

Glover's Reef Marine Reserve

Fisheries Catch Data Collection Program



Report for the period January 2005 to June 2009

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Belize Marine Program
Wildlife Conservation Society
Belize City, Belize





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Executive Summary

One of the main economic activities of the Glover's Reef Atoll is fishing. The Glover's Reef Atoll Fisheries Catch Data Collection Program is a fishery-dependent monitoring program that involves sampling the catch from fishers: the species composition, the amount and size of fish products harvested from the Atoll's General Use Zone. The data are used to provide Catch per Unit Effort (CPUE) information which can be used to determine trends in landings and fishing pressure at the Atoll and gauge the effectiveness (e.g. spillover effects) of the marine reserve's 'no take' zones on fisheries production. Since the inception of the program, a total of 300 fishers have participated in the surveys. This report presents data collected for the period January 2005 to June 2009. Overall, the 2005-2009 Fisheries Catch Data results show that the average Catch Per unit Effort (CPUE) for lobster, conch and finfish for the 2008 – 2009 period were the lowest recorded since the program started in 2005.

Introduction

Glover's Reef Marine Reserve

The Glover's Reef Atoll (16°44'N, 87°48'W) is about 32 km long and 12 km wide with an area of 35,876 ha. The atoll lies approximately 45 km east of the Belizean mainland and 25 km to the east of the Belize Barrier Reef (Figure 1). The depth ranges from 300 to 400 m to the north and west of the atoll, while the east side drops to over 1000 m. There are three main channels that connect the ocean reef and lagoon habitats, with the latter containing approximately 850 patch reefs. The entire Glover's Reef Atoll was established as a Marine Protected Area in 1993 (Statutory Instrument 38 of 1993 under the Fisheries Act Chapter 210) and is managed by the Belize Fisheries Department. The Glover's Reef Marine Reserve includes five management zones: General Use Zone, Conservation Zone, Wilderness Zone, Seasonal Closure Zone and Spawning Aggregation Site (Figure 2).

