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MARINE TURTLES IN THE PHOENIX ISLANDS

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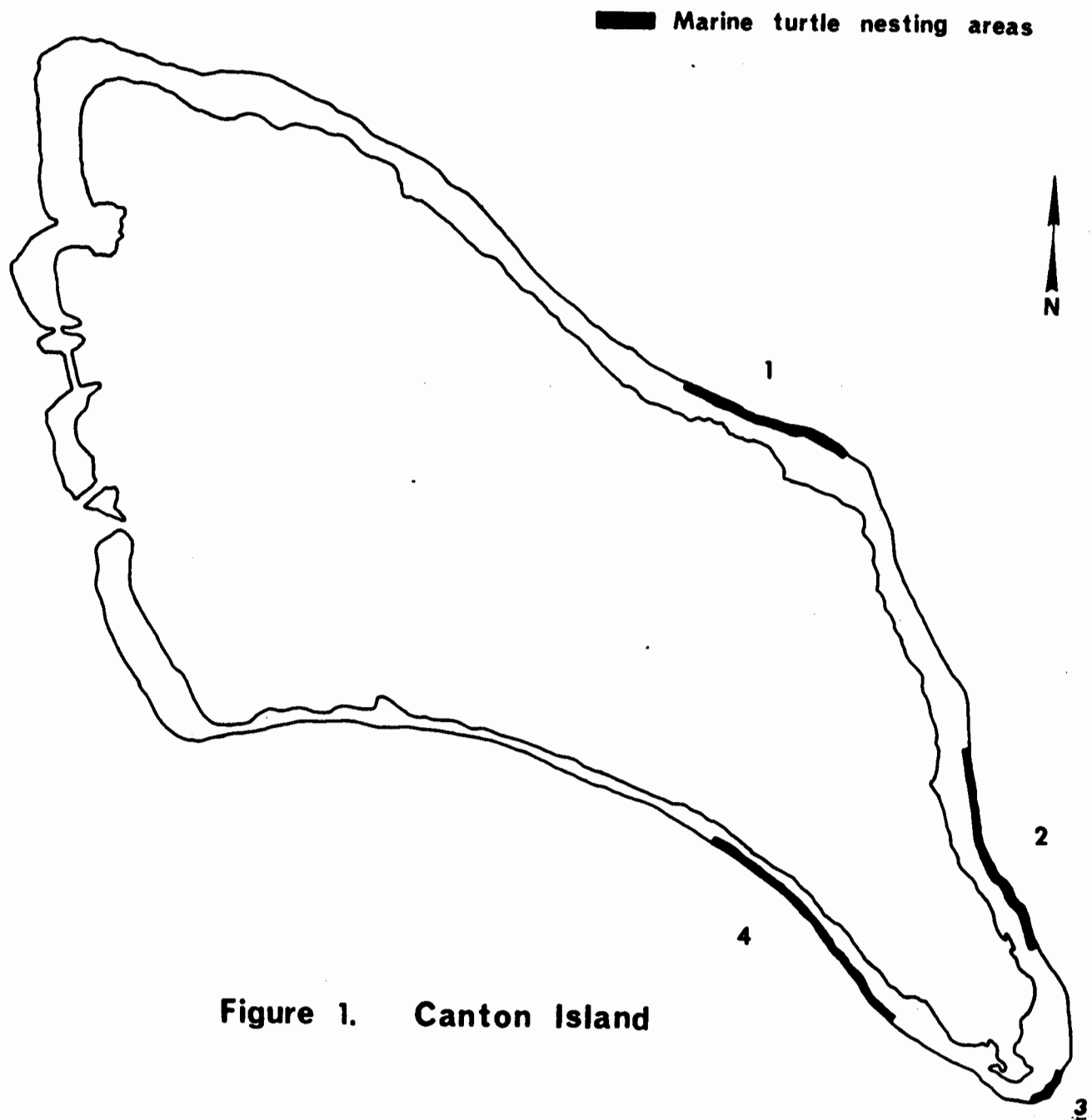


