

MARINE SKILL REPORT SUBMITTED TO THE
UNIVERSITY OF HAWAI'I MARINE OPTION PROGRAM

A Study of the Ecology of the Hawaiian Green
Sea Turtle, Chelonia mydas, at Punalu'u, Hawai'i,
Using Tag and Recapture Methods.

DURATION

January 18, 1988 - March 23, 1988

PROJECT LEADER

Kimber Alspach

PROJECT MEMBERS

Brion Duffy
Mark A. Alspach

ADVISORS

George H. Balazs, NMFS
Robert Forsythe, NMFS
Dr. Walter Dudley, UHH, MOP Co-Director
Dr. Leon Hallacher, UHH, MOP Co-Director
Shelly Ebersole, UHH, MOP Student Coordinator

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INTRODUCTION

The endangered Hawaiian green sea turtle, Chelonia mydas, has been the object of study by George Balazs of the National Marine Fisheries Service for fifteen years. In 1973, he initiated a comprehensive, long-term tag and recapture study. Although he was not the first to attempt such an endeavor, his has been the most widespread and productive attempt to document the natural ecology and life history of these turtles (Balazs 1982a, 1983). Still, many questions remain unanswered: "The longevity and duration of reproductive life for Green Turtles in the wild are presently unknown. Long-term tag recoveries can, however, help to answer these important questions" (Balazs 1983). These questions are important ones indeed, as they are central to the conservation and propagation of this species whose numbers have seriously declined in modern times (Balazs 1982a).

Punalu'u Bay, on the coast of the Ka'u Desert of Hawai'i County (Figure 1), has been the site of several tagging expeditions under the direction of Mr. Balazs in cooperation with the Marine Option Program of the University of Hawai'i Hilo. This location is one of "seven representative study areas...selected for repetitive and long-term sampling" (Balazs 1982b). From March 21 to 23, we conducted an expedition to Punalu'u Bay to capture, tag, and release Green Sea Turtles in order to collect additional data on their life-cycle.

