

STATUS OF THE GREEN TURTLE (Chelonia mydas)

POPULATION IN THE WATERS FRONTING THE

MAUNA LANI RESORT, SOUTH KOHALA, HAWAII

MONITORING REPORT - NOVEMBER 1992

Prepared For:

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INTRODUCTION

Because of declining population sizes the green sea turtle (Chelonia mydas) was granted protection under the federally mandated Endangered Species Act in 1977-78. Green turtles as adults are known to forage and rest in the shallow waters around the main Hawaiian Islands. Reproduction in the Hawaiian population occurs primarily during the summer months in the Northwest Hawaiian Islands with adults migrating during the summer months to these isolated atolls and returning in late summer or early fall. In the main Hawaiian Islands green turtles will rest along ledges or in caves in coastal waters usually from 40 to 80 feet in depth during the day. Under the cover of darkness turtles will travel inshore to shallow subtidal and intertidal habitats to forage on algae or limu (Balazs et al. 1987). The normal range of these daily movements between resting and foraging areas is about one kilometer (Balazs 1980; Balazs et al. 1987). Thus from the present state of knowledge, an ideal green turtle habitat would have the presence of appropriate offshore resting areas (caves, ledges or undercuts) being located within a kilometer or less of a sufficient abundance of appropriate forage algal species situated in shallow water. Selectivity of algal species consumed by Hawaiian green turtles appears to vary with the locality of sampling but stomach content data show Acanthophora spicifera and Amansia glomerata to be quantitatively the most important (Balazs et al. 1987); the preferences may be due to the ubiquitous distributions of these algal species.

Green turtles are known to frequent the reefs offshore of the Mauna Lani Resort as well as along reefs at Puako to the north and the Kapalaoa area to the south (Brock 1988c). Indeed, one green turtle resting site offshore of Mauna Lani is well known and used as a dive tour destination; this site is locally called "Turtles". The turtle population in the waters fronting Mauna Lani has been surveyed on several occasions; the first quantitative survey was made by Brock (1989). That study noted eight turtles in the area just south of the Puako fringing reef and 10 turtles at "Turtles". The objectives of the 1989 survey were to identify resting habitat and possible forage areas as well as obtain an estimate of the abundance of this species in the study area. Subsequent work by Marine Research Consultants (1992) noted concentrations of green turtles in the same two general areas:

The present survey was undertaken to obtain a semiquantitative estimate of the abundance of turtles in the waters offshore of the resort using methods that are easily repeatable for later comparative analysis; this work was carried out in conjunction with surveys of the local fish communities.

MATERIALS AND METHODS

A number of methods and techniques were used in assessing the green turtle population at Mauna Lani. Since the primary resting area is the site locally known as "turtles", a SCUBA dive was conducted at that location. To ascertain the location of other resting areas just south of the Puako fringing reef as noted in Brock (1989), surface observations were made; if turtles were sighted, a dive was made to observe the individuals at close range.

Surface observations from an anchored skiff were made at 24 locations fronting the resort; the location of these sites are the same as the transect locations established to census fishes are given in Figure 1. In this effort, one man scanned the surface for green turtles surfacing for air. If a turtle was sighted, the location was marked on a map and underwater observations were made to further substantiate use of the area by green turtles.

If turtles were encountered either on the surface or underwater, estimates on straight line carapace lengths were made and if visually apparent, we noted the presence of deformities, tumors or tags. During all underwater survey work macrothalloid algal species and their abundance were noted. The intent of these qualitative observations were to use them in determining possible sites for turtle foraging.

RESULTS

The field survey was carried out on 14-15 November 1992. One man made surface observations for a minimum of 20 minutes at each of 24 locations fronting the resort as given in Figure 1. The results of this effort is presented in Table 1; in total, 8.7 man-hours (520 minutes) were spent looking for turtles surfacing for air and 10 turtles were sighted (Table 1). Green turtles were seen in the vicinity of stations 3-B, 3-C (3 individuals), 4-A, 4-B (2 individuals), 5-A and 8-B. The sizes of these turtles was estimated to be from 30cm to 60cm (straight line carapace length). One turtle seen from the surface (just seaward of station 5-A) bore a stainless steel cattle ear tag on the trailing edge of a front flipper. This turtle was also seen underwater but the diver could not approach close enough to read the number. It is probable that this turtle (estimated carapace length of 35cm) was one of captive-raised turtles annually released from Mauna Lani Resort.

