

## STATUS OF MARINE TURTLES IN THE PHOENIX ISLANDS

### 1. A Preliminary Survey of Canton Island

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#### INTRODUCTION

##### Background and Objectives

During the period February 13-20, 1973, a preliminary survey was made of the marine turtle population which exists in the Canton Island area. This low-lying coral atoll is the largest and northernmost of the eight islands which comprise the Phoenix group and is under the jurisdiction of the United States Air Force (USAF) Space and Missile Test Center (SAMTEC). Previous communications with personnel located on the island indicated that marine turtles commonly nest at several locations along the Canton Island coastline and that the lagoon and surrounding open ocean contain a substantial number of these salt water reptiles. In addition, it was reported that nesting pits and tracks are frequently seen on both Enderbury and Hull Islands.

The above communications motivated the author to review the literature in order to determine what, if any, scientific work had been conducted specifically on these marine turtles. No information could be found relating to species present, locations of nesting areas, breeding seasons, migration, population numbers, food utilized or any other important data concerning these animals. Little mention could be found that marine turtles did in fact even nest in the Phoenix Islands.

Information of this nature is critical to the continuing existence of any marine turtle colony. The endangered state of the world's marine turtles has been brought about by man's over-exploitation and encroachment on both the nesting beaches and the feeding grounds. For this reason it is imperative that all reproducing populations be identified and studied so that data can be obtained on how best to design and conduct a program of conservation.

Permission to enter Canton Island to conduct the preliminary study was granted by the USAF-SAMTEC as outlined in Appendix I. This report covers the work accomplished during the study and presents information based upon the investigator's observations and experiences while surveying and mapping nesting areas. Information is also contained which was compiled from interviews conducted with resident personnel having local knowledge about turtles. Based on the project's findings, recommendations are given which may assist the USAF-SAMTEC in its efforts to protect and perpetuate marine turtles in the Phoenix Islands.

#### SYNOPSIS OF ACTIVITY

The major portion of each day while on Canton was utilized surveying coastlines on foot in order to locate nesting areas. The investigator was fortunate in that partial transportation for this work was provided by FEC and Kentron personnel who made trips to outlying parts of the island. Once found, each area was recorded on a chart along with pertinent land marks and descriptions of adjacent vegetation and terrain. Further, the extent of nesting activity as well as the approximate age

of nesting pits and tracks were recorded. Substrate was sampled from each nesting location, and observations were made of possible egg and hatchling predators inhabiting the area. One night was spent at a coastal location observing the nesting behavior of two adult turtles that had come ashore. Evenings and other opportune times were used for informal interviews with interested persons who possessed local knowledge on marine turtles. A short article was placed in the local newsletter stating the investigator's interest and requesting anyone with marine turtle encounters to contact him. One diving and one sailing session were carried out in the island's lagoon to observe marine life and habitats. A part of one morning was spent reviewing papers relating to the ecology of the Phoenix Islands. These manuscripts are on file at the Base Commander's office and were made available to the investigator. The 20-minute motion picture entitled "A Legacy to Preserve" produced by the USAF was viewed one evening.

## FINDINGS

### Nesting Locations and Activity

The principal nesting areas on Canton Island occur at four distinct locations along the north, east and south coastlines. Figure 1 illustrates the boundaries of these areas which are labeled 1, 2, 3 and 4 respectively. The "x" notations in the figure indicate sites where signs of minor nesting activity were observed. A description of each principal area follows:

Area 1: This location is approximately 2.1 km long with a substrate consisting mostly of fine sand having a moderate to steep sloping beach

