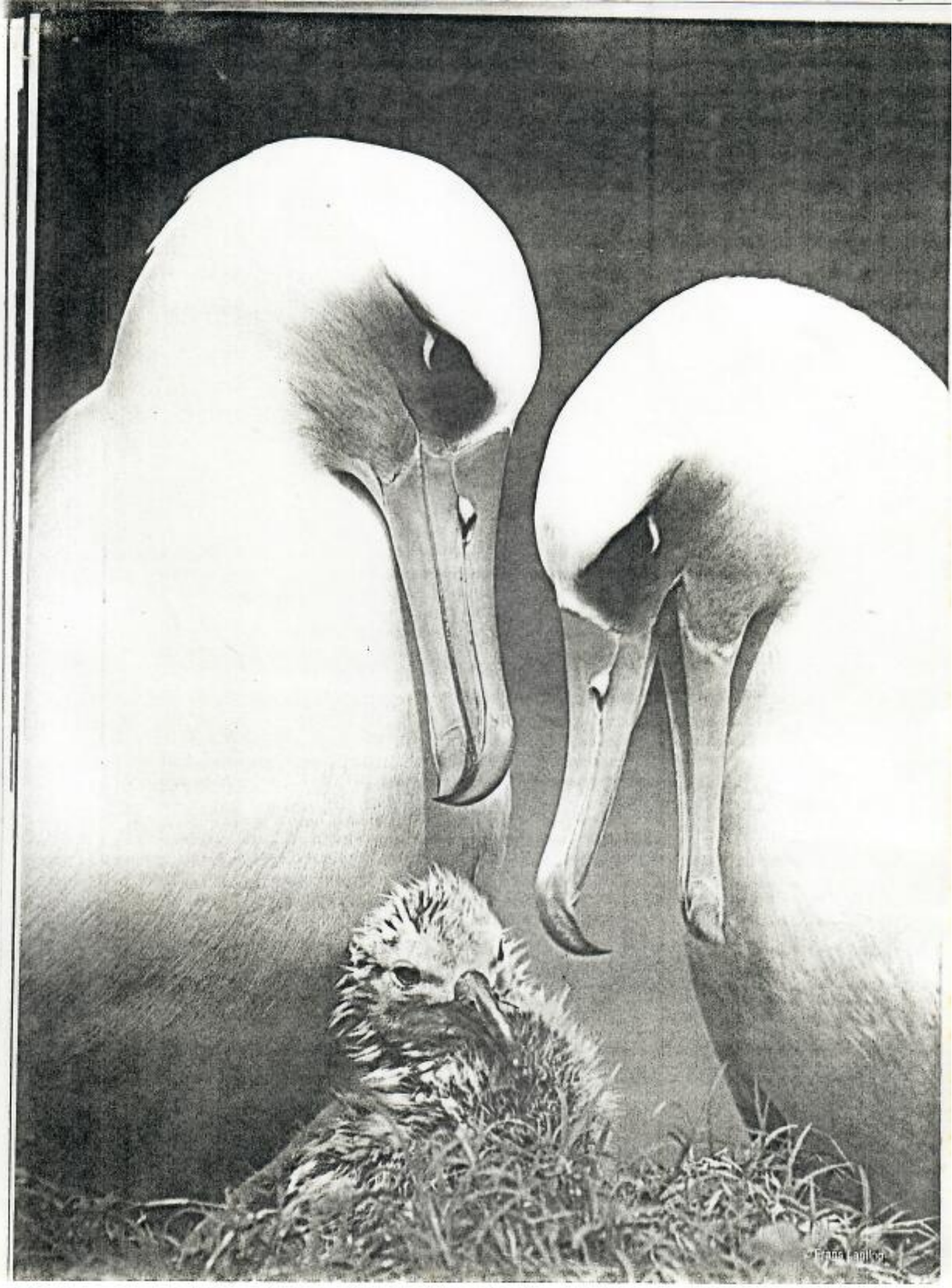
Jean Kenyon



© Frans Lanting

Scattered across the ground, the interspersed nests of Laysan and black-footed albatrosses probably hold only a single egg each (above). One parent, such as this black-footed albatross (top right), patiently incubates the egg while the other parent soars out to sea in search of food. A Laysan albatross (middle right) may be out to sea for many days before returning to the nest where its chick eagerly awaits a meal. Bills crossed at right angles, chicks are fed by regurgitation of the morsels collected by its parents.

Jean Kenyon



Taking turns, parent Laysan albatrosses alternate between vigilantly guarding their young chicks and going out to sea for food. Both parents are present at feeding time, when the adults switch roles. After several weeks, the chick is old enough to be left alone.

and Laysan albatrosses lacks little in elaboration. Beginning with tentative billing, the dance quickly escalates into a stunning and varied sequence of rapid bill clappering, wing fanning, head shaking, and sky-calling, accompanied by a rich vocal repertoire of shrieks, whines, moos, and whinnies. Though the dances appear superficially similar to an uninitiated human observer, repeated observation reveals clear differences: mutual bill clappering occurs face-to-face between Laysan but with lowered heads side-to-side between black-footed. Also, black-footed albatross spread both wings during their wing-fanning display while Laysan albatross spread only one.

Such differences function in reproductive isolation, precluding wasteful mating between species. Nonetheless, hybrids are occasionally observed; subverting the favorable conjunction of species specific signals, they are thought to be the outcome of rape, a phenomenon still poorly understood within the animal kingdom. Mated interspecific pairs have not been reported. The social signals of the hybrid are as mixed as its plumage; its sexual overtures are rebuffed by members of both parental species, and a hybrid apparently does not succeed in finding a mate.

One egg at a time

Following the laying of a single egg, each mated pair settles down to the business of sharing incubation duties, a task for which both male and female are well equipped by the development of a highly vascularized brood patch. While one member of the pair patiently incubates for a period up to 23 days, its partner forages offshore for the flying-fish and squid so important in the diet of both species.

The mean incubation period is 64 days for the Laysan albatross and 65 days for the black-footed. Chicks hatch with eyes open and covered with a layer of grayish down. For the first two to three weeks, pair members take turns guarding their offspring, but after a month chicks are only visited every several days for a feeding. Characteristic of their taxonomic order, Procellariiformes, albatross parents produce a rich stomach oil, delivered via regurgitation. Unbrooded chicks may be subject to thermal stress as solar radiation and ground temperatures build beneath subtropical skies. Excess heat is dissipated via evaporative cooling, during which the moist throat and mouth area are rapidly vibrated, or by sitting on the "heels," keeping their webbed feet off the hot ground and losing heat from blood circulating through the webbing. Black-footed albatross fledge on the average at 140 days, Laysan at 165 days. Weak fledglings fall into shallow lagoons to drown or be gobbled up by hungry sharks; the stronger ones begin an unbroken pelagic existence of several years, soaring on the updrafts created on the windward side of waves, touching down only to feed or rest.

The area covered during feeding journeys of the adult birds may be extensive: one Laysan albatoss banded on Midway was captured 22 days later more than 3,200 kilometers (2,000 miles) distant.

The precise means by which albatrosses are able to navigate thousands of miles over the featureless oceans to a tiny pinpoint of island continues to elude scientists. Yet the ability of Laysan albatross to precisely home over long distances was demonstrated by artificial translocation experiments conducted in the late 1950s. Eighteen mature Laysan albatross were transported by navy aircraft from Midway Atoll, near the end of the Hawaiian Archipelago, to scattered and distant locations throughout the North Pacific, including the Philippines, Marshall Islands, Guam, Japan, Oahu, and Washington State. Despite the fact that several locations were outside the known range of this species, 14 birds were recovered on Midway, representing all translocation areas. Recovery on Midway 32 days after release in the Philippines 4,120 miles (6,630 kilometers) distant represented the longest journey, while speed calculations of a bird released from Washington indicated a minimum average flight of 317 miles (510 kilometers) per day.

With feats such as these, the appellation "gooney bird," derived from their comical exaggerated waddle on land, scarcely seems a fair assessment of the albatross's general character. The attention that a mated pair bestows upon each other strikes even a cautious scientific observer as strongly akin to our own human notion of affection. As our appreciation of the range of capabilities and complex behaviors demonstrated by species other than our own continues to grow, perhaps the derogatory phrase "birdbrain" may take on more benevolent connotations.

Jean Kenyon studied biology at Washington University, Missouri, where she earned a B.A. degree, and went on to Tufts University, Massachusetts for her M.S. As a dive master in the U.S. Virgin Islands, she dived extensively throughout the Caribbean—the site of her two previous articles (on black coral and Lighthouse Reef, Belize) for *Sea Frontiers*. She has also been involved in educational activities at the Bermuda Biological Station and at the Center for Coastal Studies at Provincetown, Massachusetts. Aboard the four-masted bark *Sea Cloud*, she served as a marine biologist and coral-reef naturalist. She is currently pursuing Ph.D. studies of the biogeography of corals at the University of Hawaii. Her interest in the subject resulted from the time she spent as a volunteer for the U.S. Fish and Wildlife Service at the Hawaiian Islands National Wildlife Refuge.

Related reading:

Grant, Gilbert S. "Paint chips and albatross chicks." *Sea Frontiers*, July-August 1987, pp. 270-272.

Carino, Ralph. "Restarting the wandering gooneys." *Sea Frontiers*, January-February 1987, pp. 42-45.

Haley, Delphine, ed. *Seabirds of Eastern North Pacific and Arctic Waters*. Pacific Search Press, Seattle, WA, 1984.

Whittow, G. Causey. "The Birds of Midway Islands." *Sea Frontiers*, May-June 1982, pp. 171-177.

Owre, Oscar T. "Count-Down for Gooneys!" *Sea Frontiers*, May 1960, pp. 100-109.

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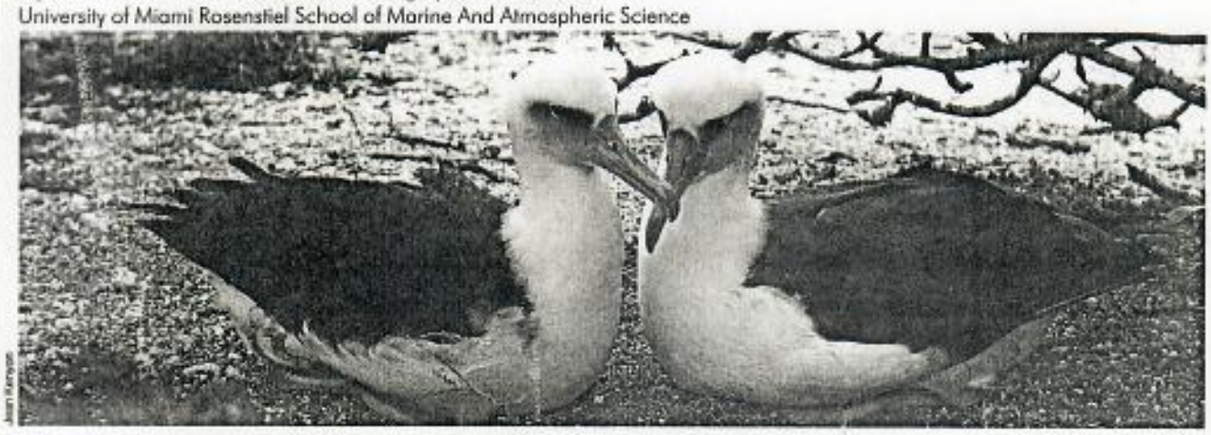

Jean Kenyon

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FEATURES

Contents continued page 322

Above: Love birds? Just as apropos perhaps as some of the other names albatrosses have acquired through the centuries. Laysan albatrosses, one of three species of northern-hemisphere albatrosses, are thought to form pair bonds for life—see page 342.