Figure 1: Location of Glover's Reef Atoll

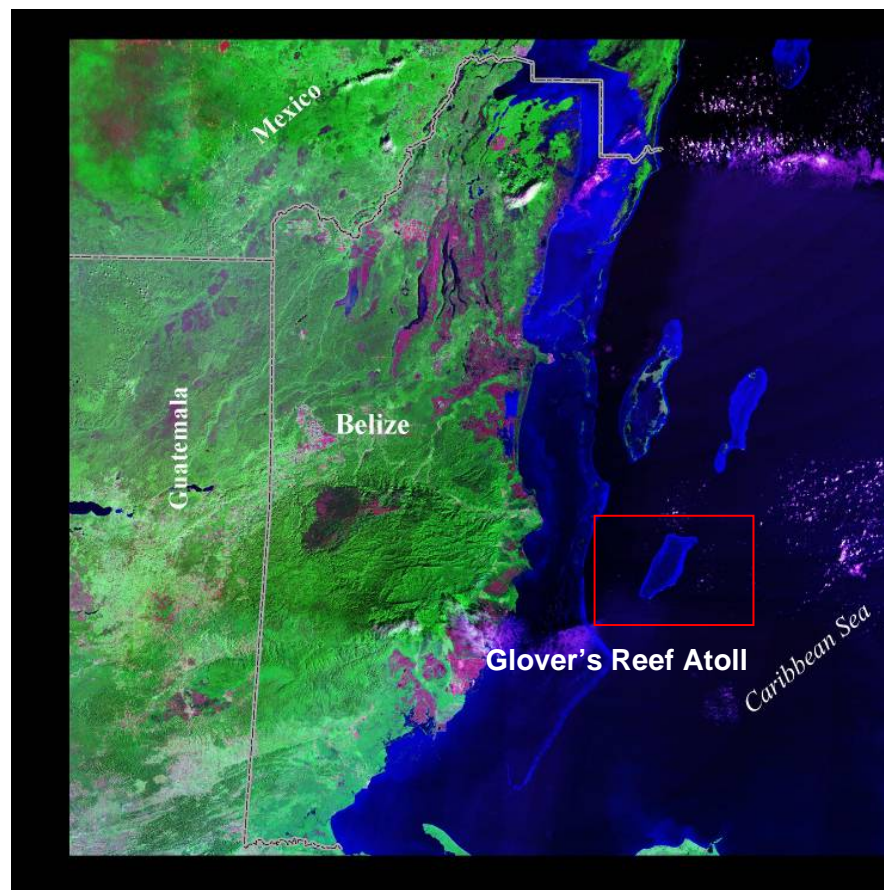


Figure 2: Glover's Reef Marine Reserve: Management Zones



The Glover's Reef Fisheries Data Collection Program

The Glover's Reef fisheries data collection program was developed by Sandra Grant, a consultant, hired by the Wildlife Conservation Society (WCS) and the Caribbean Regional Fisheries Mechanism (CRFM) Secretariat. The program was developed based on information gathered from a Glover's Reef Marine Reserve (GRMR) boat census in 2004 which looked at fishing patterns, gear use, landing patterns, number of boats and fishers utilizing the GRMR. The census showed that the majority of fishers originated from Sarteneja Village, Dangriga Town and Hopkins Village with a small number of fishers from Belize City.

The sampling program was divided into two sections to reflect the distinct fishing patterns and gear use of the fishers: (1) Skiffs operated by fishers from Hopkins Village and Dangriga Town and (2) Sailboats operated mainly by fishers from Sarteneja Village. Data collection from the skiffs is based on landings data gathered in Hopkins Village and Dangriga Town while data are collected at sea from the Sarteneja Village fishers. A pilot study was conducted in August 2004 and the program commenced in January 2005.

Methodology

The catch from fishers is sampled for the species composition, the amount and size of the product harvested, gear type used and fishing effort. Starting in March 2006, the location of where the catch was harvested was also recorded according to zones G1, G2 etc (Figure 3). Catch data are recorded for lobster, conch and finfish. For each fisher's catch, the name of the fisher, species caught, fishing gear and total fishing effort (hours fished) were recorded. The following were also recorded: for lobster - weight (g) and carapace length (mm); for conch - shell length (mm), shell width (mm), lip thickness (mm) and weight (g) at various stages of processing; and for finfish - fork or tail length size (cm) and weight (g).

DATA COLLECTION FROM SARTENEJA VILLAGE AND BELIZE CITY FISHERS

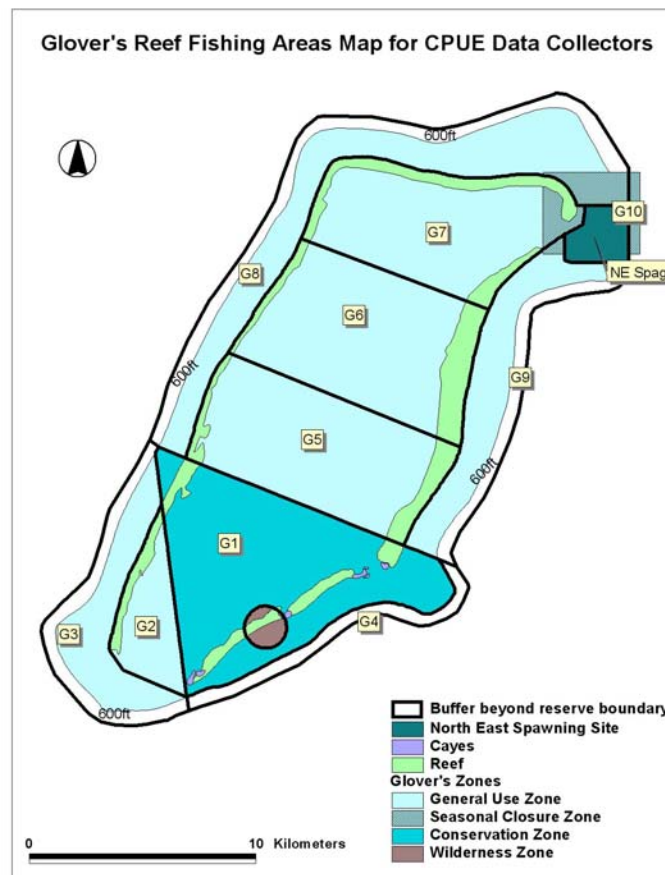
Sarteneja fishers use sailboats and spend approximately eight days per fishing trip at the Atoll. The sailboat "houses" approximately 5 to 8 fishers who use individual 'dories' to fish. Fishing intensity is seasonal ranging from eight sailboats that normally fish the Atoll to significantly more sailboats at the lobster and conch open seasons. Each month, the fisheries data collector samples approximately three sailboats which includes five or more fishers per sailboat. The sampling is done on three consecutive days per month and data may be collected from one to three days depending on the presence of Sarteneja sailboats. Sarteneja fishers tend to use a systematic route when fishing at the Atoll and they are sampled at these locations along this route. A fishing

day lasts approximately six to eight hours, commencing at approximately 8:00 a.m.. The fishers return to the sailboat at midday to put the catch on ice and to have lunch after which they continue to fish until about 4:00 p.m.. Catch data are collected normally starting at midday when the fishers return to the sailboat.

