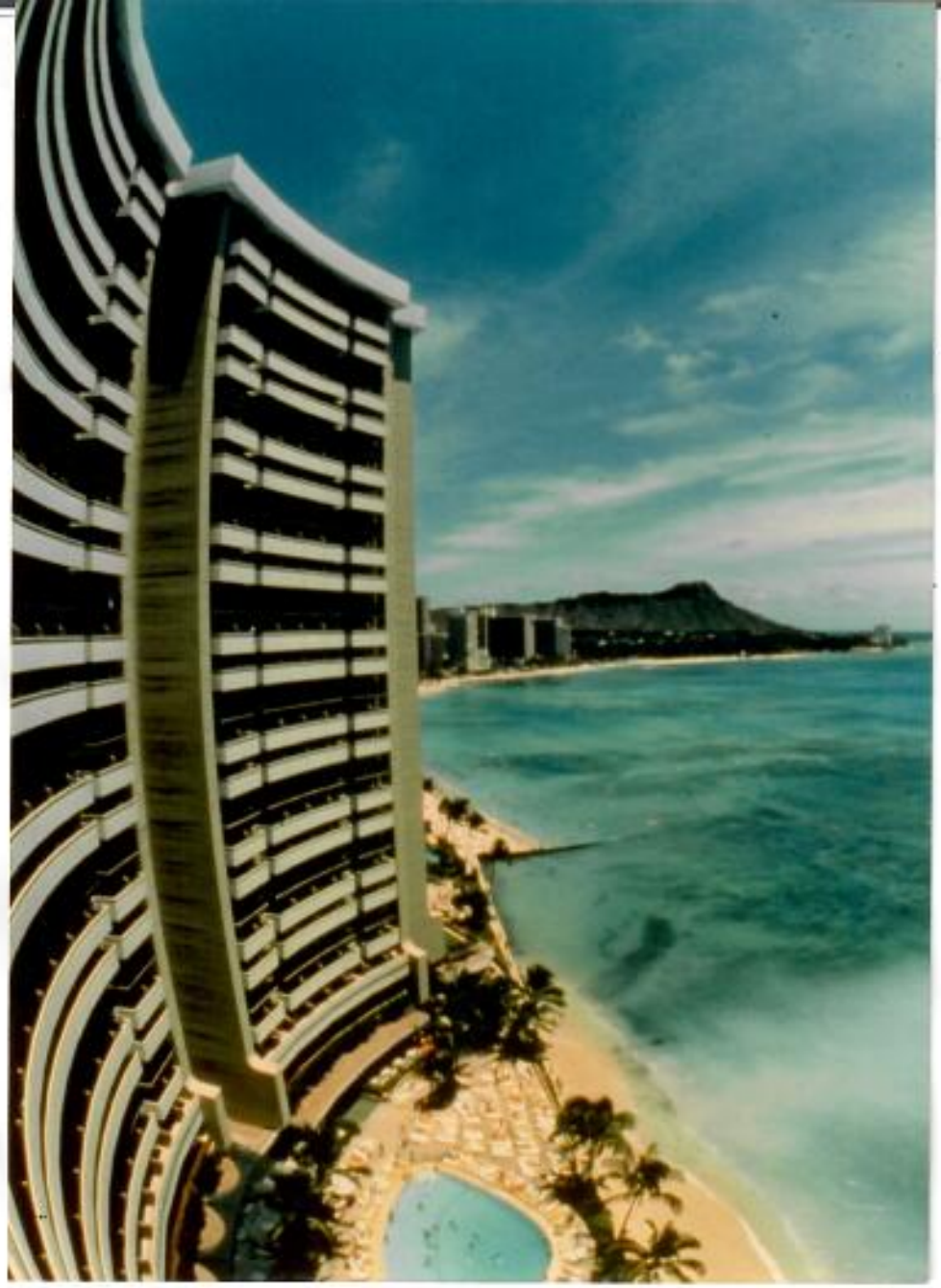
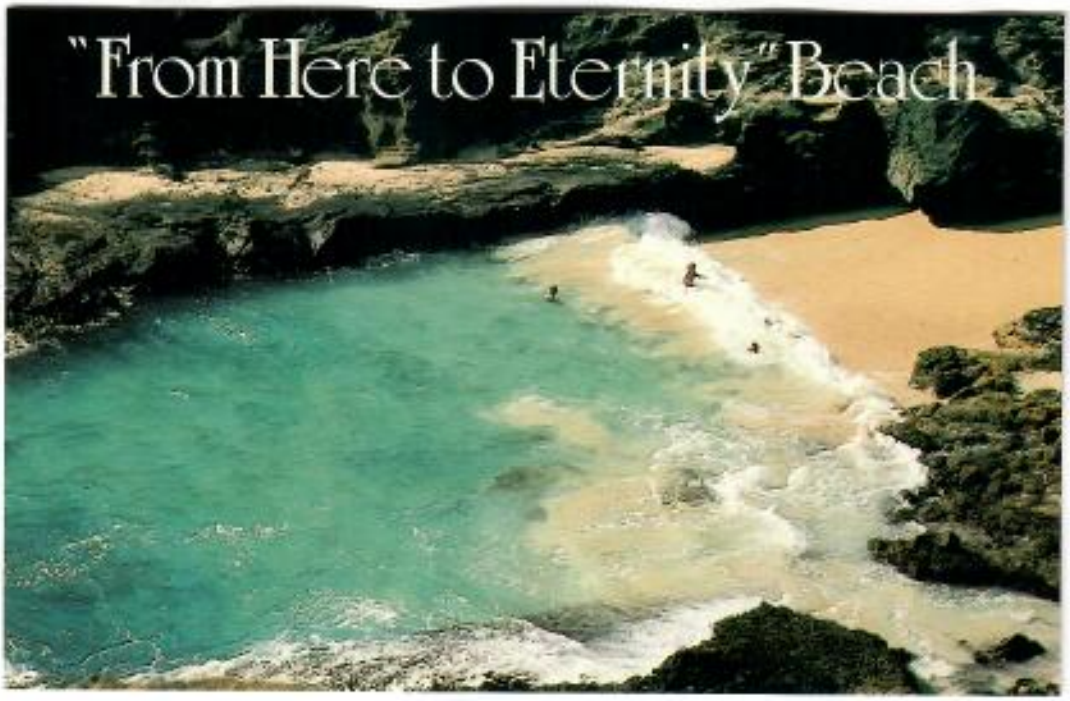
OAHU

WAIKIKI

G.H. BALAZS
FILE




"From Here to Eternity" Beach

Dead turtle Magic Is. 5/22/91 appears to be Save one!

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known: GREEN
Date: 5/5/91 Observer: WILLIAM C. HAMM
Address & phone SOUTH PACIFIC SCUBA
Time: 10:45 AM (optional): 735-7196
Location: CANYONS REEF ≈ ¼ MILE OFF OUTRIGGER REEF HOTEL
Observed from (circle): shore (boat) (name: EXPLORER),
while skin or (SCUBA) diving (on surface or at 30 feet deep).
Estimated size (length): 2½ FEET
Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)
FEMALE GREEN TURTLE WITH LARGE TUMORS ON BOTTOM OF LEFT REAR FLIPPER. LARGE AREA OF SHELL ABOVE SAME FLIPPER EITHER DECAYED OR BITTEN OFF.
Seals and sea turtles are protected under Federal and State law. **DO NOT DISTURB.**
THE TURTLE WAS VERY LETHARGIC AND APPEARED VERY CLOSE TO DEATH!

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known: GREEN HAWAIIAN
Date: 6-6-91 Observer: J.L. WILSON
Address & phone 638-8031
Time: 11:05 AM (optional): 522-5801
Location: 4TH REEF DIAMOND HEAD/RUB ROCK
Observed from (circle): shore (boat) name: EXPLORER),
while skin or (SCUBA) diving (on surface or at -35 feet deep).
Estimated size (length): 2½-3 FEET
Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)
"L" TURTLE NESTING/SLEEPING IN CAVE UNDER LEDGE. GEO: SEEING MORE TURTLES VICINITY RUB ROCK LATELY - NO TUMORS FOR 2 WEEKS NOW. Seals and sea turtles are protected under Federal and State law. WILL KEEP YOU POSTED, **DO NOT DISTURB.** GETTING EXCELL. VIDEO FOOTAGE THIS PAST WEEK. ALOHA, JOAN

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known: GREEN HAWAIIAN
Date: 6-5-91 Observer: J.L. WILSON
Address & phone 638-8031
Time: 10:48 AM (optional): 522-5801
Location: CATCH BASIN - ½ MILE OFF WAIKIKI
Observed from (circle): shore (boat) (name: EXPLORER),
while skin or (SCUBA) diving (on surface or at 38 feet deep).
Estimated size (length): 45

Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)
"C" TURTLE - SLEEPING IN HOLE ADJACENT TO LIMU/ALGAE PASTURE -

Seals and sea turtles are protected under Federal and State law.
DO NOT DISTURB.

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known: HAWAIIAN GREEN SEA
Date: 4/29/91 Observer: JOHN L. WILSON
Address & phone 638-8031
Time: 10:45 (optional): PO BOX 1043 HALEIWA.
Location: WAIKIKI - OFF SHERATON HOTEL
Observed from (circle): shore (boat) (name: EXPLORER),
while skin or (SCUBA) diving (on surface or at 25 feet deep).
Estimated size (length): 18" APPROX

Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)
"L" MARKED ON SHELL, BOTH SIDES, TAGS ON FRONT FLIPPERS - SWIMMING IN OPEN WATER NEAR GRASS AREA - VIDEO TAPED - ON MY FILE TAPE 28 -

Seals and sea turtles are protected under Federal and State law.
DO NOT DISTURB.

Dead turtle Magic Is. 5/22/91 appears to be Save are!

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known: GREEN
Date: 5/5/91 Observer: WILLIAM C. HAMM
Address & phone SOUTH PACIFIC SCUBA
Time: 10:45 AM (optional): 735-7196
Location: CANYONS REF = 1/2 MILE OFF OUTBACK REEF HOTEL
Observed from (circle): shore, (boat) (name: EXPLORER),
while skin or (SCUBA) diving (on surface or at 30 feet deep).
Estimated size (length): 2 1/2 FEET

Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)

FEMALE GREEN TURTLE WITH LARGE TUMORS ON BOTTOM OF LEFT REAR FLIPPER. LARGE AREA OF SHELL ABOVE SAME FLIPPER EITHER DECAYED OR BITTEN OFF. THE TURTLE WAS VERY LETHARGIC AND APPEARED VERY CLOSE TO DEATH.

Seals and sea turtles are protected under Federal and State law.
DO NOT DISTURB.

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known: LOGGERHEAD
Date: 12/20/91 Observer: J. L. WILSON
TEMP. 72°F Address & phone 638-8031/638-5069
Time: 11:15 AM (optional):
Location: CANYONS OFF FT. DUROSSY
Observed from (circle): shore, (boat) (name: EXPLORER),
while skin or (SCUBA) diving (on surface or at 33 FT feet deep).
Estimated size (length): CARAPACE TO TAIL-APPROX 4 1/2'

Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)

FILMED TWO-THREE MINUTES CLOSE-UP OF LOGGERHEAD — VIDEO AVAILABLE UPON REQUEST.

Seals and sea turtles are protected under Federal and State law.
DO NOT DISTURB.

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known:
Date: 30 APR 1992 Observer: SKIP KOMER
Address & phone 2160 BANCROFT DR, KAILUA 9673
Time: 1230 (optional): 259-5324
Location: ABOUT 300 YDS OFFSHORE FROM FT DERUSSEY, WAIKIKI
Observed from (circle): shore, (boat) (name: N/A),
while (skin) or SCUBA diving (on surface or at ± 20' feet deep).
Estimated size (length): 2-3' SHELL

Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)
TWO TAGS - ONE ON FRONT FLIPPER (LEFT)
NUMBER WAS COVERED WITH MOSS, BUT APPEARED TO BE 96744
ONE ON LEFT REAR FLIPPER: H-92
ON REAR HALF OF SHELL (BLEACH MARKS?) M-90

Seals and sea turtles are protected under Federal and State law.
DO NOT DISTURB.

WEATHER: CALM, SUNNY
BEHAVIOR: VERY "MELLOW" - APPEARED USED TO DIVERS - APPROACHED VERY CLOSELY (LOOKING FOR FOOD?) INTERESTED IN MY PENCIL AND FLASHLIGHT - NO TUMORS NOTED.
NOT VICIOUS"

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: 1 Type, if known: GREEN SEA TURTLE
Date: 6-2-91 Observer: J.L. WILSON
Address & phone 638-5669/522-5801
Time: 10:47 AM (optional):
Location: CATCH BASIN - OFF SHERATON
Observed from (circle): shore, (boat) (name: EXPLORER),
while (skin) or SCUBA diving (on surface or at 35 feet deep).
Estimated size (length): TURTLE "C"

Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)
WX - OVERCAST, RAIN - TURTLE SLEEPING UNDER ROCK OVERHANG, 'C' ON SHELL, NOTICABLE TAGS ON FRONT FLIPPERS - APPEARS HEALTHY.

Seals and sea turtles are protected under Federal and State law.
DO NOT DISTURB.

Attention of Ross Hyja: 10-16-94

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): (Turtle) Seal
Number of animals: One Type, if known: Green
Date: ~~10/14/94~~ 10/5 & 10/7/94 Observer: Gracy
Address & phone see below
Time: 9 am & 11:00 am (optional):
Location: emerging from "Gracey Reef" off Kapukulu well
Observed from (circle): shore, boat (name:), while skin or SCUBA diving (on surface or at feet deep).
Estimated size (length):
Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)
Untagged; thru mask carapace about 20" long. Less shy than former ones sighted. Do you want to be notified of future sightings in same area? Still looking for tumors?

Seals and sea turtles are protected under Federal and State law.

DO NOT DISTURB.

New address is 2790 KAHALOA DR, Apt 808
Honolulu 96822
phone 988-8019 Gracey Javelosa

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMIN.
NATIONAL MARINE FISHERIES SERVICE, F/SWC2
HONOLULU, HAWAII 96812

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

HONOLULU, HI
26 AUG

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
COM-210

U.S. MAIL

G. BALAZS
U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE F/SWC2
P. O. BOX 3830
HONOLULU, HAWAII 96812

Sighting while swimming 2½ mile roughwater course
Sans Stacci to Alter Hawaiian

SIGHTING INFORMATION: TURTLE AND SEAL

Animal sighted (circle): (TURTLE) SEAL

Number of animals: 1 Type, if known: _____

Date: Aug 25, 85 Observer: Andrea Wilder per Valisa Saunders

Address & phone (optional) 544-3359 or 262-0311

Time: 8⁰⁰ am

Location: About 800 yards off shore from Sheraton in Waikiki

Observed from(circle): shore; boat(name: _____);

while swimming skin or SCUBA diving(on surface or at _____ feet deep).

Estimated size(length): 2 ft.

COMMENTS:(color pattern; injuries; scar patterns; tumors; flipper tags:present Y/N, tag color, and if readable tag number; bleach marks(number/letter); behavior; and weather.

Somewhat cloudy day - Water visibility poor
Andrea said turtle swam under them for a little while

SIGHTING INFORMATION: TURTLE AND SEAL

Animal sighted (circle): (TURTLE) SEAL

Number of animals: 1 eg Type, if known: green sea

Date: 5/5/86 * 5/7/86 Observer: Rike Weiss

Time: @ 6:40 a.m. Address & phone (optional) 526-3911

Location: Ala Moana Beach, close to rocks opposite 2nd life guard stand

Observed from(circle): shore; boat(name: _____);

while ~~skin~~ swimming or ~~SCUBA~~ diving(on surface or at surface feet deep).

Estimated size(length): head the size of small grapefruit * @ 3 feet

COMMENTS:(color pattern; injuries; scar patterns; tumors; flipper tags:present Y/N, tag color, and if readable tag number; bleach marks(number/letter); behavior; and weather.

U.S. DEPARTMENT OF COMMERCE
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GEORGE H. BALAZS

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE F/SWC2
P. O. BOX 3830
HONOLULU, HAWAII 96812

Sighting Information • TURTLE and SEAL

Animal sighted (circle): (TURTLE) SEAL

Number of animals: 3 Type, if known: _____

Date: 11-27-88 Observer: R.D. Lebickuck

Address & phone (optional) 2049 Oak Ridge Dr. Santa Rosa, Ca. 95404

Time: 0800

Location: In front of the Sheraton Hotel Waikiki Beach

Observed from(circle): (shore); boat(name: _____);

while skin or SCUBA diving(on surface or at _____ feet deep).

Estimated size(length): 30 in.

COMMENTS:(color pattern; injuries; scar patterns; tumors; flipper tags:present Y/N, tag color, and if readable tag number; bleach marks(number/letter); behavior; and weather.

All 3 swimming together in about 5 Ft. of H_2O at about 0810 all 3 moved out to deeper H_2O.

Mahalo

Sighting while swimming 2½ mi rough water course
Sans Souci to Halona Hawaii

SIGHTING INFORMATION: TURTLE AND SEAL

Animal sighted (circle): TURTLE SEAL

Number of animals: 1 Type, if known: _____

Date: Aug 18, 85 Observer: Valisa Saunders

Address & phone 544-3359 work.
(optional) 262-0311

Time: 8:30 AM

Location: Approx 800 yards from shore and about 500-800 yards E of Sans Souci Beach in Waikiki

Observed from(circle): shore; boat(name: _____);
while skin or SCUBA diving(on surface or at 20 ft feet deep).
swimming

Estimated size(length): 12-14 inches the turtle

COMMENTS:(color pattern; injuries; scar patterns; tumors; flipper tags:present Y/N, tag color, and if readable tag number; bleach marks(number/letter); behavior; and weather.

of 18 swimmers doing roughwater course, nearly ½ also reported seeing a small sea-turtle in about the same location. Weather was nice today - Sunny + clear. Water visibility excellent 5 miles or Horizon

---

SIGHTING INFORMATION TURTLE AND SEAL

Animal sighted (circle): Turtle Seal

Number of animals: 1 Type, if known: No

Date: 11-4-89 Observer: Lowell D. Funk

Address & phone 240 Makee Rd #7-B

Time: 7:30 AM (optional): 923-4193

Location: in the marine reserve area in Waikiki

Observed from (circle): shore, boat (name: _____),

while skin or SCUBA diving (on surface or at 4 Feet feet deep).

Estimated size (length): 30 inches

Comments: (such as color pattern; injuries; scar patterns; tumors; whether flipper tags are present(Y/N); color and number of the tag(s); bleach marks (number/letter); behavior; and weather)

I have seen this Turtle several times it appears to be healthy. No tumors, scars or tags

Seals and sea turtles are protected under Federal and State law.

DO NOT DISTURB.

6

Sighting Information • TURTLE [redacted]

Animal sighted (circle): TURTLE (circled) [redacted]

Number of animals: 1 Type, if known: ?

Date: 5/10/89 Observer: Norma Santiago

Time: 7:00 a.m Address & phone (optional): 543-5878 1520-A Phonuist. Hon. Hi. 96819

Location: Outrigger Canoe Club

Observed from(circle): ~~shore; boat(name:);~~ 50 meters off Shore

while skin (circled) or SCUBA diving(on surface or at 2 feet deep).

Estimated size(length): 1 1/2 feet.

COMMENTS:(color pattern; injuries (circled); scar patterns; tumors; flipper tags:present Y/N, tag color, and if readable tag number; [redacted] behavior; and weather.

Turtle seemed ill, movement was very slow.
water was murky - surfing.

8870 Right only
3/27/86
I TAGGED

Jan Newhart

10/31/89

Dear George,

I see, what I think is the same turtle, once or twice a week. It looks fine from the top and seems to live under the ledge that I took you to off Outrigger. I don't see a tag and it looks to be about the same size as the one in this photo, but I guess with out the magnification of the water it is probably smaller.

Aloha,
Jan

TURTLES ARE FREQUENTLY SEEN OFF OUTRIGGER CANOE CLUB!—

GEORGE — WHY DON'T YOU SEND ME A LOT OF THESE? I'LL HANG THEM ON THE OCC BULLETIN BOARD.

Sighting Information • TURTLE and SEAL

Animal sighted (circle): TURTLE (circled)   SEAL

Number of animals: ONE   **Type, if known:** ?

Date: 4/27/89   **Observer:** JAN NEWHART

Time: 4 PM   **Address & phone (optional)** 926-7651 2600 PUALANI WAY HONO 96815 #2303

Location: OUTRIGGER CANOE CLUB CHANNEL APPX 200 FT FROM BEACH

Observed from(circle): shore; boat(name:____________);

while skin or SCUBA diving(on surface or at 6 **feet deep).** SWIMMING

Estimated size(length): 12"

COMMENTS:(color pattern; injuries; scar patterns; tumors; flipper tags:present Y/N, tag color, and if readable tag number; bleach marks(number/letter); behavior; and weather.

BEIGE, NO MARKS THAT I COULD SEE
IT WAS EATING & I FLOATED
ABOVE IT. IT SEEMED UNCONCERNED
W/ ME BUT SLOWLY SWAM OFF—

MARINE SKILL PROJECT REPORT SUBMITTED TO THE UNIVERSITY OF HAWAII MARINE OPTION PROGRAM

Investigation of Green Sea Turtles, *Chelonia mydas*, Occurring in the Nearshore Waters of Waikiki

DURATION

October 1, 1990-July 31, 1991

by

STUDENT INVESTIGATOR
Russell K. Miya

and

PROJECT ADVISOR
George H. Balazs
Zoologist and Leader, Marine Turtle Research
National Marine Fisheries Service
Honolulu Laboratory

REPORT DATE

August 1, 1991

ABSTRACT

The objectives of this study in the nearshore waters of Waikiki were to discover: (1) the physiography of the area in which green turtles are residing including where they rest underwater when not feeding; (2) the approximate number of turtles and their size-classes resident at this location; (3) their daily feeding patterns and diet; and (4) any adverse impacts to the turtles, either from humans or from natural factors. During this 10 month study fifteen sea turtles were captured, tagged and released. Only one species, the Hawaiian green sea turtle, *Chelonia mydas*, was seen and captured. Green turtles feed in the nearshore waters (within 100 meters of the shore) and can be seen there on any given day. Food sources being utilized consist of the benthic algae, Ulva fasciata, Ulva reticulata, Hypnea musciformis, and Pterocladia capillacea. Sizes of the turtles tagged ranged from 37.6 cm (straight carapace length) at 8 kg to 80.7 cm at 82 kg. Resting habitats for turtles were identified at Grace's Ledge at a depth of 8-10 feet, and at Canyons which has a depth of 30-35 feet. None of the turtles tagged and released had signs of fibropapilloma disease. The findings from this study conclude that the green turtle population is relatively large and apparently healthy in the nearshore waters of Waikiki. Efforts should be made to enhance the protection of these turtles and the habitats upon which they depend. The educational and tourism aspects of viewing the turtles in a benign fashion should be promoted wherever possible.

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INTRODUCTION

The Hawaiian green turtle, *Chelonia mydas*, has been protected since September 1978 under the U.S. Endangered Species Act. Areas of Oahu and other locations on the neighbor islands have been the focus of research due to their importance as foraging and/or resting habitats for green turtles. On Oahu, locations such as Kawela Bay, Maunalua Bay, and West Beach are areas that green turtles use for these purposes (Figures 1, 2, & 3). All of these areas have been examined by the National Marine Fisheries Service (NMFS) and in some cases other workers. The NMFS is the federal agency principally responsible for the research and recovery of sea turtles in U.S. waters. In the past year, Kaneohe Bay has been the focus of the NMFS research and tagging efforts. I have been able to act as an assistant in these efforts. With the advice and help of George H. Balazs, (Leader, NMFS Marine Turtle Research Program) we discovered an area which had not been studied and which had turtle sightings on a daily basis. This area fronts the Sheraton Waikiki Hotel, on Waikiki Beach, Oahu (Figure 4). This area is unique because of the number of tourists that swim, snorkel, and sunbathe on inflatable rafts while the sea turtles swim and feed under and around them. In the past, Waikiki has not been a haven for sea turtles although ocassionally they have been reported. It would appear that only in the past 3-5 years the number of turtles off Waikiki has increased and their presence become more visible.

The proposed research was based on the work conducted by NMFS (Balazs et al., 1987). An attempt was made to discover, as the NMFS did in other areas of the Hawaiian Islands, the reasons for aggregation of green sea turtles in front of the Sheraton Waikiki. Research was undertaken to answer several important questions concerning the following: (1) the physiography of the area in which the turtles are residing and where they are resting underwater when not feeding; (2) the approximate number of turtles and their size-classes resident to this location; (3) the ecological aspects of the turtles captured, including their daily feeding patterns and what they are eating; (4) adverse impacts to the turtles, both from humans (i.e., fishing nets, marine debris) and from natural factors (i.e., disease, such as tumors, and shark predation)(Balazs et. al., 1991).

A Recovery Plan to promote the biological recovery and conservation of the species in the Hawaiian Islands has recently been prepared (Balazs et al., 1990). The work undertaken in the present study is consistent with several recommendations contained in the Recovery Plan. Both the National Marine Fisheries Service and the public at large will benefit from this study. People will be enlightened to new information as the result of this project.

METHODS AND MATERIALS

Twenty underwater surveys were conducted to determine the physiography of the study site, foraging sites, and resting habitats.

This was done by skin diving in and around the general area where an aggregation of turtles was seen.

Visual surveys were conducted from the shoreline to observe foraging turtles and the characteristics of the nearshore and intertidal habitats. Along with the shoreline observations, the study site was observed from the 12th floor of the Sheraton Waikiki Hotel. This provided an ideal vantage point for observations and censusing of turtles. Ms. B. J. Hughes, Public Relations Director at the Sheraton Waikiki, was informed of this project and agreed to provide a room for observations when vacancy permitted it.

Capture methods included: (1) entrapment in a large mesh net used by NMFS to safely sample turtles; (2) and hand capture by skin divers. Once a turtle was captured by either of these two methods the turtles were tagged for long term identification. Two different tags were used, a highly visible blue plastic tag and a tag made from a corrosion resistant alloy called Inconel. The Inconel tags are an alloy consisting of cadmium and nickel. Two to three tags were applied, depending on the size of the turtle. Tag sites were the trailing edge of the front flippers and, when necessary, the inside trailing edge of a hind flipper. Besides tagging, we applied a painted alphabet letter on each turtles' shell for easier identification from the shoreline.