If turtles were sighted at a station, an effort was made to observe the individuals underwater. In all cases turtles seen on the surface were confirmed by the diver underwater except for the individual sighted at station 3-B and at 8-B.

In addition, a SCUBA dive was made at the local dive site, "Turtles" to census individuals in that area on 15 November 1992. The dive site is popular and during our census work over the two-day period we noted numerous tours diving at this location. Our dive resulted in the censusing of four turtles: three right around the "Turtles" resting area (estimated straight-line carapace lengths of 1 at 30cm, 1 at 50cm and 1 at 60cm) and a fourth turtle encountered about 100m south and offshore of the dive site with an estimated carapace length of 40cm. Other than the turtle seen seaward of station 5-A, none of the turtles bore tags or obvious signs of tumors.

DISCUSSION

In summary, the 8.7 hours of timed surface observations noted 10 turtles over a two-day period and the subtidal diving work encountered four additional turtles. More than 10 hours were involved with the underwater (SCUBA) surveys. As with the survey completed in 1989 and the Marine Research Consultants (1992) field effort, these results suggest that there is a resident population of green turtles in the waters offshore of the Mauna Lani Resort and nearby Puako. The October 1989 census noted 22 turtles in this area with the majority of the turtles resting in one of two specific resting areas (see Appendix A). The Marine Research Consultants (1992) survey noted 48 turtles present in the waters offshore of the resort over four days of field effort; since the field work was spread out over four separate occasions (15 October, 4 November, 28 November and 30 December, 1991) it is possible that some turtles were censused more than once. The 15 October 1991 census recorded 17 individuals which is similar to the counts made in 1989 (see Brock 1989). Counts made on other days were lower (i.e., 4 November - 10 turtles, 28 November - 11 turtles and 30 December - 9 turtles; see Marine Research Consultants 1992).

A common point among these surveys is that most resting turtles encountered show a preferential use of Porites compressa as a resting substratum; the reason(s) for this are unknown.

One interesting observation made on all surveys has been the apparent small size of the turtles encountered. In the present study 36 percent of the turtles were estimated to be between 30 and 39cm, 36 percent in the 40-49cm size class, 14 percent in the 50-

59cm size category and 14 percent in the 60-69 cm size class and the estimated mean size was 41.4cm. Of the 22 turtles censused in October 1989, one turtle was estimated to be in the 40-49cm size class, 16 in the 50-59cm size class (73% of the total), 4 in the 60-69cm size class and one in the 70-79cm size class. The calculated mean size for this sample is 57.3cm. The Marine Research Consultants (1992) survey found 13 juveniles (less than 38cm), 28 subadults (38 to 76cm) and 7 adults (greater than 76cm).

As a comparison, green turtles censused in the West Beach, Oahu area had an estimated mean size close to 80cm (Brock 1988b) and at Hawaii Kai, Oahu a mean size of 58cm (Brock 1988a). The estimation of length in the field on free swimming turtles is fraught with potential errors; but attempting to make some estimate on size provides some information that would otherwise not be available. In the November 1992 survey, no turtles were encountered that were estimated to be greater than 60cm in straight line carapace length. Balazs (1980) defined green turtle growth in the following way: juvenile - to 65cm straight line carapace length; subadult - 65 to 81cm straight line carapace length and adult (i.e., reproductively active) - 81cm and greater. Thus none of the turtles in the present survey were adults suggesting that the Mauna Lani and Puako habitats are appropriate for juveniles.

Possibly contributing to the number of juvenile and subadult turtles in the waters fronting the resort is the fact that some of the water features at the Mauna Lani Resort are used as a growout facility for green turtles hatched in captivity at Sea Life Park in Honolulu. It is quite probable that at least one of the small turtles we have encountered (in the vicinity of station 5-A) was from this program and others may be also. The Marine Research Consultants (1992) survey found six small turtles with tags which, again, are probably individuals from the Sea Life Park - Mauna Lani Resort captive rearing program.