Front cover: Unusual elegance and grace have been bestowed on the seahorse through the process of evolution. Not adapted for speed, the golden Pacific seahorse (Hippocampus ingens) may rely on its vertical posture, uncanny stillness, and golden coloration to blend artfully in with many of the brown algae found in southern California. Both the anatomy and behavior of this animal are unlike those of any other fish—see page 358. Photograph: Alex Kerstitch

MAUI NEWS.

WAILUKU, MAUI, H. T., SATURDAY. FEBRUARY 1, 1908

ECLIPSE SURVIVORS REACH LAND.

Starving Crew is Ignored by a Passing Vessel---Three Give Up Hope and Die---Reach Hana in Pitiable Condition.

FOUNDERS AT SEA.

The American Ship Eclipse one hundred and three days out from Newcastle New South Wales, Australia sank on the eleventh of January and all on board took to the boats for their protection.

It is reported that the ship was in a bad condition when she left port and was a very old vessel many years ago.

She was carrying coal to San Francisco and by keeping the pumps at work managed to make fairly good headway until she was about two degrees north latitude when she was struck by lightning while becalmed.

The lightning dismasted her and loosened her timbers and increased the inflow of water. For fourteen days she rolled in the rough of the sea while the crew rigged up jury sails and again headed for San Francisco.

In the mates boat were quantities of fruits in tins which were all lost. As the boat of the Captain was not so well provisioned and had less water than the men required the Captain put all on short provisions and allowed the men but one gill of water per day.

When three hundred miles off shore a ship was sighted at day break that was headed straight for them and the hopes of the men were raised to the highest pitch but the Captain said that when within a quarter of a mile the vessel changed her course and veered off and ignoring the shouts of the men and their frantic waving of signals of distress and the flying of the same they were left to their fate. He says he is satisfied that the vessel was either the Falls of the Clyde or the Fort George.

could to relieve the suffering of the men.

Captain Larsen and the men speak in the highest terms of the treatment accorded them at Hana.

The Claudine took the Captain and men to Honolulu where they will be placed in the hospital for some time until they are again able to follow the sea which all of them intend to do except the Captain who says that he has now gone through three ship wrecks and that he will never follow the sea again.

REV. J. E. KEKIPI WINS LAND SUIT.

Gave What he Claimed was a Mortgage but was in Form a Deed. Defendant Admitted to Third Parties that the Instrument was a Mortgage.

On the eleventh of January she was leaking so badly that the two steam pumps were unable longer to keep down the water and she was filling at the rate of three feet in twenty-four hours. After she had eleven feet of water in her and her decks were awash Captain Larsen decided to abandon her and ordered all hands into the boats. They were then in latitude thirty six degrees North and one hundred and fifty-five degrees west longitude and about one thousand miles from land.

The mate and six men took to the smaller boat with ample provisions and water while the Captain and eight men took to the large forty foot boat. After being out some days the smaller boat was capsized one night and all of the water and provisions were lost and the men were thrown into the sea. All of the men were rescued by the Captain and the sixteen men were then cramped in the small space without room to turn while the extra weight put the boat so low that they were compelled to bail the boat constantly to keep from being swamped. This work continued incessantly day and night during the entire trip.

So great was the despair of the men at the action of the bark in refusing them aid that they were almost unmanageable and one gave up hope and died within a few hours. His body was thrown into the sea.

A few hours later two others died and their bodies were consigned to the deep.

The Captain said the suffering caused by the cramped condition of the men was almost unindurable and that the constant salt spray wetting their clothing made their garments as stiff as wood while their skins were a mass of sores and their feet and legs were swolen and their minds were almost gone He had urged the men to throw away their tobacco and explained to them that if they had no tobacco they would not smoke and would not require so much water. Although a user of the narcotic himself and being supplied with a thousand cigars he left all of them aboard the ship and declined to use the weed at all on the voyage for the land. Most of the men however refused to obey him and the three who died were the heaviest users of tobacco.

After being out some days some of the men drank salt water which only added to their disteress and caused intense suffering.

When they reached land on Monday morning, January 26th, the men were in such a pitiable condition that they could not stand alone, their tongues were swollen, their lips were swollen and cracked open, their flesh wasted, eyes sunken and their legs and feet so swollen that some of them had to be carried ashore by the willing residents of Hana.

It was here that George O. Cooper and County Supervisor W. P. Haia and many Hawaiians proved to be good Samaritans and did every thing for the suffering men that they could do.

Foods of all kinds were brought by the people there and clothing provided and medical attendance given by Dr. Deas who did what he

A-14 Tuesday, Aug. 22, 1972
HONOLULU ADVERTISER

blob has name, but no owner

The Waimanalo blob has a name.

It is phosphorus. Chemistry students know it as P.

Navy ordnance experts identified the blob yesterday. But they don't know where it came from.

The papaya-sized orange chunk drifted ashore at Waimanalo Beach Friday and terrorized beachgoers when it burst into flames.

Yesterday, the Navy analyzed the substance at its West Loch Ammunition Depot in Pearl Harbor. After analyzing it, they let it burn up until nothing remained.

TWO NAVY ordnance men came to The Advertiser yesterday to retrieve the newspaper's sample of the blob. Roger Coryell, who found the blob, brought in the sample on Friday.

The Navy men said they were collecting the different blob samples around town to see if they were all made of the

University of Hawaii at Manoa

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

June 4, 1987

Mr. John Naughton
Western Pacific Program Office
National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii 96822

Dear John:

Ka'ula Island

The attached letter (with enclosures) was recently directed to our attention by Dr. Matthew Spriggs. A perusal of the enclosures alerted me to your familiarity with the history of public concerns over use of Ka'ula Island as a bombing target. In view of Federal jurisdiction in the area and references to fishery interests in a recent news article, I thought it appropriate to bring these items to your attention. Please feel free to call if you have any comments or questions.

Sincerely,

John T. Harrison
Environmental Coordinator

Attachments

cc: (with attachment, w/o enclosures)
Bruce Carlson, Waikiki Aquarium
Donald Clegg, DGP
Sheila Conant, General Sciences
William Gilmartin, NMFS
L. Stephen Lau, WRRC
James Maragos, U.S. Army COE
William Paty, DLNR
Matthew Spriggs, Anthropology

FYI
Mathew

University of Hawaii at Manoa

Department of Anthropology
Porteus Hall 346 • 2424 Maile Way
Honolulu, Hawaii 96822

May 12, 1987

MAY 14 1987

Dr. Thomas King
Advisory Council on Historic Preservation
1100 Pennsylvania Avenue, NW no. 809
Washington, D.C. 20004

Dear Dr. King:

I am writing to you because of concerns over the cultural and historic resources of two small islands in the Hawaiian chain, one of which is certainly under Federal administration and the other of which probably still is: Ka'ula and Lehua Islands.

I enclose a copy of an article from the Honolulu Star-Bulletin and Advertizer of 4 May 1987 which alerted me to the fact of the bombing by the Navy and other sections of the Armed Forces of the Island of Ka'ula, near Ni'ihau in the Hawaiian Islands. Although bombing has been undertaken since the 1950s, according to the article, because of Ka'ula's remote location its military use is not generally known to the residents of the state.

My concern is that the bombing may have damaged and certainly continues to pose a threat to the archaeological and cultural resources of the island, representing the remains of prehistoric Polynesian occupation. While bombing is supposed to be restricted to the southern tip of the Island, bombs do on occasion miss their mark (see Honolulu magazine article, August 1980, page 53). Ka'ula was known to the ancient Hawaiians and a shark god is said to dwell in a prominent sea cave there (see Bryan's 1942 article). In Palmer's Geology of Lehua and Kaula Islands (1936) (xerox of parts enclosed) there is a description of habitation and/or 'burial caves' and three or four windbreak shelters. Although Palmer considered the latter to be of recent (in 1936) construction, the description fits well with the standard prehistoric Hawaiian "C-shaped" shelter. It is interesting that Bryan, presumably referring to two of these structures at the northern end of the Island, suggests that they might have been heiau, Hawaiian religious sites. Bryan also notes a single shelter cave with a stone wall across its mouth.

The only visit by an archaeologist to the Island took place in 1976 when Dr. Robert Hommon, then of State of Hawaii, Department of Land and Natural Resources, Historic Sites Section, went there on a 2 day visit and found three sites, two stone structures and a partially walled and paved cave site. In

addition, the "camp cave" where visitors stay would seem to have potential for excavation (see Honolulu article, photo on page 54) but this is not commented on by Hommon who also notes other rockshelters on the island which might have similar potential. I enclose a copy of Hommon's fieldnotes from DLNR files. No follow-up action appears to have been taken by the State of Hawaii after Hommon's visit.

Ka'ula is subject to the Section 106 review process which to the best of my knowledge has never been undertaken for this Island. I would appreciate it if you could look further into the matter.

As far as I am aware, Lehua Island (also in Palmer's report) is also still under Federal control although I have not heard of it being used as a bombing target. Palmer notes at least one prehistoric religious site as being located on this Island and so a review of current Federal use of Lehua could also be in order.

Both islands appear to have sites of archaeological significance and probable religious values to Native Hawaiians, and their administering authorities should provide information as to whether they are eligible for the National Register. I hope that the Council will be able to ensure that the cultural resources of these two islands are given proper consideration by the Federal Government.

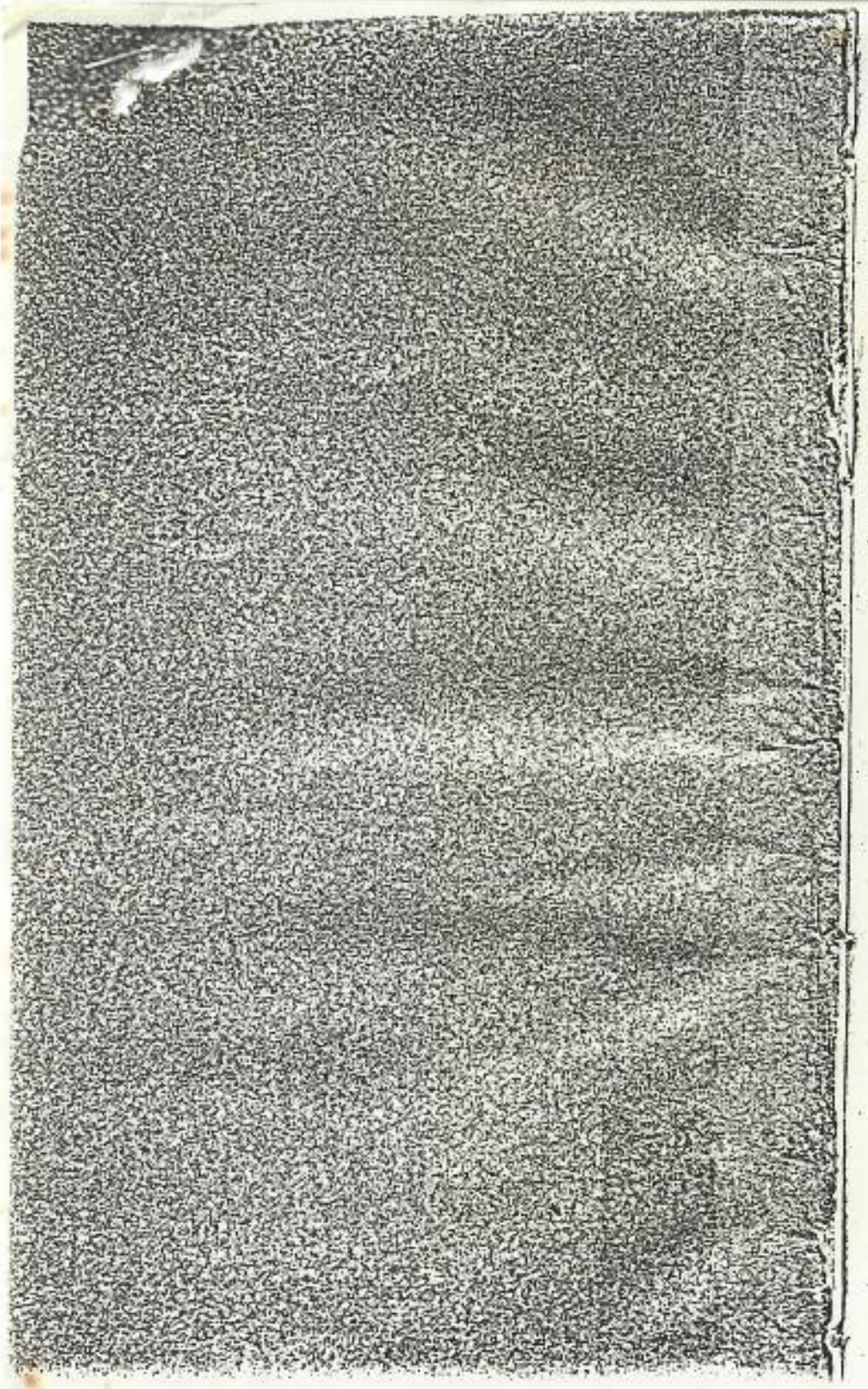
Your Sincerely,

Matthew Spriggs

Matthew Spriggs, Ph.D
Associate Professor

MS:jt

Enclosure



Issued May 21, 1912.