Body measurements and weight were recorded on each turtle. Turtles were weighed by two spring scales. The first weighed up to 100 pounds with an accuracy of one pound. The second scale

weighed up to 350 pounds with an accuracy of 2.5 pounds. Measurements included straight-line and curved carapace length (Figure 5 & 6), straight-line carapace length from the center of the precentral scute to the notch length, straight-line width (Figure 7), and curved carapace width at the widest point (the sixth marginal scute), and straight-line plastron length. Other measurements included head width, right front flipper width, and tail length (Figures 8 & 9).

Food sources were determined by sampling the turtle's mouth immediately after capture, or by gently inserting a plastic tube through the esophagus into the upper portion of the stomach. Low pressure water was introduced into the tube to flush food particles for identification (Balazs, 1980).

George Balazs, my project advisor, guided me in the use of specially made nets for capturing and tagging of green turtles. State and federal permits and other authorization needed to do this research were obtained by George Balazs as a federal employee of NMFS.

RESULTS

Physiography

Waikiki Beach is located on the south shore of the island of Oahu. It is the most visited beach in all of the Hawaiian Islands. The

number of beach goers on any given day can reach into the thousands.

The shoreline of Waikiki Beach is nearly fully developed with high-rise hotels. One of the two main sites where tagging occurred fronts the Sheraton Waikiki Hotel (Figure 4). This site is divided by an old seawall that extends seaward 30 yards and curves toward Diamond Head for approximately 20 yards. This wall was used in our tagging efforts as a natural barrier to trap green turtles by quickly swimming out a barrier net to enclose the turtle while it was feeding. Both sides of the seawall close to shore are shallow with a depth of approximately 4 feet. The majority of the bottom here consists of sand with little reef or rocks. Reef formations start approximately where the seawall starts to curve (25-30 yards from shore).

The second site that was the focus of tagging efforts was at a site we called Grace's Ledge. The ledge was named after Grace Yavelow who first saw turtles at this location and reported their occurrence to us. Grace's Ledge is located approximately 300 yards off the Kapahulu seawall (Figure 4). It is located just west (Ewa) of a sand channel at a depth of 8-10 feet. This site was ideal for hand capturing turtles because the turtles would be resting or sleeping inside the ledge, which has a overhang of 6-8 feet. Within 15 yards of the ledge are two to three other small holes that turtles often occupy.

On five occasions walks were taken along the shoreline of Waikiki to look for green turtle fecal pellets. No fecal pellets were seen during these surveys. This was very important due to the number of people on the beach on any given day and the possible negative public reaction that could result if there were great numbers washing ashore (Balazs et. al., 1990).

Ecological Aspects of the Turtles Captured

Netting efforts in front of the Sheraton Waikiki Hotel resulted in 8 turtles being captured (Table 1). All of the turtles, except for two, were caught on the Sheraton's side of the seawall. All netting attempts were conducted in the late afternoons because the number of turtles seen from the hotel room was consistently greater during this time of the day.

Hand capturing efforts resulted in seven captures with one recapture. All of the hand captures were at Grace's Ledge except one, which was captured in front of the Natatorium (Table 2). All of the turtles captured at Grace's Ledge were caught during the day. Nocturnal capture efforts were not attempted.

All turtles captured at both locations were measured. The sizes of the turtles ranged from 37.6 cm (straight carapace length) to 80.7 cm (Table 3).

Identification of stomach samples from four turtles resulted in several different algae (Table 4). Three of the turtles sampled were

captured in front of the Sheraton Waikiki. Two of these three turtles contained Hypnea musciformis. This is a red alga. It was introduced in the Hawaiian Islands from Florida in 1976 (Balazs et al., 1987). The fourth turtle sampled was captured at Grace's Ledge. This turtle's stomach sample consisted of 100% Ulva fasciata. Ulva fasciata and Ulva reticulata are both highly visible at the Sheraton Waikiki Hotel study site. An objective established after the project was underway was to try to determine if the same turtles that were using Grace's Ledge as a sleeping or resting place were feeding in front of the Sheraton. This connection was never made visually, however, the 100% of Ulva fasciata in the turtles captured at Grace's Ledge makes the possibility of this connection hopeful.

Over the ten months of this study three turtles were found dead in Waikiki. Two of these three turtles died from obvious propeller slashes. The third turtle, which was the first turtle tagged in this study, died from gillnet entanglement. Identification of two of these turtles' stomach contents revealed that Ulva reticulata specimens were in both samples (Table 5). Various external samples were also taken for identification (Table 6).

Eight of the fifteen turtles captured showed some evidence of external injury or abnormality, although in most instances this was minor (Table 7). One turtle, (tag no. N535) had obvious three-prong (Hawaiian sling) spear marks on the top of the head which were healed.

One of the turtles captured at Grace's Ledge was found to have been originally tagged on December 14, 1989, after being rescued from entanglement in a gillnet set in "waist deep" water off the Kapahulu seawall. A City and County Waikiki life guard rescued it and turned it in to the Waikiki Aquarium. The turtle was "stressed and weak". It was tagged and released 4 days later at Kawaikui Beach Park, about 5 miles to the east of Waikiki along Oahu's south shore. One year later we hand captured this same turtle at Grace's Ledge. The growth rate of the straight carapace length in one year equaled 3.6 cm (Table 8). This same turtle was captured again on April 4, 1990. The growth rate of the straight carapace length in 3.7 months equaled 1.2 cm (Table 8). These rates are relatively rapid compared to other sites studied on Oahu by NMFS.

Submergence times (breath-hold time) were taken on two green turtles while observing from the Sheraton Waikiki Hotel (Table 9). The turtles were feeding at the time of observations.

Foraging Habitat Appraisal

Surveys taken from shore and underwater demonstrated an abundance of various algae in the nearshore reef and waters fronting the Sheraton Waikiki Hotel. Algae that are highly abundant in this area are Ulva reticulata and Ulva fasciata. An assortment of detached algae can be found along the sand bottom around the

seawall. Loose algae found were identified as Codium sp., Sargassum sp., and Hypnea musciformis.

The number and frequency of turtles sighted from shore were always greater during late afternoons to early evenings than in the mornings and early afternoons. Also the numbers sighted were greatest during higher tides.

Underwater surveys taken at Grace's Ledge determined that there was no foraging habitat in the immediate area of the ledge.

Resting Habitat Appraisal

Hawaiian green turtles spend most of the time either foraging or sleeping and resting. The green turtles' rest period is spent along the bottom near small caves, reef outcroppings, and in small holes or crevices.

There are two known resting locations that were discovered during this study. The first is Grace's Ledge. The second is a location called Canyons (Figure 4). It lies approximately 400 yards off Fort DeRussy in 30 to 35 feet of water. This location was discovered by personnel of Atlantis Reef Divers aboard the vessel the Explorer. The Explorer visits this site daily with tourists and other interested divers. Turtles have been sighted resting in small holes in this area. Turtles have also been seen resting with small fish picking or cleaning algae and perhaps other external growth from them. Therefore, the likelihood exists that the turtles are repeatedly using

this area as a "cleaning station". Further surveys need to be undertaken to determine the longterm importance of this area as a cleaning site for turtles.

John Wilson, a diver with the Explorer, has videotaped many turtles that frequent this site. He has footage of turtle N842, or ("L" turtle) that had been tagged on April 4, 1991 in front of the Sheraton Waikiki. He has also sighted turtle N570, or ("C" turtle) on several occasions. This turtle was originally tagged at Grace's Ledge on December 14, 1990. John Wilson also sighted, but did not film, turtle N844, or ("M" turtle). This turtle was tagged on April 26, 1991 in front of the Sheraton Waikiki.

DISCUSSION

Interested citizens and numerous observations helped to locate and then focus on two main sites. The information collected from these sites answers several important questions about the green turtle population in Waikiki. The first site fronted the Sheraton Waikiki Hotel. This site was used by the green turtles for foraging purposes. Their feeding patterns were observed in the early morning and in the afternoons to late evenings. Late afternoons to early evenings were determined to have greater concentrations of foraging turtles. Also, during higher tides more turtles were observed. Therefore, the combination of the two were used to coordinate netting efforts. Grace's Ledge was the second site of focus. The primary use of the ledge was for sleeping and/or a resting location for the turtles. A third site was discovered late into the project. This site is known as Canyons. Turtles have been seen resting in small holes in this area. Canyons has also been noted for the possibility of being a cleaning station for the turtles.

The number of green turtles now using the nearshore waters of Waikiki is difficult to determine. During this study fifteen turtles were captured and tagged with only one recapture. This leads one to conclude that the population must be greater than fifteen turtles. Also, each turtle except for two had a painted letter on its shell for easy identification. Only one turtle from Grace's Ledge was resighted, and two from the Sheraton site were sighted. However,

the two were not sighted in front of the Sheraton, but at nearby Canyons. The size-classes of the fifteen turtles captured had a very broad range. The smallest was 8 kg with a straight carapace length of 37.6 cm. The size of the turtle and a visual inspection of the exterior determined the turtle to likely be a new recruit from its pelagic stage of life. The largest turtle captured weighed 82 kg and had a straight carapace length of 80.7 cm. This turtle was an adolescent male nearing sexual maturity.

Adverse impacts on turtles by humans were several. Two turtles (not tagged) were found dead from obvious propeller wounds. Another turtle, which happened to be the first turtle captured and tagged for this project, washed ashore dead. The necropsy performed on this animal concluded that the cause of death was most probably forced submergence by a gillnet.

Debris from humans was seen on each occasion of research activity. Trash, plastics, and discarded clothing were frequently seen on the beach and in the water.

Natural factors such as disease or shark predation were not major factors in the project's findings. On one occasion a turtle was observed with a section of its carapace missing but healed. This may possibly have been an old wound from a shark. Only one turtle was sighted (not tagged) with tumors or fibropapilloma disease. This turtle had been seen at Canyons and documented on video tape by John Wilson of the Explorer. It was subsequently found dead washed ashore at Magic Island near Ala Moana Beach Park.

Other possible adverse impacts from humans were discovered (on 11-6-90) at Grace's Ledge. An illegal mooring and buoy had been attached by a chain and rope to the ledge. Two possible consequences could have come about with this illegal mooring. First, the mooring or line that extended from the ledge could have possibly entangled one of the turtles that reside in the ledge and thus killed the turtle by forced submergence. Secondly, the ledge being marked promoted an easily visible location for frequent visitors. This could possibly lead to harassment or even poaching of the turtles which use this location as a resting place.

During the 10 month study the project received considerable public exposure. The Hawaiian Moving Company, which airs on KGMB-TV Channel 9 every Sunday throughout Hawaii came to the Sheraton Waikiki study site to film our netting and tagging activities. The project's segment aired twice on television and turned out to be a success. This provided great exposure for Hawaiian green sea turtles, the University of Hawaii's Marine Option Program, and the National Marine Fisheries Service.

As the study progressed it became evident that tourism is enhanced by the green sea turtles living off Waikiki. This "ecotourism experience" can be strengthened and expanded in a number of ways. For example, the Sheraton Waikiki Hotel could provide small descriptive brochures in each room briefly giving some facts about the Hawaiian green sea turtle and that one can readily view turtles from their own hotel lanai (balcony).

For a number of reasons tourists usually don't get a chance to see the threatened green sea turtle in its natural habitat. However, with more information like the brochures proposed above, tourists can be enlightened about the green sea turtle population in Waikiki. Many of the tourists who visit Hawaii enjoy viewing humpback whales during the months of their migration to Hawaiian waters. Green sea turtles can be seen all year around on a daily basis feeding in the nearshore waters of Waikiki.

ACKNOWLEDGMENTS

This research could not have been accomplished without the help of many people. A special thanks goes to George H. Balazs, Zoologist and Leader of Marine Turtle Research with the National Marine Fisheries Service. George's advice and instruction were essential in making this project a successful one. The National Marine Fisheries Service provided custom-made nets and other equipment for the capturing and tagging of turtles. Hotel rooms for observations were provided by B.J. Hughes, Public Relations Director, Sheraton Waikiki Hotel. Steve Russell, Marine Option Program Coordinator, contributed his time and advice to this project. Other thanks go out to fellow Marine Option Program students, students from the Marine Science Program of Hawaii Loa College, the Leahi Catarmaran and owner Teresa Parsons, and Grace Yavelow who pointed out Grace's Ledge. Food samples were identified by Dennis Russell, Seattle Pacific University. Many thanks also to Christina Lamb, Valerie Boyar-Nato, Karl Bromwell, Steve Ball (professional photographer), Michele Finn, Corey Hanner, the Hawaiian Moving Company, John Wilson, and the Explorer's crew. This study was accomplished with funds provided by the University of Hawaii's Marine Option Program and the National Marine Fisheries Service.

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Table 1. Result of turtle netting effort in waters fronting the Sheraton Waikiki Hotel.

Field Study Date	Duration in hours	Length of Nets (ft)	No. of Turtles Captured
11-8-90	2.0	100 X 5	0
2-15-91	3.75	100 X 5	0
3-1-91	3.5	100 X 8	1
3-15-91	3.0	100 X 8 &	
		100 X 5 (boundary net)	2
4-5-91	3.0	100 X 8 &	
		100 X 5 (boundary net)	2
4-26-91	3.0	100 X 8 &	
		100 X 5 (boundary net)	3
Total	**18.25**		**8**

Table 2. Results of hand-capture efforts. Waikiki, Oahu.

Field Study Date	Location	No. of Turtles Captured
11-15-90	Grace's Ledge	1
12-14-90	Grace's Ledge	2
12-20-90	Natatorium	1
3-28-91	Grace's Ledge	1
3-29-91	Grace's Ledge	2
4-4-91	Grace's Ledge	1 (recapture)
4-22-91	Grace's Ledge	0
Total No. of Turtles		7

Table 3. Biometrics of 15 green turtles sampled at Waikiki, Oahu

G=Grace's Ledge N=Natatorium

S=Sheraton Waikiki Hotel

Tag No.	Carapace Length		Carapace Width		Plastron Length	Tail Length	Head Width	Front Flipper Width	Weight
	Straight (cm)	Curved (cm)	Straight (cm)	Curved (cm)	(cm)	(cm)	(cm)	(cm)	(lbs)
N535(G)	42.5	45.5	34.1	41.5	34.5	7.3	6.4	7.4	27
Y47 (G)	61.2	65.0	47.7	58.0	49.9	12.5	8.8	11.3	78
N570(G)	49.5	53.0	40.8	48.5	40.7	9.8	7.5	9.0	45
N573(N)	43.7	47.0	33.9	41.0	34.7	6.7	7.3	7.9	30
N691(S)	49.9	53.3	36.7	46.0	39.7	11.0	7.8	8.7	47
N741(S)	44.7	47.0	36.0	43.0	35.3	9.5	7.8	8.6	33
N744(S)	69.3	74.0	55.4	71.0	56.1	17.5	10.8	0	113
N776(G)	43.2	46.5	35.7	42.0	33.7	8.0	7.1	7.9	28
N778(G)	48.9	53.0	40.6	49.0	40.2	9.0	7.9	9.6	36
N781(G)	60.1	63.5	46.5	57.0	47.1	13.0	8.8	10.2	63
N793(S)	61.3	65.2	49.3	60.5	49.5	14.5	9.4	11.1	72
N796(S)	80.7	86.2	64.3	81.1	64.4	31.5	11.8	14.1	180
N840(S)	37.6	39.5	30.9	37.0	31.2	7.0	6.2	6.9	17
N842(S)	42.9	46.0	33.9	40.0	33.8	9.0	7.0	7.5	24
N844(S)	42.0	45.0	34.8	41.0	33.5	9.0	6.9	7.9	24

Table 4. Identification of stomach contents sampled from four (4) turtles. Waikiki, Oahu.

Tag No.	Straight Carapace Length (cm)	Sample Contents	% T = trace
N691-Sheraton Waikiki	49.9	Spyridia filamentosa	30
		Gelidium pusillum	30
		Laurencia nidifica	20
		Dictyota friabilis	10
		Ulva fasciata	10
		Lyngbya sp.	T
		Ceramuim sp.	T
		Amphipods	5
N741-Sheraton Waikiki	44.7	Pterocladia capillacea	80
		Hypnea musciformis	15
		Acanthophora spicifera	5
		Ectocarpus indicus	T
		Sargassum sp.	T
		Sand grains	
N776-Grace's Ledge	43.2	Ulva fasciata	100
		Terrestrial plant material	T
		Amphipods	7
		Spine	1

Table 4. continued

N844-Sheraton Waikiki	42.0	Hypnea musciformis	40
		Sargassum sp.	30
		Ulva reticulata	15
		Paper	10
		Sand	5
		Ectocarpus indicus	T

Table 5. Identification of stomach contents from two (2) green turtles found dead at Waikiki, Oahu.

Tag No.	Straight Carapace Length (cm)	Sample Contents	% (T trace)
Z227	42.5	Hypnea musciformis	30
Forestomach (crop)		Pterocladia capillacea	30
		Ulva reticulata	25
		Codium edule	15
		Acanthophora spicifera	T
Z227	42.5	Pterocladia capillacea	70
Secretory Stomach		Codium arabicum	10
		Hypnea musciformis	10
		Codium edule	5
		Ulva reticulata	5
		Amansia glomerata	T
		Gracilaria coronopifolia	T
		Sargassum echinocarpum	T
---	53.0	Ulva reticulata	90
Forestomach (crop)		Acanthophora spicifera	5
		Amansia glomerata	5
		Ceramuim sp.	T
		Champia parvula	T
		Gelidiella acerosa	T
		Gracilaria coronopifolia (?)	T
		Lyngbya majuscula	T

Table 6. Identification of other samples taken from green turtles at Waikiki, Oahu.

Tag No.	Straight Carpace Length (cm)	Identification	% (T = trace)
N691	49.9	One amphipod in stomach sample	--
N741	44.7	Algae scrapped from plastron	--
		Sphacelaria furcigera	90
		Achrochaetuim sp.	10
		Chaetomorpha gracilis	T
		Lyngbya sp.	T
		Round worm	
N744	69.3	(5) O. branchiatus (leeches) near front flipper	
N776	43.2	7 amphipods	
Y47	62.4	(1) O. branchiatus in corner of mouth	

Table 7. Injuries and abnormalities found on eight (8) green turtles at Waikiki, Oahu.
G=Grace's Ledge
S=Sheraton Waikiki

Tag No.	Straight Carapace Length (cm)	Description
N535(G)	42.5	3 healed spear punctures from Hawaiian sling on top of head
Y47 (G)	61.2	Old gouge (scab) top of head near right eye
N570(G)	49.5	Seam between 8 & 9 marginal scutes has a healed notch
N573(Natatorium)	43.7	Small notch on scales 6 & 7 on right front flipper
N744(S)	69.3	3rd and 4th lateral right scute has deep scar that is healed
N778(G)	48.9	Abnormal scutes - 6 lateral left and 5 lateral right
N781(G)	60.1	Left eyelid slightly swollen
N840(S)	37.6	Superficial nick on 1st lateral left scute

Table 8. Growth rate for one green turtle recaptured at Waikiki, Oahu.

Tag No.	Date of Recapture	Carapace Length Straight	Carapace Length Curved	Recovery Interval	Growth Rate in (cm) Straight	Growth Rate in (cm) Curved
Y47	12-14-89	57.6	61.0	--	--	--
	12-14-90	61.2	65.0	1 year	3.6	4.0
	4-4-91	62.4	66.0	3.7 months	1.2	1.0

Table 9. Submergence times of two (2) green turtles foraging in front of the Sheraton Waikiki Hotel.

Turtle #1		Turtle #2	
Date	Minutes/Seconds	Date	Minutes/Seconds
11-30-90	2:45	1-21-91	1:15
Time=2:15pm	1:40	Time=5:38pm	1:40
	2:00		2:00
	2:20		1:25
	1:50		1:05
	1:35		1:35
	1:35		4:45
	1:50		4:00
	--- moving slightly ---		1:10
	0:35		3:20
	1:25		2:05
	1:50		1:00
	2:30		3:30
	1:50		1:40
	2:05		
	1:30		x=2:11
	1:12		n=14
	1:38		
	1:40		
	x=1:46		
	n=18		

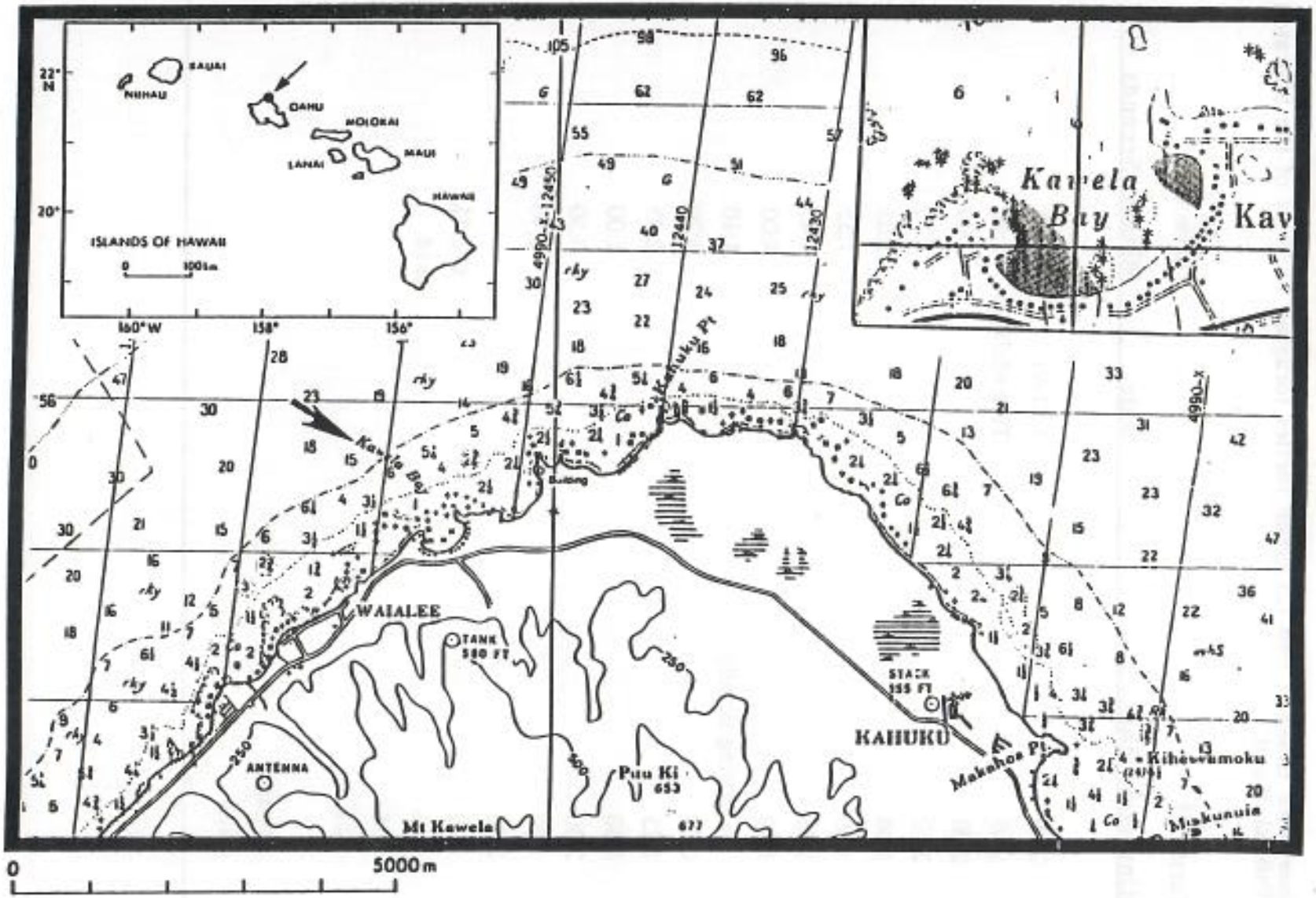

Figure 1.--Kawela Bay, Oahu, lat. 21°24'N, long. 158°01'W. Adapted from NOAA chart 1 9357 (depth in fathoms). Inset shows the approximate areas where most turtles were seen. (from Balazs et. al., 1987)

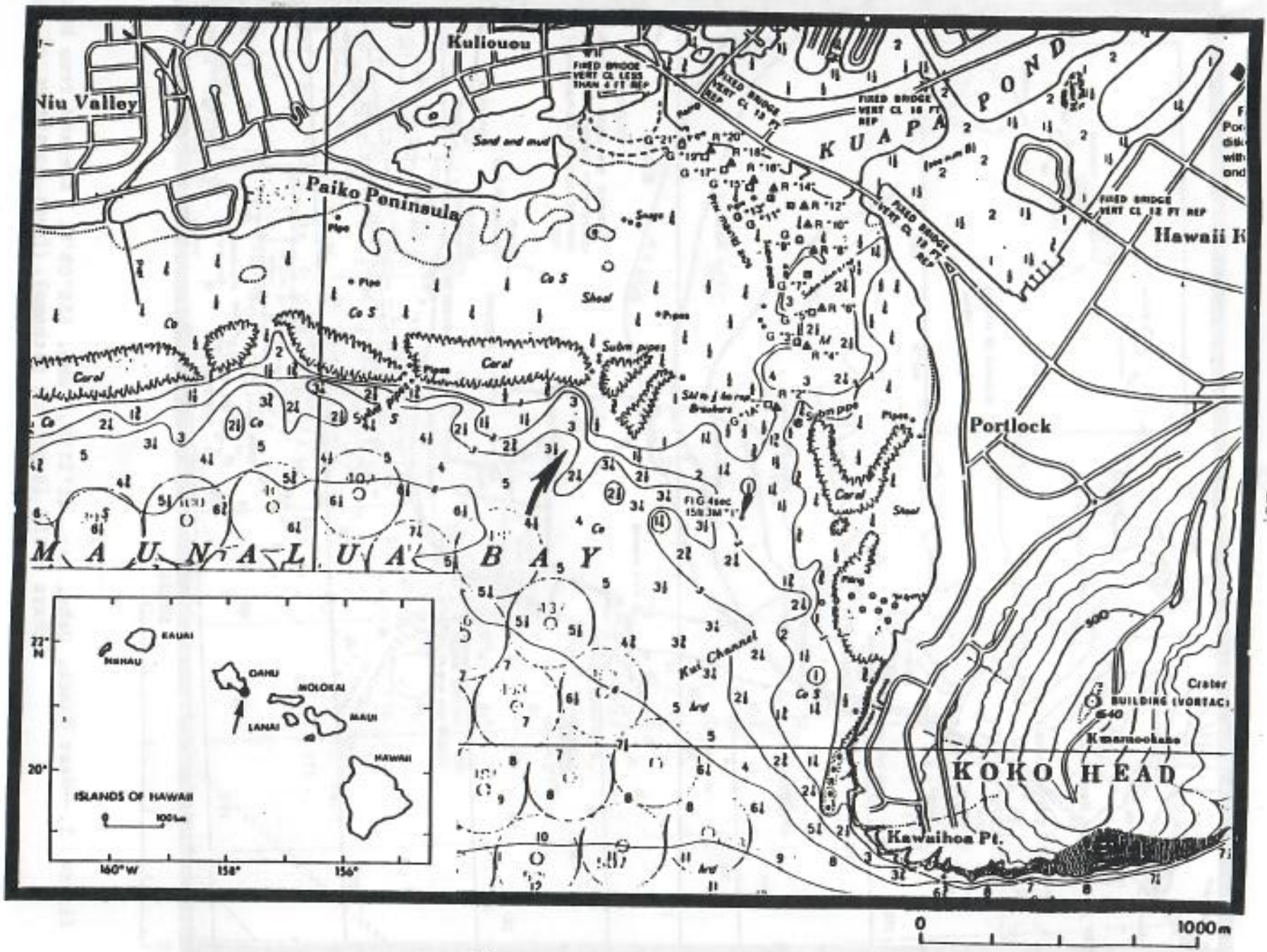

Figure 2.--Maunalua Bay, Oahu, lat. 21°17'N, long. 157°45'W. Adapted from NOAA chart 19358 (depth in fathoms). (from Palmer et al. 1987)