The sampling methods between the October 1989 survey, the Marine Research Consultants study and the November 1992 effort are not identical making statistical comparisons on the abundance of turtles offshore of the Mauna Lani Resort area difficult. From the standpoint of statistics, the best data for comparison would be the timed surface observations at the 24 stations where the same experienced observer counts turtles surfacing for air in a radius of approximately 100m of the anchored vessel. The location of these stations are fixed, they cover much of the nearshore waters fronting the resort and the data are collected over timed intervals and thus may be quantified as number of individuals censused per unit of time. The underwater surveys are more variable in the amount of substratum surveyed, etc., and variables such as water clarity will affect the counts. Thus, these data are probably not the most appropriate to subject to statistical analysis.

The October 1989 survey found ten turtles present in and around the resting site known as "Turtles" as determined by SCUBA surveys and Marine Research Consultants (1992) noted four turtles in the area. Similarly, the present survey noted only four turtles in the same vicinity of "Turtles". These decreases may be just due to chance or any one of a number of reasons; however, the high use of the area as a dive tour destination may be deterring turtles from using this resting habitat. Use of the area by dive tour operators appears to be light relative to other turtle dive destinations. At Hawaii Kai, Brock (1988a) estimated that about 80 divers view the turtles on a daily basis with no definable negative impacts. In the main resting site at "Turtles" we censused three individuals; and one of these turtles was quite wary, leaving as we approached suggesting that either the carrying capacity of the site with respect to divers has been reached or that out of ignorance, some divers intimidate the turtles. The fourth turtle was seaward of the usual resting area, swimming and very wary of our diver's approach.

In conclusion, the data gathered on the resident green turtle population offshore of the Mauna Lani Resort suggests that these juvenile turtles are apparently coexisting with man in an area that has received a moderate level of development over the last ten years. There is nothing to suggest that the population of green turtles at Mauna Lani is declining albeit the lack of a historical database. If further development at Mauna Lani is of concern with respect to green turtles, one only has to compare the turtle population offshore of the Hawaii Kai development on Oahu. The massive nature of change at Hawaii Kai (dredging, habitat alteration, increased runoff, etc.) commencing 30 years ago has not caused green turtles to abandon the habitat. High use by private boaters and commercial dive tour operators focusing on the green turtle resting habitat has not caused turtles to leave the area. In the case of Hawaii Kai, green turtles are one of the few larger vertebrate species to persist in the face of considerable environmental change. If what has occurred at Hawaii Kai provides a reasonable database we should not expect to see a decline in the green turtle population offshore of Mauna Lani with its further development.

