

Proposed 1990 Green Turtle Study  
Tern Island, French Frigate Shoals

Objectives:

1. Monitor nesting and hatching phenologies on Tern Island.
2. Continue hatching success analysis on Tern Island nests.
3. Examine temperature profiles of nests.

Justification:

The future and existence of Tern Island depends on the outcome of investigations into the removal, replacement, or modification of the existing seawall. An important factor in these investigations is the effect a course of action will have on wildlife using Tern Island. During the last few years, Hawaiian green sea turtle nesting activity on Tern Island has apparently been increasing. Data on the number of turtles nesting on Tern Island, location of nests, and duration of the reproductive season (nesting and hatching) are essential to any final decision and scheduling of work.

Forty-plus years of human occupation has left a multitude of man-produced debris buried within Tern Island. The potential for hatchlings being trapped by this debris exists. After hatchling emergence, nests will be excavated to determine the extent of this problem. Previous years' data have shown that few hatchlings have been trapped by buried debris. We will continue excavating nests because we are also accumulating a good data set on hatching success of nests on Tern Island.

Over the last 4 years, incubation lengths of Tern Island nests have ranged from 54 to 97 days. We have noticed that nests located inland have shorter incubation lengths than those closer to the beach berm. We would like to investigate incubation lengths more closely by looking at temperature profiles of incubating nests at various locations. Incubation temperature has been shown to effect sex of hatchling turtles; thus, information on how nest location effects nest temperature will be important in future management considerations.

Methods:

Objective 1. On Tern Island, turtle observations will begin with the first nest laid and continue until the last nest hatches. In past years, the nesting season has ranged from the first nest being found in late April to last hatchlings emerging in late December. After the first nesting activity is noticed, we will

begin a daily, early morning patrol to check for nests. The date and location of each nest will be recorded. In addition to the morning patrols, evening patrols (about 1 hour after sunset) will also be conducted. The main purpose of the evening patrols is to identify nesting females. Any nesting females encountered on morning or evening patrols will be identified by reading existing tags or applying tags to un-tagged females. Curved carapace lengths will also be recorded for each female. Tags will be applied before females begin to excavate nests (while they are moving) or after nesting as they finish covering their eggs. A quick-drying lead-free spray paint will be used to place an identification number on the carapace to expedite identification of turtles already encountered. To eliminate as much disturbance to the Hawaiian Monk seals and seabird colonies, as possible, turtle patrols will be limited to the beach zones. (During nights, most seals have hauled out and are in the interior, vegetated zone of the island.) Turtle observers will enter the interior of the island only when tracks of turtles coming ashore are located. The observer's activity will be limited to the vicinity of nesting turtles and all precautions will be taken to reduce disturbance to seals and seabirds.

Objective 2. Hatching of Tern Island nests will be monitored by observing nest sites starting 50 days after the nest was laid. If a nest has not hatched within 100 days, the nest will be excavated and contents analyzed (throughout several years of study, mean incubation length for FFS nests have been between 63 and 68 days; extremes have been 53 and 97 days). We feel that by watching for pre- and post-hatching pit formation and tracks of hatchlings almost all hatching nests can be detected. There is no need to trap emerging hatchlings! We prefer to do nothing that would disrupt the natural emergence of hatchlings. We will wait 3 days after initial emergence before excavating the nest to determine if any hatchlings were trapped by man-made debris. Excavating the nest will also allow us to record clutch size and hatching success. Hatching success parameters will include the number of infertile or bad eggs, dead or partially developed embryos (1/4, 1/2, and 3/4), dead fully developed hatchlings, live hatchlings trapped in nest, and number of hatchlings that successfully emerged on their own (based upon the number of hatched egg shells in the nest). After analyze, all nest materials will be returned to the excavated pit and buried.

Objective 3. If equipment can be obtained (see equipment needed, below), we would like to put four temperature sensors in several nests. Nests would be chosen because of their location. Four sensors would be placed in some nests as the eggs are being laid. One sensor at each of these locations: bottom, center, side, and top of the egg chamber. Other nests would receive just one sensor placed in the middle of the egg chamber. The number of nests monitored will be determined by equipment budget restraints. Hopefully, we could do at least 10 4-sensor nests and 20 one sensor nests. Early nests may hatch in time for

sensors to be used in another nest.

Nest temperatures will be monitored three times daily (morning, midday, and evening). If we find little in the way of daily fluctuation of temperature we could go to daily temperature recording. Locating nests being laid in different zones, will probably require additional beach patrols.

#### Personnel:

The green turtle work on Tern Island can be accomplished without additional personnel. We plan to use the East Island turtle researchers when they rotate off East as well as volunteers and personnel stationed on Tern. Each patrol will take about 1 hour. Excavating nests will require additional time. On average we will probably be spending 20 hours/week on the Tern Island green turtle study.

#### Equipment Needed:

The only equipment needed are the temperature probes and control box. The probes should have about 5 foot leads. Two control boxes (one for a backup) will be needed. The probes will be left in the nest and each time a temperature reading is needed they can be plugged into the control box. As the probes will be left outside for 2 to 3 months we will need some way to keep the connections protected from weather and sand - perhaps small plastic bags. Fifty probes will allow us to get adequate sample sizes; however, the more the better. If the probe could possibly pierce an egg, we should get some small styrofoam balls (turtle egg size) and insert the temperature probes into them before placing them into the turtle nests.