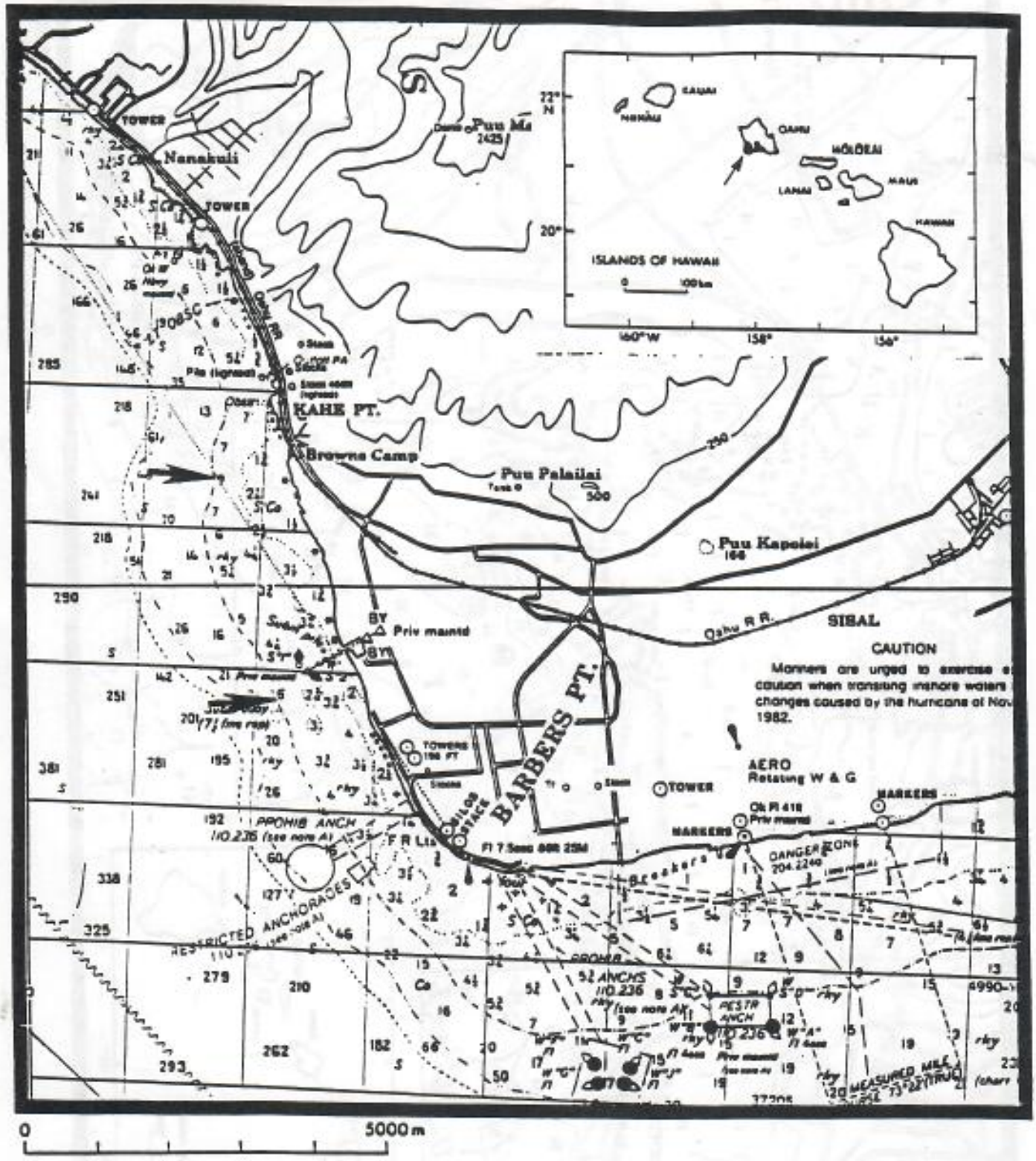

Figure 3.—West Beach, Oahu, lat. 21°21'N, long. 158°08'W. Adapted from NOAA chart 19357 (depth in fathoms). (from Balazs et. al., 1987)

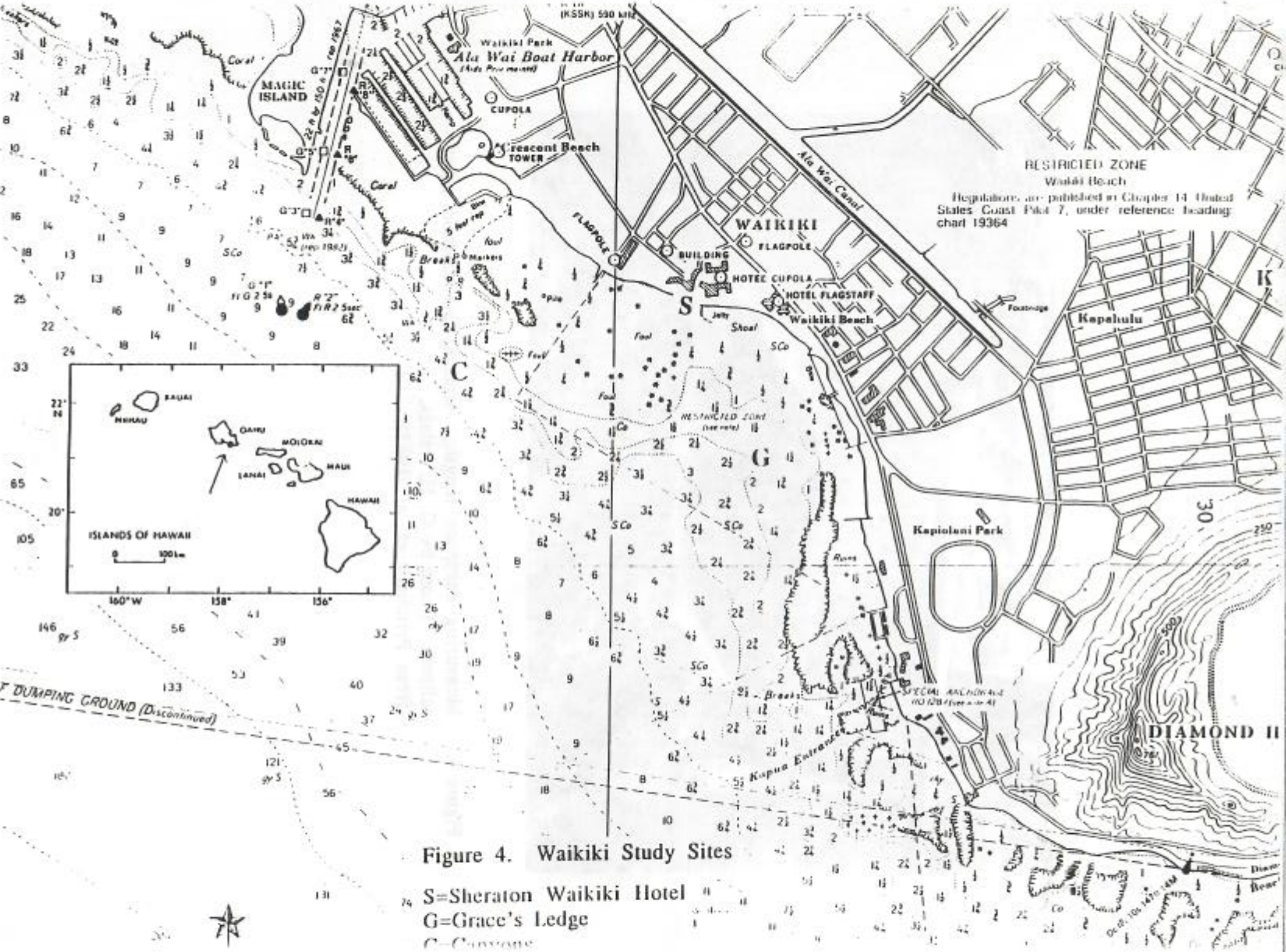

Figure 4. Waikiki Study Sites

S=Sheraton Waikiki Hotel
G=Grace's Ledge
C=Cannons

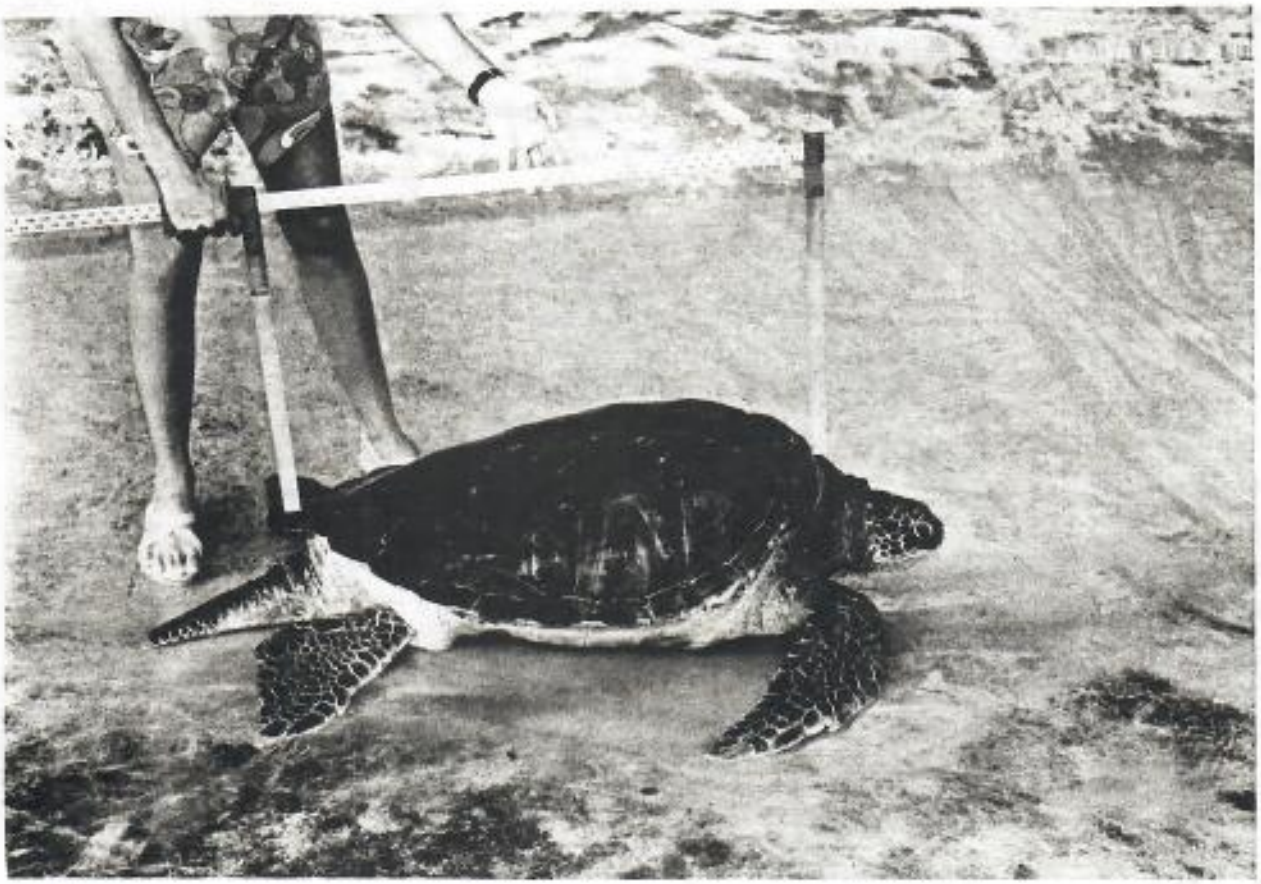

Figure 5. Measuring carapace length: straight-line method using calipers. Photo by G. H. Balazs.
(from Pritchard et. al. 1983)

Figure 6. Measuring carapace length: curved-line method, using flexible tape. Photo by G. H. Balazs.
(from Pritchard et. al. 1983)

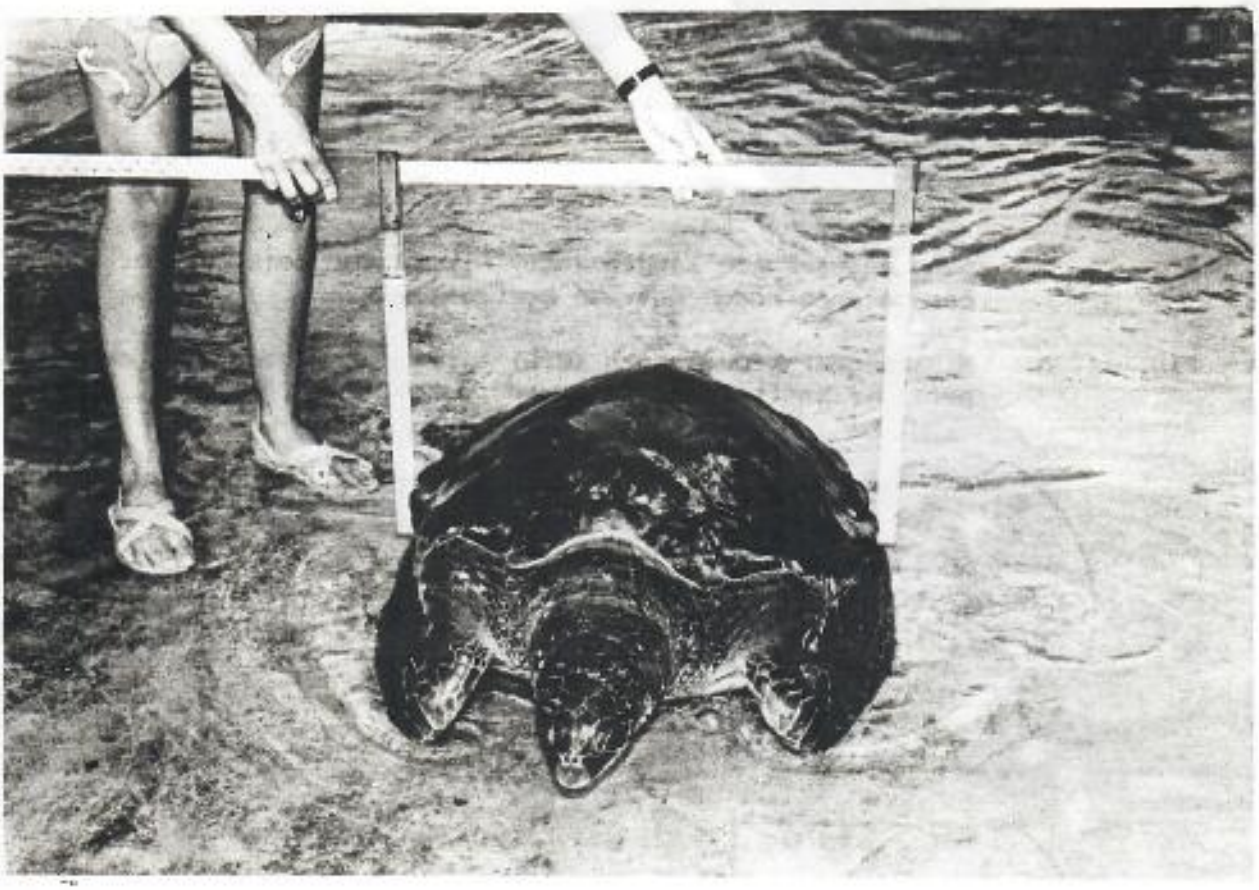

Figure 7. Measuring carapace width: straight-line method using calipers. Photo by G. H. Balazs.
(from Pritchard et. al. 1983)

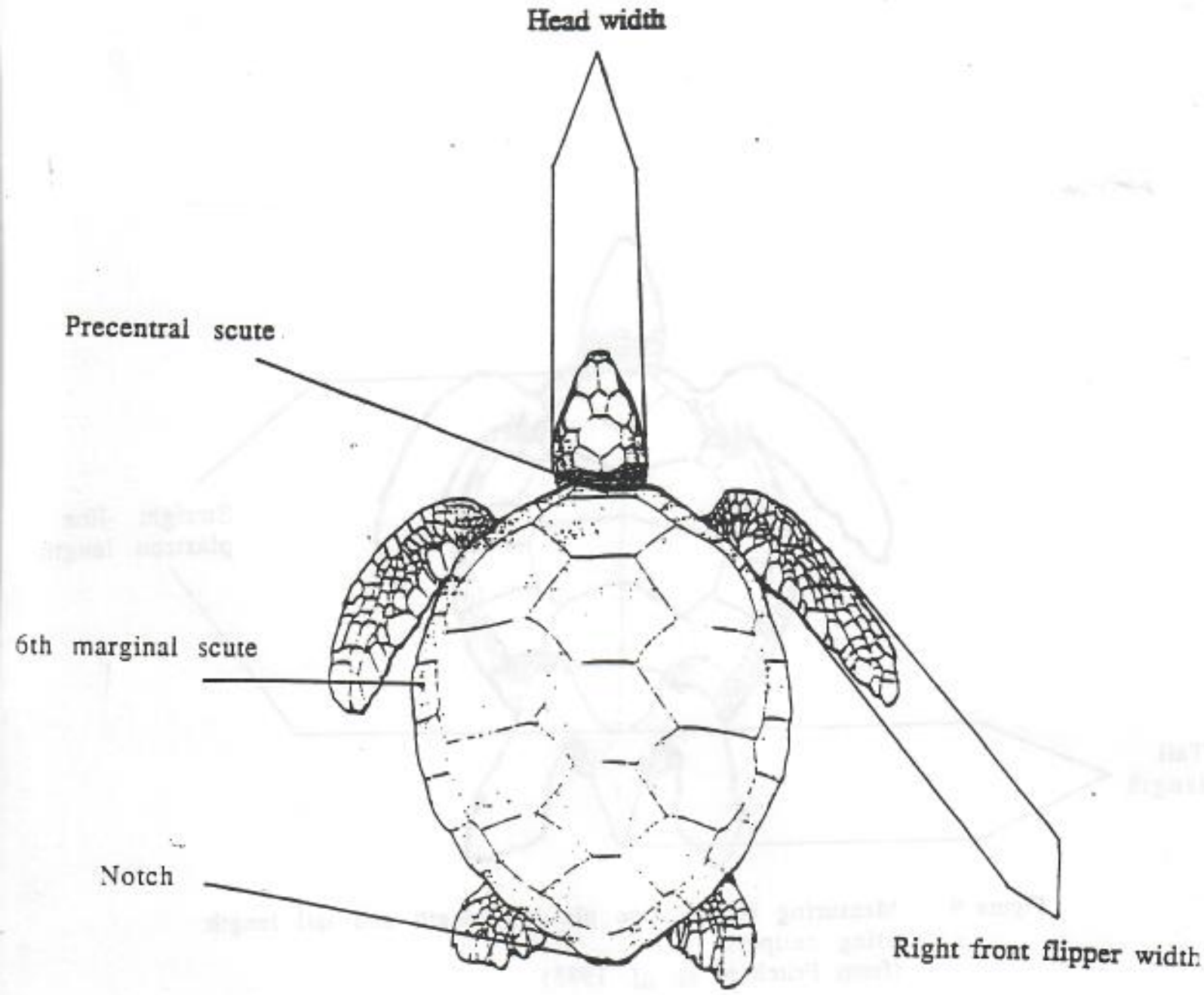

Figure 8. Measuring head width and right front flipper using calipers.
(drawing from Pritchard et. al. 1983)

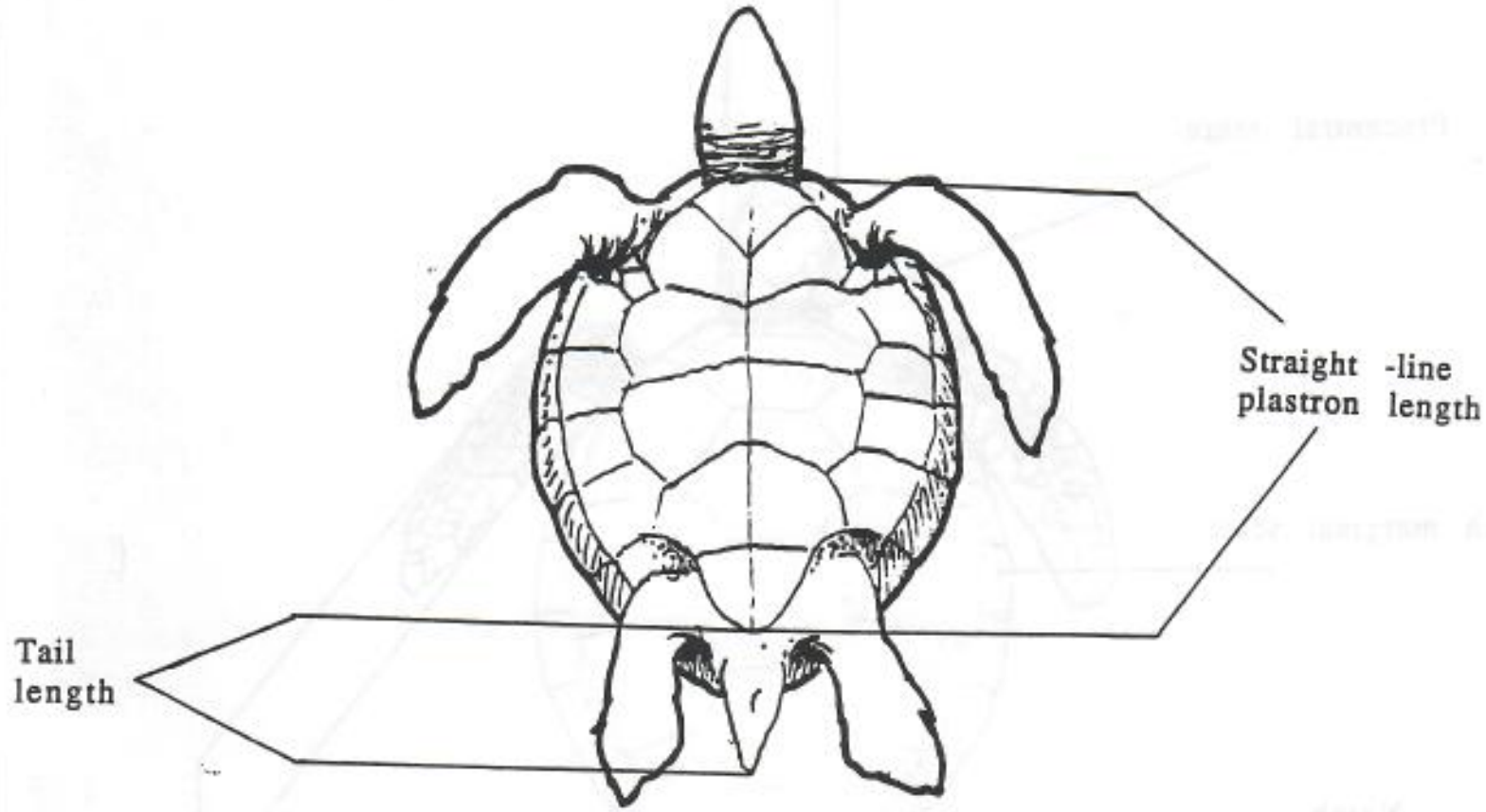

Figure 9. Measuring straight-line plastron length and tail length using calipers
(from Pritchard et. al. 1983)

RM=Russell Miya
GHB=George H. Balazs
KB=Karl Bromwell
CL=Christina Lamb
MF=Michele Finn
CH=Corey Hanner

APPENDIX 1
Brief Summary of Research Activities

Date	Location	Activities and Remarks
6-18-90	Sheraton/ Royal Hawaiian	RM & GHB visit site as the result of tourist Valerie Boyar-Nato (25 Pickwick Rd Hamden, Ct., 06517) reporting sighting of turtles from Rm.3133. On this date, we saw 3-4 turtles left of seawall.
7-25-90	Sheraton	RM & GHB meet with BJ Hughes to discuss study.
8-15-90	Sheraton/RH	RM & KB visited seawall. 4 possibly 5 turtles sighted. 2 turtles on each side of the seawall. Also sighted was 1 turtle in front of the Halekulani.
10-1-90	Grace's Ledge	RM swam with Grace Yavelow to locate reef ledge where GY has seen a tagged turtle. 3 turtles were seen, including one which had tags.
10-9-90	Kaimana Beach	GHB retrieved fresh dead turtle with severe propeller wounds.
10-13-90	Grace's Ledge	RM swims to ledge. 2 turtles seen. 1 turtle (small) was sleeping inside ledge. Tagged turtle was swimming around ledge.
10-16-90	Grace's Ledge	RM, GHB and KB survey ledge and adjacent reef. No turtles seen. Swell present.