DATA COLLECTION FROM HOPKINS VILLAGE AND DANGRIGA TOWN FISHERS

Hopkins and Dangriga fishers use skiffs and spend approximately two to three days per fishing trip at the Atoll. Each skiff carries about 4 fishers who primarily harvest conch and pelagic fish species. The data collector would sample opportunistically from the skiffs once they return to the mainland on a monthly basis.

Figure 3: Glovers Reef Fishing Areas Map



Results

CONCH

A total of 230 fishers provided catch data for conch since the program started in 2005. During the 2007 Conch Open Season, the highest number of fishers and boats were sampled: 110 and 18, respectively, over 52 days of sampling (Table 1).

Table 1: Fisheries Catch Data Sampling Effort at Glover’s Reef Marine Reserve for the 2005 to 2009 Conch Open Season

Conch Open Season 1 October to 30 June	Number of Days Sampled	Number of Fishers Sampled	Number of Boats Sampled
2005 Season Jan 2005 to June 2005	29	38	10
2006 Season Oct 2005 to June 2005	94	72	16
2007 Season Oct 2006 to June 2007	52	110	18
2008 Season Oct 2007 to June 2008	42	95	14
2009 Season Oct 2008 to June 2009	16	54	7

The CPUE results for conch showed that the lowest average CPUE recorded was 3 conch/hour/fisher during the 2009 conch open season (1 October 2008 to 30 June 2009). This represents a decline of 50% of the highest average CPUE which were recorded during the 2005 and 2007 conch open seasons (Figure 4).

When broken down according to the origin of fishers, the results show that the Sarteneja Villagers/ Belize City fishers tend to have a higher CPUE than the Hopkins Village/Dangriga Town fishers (Figure 5) with the highest average CPUE of 11 conch/hour/fisher recorded in 2006. In 2009, however, the Sarteneja Villagers/Belize City fishers recorded their lowest average CPUE of 3 conch/hour/fisher. The Hopkins Village/Dangriga Town fishers showed an increase in average CPUE in 2008 compared to previous seasons (Figure 5).

Figure 4: Average number of conch per hour per fisher caught at Glover's Reef Marine Reserve for the 2005 to 2009 Conch Open Seasons (1 October to 30 June)