Figure 1. Canton Island

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INTRODUCTION

During the period February 13 to 20, 1973, a visit was made to Canton Island for the purpose of conducting a preliminary survey of marine turtle nesting populations. Although previous investigators have described the sea birds (Buddle, 1938; Murphy *et al.*, 1954), insects (Van Zwaluwenburg, 1943, 1955), and vegetation (Hatheway, 1955), very little is known about the marine environment of Canton or the other seven atolls (Enderbury, Birnie, Phoenix, Sydney, Hull, Gardner and McKean) which comprise the Phoenix group. Publications dealing with marine life are limited to a description of fishes collected during the 1939 Bushnell Expedition at Canton, Hull, Enderbury and McKean (Schultz, 1943) and to an identification of some marine algae at Canton Island (Degener and Gillaspy, 1955; Dawson, 1959).

The fact that marine turtles are present in these waters and nest on certain beaches has been only casually noted in the literature by a few authors. Wilkes (1845) recorded that one Frenchman and eleven Tahitians were found catching turtles on Hull Island when he first visited this atoll in August of 1840. Bryan (1939), in describing the natural history of the Phoenix group, stated that turtles are known to come out of the sea to lay eggs. Bryan (1942), Walker (1955) and Degener and Gillaspy (1955) each briefly noted that turtles could be found on Canton. In addition, Bryan (1942) speculated that turtles must occasionally come out on sand beaches at Phoenix Island since a skull and bones were found during a visit in 1924. Bryan (1942) also stated that turtles had, at one time, been caught frequently on Hull Island. The British Pacific Islands Pilot (1946) noted that Gardner, Hull and Sydney had turtles, while the United States Sailing Directions for the Pacific Islands (1952) listed turtles on Enderbury in addition to these three atolls.

Although the presence of turtles has been recorded, no data is available on the species present, seasonality of nesting, relative abundance, beach utilization or migratory habits. Both Parsons (1962) and Hirth (1971) presented extensive biological information on green turtle (*Chelonia* sp.) colonies throughout the world, however no mention was made of this species in the Phoenix Islands. Wiens (1962) discussed marine turtles in relation to Pacific atoll environment but made no reference to Phoenix Island turtle populations. Apparently no scientific studies or

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descriptions of marine turtles in this area have been conducted. This has probably been due in part to the islands' remoteness and lack of suitable conditions for habitation by man.

The occurrence of relatively large numbers of nesting turtles in the Phoenix Islands was brought to the author's attention in November of 1972 by personnel located on Canton Island. Immediate efforts were made to learn as much as possible about this little studied marine turtle population. Continuing pressures and overexploitation by man on the five genera of marine turtles has made it imperative that all colonies and nesting areas throughout the world be identified, described, and surveyed so that conservation programs can be formulated to protect these reptiles. Permission was subsequently obtained to enter Canton Island to conduct a preliminary study. This paper covers the work accomplished during the study and presents information based upon the author's observations while surveying and mapping nesting areas. Although the field work was confined to Canton, information is also contained which was compiled from interviews conducted with resident personnel having knowledge about turtles on several of the other islands.

FINDINGS

Status

Canton, a low sand and coral Central Pacific atoll, is located approximately 266 km below the equator at 2°50' S, 171°43' W. The island consists of a sparsely vegetated strip of land varying in width from 50 to 600 meters extending 43 km around a lagoon. A fringing reef, which in certain areas is exposed at low tide, surrounds most of the island. Canton is the largest and northernmost of the eight islands in the Phoenix group. Sporadic use has been made of several of the islands during the past 125 years for the purpose of mining guano, growing coconuts, refueling aircraft and tracking satellites. During World War II a major military installation was located on Canton. Past attempts to permanently colonize Sydney, Hull and Gardner with Gilbert Islanders did not meet with success. Bryan (1942) has given the historical background of each island in the group while Murphy *et al.* (1954) detailed more recent information concerning Canton.

Although the Phoenix Islands are jointly claimed by both the United States and Great Britain, the U. S. Department of Defense has held authority on Canton, Birnie, Enderbury and Hull since 1970 to conduct research on terminal tracking of missile launches. Only personnel affiliated with this project are presently in the island group.