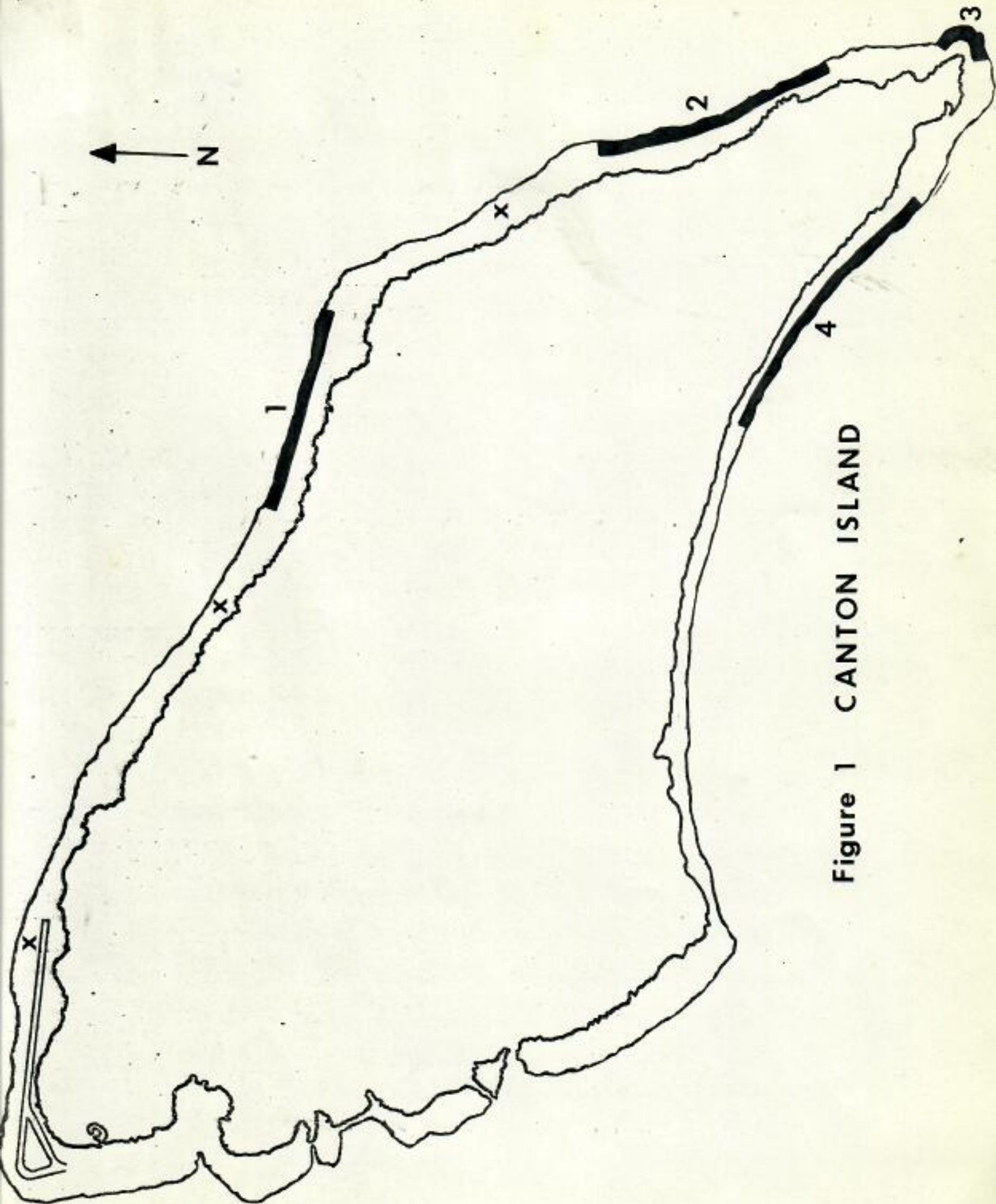


Figure 1 CANTON ISLAND

which leads up to a relatively flat, sparse vegetation zone. This sandy vegetation region is in some places narrow, dropping off abruptly toward the lagoon side to rough dense coral rubble. A wooden-framed structure is located to the western end of this area and is referred to by island personnel as the "beach house". The western end of an abandoned airstrip is almost directly inland from the beach house. The initial reconnaissance of this site revealed tracks representative of 16 nesting turtles. It was estimated that none of the tracks were older than 10 days. Area 1 was found to have the most recent evidence of nesting of any of those investigated. The investigator made frequent visits to this location, and at approximately 1800 hours on February 18, an adult turtle was observed inside the fringing reef. Upon return at 2300 hours two animals were found to be nesting in the vegetation zone, well above the high tide mark. Both turtles observed were identified to be the Green Turtle (Chelonia sp.). Upon completion of nesting, the animals were individually identified by placing a numbered tag on the trailing edge of the right-front flipper that bore the inscription "Notify University Hawaii - HIMB". On the 20th of February, two fresh sets of tracks were again observed in this same area.

Area 2: This nesting area 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. Fine sand is mixed with pieces of coral rubble, and in many places the beach is littered with timber. It was felt that this area hosted the largest number of nesting

turtles of any investigated. Although only one set of fresh tracks was observed in this area, more than 100 nesting pits were identified along the length of this coastline. Most of these appeared to be 2 or more months old.

Area 3: This area was the smallest of any located (0.4 km), covering the immediate beach area adjacent to the A-Site facility. A high concentration of old 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 are found on the surface and driftwood is abundant. The underlying sand has a fine consistency but is mixed with larger coral pieces closer to the surface. Two visits were made to this area for nighttime observations. No fresh tracks were seen in this area.

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

#### Species Identification

In addition to observing the nesting adults, seven hatchlings held in the Base Commander's pond were examined. All were identified as being