U. S. DEPARTMENT OF AGRICULTURE
BIOLOGICAL SURVEY—BULLETIN No. 42
HENRY W. HENSHAW, *Chief*

REPORT

OF AN

EXPEDITION TO LAYSAN ISLAND IN 1911

UNDER THE JOINT AUSPICES OF THE UNITED STATES DEPARTMENT OF AGRICULTURE AND THE UNIVERSITY OF IOWA

BY

HOMER R. DILL
Assistant Professor of Zoology in the State University of Iowa
AND
WM. ALANSON BRYAN
Professor of Zoology in the College of Hawaii

WASHINGTON
GOVERNMENT PRINTING OFFICE
1912

The struggle for existence on Laysan is most keen at all times. The inevitable operation of the law of nature that balances the food supply with the number to be fed is as effective on this sand island as it is everywhere else in the world. As a matter of fact, a marked reduction in the number of pairs of all the land birds can be noticed as compared with the number of the same species on the island eight years ago. The Laysan canary, Miller bird, Laysan honey eater, and the Laysan rail, without doubt, are doomed to extermination on the isolated island on which they have maintained themselves long enough to develop into distinct species, unless something is done to preserve for them the source of their food supply.

Rare as the Laysan teal has always been, it is gratifying to find that it has not been wiped out of existence. Eight years ago there were several small flocks of this interesting bird, which is without doubt the rarest wild duck in the world. This year only seven adult birds were seen during an entire day especially devoted to watching for it on the small fresh-water lake and the main lagoon—the natural rallying place for the species. Ducks were seen on five of the seven days spent on shore, but there were by no means as many of them as there were on the occasion of my former visit. One pair seen had a flock of five young following them. Thus it will be seen that while this rare species is not extinct, as was greatly feared, it is so rare that there are probably not more than a half dozen adult pairs on the island at this time.

Even after the wholesale slaughter of the birds and the result it had on their nesting and mating habits, the birds remain as fearless as ever. There is not a species on Laysan that can not be caught in the hands with a little care and patience. One pair of ducks, for example, came up within 6 feet of the writer, a lack of fear which would make the species an easy one to exterminate should poachers at any time make another raid on the island inhabitants.

Rabbits now literally swarm over the island by thousands. The amount of damage done by them can better be imagined than told. They are exterminating first one species of plant then another. Several species that were common everywhere eight years ago have entirely gone, others are already doomed. Unless some drastic measures are resorted to within a very short time not a bush or spear of grass will be alive.

There is no indication that the islands of Laysan and Lysianski have been visited by hunting vessels since the last visit of the *Thetis*. It is to be hoped that for the time being at least the traffic in birds' wings and feathers has been broken up in these waters. However, there is no assurance that it will not be renewed without notice, hence the necessity for continuing the service of the *Thetis* or a similar vessel, and the necessity of making frequent visits at irregular intervals to all of the islands of the reservation.

RECOMMENDATIONS FOR FUTURE PROTECTION OF THE RESERVATION.

As to the future care of this wonderful colony, I would suggest that the most effective way to conserve the bird life is to appoint a warden for the reservation who should have general supervision of these low-lying islands and their bird inhabitants. A resident warden should then be provided who should be supplied with a small auxiliary power schooner, or a large power sampan, that would enable him to make frequent and unannounced visits at irregular intervals to all of the islands along the chain. The installation of a wireless telegraph station at Midway, where the power and facilities are already available, would add greatly to the convenience and safety of commerce and trans-Pacific travel and would put the islands of the chain in direct touch with Honolulu and the outside world.

If a vessel such as has been suggested should be stationed at Laysan or Midway Island it would be an important step toward the proper supervision of all the outlying islands, whether included in the reservation or not. Naturally the people and the authorities of the Territory of Hawaii feel a keen interest in the welfare of this reservation. A feeling is growing that the day is not far distant when this Territory will look upon the Leeward chain of islands as forming a great natural park as interesting and wonderful in its way and as instructive to visit as are any of the other famous national parks.

The visiting of these islands and reefs by interested persons, should they be opened to the public under proper regulations and supervision, will result in no harm to the breeding colony, as the long residence of the guano company on the island of Laysan has proven. As years go by and the birds become more rare elsewhere, the great reservation thus conserved in the mid-Pacific will be an object of world interest and concern. The birds themselves are a valuable possession to Hawaii and the nation, while as an attraction to visitors as well as to the residents of these islands they represent, as yet, an asset that is scarcely appreciated.

It is urged that the Federal Government and the Territorial government should at once become actively interested in these islands and that measures should be taken to safeguard the birds against the possibility of further despoliation by plume hunters. It is also urged that steps should be taken to introduce the rare land birds of Laysan on other of the low islands of the chain where conditions are favorable in order to prevent the extermination of these interesting and valuable birds in the manner I have suggested.

At least three of the land forms of Laysan are of unquestioned economic importance and of great value to the Territory of Hawaii as the natural enemies of certain noxious and injurious insects. The difficult problem of their transportation and introduction into the

Honolulu 1/31/93
Sunday Star-Bulletin & Adver.
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Climate change reduces wildlife in island chain

JAN TENBRUGGENCATE
Advertiser Environment Writer

An unusual climate change during the late 1970s and early 1980s made the ocean around the Northwestern Hawaiian Islands much richer in life than normal.

The result was the well-fed seabirds raised keikis like crazy. Seals produced more and healthier pups than usual. Even reef fishes and lobsters grew in numbers. All because of weather conditions that mixed nutrient-rich deep ocean water with the less fertile surface waters. The increase in mid-North Pacific fertility resulted in burgeoning ocean and birdlife populations right up the food chain.

"What we were seeing was a lot of changes in biological rates," said Jeffrey Polovina, chief of insular resources for the Honolulu Laboratory of the National Marine Fisheries Service, who developed the hypothesis explaining changes in productivity with University of Hawaii oceanographer Gary Mitchum.

For the researchers who study biology in the Northwestern Hawaiian Islands, the difficulty has been that much of their best data is fairly recent. They don't have a good biological record that goes back several decades, and many of the better baseline studies only date back to the mid-1970s.

As a result, when populations of many species seem to begin declining after about 1983, it appeared there was something bad happening in the environment.

Meteorological records, though, go back much farther. The last time similar conditions to those of 1977 to 1983 occurred was about 1926, Polovina said.

He said the meteorological information suggests that instead of high normal productivity dropping, the situation was a case of abnormal productivity simply returning to normal, he said.

Ken McDermond, refuge manager for the Pacific remote island refuges of the U.S. Fish and Wildlife Service, said there is no question that production has dropped among certain seabird species that nest in the Northwestern Hawaiian Islands, notably at French Frigate Shoals.

He said there have been cases of birds abandoning their eggs, and of chicks dying of starvation on their nests.

Hawaiian monk seal expert Bill Gilmartin, of the National

Tern Island in French Frigate Shoals: Number of wildlife is dropping in the Northwestern Islands.

Marine Fisheries Service, said his agency has saved about 20 starving seal pups from French Frigate Shoals. They are being fed until they are healthy again, and will be released at Midway, where "seals are heavy and look real good."

Polovina said French Frigate Shoals may be near its carrying capacity for monk seals. Gilmartin said the extensive reef and sand bar complex about 400 miles northwest of Kauai is home to several hundred animals and is responsible for about half the total Hawaiian monk seal births each year.

Gilmartin said monk seal births at French Frigate Shoals were about 120 each year from 1987 to 1988, then dropped precipitously to the 80s in 1990 and 1991. They rose to 102 in 1992.

Additionally, many of the pups born during the past three years have died, apparently of starvation.

"Indications are that there is some sort of major food problem. There are very few animals left in the 1- to 2-year age class," Gilmartin said.

Polovina said the delay in the seal birth and survival decline after a mid-decade change in ocean fertility fits his hypothesis. Many of the fish and crustaceans on which seals feed had good reproduction through the middle '80s, and then took another couple of years to grow to the size at which seals feed on them, meaning seal populations remained well fed for several years after the decline.

That the seals did decline starting in 1990 suggests "the seals are feeding on something that's been impacted," Polovina said.

He said there has been a decline in the number of lobsters reaching the age of three, roughly the time they are big enough to be caught commercially or for predators.

There has also been a decline in numbers of several species of reef fishes at French Frigate Shoals. Researchers in December 1992 set traps and found reductions in goatfish (*weke*) and other species.

Polovina said he believes that a decline in the production of small crustaceans and other food for the non-vegetarian fishes is responsible for the decline in their predators.

As for the open-ocean seabirds that nest at French Frigate Shoals, bird researchers noted that reproductive success during the high-fertility period was as much as 90 percent, and that it has dropped to 60 percent today.

Polovina said species like the red-footed booby and the red-tailed tropic bird feed on squid and flying fish in the open ocean, and the amount of food jumped during the period of high fertility.

Seabird Temperature Regulation

G. CAUSEY WHITTOW, PETER M. MATHIU, AND WILLIAM R. DAWSON

The Ontogeny of Thermoregulation in Tropical Seabirds

Based on quantitative measurements, we ranked five species according to the magnitude of their responses to heat and to cold. Three species of tropical seabirds on Manana Island and two species of albatross at Midway Atoll, in the Hawaiian Islands, revealed that an increase in metabolic heat production during exposure to cold (endothermy) was first detectable in the hatchling. In no instance did the embryo in situ in the egg increase its heat production. This qualitative similarity among the five species was in accord with their classification as semi-precocial, which is based on the maturity of their hatchlings. But the quantitative ranking revealed substantial differences among species that, according to cruder, more qualitative criteria, are nominally the same, i.e. semi-precocial. Our results support the concept of a continuous spectrum of hatchling maturity rather than distinct categories.

Figure 1.
Laysan albatross on an egg with a pip-hole at Sand Island, Midway.
G.C. WHITTOW

BIRDS' EGGS OFFER UNPARALLELED OPPORTUNITIES to study embryonic growth, development, and function. Like mammalian embryos, avian embryos develop at a constant, high temperature. Unlike mammals, however, birds develop in an egg that is outside the body of the parent (Figure 1). Provided that it is kept warm and turned regularly, the avian egg may be incubated artificially, and it will produce a hatchling that is every bit as viable as one resulting from an egg incubated by a parent bird. The egg contains everything that the embryo needs for its growth and development. During incubation, the egg may readily be exposed to different experimental conditions in the laboratory. For this reason, advances in our understanding of embryonic function will likely come from studies of birds' eggs—they are simply more amenable to investigation. Here we describe a study of the development of one physiological function—thermoregulation—in the embryos of five species of tropical seabirds. Tropical seabirds breed on islands where thermal conditions can be extremely demanding, and the thermoregulatory ability of the embryos and hatchlings may be crucial to their survival. Birds and mammals share many features of their thermoregulation. Both are "homeothermic," which means that they regulate their body temperature within narrow limits and at a high level, well above the temperature of their surroundings. Birds and mammals are also endothermic, a term indicating that they can increase their body temperature by generating a considerable amount of heat within their body tissues during exposure to cold. Consequently, information gained more easily from birds may apply to mammals, including ourselves.

