

SAVING BIG ISLAND TURTLES • HIKE TO A SWAMP • HONOLULU'S CLASSIC BUILDINGS

# Hawaii

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## DESTINATION LANAI

Visitor Industry Replacing  
Island's Pineapple Economy



# TURTLE TAG

## *Students and Scientists Combine Efforts to Save Hawaii's Endangered Green Turtle*

By John Penisten and Walter C. Dudley Jr.

Looking at it close up for the first time, it strikes you as a face that only a mother could love. But those glistening, soulful eyes soon reveal a generally docile and friendly disposition hiding behind an armor-clad leathery skin and bulbous body shaped like a '48 Hudson. That doleful look on its face tells you there is nothing to fear from the turtle, *honu*, one of Hawaii's most gentle and graceful marine animals.

The Hawaiian green turtle, *Chelonia mydas*, is one of the seven species of sea turtles listed as endangered or threatened under the Federal Endangered Species Act. As a threatened species, it is protected by state and federal laws. It's illegal to disturb, harm or kill these gentle sea creatures.



Although the turtles look miserable, the process is without pain and helps preserve the species.

JOHN PENISTEN

Volunteers from U.H. Hilo assist the federal marine biologists in catching and tagging turtles at Punaluu Bay.



JOHN PENISTEN

"The green turtle population in Hawaii, like all sea turtle populations worldwide, is difficult to estimate accurately," says George Balazs, zoologist and leader of marine turtle research for the National Marine Fisheries Service in Honolulu. "However, we use the number of nesting females as an index figure for the population. The French Frigate Shoals, located in the uninhabited, far northwestern Hawaiian Islands is the principal breeding grounds. Counts here indicate there are only about 750 to 800 sexually mature female green turtles in Hawaii."

But help is on the way. To restore Hawaii's sea turtles to their former abundance, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and the Hawaii State Department of Land and Natural Resources formed a Turtle Recovery Team in 1985. The team drafted a formal recovery plan in 1987.

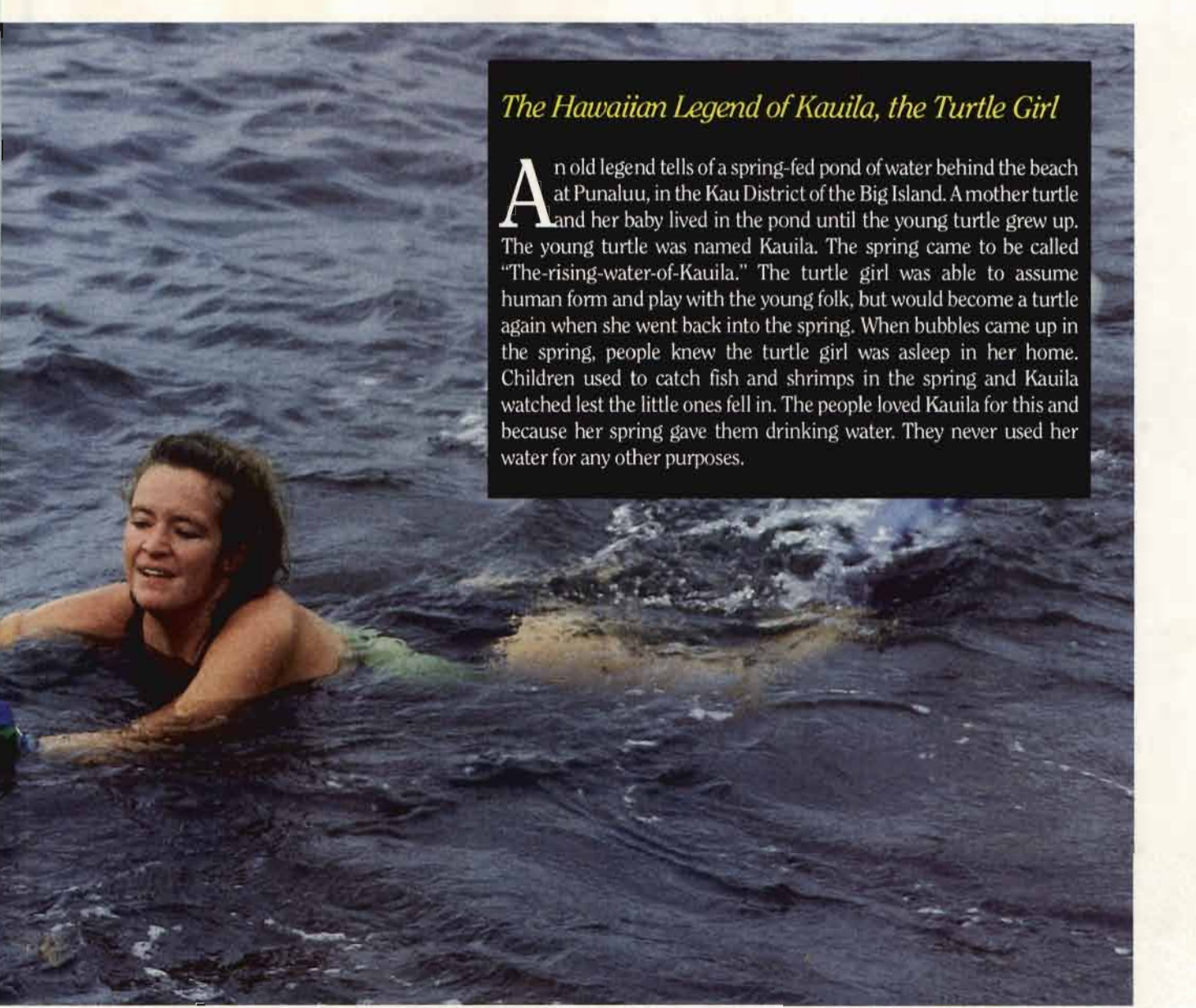
"The Turtle Recovery Program's goal is to assist the animals in recovering to a healthy population size in Hawaii," says Balazs. "At the same time, we want to get rid of the threats to them, to mitigate and remove the problems that caused the turtles to be placed on the 'threatened species' list. Simply, we want to get their numbers up and remove mortality factors affecting them."