10-16-90	Sheraton/RH	Gill net fisherman seen tending nets on beach.
10-21-90	Sheraton/RH	RM & CL (Christina Lamb) observing from shore at 7:15 am. 1 possibly 2 turtles were seen on the right side of sea wall.
10-22-90	Sheraton/RH	RM & CL observe from shoreline at 7:30 am. 2 turtles seen on the right side of seawall.
10-24-90	Sheraton/RH	RM & CL observe from shore at 5:10 pm. 3 possibly 4 turtles seen on the right side of seawall. 2, possibly 3 turtles sighted on the left side.
10-28-90	Sheraton/RH	RM snorkeled seawall area and collected algae for examination. My rough examination included-Ulva fasciata, Ulva reticulata, some areas of Padina sp., and a type of Sargassum sp. all around area. There were a lot of loose seaweeds. I also saw 4 possibly 5 turtles from the shore, most of which were seen on the Sheraton's side of seawall.
11-6-90	Grace's Ledge	RM documents the presence of a newly placed orange buoy and chain with cable secured to overhang of ledge. Also saw tagged turtle(B) sleeping in ledge.
11-6-90	Sheraton/RH	RM conducts shoreline census from 9:55 to 10:30am. No turtles seen. Also at 4:00 to 4:30 pm. 3 possibly 4 turtles were seen.
11-8-90	Sheraton/RH	RM, GHB and KB conduct turtle netting effort using 100' x 5' net. Two turtles seen in the vicinity, but none caught.

11-9-90	Sheraton/RH	RM and CL conduct shoreline census from 5:00 to 5:30 pm. 3 turtles seen. Also walked beach from the Royal side of the seawall to the Surfrider. No fecal pellets seen.
11-15-90	Grace's Ledge	RM, GHB and GN survey site and capture one turtle. Tagged N535, N536, Z227(SL=42.5cm). Paint mark "A". No other turtles seen. Buoy was removed.
11-29-90	Grace's Ledge	RM & CH surveyed site. Saw tagged turtle(B) inside ledge. Swam further out from ledge and saw a second turtle swimming, this one had a very noticeable chunk out of its carapace. Also the chain and a new blue nylon rope attached to the chain, but no buoy.
11-30-90	Sheraton	RM and GHB made observations from Room 2803. Two, possibly three, different turtles seen, all just to the west of the seawall. Time was from 1pm to 3:05pm.
12-11-90	Leahi Cat.	RM went on 11am cruise. No turtles seen but I was told of turtles seen eating algae off their anchor line and two other places where they see turtles.
12-14-90	Grace's Ledge	RM, GHB and KB survey site using 16' NMFS boat out of Kewalo Basin. Two turtles seen, both of which were captured (Y47-Y50+Z243, SL=61.2) originally tagged 12-14-89 after being rescued from a gillnet by a lifeguard in the same area. Paint mark "B". (N570,N571,N572,Z242 SL=49.5cm, paint mark "C".

12-17-90	Hyatt Regency	Turtle paint mark "A" found dead on the beach across from this hotel. Clear evidence of forced submergence from gillnet entangle.
12-18-90	Sheraton	RM observes from Room 1435 at 8:30 am. No turtles seen. Rainy overcast morning.
12-20-90	Grace's Ledge	RM, GHB and KB surveyed sites. "B" turtle seen at ledge. Turtle captured off Natatorium N573,N574,N575, SL=43.7cm. One, possibly two, other turtles seen in this vicinity.
1-15-91	Grace's Ledge	RM swam to ledge. No turtles seen. Remneince of a small swell. No mooring.
1-17-91	Kaimana Hotel	Rm & CH Snorkeled in the front of the hotel, near the wind sock, to look for turtle ledge that Jan Newhart told us about. No turtles seen. Visibility was poor. Also walked beach from Waikiki Aquarium to Kapahulu seawall, no fecal pellets seen.
1-20-91	Grace's Ledge	RM swam to ledge. One turtle was seen resting inside ledge. I had never seen this turtle before. Was the size of "B" or bigger.
1-21-91	Sheraton/RH	RM and CL conducted shoreline census. Saw 5 possibly 6 turtles , all of which were located on the Sheraton side of the seawall. Also walked beach from the seawall to the Leahi concession, no fecal pellets seen.
1-24-91	Sheraton	RM and CL observe from Room #1135. 4 turtles seen. Two on each side of seawall.

1-31-91	Sheraton	RM observes from room 1735 at 4:30 pm. 2 possibly 3 turtles were seen on the Royal side of the seawall. 3 possibly 4 turtles were seen on the Sheraton side.
2-10-91	Sheraton	RM and CL survey channel which lies just west of the Sheraton. It was fairly shallow-approx.10ft in depth. There no were ledges, and it appears to be dredged.
2-14-91	Sheraton	Rm and CL observe from room 1235 at 4:30 pm. 6 turtles were seen, all but 1 were located on the Sheraton side of the seawall. (4 were seen west of the finger of algae).
2-15-91	Sheraton	RM, CL, MF, KB, & GHB attempt to net turtles with CL on the lanai of room 1235 locating and instructing us to where they were. 2 attempts on each side of the seawall using the 5x100 nets were unsucessful but we came close. CL estimated 6 turtles total from 3:15-7:00. Use nets as boundaries next time!!!
2-21-91	Grace's Ledge	RM swam out to ledge at 12:30 pm. One turtle in ledge with no tags. Looked like the same turtle I saw on 1-20-91.

2-28-91	Sheraton/RH	RM observed from shoreline at 3pm. 3 possibly 4 turtles were seen. 2 on each side of the seawall.
3-1-91	Sheraton	RM, GHB, KB, T, MF attempting to net turtles with GHB in room 1235. First attempt on the Royal side was successful. Second attempt on Sheraton side was not successful. 8 x 100 ft nets were used. " E" turtle was 47lbs and robust.
3-7-91	Sheraton/RH	RM observes from the shoreline? at 4pm. 2 turtles seen on the Sheraton side of the seawall.
3-15-91	Sheraton	RM, GHB, KB, Paul, Steve, Leslie, Mark-students from Hawaii Loa College, and Steve Ball. Teresa Parsons was great PR. 2 attempts on the Royal side and 1 on the Sheraton side. 2 catches -33lbs and 113lbs. Collected 5 leeches from the 113lbs turtle.
3-21-91	SW/ Waikiki Beach	RM and CL walk beach from Leahi Cat. to the police station. No fecal pellets seen(1:30 pm). Observed from room 1435 from 2:50 to 4:30pm. 2 turtles were seen, 1 straight out from the seawall and the other on the Sheraton side. No white letters present on carapace.

3-28-91	Grace's Ledge	RM, GHB & KB. RM & KB swam to ledge. 1 turtle in ledge was captured. End of small swell, 1 to an occasional 2 ft. In the water at 8:45 to 9 am. This turtle is lettered "H".
3-29-91	Grace's Ledge	KB, RM & GHB. 2 turtles caught in ledge. Smaller in Grace's Ledge and the larger in the last hole seaward.
4-3-91	3's/Waikiki	GHB & RM picked up a prop slash turtle at beach stand. Found floating between 3's and Paradise-turtle was still alive.
4-4-91	Grace's Ledge	GHB, RM, & KB. GHB & RM swam to ledge. "B" turtle was recaptured inside ledge. Visibility was very poor. 1 to 3 ft swell
4-5-91	Sheraton	RM, GHB, KB, MF, and Hawaii Loa College students. Hawaiian Moving Company. Netted 2 turtles, both on Sheraton's side of seawall.
4-22-91	Grace's Ledge	RM, GHB, &KB Visibility very poor similar to 4-4-91. No turtles caught. One turtle seen on the surface above the ledge.

4-23-91	UH	Anonymous informant spoke of the Manakai 1 &2 taking tourist to Grace's Ledge. They work out of the Hilton lagoon area. He mentioned bread bags and also illegal moorings being used. He also informed me that the Captain would sometimes ride turtles.
4-26-91	Sheraton	GHB, RM, and fellow MOPers. Laid barrier nets on the finger of limu and also just right of the wall. 3 turtles caught. Used RM 1435.
5-8-91	Sheraton	RM snorkeled on the Sheraton side of the Seawall for algae samples. 1 turtle seen approx. eight feet from me along the bottom.
5-15-91	Waikiki	RM & GHB taken by the Explorer to see area known as canyons. "L" turtle seen by Atlantis diver. Bearings taken.
6-3-91	Waikiki	RM walked beach at 6:30 pm for fecal pellets from Leahi Cat. to the Seawall. No pellets were seen. 2 to 3 turtles were observed on the Sheraton side of the Seawall within are netting range.

OBJECTIVES OF THE NATIONAL MARINE FISHERIES SERVICE SEA TURTLE RESEARCH PROJECT CONDUCTED OFF WAIKIKI BEACH WITH LOGISTICAL SUPPORT FROM ATLANTIS REEF DIVERS

prepared by
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OVERALL: To promote the long-term conservation and recovery of sea turtles and the habitats upon which they depend by developing management practices based on sound biological information.

SPECIFIC:

1. To determine the approximate number of sea turtles by size-classes and species, resident to Waikiki region.

2. To determine the types and locations of life-support activities undertaken by the turtles within the habitat limits of Waikiki (i.e., foraging, resting, grooming).

3. To ascertain the food sources utilized by the turtles.

4. To determine adverse impacts to the turtles, both from humans (i.e., fishing nets, rubbish, boat strikes) and other factors (i.e., disease, shark predation).

5. To calculate growth rates and eventually estimate ages at sexual maturity.

6. To estimate the recruitment rates of small juveniles to the Waikiki population and migrations/movements which may occur after residency has been established.

7. To determine flipper tag retention rates.

8. To examine the various aspects and potential interactions of sea turtles residing in an area where scuba diving and tourism commonly occur.

GREEN TURTLES TAGGED AND RECAPTURED
AT "WAIKIKI CANYONS" IN COLLABORATION
WITH ATLANTIS REEF DIVERS
BY GEORGE H. BALAZS

DATE	NO. CAPTURED	NO. WITH TUMORS (SCORE)	NO. RECAPTURED		TOTAL NO. TAGGED (TO DATE)
05-15-91	Observations only-2 SCUBA dives				-
08-29-91	Observations only-1 SCUBA dive				-
10/91 Loggerhead sighting					
01-24-92	4	0	0		4
01-31-92	1	0	0		5
02-12-92	3	0	0		8
04-24-92	3	0	0		11
05-01-92	4	0	0		15
05-08-92	4	2 (3,3) SL = 70.3, 52.6	0		19
05-15-92	2*	0	1		20
05-22-92	1	1 (2) SL = 69.4	0		21
06-19-92	2	0	1	GL**	22
08-21-92	2	0	0		24
09-18-92	2	0	1		25
09-25-92	1	0	1		25
10-16-92	1	0	0		26
02-08-93	2	0	1		27
02-19-93	2***	1 (2) SL = 68.7	0		29
04-23-93	3	0	2		30
04-27-93	1	0	0	H81 N744 R814 new	31

* Includes release of a gillnet entangled turtle found by ~~Royal Hawaiian Hotel~~. Outrigger

** GL=Grace's Ledge

***Includes release of a fishline entangled turtle with right front flipper amputated and healed.

Sheraton

+ [illegible]

Sid - prop slash

07 already captured before

9th ? 8/20

>1 year?

4/30/93 nothing captured

5/21/93 2 captured (Sid & Scarlette)

6/30/93 1 new captured

8/23/93 3 captured (1 new)

10/15/93 2 captured (1 new)

10/29/93 4 captured (1 new)

2/11/94 3 (2 new)

5/6/94 3 (2 new) MAF

Tagging summary from Waikiki | Waikiki, Canyon | Waikiki, Grace's Ledge | Waikiki, Sheraton during 01/01/89-02/19/93

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Tag Nos.	Date	Carapace Length (cm) Straight	Curved	Weight (lbs)	Captured Method
10/90-8/91 Sheraton/Graces					
N535, N536, Z227	11/15/90	42.5	45.5	27.0	Hand/Snorkel
N570, N571, N572, Z242	12/14/90	49.5	53.0	45.0	Hand/Snorkel
N573, N574, N575	12/20/90	43.7	47.0	30.0	Hand/Snorkel
N691, N692, N693	03/01/91	49.9	53.5	47.0	Net
N741, N742, N743	03/15/91	44.7	47.0	33.0	Net
N744, N745, N746	03/15/91	69.3	74.0	113.0	Net
N775, N776, N777	03/28/91	43.2	46.5	31.0	Hand/Snorkel
N778, N779, N780	03/29/91	48.9	53.0	37.0	Hand/Snorkel
N781, N782, N783	03/29/91	60.1	63.5	64.0	Hand/Snorkel
N793, N794	04/05/91	61.3	65.2	72.0	Net
N795, N796, N797	04/05/91	80.7	86.2	180.0	Net
N840, N841	04/26/91	37.6	39.5	17.0	Net
N842, N843	04/26/91	42.9	46.0	24.0	Net
N844, N845 +747 N=15	04/26/91	42.0	45.0	24.0	Net
START ATLANTIS/CANYON					
H81, H82, H83	01/24/92	80.8	86.5	---	Hand/Scuba

--Continued

Tag Nos.	Date	Carapace Length (cm) Straight	Curved	Weight (lbs)	Captured Method
H84, H85, H86	01/24/92	66.9	72.0	105.0	Hand/Scuba
H87, H88, H89	01/24/92	49.5	53.0	38.0	Hand/Scuba
H90, H91, H92	01/24/92	45.6	48.5	29.0	Hand/Scuba
H93, H94, H95	01/31/92	42.9	44.0	22.0	Hand/Scuba
H124, H125, H126	02/12/92	58.4	62.5	67.0	Hand/Scuba
H127, H128	02/12/92	40.4	41.5	18.0	Hand/Scuba
H129, H130, H131	02/12/92	71.5	76.0	112.0	Hand/Snorkel
H164, H165, H166	03/20/92	60.1	63.0	62.0	Hand/Snorkel
H297, H298, H299, H300	04/24/92	73.7	78.5	---	Hand/Scuba
H426, H427, H428, H429	04/24/92	68.2	72.0	---	Hand/Scuba
H430, H431, H432, H433	04/24/92	65.8	71.5	---	Hand/Scuba
H434, H435, H436	05/01/92	48.5	51.5	35.0	Hand/Scuba
H438, H440, H441	05/01/92	72.7	78.0	---	Hand/Scuba
H442, H444, H445, H446	05/01/92	71.9	76.5	---	Hand/Scuba
H447, H450, H451, H452	05/01/92	64.5	69.5	---	Hand/Snorkel
H464, H465, H466, H467	05/08/92	74.8	81.0	---	Hand/Scuba
H468, H469, H470, H471	05/08/92	57.1	61.0	62.0	Hand/Scuba
H472, H473, H474	05/08/92	52.6 tumors 5>3	55.5	48.0	Hand/Snorkel

Tag Nos.	Date	Carapace Length (cm) Straight	Curved	Weight (lbs)	Captured Method
H475, H476, H477	05/08/92	70.3 Tumors 5=3 (5 months Post-Release)	77.0	---	Hand/Scuba
H521, H522, H523, H524	05/22/92	69.4 Tumors 5=2	75.0	---	Hand/Scuba
H809, H810, H811	06/19/92	52.2	56.0	50.0	Hand/Scuba
R380, R381, R382, R383	08/21/92	69.2	75.0	---	Hand/Scuba
R384, R385, R386, R387	08/21/92	43.6	46.0	25.0	Hand/Scuba
R422, R423, R424, R425	09/18/92	75.7	82.0	---	Hand/Snorkel
R529, R530, R532	10/16/92	66.0	73.0	95.0	Hand/Scuba
R780, R781, R782, R783	02/08/93	53.1	57.0	47.0	Hand/Scuba
	02/19/93				Hand/Scuba

15 (7 snorkel, 8 net)
28 (5 snorkel, 23 scuba)

SCL = 37.6 to 80.8

SCL Range 37.6 – 80.8

wt Range 7.7 – 64.1 kg 180 lbs

Summary of recoveries from Waikiki | Waikiki, Canyon | Waikiki, Grace's Ledge | Waikiki, Sheraton during 01/01/89-02/19/93

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Tag Nos.	Date		Straight Length (cm)		Year Interval	Growth Rate cm/yr
	Original	Recovered	Original	Recovered		
Y47, Y48, Y49, Y50, Z243 (12/14/90)	12/14/89	12/14/90	57.6	61.2	1.0	3.6
Y47, Y48, Y49, Y50, Z243	12/14/89	04/04/91	57.6	62.4	1.3	WILD 3.7
H90, H91, H92	01/24/92	04/30/92	45.6	---	0.3	---
H90, H91, H92	01/24/92	05/15/92	45.6	45.6	0.3	0.0
H434, H435, H436	05/01/92	06/17/92	48.5	---	0.1	---
H164, H165, H166	03/20/92	06/19/92	60.1	60.3	0.2	1.0
H90, H91, H92	01/24/92	09/18/92	45.6	46.9	0.6	2.2
H84, H85, H86 Scarlette	01/24/92	09/25/92	66.9	69.8	0.7	4.1
H475, H476, H477	05/08/92	10/18/92	70.3	70.6	0.4	0.7
H90, H91, H92 SD	01/24/92	11/20/92	45.6	47.5	0.8	2.4
H434, H435, H436	05/01/92	02/08/93	48.5	52.2	0.8	WILD 4.6

Monthly growth rate summary from Waikiki | Waikiki, Canyon | Waikiki, Grace's Ledge | Waikiki, Sheraton during 01/01/89-02/19/93

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Tag No.	Month Interval	Straight Carapace (cm) Growth Rate		Curved Carapace (cm) Growth Rate		Growth Rate Weight (kg)
		Length	Width	Length	Width	
Y47, Y48, Y49, Y50, Z243	12	0.3	0.2	0.3	0.4	---
Y47, Y48, Y49, Y50, Z243	15	0.3	0.2	0.3	0.4	---
H90, H91, H92 Sid	3	---	---	---	---	---
H90, H91, H92	3	0.0	-0.1	0.3	0.2	0.7
H434, H435, H436	1	---	---	---	---	---
H164, H165, H166	2	0.1	0.2	0.5	0.8	2.5
H90, H91, H92 Sid	7	0.2	0.1	0.4	0.3	0.6
H84, H85, H86 Scarlette	8	0.4	0.3	0.5	0.5	0.6
H475, H476, H477	5	0.1	-0.1	0.0	-0.1	---
H90, H91, H92 Sid	9	0.2	0.2	0.3	0.2	0.4
H434, H435, H436	9	0.4	0.3	0.5	0.4	1.1

Annual growth rate summary from Waikiki | Waikiki, Canyon | Waikiki, Grace's Ledge | Waikiki, Sheraton during 01/01/89-02/19/93

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Tag No.	Year Interval	Straight Carapace (cm) Growth Rate		Curved Carapace (cm) Growth Rate		Growth Rate Weight (kg)
		Length	Width	Length	Width	
Y47, Y48, Y49, Y50, Z243	1.0	3.6	2.1	4.0	4.5	---
Y47, Y48, Y49, Y50, Z243 wild	1.3	3.7 wild	2.3	3.8	4.6	---
H90, H91, H92 Sid	0.3	---	---	---	---	---
H90, H91, H92	0.3	0.0	-1.3	3.3	1.7	6.7
H434, H435, H436	0.1	---	---	---	---	---
H164, H165, H166 wild	0.2	1.0 wild	2.0	5.0	7.5	25.0
H90, H91, H92 Sid	0.6	2.2	1.0	4.2	3.3	6.7
H84, H85, H86 Scarlette	0.7	4.1 Scarlette	3.4	5.7	5.7	7.1
H475, H476, H477 wild	0.4	0.7 wild	-0.7	0.0	-1.3	---
H90, H91, H92 Sid	0.8	2.4 Sid	2.1	3.8	2.5	5.0
H434, H435, H436 wild	0.8	4.6 wild	3.0	5.6	4.4	12.5

Historical information for turtle H84

Scarlette

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Tag information--

Tag Number	Date Tagged	Tag Type	Tag Position
H84	01/24/92	I681	RFL
H85	01/24/92	I681	LFL
H86	01/24/92	I681	LHF

Historical information--

Date	Type of Encounter	Location	Tumor Score	Nesting Activity	Straight Length	Since Last Encounter				Overall			
						Interval		Growth-rates		Interval		Growth-rates	
						Month	Year	cm/mon	cm/yr	Month	Year	cm/mon	cm/yr
01/24/92	Near Shore	Oahu, Waikiki, Canyon	0	-	66.9	---	---	---	---	---	---	---	---
09/25/92	Near Shore	Oahu, Waikiki, Canyon	0	-	69.8	8	0.7	0.4	4.1	8	0.7	0.4	4.1

Historical information for turtle H164

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Tag information--

Tag Number	Date Tagged	Tag Type	Tag Position
H164	03/20/92	I681	RFL
H165	03/20/92	I681	LFL
H166	03/20/92	I681	LHF

Historical information--

Date	Type of Encounter	Location	Tumor Score	Nesting Activity	Straight Length	Since Last Encounter				Overall			
						Interval		Growth-rates		Interval		Growth-rates	
						Month	Year	cm/mon	cm/yr	Month	Year	cm/mon	cm/yr
03/20/92	Near Shore	Oahu, Waikiki, Grace's Ledge	0	-	60.1	---	---	---	---	---	---	---	---
06/19/92	Near Shore	Oahu, Waikiki, Canyon	0	-	60.3	2	0.2	0.1	1.0	2	0.2	0.1	1.0

Historical information for turtle H90

Sid

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Tag information--

Tag Number	Date Tagged	Tag Type	Tag Position
H90	01/24/92	I681	LFL
H91	01/24/92	I681	RFL
H92	01/24/92	I681	LHF

Historical information--

Date	Type of Encounter	Location	Tumor Score	Nesting Activity	Straight Length	Since Last Encounter: Interval Month	Interval Year	Growth-rates cm/mon	cm/yr	Overall: Interval Month	Interval Year	Growth-rates cm/mon	cm/yr
01/24/92	Near Shore	Oahu, Waikiki, Canyon	0	-	45.6	---	---	---	---	---	---	---	---
04/30/92	Near Shore	Oahu, Waikiki	0	-	---	3	0.3	---	---	3	0.3	---	---
05/15/92	Near Shore	Oahu, Waikiki, Canyon	0	-	45.6	---	---	---	---	3	0.3	0.0	0.0
09/18/92	Near Shore	Oahu, Waikiki, Canyon	0	-	46.9	4	0.3	0.3	4.3	7	0.6	0.2	2.2
11/17/92	Near Shore	Oahu	0	-	---	1	0.1	---	---	9	0.8	---	---
11/20/92	Near Shore	Oahu, Waikiki, Canyon	0	-	47.5	---	---	---	---	9	0.8	0.2	2.4

prop slash treatment

Historical information for turtle Y47

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Tag information--

Tag Number	Date Tagged	Tag Type	Tag Position
Y47	12/18/89	I681	RFL
Y48	12/18/89	I681	LFL
Y49	12/18/89	I681	L34
Y50	12/18/89	I681	LHF
Z243	12/14/90	R	R3

Historical information--

Date	Type of Encounter	Location	Tumor Score	Nesting Activity	Straight Length	Since Last Encounter				Overall			
						Interval		Growth-rates		Interval		Growth-rates	
						Month	Year	cm/mon	cm/yr	Month	Year	cm/mon	cm/yr
12/14/89	Stranded	Oahu, Waikiki (Kapahulu Seawall)	0	-	57.6	---	---	---	---	---	---	---	---
12/14/90	Near Shore	Oahu, Waikiki, Grace's Ledge	0	-	61.2	12	1.0	0.3	3.6	12	1.0	0.3	3.6
04/04/91	Near Shore	Oahu, Waikiki, Grace's Ledge	0	-	62.4	3	0.3	0.4	4.0	15	1.3	0.3	3.7

Historical information for turtle H475

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Tag information--

Tag Number	Date Tagged	Tag Type	Tag Position
H475	05/08/92	I681	LHF
H476	05/08/92	I681	R45
H477	05/08/92	I681	L45

Historical information--

Date	Type of Encounter	Location	Tumor Score	Nesting Activity	Straight Length	Since Last Encounter: Interval Month	Since Last Encounter: Interval Year	Since Last Encounter: Growth-rates cm/mon	Since Last Encounter: Growth-rates cm/yr	Overall: Interval Month	Overall: Interval Year	Overall: Growth-rates cm/mon	Overall: Growth-rates cm/yr
05/08/92	Near Shore	Oahu, Waikiki, Canyon	3	-	70.3	---	---	---	---	---	---	---	---
10/18/92	Stranded	Oahu, Fort DeRussy	4	-	70.6	5	0.4	0.1	0.7	5	0.4	0.1	0.7
10/18/92	Near Shore	Oahu, Waikiki	4	-	70.6	---	---	---	---	5	0.4	0.1	0.7

Historical information for turtle H434

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Tag information--

Tag Number	Date Tagged	Tag Type	Tag Position
H434	05/01/92	1681	RFL
H435	05/01/92	1681	LFL
H436	05/01/92	1681	RHF

Historical information--

Date	Type of Encounter	Location	Tumor Score	Nesting Activity	Straight Length	Since Last Encounter				Overall			
						Interval		Growth-rates		Interval		Growth-rates	
						Month	Year	cm/mon	cm/yr	Month	Year	cm/mon	cm/yr
05/01/92	Near Shore	Oahu, Waikiki, Canyon	0	-	48.5	---	---	---	---	---	---	---	---
06/17/92	Near Shore	Oahu, Waikiki, Canyon	0	-	---	1	0.1	---	---	1	0.1	---	---
02/08/93	Near Shore	Oahu, Waikiki, Canyon	0	-	52.2	7	0.6	---	---	9	0.8	0.4	4.6

Turtle Hilton

Where Both Humans and Amphibians Are Welcome

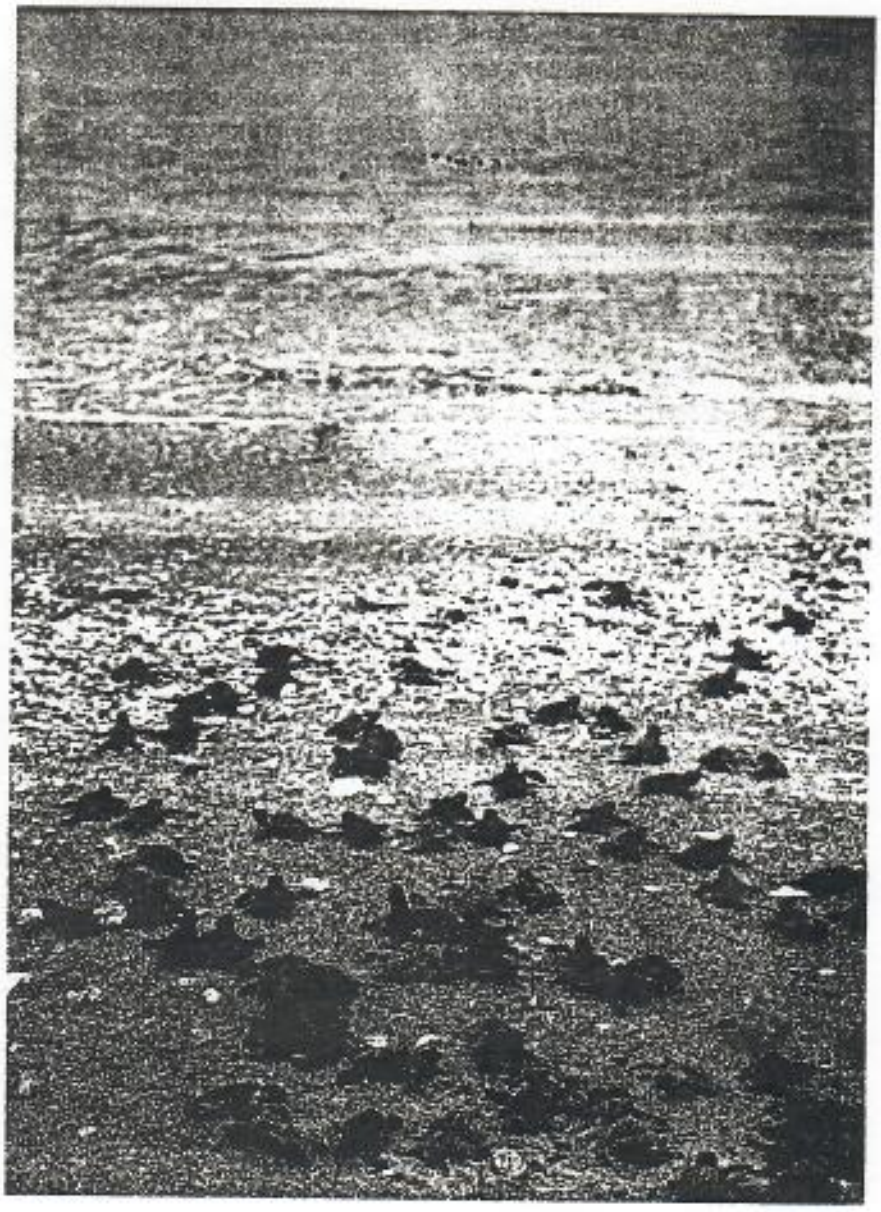
by Elizabeth Royte

At a little before midnight, when most citizens of Jupiter, Florida, are asleep, the wide, sloping beach of the Hilton hotel crawls with life. Couples patrol the high-water mark, grandparents hush gaggles of children, conventioneers leave off their talk of profit and loss, while, out in the surf, the dark shapes of giant sea turtles appear. If conditions are right—no loud noises or bright lights, an agreeable temperature, the proper dampness of sand—the creatures make their way up the beach and begin excavating nests in which they can lay their eggs.