Manana Island: The Problem

In the early spring, sooty terns (*Sterna fuscata*) (Figure 2) return to Manana Island in the Hawaiian Islands and lay their single eggs on the old volcanic slopes. The eggs are laid directly on the ground—without even the pretense of a nest—and should the incubating bird forsake its duties, the egg would be exposed to the prevailing wind, rain, or sun. Farther up the slopes, their charadriiform cousins, the brown noddies (*Anous stolidus*) (Figure 6) perform a similar feat. Later in the year, when conditions are somewhat warmer, the wedge-tailed shearwaters (*Puffinus pacificus*) (Figure 8) lay their eggs in the security of a burrow in the ground.

What does this mean in terms of the development of thermoregulation in the three species? Are the eggs of the sooty tern hardy, in the sense that

NATIONAL GEOGRAPHIC RESEARCH & EXPLORATION 8(1):96–107; 1992

Figure 2.
Sooty tern and egg on Manana Island.
G.C. WHITTOW

they can withstand temporary cooling or overheating, and the shearwater embryos more fragile, needing the protection of the burrow to avert extremes of exposure? We know that the embryos, especially the very young embryos, of many birds can survive cooling to surprisingly low temperatures—and to a lesser extent, heating to high temperatures. The tissues of the embryo are passively tolerant to low or high temperature.

But could the sooty tern, brown noddy, and wedge-tailed shearwater embryos respond actively to lowered temperature by increasing their metabolic heat production to compensate for the increased heat loss? Do the three species differ in this respect? We know that they differ in the size of their eggs, which may have a bearing on the responses of the eggs to changes of temperature. A large egg would cool more slowly than a smaller one, but ironically, the shearwater has the largest egg of the three species, and its egg, in its underground burrow, is also the most protected of the three eggs.

Some similarities among the three species might be germane to the development of thermoregulation in their embryos. The sequence of events during pipping of the eggshell prior to hatching is the same in the three species. Pipping involves fracture of the shell and penetration of the air-cell of the egg, both of which have the potential of increasing the oxygen consumption and metabolic heat production of the embryo. The newly hatched chick (hatchling) has a similar degree of maturity in the three species; all are designated semi-precocial, and all might be expected to have a similar thermoregulatory capability.

Whether the sooty tern, brown noddy, and wedge-tailed shearwater embryos achieved the ability to respond actively to changes in their envi-

G. CAUSEY WHITTOW, chairman, Department of Physiology, John A. Burns School of Medicine, University of Hawaii, Honolulu, HI 98622.

PETER M. MATHIU, lecturer, Department of Veterinary Physiology, College of Agriculture and Veterinary Sciences, University of Nairobi, Kenya.

WILLIAM R. DAWSON, director, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109.

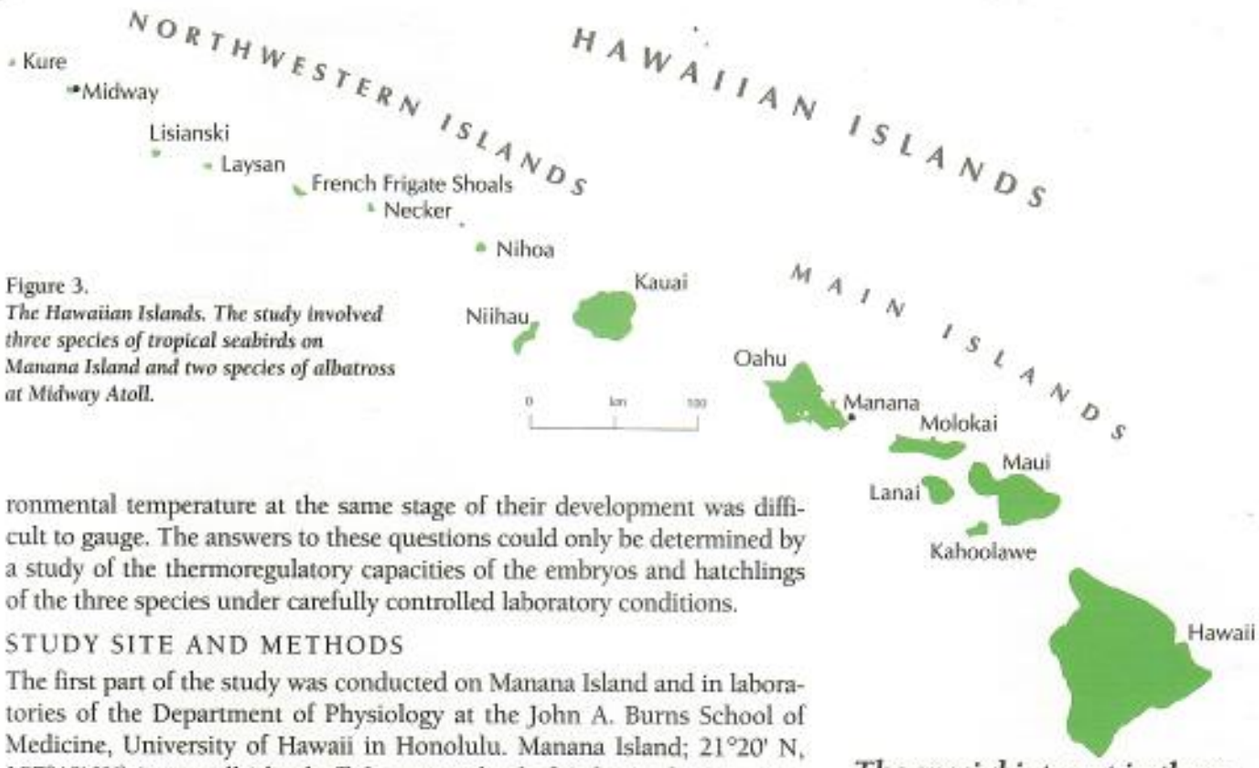

Figure 3.
The Hawaiian Islands. The study involved three species of tropical seabirds on Manana Island and two species of albatross at Midway Atoll.

ronmental temperature at the same stage of their development was difficult to gauge. The answers to these questions could only be determined by a study of the thermoregulatory capacities of the embryos and hatchlings of the three species under carefully controlled laboratory conditions.

STUDY SITE AND METHODS

The first part of the study was conducted on Manana Island and in laboratories of the Department of Physiology at the John A. Burns School of Medicine, University of Hawaii in Honolulu. Manana Island; 21°20' N, 157°40' W) is a small island off the main island of Oahu in the Hawaiian Islands (Figure 3), rising to a height of 110 m and covering 25.5 ha. The center of the island is a crater—Manana is an example of a tuff-cove, a volcanic eruption that blasts its way through the ocean in an explosion of steam and fine brown ash.

Eggs of the three species were collected on the island and transported in insulated boxes by boat and car (a distance of 24 km) to the University of Hawaii. The eggs were placed in a commercial, forced-draught incubator at a temperature corresponding to the known egg temperature of eggs incubated under natural conditions (36 to 38°C). The relative humidity in the incubator was 60%.

The experimental plan was to expose eggs to various environmental temperatures and to measure their responses at the following stages of development :

- unpipped eggs, immediately prior to pipping, in which the shell was intact and the embryo had not punctured the air-cell inside the egg (Figure 4);
- externally pipped eggs, i.e. eggs in which the shell had been fractured by the embryo;
- internally pipped eggs in which the embryo had penetrated the air-cell in the egg, with its beak;
- eggs with a pip hole, an overt hole in the shell allowing the embryo to breathe fresh air; and
- hatchlings.

Thus, embryos at five different stages of development were studied. Each egg or hatchling was exposed to a particular air temperature for one and a half (eggs) to two (hatchlings) hours, and measurements were made of

The special interest in these birds stems not only from their large size but also from the sequence of events during pipping of their eggs. In contrast to the situation in the three species that we have been investigating on Manana Island, the albatross embryo penetrates the air-cell in the egg first and subsequently cracks the shell. This sequence imposes a set of constraints on the development of thermoregulation in the albatross that differs from those in the three species of birds on Manana.

CORRESPONDENCE

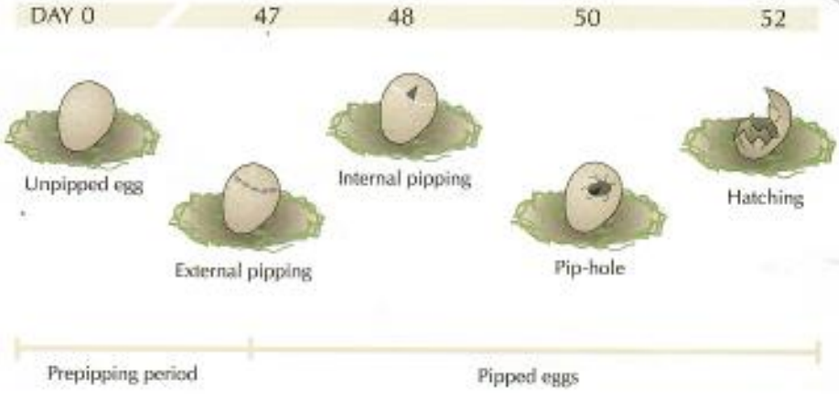

Figure 4.
Pipping sequence in the egg of the wedge-tailed shearwater.

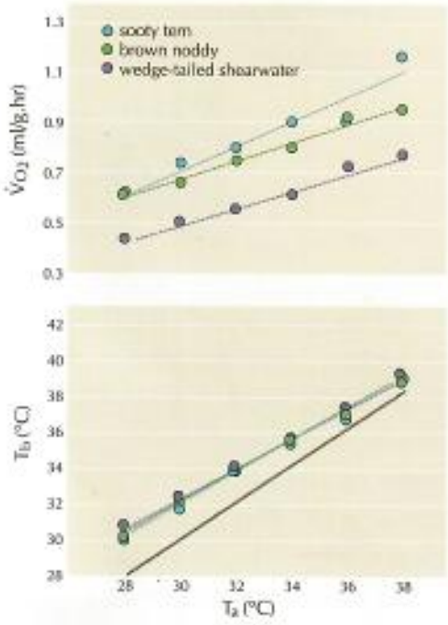

Figure 5.
Top: *Oxygen consumption ($\dot{V}_{O_2}$) of the unpipped eggs of the sooty tern, brown noddy, and wedge-tailed shearwater at various ambient temperatures (T_a). The lines are the fitted regression lines.*
Bottom: *Body temperature (Tb) of the embryos at various ambient temperatures. The gray line represents the identity of body temperature and ambient temperature.*

oxygen consumption and body temperature at the end of the experimental period. In the hatchlings, respiratory frequency and total evaporative water loss were also measured.

The egg or hatchling was contained in a ventilated Plexiglas chamber placed in a Hotpack environmental chamber which provided air at the desired temperature. Dry air was drawn through the egg / hatchling chamber by means of a pump; the air-flow rate was measured with Brooks flowmeters. The oxygen content of the dried, carbon dioxide-free effluent air from the chamber was measured by means of an Ametek Applied Electro-chemistry Oxygen Analyser (Model S-3A/11). The moisture content of the effluent air was determined by passing the air through weighed tubes of a drying agent (Drierite). From the air-flow rates and the differences in oxygen and water content of the air entering and leaving the chamber, the oxygen consumption and total evaporative water loss could be calculated. Respiratory frequency was detected from air pressure changes in the chamber measured by means of a Grass pressure transducer and polygraph. Air and body temperatures were measured by means of Yellow Springs Instrument thermistors and telethermometers: In hatchlings, the thermistor probe was inserted into the rectum; in eggs with pip holes, the probe was inserted through the pip hole so that its tip lay between the folded limbs of the embryo and its body; and in eggs without pip holes a needle thermistor was inserted into the egg until its tip was approximately in the center of the egg.

