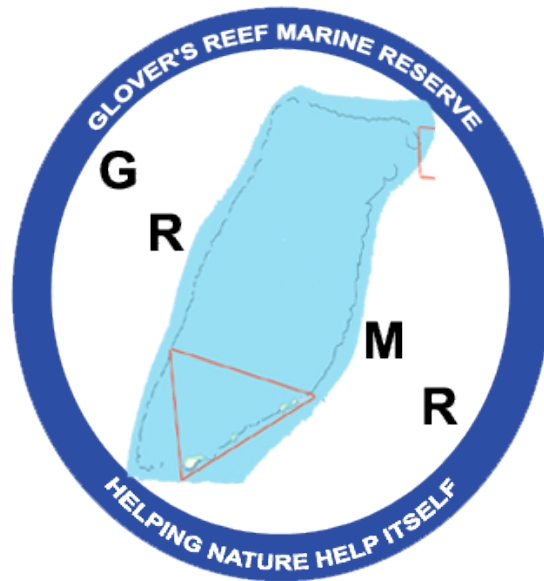


Glovers Reef Marine Reserve



2006 Yearly Report

Submitted to: Mr. Isaias Majil, *MPA Coordinator*
Prepared by: Roberto Carballo, *Reserve Manager*
Elias Cantun, *Reserve Biologist*

Table of Content

	<i>Page number</i>
1. Introduction	
1.1 Glover's Reef	3
1.2 Reserve boundaries and zones	3-4
1.3 Rules and regulations	4
2. Enforcement	
2.1 Patrols	5-9
2.2 Warnings and Arrest	9-11
3. Monitoring	
3.1 Nassau Grouper Aggregation	11-13
3.2 Lobster Survey	14-19
3.3 Juvenile Lobster Trap Collectors	20-22
3.4 MBRS Coral and Adult fish Surveys	22
3.5 LAMP Survey	23-25
3.6 Marker Buoys	26
3.7 Turtle Monitoring	26
4. Infrastructure & Equipments	
4.1 Equipments	26-27
4.2 Building Facilities	27
5. Fuel Consumption	27-28
6. Staff Training	28
7. Tourism Visitation	28-29
8. Work Plan	29-30
9. Conclusion	30

1.0 INTRODUCTION

1.1 Glover's Reef

Glover's Reef is uniquely positioned deep within Belize's territorial waters, and it is recognized by many to be a spectacle of the Caribbean. In fact, Glover's as it is frequently referred to, according to Dahl et al. (1974), is said to be, "the prototypic atoll of the Caribbean, which is not only the best developed biologically, but also possesses the greatest diversity of reef types."

Formed almost seven million years ago by faulting offshore resulting in submarine escarpments, Glover's Reef is Belize's best formed coral atoll structure, with an approximate area of 260 km² and dimensions of 32 km long and 12 km wide. In addition, it is the southernmost of Belize's three offshore atolls and is about 75 km southeast of Belize City, and 45 km east, from the mainland.

Historically, because of its geographical location, Glover's Reef was once an important trading post for the indigenous Mayas of Meso-America, more than 900 years ago.

However, in more recent times, the atoll once served as a refuge for British buccaneers.

As a matter of fact, the name Glover's is derived from the famous British pirate, John Grovers. Nowadays, Glover's Reef is renowned, and acclaims international recognition, for its majestic cayes, vibrant marine flora & fauna, and of course, its unique reef structure, which is rugged, and resembles a mountain like precipice, of "spectacular walls and coral canyons." But above all else, the area is treasured for its geological & scientific attributes.

It was a result of the latter, that in 1993, Glover's Reef was officially designated as a marine reserve. According to (Munnings et al. 2002), the reserve was established by the government to maintain the ecological process, to preserve the genetic diversity, to maintain natural areas for educational and research, to provide social and economic benefits through ecologically sensitive recreation and tourism, and to achieve sustainable use of its resources through wise management of the species and their habitats. To date, Glover's Reef is the third largest marine protected area in Belize and is managed by the Belize Fisheries Department.

1.2 Reserve boundaries and zones.

The atoll is divided into four zones.

1. The General Use Zone is approximately 261 km², and allows for extractive activities. These include commercial fishing within the context of Belize Fisheries Regulations, however, no traps, long line, or nets are permitted.
2. The Conservation Zone is about 70 km², encompassing all cayes of the atoll. This area is designated as a non extractive activity zone, with the intention to protect a representative sample of the atoll's habitats. To provide an area for recreational activities, and provide a relatively undisturbed area for applied research.