the Green Turtle (Chelonia sp.). Most of the people interviewed felt that they had seen only one type of turtle during their encounters and photographic identification confirmed them to be the Green Turtle. Two reports were received describing turtles with distinct ridges on their carapace or upper shell. No ridges are found on Green Turtles. In view of these observations it may be reasonable to assume that one or more of the other four genera of marine turtles may be represented in this area.

#### Predation and Nesting Disturbance

The intertidal ghost crab, Ocypode sp., was found in large numbers at both Areas 1 and 2. Although present at Areas 3 and 4, the relative densities appeared to be somewhat less. This animal represents a serious threat to both hatchlings and eggs when they occur in proximity to nesting areas. Estimated losses from Ocypode predation range as high as 30% in some parts of the world. It is interesting to note the development of large colonies of these crabs on Canton at beach areas frequented by nesting turtles.

Several land crabs of the genus Cardisoma were seen but not in great enough numbers to represent a serious threat to turtles.

Numerous rodents estimated to be from 10-20 cm long were observed during night surveys. Since fresh and brackish water pools are located along the northeast coast, it is probably possible for numbers to rapidly increase during certain times of the year. These animals are a potential, if not an already existing predator to both turtle eggs and hatchlings.

Sea birds undoubtedly account for predation of hatchlings on Canton

as they do in other parts of the world. It was interesting to note a frigate bird (Fregata sp.) colony situated adjacent to Area 2. It is not known if this is a regularly used site for these birds.

A black tipped shark (Carcharhinus sp.), approximately 1 meter long was observed inside the fringing reef of Area 2. Such sharks and carangid reef fish account for large numbers of hatchling losses in areas where these predators are abundant.

The land hermit crab (Coenobita sp.) which utilizes the gastropod shell Turbo is abundant and widespread on the island but it is not felt that it is an active predator on either eggs or young turtles. Weak or injured hatchlings or uncovered eggs would probably be readily attacked by these crabs, but in the investigator's opinion no serious loss would be incurred under normal conditions because they are slow moving and do not burrow.

Disturbance of hatchlings and nesting adults occurs due to the following reasons: 1) lights near nesting beaches, either from structures, vehicle headlights, fishermen, or other nighttime activity; 2) the reported practice of driving vehicles on beaches or on the vegetation zone immediately above the high tide mark on the outer islands.