Nesting Areas

While on Canton the major portion of each day was spent surveying coastlines on foot in order to locate nesting areas. The author was fortunate in that partial transportation and assistance for this work was provided by personnel on their off-duty hours. Once identified, each nesting area was photographed and charted. Notes were taken on terrain, possible predators, and abundance as well as age of tracks and nesting

pits. Because of the intensity of the equatorial sun, as much work as possible was conducted during nighttime hours.

The principal nesting areas on Canton occur at four locations along the north, east and south coastlines (Fig. 1). A description of each area follows.

Nesting area 1 is approximately 2.1 km long with a substrate composed chiefly of fine coral sands. It has a moderate to steep sloping beach which leads up to a relatively flat, sparse vegetation zone consisting of Portulaca, Lepturus, Boerhavia and Scaevola. This sandy vegetation region is in some places narrow, dropping off abruptly toward the lagoon side to become rough coral fragments. An abandoned wood-framed structure is located at the western end of this area. The eastern end of an abandoned airstrip is almost directly inland from the structure. Initial reconnaissance of this site revealed 16 sets of fresh turtle tracks as well as signs of recent digging. None of the tracks were estimated to be over ten days old. Unlike the subsequent areas examined, older pits from previous nesting were not seen at this location. Area 1 was found to have the most recent evidence of nesting of any of those investigated. The author made frequent visits to this location, and at 1800 hours on February 18th, a large turtle was observed inside the fringing reef. Upon return at 2300 hours two animals were found to be nesting well into the vegetation zone. Both turtles observed were identified to be of the genus Chelonia (green turtle). Several incomplete pits were dug by each turtle before egg deposition. Upon completion of nesting, the animals were tagged and found to have a straight line carapace length of 86 and 88 cm respectively. On February 20th, two additional fresh sets of tracks were observed in the same area.

Although the coastline is very similar along a 2 km distance adjacent to the western end of area 1, no signs of nesting activity were observed in this region. Extensive bulldozing during World War II for the construction of aircraft revetments took place immediately inland from this beach area. The destruction of a portion of this vegetation zone may be responsible for the absence of nesting at this time.

Nesting area 2 extends for approximately 2.7 km. Two abandoned concrete transmitter bunkers are located directly inland from the center of this location. Along this area of the coastline the beach slopes gently up to a sparse vegetation zone composed of Portulaca, Lepturus and Boerhavia. Fine coral sand was found to be mixed with broken fragments of coral, and in many places the beach was littered with large timber. It was felt that this area more than others investigated, hosted the largest number of nesting turtles during certain times of the year. Although only one set of fresh tracks (less than ten days old) was observed in this area, more than 100 pits were counted along the length of this coastline. Most of these were estimated to be not more than two to three months old. It was subsequently reported to the author that during the last week of June 1973, 13 sets of fresh tracks were seen in this area.

Nesting area 3 was the smallest (0.4 km) of any located. This region covered the sandy beach area at the southern point of the island. More than 30 pits, probably the same age as those in area 2, were observed at this

location. Above the high tide mark the land is flat and devoid of any vegetation. Large pieces of coral were found on the surface and drift-wood was abundant. The underlying sand had a fine consistency but was mixed with large coral chunks, probably making nesting difficult. No fresh tracks were seen in this area.

Area 4 extends for approximately 3.1 km and consists of a gently sloping, fine sand and coral rubble beach with moderate to thick vegetation (Scaevola) above the high tide mark. Small clam shells (Tridacna sp.) are abundant on the beach. More than 40 pits were observed well into the vegetation zone and in many cases nesting sites were found behind large shrubs placing them out of sight of the ocean. The reef flat along this coastline contains large fragments of coral. Four fresh tracks were observed in this area.

Predators

Since hatching and nest emergence was not encountered during the survey work, no actual predation was witnessed by the author. The following observations were made on species present which are known to prey upon hatchling turtles and eggs in other areas of the world.