Sea turtles have been nesting here for more than a hundred million years, and it's the aim of the hotel and the local community to help them continue unmolested. Florida's Department of Natural Resources began studying the turtles in the late Fifties, and, for a decade or so, concerned residents of Palm Beach County have worked to protect them. But it was the launch of the Jupiter Hilton's Turtle Watch Program in 1984 that heightened public awareness of the endangered species.

The program started when the Hilton's management realized that its clients who walked on the beach at night were often scared by the nesting turtles—and, in turn, often scared the turtles away. In the spirit of doing well by doing good, the hotel reduced its room rates during the nesting season and began an educational program for interested guests. Today, Marc Levasseur, a former hotel employee and a naturalist licensed by Florida's Department of Natural Resources, presents a slide show three times a week on sea turtle biology, and leads guests on beach walks to watch mother turtles lay and hatchlings make their break for the sea.

Eight species of sea turtles roam the world, and three of them—the loggerhead, leatherback, and green turtle—nest on Florida's beaches. The Juno Beach–Jupiter stretch is one of the busiest in the world; last year, monitors counted 1,000 nests per mile. The most common of these turtles, the loggerhead, is not endangered but threatened. Researchers estimate their nesting population today at 20 percent of 1960 levels. The turtles average 350 pounds and grow to a yard in length with heads that



Turtle Watch gives newborns a head start in their race for the sea and survival.

Elizabeth Royte is a free-lance writer whose work has appeared recently in the New York Times Magazine *and* Life.

Photograph by Flip Schulke/Black Star

measure 10 inches across. Between the age of 15 or so until about the age of 75, says Levasseur, the female loggerhead lays every two to three years, but lays a lot—two to seven times each nesting season, at two-week intervals.

The green turtle, reaching 300 pounds, has the unhappy distinction of being the most endangered, due largely to its palatable flesh: Green turtle is the chief ingredient of turtle soup. The leatherback, also endangered, distinguishes itself as the largest turtle in the world. It weighs from 1,200 to 1,500 pounds and has a six-foot-long carapace of tough, leathery skin. The turtles favor jellyfish, which is hastening their demise: They eat floating plastic bags, which resemble jellyfish but play havoc with their intestines.

Once she has found a suitable nesting site, a turtle clears a body pit for herself with her front flippers. Her rear flippers then dig deep into the sand, scooping out a nest chamber two feet deep and 10 inches wide. When she begins laying, she's not easily distracted. Without fear of disturbing her, guide Marc Levasseur can set his flashlight in a small hollow between her rear flippers to show guests her rapidly dropping eggs. At this point, many small children in the crowd begin to feel squeamish. "What's that thing they come out of?" they ask. It's called a cloaca and it tucks away when she's not laying. The eggs drop out, two and three at a time. Won't they crack? No, they're fairly soft; they dent like wet Ping-Pong balls when held. "Yuck," the kids say, but respectfully, when Levasseur places the mucus-coated eggs in their hands. "They're warm. They're slimy."

The nest chamber steadily fills, with 20, 30, 50—up to 150 eggs. With each effort of expulsion, the turtle lifts her back fins; sometimes she sighs. The children crawl through the sand to look into her large, staring eyes. "She's crying," they say, alarmed. "No," Levasseur reassures them, "the tears cleanse her eyes of sand and prevent drying." When the turtle finishes laying, she begins arduously covering the nest. The beach seems to tremble as the loggerhead pushes her great weight backward, pounding the sand tight. Her back fins curl and shovel, her front legs, in a movement resembling a swimmer's breaststroke, throw sand far and wide. The larger the disturbed area, the more difficult it will be for predators to locate the eggs.

Out of 100 or so eggs, a survival rate of two is considered good. Turtle eggs have many predators: foxes, raccoons, and armadillos, who dig up the nests; and humans, who, despite a $100-an-egg fine, poach them to sell as aphrodisiacs. A tropical storm can wipe out every nest on the beach. To mitigate against these risks, Levasseur removes eggs from areas heavily trafficked or too close or far from the water. He reburies them in man-made nests, which he monitors for the Department of Natural Resources.

If all has gone well, the turtle hatchlings, after about two months, begin to fight their way out of the shell. In their subterranean air pocket they wait until the sand temperature favors a final assault on the beach surface. The exodus begins slowly. The sand-coated hatchlings, up to three inches long and ungainly as windup toys, waddle toward the sea, flippers whirring. When the turtles hit hard sand they pick up speed, and by the time they touch the wet sand they're practically racing. A protected hatchling release resembles the start of the New York City Marathon—cameras rolling, a cordon of safety—but in nature the hatchlings emerge under the rapacious eyes of ghost crabs, fire ants, and raccoons. If they make it to the sea, the hatchlings must then avoid sharks, barracudas, and grouper.

By ushering hatchlings into the sea, Jupiter's guardians up the odds of success. It can be argued that they're interfering with a natural process, but, says Marylou Jackson, who takes over Levasseur's job on Saturday nights, "I don't care if it's unnatural. These turtles need any head start we can give them."

For humankind, contact with the turtles ends at the water's edge, only to pick up decades later, when females return to their natal beach to lay. For all marine researchers know about nesting females and hatchlings, the population dynamics of sea turtles during the pelagic (open sea) interval remains an enigma. Sitings and tagging programs suggest turtles circle the globe or remain at the edges of ocean currents for years. Males never touch land again.

If it were only natural predation cutting the ranks of sea turtles, we wouldn't need programs like Turtle Watch. But man has exploited the species beyond any sustainable level. From the sea turtle, man derives more profit than most other endangered species on Earth. Despite international bans, some cultures continue to eat the eggs, cook and burn the oil, wear the leather from flippers, make jewelry from the shell, and eat the meat.

Beachfront development that encroaches on turtle habitat, and jetties and erosion-control structures that cut off turtles from nesting beaches further decimate turtle populations. Turtles spook easily; simply shining a flashlight on a potential nester is enough to frighten her away. Lights also confuse the laying mothers and hatchlings, luring them across roadways and into populated areas. Boat propellers slash turtle shells; shrimpers' nets drown them. Some sea turtles live on rafts of sargasso, a seaweed, on the edge of the Gulf Stream. Unfortunately, sargasso tends to collect pollution, and young turtles eat almost anything—tar balls, oil-soaked grasses, plastics, and sewage.

Public-awareness programs on sea turtles make an exceptionally easy sell, if only because the ancient creatures inspire a natural fascination. After all, they remain largely unchanged over

150 million years of evolution. "I cried the first time I saw a turtle lay, five years ago," says a middle-aged woman who lives in Pennsylvania. She's been standing on the dark Jupiter beach for hours, slapping at mosquitoes alongside her patient husband. "I come back every year now just for this. Listen to that sighing and grunting."

"We've been living in the area for years and never knew the turtles were here," says an older man strolling the beach with his four visiting grandchildren. "Marc's program is terrific. Now I bring everyone to it."

A couple of miles down the road from the Hilton, the Marinelife Center of Juno Beach runs a research and rehabilitation program of its own. In 1990, the center's volunteers relocated more than 11,000 eggs. Asked what physical difference it would make if sea turtles disappeared from these beaches, Larry Wood, the center's curator, says, "Turtles are one more thread in the web in the natural world. We don't know what will happen if that thread disappears, but we've got to convince people that humans are only part of the world."

The Hilton program naturally arouses some cynicism—the hotel does advertise its Turtle Watch, although in a relatively low-key manner—but Wood doesn't question the hotel's motivation. "What's the difference if they're in it for the money or not?" he says. "Public education and awareness is the bottom line: The more people know about these turtles, the better."

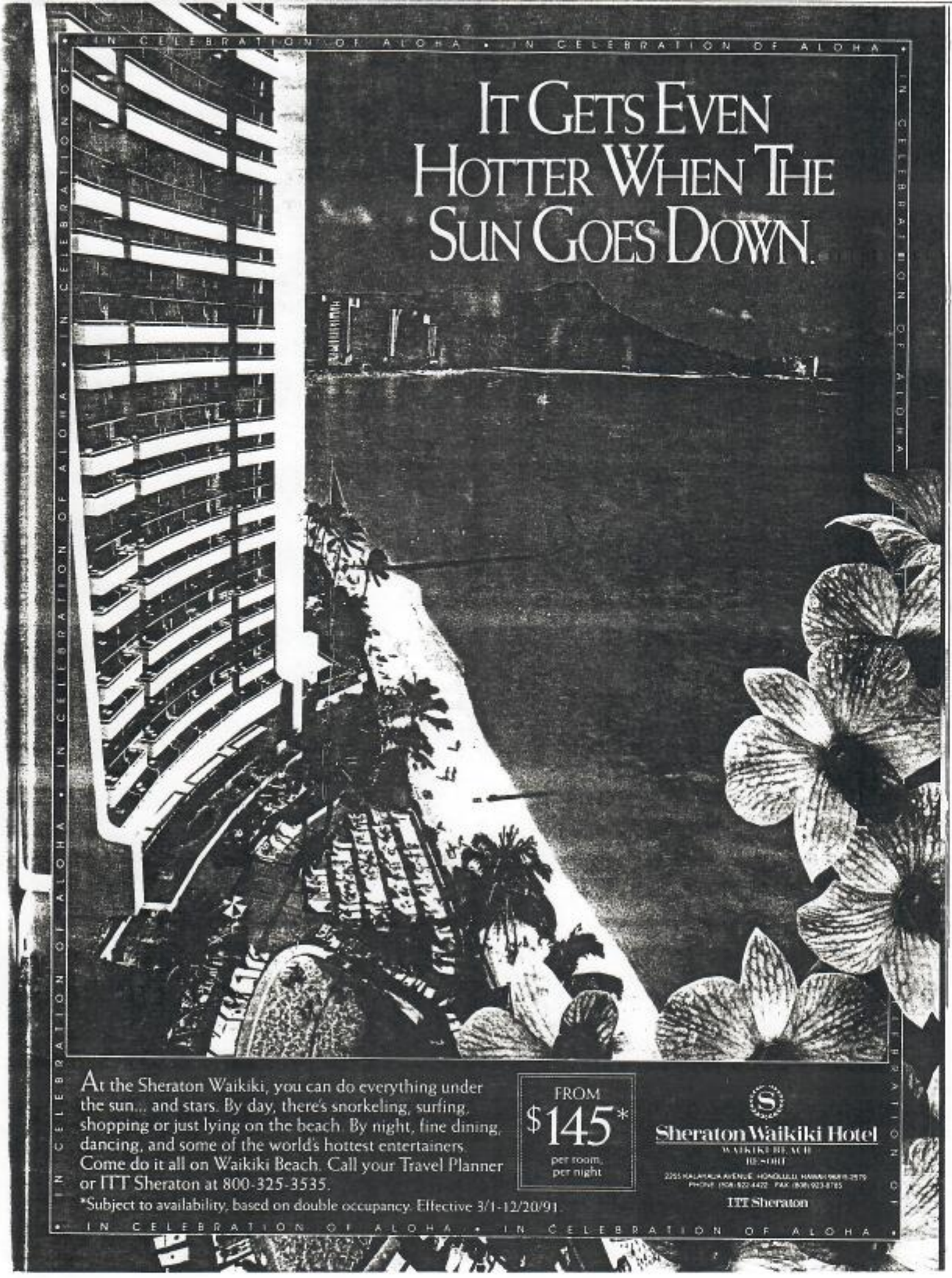
People of all ages participate in Jupiter's Turtle Watch, but it's the children who seem to give the program its soul. They, after all, have the most at stake in preserving the Earth's rich natural heritage. To watch the children's astonished faces as the turtles drop their eggs, to hear their shrieks of delight as a hundred hatchlings march to the sea, is to know they aren't likely to sit idly by when next confronted by our ongoing ecological crisis. •

Ways to Watch

Jupiter Beach Hilton. The turtles nest from June through August, during which period the Jupiter Hilton's special Turtle Watch rate is $90 a night for two people, including continental breakfast. The nine-story beachfront hotel has 193 rooms with bath, including 26 nonsmokers' rooms and two rooms for the handicapped. Marc Levasseur lectures three times a week from early June until Labor Day weekend (Indiantown Rd. and Rte. A1A, Jupiter, FL 33477; tel: 407-746-2511 or 800-821-8791; in FL, 800-432-1420).

Other sites. Eighteen licensed groups conduct turtle walks in Florida state parks, refuges, and along the national seashore (Florida Department of Natural Resources; tel: 407-225-2534).

Note: A 45-page booklet on sea turtles is available from the Jupiter Beach Hilton.—*E.R.*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Skill Project In Progress

Turtle Project Encounters a Few Surprises

December 14, 1989, National Marine Fisheries Service Sea Turtle Biologist George Balazs receives a phone call that someone has rescued a turtle from drowning in a gill net off Kuhio Beach in Waikiki. This turtle is tagged, cared for in captivity for a few days and then released.

December 14, 1990, UHM Marine Option Program student Russell Miya and Balazs are working on Miya's skill project, attempting to catch turtles in nearshore waters of Waikiki 300 yards off the Kapahulu seawall and the same turtle that was rescued exactly one year previously, is caught by Miya and Balazs. One other young turtle is caught and tagged on this outing as well.

December 17, 1990, Balazs receives a report that a dead turtle has washed up in Waikiki across from the Hyatt. It is the young turtle tagged only three days earlier. Pieces of net, and marks on it's body showed it had drowned in a gill net.

When Russell Miya began his skill project entitled Investigation of Green Sea Turtles, *Chelonia mydas*, Occuring in the Nearshore Waters of Waikiki Oahu, he had a number of specific questions in mind. From the onset, however, Russ has encountered a number of surprises as well as interesting coincidences as described above.

"What Russ does now is going to outlive Russ's presence in the University or anywhere else," said Balazs.

An American Studies major, Miya got involved with MOP after talking to a MOPer in his Spanish class. He began volunteering to help with turtle autopsies and tagging and stuck with it. Although he has no background in biology, Miya said that he is enjoying learning as he goes along and that George Balazs is very understanding, taking time to explain to Miya what he needs to know.

The goals of Russ's skill project are to determine the number of turtles residing in the area between the Sheraton Waikiki and the Kapahulu sea wall, their size, sleeping and eating habits as well as whether they are afflicted with a tumor disease, fibropapilloma. This information will be added to on going studies of the Green Sea turtle being conducted by Balazs around the state.

"The tumor information will be good if we do find tumors or if we don't," said Miya, "because we don't have any information in Waikiki whatsoever. Any information is good information."

Many of the turtle sightings so far have been at a ledge, now named Grace's ledge by Miya, about 300 yards off the Kapahulu sea wall. A senior citizen named Grace who goes swimming in this area frequently

(Continued on page 5)

In this issue

Calendar of Marine-Related Events

January

1(Tu): - HOLIDAY: New Years Day.
9-10: - MCC registration.
9-11: - UHH registration.
10(Th): - Last day for regular registration for WCC.
- DEADLINE: Submission of abstracts for the Pacific Science Congress to be held in Honolulu from May 27 to June 2, 1991. For more information: Dr. Nancy Davis Lewis, General Secretary or Linda Pearsall, Congress Manager @ (808) 956-7526 or FAX (808) 956-3512.
11(F): - DEADLINE: Poster abstracts for The Oceanography Society Meeting (See Dec. 90 *Seawords*).
14(M): - First day of instruction for UHM, UHH, WCC, MCC.
* DEADLINE: Submittal of video proposals by Video Workshop participants to Sherwood, via your coordinator.
14-28: - Late registration for UHM, WCC.
15(Tu): Ω LECTURE SERIES: Underwater photography of Hanauma Bay with speaker Dave Schrichte. 7 to 9 p.m., Hawaii Kai Public Library. Limit: 65 people.
15-2/8: - Add-Drop period for UHM, WCC.
16(W): * UHM MOP recruitment table at campus center.
17(Th): * UHM MOP General Meeting for new and old students AND t-shirt silk-screening workshop. 4-6 p.m. in MSB 203. Sign up in MSB 229.
- The Miracle Planet "The Third Planet". Examines the series of events that resulted in conditions conducive to the emergence of life. 8 p.m. on Public Television, KHET.
18(F): ∞ UHH TGIF.
19(Sa): ** LECTURE: Waikiki Aquarium. Mahimahi Culture at the Aquarium. 9-11 a.m.
20(Su): **WORKSHOP: Waikiki Aquarium. Stories in the Sand. 9 .a.m. - noon.
- A World of Ideas with Bill Moyers "The State of the World with Lester Brown". Interview with environmentalist Lester Brown, President of the Worldwatch Institute in Washington, D.C. 9:30 p.m. on Public Television, KHET.
21(M): - HOLIDAY: Martin Luther King, Jr. Day.
22(Tu): "Life on Ice: Antarctica and Mars". Explores the dry valleys of Antarctica, which resembles the surface of Mars, in an effort to gain insight into the possibility of life elsewhere in the universe. 7:30 p.m. on Public Television, KHET.
23(W): * MOVIE: "Worlds Below". Video journey exploring the undersea worlds of Monterey Bay, Calif. 11:30 in MSB 203.
24(Th): The Miracle Planet "The Heat Within". Reveals how the heat released from the interior of the earth has broken continents apart and created new lands. 8 p.m. on Public Television, KHET.
25(F):- Last day for UHM graduate students to apply for graduation.
26(Sa): ** Waikiki Aquarium. Night Reef Walk. 6:00-8:30 p.m.
27(Su): ∞ UHH Sailing on Hilo Bay.
28(M): - DEADLINE: Payment for UHM spring registration.
29-31: - Sea Grant Site Review.
30(W): Kaneohe Bay Master Plan Public Meeting. 7:00p.m. Kaneohe Public Library. Call Office of State Planning at 548-8467 for more info.
31(Th): * MACINTOSH COMPUTER CLASS: Basic intro to using the Macintosh computer and the MS Word Program. Open to MOP students. 2:30 - 4:30 in Keller 202. Limit: 12 people. Sign up in MSB 229.
- The Miracle Planet "Life from the Sea". 8 p.m. on Public Television, KHET.

February

1(F): - DEADLINE: Call for Papers for Oceans '91. For more information please contact Mary Kamiya c/o Hawaii Natural Energy Institute, University of Hawaii at Manoa, 2450 Dole Street, Honolulu, HI 96822 or phone (808) 956-2328, FAX (808) 956-2336.
6(W): * SEMINAR: "Underwater Archaeology at Port Royal, Jamaica." by Jim Adams Dept. Anthropology 3:30 p.m.
7(Th): ** LECTURE: Waikiki Aquarium. Natural History Research in Hawaii: Applications. 7-9 p.m.
8(F): * DEADLINE: Nomination for Ng Scholarship recipient. (See Ofthis issue).
*MOP Symposium abstracts due at Maui Community College. (See OI this issue).
9(Sa): ** FIELD TRIP: Waikiki Aquarium. Natural History Research in Hawaii: Fieldtrip. Time TBA
10(Su): ** Waikiki Aquarium. Night Reef Walk. 6:30-9:00 p.m.
12-21: ** Waikiki Aquarium. Marine Aquarium Set-up. Tuesdays and Thursdays 7-9 p.m. (also see 2/23/91).
13(W): * MOVIE: Discover: "The World World of Science". Two broadcasts from cable television, 1) a special report on Hawaii dealing with volcanic activity, fishing, fruit fly research, and astronomy atop Mauna Kea; 2) research with dolphins at Kewalo Basin. 11:30 a.m.-12:30 p.m. in UHM MSB 203.
* Beginning of UHM MOP SCUBA class with instructor Alan Hong. Sign up in MSB 203.
14(Th): Valentine's Day
16(Sa): ** LECTURE: Waikiki Aquarium. Stories in the Sand. 9 a.m. - noon.
18(M): HOLIDAY: President's Day.
20 (W): * SEMINAR: Kilauea Pt. National Wildlife Refuge, by MOPer Eric Hill. 3:30p.m. in MSB 203.
22(F): ∞ UHH TGIF
23(Sa): ∞ Fishing in Hilo Bay
** Waikiki Aquarium. Marine Aquarium Set-up. 9 a.m. - noon. (also see 2/12-21/91)
** Waikiki Aquarium. Night Reef Walk. 5:30-8:00 p.m.
27(W): * SEMINAR: TBA 3:30 p.m.

∞ For more information contact John Coney UH Hilo, @ 933-3544.
• Graduate Ocean Policy Certificate programs held Tuesdays from 4:30-6:00 p.m. in MSB 405
Ω Please contact Allen Tom @ 956-2870 for sign up and more information.
* Denotes Manoa MOP activity
** Waikiki Aquarium pre-registration required. Please phone 923-9741 for more information.

Alumni, Alumni Everywhere

JOHN MCMAHON, former MOP/BML Director, has a new job as Director of the Maritime Training Center at Seattle Central Community College. He will be developing new courses in maritime fishing and recreational boating industries.

DOUG PENDLETON has temporarily filled McMahon's former position as education director at the Seattle Aquarium. Doug is an ex-Manoa MOPer and founder of the Blue-Water Marine Lab.

STACIE KADO and MARK INOUYE, both UHM alums, were married in September and now reside on Maui.

Their wedding brought together lots of UHM MOP alumni: ALAN TOMITA is collecting and maintaining exhibits for the Seattle Aquarium; BRUCE ARAI is the groom's boss on Maui; ROD UEUNTEN works as an engineer for Kiewit Construction; MELINDA GAZA married last year and continues to work for Aloha Airlines; LES MATSUURA has just resigned as Education Coordinator for the Waikiki Aquarium to devote full time to production of science and nature videos at KHET; LESLIE YASUKOCHI has returned to work at the Anuenue Fisheries Research Center of the Division of Aquatic Resources; WILLIE ORCUTT (UHM/UHH) continues to thrive in the construction industry, while his sister ANNIE ORCUTT (also UHM/UHH) is with the UH Sea Grant Extension Service, specializing in the Pacific Islands; JUDY DOMINGO also attended but did not stay long enough to be interrogated.

<u>UHM MOPers Elsewhere:</u>

HEATHER FORTNER arrived in Pearl Harbor in mid-December and will sit for her Chief Mate's license; she plans to go on for her Master's licence in 1992. She now lives in Vancouver, Washington when not at sea. Heather is well remembered for her book, "The Limu Eater", and is known world wide for her gyotaku.

GLYNNIS NAKAI has left Sea Life Park's Education Department to start graduate studies in wildlife management at the University of Massachusetts.

TERRY COMPTON, now married, has taken Glynnis' old job.

ALLISON CHUN was married recently and left her job as an educator with Friends of Heeia State Park to begin her graduate studies this coming semester in the UHM Department of Oceanography.

RANDY HARR left his research technician position with Richard Radtke and has taken Allison's former job.