3. The Wilderness Zone is located at the southern tip of Middle Caye and only scientific activity is permitted.
4. The Special Protected Zone is a bank located at the northern point of the atoll where the spawning aggregation of Nassau grouper is monitored. The bank is closed all year to fishing.

Visitors can differentiate the different zones by large cylindrical buoys deployed around the Conservation Zone.

1.3 Rules & regulations

The reserve staff has a mandate to enforce all fisheries regulations including those of all marine reserve.

The Fisheries regulations states that all persons engaged in commercial fishing [must be in possession of a valid fisher folk license, and all fishing vessel must also be licensed.](#) Reserve officers also checked for the possession of marine products in closed season and compliance with size limits.

In addition, reserve staff [has the power to arrest anyone found in violation of these regulations, and such persons shall be charged and prosecuted in a court of law.](#)

The rules of the reserve are as follows:

1. All visitors must check in with the reserve staff upon entering the reserve.
2. There is a park fee set in place for foreign visitors. The fee is \$10.00 per person/day, and \$30.00 per person/week.
3. The sport fishing fee is \$25.00 per person/week and only catch and release sport fishing is allowed.
4. Boat should avoid anchoring by using mooring buoys where they are available.
5. All boat operators must display the “diver’s down” flag when diving.

2.0 ENFORCEMENT

2.1 Patrols

Enforcement plays a very vital role in the survival of the species and proper management of the marine reserve. For that reason enforcement remains as one of the most important aspects of marine conservation within a marine reserve. Regular patrols and checks of fishermen catch helps reduce illegal fishing and preserve the livelihood of our marine resources at Glovers. Without enforcement fishers would have no fear to take marine creatures illegally.

At Glovers there is a no take zone which serves to protect marine species in order for them to reach maturity and reproduce thus maintaining the area with a relevant number of individuals. Glovers as we know is a relatively large reserve and with the given tools it is impossible to patrol the entire area on a daily basis. Thus more effort is placed on the conservation zone. Daily patrols are done in this area and boats within the immediate surroundings are checked.

Most of the fishermen that fish within Glovers are sailboat fishermen who are engaged in spare fishing and diving for conch and lobsters, a good number of these guys come all the way from Sarteneja, Belize City, Cayo and Orange Walk. We also get fishermen from Dangriga and Hopkins these guys don't use sailboat they use skiff and most of them are engaged in hand line fishing for fish. The fishermen from the sailboats usually stay out at sea for 7 days before they go back into the mainland to deliver their products and those from Hopkins and Dangriga usually spend 4 days.

Enforcement activities tries to ensure that no illegal harvesting of any marine species occurs and thus ensuring the sustainable harvesting of our marine resources. In the tables below are the lists of boats and fishermen that visited the atoll for the year of 2006.

Table 1. Fishing Vessel seen at Glovers for the month of January.

Boat Name	Captain's Name	Number of Crew
Diara 1	Mr. Samosa	5
Maurita	Mateo Rivero	7
Ubafu	Mr. Juan	12
Princess	Leobihildo Tamai	8
Adinely	*	5
La Bonita	Taulfo Rivero	6
Viva	Oscar Mena	6
Tormento	Francisco Lopez	4
Nashy	Wilfred Coleman	3

Table 2. Fishing Vessels encountered in the month of February.

Boat Name	Captain's Name	Number of Crew
-----------	----------------	----------------

Tormento	Francisco Lopez	4
Ubafu	Juan Manuel	11
Serena	Mr. Rivero	3
Marisol	Carlos Parham	3
Maurita	Emilio Rivero	9

Table 3. Fishing Vessels encountered in the month of March.

Boat Name	Captain's Name	Number of Crew
Alice	Nowel Nunez	2
Ubafu	Juan Manuel	11
Maurita	Mateo Rivero	7
Princess	Mr. Tamai	7

Table 4. Fishing Vessels encountered in the month of April

Boat Name	Captain's Name	Number of Crew
Adinely	*	5
Ubafu	Juan Munoz	9
Princess	Leobihildo Tami	7

Table 5. Fishing Vessels encountered in the month of May.