RESULTS AND DISCUSSION

UNPIPPED EGGS. The oxygen consumption of unpipped eggs diminished with decreasing temperature, as was true also for the body temperatures of the embryos (Figures 5). None of the unpipped eggs in the three species of birds showed any sign of incipient endothermy (increased metabolic heat production) in response to a lowered environmental temperature. Evidence for endothermy would have consisted of increased oxygen consumption, oxygen consumption maintained at the level prevailing at incubation temperature (35° C), or, at the very least, a diminution in oxygen consumption with temperature at a rate less than that predicted from the purely physical effect of temperature on chemical reactions, i.e. the Van't Hoff–Arrhenius effect (assuming a Q_{10} value for the effect of temperature on biological oxidations of 2). But perhaps the embryos in unpipped eggs were too immature to respond.

Figure 6.
Brown noddy and egg on Manana Island.
G.C. WHITTOW

Alternatively, the embryos may not have increased their oxygen consumption because the rate of diffusion of oxygen into the egg was limited by the pore structure of the shell. The embryo obtains its oxygen by diffusion from the air outside the egg through microscopic pores in the shell.[1,9] The diffusion of oxygen into the egg is driven by the difference between the partial pressure of oxygen inside the egg and that outside. If the embryo's demand for oxygen increases—as it might during exposure to cold in order to produce more heat metabolically—the rate of diffusion of oxygen into the egg might not be able to keep up with the demand. The number of pores and their size do not change; consequently, they limit the rate at which oxygen can enter the egg. H. Tazawa and coworkers[10] described this phenomenon as "effectively 'throttling' the embryo's heat production capacity." An increased rate of diffusion of oxygen could be accomplished by increasing the difference in partial pressure of oxygen across the shell. However, increasing the difference in partial pressure can only be achieved at the expense of lowering the oxygen pressure inside the egg because the partial pressure of oxygen in the fresh air outside the egg is constant. There is a limit to the degree to which the partial pressure of oxygen inside the egg can decrease without subjecting the embryo to the adverse effects of a deficiency of oxygen (hypoxia).

EXTERNALLY PIPPED EGGS. The behavior of the oxygen consumption and body temperatures of the externally pipped eggs was similar to that of unpipped eggs in that both diminished with decreasing temperature. The absence of an increase in oxygen consumption in externally pipped eggs

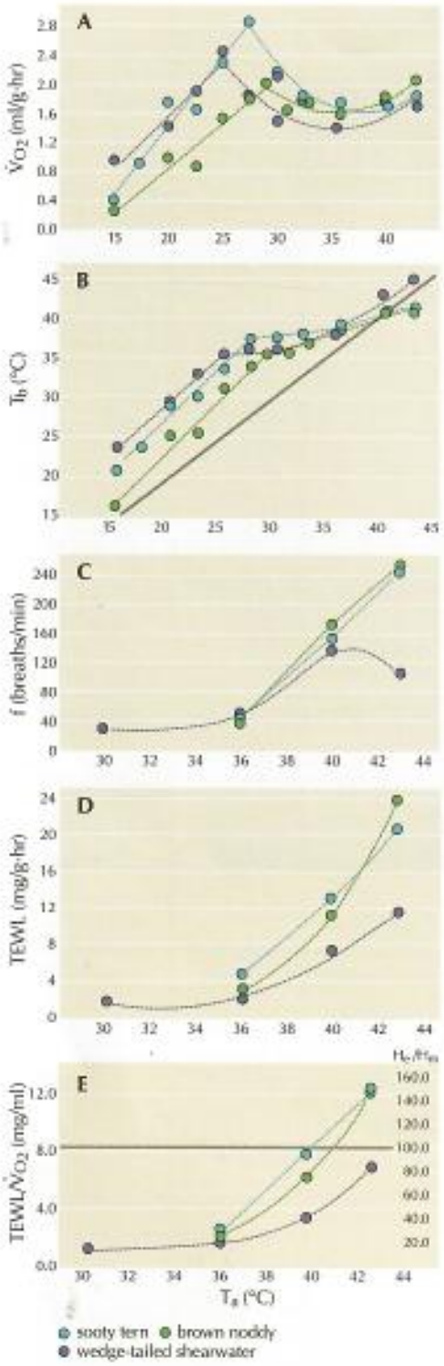

Figure 7.
Measurement at various ambient temperatures of hatchlings': A. Oxygen consumption. B. Body temperature. Gray line represents the identity of body temperature and ambient temperature. C. Respiratory frequency (f). D. Total evaporative water loss (TEWL). E. Ratio of TEWL/oxygen consumption ($\dot{V}_{O_2}$), and of total evaporative heat loss (H_e)/heat production (H_m). Gray line represents $H_e = H_m$.

during cooling allowed us to eliminate the possibility that the similar absence of a response in unpipped eggs could be attributed to the restriction on the rate of diffusion of oxygen imposed by the pores in the eggshell. The fracture of the shell in externally pipped eggs greatly increases the ease with which oxygen diffuses into the egg.[11] The failure of the embryos of externally pipped eggs to increase their oxygen consumption in the cold suggests that the embryos did not have the ability to do so.

INTERNALLY PIPPED EGGS. The oxygen consumption of internally pipped eggs was higher than that of both externally pipped and unpipped eggs even at the normal incubation temperature (that is, before the eggs were cooled) in keeping with the larger size and greater maturity of the embryos in internally pipped eggs. However, the responses of the oxygen consumption and embryo temperature to changes in environmental temperature were similar to those of externally pipped and unpipped eggs, in that the oxygen consumption and body temperature diminished with decreasing air temperature. When the embryo penetrates the air-cell with its beak, as it does in internally pipped eggs, increased opportunities for increasing oxygen consumption arise from the initiation of pulmonary ventilation, when the embryo begins to use its lungs, rebreathing the air in the air-cell. This provides another avenue for increasing oxygen uptake, but it is limited by the embryo's ability to tolerate a low partial pressure of oxygen in the air-cell gas as the embryo consumes the oxygen.

EGGS WITH PIP HOLES. Eggs with overt pip holes respond to changes of air temperature similarly to those of the younger eggs. However, in the wedge-tailed shearwater, several eggs with pip holes hatched or were in the process of hatching during the measurement periods. In all instances, and at various air temperatures, the oxygen consumption of these hatching eggs was higher than that of eggs with pip holes that did not hatch.

Formation of a pip hole in the shell permits the embryo to breathe fresh air. Thus, the embryo in such an egg can use its lungs to obtain additional oxygen over and above that which diffuses through the shell. Furthermore, the embryo is not subject to exposure to hypoxia or to limitations imposed by the number and size of pores in its shell. The embryo in an egg with a pip hole is free from a number of constraints to which younger embryos are subject. In addition, the embryo in such an egg is larger and more mature; in fact, it is almost ready to hatch.

One might expect such an embryo to be able to increase its oxygen consumption at lowered air temperatures. However, the embryos in eggs with pip holes did not respond to cooling in a way that could be construed to demonstrate nascent endothermy. On the other hand, eggs in the process of hatching consumed more oxygen at all temperatures than eggs with pip holes. The process of hatching seemed to result in a dramatic increase in oxygen consumption. Increased oxygen consumption was not simply caused by the increased activity of the embryo during hatching; the oxygen consumption of hatching embryos that were quiet during the measurement of oxygen consumption was also relatively high.

HATCHLINGS. In contrast to the failure of embryos in situ in the egg (regardless of age) to respond to a lowered air temperature with a sustained or increased oxygen consumption, the hatchlings of all three species increased their oxygen consumption (Figure 7A). The increase in oxygen consumption was associated with an attenuation of the decrease in embryonic temperature (Figure 7B).

Figure 8.
Wedge-tailed shearwater on Manana Island. Note white egg in burrow in the background.
G.C. WHITTOW

The oxygen consumption reached a maximum at air temperatures between 25°C and 29°C in the three species (Figure 7A). At lower air temperatures, the oxygen consumption declined concurrently with an accelerated rate of decline of body temperature (Figure 7B). These results show hatching to be a climactic event in the development of thermoregulation in the three species. The reasons for this are unclear, but the emancipation of the embryo from the physical constraints imposed on it by the shell, must be important, allowing the embryo to move its limbs and augment its breathing movements. Also, the shearwater evinces a response of the respiratory system to a chemical stimulus (carbon dioxide) that is quite different in the late embryo (egg with pip hole) than in the hatchling.

At air temperatures above the incubation / brooding temperature of 36°C, oxygen consumption increased as did body temperature (Figure 7A&B). At the highest air temperature (43°C), the sooty tern and brown noddy maintained their body temperature below ambient temperature, but the wedge-tailed shearwater hatchling was unable to do this. At high air temperatures, respiratory frequency increased in all three species (Figure 7C). The highest respiratory frequencies occurred in the two smaller species; in the wedge-tailed shearwater, respiratory frequency reached a maximal value at an air temperature of 40°C, and at 43°C the frequency declined. Total evaporative water loss also increased at higher air temperatures (Figure 7D), the greatest increase occurring in the sooty tern and brown noddy. In the sooty tern and brown noddy, but not in the shearwater, the evaporative heat loss exceeded the metabolic heat production (Figure 7E), enabling these two species to maintain their body temperature below ambient temperature (Figure 7B).

The author has paid particular attention to the critical period late in incubation and during pipping and hatching, when the unhatched chick is well-developed and begins to ventilate its respiratory system. It is thus theoretically able to increase oxygen consumption and metabolic heat production and also to effect evaporative cooling, both of which may be needed depending on environmental conditions and parental attentiveness.

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Table 1. **Thermogenic Capacity, Thermal Conductance, and Evaporative Heat Loss of Hatchlings**

Species	Body mass (g)	Thermogenic capacity*	Thermal conductance† (%)	Evaporative heat loss** (%)
Sooty tern	22.5	1.64	193.7	150
Brown noddy	23.9	1.28	248.2	150
Wedge-tailed shearwater	37.4	1.74	216.2	40

*Maximal oxygen consumption ÷ oxygen consumption at thermoneutral temperatures.
†Calculated ÷ predicted.[2]
**Total evaporative heat loss ÷ heat production.

CONCLUSIONS

At the outset of the study, we expected the differences in the size of the eggs and hatchlings of the three species, as well as the variations in their breeding ecology, to be associated with demonstrable differences in the way in which thermoregulation develops in the three species. The results of the investigation have shown that, in fact, the three species were qualitatively similar in this respect. Thus, none of the eggs increased its oxygen consumption, and hence heat production, in response to cooling, whereas all three hatchlings showed well-defined responses to both heating and cooling. The three species shared another attribute that was considered to have a direct bearing on the development of thermoregulatory ability in the embryo, viz. the sequence of events during pipping of the egg just prior to hatching was similar. The maturity of the hatchlings was also nominally similar among the three species. All three species are considered to be "semi-precocial." That is, the hatchlings have a covering of down, and although they are mobile, they remain at the nest.[4] Were the three features—development of thermoregulation, pipping sequence of the eggs, and the maturity of the hatchling—all linked? This question could not be answered on the basis of our work on Manana Island, but we conjectured that further light could be thrown on the problem by studying the albatross on Midway.

Midway Islands: The Solution

In the subtropical winter, the Laysan (*Diomedea immutabilis*) (Figure 1) and black-footed (*D. nigripes*) (Figure 9) albatross return to Midway (Figure 3) in the northwestern Hawaiian Islands to lay their eggs. The single egg is laid in a small mound that provides little protection for the egg except perhaps to reduce the possibility of the egg's becoming waterlogged during heavy rain. At ~300 g, the eggs are much larger than the 60-g egg of the wedge-tailed shearwater on Manana Island. Although related — the shearwater and the albatross are both members of the order Procellariiformes—the shearwater and albatross differ in another respect: In the albatross the pipping process starts with internal pipping, followed by fracture of the shell. Thus, if the sequence of events during pipping is an important determinant of the development of thermoregulation, there should be a noticeable difference between the shearwater and the albatross in the responses of the eggs to cooling.