TAD KOBAYASHI, also recently married, is a medical technician with Kaiser-Permamente here in Honolulu.

DEANNA LEE is the new Administrative Officer for the Korean Studies Center at UHM.

SHIRLEY CHANG returned from teaching overseas and now works as a clerk at HOPACO's Ala Moana store.

LAURIE SANDERSON has a post doc at UC Davis and recently presented the weekly UHM Dept. Zoology seminar: "Eco-Morphology of Vertebrate Suspension Feeding."

JEREMY UEJIO is married and living in San Francisco, having completed one phase of his graduate studies in computer science.

DAN LAMBERT returned to Honolulu from Chicago, has become a new father and has taken a position as Manager of Marketing for The Gas Company/BHP Petroleum.

BARRY CHOY is now a NOAA officer and was in town for the holidays. He hopes to enroll in the NOAA aircraft pilot program.

RUSSELL CHUN (former *Seawords* editor) still enjoys his subscription in his position as an Army Captain stationed in Germany.

TONY SALVAGGIO had been raising larval abalone and sea urchins for Ocean Farms of Hawaii on the Big Island, but has now moved with his wife and child to Pembroke, Mass and is seeking employment at Woods Hole Oceanographic Institution.

SCOTT SHULTIS completed Coast Guard basic training in New Jersey and at his last writing was headed to the San Francisco area for additional courses.

TAP WADA, visited briefly this summer and has finished her masters in wildlife management in Arizona and soon will head to Oregon to work for awhile before undertaking additional graduate work.

MARK MITSUYASU and CAROL YONAMINE are alive and well in Oregon where Mark has started his masters in marine affairs and is a teaching assistant at Oregon State University. Carol is working for Saturday Academy, a non-profit, experiential science education program for intermediate and high school students.

<u>A little bit of news has trickled in from other campus' alums:</u>

GARY WOITOVITCH (WCC) is featured as a MOP graduate in WCC's 90-91 campus catalog. Gary now works at the Anuenue Fisheries Research Center for the Division of Aquatic Resources.

LIZ AMBROSE (UHH) is now married, living in Honolulu, and as of the last contact was applying for a Service Technician job with Lion Coffee.

Congratulations to our alumni on all their successes! Keep those cards and letters coming!

MOP's 3rd Annual Marine Archaeology Symposium

MOP's third annual Symposium on Marine Archaeology and Maritime History of Hawaii and the Pacific will be held March 25-27, 1991 at the Hawaii Maritime Center's Pacific Room. This year the symposium will focus on the legislative agenda to protect Hawaii's submerged cultural resources.

James Delgado, currently heading up the National Maritime Initiative at the National Park Service, Washington, D.C., will be speaking on the legislative process of the federal Abandoned Shipwreck Act and the need for similar legislation at the state level in Hawaii.

Besides working on guidelines for managing submerged cultural resources in U.S. coastal waters, Delgado has been busy with an assessment of shipwrecks at Bikini Atoll in the western Pacific which he will report on at the symposium.

Other speakers currently slated at the three-day symposium include Dr. Karen Peacock, Curator of Hamilton Library's Hawaiian and Pacific Collection, who will speak on the collection as a research resource. The collection contains several whaler's logs which are full of information on the history of whaling in Hawaii and elsewhere in the Pacific. Sergio Rapu, former Governor of Easter Island and currently with the Poynesian Cultural Center, will present on submerged cultural resources of Easter Island. King Kamehameha's yacht Cleopatra's Barge will be the topic of Heidi Tobias-Smith's presentation. Heidi is a former Maui Community College MOP student who is currently working on her Ph.D in the History Department at UH Manoa. This is just a sample of the many exciting topics in store for this year's symposium.

For MOP students, a diving workshop on underwater archaeological surveying skills will follow the symposium. The three-day workshop, March 28-30, will be based at UH's marine lab on Coconut Island. Current plans are to survey the hull of a vessel located in about 35' of water in Kaneohe Bay near Coconut Island. James Delgado will instruct the workshop and lead the survey.

Anyone interested in the symposium or workshop should contact the MOP office to request being put on the mailing list. MOP students planning to attend the workshop should start the process of becoming a UH authorized scientific diver now (although snorkelers can participate as well). Application deadline for the workshop is February 28, 1991. For more information on the symposium or workshop contact Steve Russell, Manoa MOP Coordinator at (808) 956-8433.

-Steve Russell

Ng Scholarship for MOP Students

In 1987, MOP alumna Elizabeth Ng made a generous donation to the UH Foundation to create a scholarship fund in memory of her mother, Anna Toy Ng. Each year students are nominated on the basis of their marine scholarship, including the criteria of motivation, enthusiasm, participation and personal investment in MOP and ocean stewardship.

Nominees must be current MOP students in good standing; they can be proposed by their peers, MOP alumni or staff. The selection committee is comprised of the MOP Director, MOP Coordinators, alumnus Vernon Sato, and Elizabeth Ng. The committee will make its 1991 selection in February, and it will be announced at the annual MOP student Symposium at Maui Community College.

The recipient receives a monetary award and a name plate on a perpetual plaque which resides at the student's home campus until the following year. The funds are intended to assist the student with skill project costs, transecting workshop tuition, or to serve as a recognition of noteworthy service to MOP. Nomination forms are available from all MOP Coordinators. Deadline for receipt of nominations at UHM MOP is February 8, 1991.

Turtles (con't)

NMFS Biologist George Balazs captures a green sea turtle for tagging at the 1990 QUEST workshop. Photo by Cheryl Rosenfeld.

sighted turtles and reported them to Balazs. So far the turtles seen have been small, explained Miya. They have also sighted a turtle with a major part of its carapace gone and another with a mark matching that of a spear. Miya explained that it is difficult to determine the number of turtles living in this area because he can only observe the area for part of a day.

"From this project I'm going to learn how to collect data and actually put it together," said Miya. These are skills he would not have acquired in his present major.

After the project began, to the surprise of both Miya and Balazs, an illegal mooring appeared at Grace's ledge. They found a heavy duty chain tied to the ledge with a cable and rope running to the surface, attached to an orange buoy. It was reported to the Department of Transportation, Boating Division and the Army Corps of Engineers. The buoy and cable were subsequently removed, but on a recent visit to the area a new rope had been attached to the chain. The presence of the mooring poses a threat to the turtles as well as Miya's data. Also, if illegal mooring is allowed, without enforcement, others are encouraged to follow. It is unclear to either Miya or Balazs why a mooring is placed here as there is a sand channel next to the ledge that is sufficient to anchor in. Balazs explained they have some suspicions about who is placing the illegal mooring and will continue to monitor the area for any impacts on turtles.

Miya is also focusing his efforts on observing the area in front of the Sheraton Waikiki because turtles have been sighted foraging there. The Shereton has enthusiastically supported Miya's project and allows him free parking as well as a room on an upper floor, on a space available basis, for observation of the foraging site.

In refering to the Waikiki project, Balazs describes Grace's ledge as the sleeping hotel and the Sheraton as the restaurant because the same turtles are likely to be using each area. Balazs explained that the protection of turtles that began in 1978 meant that turtles could enter Waikiki with less chance of being speared. Areas like the one in front of the Sheraton that have algae the turtles like to eat will now support resident populations.

Although the green sea turtle has been protected since 1978, and Balazs reports an increase in their population since that time, the use of gill nets in nearshore waters poses a serious threat to these protected animals. The eerie coincidence involving gill nets a year apart may point to a conflict of interest that has not been addressed. Gill net regulations state that personal-use nets can be left in one area for up to 12 hours, but there is no clear language on how these nets should be attended. These nets fish the same waters the turtles use as well as remove the resource many of the tourists have come to see. The death of the young turtle in mid-December is a prime example of this conflict.

"It's sad for several reasons. First and foremost it's sad because an individual of a threatened population species has died. It's sad secondly because it was supposed to have been a marked animal for a longer term study," said Balazs.

So Russell Miya may have gotten into more than he bargained for dealing with gill nets and illegal moorings, on top of learning a whole new set of skills, but he is enjoying himself and says he really enjoys working with the turtles and may even continue on after his skill project is finished. He hopes to present his work in progress at the Marine Option Program Student Symposium on Maui in March, depending on the amount of information collected by that time. Good luck Russ!

A green sea turtle, Chelonia mydas, with a tumor on it's right flipper. Photo by Cheryl Rosenfeld.

-B.R.

Of Interest

R/V Moana Wave

The UH Manoa Department of Oceanography needs student volunteers to work on a research cruise sampling mesopelagic boundary communities off the coasts of Lana'i and Kahoolawe. The cruise is scheduled for Jan. 11-17, 1991 on the University of Hawaii's research vessel the *Moana Wave*.

For more information, please contact Stuart Reid at 956-9629 or Dr. Richard Young at 956-7024.

National Marine Fisheries

Two positions are vacant at the National Marine Fisheries Service. The first one calls for a computer programmer to analyze fishery and biological data, and to write simulation programs and data file manipulations.

Qualifications for the position are knowledge of the computer language Micro (386), which is often accompanied with SAS packages and U.S. citizenship. Nominee will start in mid-January 1991 and pay is $9.56 per hour.

The second opening is part-time work sorting and identifying lobster larvae. Qualifications include an ability to work with a microscope and to pay attention to detail. Training in identification of species will be provided. Pay is $6.24 per hour plus COLA.

For more information on either position, please contact Jeff Polovina at 2570 Dole Street, Honolulu, HI 96822 or phone 943-1218.

MOP Meeting

New MOP students are invited to meet other MOPers and staff members during a general meeting and t-shirt silk-screening workshop 4 to 6 p.m., Jan. 17, 1991. The meeting will be on the UH Manoa second floor lanai and the workshop in MSB 203. T-shirts will be available for those who sign up in MSB 229 by January 14. Hope to see everyone there!

Macintosh Computer Class

MOP students interested in learning how to use the Macintosh computer system will be able to take an introductory class on Jan. 31, 1991.

The course, sponsored by MOP, will focus on basic computer operations and the MS Word Program. This course is the ticket for MOP students to use the Macintosh in the student study center. The class will be from 2:30 to 4:30 p.m. in Keller 202 on the UH Manoa campus. It is limited to 12 students, so please sign up in MSB 229 or phone 956-8433 to reserve your space.

Welcome New MOP Students

UHM MOP has the privilege of welcoming the following students to our program:

Warren Lee (LCC) - Liberal Studies
Tambry Young (UHM) - Zoology
Ann Yokoyama (UHM) - Sociology
Cindy Tolocko (UHM) - Psychology
Katrina Tipton (UHM) - Zoology

Scholarship Competition

The American Fisheries Society (AFS) is sponsoring the fifth annual J. Frances Allen Scholarship competition for female doctoral students. The scholarship, created in honor of Dr. Allen, a pioneer in women's involvement in AFS and in the field of fisheries research, is to reward outstanding doctoral students and to stimulate interest in fisheries science among aspiring female scientists.

The qualified applicant must be a female Ph.D. student who is an AFS member of record as of Dec. 31, 1990. She also must be conducting aquatic research in line with the present-day objectives of the Society. This includes "all branches of fisheries science and practice, including but not limited to aquatic biology, engineering, economics, fish culture, limnology, oceanography and technology."

A one-time award of $2,500 can be used for any aspect of doctoral education including tuition, textbooks, equipment, travel and/or living expenses. This award is made directly to the student and not to the student's educational institution.

For more information and an application, please contact Joan Holt at: Editorial Office, American Fisheries Society, 5410 Grosvenor Lane Suite 110, Bethesda, Maryland 20814-2199 or phone (301) 897-8621. Applications must be postmarked no later than March 31, 1991.

Skinner Memorial Fund

The John E. Skinner Memorial Fund was established to provide monetary travel awards to deserving graduate students who are active in fisheries disciplines, are members of AFS and who would like to attend the 1991 AFS annual meeting in San Antonio, Texas.

Awardees are chosen by a committee of the AFS Education Section, based on academic qualifications, professional

service and promise, and reasons for wishing to attend the meeting.

If interested in applying, please contact Ira R. Adelman, Skinner Committee Chair, Department of Fisheries and Wildlife, University of Minnesota, 1980 Folwell Ave., St. Paul, MN 55108. Complete applications must be received for review no later than May 15, 1991.

Research Semester

The Science and Engineering Research Semester (SERS), sponsored by the Department of Energy, provides students the opportunity to practice research during the academic year on a variety of mainland campuses. SERS research fields are in biomedicine, chemistry, materials science, engineering, physics, environmental science, geoscience, mathematics computer science, artificial intelligence, energy systems and waste technology.

To be eligible, the student must be a U.S. citizen or a permanent resident enrolled in a U.S. college or university and have completed the sophomore year. A limited number of positions are available for graduating seniors. Participants will receive a stipend, housing allowance and transportation expenses.

Details and application forms are available from Career Placement Services, 2442 Campus Road Honolulu, HI 96822. Applications for the Fall '91 semester must be received by March 15, 1991.

Waikiki Aquarium Spring 1991

The following events are scheduled for the spring of 1991 at the Waikiki Aquarium. Please phone 923-9741 to reserve your space.

Night Reef Walks

Saturday, January 26, 6-8:30 p.m.

Sunday, February 10, 6:30-9 p.m.

Saturday, February 23, 5:30-8 p.m.

Aquarium education staff guide adults and families on an exploration of the reef after dark. Marine life natural history, reef walking safety and conservation are covered.

Stories in the Sand

Sunday, January 20 9 a.m. to noon

Saturday, February 16 9 a.m. to noon

A hands-on lab class, adult and families "read" stories about the origins and compositions of sands from islands and continents, and learn how to identify bits and pieces of reef material that help build Hawaiian beaches.

Marine Aquarium Set-up

February 12-21 on Tuesdays and Thursdays, 7-9 p.m.

Saturday, February 23, 9 a.m. to noon

Designed for intermediate-level home aquarists, this 5-session course is taught by Aquarium scientist from the Live Exhibits staff. They cover the "ecology" of salt-water aquariums, water quality, nutrition, disease diagnosis and control, specimen compatibility and more.

Mahimahi Culture at the Aquarium

Saturday, January 19, 9-11 a.m.

A behind-the-scenes understanding of the Aquarium's new Mahimahi Hatchery Exhibit. With a slide/lecture presentation and facility tour, Researcher Syd Kraul introduces the special aquaculture technology needed to raise open-ocean fish and shares the problems and rewards of rearing mahimahi.

MOP Sponsored Scuba Class

MOP is sponsoring a scuba class for the spring semester with instructor Alan Hong. Classroom and pool sessions will be held 6:30 p.m. - 9:30 p.m., February 13, 18, 20, 25, 27 and March 4, 6, 11 and 13. Ocean dives will be 10:00 a.m. - 2:00 p.m, on March 3,10, and 17. Sign-up is in MSB #229, $25 cash deposit is required. Cost will be $130.00 for U.H. students and $150.00 for the general public. Scuba equipment is provided, but students must supply mask, fins, snorkel, and gloves.

Underwater Archaeology

The College of Continuing Education and Community Services is offering a non-credit course, "Introduction to Underwater Archaeology".

The class, instructed by Heidi Tobias-Smith, will be on Thursday nights from 6:00 -7:30 for six weeks from January 31 through March 7, 1991.

For more information please call 521-6819 or 956-8244.

Call for Papers

Oceans '91 - Ocean Technology for the Pacific in the 90's is a conference which focuses on international issues of ocean technology R&D programs and opportunities in the Pacific.

Presented by the Institute of Electrical and Electronics Engineers, the conference will be at the Hilton Hawaiian Village from Oct. 1-3, 1991 in Honolulu.

Abstract deadline for technical papers is Feb. 1, 1991. For more information please contact Mary Kamiya c/o Hawaii Natural Energy Institute, University of Hawaii at Manoa, 2450 Dole Street, Honolulu, HI 96822 or phone (808) 956-2328, FAX (808) 956-2336.

Of Interest

Preserves Manager

The Nature Conservancy of Hawaii has a vacancy for a Lana'i/O'ahu Preserves Manager in their Hawaii field office in Honolulu.

The manager is responsible for day-to-day operations and ongoing planning and administration of Conservancy nature preserves on O'ahu and on Lana'i. Management programs are predominantly focused on preventing damage to native species and natural communities by non-native animals and weeds, wildfire and inappropriate human use. These programs also emphasize interpretation of preserve resources and programs to the public, and support field research by collaborating scientists. The Manager will spend roughly equal time in the field and in the office, supervise volunteers, a preserve intern and potentially, a staff field assistant, and prepare and administer long-range and annual plans and budgets.

Qualifications for the position include a demonstrated ability to organize and implement complex projects; to communicate effectively; the ability and willingness to work long flexible hours; to travel inter-island on short notice; to perform physically demanding work in remote locations — where basic skills with hand tools, 4-wheel drive vehicles and firearms are preferred. Educational requirements include a Bachelor's degree, although a Master's degree is preferred; a strong background in natural history or resource management; a strong personal interest in the conservation of natural areas; and familiarity with Hawaiian natural history.

For more information please contact Kim T. Gould, Director of Administration, The Nature Conservancy of Hawaii, 1116 Smith Street, Suite 201, Honolulu, Hawaii 96817 or phone (808) 537-4508. Deadline to apply is mid-January.

COSU II

If you are concerned with the uses of coastal ocean space, then the Second International Symposium on Coastal Ocean Space Utilization (COSU II) will be a conference you should not miss. To be held in Long Beach, California from April 2-4, 1991, COSU II will bring together a diverse community of managers, planners, researchers, regulators, contractors and operators concerned with meeting public and private needs through the use of coastal ocean space and adjacent coastal lands. The symposium's perspective will be to present significant international developments which apply to coastal nations and regions facing similar environmental, political, social and economic challenges. This highly interactive forum will provide an opportunity for public, private and academic leaders to meet and exchange ideas of mutual interest.

For more information contact Don Walsh, Meeting Coordinator, c/o International Maritime, Inc., 839 South Beacon Street, Suite 217 San Pedro, CA 90731 or phone (213) 514-8304/ FAX (213) 514-8380.

Instructors Needed

ASSETS School for the gifted, dyslexic and/or learning disabled has three instructors' positions vacant for their 1991 summer science session.

ASSETS is a six-week program designed to introduce high potential/gifted students to the earth, physical and biological sciences. Field trips and guest speakers are scheduled weekly. The goals of the program include challenge, enrichment, excitement, development of inquiry skills, experimentation and the generation of project ideas necessary to compete in a Science Fair.

Two of the positions are for a head instructor and assistant to work in ASSETS' Summer Science Academy for Accelerated or Gifted 6th, 7th and 8th graders.

The third vacancy is for an assistant instructor to work in ASSETS' Junior Summer Science Academy for Accelerated or Gifted 3rd, 4th, and 5th graders.

Salary per session is $2800-$3200 for head instructors and $1800-$2200 for assistants. Salaries are based on qualifications.

For more information contact the Executive Director of ASSETS, Box 106, Pearl Harbor, HI 96860 or phone 423-7359.

Laboratory Assistant

A student is needed to assist in a field and laboratory research project involving "blue-water diving" and the preparation and analyses of marine snow (fragile suspended particles). Work includes offshore tethered SCUBA diving and aspects of microanalyses (leading to light and electron microscopy), microbiology and geochemistry.

Duties for the position are diving from a small boat, with the possibility of participating on short research cruises, organ-

izing dive gear for field operations, preparing samples for electron microscopy and other microbiological and geochemical analyses; and assisting with general laboratory work. The work also may involve training on analytical Scanning and Transmission Electron Microscopes, depending on student's interest and abilities.

To apply, candidate must be a University of Hawaii student as well as having conscientious work habits as well as University of Hawaii SCUBA authorization and a driver's license. Additional desirable qualifications include college level courses in one or more of chemistry, biology, microbiology, or geology; familiarity with personal computers and underwater photography experience. Training in blue-water dive operations and laboratory duties will be provided.

Salary for the position is $6.00 per hour for 10-20 hours per week.

For more information please contact Dr. Jim Cowen, 108 Marine Sciences Building or phone 956-7124.

Alaska Summer Employment

Applicants are currently being recruited to work at three sport fishing lodges in Southeast Alaska.

Vacant positions include boat skipper, mechanic, mechanic assistant, camp cook, assistant cook and lodge assistant.

Employers will provide transportation to and from the job site, room and board, a monthly salary and the opportunity to meet and work with interesting people in a magnificent setting.

To receive an application packet consisting of job descriptions and an application form, please send a legal size self-addressed, stamped envelope to: 1991 Summer Employment, 1315 S. King St. #4B, Honolulu, HI 96814. The company requests no phone calls or office visits.

MOP Recruitment

UHM MOP will have a recruitment table at campus center on January 16. If you are interested in donating an hour of time to help promote the program, the MOP staff would gladly accept your offer.

Even if you are unable to donate an hour of time, if you are strolling through campus center trying to decide which organization to avoid or join, just stop by the MOP recruitment table.

Please contact Steve in MSB 229 or phone 956-8433 if interested in working at the table. Hope to see you on the January 16!

Maui Marine Art Expo

The Eighth Annual Maui Marine Art Expo will take place February 1 through March 31 at the Stouffer Wailea Beach Resort in Wailea, Maui. Jean-Michel Cousteau will present a Cousteau film the evening of March 9, and a portion of the proceeds from the expo will go to The Cousteau Society. For more information call 808-879-4900.

Congrats MOPer Tina Xavier

Congratulations to UHM MOPer Tina Xavier for the acceptance of her proposal "Developing a Teaching Curriculum on Marine Applications of Satellite and Airborne Remote Sensing" by the Hawaii Space Grant College Undergraduate Fellowship Program. Tina will receive a tuition waiver as well as a $1,000 stipend for the spring semester as an award for her curriculum development work.

Semester Highlights

March 2, 1991: Eighth Annual MOP Student Symposium to be held at Maui Community College with a marine field trip on March 3. MOP students who would like to present a talk on their completed or in-progress projects should submit an application and abstract to MCC MOP by February 8,1991. Students who are accepted will have all costs covered for transportation, room and board, and field trip admission. See your MOP Coordinator for futher information.

March 25-30, 1991: MOP's Third Annual Marine Archaeology Symposium and workshop (See page 4 of this issue for more information).

May 19-30, 1991: Quantitative Underwater Ecological Survey Techniques Workshop (QUEST) to be held at UH Hilo. Start planning now to become UH Scientific Diver Authorized. Application forms are available from MOP Coordinators.

Please note:

Due to holiday delays, SeaLetters will not be published this month but will reappear in February.

Seawords
1000 Pope Road, #203
Honolulu HI 96822
Ph (808) 948-6000

Managing Editor: Betsy Reynolds
Assistant Editor: Cheryl Rosenfeld

Seawords is a monthly news publication by students of the Marine Option Program, and is supported by the UH Sea Grant College Program, the state Aquaculture Development Program, and the UH. Opinions expressed herein are not necessarily those of MOP or of UH. Comments and suggestions are welcome, including topics and original material (articles, cartoons and black and white photographs) that may be of interest to MOP and/or the marine community.

Something to consider for 1991;

Do-it-yourselfers (DIY's) performing their own automotive oil changes dump 20 times more oil into the environment annually than the Exxon *Valdez* spilled into Alaskan waters in March 1989. So notes Ronald H. Weiner, president of the National Institute for Automotive Service Excellence. Weiner estimates that 60 percent of the 350 million gallons of used motor oil generated by DIYs each year is disposed of improperly, contaminating surface water, ground water, and soil and gumming up waste-water treatment plants. Failing to recycle oil not only pollutes, Weiner says, it wastes an increasingly precious resource. So if you're a DIY, take your used motor oil to a waste-oil collection site or consider getting an oil change at a reputable service station that will dispose of the spent product appropriately (Reprinted from AAA World, Nov/Dec 1990).

[Editors Note: It is statistics like this one that remind us just how important being aware of environmental and political issues is. 1991 could be a year of environmental crisis and war, or we could choose 1991 to be the year the earth was given a second chance. Believe it or not, each one of us does have the power to change the future. Simple acts of recycling oil can, in the long run, make a differnce on the environment, it may even prevent a war. Think about it.
Call the State of Hawaii Used Oil Hotline on Oahu at 537-1107.]

University of Hawaii at Manoa
Marine Option Program
1000 Pope Road Rm. #229
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Face of Hawai'i: 1991 Photo Contest Winners

Honolulu

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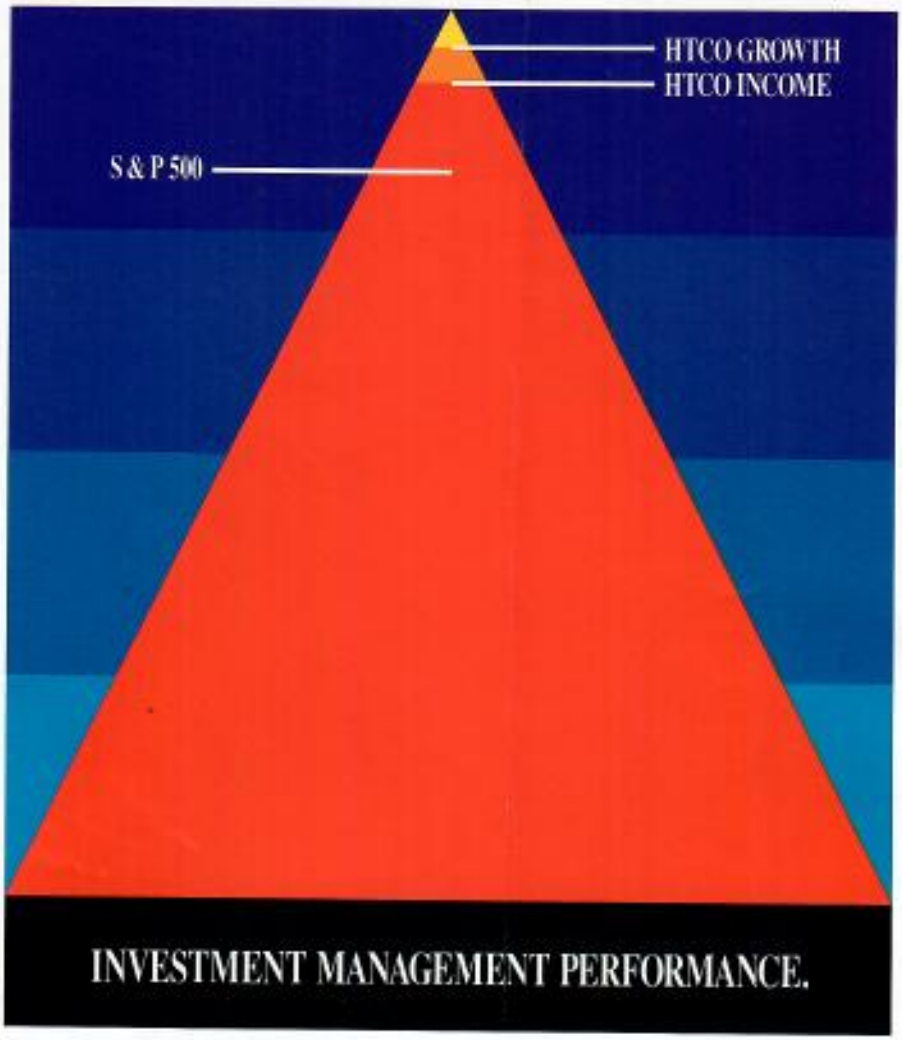

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1991 PHOTO contest winners

Out of nearly 2,000 entries, the judges pick eight outstanding photographs to receive the $4,000 in prizes

A lot of people took the contest theme literally. This year it was "The Face of Hawai'i," so they sent in—faces. They didn't have to. Our announcement pointed out that the theme could be reflected in practically anything—the smile of a child, the fury of an ocean storm, the charm of a country storefront, the majesty of pali cliffs.