Boat Name	Captain's Name	Number of Crew
Sandinoe	Alberto Palmero	9
Tu y yo	*	7
Princess	Leobihildo Tami	7
Big Blue	*	3
*	Mr. Galves	3

Table 6. Fishing Vessels encountered in the month of June

Boat Name	Captain's Name	Number of Crew
Sandinoe	Alberto Palmero	9
Tu y yo	Havier Garcia	7
Princess	Leobihildo Tami	7
Tormento	Francisco Lopez	5
Vision	Hernando Rivero Jr.	13
Viva	Oscar Mena	6
La Bonita	Taulfo Rivero	6
Ubafu	Juan Manuel	11
Adinely	*	7
Murder	Wilfred Coleman	3
Miss Southwest	Arthur Milton	4

Table 7. Fishing Vessels encountered in the month of July

Name of vessel	Captain's Name	Number of crew
Tormento	Francisco Lopez	5
Princess	Leobihildo Tamai	8
La Bonita	Taulfo Rivero	7
Ubafu	Juan Munoz	11
Vision	Hernando Rivero Jr.	13
Viva	Oscar Mena	8
Diara 1	Samosa	5
Chico	Alfonso Nunez	3
Tulin	Lino Palmero	9
Sandinoe 1	Alberto Palmero	9
Sandinoe 2	Javier Garcia	7
*	Mayo (Nickname)	2

Table 8. Fishing Vessels encountered in the month of August

Name of vessel	Captain's name	Number of crew
La Bonita	Taulfo Rivero	7
Vision	Hernando Rivero Jr.	11
Viva	Oscar Mena	8
Lynette	Albert Miranda	4
Princess	Leobihildo Tamai	7
Tormento	Basilio Lopez	5

Table 9. Fishing Vessels encountered in the month of September

Name of vessel	Captain's name	Number of crew
Murder	Wilfred Coleman	2
Mary	Mr. Castillo	6
Lennox	Lennox	3
La Bonita	Taulfo Rivero	7
Princess	Leobihildo Tamai	7
Tormento	Francisco Lopez	5
Ubafu	Juan Munoz	11
Vision	Hernando Rivero Jr.	11

Table 10. Fishing Vessels encountered in the month of October

Boat Name	Captain's Name	Number of crew
Tormento	Francisco Lopez	5
Princess	Leobihildo Tamai	8
La Bonita	Taulfo Rivero	7

Ubafu	Juan Munoz	8
Vision	Hernando Rivero Jr.	13
Viva	Oscar Mena	8
Diara 1	Samosa	5
Chico	Alfonso Nunez	3
Sandinoe 1	Alberto Palmero	9
Murder	Wilfred Coleman	2
Yeseiri	Emilio Rivero	4
Lucky Dube	Aston	3
Jessie	Robert Casimiro	3
Adinely	Fidel Viamil	8
Darling	With Ubafu	4
Los Babes	With Sandinoe	4
Julia	Lino Palmero	8
Stacy	Alton Eley	*
Mary	Darrel Castillo	4
Larubeya	Apolonio Olivas	3

Table 11. Fishing Vessels encountered in the month of November

Boat Name	Captain's Name	Number of Crew
Marisol	*	*
Ubafu	Juan Munoz	9
Princess	Leobihildo Tami	7
Vision	Hernando Rivero	8
Diara	Samosa	5
Jessie	Robert Casimiro	3
Murder	Wilfred Coleman	2
Tormento	Francisco Lopez	5
La Bonita	Taulfo Rivero	7

Table 12. Fishing Vessels encountered in the month of December

Boat Name	Captain's Name	Number of Crew
Ubafu	Juan Munoz	10
Princess	Leobihildo Tami	9
Vision	Hernando Rivero	8
Diara	Samosa	5
Murder	George Dawson	3
Tormento	Francisco Lopez	5
La Bonita	Taulfo Rivero	7

A total of thirty two fishing vessels were found within the atoll for the year of 2006. Of these thirty seven fishing vessels sixteen were sailboats and the other sixteen fishing

vessels were skiffs. A very interesting observation made was that this high number of fishing vessels was due to the large number of vessels that visited the atoll to fish during the opening season of conch.

2.2 Warnings and Arrest

On the 24 January Mr. Renison Enriquez was going for a monitoring dive when he encountered a white and green skiff fishing within the boundaries of the conservation zone. He later learned that the vessels was Nashy and had three occupants. Two of whom were known by others as Mr. Wilfred Coleman and “BDF”. Mr. Enriquez informed the fishers that they were within the conservation zone and had to move out of the area which they immediately did.

In January at about seven fifty (am) in the morning a call was received from Kendra of Long Caye. She informed Mr. Enriquez that there was a fisherman in a dory fishing in front of their island. Upon receiving this call we mounted our vessel and headed toward Long Caye. At approximately eight o’clock (am) one Julius Forman was met paddling his dory well within the boundaries of the conservation zone. As a result his license was taken away and he was instructed to go into the Belize City for further action.