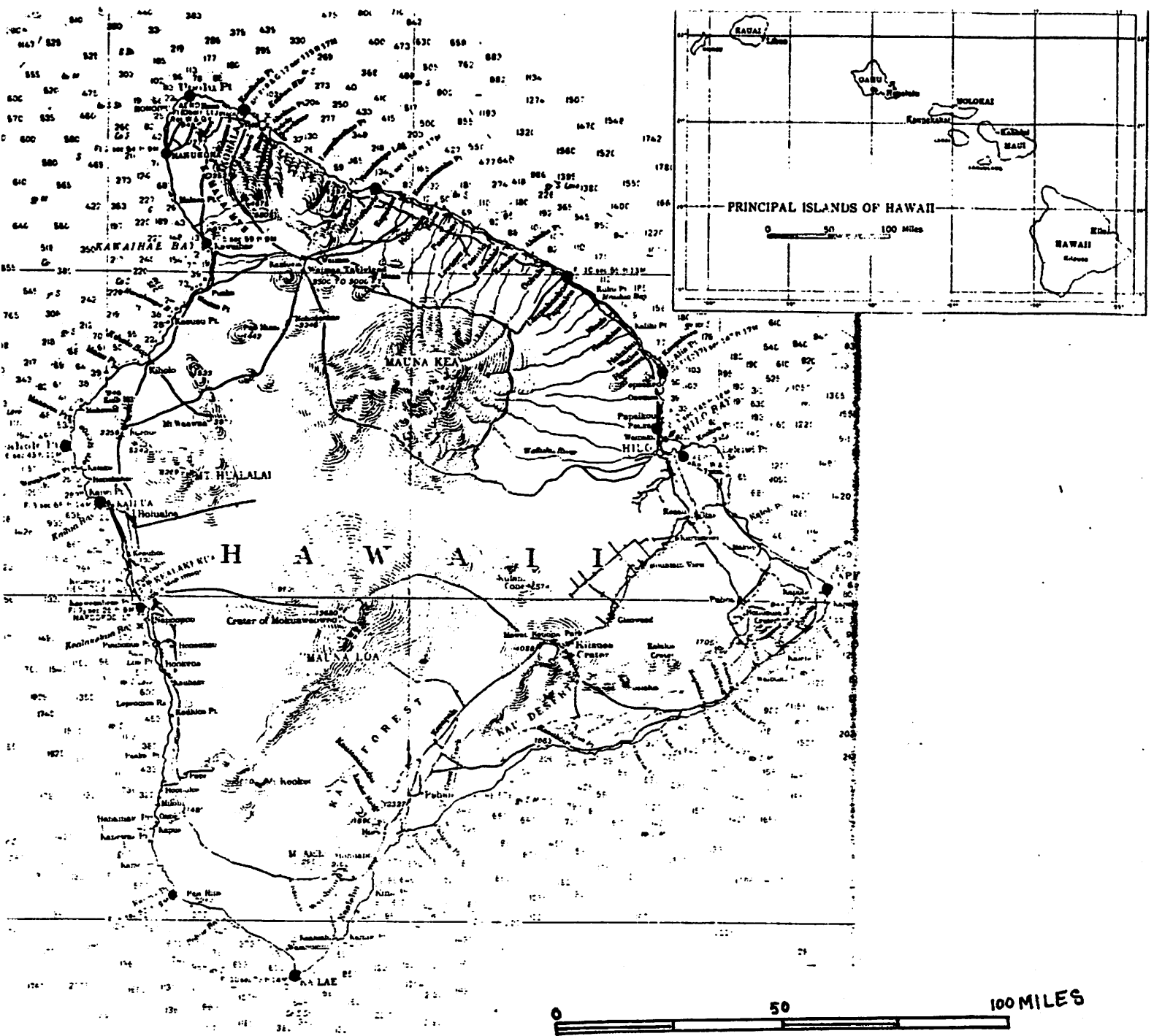


Figure 1. The arrow indicates the location of Punalu'u Bay on the southeast coast of the island of Hawai'i. This map is taken from the U.S. Coast and Geodetic Survey 1948 (G9701 P51948U5).

METHODS AND MATERIALS

Preparation for this project included recruitment of student volunteers and development of an informative seminar for them. Participants were required to have current certification in both First Aid and Cardiopulmonary Resuscitation. Efforts were made to arrange certification classes specifically for those volunteers needed them. Upon consultation with Mr. Balazs, we prepared an itinerary of priority events and organized other necessary activities around them to produce a comprehensive working agenda. In addition, two of us participated in a similar tag and recapture project (also under the direction of Mr. Balazs) in North Kona (Hawai'i County) sponsored by the Hawai'i Preparatory Academy.

Green Turtles are generally caught using one of two methods:

- 1) A large-mesh tangle net set vertically in the water column and perpendicular to shore has been shown to be an effective method for catching turtles (Balazs 1982b, 1987). Every 20 or 30 minutes, the net floats must be checked for any activity which might indicate a turtle has been caught. This is required so that entangled turtles do not drown.
- 2) Skin divers may catch turtles by hand if they are found resting and/or are unaware of the diver's approach. This method is especially effective at night and in known resting areas.

When caught, the turtles are examined immediately for tags from a previous capture and the numbers noted in case of escape (Balazs; personal communication). Turtles are then taken to shore in a raft made from a large inner tube with a piece of plywood strapped to one side. When overturned, this raft doubles as a work platform when measurements and samples are being taken on shore. In addition, the raft provides a secure place to leave turtles unattended for short periods.

Turtles without tags are provided with tags. One tag is attached to the trailing edge of each front flipper and the tag numbers noted. Large turtles may receive additional tags on the hind flippers. The tags used are self-locking upon application, made of Inconel 625 alloy, and their dimensions are 25x8x9 mm (Balazs 1983, 1987).

Straight-line measurements of the carapace are used for most comparisons of size and growth (Balazs 1987). Calipers were used to take this measurement and several others (except for the curved-line measurements of the carapace which require a tape measure) in order to monitor growth rates upon recapture:

- 1) Carapace length;
 - a) straight-line
 - b) curved-line
- 2) Carapace width at 6th marginal;
 - a) straight-line
 - b) curved-line
- 3) Plastron length
- 4) Plastron width
- 5) Head width

6) Tail length

Stomach samples were obtained by siphoning sea water into the crop through the esophagus with a flexible plastic tube (Balazs 1982b, 1987; Legler 1977). These were stored in 10% formalin in seawater and examined later to determine the food sources. Parasitic barnacles which burrow into the shell and softer tissues were noted and removed to discourage their persistence. The turtles were weighed using a spring scale by placing them in the innertube raft and hoisting it off the ground.

In addition to the information stated above, the following data were also noted:

- 1) Date, time, location, and method of capture.
- 2) Wind, water, and other pertinent weather conditions.
- 3) Any abnormalities including excess or lack of algal growth, the presence of wounds, scars, eye infections, tumors, or other lesions.

At this study site, netting was the principle method of capture since the turtles are moving about as they forage. On the evening of March 21, 1988, the net was anchored to an iron ring attached to a concrete block approximately 50 meters from shore at the northeast end of the bay and deployed toward the southern inside corner where it was anchored on the rocky substrate. The participants were divided into 5 teams of 4 and rotated on 2 to 3 hour shifts while the net was in the water. At night, a high intensity

spot light was used to examine the bouy line to determine if anything was caught. After low tide passed, at approximately 2:00 A.M., the lead line and netting were clipped to the bouy line using oversized safety pins. This allowed the net to be left in place and unattended for the remainder of the morning. The net was unclipped and watches resumed early in the afternoon on the next day. As the tide was coming in, snorkelers were sent out every half hour to ensure that the lead line did not get snagged on the rocky bottom and possibly prevent a turtle from surfacing to breath. On the night of March 22, 1988, the net was not clipped up but was left out until just after sun-up.