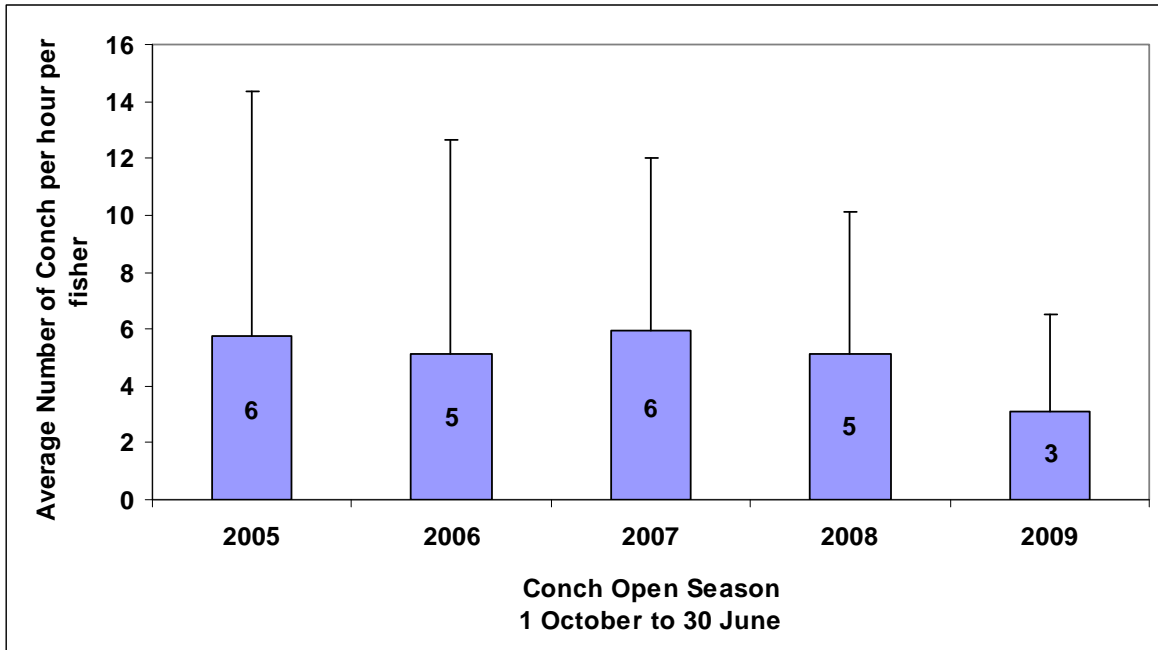
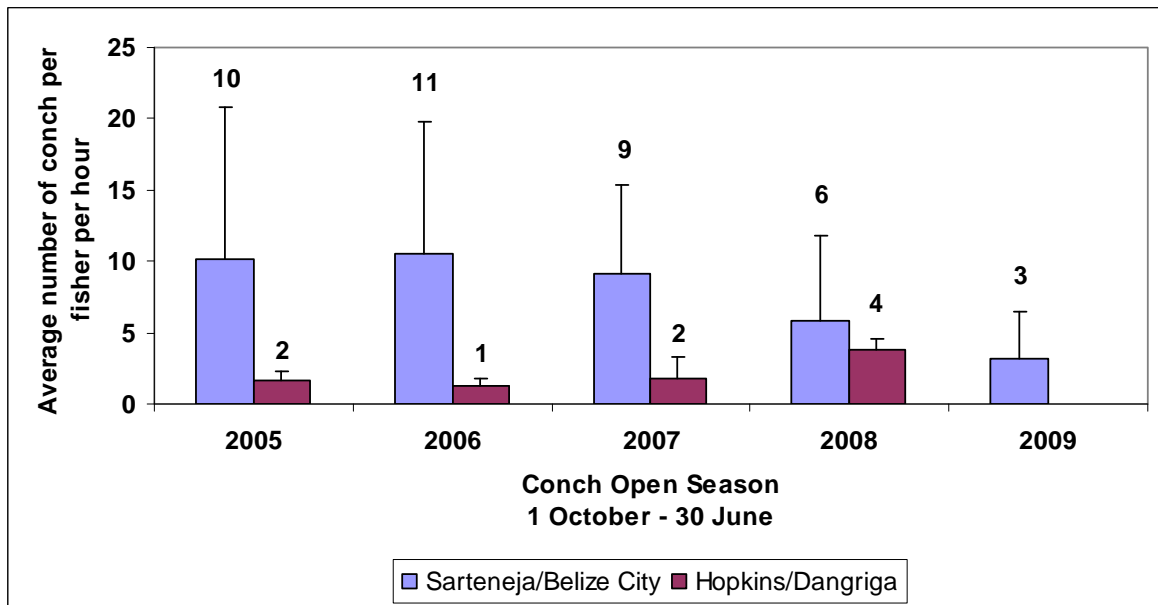


Figure 5: Average number of conch per hour per fisher (Sarteneja Village/Belize City versus Hopkins Village/Dangriga Town) caught at Glover's Reef Marine Reserve for the 2005 to 2009 Conch Open Seasons (1 October to 30 June).