Balazs indicated that the continued use of gill nets on the reefs around Hawaii by fishermen is a major problem. When a turtle becomes entangled in a gill net, its chances of survival are slim. Usually the animal becomes hopelessly entangled and drowns because it can't surface for air. "I get an average of one confirmed report per week of a gill net killing a turtle somewhere in Hawaii," notes Balazs, "and these are only the reported incidences."

The Turtle Recovery Program is being

assisted on by students and faculty at the University of Hawaii Hilo Marine Option Program. These volunteers assist the federal marine biologists in capturing, tagging and releasing green turtles at Punaluu Bay on the Big Island.

In addition to the green turtle, the hawksbill and leatherback turtles are also native to Hawaii. The green turtle, however, is the most common. These turtles, which weigh up to 400 pounds, are primarily vegetarians. They eat *limu* (seaweed) growing on coral reefs and rocks close to shore. Green turtles prefer to live near "pastures" of *limu* that are located in nearshore waters around the Islands. Like cattle, green turtles use bacteria in their guts to digest their food. Adult green turtles are identified by the carapace (upper shell) which is dark in color with olive or gold flecks. Green turtles are so named



## *The Hawaiian Legend of Kauila, the Turtle Girl*

**A**n old legend tells of a spring-fed pond of water behind the beach at Punaluu, in the Kau District of the Big Island. A mother turtle and her baby lived in the pond until the young turtle grew up. The young turtle was named Kauila. The spring came to be called "The-rising-water-of-Kauila." The turtle girl was able to assume human form and play with the young folk, but would become a turtle again when she went back into the spring. When bubbles came up in the spring, people knew the turtle girl was asleep in her home. Children used to catch fish and shrimps in the spring and Kauila watched lest the little ones fell in. The people loved Kauila for this and because her spring gave them drinking water. They never used her water for any other purposes.

from the color of their body fat. In earlier days, the green turtle was much sought after for its meat.

The hawksbill turtle is a rarely seen marine animal found mostly around Molo-kai and the Big Island, where a few females have nested in recent years. This smaller sea turtle inhabits coral reefs and rocky bottom areas where its long, narrow, hawk-like beak is used to probe for sponges and other bottom-dwelling invertebrates.

The leatherback is perhaps the largest of the world's sea turtles with some weighing as much as 2000 pounds. The leatherback does not rest on or come very close to Hawaii's shores but it is seen regularly on the open ocean where it feeds almost exclusively on jellyfish. This species is the only sea turtle without a hard shell, hence its name.

Sea turtles are perhaps among the most graceful of ocean animals. These rep-

tiles are well adapted to their marine environment with hydrodynamic-shaped bodies and strong flippers that make them fast long-distance swimmers. Turtles must breathe air but can remain underwater for as long as 2½ hours without breathing. Green turtles are even known to sleep in underwater caves or buried under deepwater ledges.

