In-water Surveys of Marine Turtles at Glover's Reef Marine Reserve, November 2008

Report compiled by:
Robin Coleman, Ph.D.
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PROJECT BACKGROUND:

In 2007, the Wildlife Conservation Society (WCS), in partnership with the Belize Fisheries Department, initiated a long term in-water sea turtle monitoring program at Glover's Reef Atoll, the first of its kind in Belize. The project focuses on building the capacity of stakeholders to collect accurate, reliable, and standardized data that decision makers can use to better understand the status and threats to sea turtles in Belize and make informed decisions regarding their conservation and management needs.

OBJECTIVES:

The main objectives of the in-water sea turtle monitoring program at Glover's Reef Atoll are to: (1) determine the relative population abundance and long-term population trends; (2) increase our knowledge of sea turtle movements and habitat use at Glover's Reef; (3) assess genetic stock of foraging sea turtles at Glover's Reef; and (4) study growth rates of sea turtles at Glover's Reef.

NOVEMBER 2008 IN-WATER SURVEYS

Surveys were conducted from 24th to 27th November, 2008. Previous surveys were conducted in April and September of 2007 and April and July of 2008. The survey team for November included three Glover's Reef Marine Reserve staff, six Wildlife Conservation Society staff, one South Water Caye Marine Reserve staff, one Toledo Institute for Development and Environment (TIDE) staff and one Hopkins Fisherman Association (HFA) representative (see list of team members at the end of the report).

Sea conditions during the November surveys were mainly choppy with relatively strong surface and underwater currents at times, however, there was good visibility for most of the surveys. Transect depths ranged from 3.0 m to 18.0 m.

The survey team conducted a total of 12 in-water surveys on the forereef areas of the atoll (Figure 1). Eleven sites had been previously surveyed and one new site (South of North East Point - M) was surveyed for the first time. Eleven of the surveys were approximately 60 minutes in length and one survey was discontinued after 45 minutes due to strong currents. A total of 11.65 hours of surveys were conducted. Survey lengths varied from 0.84 km to 1.79 km and a total of 15.83 km of in-water habitat were surveyed for sea turtles (Table 1).

Figure 1. Map of Glover's Reef Marine Reserve with transects (red lines) and sightings of sea turtles (Ei – hawksbill, Cm – green and Cc – loggerhead) during in-water surveys for period 24th – 27th November, 2008.

Table 1. In-water survey results for 12 surveys conducted at Glover's Reef Marine Reserve from 24th to 27th November, 2008. Abbreviations are the same as in Figure 1.

Date	Location	No. of snorkelers	Duration (min)	Survey Length (km)	Ei Sighted	Cc Sighted	Cm Sighted	Total Sighted	No. Captured
24-Nov-08	North of Fisherman Camp 1 (A)	8	61	0.85	4			4	2
24-Nov-08	South of Fisherman Camp 1 (B)	8	57	1.01	5		2	7	2
24-Nov-08	South of Fisherman Camp 2 (C)	8	60	1.22	10		1	11	2
25-Nov-08	North of South West Caye (H)	7	54	1.28	5			5	3
25-Nov-08	North of Middle Caye (I)	7	55	1.21	2			2	0
25-Nov-08	South of Long Caye (J)	7	61	1.73	7			7	5
25-Nov-08	North East Caye (K)	7	65	1.18	5			5	4
26-Nov-08	North of Baking Swash (D)	7	60	1.59	3		1	4	2
26-Nov-08	Baking Swash (E)	7	60	1.79	11			11	5
26-Nov-08	South of Fisherman's Cut (F)	7	60	1.6	1		1	2	1
27-Nov-08	South of North East Point (M)	7	61	1.53	6		2	8	3
27-Nov-08	West of NE Elbow (O)	7	45	0.84	2	1	1	4	2
Total			**699**	**15.83**	**61**	**1**	**8**	**70**	**31**

SEA TURTLE SIGHTINGS

A total of 70 turtles were sighted with an overall sighting rate of 6 turtles/survey hr. Sightings relative to survey length averaged 4.4 turtles/km. Of the 70 turtles sighted, 61 (87.1%) were hawksbills (*Eretmochelys imbricata*), 8 (11.4%) were green turtles *(Chelonia mydas)* and 1 was a loggerhead (*Caretta caretta*). The greatest number of turtles sighted occurred at Baking Swash (E) located on the west side of the atoll with 11 turtles sighted during the 1.79 km survey (Figure 1, Table 1).