RESULTS

A total of three turtles were captured during the two nights at Punalu'u Bay, none of which were recaptures. Only one was caught using the net, and this occurred before it was secured. Another was captured in a throw net and brought to us by a local fisherman. The third turtle was caught by a student participant while snorkeling. Two tags were applied to each turtle as they were all of small to medium size. The straight-line measurements of the turtle's carapaces were 64.7 cm, 47.6 cm, and 48.7 cm respectively (Table 1). All were juveniles; under 65 cm. There were no obvious tumors or lesions although the one caught by hand had a notch in the carapace between the 10th and 11th marginal scute. Parasitic barnacles were noted on all of the turtles as well as a small amount of algal growth (predominantly red and some green) on the underside of the carapace edges and at the flipper sockets. All were found to have eaten Pterocladia capillacea before capture.

Table 1. Three turtles were captured, tagged, measured, and released at Punalu'u Bay in March, 1988. Measurements are presented in centimeters unless otherwise noted.

DATE & METHOD capture	TAG # right left	CARAPACE					PLASTRON length	HEAD width	TAIL length	FLIPPER front right	WEIGHT (lbs)	NOTES
		straight			curved							
		length	notch	width	length	width						
3/23/88 hand capture	8922 8923	48.7	48.4	37.6	52	47	38.4	7.6	12	9.2	37	burrowing barnacles present. Pterocladia capillacea found in stomach
3/22/88 throw net	8920 8921	47.6	no notch	38.2	53	45	39.4	7.5	12	8.4	36	burrowing barnacles present. Pterocladia capillacea found in stomach
3/21/88 net	8918 8919	64.7	64.5	50.9	69	63.5	51.8	9.4	12	10.6	—	many burrowing barnacles in soft tissue around shell, large notch btween 10th and 11th marginal

DISCUSSION

It is unclear why there was a lack of turtles caught in the net which was the primary method used on past tagging expeditions to this location. There is no doubt that there were turtles in the area as numerous sightings of foraging turtles were made by study participants. Many suggested that the net was not set at a good location, but it was later confirmed to be the same as in previous years.

Another consideration involves the time of day and tidal flux at the time the net was first set. High winds and waves made it difficult to set the net without tangling it. The first attempt was interrupted by the capture of the first turtle. During the second try, the inner tube raft used to deploy the net was tipped over by a large wave. The net was finally set properly on the third try, but high tide had passed and the sun was setting. In the past, high tide was generally the period of peak activity in the net.

Human disturbance also may have frightened away turtles. At one point during the deployment, there were over fifteen snorkelers in the water at one time and never less than five during the two and a half hours taken to set the net. This activity may have alerted the turtles who either left to return to forage at a later time or simply moved to another region of the bay.

On the second night of watching the net, observers were instructed to snorkel the length of the net periodically as

the tide was rising to ensure that the lead-line did not snag on the bottom. If this should happen, an entangled turtle would not be able to surface for air. This activity also may have frightened away turtles headed in that direction. In the hope of catching turtles during the morning high tide, the net was left until sunrise. Unfortunately, this effort was unsuccessful.

This project was important to the ongoing study of green sea turtles in Hawai'i. In spite of various setbacks, three turtles were added to the current list of turtles tagged at the Punalu'u Bay study site. Stomach samples taken from them support the hypothesis that Pterocladia capillacea is the principle food source for turtles in this area. Further study of its nutritional value may help to explain the higher growth rate of green turtles at Punalu'u compared with elsewhere in the Hawaiian Archipelago.

A total of twenty-one students participated in the tagging project (Table 2). All were given a chance to experience the rigors of scientific field work as well as its rewards. They had the opportunity to gain first hand knowledge of the tagging program from the marine scientist who led the expedition and to discover and develop their own skills and interests as potential scientists.

Projects such as this one are instrumental to increasing public awareness of the plight of sea turtles and other species which have been determined to be threatened or endangered. Hopefully, it is not too late for all of mankind

Table 2. There was a total of twenty-three participants in a turtle tagging expedition to Punalu'u Bay from March 21-23, 1988.

NAME	AFFILIATION
Robert Forsyth	NMFS
Walter Dudley	UHH, MOP
Kimber Alspach	UHH, MOP
Brion Duffy	UHH, MOP
Andy Alspach	UHH, MOP
Dennis Epperly	UHH, MOP
Sherri Miller	UHH, MOP
William Dana	UHH, MOP
Patrick Aquino	UHH, MOP
Toni King	UHH, MOP
Alvin Araki	UHH, MOP
Nancy Justice	UHH, MOP
Darren Schmidt	UHH, MOP
Sammuel Guevara	UHH, MOP
Christine Ramos	UHH, MOP
Brian Ponce	UHH, MOP
Heide Tobias-Glover	MCC, MOP
Robert Lohle	MCC, MOP
Mary Roney	UHM, MOP
Lara Asato	UHM, MOP
Dan Bauer	UHM, MOP
Ray Boland	UHM, MOP
Tina Xavier	UHM, MOP

to take notice and act to preserve our environment and its varied resources upon which we depend. Any act to fulfill this purpose is invaluable as its eminent outcome is unknown. A local fisherman, taking his livelihood from the sea, donated his catch having the faith that it would be returned; if not to him, to his children.

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