The investigator heard numerous reports describing both hatchling and adults becoming disoriented and traveling inland. This behavior seemed to be most common in Area 3. Personnel tend to believe that vibrations from generators at A-Site attract the animals. Based on the investigator's knowledge and experience, lights from the facility are responsible for the animals becoming confused. It has been sufficiently demonstrated



that marine turtles are able to find the ocean by photoreception.

It is the investigator's opinion that predation by humans has been held to a minimum due to: 1) strict regulations (OL-1 Regulation 126-1 and 127-1); 2) preliminary briefings on ecology before entering the island; and 3) frequent showing of the educational film on birds and turtles. However, it must be recognized that personnel from both Hawaii and Samoa may consider turtle meat and eggs to be a highly desirable food. One documented report was given concerning eggs being excavated shortly before the investigator's visit. In addition, an account was given about an individual being halted in the process of taking an adult which had come ashore to nest.

#### Other Islands in the Phoenix Group

The investigator made no personal marine turtle observations on any islands except Canton. The following limited information was obtained from personnel that had made visits to these atolls.

Enderbury Island - Heavy nesting reported at times along both the east and west coasts. Turtles are known to become disoriented and travel inland near the B-Site facility. This structure was described as having more lights than the A-Site facility.

Hull Island - Nesting reported along the west and south coasts. Continuous illumination of a SAMTEC facility was also described as existing on this atoll.

Sydney Island - Fresh tracks reported on the northwest shore during the investigator's visit.

Gardner Island - Fresh tracks reported on the south shore during the

investigator's visit.

Birnie Island - Tracks seen on several occasions.

Phoenix Island - No information available.

McKean Island - No information available.

#### CONCLUSIONS

Although there is no scientific basis at this time for making an estimate of the total size of the marine turtle nesting population on Canton, this preliminary study tends to indicate the involvement of a fairly large number of animals. It is the investigator's opinion, based on interviews and observations, that nesting takes place at some locations during the entire year. However, the similar age and abundance of pits in Areas 2 and 3 show that mass or seasonal nesting does occur at times, probably during October and November.

Since man's arrival, the ecology of Canton has been the most severely degraded of any of the Phoenix Islands. That the nesting of marine turtles on Canton has been able to continue in even moderate numbers attests to the former magnitude of this colony. The relatively unexploited state of some of the outer islands in the Phoenix group may well classify them as being among the most undisturbed and unaltered marine turtle nesting areas left in the entire Pacific basin. In fact, the size of the total nesting population in the Phoenix Islands could well constitute the largest found in any Central or South Pacific island group due to exploitation of the resource in the inhabited locations.

The investigator was duly impressed with the awareness of the need

to protect marine turtles displayed by the majority of the personnel. Interest was indicated in obtaining informative literature on marine turtle biology and arrangements were made to periodically send articles for distribution. In addition, the means were established for conducting periodic observations on turtle activity in Area 1. This will allow for the longer-term collection of some valuable nesting data.

RECOMMENDATIONS - Based on the study's findings, the following recommendations appear to be justified:

1. All lights at the A-Site facility should be eliminated except for the necessary red beacon at the top of the structure. A similar procedure should be followed at B-Site and any other facility having illumination on or near recognized marine turtle nesting areas.
2. The beach house located adjacent to nesting Area 1 should not be further developed as this would encourage frequent or heavy usage by personnel. The present infrequent utilization as a recreation center will probably not interfere with turtle nesting provided that the following conditions are met: 1) only a minimum amount of light be displayed during evening hours; and 2) food scraps and other wastes be removed so increases in rodent, crab or fly populations will not occur.
3. A system should be developed for monitoring the rodent population in the uninhabited areas of the island, particularly from the jet airstrip to the A-Site facility. If conditions are warranted it may be necessary to initiate an eradication program in the outlying areas.
4. The operation of motor vehicles on the beach or in the vegetation zone immediately above the high tide mark in nesting areas should be

eliminated. Such activity can cause extensive damage to both eggs and hatchlings located in nests under the sand.