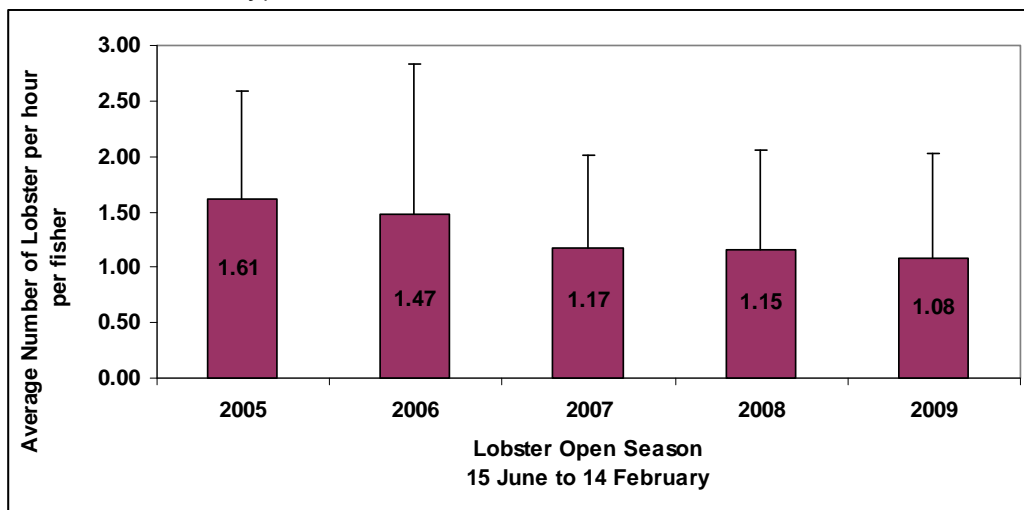
LOBSTER

A total of 74 fishers and 9 sailboats were sampled during the 2008 Lobster Open Season (15 June 2007 to 14 February 2008), the highest numbers recorded since 2005 (Table 2). The average CPUE (average number of lobsters/hour/fisher) for lobster decreased steadily every lobster open season from 1.6 lobsters/hour/fisher during the 2005 lobster season to 1.08 lobsters/hour/person during the 2009 lobster season (Figure 6).

Table 2: Fisheries Catch Data Sampling Effort at Glover’s Reef Marine Reserve for the 2005 to 2009 Lobster Open Seasons

Lobster Season	Number of Days Sampled	Number of Fishers Sampled	Number of Boats Sampled
2005 Season Jan 2005 to 14 Feb 2005	6	Names not recorded	4
2006 Season 15 June 2005 to 14 Feb 2006	16	53	8
2007 Season 15 June 2006 to 14 Feb 2007	13	45	7
2008 Season 15 June 2007 to 14 Feb 2008	23	74	9
2009 Season 15 June 2008 to 14 Feb 2009	20	64	7

Figure 6: Average number of lobster per hour per fisher caught at Glover’s Reef Marine Reserve for the 2005 to 2009 Lobster Open Seasons (15 June to 14 February)



The population size class structure of spiny lobster (*Panulirus argus*) showed that during the 2005 to 2006 lobster open seasons, 29% and 21% of the lobsters sampled were greater than 120 mm CI (carapace length) (Figure 7a). However, for the 2007 to 2009 lobster seasons, only 4%, 7% and 5% of the lobsters sampled were greater than 120 mm CI (Figure 7b).

Figure 7a: Population Size Class Structure of Spiny lobster (*Panulirus argus*) for the 2005 and 2006 Lobster Open Seasons

