

the hook, it was broken in two; one part was removed via the incision and the other was removed via the mouth. The procedure lasted for one hour. The wound was closed and the turtle was kept warm at room temperature while covered in cloth soaked in heated sea water for several hours. The turtle was then placed in a tank containing only a few centimeters of water. Antibiotics were prescribed because of respiratory distress not caused by the operation. The turtle began feeding in five days.

Respiratory problems are common and are treated with either ampicillin or gentamicin. One of the other most frequent disorders we come across is keratoconjunctivitis, probably caused by pollution. Treatment consists of the administration of ophthalmic salves. In cases where the turtle appears sick or underweight, amino acid solutions enriched with vitamins are administered. Commensal organisms, such as lepadomorph (*Lepas* sp.) and balanomorph (*Chelonibia testudinaria*) barnacles are often found. Only one case of a tanaid (*Hexapleomera robustus*) has been noted; large numbers were founded in the galleries between the plates of the carapace of a very weak turtle.

We have also seen damage to the carapace or plastron caused by boat propellers, particularly during the summer when boat activity increases. One turtle with its carapace broken was repaired with acrylic resin. The turtle was returned to a tank one hour later and began feeding the next day. Another turtle was found dying on a beach with a broken plastron. We sutured the wound with surgical stitching and the animal began feeding in 15 days; in 30 days, the wound had healed and the animal was released. Released turtles are tagged. Our tagging methods follow the guidelines of the Sea Turtle Mediterranean Project, as well as the later guidelines provided by the Progetto Nazionale Tartarughe coordinated by Dr. Argano of the University of Rome. After rehabilitation, all turtles are released southeast of Sicily in the spring because of the reduction of beach sites suitable for egg-laying in the Gulf of Naples.

This paper was designed to provide encouragement regarding the successful medical treatment of injured or unhealthy sea turtles, and to convey the importance of the Gulf of Naples to the maintenance of loggerheads in the Mediterranean Sea. The Naples Aquarium is fortunate in having a facility near the sea for expedient maintenance and/or treatment of sea turtles and looks forward to playing an active role in ensuring that areas of the Gulf of Naples become protected sites for these animals.

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## SATELLITES USED TO STUDY THE OCEANIC MIGRATIONS OF HAWAII'S GREEN SEA TURTLES

In August 1992, scientists of the U. S. National Marine Fisheries Service Honolulu Laboratory attached small, satellite-linked transmitters to the shells of three adult green turtles nesting at French Frigate Shoals in the Northwestern Hawaiian Islands. The research was directed by George Balazs of the Honolulu Laboratory; personnel of the U. S. Fish and Wildlife Service, the agency responsible for the French Frigate Shoals National Wildlife Refuge, also assisted with the research project.

The Argos satellite system to which these transmitters are linked is jointly sponsored by the United States and France. Currently, two satellites in polar orbits circle the earth about every 100 minutes and receive signals from Argos-approved transmitters. The transmissions are

initially relayed to France where the exact location of each signal is computed and forwarded with other data to an Argos facility in Maryland. These data are made available to researchers throughout North America. Argos satellites are used to track a wide variety of wildlife. They are also used to track drifting buoys that provide data on currents and other oceanographic features.

Over a 4-week period all three turtles were successfully tracked during their homeward migrations across the high seas (Figure 1). Two of the turtles traveled to Kaneohe Bay on Oahu, and the third turtle swam directly to Johnston Atoll, swimming well south of the island chain over open ocean. Scientists were surprised to find that the turtles did not travel from island to island, a route which offers short stepping stones and "landmarks" between French Frigate Shoals and the main Hawaiian Islands. Instead, the turtles' chosen routes took them over exceedingly deep water where no known navigation guideposts exist. The turtles traveled at an average speed of about one mile per hour, generally against prevailing winds and ocean currents. One turtle traveled 610 miles in 23 days and the other 680 miles in 26 days.