The intertidal ghost crab, Ocypode sp., was found in large numbers at nesting areas 1 and 2. Although present at areas 3 and 4, relative population densities appeared to be considerably less. This crustacean represents a serious menace to both hatchlings and eggs when occurring in close proximity to nesting areas (Hendrickson, 1958). The land hermit crab (Coenobita sp.) which utilizes the gastropod shell Turbo was observed to be abundant and widespread on the island. Both Fosberg (1969) and Honegger (1967) have observed hermit crabs attacking hatchlings at other nesting beaches. Several land crabs of the genus Cardisoma were seen near area 2 but not in great enough numbers to represent a serious threat to young turtles.

Numerous rodents estimated to be from 10 to 20 cm long were seen during night surveys. Fresh and brackish water pools located along the northeast coast may make it possible for their numbers to rapidly increase during certain times of the year. These animals are responsible for losses of hatchling turtles (Fosberg, 1969; Hendrickson, 1958).

Sea birds probably contribute to hatchling mortality on Canton Island. Observations on the abundance of sea birds indicated that relatively few were present during the author's visit. However, it was interesting to note a small frigate bird (Fregata sp.) colony situated adjacent to area 2. This genus has been known to prey upon hatchlings (Honegger, 1967).

A black tipped shark (Carcharhinus sp.) approximately one meter long was observed inside the fringing reef of area 2. Such sharks and carnivorous reef fish account for hatchling losses (Carr and Hirth, 1962).

Predation and interference with adults, hatchlings and eggs by personnel on the island has been held to a minimum. This is primarily due to the strict enforcement of Department of Defense regulations and to the education of personnel on the importance of protecting the environment.

It is not uncommon for personnel to find both hatchlings and mature females wandering inland from beach areas. This disorientation of the animal's sea finding ability may be caused by Canton's low profile and large lagoon. It has been determined that brightness cues from an open horizon are partly responsible for marine turtles being able to find their way to the ocean. The presence of lights on certain facilities in remote areas of Canton Island may also be a factor in causing turtles to travel inland.

Identification and Incidence

In addition to observing the nesting adults at area 1, seven young turtles held by personnel in a salt water pool were examined. All were identified as being of the genus Chelonia. Most of the personnel contacted on the island indicated that they had seen only one type of turtle during their encounters and photographic identification confirmed them to be Chelonia. Two reports were received describing turtles with distinct ridges on their carapace. In view of these observations it may be reasonable to assume that other genera of marine turtles may be present in the Phoenix Islands.

Interviews with personnel familiar with the island revealed that marine turtles were commonly seen throughout the year both inside the lagoon and immediately outside the one major pass located on the western side. Divers reported that most turtles are large adults (over 90 cm carapace length) however, some smaller juveniles (under 60 cm carapace length) are occasionally seen.

Nesting was reported to occur sporadically on Canton during all months of the year. However, turtles were more frequently seen in areas 2 and 3 during October and November. The similar age and abundance of pits in these areas suggest that seasonal nesting takes place in area 4 since this site is seldom frequented by personnel in comparison with the other three locations.

Although the author did not visit other islands in the Phoenix group, some information was obtained on the incidence of nesting from personnel that frequented several of these atolls. Enderbury was reported to have heavy nesting along the eastern and western coasts during October and November, although some nesting takes place throughout the year. Nesting turtles have also been seen on the western and southern coasts of Hull Island throughout the year. Tracks were observed on the northwestern coast of Sydney and the southern coast of Gardner Island during the author's visit. On several occasions tracks have been seen on Birnie Island. No information could be obtained concerning activity on Phoenix or McKean Islands. Nesting populations on Hull, Sydney and Gardner were probably heavily exploited during the Gilbertese tenure at these locations thus reducing present day numbers.

CONCLUSIONS

On Canton Island nesting takes place on select beaches which display desirable characteristics for the successful excavation of a suitable egg chamber. Nesting occurs at several of these locations during the entire

year, however the presence of larger numbers of animals during October and November indicates that a seasonal nesting cycle may also be present. In view of the fact that most green turtles display migratory breeding habits, it would be of value to determine what other locations in the Pacific are frequented by this colony.

Although there is no basis at this time for making an estimate of the total size of the nesting population on Canton and other islands in the Phoenix group, this preliminary study indicates that a fairly large number of animals may be involved. The need to carry out more extensive research on all aspects of this population is particularly important at this time due to the continuing reduction in numbers of marine turtles throughout the world.

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