

Field report to  
Belize Marine Program, Wildlife Conservation Society

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

by

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### ***Principal Objective***

Conduct follow-up training, and in-water surveys and captures of marine turtles at Glover's Reef Marine Reserve (GRMR).

### ***In-water Surveys***

The in-water survey team was comprised of up to seven WCS staff, five Belize Fisheries staff, 14 Sail Caribbean volunteers, and one local fisherman (see Participants listed at end of report). Environmental conditions were relatively good for the July surveys which were conducted from 26-31 July 2008. New participants were trained in measuring, weighing, and collecting tissue samples, and for repeat participants methods presented in previous surveys were reinforced.

The survey team conducted a total of 14 in-water surveys (Table 1). The majority of surveys were 60 minutes in duration, with two surveys less than 60 minutes. A total of 13.4 hours of surveys were conducted, and varied from approximately 0.5 to 1.7 km in length for a total of 17.1 km of in-water habitat surveyed for sea turtles. The greatest number of turtle sightings in a single survey occurred at Rock Head on the west side of the atoll with seven turtles sighted during 1.1 km survey. During the surveys we sighted a total of 54 sea turtles (Figure 1), an overall sighting rate of 4.0 turtles/survey hour. Of these 54 turtles, 48 (88.9%) were hawksbills (*Eretmochelys imbricata*), 4 (7.4%) were green turtles (*Chelonia mydas*), 1 (1.8%) was a loggerhead (*Caretta caretta*), and 1 (1.8%) was not identified to species. The in-water survey team captured 20 of the 54 sightings, two of which were individuals tagged earlier in the same week. One of these "captures" was identified by a painted number on its shell but was not recaptured by hand. Of the 18 individuals captured, 16 were juvenile hawksbills and two were juvenile green turtles. This effort resulted in a capture rate of 0.37, about one turtle captured out of every three turtles sighted. Sightings relative to survey length averaged 3.16 turtles/km. No turtles tagged during previous surveys were recaptured; however, one turtle bearing tags was sighted, but not identified.

Turtles captured for the first time were measured, weighed, tagged, and a tissue sample extracted from the left rear flipper prior to release at the location sighted. Mean size for captured hawksbills was 40.4 cm minimum straight carapace length (SCL), SD= 7.4, range = 30.3-55.5 cm, n=16, and for greens was 29.7 cm SCL (SD= 1.8, range = 28.4-31.0 cm, n=2). All methods for collecting biometric data were the same as described in the field report for the April 2007 monitoring effort.

Table 1. In-water survey results for 14 surveys conducted at Glover's Reef Marine Reserve from 26 to 31 July 2008.

Date	Location	No. of snorkelers	Duration (min)	Survey Length (km)	Ei Sighted	Cc Sighted	Cm Sighted	Species Unk	Total Sighted	No. Captured
26-Jul-08	S of Long Cay	7	60	1.18	5				5	2
27-Jul-08	N of NE Caye	8	60	1.17	3			1	4	1
27-Jul-08	NE of Middle Cay	8	60	0.801	5				5	4
27-Jul-08	N of SW Caye	8	60	1.37	4				4	2
28-Jul-08	NE Elbow	8	60	1.60	3	1			4	2
28-Jul-08	NE Elbow west	8	60	1.30	3		1		4	1
28-Jul-08	N of Baking Swash	8	60	1.15	6				6	3
28-Jul-08	Baking Swash	8	60	1.38	2				2	0
29-Jul-08	Fisherman's Camp 1	8	60	1.10	3		1		4	2
29-Jul-08	Fisherman's Camp Area	8	60	1.57	1				1	0
29-Jul-08	S of Fisherman's Camp	8	30	0.52	2				2	0
30-Jul-08	Rock Head	8	55	1.10	7				7	0
30-Jul-08	Fisherman Cut	8	60	1.74	1		1		2	0
31-Jul-08	Fisherman Camp Area	8	60	1.13	3		1		4	3
Total			805	17.09	48	1	4	1	54	20

