Survey of Basking Green Turtles at Midway Atoll April 17-26, 2010

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Introduction

Midway Atoll (28° N, 177° W) measures 9 km in diameter with 234,876 hectares of submerged reef and has three coral islands (Eastern Island, Sand Island and Spit Island) totaling 626 hectares. Work done by Balazs et al, (2005) between 1975 and 2001 showed that there was a significant population of green turtles living at Midway Atoll. The main population was congregated around Sand Island with the inner harbor and the cargo and fuel piers acting as sleeping locations for juvenile, sub-adult and adult turtles (Rice & Balazs, 2000). In the 1970's and 1980's, most of the population was composed of juvenile turtles with a slow growth rate. By the late 1990's, the population structure had changed such that fully 40% of the animals were sub-adults or adults. (Balazs et al, 2005). There were several cases of fibropapilloma tumors observed in the 1990's, whereas no cases had been observed in the 1970's.

In April of 2010, we went to Midway Atoll in conjunction with the Oceanic Society expedition (http://www.oceanicsociety.org) to conduct a survey of the green turtles that bask on "Turtle Beach," Sand Island and to observe related behaviors within the waters adjacent to Sand Island and Eastern Island.

Methods

From April 17-26, Turtle Beach was visited frequently (usually every hour on the hour) during the daylight hours and occasionally during the early night hours. Photographs of the beach were taken and telephoto shots of the turtle's heads (mostly the right side because of the orientation of the turtles) were taken for future individual identification using head scale patterns. Observation of the turtles was limited to one end of the beach because of concern about disturbing turtles, sea birds and monk seals. When possible, isolated individual basking turtles were unobtrusively approached from behind and scanned for PIT (passive integrated transponder) tags and metal flipper tags and measured for straight carapace length (SCL).

Findings

The basking data (emergent times, numbers on the beach, identification of individuals, etc.) gave a snapshot of the behavior during the 9 days of observation. Prior to 0700 h there were usually very few turtles on the beach (Figure 1). The number of turtles basking increased through the morning reaching a peak between 1200 and 1400 h. The counts tapered off toward the evening hours. By 2100 h there were very few turtles on the beach. On one occasion we were able to confirm that one turtle (PIT tag # 4A7E3F173E) had remained out all night and into the next morning.

The sex ratio of basking turtles was 31% males, 36% female and 33% sub-adults and unknown. Combining adults (male and female) the total is 67%. While it cannot be assumed that the basking turtles are representative of the population as a whole, it is interesting to consider that the number of observed adult turtles seems to have increased from approximately 3% in the 1970s to 67% in 2010.

The largest number of basking turtles on Turtle Beach at one time from 4/17 to 4/26/2010 was 17. Past counts have been higher. Wayne Sentman (Oceanic Society Biologist) reported 20 basking turtles on May 9, 2010. A picture taken on October 24, 2009 by George Balazs shows 35 turtles basking on Turtle Beach (Figure 2).

Opportunities to read tags on quiescent basking turtles were intermittent. The number of turtles on the beach had to be small, they needed to be facing in a direction that would prevent them from observing the approaching investigator and they needed to be quiescent with their eyes closed. This situation occurred 25 times and Table 1 outlines the results of the 8 tag recoveries.

There were no fibropapilloma tumors observed on any basking turtles during the trip. This was particularly good news because of the presence of tumored animals discovered during our work from 1998 - 2001. It appears that the disease may have run a course similar to that in the population in Pala'au, Molokai, Hawaii where the disease has gone from a high of nearly 60% incidence rate in 1996 to 11% in 2010 (Chaloupka et al., 2009).

Figure 2 (background photo). October 24, 2009, 35 green turtles basking on Turtle Beach, Sand Island, Midway Atoll at 1530 hours. *Photo by George H. Balazs.*

Figure 1. Average number of turtles basking on Turtle Beach during each one hour interval between 0700 and 2100 h.

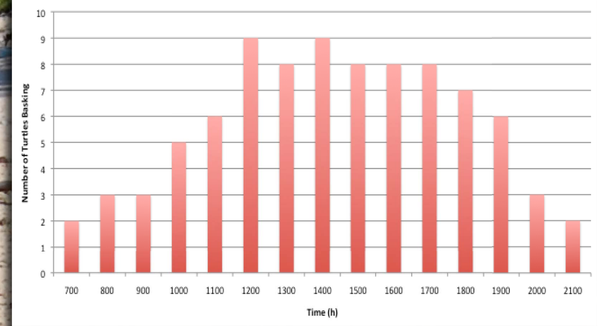

Table 1. Eight tag recoveries made at Turtle Beach, Midway Atoll between 4/18 and 4/23/2010. Tags were read by unobtrusively sneaking up behind basking turtles and reading the PIT tag and taking a straight carapace length measurement (SCL).

PIT Tag Numbers	Date First Capture	Location	SCL (CM)	Date Read	Location	SCL (CM)	Time between tag recapture	Growth cm/year	Remarks
4A7E3F173E 413611786C	6/3/77	Inner Harbor, Midway	90.1	4/18/10	Midway, Turtle Beach	~100	32.8 Years	0.3	Tagged in inner harbor by Koral Kings Dive Club, Midway Atoll
41363F315B 413E2D6650	11/13/01	Inner Harbor, Midway	83.1	4/18/10	Midway, Turtle Beach	88.7	8.4 years	.58	Captured by hand by HPA/NOAA team
50191B4D63 500E1B000C	11/13/01	Basking, East Island, FFS	58.4	4/19/10	Midway, Turtle Beach	80.4	8.4 years	2.29	Captured by hand by HPA/NOAA team
4135704F6D 4136356E27	6/14/94	East Island FFS	90	4/19/10	Midway, Turtle Beach	92.2	15.8 years	.14	Originally tagged while nesting on nesting at East Island on 6/14/94, FFS
4708405E22 470D087522	6/20/08	East Island FFS	89.2	4/19/10	Midway, Turtle Beach	89.2	1.8 years	0.0	Originally tagged while nesting on East Island, FFS (SCL=89.2cm)
4144330940	10/19/98	Sand Island, Midway cargo pier	83.5	4/21/10	Midway, Turtle Beach	84.9	11.5 years	.11	Captured by hand by HPA/NOAA team
4135747E3F 4136012807	11/15/00	Inner Harbor, Midway Tug Pier	61.9	4/23/10	Midway, Turtle Beach	89.4	9.4 years	2.62	Captured by hand by HPA/NOAA team
413B1B0E44	5/16/99	East Island, FFS	91.1	4/23/10	Midway, Turtle Beach	91.7	10.9 years	.05	Originally tagged while nesting at Tern on 5/16/99 (SCL=91.1cm)

Acknowledgements:

This project could not have been completed without the help of many people and organizations: Special thanks to the U. S. Fish and Wildlife Service personnel for their outstanding help and support, Dan and Doris Aeberli for their dedication and hard work in monitoring Turtle Beach, taking pictures and recording data, the Oceanic Society for sponsoring the trip and promoting interest in Midway Atoll sea turtles, Oceanic Society biologist Wayne Sentman for his expertise, experience and support.

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