Figure 9.
Black-footed albatross with hatchling. Sand Island, Midway.
G.C. WHITTOW

STUDY SITE AND METHODS

Midway Atoll (28°13' N, 177°23' W) is made up of two small islands—Sand Island and Eastern Island—and a circling reef. We studied albatross on Sand Island where the two species nest extensively in contiguous areas. The black-footed albatross is slightly larger than the Laysan albatross, and it begins to lay its eggs a few weeks earlier.[8] The incubation period of the two species is very similar[3] and so is the sequence of events during pipping.

The procedure and methods were similar to those employed in the study of the three species on Manana Island. However, we studied only two stages of development in the albatross: eggs with pip holes and hatchlings. Furthermore, the eggs and hatchlings were exposed only to lower air temperatures; their responses to temperatures above their normal incubation temperature were not investigated. A larger Plexiglas chamber was required to contain the larger albatross eggs and hatchlings, and the air temperature in the chamber was changed by immersing the chamber in a Grant thermostatically-controlled water bath. The albatross eggs or hatchlings were exposed to a changed temperature for a longer period—three hours, in keeping with their larger size.

There are both theoretical and applied implications to this work, and these of course are not disconnected from each other. In general, it is difficult to convert homeotherms into heterotherms but this is a potentially extremely useful procedure if it could be made to work (hypothermia in surgery, for example).

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RESULTS AND DISCUSSION

EGGS WITH PIP HOLES. The embryonic oxygen consumption and body temperature in eggs with pip holes diminished at low air temperatures in both species of albatross. In other words, there was no evidence that the albatross embryos could increase their oxygen consumption or maintain their body temperature when they were cooled. In this respect they resembled the sooty tern, brown noddy, and wedge-tailed shearwater. However, it was again recorded that the oxygen consumption of eggs that were hatching, or had just hatched at the time the measurements were made, was considerably higher than that of eggs in which the pip hole had not been extended as part of the hatching process. More oxygen was consumed at all air temperatures at which the phenomenon was observed.

HATCHLINGS. In contrast to the behavior of embryos in situ in the egg, most of the hatchlings increased their oxygen consumption in response to cooling and, concomitantly, attenuated the rate of fall of their body temperature. The fact that a minority of hatchlings failed to show such a response suggests that at some time during the first 24 hours of the hatchling's life a transition occurs from a poikilothermic state to a condition of partial endothermy. The poikilothermic embryo or hatchling cannot prevent its body temperature from falling when exposed to cold. The endothermic hatchling has acquired the ability to generate more heat in response to cold, which enables it to counter the increased heat loss in the cold and thus to attenuate the decrease in body temperature.

CONCLUSIONS

There was no evidence of nascent thermoregulation in the embryo as long as it was in situ in the egg. The act of hatching was the signal for the relatively abrupt appearance of endothermy. In this respect, the albatross resembled the shearwater, the noddy, and the tern, although in the albatross species the sequence of events during pipping differed from that of the other three species, and the albatross is much larger than the other species. Apparently the larger size of the albatross eggs and the events during the later stages of incubation (i.e. pipping) did not influence the development of thermoregulation. We conclude that the similarity among the five species in the way in which their thermoregulatory capacity develops is related to the degree of maturity of the hatchling.

All five species are nominally semi-precocial, based on easily observed features such as the mobility of the hatchling, the care accorded it by the parent bird, the nature of the downy integument, and so on. The designation "semi-precocial" had set the stage for the first appearance of endothermy in the hatchling. The quantitative nature of the responses of the hatchling of the sooty tern, brown noddy, and wedge-tailed shearwater to both heat and cold allowed us to test whether the three species could be ranked within the overall category of semi-precocial on the basis of their thermoregulatory responses.

There was a precedent for ranking hatchlings within the traditional categories; quantitative rankings based on the yolk content of the freshly laid egg, for example, are believed to be a more precise, albeit a more cryptic, yardstick of hatchling maturity.[3] The connection between egg yolk content and hatchling maturity is that a great deal of yolk in the egg is required to supply the energy and materials necessary for the development of a mature hatchling.

We compared the three Manana Island species as to the thermogenic capacity of the hatchlings, i.e. the maximal increase in heat production during exposure to cold, their thermal conductance (the inverse of insulation), and their responses to heat exposure (Table 1). The wedge-tailed shearwater had the highest thermogenic capacity but the poorest physiological response to high temperatures, the latter feature perhaps being related to its larger size and to the fact that its burrow habitat protects it from exposure to solar radiation. The brown noddy was the least cold tolerant, which seemed to be partly a result of a smaller thermogenic response to cold and partly due to inferior insulation (higher conductance). The ranking based on their endothermic responses to cold corresponded to that based on the yolk content of the freshly laid egg.[7] The significance of this comparison is that even within categories of maturity of the hatchling—semi-precocial in this instance—different species can be ranked according to their quantitative responses to cold. This conclusion is in accordance with the belief that the maturity of hatchlings represents a continuous spectrum from the least to the most mature. Thus, the assessment of thermoregulatory capacity discriminates among species that would otherwise be grouped together according to the cruder classification based on observation of the hatchling.

The defense of the late embryo to overheating of the egg, such as occurs when the eggs are exposed to solar radiation, resides in evaporative cooling. Just as the heat production of the egg is facilitated by the pipping process, the capability of increasing water loss is also enhanced.

NGS GRANT PROPOSAL

REFERENCES

1. **Ar, A.; & Rahn, H.:** Pores in avian eggshells: Gas conductance, gas exchange and embryonic growth rate. *Respiration Physiology* 61:1–20; 1985.

2. **Calder, W.A.; & King, J.R.:** Thermal and caloric relations of birds. Farner, D.S. & King, J.R., editors: *Avian Biology*, vol.4, 259–413. Academic Press, New York; 1974.

3. **Carey, C.; Rahn, H.; & Parisi, P.:** Calories, water, lipid and yolk in avian eggs. *Condor* 82:335–343; 1980.

4. **Nice, M.M.:** Development of behavior in precocial birds. *Transactions of the Linnean Society of New York* 8:1–211; 1962.

5. **Pettit, T.N.; Grant, G.S.; Whittow, G.C.; et al.:** Embryonic oxygen consumption and growth in the Laysan and black-footed albatross. *American Journal of Physiology* 242:121–128; 1982.

6. **Pettit, T.N.; & Whittow, G.C.:** The initiation of pulmonary respiration in a bird embryo: Tidal volume and frequency. *Respiratory Physiology* 48:209–218; 1982.

7. **Pettit, T.N.; Whittow, G.C.; & Grant, G.S.:** Caloric content and energy budget of tropical seabird eggs. Whittow, G.C. & Rahn, H., editors; *Seabird Energetics*. Plenum Press, New York, 113–137; 1984.

8. **Rice, D.W.; & Kenyon, K.W.:** Breeding cycles and behavior of Laysan and black-footed albatrosses. *Auk* 79:517–567; 1962.

9. **Tazawa, H.:** Embryonic respiration. Seller, T.J., editor: *Bird Respiration*, vol.2, 3–41. CRC Press, Boca Raton, FL, 3–41; 1987.

10. **Tazawa, H.; Wakayama, H.; Turner, J.S.; & Paganelli, C.V.:** Metabolic compensation for gradual cooling in developing chick embryos. *Comparative Biochemistry and Physiology* 89A:125–129; 1988.

11. **Whittow, G.C.:** Physiological ecology of incubation in tropical seabirds. Schreiber, R.W., editor: *Tropical Seabird Biology. Studies in Avian Biology*, no.8, 47–71; 1984.

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Biologists removing oil spill on Laysan Isle

Advertiser Staff and News Services

Two U.S. Fish and Wildlife Service biologists on Laysan Island are working to clean up an oil spill on the remote speck of land, home to millions of seabirds, endangered Hawaiian monk seals and green sea turtles.

John Naughton, Pacific Islands environmental coordinator for the National Marine Fisheries Service, said yesterday the two biologists reported 15 monk seals matted with oil from the spill, five of them heavily.

"Our recommendation was not to try and clean the seals because they are very vulnerable to stress," Naughton said. "We recommended they rake the oil in piles so the seals and turtles aren't hauling through it, and burn it when the wind conditions are right."

The oil began washing ashore March 26, according to the two Fish and Wildlife Service biologists stationed on the island 850 miles northwest of Honolulu.

They reported tar balls and odd-sized clumps of oil were found along about five miles of the seven-mile coastline. Heavy surf later concentrated the oil along 350 feet of the southeastern shoreline.

Naughton said that initially wildlife officials were afraid the oil was part of a large spill. But, he said, it appears that the oil that washed ashore is an isolated patch probably vented — "accidently or purposely" — by a large passing ship.

A National Marine Fisheries research vessel is due to visit Laysan in a week or so, he said, and will check out the seals and obtain samples of the oil for analysis by the Coast Guard. With luck, he said, the analysis will pinpoint where it came from.

"Certainly it would be nice if the public was aware that spills even in very remote areas can have dire consequences," Naughton said.

Laysan Island is home to more than 250 Hawaiian monk seals, green sea turtles and more than 2 million birds.

BY MARK JEROME WALTERS

AND THEN THERE WAS ONE

THE HAWAIIAN MONK SEAL IS THE LAST OF A VANISHING GENUS.

In the *Odyssey*, when Homer describes certain frolicking sea mammals as "brine children," he may have been referring to the Mediterranean monk seal. Once common throughout that sea, now fewer than 500 survive, withdrawn to remote caves and beaches. The complicated territorial boundaries of the region make coordinated recovery efforts all but impossible. The "brine children" of humankind's first great epic poem will almost certainly be extinct within a few lifetimes.

A second species of monk seal lived a world away in the Caribbean Sea. Noted by Christopher Columbus in 1494 during his second New World voyage, it was widely slaughtered for skins and oil. By 1887, according to one observer, it had become an "almost mythical species." Although officially listed as endangered, the last of the species probably vanished in the 1950s.

The third species of the triplet genus *Monachus* – the only one with even a slight hope of survival – still miraculously survives in the Pacific. The Hawaiian monk seal remains thinly scattered over its historic range on the northwestern Hawaiian archipelago, from Midway and tiny Kure Atoll almost to Kauai. Most of the places they choose to breed are uninhabited by humans.

While the Mediterranean and Caribbean seals were noted long ago by famous sailors, sightings of the Hawaiian monk seal were not recorded until 1825, at Kure Atoll. Shortly after their discovery, a series of shipwrecks on the atoll's reef left the docile animals vulnerable to hungry, stranded sailors. Then, in 1960, a Coast Guard station was established, opening the area to further disturbance.

On Midway, meanwhile, a series of developments profoundly disrupted the seals there: an attempt to blast a ship channel through the coral reef in

Peter Lanting/Minden Pictures

the 1800s; the construction of a cable station in 1902; and the building of an airport by Pan American Airways in 1935. World War II sparked large scale use of the island.

Throughout numerous islands used by the seals, various expeditions and projects – from guano mining to harvesting of bird feathers – left much of the seals' habitat tattered.

In 1940, many of the islands and atolls were incorporated into the Hawaiian Islands National Wildlife Refuge, and, in 1967, the area was declared a Research Natural Area. But much of the damage had been done, and the populations continued to decline. When counts of the seals began in 1956, there were thousands. Since then the numbers have been halved, and there are probably now under a thousand individuals.

As late as 1976, even some people within the National Marine Fisheries Service (NMFS) considered the Hawaiian monk seal disposable. They thought of the seal as a living fossil or "relict species," and that any attempt to save them would inveigh against nature. It was only the forceful arguments of John Twiss, executive director of the Marine Mammal Commission, that convinced Congress to appropriate money and order the NMFS to try to save the species.