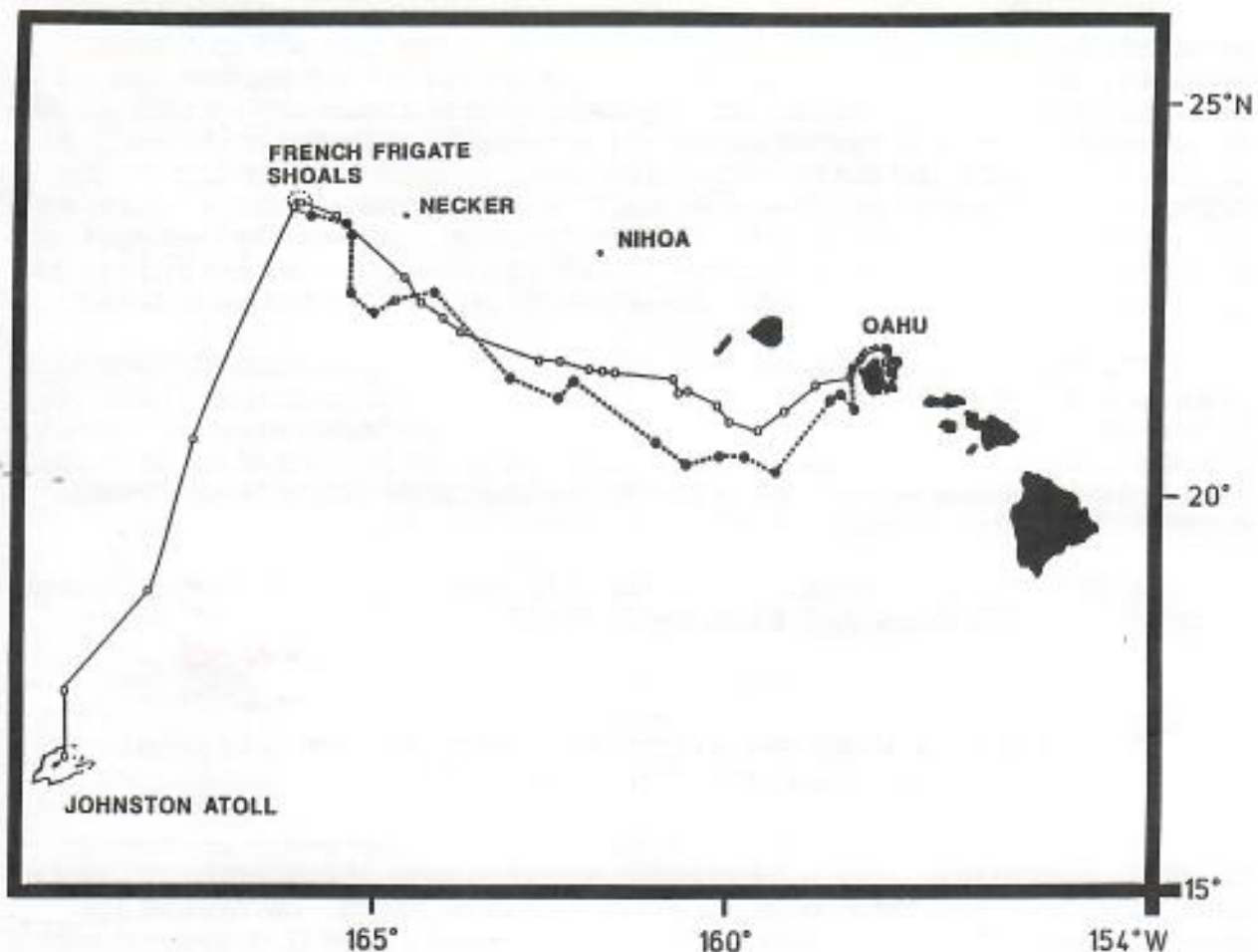


Figure 1. Homeward migratory routes taken by three adult green turtles equipped with satellite transmitters while nesting at French Frigate Shoals, Hawaii. The broken line represents a turtle moderately afflicted with tumors (fibropapillomas). This turtle took a less direct route, and greater travel time, to reach Kaneohe Bay. The two solid lines represent the pathways taken by healthy turtles. Graphic by Deborah Yamaguchi.

In the past, the use of metal flipper tags at French Frigate Shoals has demonstrated that adult green turtles, both male and female, migrate to breed at this remote location from seaweed foraging pastures scattered throughout the main Hawaiian Islands. Some of these locations are as far away as 800 miles. However, there are many unanswered questions about these ocean voyages, including routes followed, travel speed, trip duration, method of navigation, and whether or not the turtles return to [fixed] foraging pastures. The fibropapilloma disease currently affecting many green turtles in Hawaii also raises a question as to how this disease affects a turtle's ability to successfully accomplish these lengthy migrations. Long-distance tracking of sea turtles by satellite offers the potential to provide answers which are vital in the long-term management and conservation of Hawaiian green turtles as a protected species under the U. S. Endangered Species Act. Source: excerpted from a *Press Release*, 4 November 1992, National Marine Fisheries, U. S. Department of Commerce.

### FIRST REPORTS OF LEATHERBACK TURTLES TAGGED IN MEXICO AND RECAPTURED IN CHILE

Two adult female leatherback turtles, *Dermochelys coriacea*, were drowned by a purse seine using hand-crafted albacore fishing gear off the southwestern coast of Mocha Island, Chile (30°30' S, 75°45' W) on 14 April 1988. One was tagged with a Mexican monel metal tag (tag number E-4364) with the return address: Instituto Nacional de la Pesca. The turtle had been tagged in the crural membrane between the tail and hind flipper. Four years later, a fisherman in Valparaíso captured another Mexican-tagged leatherback (tag number A-5462) in a gill net off San Antonio, Chile (33°30' S, 71°30' W) on 15 June 1992. These leatherbacks had both been tagged on the nesting beaches of Mexico, the precise time and place are still being determined. We would be very grateful for any additional information available about the long distance movements of Mexican leatherbacks. Please forward such information to the authors.

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### OSA SEA TURTLE STUDY

*Abstract:* The Osa Sea Turtle Study, an assessment of sea turtle nesting and predator excavation frequency, was initiated by Fundacion TUVA of Peninsula de Osa, Costa Rica, on a 4.2 km stretch of coastline on the Pacific Ocean, 16 km east of Corcovado National Park. A preliminary assessment was conducted daily for two months during the summer of 1992, during which time a total of 135 nests were observed. These nests were divided into groups depending upon whether or not they were exhumed by predators; those exhumed were subdivided according to when and by what they were disturbed. An excavation frequency of nearly 100% was expected prior to the study, but results indicate that approximately one-half of the nests remained undisturbed at the end of the study. Of the known predators (i.e., dogs, humans, *pizotes*), dogs were responsible for the largest percentage of nest excavation (56%) and humans were second, responsible for 17%.

*Introduction:* Fundacion TUVA (Tierras Unidas de Vecinos por el Ambiente, which, in English, translates as United Lands of Neighbors for the Environment) is a non-profit and non-government foundation jointly formed by Tropical Reforestations, SA, and the Aquatic