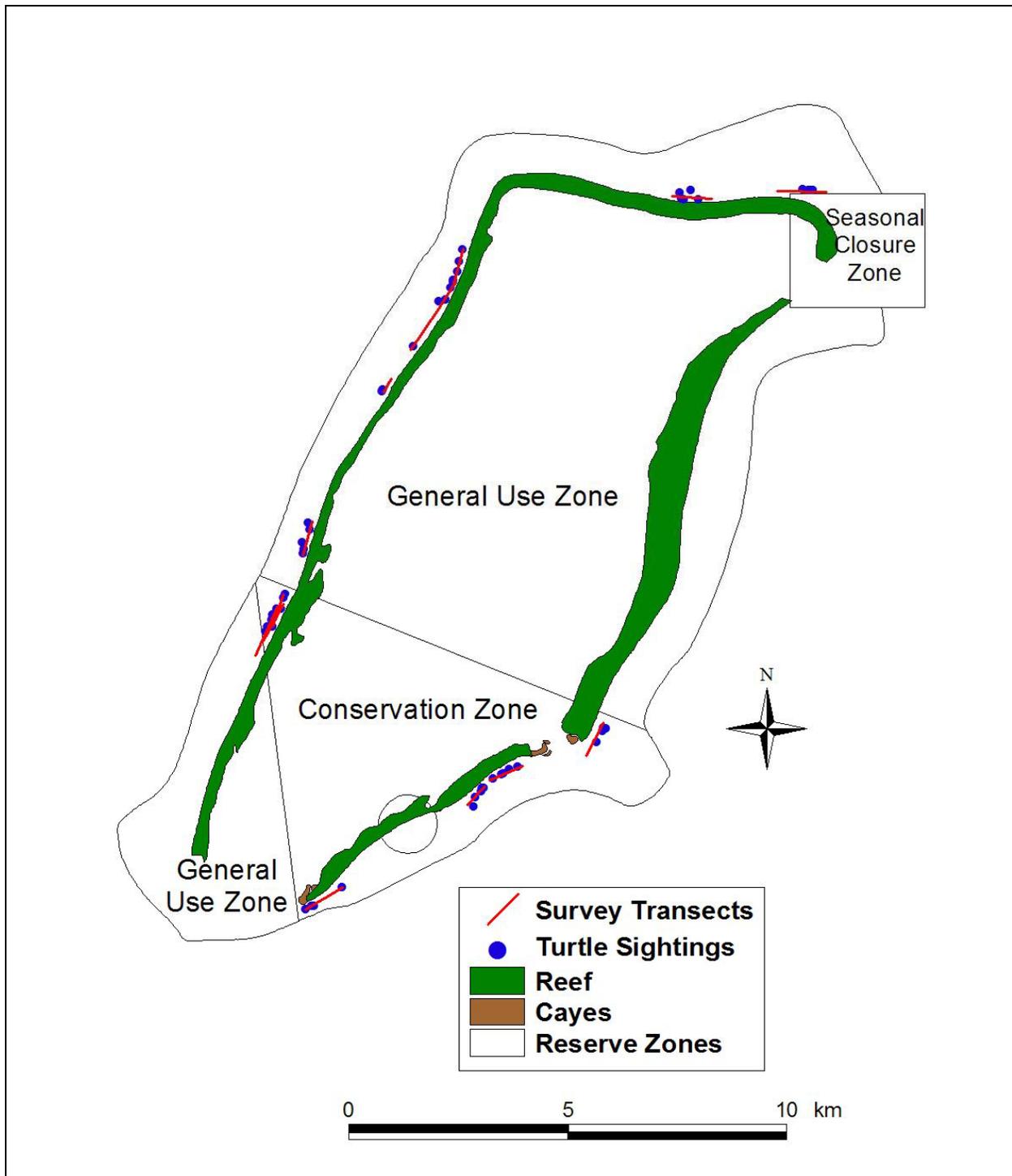


Figure 1. Map of Glover's Reef Marine Reserve with sightings of sea turtles (blue dots) and transects (red lines) surveyed during in-water monitoring period 26-31 July 2008.

A summary of turtle sightings and effort at the four monitoring periods conducted thus far is shown in Table 2. The best indicator of trends in turtle abundance is reflected in turtles sighted per duration of each survey in person hours (SPH), as this incorporates the effort of each survey and combines this effort into a single rate for each monitoring period. For each individual survey SPH is calculated as  $T_i/D_i$ , where  $T_i$  is number of turtles sighted and  $D_i$  is the duration in person hours. This allows us to calculate a mean, confidence intervals, and standard deviation for each monitoring period to better assess changes. The highest SPH thus far was during the April 2008 monitoring period; however, the highest CI and SD were also from this monitoring period, indicating greater variability among surveys within this period.

Table 2. Turtle sightings for each monitoring period at Glover's Reef Marine Reserve, including sightings and captures per unit effort for each. CI = 95% Confidence Interval, SD = Standard Deviation.

Monitoring Period	Total Turtle Sightings	Sightings / Hour Surveyed	Captures / Person-Survey Hour	Sightings / Survey Person-Hour (SPH)
22-26 Apr '07	38	3.30	0.156	0.518 (CI=0.194, SD=0.390)
24-27 Sept '07	26	2.48	0.157	0.304 (CI=0.158, SD=0.273)
21-15 April '08	49	3.84	0.228	0.554 (CI=0.279, SD=0.484)
26-31 July '08	54	4.03	0.188	0.512 (CI=0.123, SD=0.214)

### ***Beach Monitoring***

Thus far this season, evidence of sea turtle nesting activity was observed on Manta Caye and Northeast Caye. Part of the in-water team visited both sites to assess the potential nesting activity. We located the nest on Manta Caye, which had been laid (most likely by a hawksbill) in a pile of small rocks placed on the beach near the dock. Unfortunately, of 179 eggs only 4 hatched (and two of these were found dead inside the nest), the remaining 175 eggs rotted inside the nest cavity, most likely because it was too damp inside the nest chamber for proper incubation to occur. There were several sea turtle emergences on Northeast Caye. The disturbed areas were consistent with hawksbill nesting activity, and it's possible that all the disturbances were made by the same individual; however, after much searching we were unable to locate any eggs in any of the disturbed areas.