5. Dehydrated hatchlings found wandering inland should be held in captivity only long enough for strength to be regained before releasing. During this period animals should be fed an abundant amount of shrimp or fish flesh. Release should be made only into the open ocean as this is the natural route of departure from land.
6. A preliminary survey of marine turtle nesting areas should be conducted on each island in the Phoenix group. Since no definitive base-line information relating to marine turtles is available on any of these islands, it is essential that an initial reconnaissance be carried out at the earliest possible time.
7. A means for monitoring the major nesting areas on each island at regular intervals should be established. This would include tagging and measuring of females in addition to nesting pit surveillance. Although it is believed that olfactory chemoreception may play an important part in marine turtle navigation, the exact method which enables migration over long distances is still unknown. What effect, if any, radar emissions can have on this navigating ability is completely unknown. In the course of monitoring nesting areas, some effort should be directed toward investigating this aspect of marine turtle biology.

## Appendix I

Text of message received from Vandenberg Air Force Base dated 8 February, 1973 (No. 2841) relating to the investigator's entry to Canton Island:

UNCLAS SU/SUAS

SUBJ: USAEC MSG 020100Z FEB 73 QUOTED FOR BENEFIT OF OL-AE FILES. THIS MSG IN THREE PARTS.

PART I.

'W.B. HILLS SENDS. REQUEST ENTRY APPROVAL TO CANTON ISLAND FOR GEORGE BALAZS, SSN 564-54-0156, US CITIZEN, POB DETROIT, MICH, DOB 26 JAN 43, CONSIDERED GOOD SECURITY RISK AS OF 30 JAN 73, ASSOCIATED WITH HAWAII INSTITUTE OF MARINE BIOLOGY, UNIV. OF HAWAII. PURPOSE OF TRIP: TO CONFER WITH L/COL DEEM AND OTHER APPROPRIATE ADMINISTRATIVE PERSONNEL ON THE PRESERVATION OF TURTLE

PAGE 2 RUWJSLC0199 UNCLAS

BREEDING POPULATIONS ON CANTON ISLAND. DURATION OF STAY: 13 FEB 73 THRU 20 FEB 73. TRIP REQUESTED BY THE ISLAND COMMANDER.'

PART II.

FOR USAEC: REQUEST FOR ENTRY APPROVED WITH FOLLOWING STIPULATIONS/UNDERSTANDING:

1. SUBJECT STUDY IS AN INDEPENDENT STUDY WITHOUT AIR FORCE FUNDING.
2. MR BALAZS WILL REIMBURSE KENTRON HAWAII LTD AT THE ESTABLISHED DAILY RATE FOR HOUSING, MESSING, AND LAUNDRY.
3. THE STUDY IS CONFINED TO CANTON ISLAND.
4. ANY PHOTOGRAPHIC COVERAGE TO BE PROVIDED BY MR. BALAZS.
5. ANY STUDY REVIEWS DEVELOPED BE FORWARDED TO HQS SAMTEC/SUD FOR REVIEW AND APPROVAL WITH A COPY PROVIDED THE CANTON COMMANDER PRIOR TO PUBLICATION.

PART THREE.

FOR 619MASSQ/CCZ. REQUEST MR. BALAZS BE BOOKED VIA AEC FUNDED TRAVEL ORDERS ON THE 13 FEB FLIGHT

PAGE 3 RUWJSLC0199 UNCLAS

TO CANTON AND THE 20 FEB FLIGHT FROM CANTON TO HICKAM.

BT  
#01999

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PLATE 1. BEACH HOUSE AND COASTLINE AT NESTING AREA 1.



PLATE 2. FRESH TURTLE TRACKS AT NESTING AREA 1.