**H**awaiian green sea turtles live most of their lives in coastal waters but adult females must leave the water and return to shore to lay their eggs. In Hawaii, studies of green turtle migratory habits indicate they travel up to 100 miles round trip from their feeding areas near the coast of the main islands to nesting beaches in the uninhabited French Frigate Shoals. Scientists think the males accompany the females in this migration and mate with them

offshore from the nesting beaches.

While the life span of sea turtles is unknown, it is known that Hawaii's green turtles grow very slowly in the wild. These reptiles take an average of 25 years to reach sexual maturity. This is one reason why green turtles are threatened as a species: They simply don't reproduce rapidly enough.

Females often nest several times in a season but breed only every two to four years. After mating, females crawl out of the water and use their flippers to dig a body pit, often five to six feet in surface area. They then dig a flask-shaped egg cavity two to three feet deep with the rear flippers. After depositing about 100 golf ball-sized eggs, the females cover the nest with sand and return to the sea.

In two months, the tiny, one-ounce turtles begin to emerge. A single hatchling is unable to emerge from the nest by itself.



**Turtles are measured for growth, examined for abnormalities or signs of injury such as shark attack and even have their mouths inspected for traces of their last meal. Below: Curious visitors crowd the beach to watch the tagged turtles re-enter Punaluu Bay.**

Working as a team, hatchlings scrape sand off the roof of the nest cavity and pack this sand on the floor, effectively raising their nest toward the surface. When they are about an inch from the surface, the hatchlings wait for a cool overcast or evening period to emerge from the nest. They then explode out of the nest and make a mad dash to the water by heading toward the brightest horizon.

While some of the young turtles become victims of predator fish and seabirds, enough make it out to sea where it is speculated they feed on immature squid, larval crabs and other large slow swimming or drifting organisms. This rich diet would provide a more rapid rate of growth than feeding on *limu*. Once they have grown to be about one foot across as two- to four-year-old juveniles and young adults, they join others at coastal feeding grounds around the Islands.

As adults, sea turtles have only two predators: sharks and man. Tiger sharks regularly feed on all sizes of green turtles. Although turtles spend most

of their time in the water, where they mate and nest, it's not unusual to see them crawl onto beaches to bask in the sun or perhaps to avoid tiger sharks.

While sharks are a natural menace to turtles, man has been worse when it comes to turtle exploitation. In many cultures, turtles have been a source of food and material for clothing and jewelry. But it was its popularity as a meat source that placed the Hawaiian green turtle on the threatened species list.

In the old days, the Hawaiians judiciously used the green turtle as a food source without harming its place in the ecosystem. It has only been in more recent times, with modern, more efficient hunting techniques and equipment such as synthetic nets, outboard boats, scuba diving gear and spear guns, that the taking of green turtles increased so dramatically, that it threatened the very existence and survival of the species.

As recent as 1974, there were no restrictions on the taking of turtles. During the days of sail, numerous ships were provisioned with live turtles as a ready source of fresh meat for crews. In more recent times, the popularity of turtle meat dishes as a restaurant item for Hawaii's thriving visitor industry contributed to the decline. In addition, the development and expansion of harbors, boating, roads and construction, plus more people in the Islands combined to push the turtle farther away from traditional feeding and nesting areas and had a devastating effect on the turtle

population throughout Hawaii.

Other problems and threats to the turtles' existence still persist. Poaching, the illegal killing and taking of turtles, is still an unfortunate and all-too-frequent event. The greatest hazards to sea turtles are modern fishing fleet methods, open sea drift nets and other fishing gear. Many turtles are injured or drown as a result of incidental capture and entanglement in such gear. Floating plastic debris is also a problem when turtles ingest toxic substances that poison them or block normal body functions. Even supposedly harmless items like toy balloons can be a hazard.

And, as if all of the above weren't enough problems for Hawaii's green turtles, a mysterious disease has had a devastating impact on these animals during the last several years. Hideous looking, grotesque tumors, some as large as softballs, called fibropapillomas, are being found on many turtles.

The tumors grow so large around the eyes, they can obstruct the turtle's vision. Tumors around the flippers disrupt the animal's ability to swim properly and can affect the ability to feed which can lead to premature death.