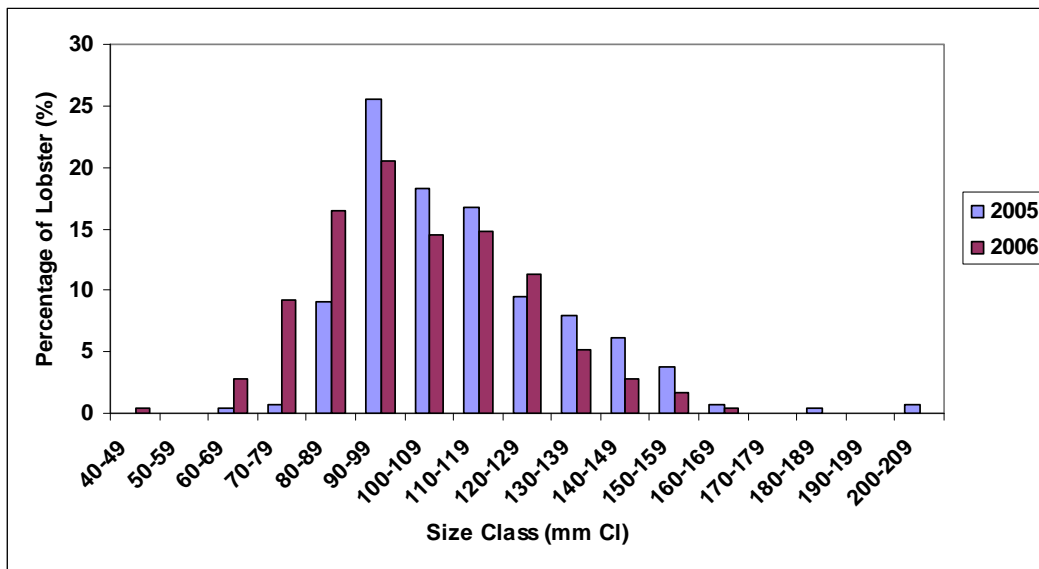
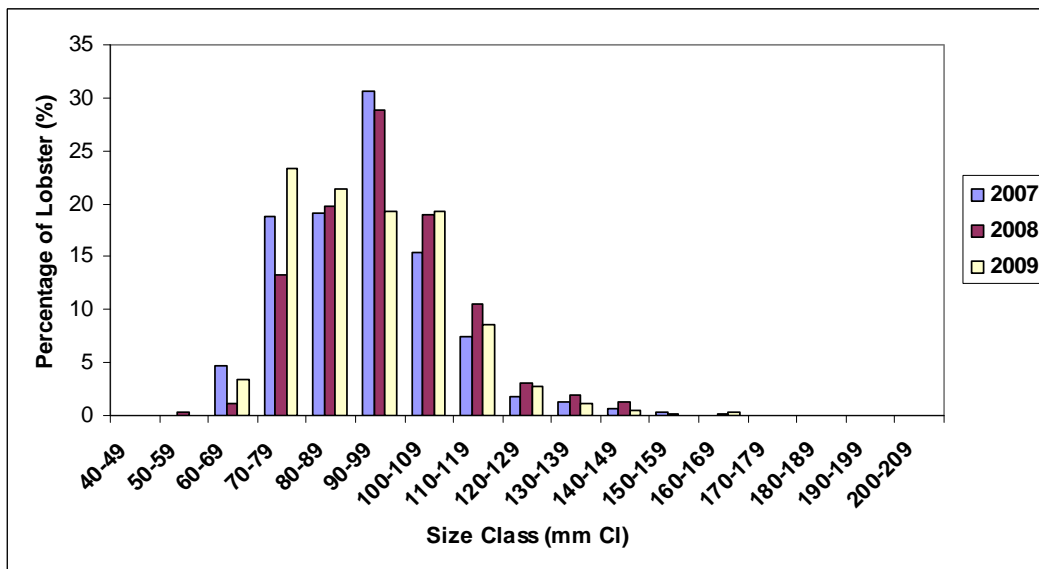


Figure 7b: Population Size Class Structure of Spiny lobster (*Panulirus argus*) for the 2007 to 2009 Lobster Open Seasons



FINFISH

The number of Sarteneja/Belize City fishers sampled ranged from 21 fishers in 2005 to 45 fishers in 2008 (Table 3). For the Hopkins/Dangriga fishers, 14 fishers were sampled in 2005 and 17 fishers in 2008 (Table 4).

Table 3: Fisheries Catch Data Sampling Effort for Sarteneja Villagers/Belize City Fishers at Glover’s Reef Marine Reserve for the period 2005 to 2008

Year	Number of Days Sampled	Number of Fishers Sampled	Number of Boats Sampled
2005 Jan 2005 to Dec 2005	14	21	8
2006 Jan 2006 to Dec 2006	21	30	8
2007 Jan 2007 to Dec 2007	16	30	10
2008 Jan 2008 to Dec 2008	23	45	9

Table 4: Fisheries Catch Data Sampling Effort for Hopkins Village/Dangriga Town Fishers at Glover’s Reef Marine Reserve for the period 2005 to 2008

Year	Number of Days Sampled	Number of Fishers Sampled	Number of Different Boats Sampled
2005 Jan 2005 to Dec 2005	56	14	6
2008 Jan 2008 to Dec 2008	17	17	5

The finfish results for the Sarteneja/Belize City fishers showed that since 2005, a total of 54 fish species have been sampled from the Atoll. The results also show that for the period 2005 to 2008, the parrotfishes were the most frequently sampled species at Glover’s Reef, however, in 2008, the parrotfishes were the third most frequently sampled species at Glover’s Reef after the Hogfishes and the Snappers (Table 5).