Tour
Strike

change

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Swim spot
Hotel

Need Cat Long

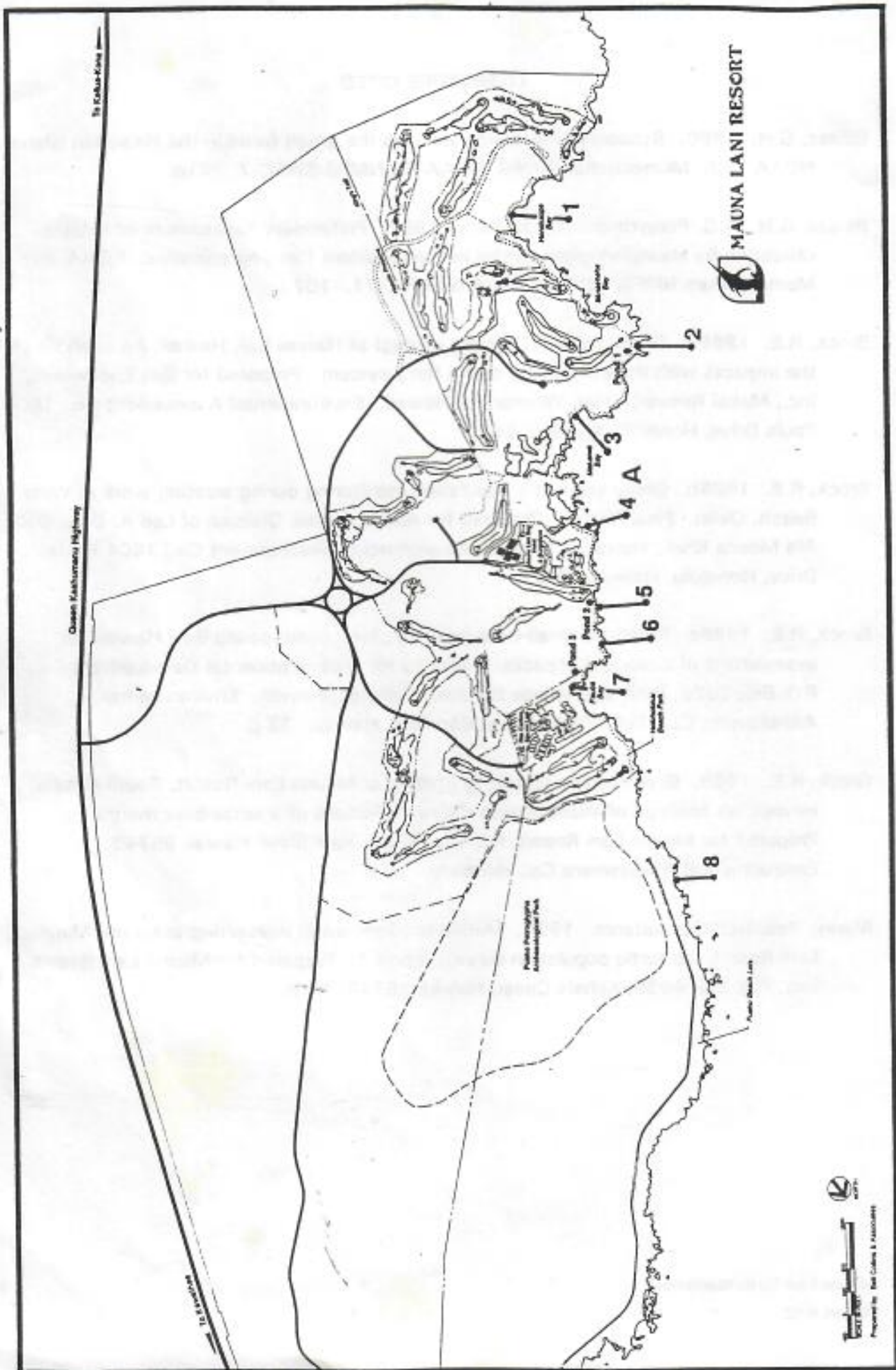


FIGURE 1. Map of the study area fronting the Mauna Lani Resort showing the approximate locations of the eight onshore-offshore transects along each of which three stations were established to carry out counts of turtles surfacing for air. "A" depicts the approximate location of popular dive site locally known as "Turtles" that was censused in this survey. Transects are not to

TABLE 1. Summary of the number and estimated sizes of green turtles encountered offshore of the Mauna Lani Resort study area on 14-15 November 1992 as censused by a single person at 24 sites from an anchored vessel.

Site	Observation Time (min)	Number of Turtles Censused & Size (cm)
1-A	20	
B	20	
C	20	
2-A	20	
B	20	
C	20	
3-A	20	
B	20	1 at 30cm
C	60	1 at 30cm, 1 at 40cm, 1 at 60cm
4-A	20	1 at 50cm
B	20	1 at 30cm, 2 at 40cm
C	20	
5-A	20	1 at 35cm
B	20	
C	20	
6-A	20	
B	20	
C	20	
7-A	20	
B	20	
C	20	
8-A	20	
B	20	1 at 40cm
C	20	
TOTALS	520 minutes	10 turtles

APPENDIX A. Summary of the number and percentage (in parentheses)

of green turtles observed in two resting sites (Puako and "Turtles") offshore of the Mauna Lani Resort and environs in underwater surveys by 10cm size classes (estimated straight line carapace lengths) from the 3 October 1989 survey (from Brock 1989).

Resting Location	Visibility (m)	Size Class (cm)	Number	Percentage
Puako	24	40-49	1	12.5
		50-59	5	62.5
		60-69	1	12.5
		70-79	1	12.5
		Total	8	
"Turtles"	20	50-59	8	80
		60-69	2	20
		Total	10	