## *Discussion & Summary*

The July 2008 survey effort was very successful at both sightings and captures of marine turtles around the Glover's Reef Marine Reserve. When comparing to previous surveys, more turtles were sighted than in previous surveys, but fewer were captured than the April 2008 survey. The reduced capture rate is likely due to lower visibility, making it more difficult to capture turtles once sighted.

The presence and size distribution of hawksbill turtles captured in July 08 is consistent with previous surveys, and provides further evidence that they use the area throughout the year. While not abundant, regular sightings of small juvenile green turtles at Glover's may suggest their use of this mixed habitat is a necessary part of the small juvenile development stage. At least one loggerhead was in the area, although sightings were lower than in our previous two April surveys. This suggests that loggerheads continue to use the area during at least part of the summer, which coincides with loggerhead nesting in the area; however, their presence is likely decreasing during this later part of the nesting season.

In comparing the monitoring periods thus far, the increasing trend in sightings is not too surprising over this relatively short time period, as we would expect the core survey team to improve their sighting skills during these initial monitoring efforts. In the last two monitoring periods SPH was very similar and if field conditions remain similar, as well as the core survey team, we can expect that significant changes in SPH reflect changes in turtle abundance at GRMR. However, differences in field conditions (e.g., wind, turbidity, currents) and field staff experience will affect SPH, and hence actual changes in turtle abundance at GRMR will require several years of monitoring to elucidate using SPH as an index.

Overall, conditions were reasonably good during the July '08 monitoring period, however, we observed a considerable amount of garbage in the water around the atoll, particularly on the northern half of the east side. The extent of the garbage was so severe that we abandoned our plans to conduct a survey in that area because we felt it could be unsafe for the snorkellers. There was a great deal of plastic floating and submerged, as well as brown "liquid" on the surface in some areas. This is of grave concern for the fragile reef system at GRMR which will likely be severely impacted by this type of contamination.

The in-water monitoring project at GRMR provides the opportunity to gain valuable insight into sea turtle aggregations at the atoll, which would otherwise not be possible. For example, growth rates, habitat use, spatial and temporal distribution, and genetic stock assessment to determine the origin of turtles in the GRMR aggregation, among others, are all important for managing the recovery of sea turtles, and thus monitoring efforts should be continued at GRMR.

### ***Recommended Next Steps***

- Complete the in-water protocol for the in-water monitoring study, including development of a schedule for the in-water surveys.
- Archive and manage turtle capture data in Access. Collaborate with Fisheries Department to develop methods for in-water and beach monitoring, and standardize data management.
- Continue training Belize Fisheries Biologists and other appropriate institutions in sea turtle biology and handling methods at GRMR as deemed possible. Acquire training materials such as DVDs, books, etc to use and distribute as needed.
- Purchase PIT tags and Reader for use on sea turtles captured at GRMR to improve long-term identification of individuals. Implement tagging with PIT for all sea turtle captures at GRMR, including training of selected core staff to apply tags.
- Identify source of garbage and contaminants at GRMR and take appropriate steps to eliminate it. A clean up of the atoll may also be needed to clear the reefs of the plastics that have become lodged or entangled on the corals.

### ***Participants – In-water Monitoring***

#### **Belize Fisheries Department:**

Elias Cantun  
Roberto Carballo  
Godwin Humes  
Luis Novelo  
Samuel Novelo

#### **Local Divers**

Crispino Verde

#### **Wildlife Conservation Society**

Virginia Burns  
Cathi Campbell  
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Tyron Lambert  
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Danny Wesby

#### **Sail Caribbean Volunteers**

Adam Baske  
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Francesca Imgruth  
Marjori Liggett  
Roberta Liggett  
Emmelia Morahogios  
Nicholas Opinsky  
Edward Pierrepoint  
William Pierrepoint  
Alexandra Putnam  
Dillon Reilly  
Dale Wesby

*Photographs*



Photo 1: In-water survey in progress at GRMR. Photo by: C.L. Campbell/WCS.



Photo 2: Belize Fisheries Department staff (Luis Novelo and Samuel Novelo) marking juvenile hawksbill with temporary paint. Photo by: C.L. Campbell/WCS.



Photo 3: Samuel Novelo with juvenile hawksbill captured during in-water surveys at GRMR. Photo by: C.L. Campbell/WCS.



Photo 4: Releasing juvenile hawksbill captured at GRMR. Photo by: C.L. Campbell/WCS.