With nature's balance so upset, the seals' ancient behavior patterns changed in myriad and grisly ways. As females were forced by human intruders to spend more time in the water, their pups became easy prey for tiger sharks and began disappearing at an alarming rate. Research in the 1960s showed that of 62 pups born on Kure during two summers, all but a single survivor either disappeared or were killed between the ages of 16 and 74 days.

As one generation of animals failed to be replaced, populations were becoming geriatric, and females scarce. An increase in the number of females on some beaches has led to a bizarre and violent phenomenon of "mobbing," in which more than two dozen males sometimes attack and try to mate with one female. The attacks may last for several hours, with the males ripping skin from the females' backs, tearing away blubber and muscles, and even the spinal column. The females often die from infections or, if they return to the water, are attacked and eaten by sharks.

Biologists hope to counteract the mobbing by giving some of the worst repeat offenders a drug to reduce the level of testosterone, the male "aggression" hormone. Meanwhile, the high pup mortality has been stemmed by "head starting," or keeping them in large fenced-in enclosures at the surf line to protect them from sharks and bulls until old enough to better fend for themselves. Injured pups are also caught and rehabilitated. Of the 51 rehabilitated or head-started females released since 1981, 41 were alive at the end of the 1991 season.

Fortunately, the number of females reaching sexual maturity – and the number of pups born – has increased. But these improvements may represent only moments of hope in the long history of decline. While research has identified some elements seemingly key to the seal's survival, the story of the many subtle factors that may determine its long-term survival may never be told. In effect, researchers are left to tinker with a few remaining pieces of an entire seagoing genus that has been dismantled and whose hope for survival may already have been thrown away.

Mark Jerome Walters' latest book is A Shadow and a Song: The Struggle to Save an Endangered Species *(Chelsea Green Publishing Company).*

3/15/93 ADVERTISER

Plan to close Navy unit on Midway gores nobody's ox

By Jon Yoshishige
Advertiser Staff Writer

While politicians and communities around the country agonize over the potential impact from the Defense Department's new base-closure list, nary a peep has been heard about the recommended closure of tiny Midway Island Naval Air Facility.

Fewer than 10 Navy personnel live on Midway — about 1,300 miles northwest of Honolulu — as do about 200 civilians, U.S. citizens who serve as supervisors and a contracted labor force of Filipinos, Thais and Sri Lankans.

The Defense Department itself recognized the political safety in recommending closing Midway's air facility: "Because of the light economic activity at this geographic area, there will be no significant impact on the local economy resulting from this recommendation."

But it wasn't always so.

The Battle of Midway, June 4-6, 1942, is generally considered World War II's most important U.S. naval victory; the turning point of the war in the Pacific. Nearly a thousand Marines were stationed there to repel a Japanese invasion, as were other military personnel and bombers, fighters and torpedo planes.

Before the war, the Commercial Pacific Cable Co. established a trans-Pacific cable relay station there in 1903, and in 1935, Pan American World Airways added a trans-Pacific Flying Clipper base.

After the war, Midway — which is actually an atoll with two principal islands, Sand and Eastern, and smaller islets — had its own school, theater and television station, and housed hundreds of military personnel and their dependents.

> "All environmental cleanup efforts (on Midway) will continue until complete."
>
> **— Defense Department**

But in 1982, all base functions formerly performed by military personnel were transferred to the civilian contractors. Most of its buildings were deserted; the "gooney birds," Midway's symbol, outnumbered humans.

The facility now serves primarily as a support base for Navy aviation units and a communications station, but also is a national wildlife refuge.

Closing the base "will perpetuate the restrictions" that result from the U.S. Fish and Wildlife Service's designating Midway a wildlife refuge, the Defense Department said. "All environmental cleanup efforts will continue until complete."

The facility is "excess to that needed to support forces in its geographic area," the department reasoned in recommending closure. "There is no operational need for this air facility to remain in the inventory even in a caretaker status."

Likewise, the department on Friday recommended closing Midway's landlord, Barbers Point Naval Air Station in Leeward Oahu.

Neither closure is final.

Closing Midway would have a one-time cost of $2.1 million, but would save $6.6 million annually, the Defense Department said.

HOME

Native portulacas weave a tapestry of ground cover

HAWAII GARDENS

By Heidi Bornhorst

Portulacas are small, usually succulent herbs. There are seven native Hawaiian species. There is also a weedy portulaca found in Hawaii, the purslane, *Portulaca oleracea*, and a cultivated one, the moss rose, *P. grandiflora*.

The native Hawaiian *Portulaca lutea* has yellow, single petaled flowers with one to three flowers blooming at the tips of the stems. The anthers of the flowers range in color from yellow to red.

This species is found on other Pacific Islands in Polynesia and Micronesia, as well as on Hawaiian shores and coastlines on the Northwest Hawaiian islands and on Oahu, Molokai, Lanai, Maui and Hawaii.

Portulaca molokiensis is a recently described species and comes from the offshore islets of Molokini and Puukoae, and from Kamohio Bay, Kahoolawe. It was described by State of Hawaii forester Robert Hobdy, who did a survey of the flora of the offshore islands of Maui County.

It has very succulent, overlapping leaves that give the plant an attractive and interesting appearance. The round, corky stems with their succulent leaves stand more upright than most other portulacas. The plants can reach a height of about one foot. The flowers are lemon yellow and are found in clusters at the tips of the leaves. When the plant is going to flower, it sends a leafless, flower-bearing stem above the succulent leaves. It is a federally listed endangered species.

Portulaca villosa has pale grayish green, narrow leaves. Three to six flowers are found at the tips of the stems. They are white, pink or pink with white centers. They grow naturally on dry, rocky, clay or coral sites on Nihoa, Kaula, and all the main islands except Kauai and Niihau. *Portulaca spp nova* from Olowalu (Olowalu 'ihi) is an undescribed species that is very rare. It has only been found in Olowalu valley, a dry valley on the west side of Maui. It has pale pink flowers with a white center, and yellow anthers.

PROPAGATION: The Hawaiian portulacas are very easy to grow. The succulent cuttings root easily and rooting hormones and mist systems are not necessary. Cuttings from 2-5" long are taken, the lower leaves removed, and stuck in a pot of potting mix. With daily watering they root easily in a couple of weeks.

Portulacas can also be grown from seed. The seeds are very tiny, round and brown or black. The hardest trick is sometimes finding the seeds before they are lost in the dirt. Sow them on firmed, premoistened media in a clean pot. Barely cover the tiny seeds, and firm the media again. When watering, do it carefully as the tiny seeds are easily washed to one side or out of the pot.

LANDSCAPE USE: Portulacas make a good ground cover, either alone, or mixed with other coastal ground cover plants to create a "Hawaiian tapestry" in your landscape. They grow well in pots of well drained media set in a sunny location. 'Ihi also make interesting specimens for the rock garden. They are good candidates for a xeriphytic, water-saving garden. Ornamental portulacas are heavy feeders. They require regular fertilization to maintain a thick mat as a ground cover, and to bloom consistently. Hawaiian ones probably are similar in this requirement. Fertilize regularly with slow release of organic fertilizer (like Complehumus 8-8-8, or fish emulsion) or with liquid foliar fertilizer (such as Miraclegro). Follow directions on the fertilizer label.

PESTS AND DISEASES: Few pests are known for portulacas. Overwatering should be avoided (as with all succulent plants) or they might rot.

□

Heidi Bornhorst is a local horticulturist with broad experience in the "green industry." You can write to her c/o the Home section, The Honolulu Advertiser, P.O. Box 3110, Honolulu, HI 96802.

Turns out OK for 2 left at Tern

THE HONOLULU ADVERTISER 10/5/94 A7

By Jon Yoshishige
Advertiser Staff Writer

It must have been the loneliest feeling in the world.

Two federal workers were stuck on a roughly 30-acre spit of sand hundreds of miles from civilization.

And a tsunami was coming.

The evacuation plane leaving Tern Island in the French Frigate Shoals yesterday morning was full, so Cris Dippel and Steve Barclay were forced to stay behind.

They climbed atop the roof of a generator building — the highest point on the flat island 550 miles northwest of Honolulu. The building was barely 20 feet high.

"We were worried to leave them behind," said Kaneohe's Elizabeth Sharpe, a U.S. Fish & Wildlife Service biologist who had to leave most of her belongings to make the evacuation flight on 15 minutes' notice.

Employees and volunteers with the National Marine Fisheries Service and Fish & Wildlife Service work year-round on Tern Island.

They do biological research, including studying endangered Hawaiian monk seals, sea turtles and migratory birds, said Ken McDermond, refuge manager for the Fish & Wildlife Service's Remote Island Refuge Complex.

Yesterday, four women and three men were working there, including a woman from the National Oceanic and Atmospheric Administration working on a weather station.

A twin-engine prop plane — and its two-person crew — that usually stops on Tern Island once a month happened to be there yesterday morning when the first tsunami warnings were issued, McDermond said.

There was room for just five passengers. The refuge's manager and assistant manager stayed behind.

If the tsunami hit, the two men would know how to clear the runway for relief planes, he said.

As it turned out, the tsunami never appeared.

After a 3½-hour flight, the plane landed at Honolulu Airport around 12:15 p.m., then went right back to Tern Island to return the three workers who weren't scheduled to leave yet.

Through it all, the pair left behind didn't lose their sense of humor.

"(One fellow) said he had his Diet Pepsi and hammock on the roof so he was OK," McDermond laughed.

Set up Laysan Island as site for storing radioactive waste

The state of Hawaii can earn a billion dollars and better Oahu environmentally by setting aside Laysan Island for the storage of radioactive waste.

Laysan is legally a part of Hawaii more than 900 statute miles distant from Oahu. The island has a land area of 790 acres, and a channel depth of over 16,000 feet.

One of the first applicants for the storage of radioactive waste on Laysan Island should be the Pearl Harbor Naval Shipyard. The accumulation of waste there and the safeguards in storage have been shown and explained to our legislators. Pearl Harbor is joined in this problem by naval shipyards and by commercial power reactors over the United States.

E. ALVEY WRIGHT
Kailua

The Honolulu Advertiser 1/29/95 EG

Good news for Hawaii's monk seals

Hawaii scientists concerned about the monk seal population are heartened by the prospect of humans leaving the northwestern Hawaiian Islands.

The Navy is cleaning up Midway as it prepares to pull out. The Coast Guard has already left Kure Atoll, after removing most buildings, antennas and other equipment associated with the former LORAN station.

The departures are important because there's plenty of evidence seals don't do well with people around.

But the scientists' optimism about the seagoing mammals lies against a dark backdrop. The seal population has dropped by more than half during the past 40 years, and is continuing to drop. It was between 2,500 and 5,000 in the late 1950s and is between 1,100 and 1,200 now, said William Gilmartin, chief of the protected species investigation for the National Marine Fisheries Service.

JAN TENBRUGGENCATE
Advertiser Environment Writer

The extensive human presence on Kure, Midway and Pearl and Hermes Reef, at the far western end of the Hawaiian chain, is the most likely reason for dramatic declines in seal populations on those islands, Gilmartin said.

"We're certain that the presence of people at Kure and Midway during the '60s and '70s had a very large impact on seals," he said. There has also been evidence of regular visits by people to Pearl and Hermes, he said.

In recent years, the National Marine Fisheries Service has been watching a dramatic decline in seal populations at French Frigate Shoals, but that's for a different reason. The seal population at the shoals was the biggest in the Islands, and was probably as large as that collection of reefs and sand spits could support.

Large scale climate changes have reduced the food available there, and the seal population has been dropping since 1989, along with lobster, seabird and probably other marine life populations, Gilmartin said.

It has meant that fewer seal pups have been born in recent years, and many of the pups have been starving. Researchers have been taking starving female pups, raising them for a year at Sea Life Park on Oahu and then releasing them at Kure Atoll.

Researchers next year will probably release the yearlings at Midway, in hopes of rebuilding the population there.