Table 5: Species Types Sampled from Sarteneja Villagers/Belize City Fishers at Glover's Reef Marine Reserve (January 2005 – December 2008)

Species Type	2005	2006	2007	2008	Total Finfish Sampled
Parrotfish	197	63	25	68	353
Snapper	32	111	42	72	257
Hogfish	36	59	72	76	243
Grouper	12	73	28	31	144
Angelfish	23	22	5	4	54
Triggerfish	15	6	7	7	35
Porgy	1	6	4	17	28
Barracuda	2	4	1	16	23
Jack	2	9	3	4	18
Grunt	2	3	1	5	11
Mojarra	0	4	1	1	6
Filefish	0	1	0	2	3
Mackerel	0	1	1	0	2
Shark	0	0	2	0	2
Goatfish	0	1	0	0	1
Undetermined	1	1		20	22
Total Finfish Sampled	323	364	192	323	1202

The results for the Hopkins/Dangriga Town fishers showed that the snappers, barracuda and mackerels were the most frequently sampled species types at Glover's Reef, with the yellow-eye snapper, the red snapper and the barracuda being the most frequently sampled species (Table 6).

Table 6: Species Types Sampled from Hopkins Village/Dangriga Town Fishers at Glover's Reef Marine Reserve (January 2005 – December 2008)

Species Type	2005	2008	Total Finfish Sampled
Snapper			
Yellow-Eye Snapper	120	387	507
Red Snapper	0	409	409
Blackfin Snapper	129	0	129
Mutton Snapper	44	31	75
Yellow Tail Snapper	39	0	39
Schoolmaster	6	0	6
Silk Snapper	5	0	5
Barracuda			
Barracuda	273	89	362
Mackerel			
Kingfish	59	37	96

The average CPUE for finfish showed a decline from 2.2 finfish caught/hour/person in 2005 to 0.8 finfish in 2008 for fishers from Sarteneja/Belize City; however, the average CPUE for the Hopkins/Dangriga fishers showed an increase from 0.6 finfish/hour/fisher in 2005 to 2.2 in 2008. The average weight (g) CPUE for finfish showed a decline for both groups of fishers from 2005 to 2008 (Figure 9).

Figure 8: Average number of finfish per hour per fisher caught at Glover’s Reef Marine Reserve for the period 2005 to 2009