SEA TURTLE CAPTURES

The in-water survey team captured by hand 31 of the 70 turtles sighted. Twenty-eight were hawksbills, two were greens and one was a loggerhead. This represents a capture rate of 0.44 or almost one turtle captured of every two turtles sighted. Turtles captured for the first time were measured, weighed and tagged. Recaptured turtles were remeasured and reweighed. Mean size for captured hawksbills was 39.1 cm minimum straight carapace length (SCL), (standard deviation (SD) = 8.4 cm, range = 26.4- 58.9 cm, n = 28); and for greens, was 37.5 cm SCL (SD = 5.4 cm , range = 33.6 to 41.3 cm, n = 2).. Genetic tissue samples were collected from all turtles except recaptured turtles. Methods for collecting biometric data are described in the field report for the April 2007 monitoring surveys.

SEA TURTLE RECAPTURES

Four hawksbill turtles tagged during previous surveys were recaptured during the November surveys (Table 2). The distance between the first sighting location and the November sighting location for the four recaptured turtles ranged from 95.3 m to 865.5 m (Table 2, Figure 2).

Table 2.: Distance comparisons between the sighting locations of four sea turtles recaptured during the November 2008 surveys and the first sighting locations for each sea turtle.

Species	Turtle ID	Recapture Date	Date First Captured	Distance between first sighting and November, 2008 sighting locations (m)
Ei	BZ 28 – BZ 29	25 Nov., 2008	26 Sept., 2007	624.5
Ei	BZ 1586 –BZ 1587	25 Nov., 2008	26 July, 2008	865.5
Ei	BZ 23 – BZ 24	26 Nov., 2008	26 Sept., 2007	264.6
Ei	BZ 34 – BZ 35	26 Nov., 2008	21 April, 2008	95.3