There's a different problem at Laysan and Lisianski, where there is an overabundance of male seals, compared to females. This has resulted in a form of seal violence called mobbing, in which females are injured by the attentions of multiple males.

Under the seal program, some males have been removed from Laysan and released around the main islands.

"Now we have to wait and see if that makes a difference. If that action proves to have been a benefit at Laysan, then there's the potential of applying it to Lisianski," Gilmartin said. "We just have to wait it out."

Thus, while numbers are dropping, there are indications that the seal population could bottom out and be ready for some recovery. Another piece of good news, Gilmartin said, is better funding for the marine mammal program.

"The program is funded better than it's ever been, so a lot of things that have needed attention will get attention this year."

Many options if Hawaii takes on Pacific isles

By Melissa Vickers
Star-Bulletin

THE environment vs. economics may be the key issue facing Hawaii if it takes control of five islands, an atoll and a reef in the Central Pacific.

Military, state, Hawaiian and environmental leaders met recently to tackle that and other issues and offer opinions on the proposal introduced in Congress.

All the islands present unique environmental challenges, said John Naughton, Pacific Islands environmental coordinator for the National Marine Fisheries Service.

"Their greatest resource is as a marine life and seabird habitat," he said. "As far as mining or a prison, I don't think you'd want anything on those islands that could endanger the wildlife populations."

The Hawksbill and green sea turtles, on the endangered species list, inhabit the islands, he said. One, Midway Island, is home to Hawaiian monk seals, which are on the brink of extinction.

A prison, a mining base, a fishing industry hub, a controlled ecotourism destination, a colony for native Hawaiians and an off-limits wildlife refuge are among options under consideration by Gov. Ben Cayetano.

Midway Island, Howland Island, Baker Island, Johnston Atoll, Jarvis Island, Palmyra Island and Kingman Reef have unique attributes, histories and possible resources, said Gregory Pai, director of the Office of State Planning.

Annie Szvetecz, with environmental conservation group Life of the Land, said she is mainly concerned with ensuring no mining, extensive development or shipping be allowed.

"Environmental cleanup, and who will pay for it, is also a big question," she said. "It would be difficult to mitigate anything, including an oil spill, from this far without a lot of money."

Robert Smith, head of Hawaii's U.S. Fish and Wildlife Service, said the agency wants to make sure the area it now controls as part of the national wildlife refuge system stays protected as marine and seabird habitats.

The agency is not opposed to transition as long as it doesn't interfere with wildlife or delay or change cleanup costs for some islands

U.S. Rep. Patsy Mink said she won't support HR 602, which would allow the transfer, until legal, cost and cleanup questions are answered.

Cleanup costs for those islands, which had or have military installations, isolation of the islands, and natural resource rights and uses were issues touched on during the Office of State Planning workshop.

No matter what is eventually done with the islands, it is clear Hawaii should jump at the chance to acquire some control, said John Wiltshire, there from the University of Hawaii to discuss mineral uses. Wiltshire represented the Department of Business, Economic Development and Tourism.

Wiltshire said large deposits of cobalt off some of the islands make them valuable mineral resources. "Not in this century, but for the next. Cobalt is starting to run out in areas that have traditionally supplied it, which is what makes this so attractive."

Szvetecz said any mining, even if done offshore, is too much of a wildlife threat to even consider.

Wiltshire said many environmentalists might not be aware that new mining technologies are virtually pollution-free operations.

"By the time mining would start there, technology will have advanced those methods even more."

One of the territories in question, which includes Palmyra Island and Kingman Reef, is privately owned. Ainsley Fullard-Leo, part-owner of the island and reef, said no one has asked his opinion on what should be done.

Island snapshots

MIDWAY ISLAND

- **History:** Originally called Brooks Island by discoverer Captain N.C. Brooks in 1859, it was renamed by the Navy for its position about halfway between California and Japan. The island was a base for naval operations for many years.
- **Status:** Administered by the Navy, it is largely a wildlife refugee. Partial withdrawal by military is planned.

WAKE ISLAND

- **History:** The major stop off and refueling point for trans-Pacific aviation until WWII, when it became an air and naval base. Briefly seized by Japan. Housed 15,000 Vietnamese refugees awaiting entry to the United States in 1975.
- **Cultural heritage:** Young Marshallese men once were given the choice of supplying a bone either from their own body or from a Wake Island bird for use during a manhood ceremony.
- **Status:** Administered by the Air Force.

JOHNSTON ATOLL

- **History:** Mined for guano, seabird manure used as fertilizer, until WWII, when it became a Navy supply base. Originally a reef atoll barely above water, it has been greatly altered for its military tasks.
- **Cultural heritage:** May fall under ceded land rules as a former possession of the Kingdom of Hawaii.
- **Status:** Overseen by the Air Force, but under operational control of the Defense Nuclear Agency since 1973. Includes a wildlife refuge, chemical weapons incinerator and Coast Guard communication and weather station base.

HOWLAND ISLAND

- **History:** Amelia Earhart and Fred J. Noonan disappeared en route here after leaving New Guinea on July 2, 1937. The island was once mined for guano. A colonization effort failed.
- **Status:** Under control of U.S. Fish and Wildlife Service. Uninhabited, nearly covered with low vegetation, with fringing coral reefs. Airstrip that once served war planes is now clogged with migratory sea bird nests.

BAKER ISLAND

- **History:** Rich guano deposits mined here between 1850 and 1891. Colonists were recruited from Hawaii, but all residents were evacuated following Japanese attacks in 1942.
- **Status:** Under control of U.S. Fish and Wildlife Service. Uninhabited, with little vegetation. Fringed with coral reefs, it is home to sea birds, turtles, many reef fish.

PALMYRA ISLAND

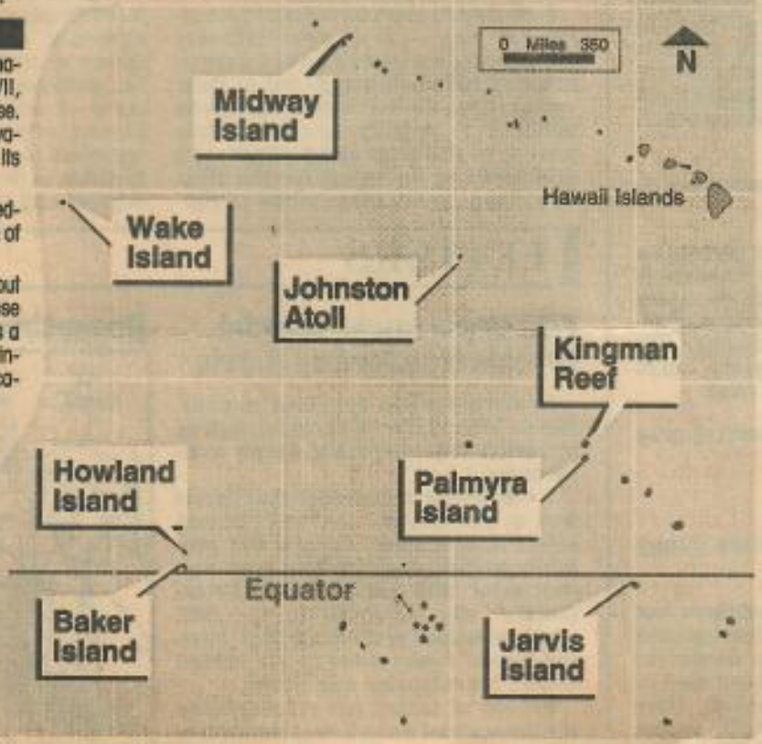
- **History:** Purchased by the Fullard-Leo family in the 1920s for $15,000 for coconut farming and fishing ventures. The family refused to sell it to the federal government for a nuclear waste dump in the 1970s.
- **Status:** Owned by Honolulu brothers Dudley, Leslie and Ainsley Fullard-Leo and leased to Realtor Peter Savio, who has said he will promote sport fishing and ecotourism there.

KINGMAN REEF

- **History:** The triangular reef barely clears the water and is a rich reef and game fish area.
- **Status:** Owned by the Fullard-Leo brothers.

JARVIS ISLAND

- **History:** Mined in late 1800s for guano. Colonization attempted, but Japanese air and sea attacks in 1942 forced evacuation. Only one mile long and surrounded by a narrow reef.
- **Status:** Under control of U.S. Fish and Wildlife Service. It is the most southerly island being considered for jurisdictional transfer to Hawaii.



Midway could become a heaven for 'ecotourists'

OCEAN WATCH
By Susan Scott A2 HSB 1/30/95

I phoned my mother in Wisconsin. "I get to go to Midway. The Navy has arranged a press trip there."

She sighed. "Oh, I'd love to go to Midway."

I paused. My mother has never been a wildlife enthusiast, nor is she adventurous. "You would?"

"Yes. I've always been very interested in famous World War II places."

"I like it because it's a national wildlife refuge," I said. "A million seabirds are nesting there right now, plus you can see monk seals and sea turtles."

"Oh. Well, I'd like to see those,too."

My mother and I are two good examples of why Midway could become a successful ecotourist destination, an option the U.S. Fish and Wildlife Service is considering for the famous atoll. The vacating Navy, now in the middle of a massive cleanup, will turn the refuge over to the wildlife service in June 1997. That would be the ideal time, before the infrastructure crumbles, for private interests to join with the feds to bring tourists.

A trip to Midway from Honolulu would likely be expensive, but for marine animal fans it would be worth every cent. Imagine a million enormous albatrosses (7-foot wingspans) flying, sitting and walking everywhere around you.

FROM your lanai, you could watch chicks hatch, parents feed, and adolescent birds perform the famous dance of the goonies.

Interested tourists could even participate in research projects and attend marine biology classes.

Then there are the rare petreis, charming fairy terns and great frigatebirds, not to mention both red- and white-tailed tropicbirds, booby birds and noddies.

There's even a good chance of spotting the nearly extinct short-tailed albatross, also called the golden gooney. With 15 species of seabirds nesting there, Midway is a bird lover's paradise.

It's also a place where a person can sit on pristine beaches and watch monk seals bask in the sun. (Glass fishing floats are common here too.) Or take a snorkel trip through the turquoise waters of the atoll to look for green sea turtles, rays, sharks and fish not often seen in the main islands.

Fishermen love it here too. Fishing grounds just outside the reef are unspoiled and abundant.

And history buffs: What could be more fun than walking through the 1902 buildings of the Commercial Pacific Cable Co., builders of the first around-the-world underwater telegraph cable? Others will be thrilled to wander through the staging area of one of the most famous World War II battles. And the Pan Am Clipper Ship of the '30s stopped on Midway, too.

IF I sound a little breathless about this, well, I am. For years I have been trying to convey the majesty of the Hawaiian Islands National Wildlife Refuge of our northwest chain. I've compared it to the Galapagos Islands. I've taken hundreds of photos. I've told little stories and big tales.

But still, there's nothing like being there to really know what it's like. Also, there's nothing like visiting a place to generate support (read: "money") for preserving, restoring and enhancing it. With government funding getting tighter each year, the idea of partnership between private and federal agencies may be the answer to some financial dilemmas.

I'm not so naive as to believe that making Midway a tourist destination would not have its problems. While I was there recently, a visitor walked too close to a sleeping monk seal. "Hello, seal," he shouted, waving his arms. The seal raised its head.

"But I wasn't harassing it," he protested later when called on his behavior. "Honestly." Although he had been told the rules, they clearly needed to be more explicit.

ON the other hand, this surely would be the perfect opportunity for people with different interests to share their passions and learn from one another. Fishermen could supply fresh catches for meals, biologists could teach historians monk seal protocol, historians could share their knowledge of this part of Hawaii's past.

It's not quite time to pack up for a Midway adventure. But if and when it happens, I'll see you there with my mom.

Susan Scott is a marine science writer and author of three books about Hawaii's environment. Her Ocean Watch column appears Mondays in the Star-Bulletin.