Nothing wrong with faces, of course. Five of the top eight winners contained faces of some kind, human and otherwise.

But our judges were open to all interpretations of the theme. This year, the persons charged with the difficult task of picking the winners were **Teresa Black**, HONOLULU Magazine art director, **DeSoto Brown**, Bishop Museum collection manager of moving images, and **Kuni Hayashi**, Media Five design director.

The eight photographers that emerged winners are taking home $4,000 in cash and prizes. Here are their "Faces of Hawai'i":

By Janice Otaguro

sensitivity creates problems with economic development that have yet to be resolved. Not every ruin is valuable, and it would be costly if there were confrontations every time a new hotel complex went in.

"We don't live in a dead society," explains Yosihiko Sinoto, senior research archaeologist at the Bishop Museum. "Every society builds on the ruins of the one before. If we didn't, there would be no human development. It's impossible to save everything."

In the past, sensitivity toward ancient Hawaiian cultural sites was never much of an issue. There was a strong feeling among the American and European colonizers who arrived in the Islands in the early 1820s that Hawaiians were a primitive people. They compared the giant ruins of Peru, Egypt or Greece with the existing stone structures in Hawai'i and concluded the indigenous local culture had produced little of particular value.

This attitude was reinforced by American missionaries who insisted on the intrinsic evil of Native Hawaiian belief systems. As a consequence of the missionaries' zeal, Native Hawaiians abandoned huge religious stone structures, individual homes and entire villages. Hundreds of the ruins were dismantled and removed to make way for the sugar plantations that first appeared in the Islands in the 1840s. When these areas were destroyed, nobody protested or even bothered to search through them.

It was only later in the 1890s and early 1900s—when artifacts (wooden tikis, skeletons, canoes, etc.) were discovered hidden in burial caves—that Hawaiian archaeology suddenly gained a kind of glamour, attracting scholars and collectors from throughout the world. During this period amateur archaeologists from many different cultures roamed the Islands hunting for "relics" to add to increasingly valuable collections of Hawaiiana. Some of the artifacts were sold for large sums to foreign institutions like the Berlin Museum.

It was with the idea of saving these artifacts and presenting them in a meaningful way that Charles Bishop—a wealthy banker—founded the Bishop Museum in honor of his wife, Bernice Pauahi.

Because so much information about the Hawaiians had been lost during the initial contact period, scholars at the Bishop Museum organized research expeditions. They went by sailboat and schooner to remote areas throughout the Pacific in order to find out who the original Hawaiians were and where they came from. Whenever a new archaeological find was reported in the Islands, the museum sent experts to the site to file reports. During the 1920s the museum began to organize serious digs for the first time and came up with evidence of early Hawaiian culture. Soon the museum and its publications became recognized throughout the world as a center for the study of Polynesian culture.

After World War II the nature of archaeology changed. There was a tremendous surge in the building of new roads, homes, resorts and golf courses. If ruins were in the way, they were removed. Archaeologists were often called in *after* the bulldozers. There were several state and federally funded surveys of important sites, but no policy to protect them. Nor was there a policy for Hawaiian burials, other than to deal with their removal as discreetly as possible.

After statehood a pattern developed toward the treatment of ancient sites based on the ethnic divisions that dominate Hawai'i's political and economic life. Members of Hawai'i's Caucasian, Chinese and Japanese business community did most of the land development. The ethnic Japanese who dominated the Democratic Party granted land use permits, while the largely Caucasian and Japanese community of museum and academic archaeologists studied the ruins for possible significance. In most cases, the sensibilities of Native Hawaiians were not considered, and until recently the Hawaiians rarely spoke out.

The American missionaries had done their job too well. The Hawaiian temples were shrines to a large number of gods. Devout Hawaiian Christians were taught to recognize only one. Some Native Hawaiians feared that to insist on saving any of the old structures was to challenge the Christian teachings they had embraced. The old temples were abandoned with the old faith.

Continued on page 86

The construction of H-3 has led to the discovery of many ancient sites. Unfortunately, many have also been destroyed.

1976-1979
Akihiko Sinoto's (at Barbers Point, O'ahu) discovery of the remains of extinct birds doubled knowledge of ancient bird life in Hawai'i. Opened controversy as to whether the demise of so many birds was linked to the arrival of Polynesians.

1975-1991
Contract archaeology projects: Seibu Hotel on Maui, H-3 Highway and West Beach on O'ahu, Kuakini Highway in Kona. Large amounts of information collected. Only a small percentage analyzed.

1989-1990
Honokahua. Analysis of bones reveals ancient Hawaiians did not practice infanticide. Excavation led to a rise of Native Hawaiian consciousness toward early sites.

1950
Kenneth Emory's studies of Kuli'ou'ou shelter on O'ahu. First radiocarbon dating of Hawaiian artifacts. A.D. 1004.

1955
Yosihiko Sinoto and Bill Bonk's excavation of South Point. Established the fishhook chronology that showed evidence of Hawaiian artifacts changing over time.

1964
Richard Pearson's Bellows field excavation—thought to be the earliest habitation site in Hawai'i. A.D. 500.

1969-1970
Patrick Kirch and Marion Kelly's excavation of Hālawa Valley on Moloka'i. Discovery of round houses encouraged Kirch to believe that this is one of the earliest Hawaiian sites.

been public protests about excavation in the past, but none were ever strong enough to affect public policy.

What makes Rosendahl upset is that prior to the announcement on television of the excavation of the 900 bodies, representatives of the state Department of Land and Natural Resources (DLNR), OHA, and Hui Ala Nui O Mākena, a Maui-based Hawaiian activist group, had all signed an agreement with the property owner, the Kapalua Land Co. "Before any digging went on, everybody involved was notified what we would find there,"

> We don't live in a dead society. Every society builds on the ruins of the one before."
>
> **Yosihiko Sinoto, Bishop Museum**

says Rosendahl. "And after we started, for nearly two years, we gave weekly briefings on whatever was found." Rosendahl believes that when the consensus changed, he, as a Caucasian archaeologist, was made the scapegoat for a long-standing state policy on burial removal that had suddenly become a very public embarrassment.

"The Hawaiian groups said we wouldn't have moved graves if they were of white people, but that isn't true. On the Mainland, archaeologists move —and sometimes study—the remains of white people all the time, when they make way for highways and new housing developments." Besides, Rosendahl and other archaeologists in Hawai'i have legally moved burials for years.

In 1982, during the building of a highway in Kona, 300 bodies were relocated without a murmur of protest arising against the action. During the 1930s and '40s, more than 1,000 Hawaiian graves were moved from the Mōkapu Peninsula to make way for the Marine base in Kāne'ohe. Over the years thousands more have been dug up by construction crews throughout the Islands to make way for hotels and condominiums, parking lots, harbors and private homes. (Remains are scattered widely throughout the Islands because it was customary for ancient Hawaiians to bury their dead beneath their houses.)

Rosendahl worries the Honokahua precedent will hamper the work of physical anthropologists, a disturbing development because there are no written records of early Hawaiian life. Anthropologists feel that only by studying all of the physical remains—bones as well as other surviving cultural relics—can they find clues to what life was really like in Hawai'i before the arrival of Capt. Cook.

What conclusions have they drawn from careful study of the remains at Honokahua and other sites? That the ancient Hawaiians lived an average of 30 years, that they were heavily muscled, and that their average height was 5 feet 7 inches, which was tall for the period (skeletons of English men from the same period average 5 feet 2 inches). Hawaiian men walked with backs arched and knees bent forward (perhaps as a result of always carrying heavy loads) in a posture similar to the way Hawaiian gods are portrayed in the surviving wooden tikis. Hawaiian people squatted instead of sat. And most surprising of all to anthropologists, the remains reveal that people with birth defects, broken limbs and other problems lived out useful lives. "Our studies indicate ancient Hawaiians were a very compassionate people," explains Rosendahl. "Until we did this research, we didn't know they were interested in caring for the less fortunate. Everybody thought they practiced infanticide as a part of their culture."

The new information has prompted mixed feelings in Native Hawaiians, many of whom are keenly interested in the new discoveries but troubled by the digging. Ma'a explains her feelings this way:

"When I was growing up my mother took me to see the movie *Hawai'i*, and I still remember this scene showing Hawaiians killing this little baby because it had a black mark on its face. I thought it was b.s. then and it still makes me mad when I think about it. At Honokahua they found a small child born with birth defects that lived for several years. This says to me that a lot of the things people have been saying for years about Hawaiians aren't true. So I have mixed feelings. I feel it's important to find out the truth, but I know that if one of the people they were digging up was my great-grandmother, I wouldn't like it."

Since the Honokahua incident, the governor has appointed various burial councils to advise the DLNR on how to handle sensitively the remains of any ancient Hawaiians found during excavations. But the effort has created new problems. Each year the state records discoveries of some 1,200 ancient Hawaiian stone sites ranging from large temples to roughly made fishing shelters. The existence of these sites is a potential time bomb for developers, who fear protracted litigation or even cancellation of their projects if ruins on their property are found to have historic or spiritual value. The new

6:10 a.m.
King's Bakery, Charlie Park sips his first cup.

6:15 a.m.
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REF:DAR-MI

October 10, 1991

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

Dear Mr. Balazs:

This responds to your letter of September 14, 1991, requesting my professional answer to your proposal for a Marine Life Conservation District (MLCD) off Waikiki Beach westward to the Hilton Hawaiian Village.

The basis of your suggestion to use the Waikiki shorewaters to: 1) increase the fish population for viewing enjoyment; and 2) make it become another Hanauma Bay are questionned. This has been suggested before. Here is the problem as we see it.

The shoreline waters in the area are generally sandy, wave scored hard bottom with turbid water, and of flatbottom relief. Therefore, the area does not support large numbers of reef fishes or live coral. Unless you go out beyond the breakers, the reef habitat and aquatic life do not improve. Exceptions occur sporadically during the summer months when hahalalu and oama schools enter nearshore waters in the vicinity of the Ilikai helipad which attracts fishermen for short periods.

From a professional perspective, we cannot agree that closure of the area to fishing through MLCD designation will increase fish density to make underwater viewing a quality exprience comparable to Hanauma Bay. Fish life in the area is limited because of the predominately sandy bottom which is on the other hand desirable for the active ocean recreation that goes on in the waters.

Rather than a sanctuary, the area already carries designation by the State Department of Transportation (DOT) for active shorewater recreation purposes such as surfing and canoeing. According to their Rules of the Road, Section 19-82-40, Waikiki shorewaters are reserved primarily for use by bathers and swimmers, and DOT is provided authority to control all activities, including fishing, within these water. The Atlantis group has with their habitat development and feeding improved the viewing outside Waikiki, Oahu and Kailua, Kona. We are supportive of enhancing habitat to afford better viewing enjoyment.

We appreciate your concerns to enhance our marine resources.

Sincerely,

WILLIAM W. PATY

University of Hawaii at Manoa

Marine Option Program
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December 26, 1991

George Balazs
National Marine Fisheries Service
2570 Dole St.
Honolulu, HI
96822

Dear George,

This letter is to formally thank you for your role in Russ Miya's very successful internship. Both Sherwood and I are impressed with Russ' project as a whole and the quality of his final report. We plan to use Russ' project as an example of what MOP students can learn and accomplish through internships. Russ learned many new skills, provided valuable assistance to your on-going research program, increased public awareness on sea turtle conservation, provided opportunities for other MOP students and myself to get involved with his project and landed himself a full-time job and, perhaps, the start of a new career along the way. We plan to "show off" Russ' final report to the SOEST Dean and Associate Dean to let them know how valuable a MOP internship experience can be to a student's education and career options.

Russ has given me a verbal agreement to present his project at the upcoming MOP Student Symposium, March 7, 1991 in Hilo. Please continue to encourage him to meet this challenge. We all experience shaky knees when it's time to speak in front of a group. With our help and encouragement, I am sure Russ will see the benefits of his participation in the symposium.

Two active MOP students, Mary Roney and Jeff Kuwabara, have expressed interest in talking to you about developing an internship on turtles and ecotourism. Hopefully, they will pursue this soon after spring semester starts.

Again, thank you for your guidance in Russ' project and your support of MOP.

Sincerely,

Steve

Steve Russell

xc: Russ Miya's student file

THE SOFT WHITE sand glistens in the bright shiny sun. A sea gull sits quietly at water's edge. The water is dark and blue with streaks of refreshing green. The cool sea breeze gently blows my hair as small children build sand castles. My family would have great big gatherings up on the grassy area of Ala Moana Beach Park and just being there with my family made my world a wonderful place to live.

Shaunalei Aweau
Honolulu

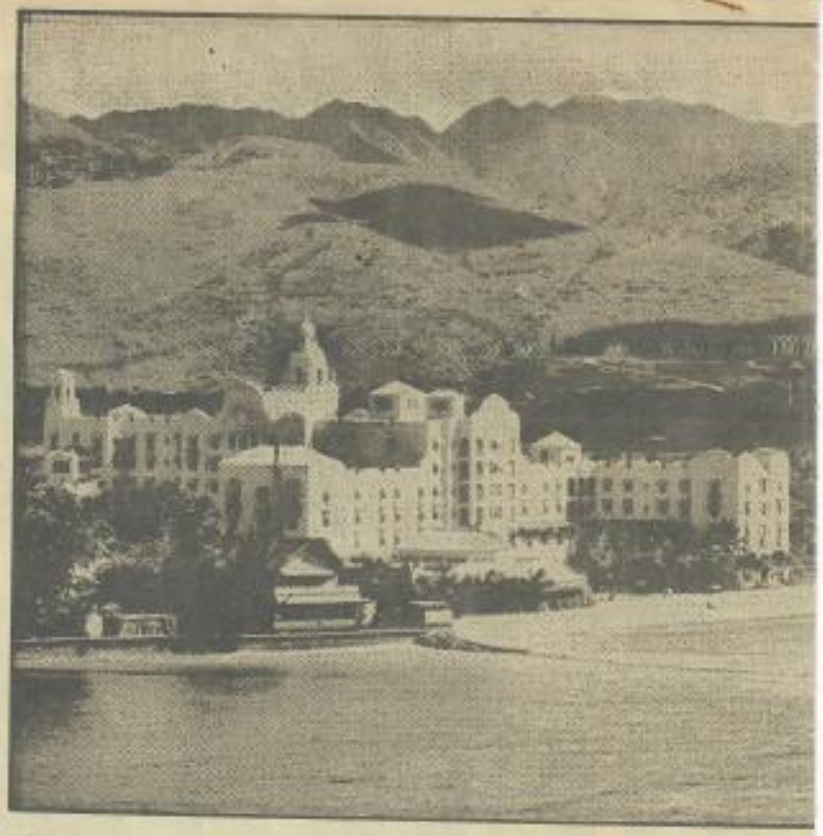
I USED TO LIVE on Koluwalu Street, Manoa. All of the neighbors were friendly and close. I had a wonderful childhood thanks to living on that street.

Adrienne O'Donnell

WE'LL ALWAYS REMEMBER the trip to Kona and the visit to Kilauea crater where the lava went over the road at Kalapana and the black-sand beach.

Joe Shorba

I REMEMBER the first time I saw the roof of



Boyhood fun in V

Edited by Cynthia A. Oshiro
UH Center for Oral History

Lemon "Rusty" Holt lived on the Lemon family estate, present site of the Holiday Inn Waikiki, from his birth in 1904 until his departure in 1930. A former postmaster, personnel-department head, and store-and-apartment manager, now retired, he lives on Wilhelmina Rise.

GRANDFATHER James Silas Lemon was a businessman who came from Quebec, Canada. He was French-Canadian. He moved to the United States to work. Because his name was too much like a Frenchman's name, he took out the hyphen between Le-Mon and made it strictly a sour Lemon. He married Mary Ann Wond from Kauai.

Silas Lemon owned the whole block bounded by Paoakalani (Avenue), Lemon Road — named after him — down Kapahulu and along Kalakaua. He paid cash for the whole thing. My mother used to say, "Five thousand dollars? Hmm! Much less than that." So I never did know (exactly).

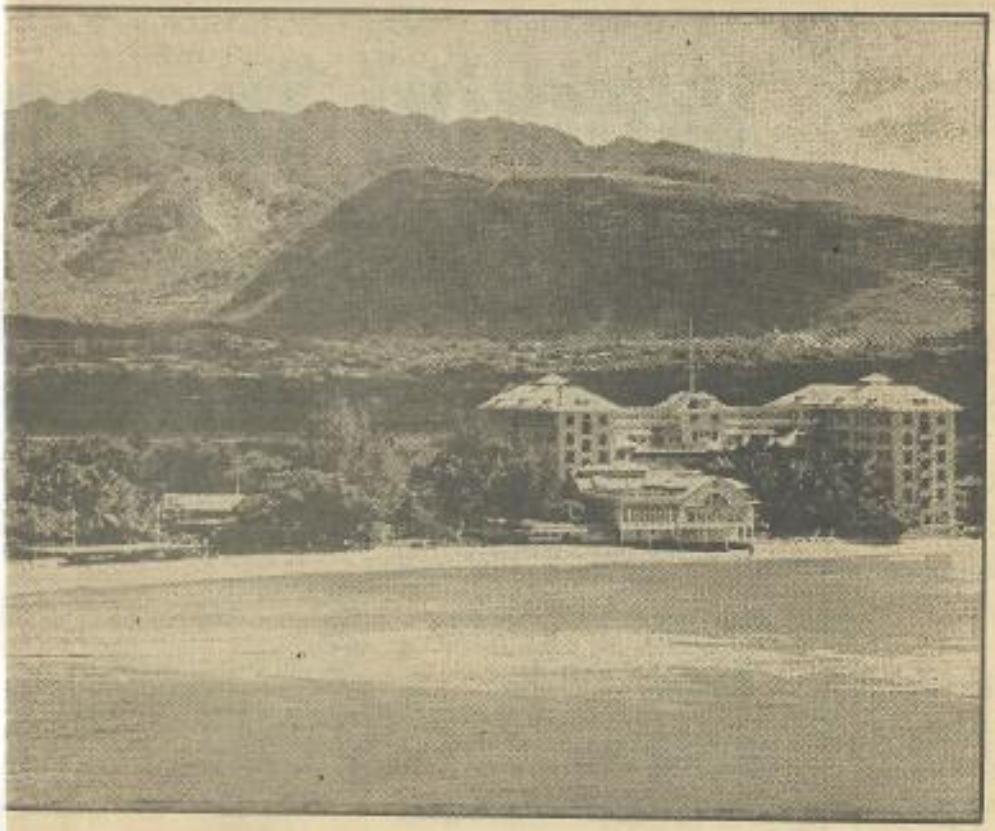
On the property there was the big house. That big house had six bedrooms, a huge living room. Nothing but koa (a native red wood), koa, koa and more koa in that living room. (My mother) August Helen Lemon married my father Edward S. Holt. My mother and my father had a house right next the big house. It was smaller than the other one, the original big

Lemon Holt

Now in order to make his haupia (coconut pudding), he had to have a hundred dried coconuts. Once a month, my grandmother would say, "You! Get a hundred coconuts down — dried coconuts." There must have been a hundred coconut trees in the yard, and I climbed every one of them.

Well, also, we had chicken, roast chicken, every Sunday. My job was to catch the (chicken) that she pointed out to me, my grandmother did. And I would chase that chicken all over the yard until that poor (chicken) just lay down and said, "Come and take me." Later on, I thought, "Hey, this is a good opportunity. Take it." So I started to chase the chicken onto the beds of violets and onto her prized maidenhair that she had from one end of the yard to the other. I did not have to chase any more chickens after that.

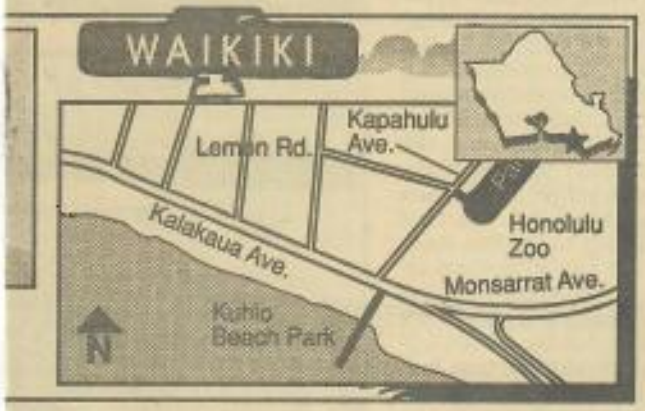
We (also) had in the back yard in a big, big cage, Sammy the monkey. And this monkey just came there once as a little baby monkey, from where nobody knew. They used to call him Sammy Lemon, the monkey.



Former postmaster Lemon "Rusty" Holt lived on the Lemon family estate, present site of the Holiday Inn Waikiki, from 1904 until 1930. At right is a look at Waikiki circa 1937 — and the Royal Hawaiian, far right, and the Moana hotels.

Star-Bulletin file photo

Waikiki that used to be



The property was one acre. There must have been 10 mango trees. Also, in the yard, there was a lemon orchard behind and a lemon orchard in the front. Then there were momi (mammee) apple

right into my good, good friend's laundry shop. I felt worse than anybody, I guess, because I had done something to a person who liked me and I liked him.

After (the laundry), there was the stream that came all the way down from Manoa and Palolo, came all the way down to the ocean. The Akana family lived on one side of the stream, and we lived on the other side.

Waikiki had two streams. Fourth of July when the ocean acted up, along came the south wind, those streams had plenty of water. It rained, rained heavy. And when it did, chickens, ducks, pigs (from farms upstream) came washing down the rivers. We had fun catching them with throw nets.

We had tourists those times, but you could count them on your right hand. They were so few. Of course, these Stonewall guys (a group of boys who congregated at the Kuhio Beach stone wall), me included, would try to get nickels or dimes or two bits from these tourists. We'd be in the water right below the stone wall.

When the tourists came, we would take off our tights (swim

where the old zoo was.

But only on big holidays were the races (held). Like Feb. 22nd, which was the big day where they had parades and horse races. July 4th and one other day, I don't remember. Anyway, the whole place was jam-packed.

The majority of people attending those horse races were families. Families, because nobody ever thought of driving from any district in Honolulu unless the sulky or the wagon was filled up. So when a sulky came along, it was usually filled up with people — mother, father, aunties, maybe uncle and children — all sitting on the floor.

Anybody who had money went underneath (the grandstands) and bet on whatever horse they wanted, shook hands and that was it. It was either silver-dollars kala (money) or five-dollar gold pieces, 10-dollar gold pieces, 20-dollar gold pieces, 50-dollar gold pieces, and 100-dollar gold pieces.

The first Waikiki (Elementary) School was opposite the Moana Hotel — across the street. My schedule going to Waikiki School was three days of schooling and the rest of the week, surfing. So that when I finished the third grade, I don't think it was possible for me to add two and two and make it come four, because it always came out three.

(After several years at St. Louis, a Catholic school,) I went to Kame-

the Byodo-In Temple curving upward toward heaven. The awesome peaks of the Koolaus behind the temple pointed skyward, too. At once a spirit of oneness and balance came over me. I saw that a man had chosen to express a dignity of human spirit by placing the edifice to his beliefs where it could be contemplated against the background of nature's own eternal order.

Marjorie J Scott
Honolulu

house. But it had so many bedrooms, you would get lost going into it because it was built like old homes were built at that time — lattice all around, enclosed porches — and whoever got to a room first, they slept there. And that's where we all grew up in my family.

THERE were three boys and four girls in my family, my immediate family. They were all delivered by my grandmother who had been a nurse and administrator of the Kapiolani Maternity Hospital.

Many of the families then did outside cooking. They believed in charcoal stoves made of kerosene-oil cans. (Sakazo) Tahara cooked for my family. Tahara would not cook on the (gas) stove. He said, "You can't cook good rice on a haole (Caucasian) stove. You have to use charcoal." He worked for our family for quite a while until he decided to start his own (restaurant) business.

The property was one acre. There must have been 10 mango trees. Also, in the yard, there was a lemon orchard behind and a lemon orchard in the front. Then there were momi (mammee) apple trees, custard-apple trees, and bananas everywhere.

There was a man who was a great friend of the family. His name was John Wise. He was superintendent of the Kapiolani Park — the zoo and the park. He gave a luau (feast) every month.

As I think I told you, we had bananas growing all over the yard. Also, my grandmother grew a lot of Hawaiian chili peppers. So this cousin of mine, Kainoa McKinney, went and got a banana, a ripe one, made a hole down into it, cut some chili peppers in half, stuck them into the hole, left the skin on because the monkey will take a banana and do his own skinning.

So Sammy took the banana, peeled it off, stuck it in his mouth and before anybody could say, "What?" he had eaten the whole banana. And then, that chili pepper hit him and that poor monkey went mad.