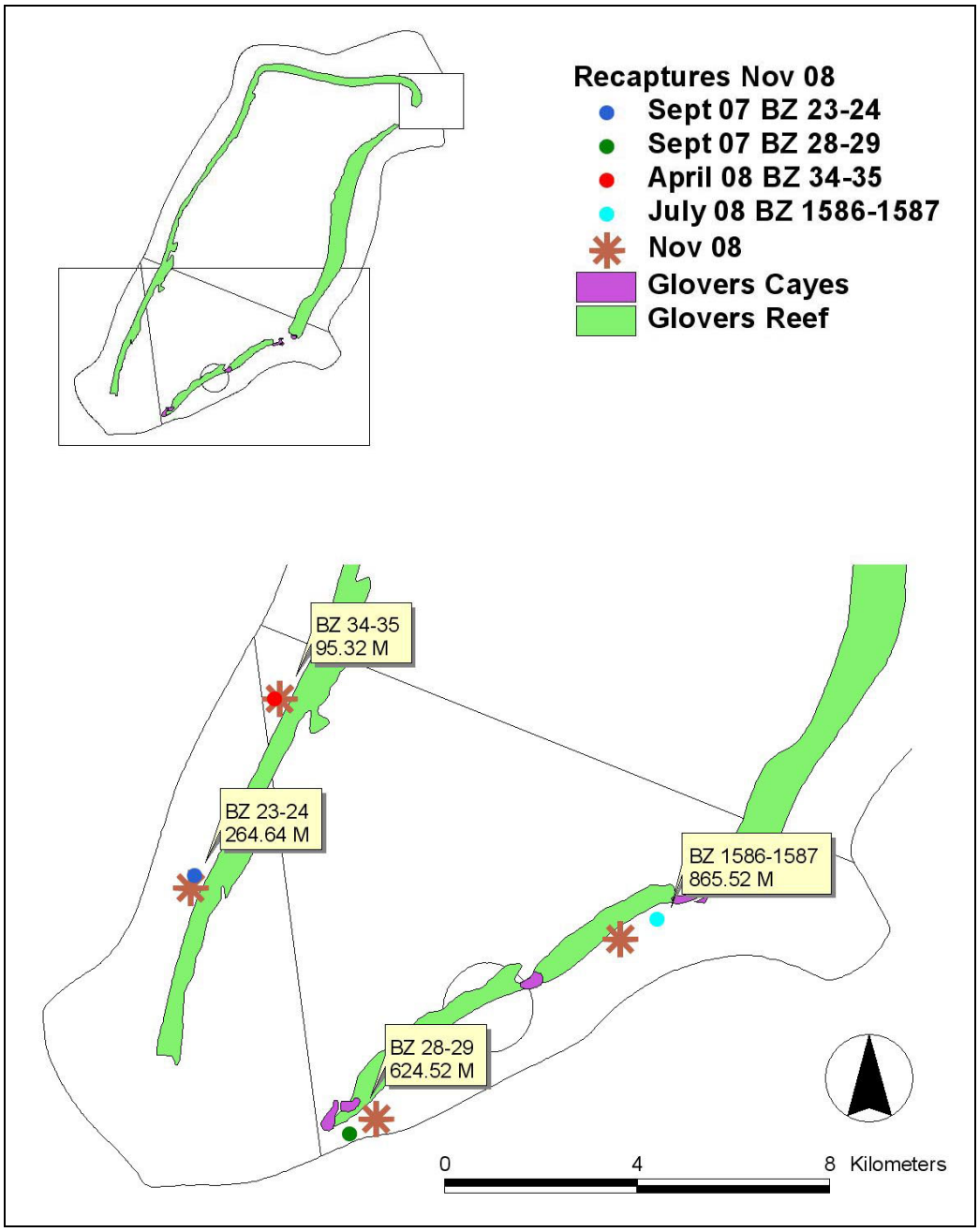


Figure 2: Sighting locations of four sea turtles recaptured during the November, 2008 surveys (brown stars) in relation to the first sighting location for each sea turtle.

INDEX OF SEA TURTLE RELATIVE ABUNDANCE

A summary of turtle sightings and effort at the five monitoring periods conducted thus far is shown in Table 3. Mean SPH is used as an indicator of relative turtle abundance for each monitoring period, and is based on the average of the number of sightings per survey person hours for each survey in a monitoring period. The highest mean SPH thus far, is for the November, 2008 monitoring period with a rate of 0.821. The highest capture per unit effort was also in November, 2008 (0.368).

Table 3: Turtle sightings for five monitoring periods at Glover's Reef Marine Reserve, including the sighting and capture rates effort for each period. (CI = 95% Confidence Interval, SD = Standard Deviation).

Monitoring Period	Total Turtle Sightings	Sightings / Hour Surveyed	Mean SPH (Sightings/Survey Person Hour)
22-26 Apr '07	38	3.30	0.518 (CI=0.194, SD=0.390)
24-27 Sept '07	26	2.48	0.304 (CI=0.158, SD=0.273)
21-15 April '08	49	3.84	0.554 (CI=2.279,SD=0.484)
26-31 July '08	54	4.03	0.512 (CI=0.123, SD=0.214)
24– 27 Nov, '08	70	5.96	0.821 (CI=0.253, SD=0.398)

TOTAL SIGHTINGS, CAPTURES AND RECAPTURES FOR FIVE SURVEY PERIODS FROM APRIL 2007 TO NOVEMBER 2008.

The total number of sea turtles sighted since the start of the in-water monitoring program in April 2007 is 237 sea turtles (Table 4). The majority of these sightings are hawksbills (85.2%). A total of 95 sea turtles were captured of which 82 (86.3%) were hawksbills. A total of six sea turtles have been recaptured to date, from which growth rate date data will be calculated.

Table 4: Summary of Sightings, Captures and Recaptures for the five monitoring periods: April, 2007 – November, 2008.

	Survey Period						
	Apr-07	**Sep-07**	**Apr-08**	**Jul-08**	**Nov-08**	**Total**	**Percentage of Total**
Sightings							
Hawksbills	29	23	41	48	61	**202**	85.2
Greens	2	3	3	4	8	**20**	8.4
Loggerheads	2	0	3	1	1	**7**	3.0
Unknown	5	0	2	1	0	**8**	3.4
Total	**38**	**26**	**49**	**54**	**70**	**237**	
Captures							
Hawksbills	8	10	19	17	28	**82**	86.3
Greens	1	2	1	2	2	**8**	8.4
Loggerheads	1	0	3	0	1	**5**	5.3
Total	**10**	**12**	**23**	**19**	**31**	**95**	
Recaptures							
Hawksbills	0	0	1	1	4	**6**	100.0
Greens	0	0	0	0	0	**0**	
Loggerheads	0	0	0	0	0	**0**	
Total	**0**	**0**	**1**	**1**	**4**	**6**	

DISCUSSION AND SUMMARY

The November 2008 surveys yielded the highest sighting and capture rates. This is the first time the surveys were done in November and therefore no comparisons can be made in relation to relative abundance during this season. Indeed, the high mean SPH in November may be due to a seasonal difference in the abundance of turtles. Several factors may bias SPH such as environmental conditions and the level of experience of the in-water snorkeling team. The high mean SPH in November compared to the mean SPH for previous monitoring periods may be due to any or a combination of these factors. The high mean SPH in November may be due in part to the level of experience of the in-water survey team, the majority of whom had participated in most or all of the four previous surveys and therefore were adept at sighting and capturing sea turtles. The use of mean SPH as an index of relative sea turtle abundance will therefore require long term standardized monitoring to avoid these types of biases.