Scientists have no definite answers as to the cause of fibropapillomas but there are theories. Some believe that pollution, perhaps chemical runoff from agriculture or other human activities, is a factor. Other researchers believe that pollution could depress the turtle's immune system, weakening barriers against disease. But so far,



PHOTOS: JOHN PENISTEN

there is no evidence of that. Others speculate that the tumorous growths are caused by a virus; still others believe the growths are caused by a parasite in the form of a flatworm. But so far, these are only theories and more research is needed.

**M**eanwhile, the turtle recovery tag and release program continues. Turtle tagging helps estimate the number of turtles using an area, measure the growth rates in wild sea turtles, study migration patterns and check tumors. One of the primary turtle capture and tagging sites in Hawaii is at Punaluu Beach near Pahala in the southern Ka'u district on the Big Island. For the past 10 years, teams of faculty and students from the University of Hawaii at Hilo Marine Option Program have assisted federal marine zoologists here in capturing and tagging Hawaiian green turtles.

"At Punaluu we are interested in three factors. Measuring growth rates in turtles, looking at population numbers by size class and turtle behavior, that is observing their feeding habits," says Balazs. He also noted that the Punaluu turtle herd has the fastest growth rates in Hawaii and that the herd there is nearly tumor free. These factors and their significance to the rest of Hawaii's turtle population are of prime interest to turtle researchers.

Working under the supervision of Balazs, U.H.-Hilo faculty and students do the actual work of entering the water to hand-capture the turtles and bring them to shore for data collection. Easy work it isn't! Grabbing a thrashing 200-pound turtle and wrestling it onto its back on a floating tire tube platform while keeping your own head above the water is not a chore for the timid.

Once the animal is cradled onto the tire tube, it is taken to the beach where it is weighed, measured and tagged. The turtles are placed on their backs at no discomfort to them. In this position, they will remain relaxed and at ease for the several minutes it takes to gather the data and make measurements. The turtles also are examined



JOHN PENISTEN

**Wrestling a 200-pound turtle onto its back on a floating tire tube platform while keeping your head above water is no easy task.**

for any abnormalities, signs of injury such as shark attack and even have their mouths inspected for traces of their last meal. Frequently, bits of limu will be found in the mouth and provide information on their diet. The researchers also remove parasitic barnacles from the turtles' shell. These pests bore into the stomach area of the shell sucking bodily fluids from the turtle.

If a turtle tagged during a previous expedition is recaptured, then the data will enable the researchers to determine how much the animal has grown. Tagging also permits the researchers to study turtle migration patterns. Many of the turtles captured and tagged at distant French Frigate Shoals have been recaptured at Punaluu.

The tags are applied to the trailing edge of the flippers near the body (equivalent of a turtle armpit) and are made of special corrosion-resistant, nontoxic metal or plastic that doesn't interfere with the turtle's movements. Though the turtles may not enjoy having the tags put on, it probably hurts no worse than having your ears pierced, and in the long run will do a great deal to help us understand and protect them.

A curious crowd of local residents and holidaying visitors gathers to watch the students and scientists at work. The spectators are excited at seeing several large turtles lying on the beach. They take lots of photos and inquire as to what is taking place. The students pass out brochures explaining that a federal marine fisheries biologist is conducting a study of sea turtles

in cooperation with the University of Hawaii at Hilo. After the data collection is completed, the turtles are released and reenter the water.

While the turtles are lying on the beach having their vital statistics recorded, curious visitors often comment on the "tears" coming from the their eyes. No, the turtles aren't crying! As the only source of water available to these marine reptiles is sea water, they need a mechanism to get rid of the extra salt from their bodies, so yes, they do cry "salty" tears but not tears of sadness.

Efforts being made by the dedicated Turtle Recovery Team throughout Hawaii are slowly helping the green turtle make a comeback in its fight for survival. "The upside is that there has been a gradual low-level increase in the nesting-index figures at French Frigate Shoals. That's very encouraging. At the same time, we've been receiving more reports about new turtle sightings, more turtles in places where few turtles had been seen before," says Balazs. "Perhaps this indicates that there are not only greater numbers of turtles now, but also greater public awareness and recognition of the necessity of turtle protection."

"The downside however," he adds, "is the continuing incidence of the tumor disease. The incidence seems to be increasing throughout Hawaii."

Hopefully Hawaii's Turtle Recovery Team will continue to find the right answers to the problems that afflict the *honu*. Like so many other endangered and threatened animals, the green turtles deserve a second chance at survival. And in the long run, man will make the difference as the turtle's worst enemy and best friend.

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# Hawaii™

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— Welcome  
to the Islands*



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DOUGLAS PEEBLES

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