Somehow, Kainoa leaned over laughing and Sammy stuck his hand through the wire, grabbed a hold of Kainoa's hair on the top, in the middle, and he would not let go. So I had to pick up an old hoe with a long handle, stuck it in. He let Kainoa's hair go and he grabbed the handle of the hoe. Kainoa always had a bald spot in the middle of his head, and it wouldn't grow back.

On the corner of Paoakalani and Kalakaua there was a little beer shop. One of my uncles started it as a hobby and a place he could get free beer. Later on, at that same corner came the first Aoki Store. Next to Aoki Store was Diamond Head Clothes Cleaning Shop. Next to that was a little barbershop; she always gave me a mush-bowl haircut by putting a bowl on top and cutting all around.

Next to that, it was a linen-clean-

trees, custard-apple trees, and bananas everywhere.

ing laundry. The owner was an old Chinese man from China. Whereas nobody in Waikiki liked me because I was such a truant or rascal, Old Man "Tailor" thought I was No. 1. He did all of the white laundry from the only hotel at that time, Moana Hotel, and Seaside Avenue little bungalows.

Along Kalakaua from where the Royal Hawaiian (Hotel) is now on the mauka (toward-the-mountain) side, it was nothing but duck ponds. We used to go down, collect duck eggs, bring 'em back to where we lived, put them in gallons in the sand. Well, after a year or six months, those duck eggs were pretty ripe.

Well, about that time, Mrs. Aoki was giving me a bad time. I wanted crack seed (Chinese-preserved fruit seeds) and no way could I get it. So I got a bunch of those eggs, ripe duck eggs, got on the streetcar and as we went past Aoki's, I started letting them go. Unfortunately, I missed Aoki's, I missed the barbershop and the eggs went trunks), dive into the water, and come up with manini, one or two manini, showing the tourists that we were catching fish with our tights. We'd hold it up, and if the tourists dropped (only) a nickel, we turned around — we didn't have any tights on — and we showed them our okoles (buttocks). When they dropped a quarter, we thanked them and did not show them our okoles.

Nightly almost, they (the boys) came to the stone wall and played music. It was really home-style stuff, but we thought it was very good, not knowing too much about it. Tourists, what few there were, would walk down, especially on Sunday nights, and listen to the music.

They had polo games out at the park (Kapiolani Park). Those days, the automobiles that they had, had rumble seats. I remember one time getting into Frank Baldwin's, the Maui man, into his car, two-seater. I remember getting into the rumble seat and keeping my finger on the lock so that the rumble seat could not collapse and lock itself, which could only be opened from the outside. He came and got his car. Drove it down onto the grounds, parked it and I got out. That was my way of getting in. Joe (Akana) had his own way. He jumped the fences.

The polo field was in the middle of the race track. The race track, if I'm not mistaken, was a mile long. It started on the Diamond Head side and went all the way down to Kamehameha and stayed there until 1927. Being a boarder was nice. We wore uniforms to any function — to school, to work, to the dining hall, always with uniforms. The uniforms had pockets so we could slip food whenever we wanted.

I wanted to explain that during my time, there were probably only 50 eligible boys to take part in sports. When I say "take part in sports," there was football, baseball, basketball, shooting — which was a big thing at Kamehameha, track and swimming. So I managed to play football, baseball, no shooting, I ran track and I swam. My nickname was given me by Ezra Crane who was sports editor of the Honolulu Advertiser. I was known by that nickname since Kamehameha time.

Well, when my grandmother died (in 1919), they had to settle the estate. My Uncle Nani Lemon was the administrator, and he wanted $100,000. So, finally, the Bank of Hawaii bought it for $86,000. And today, you couldn't buy that for $20 million.

My time, or prior to 1919, it was like a big family. Like Aokis, and Tahara, Diamond Clothes Cleaning Shop, and then the barbershop, and Old Man "Tailor." Then the Akanas. Those were the good days.

Excerpted by permission from "Waikiki, 1900-1985: Oral Histories," Center for Oral History, Social Science Research Institute, University of Hawaii, 1985. As told to Michi Kodama-Nishimoto.

Oldtimer recalls th

dited by Cynthia A. Oshiro
H Center for Oral History

Fred Ho'olae Paoa was born May 7, 905, the seventh of 12 children of enry Ho'olae Paoa and Florence idges Paoa. The Paoa family resi- nce sat on an approximately one- re lot — now part of the Hilton awaiian Village Hotel grounds — in e close-knit neighborhood of Kalia in aikiki. Paoa retired in 1968 as assis- nt police chief of the Honolulu Police epartment. Paoa and wife Madelyn e now great-grandparents, current- living in Foster Village.

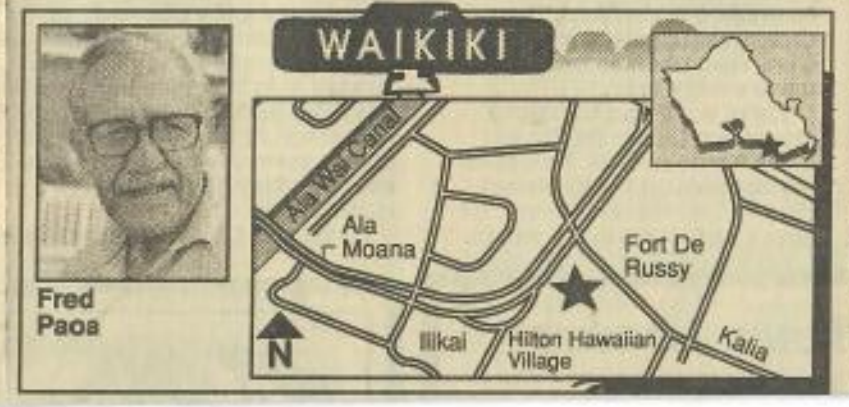
MY dad, he had (fish)nets. He was quite a fisherman. Catch- g kala (surgeonfish), mullets, eke (goatfish), etc. Sometimes we tch about a hundred, a hundred fty kala, and we never sold them. e gave it to the neighbors, Ha- iians, whoever. That was the stom in those days for the neigh- rs to share their catch with their latives and friends.

My father worked as a laborer at e old U.S. immigration station on a Moana Road. He worked there, uess, all his adult life. Naturally, rking there, he got to meet ese people — Filipinos and Japa- se immigrants, and I remember uth Americans. He used to bring e or two to the house and tell us at these people would like to h. On weekends they'd go out ere with a small spear. They'd ve for uhus (parrot fish), kumus d goatfish), oh, big fishes. Then he take'em (immigrants) ck on Monday morning. You see, ey were in his custody and he ed to take'em back there. He did at quite a bit.

He's pure Hawaiian. My mother

A 1925 photo, above, of the Hui Nalu surfboard polo team, from left: John Kaupiko Jr., Sam Kahanamoku, Sargent Kahanamoku, Louis Kahanamoku, Fred Paoa, Kekona and Fred Steere.

UH Center for Oral History



REMEMBER the first
time I saw the roof of

board. He says (of he[illegible]

That's how they operated out there. The big guys didn't let any of the young kids out there. I'm glad they did it, because when I got to do better, surfing bigger waves, then I gradually went out. You gotta really know how to handle it.

(Surfboard polo) is a rough game, very rough. We played it quite a bit. It's just like water polo, except you're on a surfboard. You have the ball, you throw it from the board. They have a goalkeeper there. He's sitting on the board and he's reaching for it (i.e., ball).

You could sit up or you could paddle (in a prone position). If the ball is thrown at a distance, you just go for it and paddle. But it's dangerous because these boards are pointed and they're heavy. So you gotta make sure that you don't get hit in the ribs.

Oh, three teams (were) there (including Hui Nalu, Paoa's team). There was Outrigger (Canoe Club), Queen's Surf. We used to beat'em all the time because we had some rough guys there.

I think I was out (at) the beach there as a beach boy, fifteen, sixteen (years old), (with) my cousins Bill Kahanamoku, Sam, Duke, David. When they went out on the canoes, take the tourists out — this is summertime — I got to get on the canoes with them as a second captain. We'd charge the tourists for going out, (about) dollar a head. And then, we took (i.e., gave) surfboard lessons. I think we charged two dollars or two-and-a-half (dollars) an hour.

there Edward S. Holt. My mother and my father had a house right next the big house. It was smaller than the other one, the original big

there once as a little baby monkey, from where nobody knew. They used to call him Sammy Lemon, the monkey.

as half. Her mother was Hawaiin and her father was Yankee. he (Paoa's mother) spoke fluent awaiian. And we answered in Enish. I'm sorry she didn't force us learn Hawaiian. We had all the ance to learn the language.

I was born in Kalia on the corner Ala Moana and Kalia road. It s a property there of about at st 45(,000) or 46,000 square feet. ite a big old rambling house ith) the old-type lanai (veranda) at went about three-quarters ound the building. There's elve in the family, six boys, six ls. You can imagine how many drooms we needed.

Boy" is my (nick) name. My par- s called me that when I was so ng. My nephews call me "Uncle ." They see me in town, they , "Hi, Uncle Boy." When they that, I know it's a relative, see. I sometimes don't know who are.

e used to have luaus on New r's Day (for) relatives or friends elatives. My dad used to buy a ig about three days before. ive pig, maybe 200 pounds. Evear, New Year's Eve, (the pig) ld get out. It was all over the hborhood. Everybody's chasing him. And everybody knows the Paoas are having a luau.

So they finally catch up with him, and we dress the pig in the morning, cook it. We had a big back yard, and we made the imu (underground oven) in the back yard (with) stones and rocks, and everybody chipped in.

We had all types of raw fish or cooked fish. Everybody catches squid, and they catch fish, and prepare for the luau. Everybody takes a hand in cooking laulau (pork, salted fish and taro tops wrapped in ti leaves), things like that. It's a big job. Mixing the poi by hand.

In those days, no (serving of alcoholic) drinks. He was very religious, you know, my dad. He wouldn't allow any drinks. (Instead,) he used to mix (syrup) up, put into gallons. Cool it. Like Kool-Aid, something like that.

Piinaio Stream flowed from Manoa Valley, through the duck ponds across Kalakaua Avenue, along Ala Moana Road near our home and ended at the area where the Ilikai Hotel now stands. We used to get underneath the shrubs and weeds along the side of the stream. Then you catch opaes, (or) shrimps, oopus (goby fish), anything you can find in there.

We used to catch also another type of oopu for bait. They were very small and they live in the mud off the shore. They form little holes in the mud. So, by inserting your fingers in the tiny holes in the mud, this type of oopu is easily caught. We put (it on a hook) on a long cord with a little weight on it. Just throw it and then retrieve the line to catch papios (young jack fish) that way.

Just off the shoreline at low tide, we dug up coral sediment with picks and shovels to get the clams that were embedded. There was actually a lot of mud in the bottom in that area, but it's the result of the stream that enters (the ocean) there. We found clams there for several years until the entire area was dredged (in the 1920s).

Then we used to go in front (offshore) of (Fort) DeRussy and Pierpoint. That's where we used to get all these different types of limu (seaweed). Get lot of wana (sea urchin) out there, just inside the reef. We used to put them in a bag. As the waves come on the seashore, we just roll them to break off all the spines. And then, break open the shell to get to the meat by using a spoon or your thumb.

(At Pierpoint), Duke's father (Duke Paoa Kahanamoku's father, Duke Halapu Kahanamoku) taught me to swim. Duke's father was a captain of police. Big guy. See, Duke's mother and my dad were brother and sister.

You know how he taught us? He tied a rope around us (at the waist). He'd throw us in the water from the pier. That's pretty deep, wasn't shallow. About fifteen feet at least. So, he says, "Okay, you want to drown, you can." Then he pull us up. Take a rest. Next one, bang. That's how we learn.

We used to surf there on these waves about (three of four feet) high. Catch'em out by the point to the pier, come on in with the surfboards. It was one small board like an ironing board. Not the regular redwood boards.

And as we get older, we went (farther) out with the big boys. I remember going out there with a surfboard. My cousin Sam (Kahanamoku) took me out. I was about 15 then. So I paddled out. Before I got out to Canoe Surf — that's at the

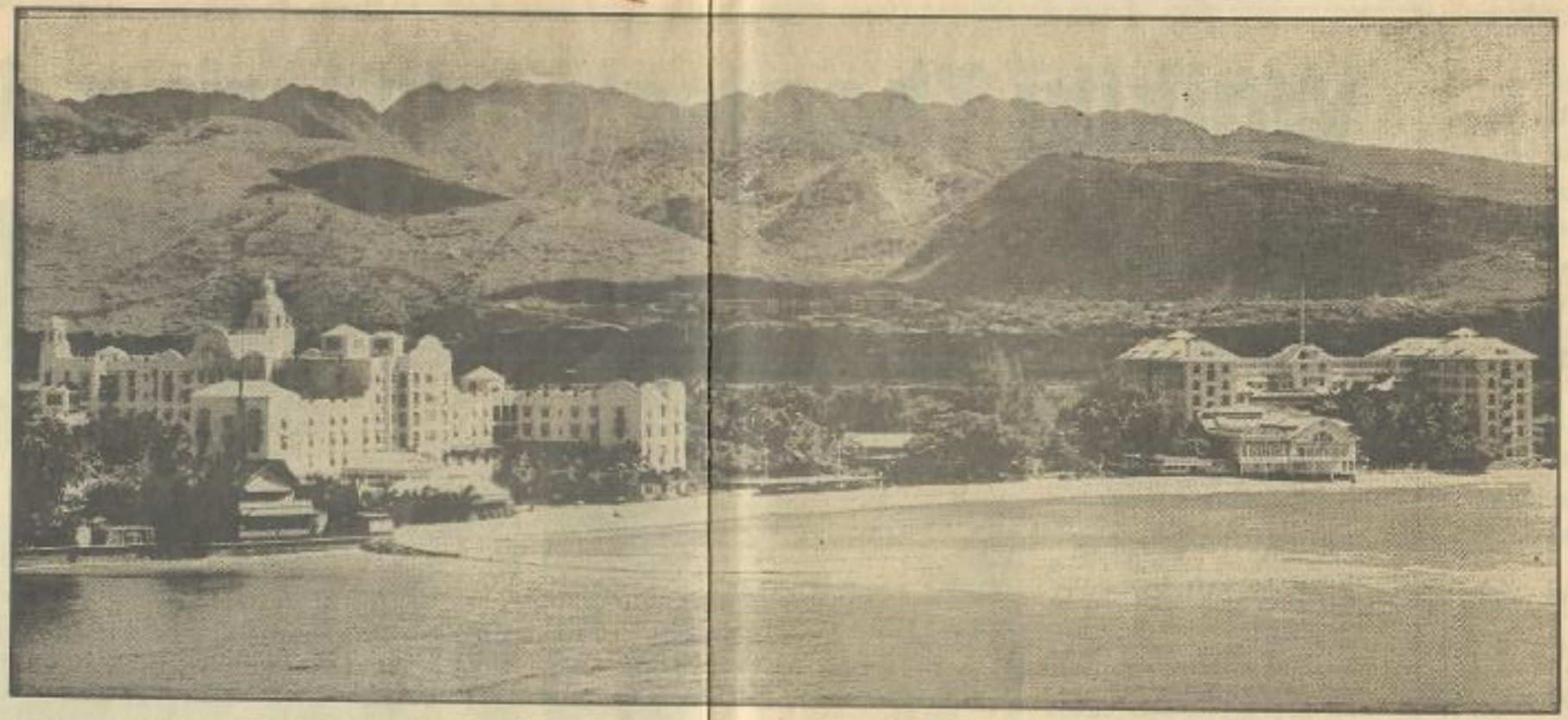
We made our money teaching surfboard lessons, swimming lessons, ukulele (lessons). We went out to the Kamaka studios on King Street. The old man (Samuel Kamaka, Sr.) made ukuleles there. In those day, they sold these pineapple-shaped ukuleles. I think they cost about three-and-a-half, then taught them lessons. We show them how to hold it and how to finger the ukulele.

We would have these people here (and be) in charge of their vacation for, say, a period of two weeks, three weeks. A family — husband, wife, and their kids, maybe. We take them out on the surfboard. They stand, and they fall over, and they like it. We made sure they're not in the sun too long because they get sunburned, and then your're going to lose your business. So, we tell them to stay out not more than 10 minutes. Or we'd bring a white shirt, cut the sleeves off, and make them wear it. Or we'd get coconut oil and rub it on them, things like that.

The people enjoyed their vacation because we did things that ordinary tourists would never think of doing. We'd get an old jalopy

See **EASY**, Page III-21

NOTE CURVING SEAWALL



Former postmaster Lemon "Rusty" Holt lived on the Lemon family estate, present site of the Holiday Inn Waikiki, from 1904 until 1930. At right is a look at Waikiki circa 1937 — and the Royal Hawaiian, far right, and the Moana hotels.

Star-Bulletin file photo

Boyhood fun in Waikiki that used to be

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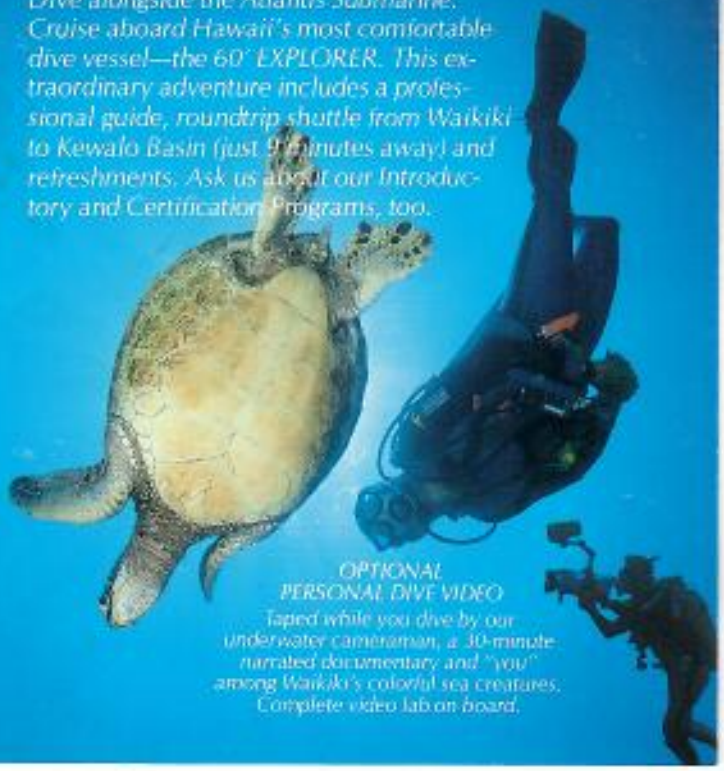

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ガイド付きのダイビングサイトは2ヶ所。
潜水艇アトランティスと一緒に海に潜る沈没船や古い飛行機の探検ダイブ、
そして限りなく広がる海中の美しさを鑑賞する自然探求ダイブをお楽しみ下さい。

初心者ダイバー——すべての機材がついて$65＋州税。

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USA/CANADA

HAWAII

Atlantis Reef Divers aid in sea turtle research

Atlantis Reef Divers' highly trained staff has joined forces with the National Marine Fisheries Service to conduct extensive sea turtle research off the coast of world-famous Waikiki Beach in Honolulu, Hawaii.

Atlantis Reef Divers offers logistical support for the undertaking which is being conducted by George Balazs, a zoologist and leader of the Marine Turtle Research Program. The turtles are listed by the United States as an endangered species, and the overall objective of the project is to promote the long-term conservation and recovery of sea turtles in the Waikiki region. To date, 19 turtles have been spotted and tagged by the researchers.

Atlantis Reef Divers is very familiar with the area's marine environment, as they dive there every day. The diving operation provides exploration for certified divers, PADI courses for those who want to become certified and a "Discovery Diving" program for first-time divers. For those aboard the turtle-tagging charters, the diving tour also includes the fascinating and educational experience of watching a scientific research team in action.

All those participating in Atlantis' certified-diver tours visit Atlantis Reef. This collection of underwater structures, found approximately one mile off Waikiki Beach, includes "YO-257", a 174-foot World War II U.S. Navy tanker; two airliners and other fish-attracting man-made reefs.

For more information on **Atlantis Reef Divers**, call toll-free, **(800) 554-6267**. □

***About once a week**, the National Marine Fisheries Service climbs aboard the **Explorer**, Atlantis Reef Divers' 60-foot diving vessel, to conduct sea turtle research off world-famous Waikiki Beach. Divers booked on one of these Atlantis turtle-tagging charters will view sights, such as those pictured here, of researchers in the midst of marine study.*

George Balazs, zoologist and leader of the Marine Turtle Research Program, is pictured (both photos) in the process of tagging the turtles and noting information on their size and condition. To date, Balazs and his team of researchers have successfully spotted and tagged 19 sea turtles in the Waikiki region. *Photo—Christopher Abraham*

928-9944

07-15-92
12:15

CALLER: ROBERT KUPUKAA
91-1190 Mikohiu
Ewa Beach, HI 96706

576-0896
(DIGITAL PAGER)
Beep him to have someone meet them at the gate

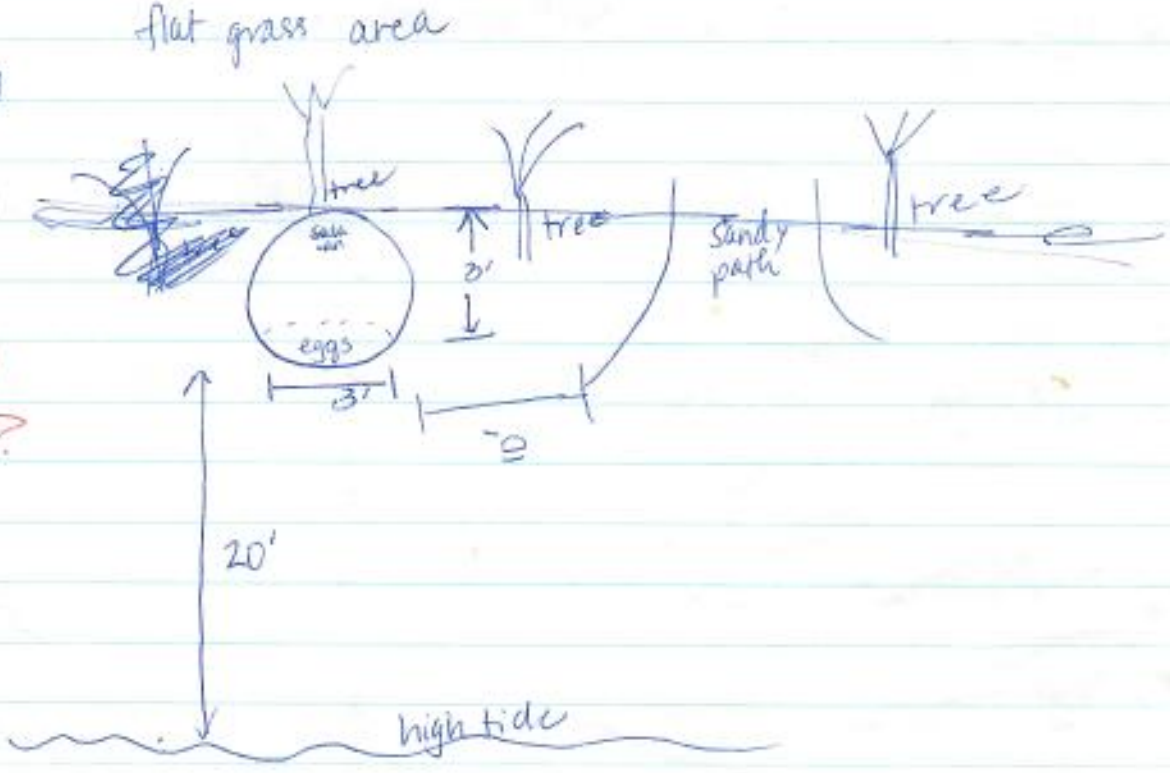
LOCATION: POLICE BEACH

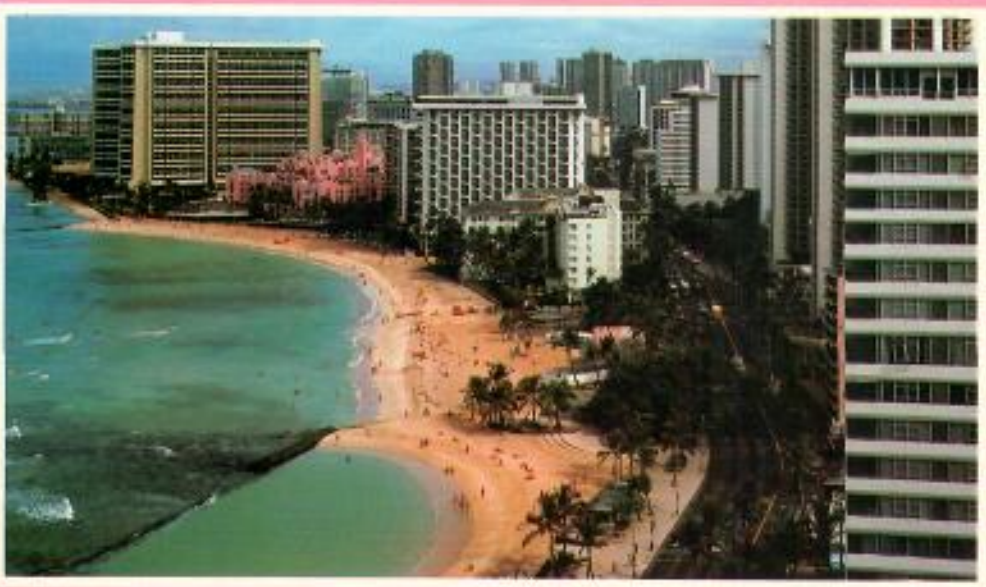
ON 07-14-92 HE AND HIS FAMILY SAW A GREEN TURTLE COME UP ON SHORE TO LAY A NEST. AFTER SHE LEFT THEY SAW HER TRACKS. TO CONFIRM EGGS PRESENT IN HER NEST, HE DUG UP THE NEST AND ACCIDENTLY BROKE ONE EGG. HE THEN COVERED UP THE NEST.

HE'S WORRIED THAT OTHER CAMPERS MIGHT DISTURB THE NEST. THE NEST IS HIGH UP ON SHORE RIGHT UNDER THE VEGETATION.

07-14 9:30 Turtle digging
10:30 Eggs laid
07-15 morn turtle gone
[NO tumors, tags on]

He took pictures!
Can we get copies?





WAIKIKI BEACH