Consistent with previous surveys, the majority of turtles sighted during the November surveys were juvenile hawksbills. The mean SCL for hawksbills captured in November 2008 (39.1 cm) was also similar to the mean SCL for hawksbills captured in April 2007 (39.9 cm), September 2007 (39.0 cm), April 2008 (41.9 cm) and July 2008 (40.4 cm), suggesting that juvenile hawksbills remain at the atoll throughout the year. Four juvenile hawksbills were captured during the November 2008 surveys that had been first sighted in surveys conducted in September, 2007 and April and July of 2008, suggesting that juvenile hawksbill may utilize the atoll for more than 14 months. Furthermore, the preliminary recapture data suggest that each juvenile hawksbill may reside in a particular area of the atoll and not travel long distances on the atoll. To better understand the movement patterns of sea turtles at Glover's, a pilot study was to be initiated during the November surveys. This pilot study involved attaching a coded acoustic transmitter to a hawksbill turtle and deploying receivers at various locations around the atoll to track the sea turtle's movements. The pilot study was not implemented, however, due to inclement weather conditions for the majority of the surveys.

The presence of green turtles during the November 2008 surveys (8 sightings)increased two fold from the July 2008 surveys during which 4 green turtles had been recorded. This increase in sightings may be due to seasonal differences. Only one loggerhead was recorded during the November 2008 surveys which is consistent with the low numbers seen in previous surveys.

NEXT STEPS

- In February, 2009, attach coded acoustic transmitter to a hawksbill sea turtle and deploy seven receivers in the forereef areas of GRMR.
- Complete the in-water protocol for the in-water monitoring study, including development of a schedule for the surveys.
- Develop sea turtle Access database; archive and manage turtle capture data in Access.
- Explore options for investigating sea turtle movement patterns in different habitats at GRMR such as sea grass flats and patch reefs within the lagoon.

NOVEMBER 2008 SEA TURTLE IN-WATER MONITORING TEAM

Belize Fisheries Department:
Glover's Reef Marine Reserve
Elias Cantun
Carlos Martinez
Luis Novelo
South Water Caye Marine Reserve
Samuel Novelo

Wildlife Conservation Society
Virginia Burns
Robin Coleman
Randolph Nunez
Faygon Villanueva
Alex Tilley
Danny Wesby

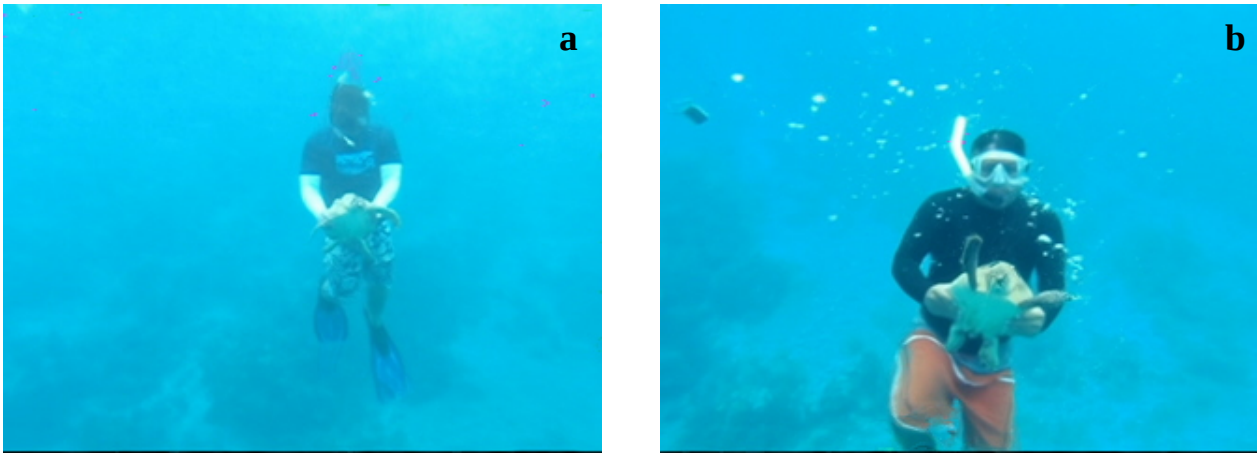
Hopkins Fisherman Association Representative
Mervyn Nunez

Toledo Institute for Development and Environment
Marlon Williams

PHOTOGRAPHS

Photo 1: Faygon Villanueva with juvenile hawksbill (*Eretmochelys imbricata*) captured during in-water surveys at GRMR. Photo: R. Coleman/WCS

Photo 2: Mervyn Nunez and Marlon Williams with loggerhead *(Caretta caretta)* captured during in-water surveys at GRMR. Photo: R. Coleman/WCS



Photos 3 (a) and (b): Faygon Villanueva (a) and Samuel Novelo (b) resurfacing with hawksbill (*Eretmochelys imbricata*) captured during in-water surveys at GRMR. Photos: R. Coleman/WCS

Photo 4: Elias Cantun and Alex Tilley measuring the plastron of a juvenile hawksbill (*Eretmochelys imbricata*) captured during in-water surveys at GRMR. Photo: R. Coleman/WCS