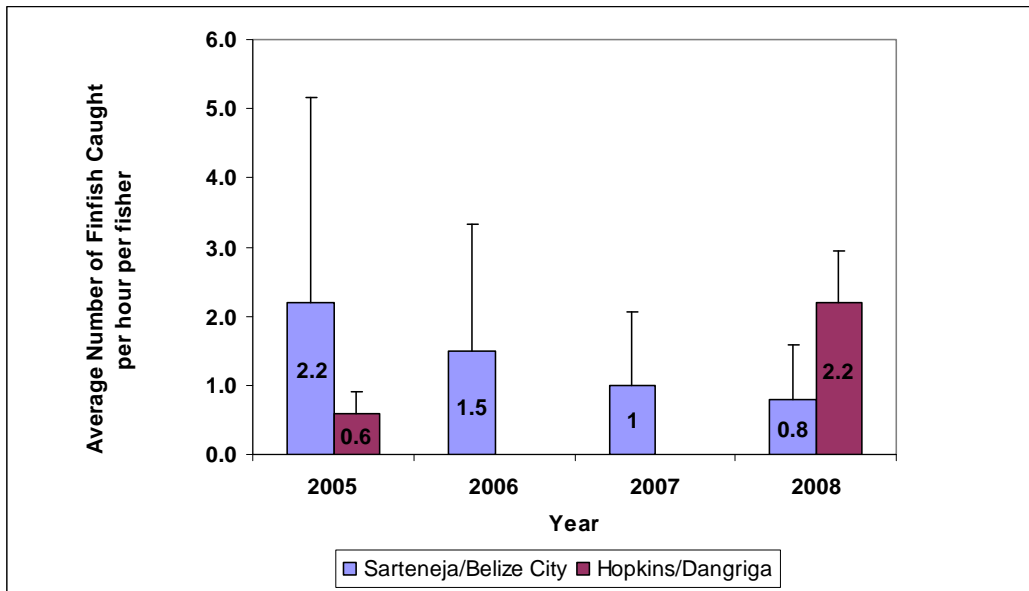
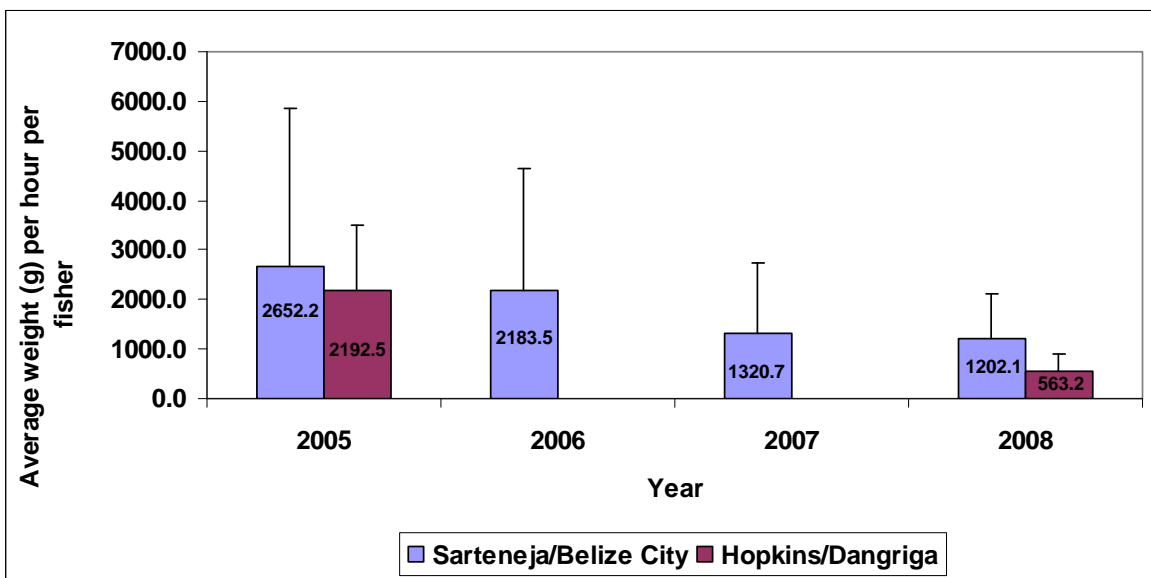


Figure 9: Average weight (g) of finfish per hour per fisher caught at Glover’s Reef Marine Reserve for the period 2005 to 2009



Summary and Conclusions

The 2008-2009 Fisheries Catch Data Results show that the average Catch Per unit Effort (CPUE) for lobster, conch and finfish were the lowest recorded since the program started in 2005. The conch results showed that the lowest average CPUE was 3 conch/hour/fisher during the 2009 conch open season (1 October 2008 to 30 June 2009). This represents a decline of 50% of the highest average CPUE recorded during the 2007 conch season (1 October 2006 to 30 June 2007).

The average CPUE (average number of lobsters/hour/fisher) for lobster decreased steadily every lobster open season (15 June to 14 February) from 1.6 lobsters/hour/fisher during the 2005 lobster season to 1.08 lobsters/hour/fisher during the 2009 lobster season.

The Sarteneja Village and Belize City finfish results showed a similar decreasing trend in the average CPUE since 2005. The average CPUE decreased from 2.2 finfish/hour/fisher in 2005 to 0.8 finfish/hour/fisher in 2008. Similarly the average CPUE by weight (g) decreased from 2652.2 g/hour/person in 2005 to 1202.1 g/hour/person in 2008. While the 2005 and 2008 average CPUE by number of finfish for the Hopkins Village and Dangriga Town showed that there was an increase from 0.6 finfish/hour/person to 2.2 finfish/hour/person, the average CPUE by weight (g) of finfish decreased from 2192.5 g/hour/person in 2005 to 563.2 g/hour/person in 2008. For the Sarteneja Village and Belize City fishers, the parrotfish has been the most sampled finfish group at Glover's. In 2008, the parrotfishes were the third most frequently sampled species at Glover's after the Hogfish (Wrasses) and the Snappers. For the Hopkins Village and Dangriga Fishers, the most sampled finfish was the yellow-eye snapper. In 2008, the red snapper was the most sampled finfish followed by the yellow eye snapper and the barracuda.

Literature Cited

Wildtracks/WCS, 2007. Management Plan: Glover's Reef Marine Reserve – World Heritage Site, 2008 – 2013.