On February 22nd Mr. Martinez and Mr. Renison discovery two individuals harvesting undersized conch. These individuals were one Marinito Allen found with 28 undersized conchs and Mateo Rivero found with forty five undersized conchs. The product of the two individuals were confiscated and taken into Belize for further action. Marinito and Mateo are to appear at the Belize City office on Tuesday February 28.

In April, May and June several verbal warnings were given to fishers who were not able to show a valid fisher folk license and also to others that were caught within the conservation zone. A few were also caught with berried lobsters, soft lobsters and undersized lobsters for which due to the small numbers were given verbal warnings. A list of the persons arrested is listed below:

Table 13. Persons arrested for second quarter of 2006.

Persons name	Cause of arrest	Outcome
Alberto Palmero	Fishing within the reserve	Warning given due to the fact that he had nothing in his possession.
Ardulfo Rivero	Fishing within the reserve	Warning given because it’s his first offense.

Cesar A. Mazariegos	Fishing within the reserve	Warning given due to the fact that he had nothing in his possession.
Eddie Garcia	Fishing within the reserve	Warning given due to the fact that he had nothing in his possession.
Higino Rivero	Fishing within the reserve	
Jose	Fishing within the reserve	Warning given due to the fact that he had nothing in his possession.
Kenroy	Fishing within the reserve	Warning given due to the fact that he had nothing in his possession.
Samuel Ruiz	Fishing within the reserve	Warning given due to the fact that he had nothing in his possession.

During the third quarter a call was received that fishers were fishing within the conservation zone. This illegal activity was occurring in the area not too far from Northeast Caye. At that time Mr. Cantun and Mr. Carballo were on duty and upon approaching the area they saw four fishermen paddling their canoes out of the conservation zone. When they arrived at the location all fishers were just outside the boundary of the conservation zone. As a result they approached the fishermen and told them to be very cautious because if caught within the conservation zone they would be arrested and taken directly to Belize City.

On Saturday July 15 while doing the LAMP survey Mr. Cantun, Mr. Carballo and Mr. Sergio Hoare saw a skiff well within the boundary of the conservation zone. They approached the skiff to notice that both occupants of the vessel were fishing for fish within the conservation zone. A GPS coordinate and the necessary information from the fishermen were documented on a slate. It was then learned that both fishermen could not show a valid fisher folks license and they were informed that they should appear at the Belize City office Monday morning at 9 am. Unfortunately the slate that had the information was left at Glovers and the information can not be written at the moment, however this will be gotten on a later date and the matter pursued.

In addition threats were received from one of the fishermen whose nickname is Mayo. His threats were that he is going to shoot one of the officers named Mr. Carballo. These threats shouldn't be taken lightly and as a result I (Mr. Carballo) see it very necessary to arm all officers who work at the reserves, however especially at Glovers since we've got a no take zone that causes a lot of problems and hatred to arise between fishermen and the reserve staff.

In September two arrests were made. On both occasions the fishermen were caught fishing without a valid fisher folk's license. The two individuals are Stephen Lendlan of Dangriga and Darrel Castillo of Hopkins Village.

Two arrests were made for the month of October. One involved a vessel named Jessie of which its three occupants were fishing within the conservation zone. The other involved one Cesar Mazariegos which was caught with 28 undersized conchs.

Warnings were given to several individuals for fishing without a valid fisher folk license, fishing within the conservation zone and harvesting undersize conch.

Our enforcement measures have made us come up with a list of individuals who are trouble makers at our reserve:

- **Darrel Castillo and crew (vessel name Mary)**; these individuals has broken all the laws harvesting of conch and lobster out of season, and are currently harvesting within the conservation zone at night. The reason why these individuals have not been caught is because they simply refuse to stop their vessel for any inspection and just drive off. Something has to be done to stop these fishers when they are being caught again.
- The vessel by the name of **Sandynoe** has been sorted out to be harvesting juvenile conch on an every trip basis, however these individuals always have their product packed all the way to the bottom when inspected. Another important note is that the captain **Alberto Palmero carries his hunting rifle out at sea** and says he is using it for protection purposes. This is seen somewhat as a treat to the reserve staff of which only Mr. Martinez carries a weapon.
- Two other vessels that have been seen to be doing several suspicious activities, such as rapidly moving off when our vessel approaches them or having canoes paddle off as well, are **Yeseiri** and **Ubafu**.

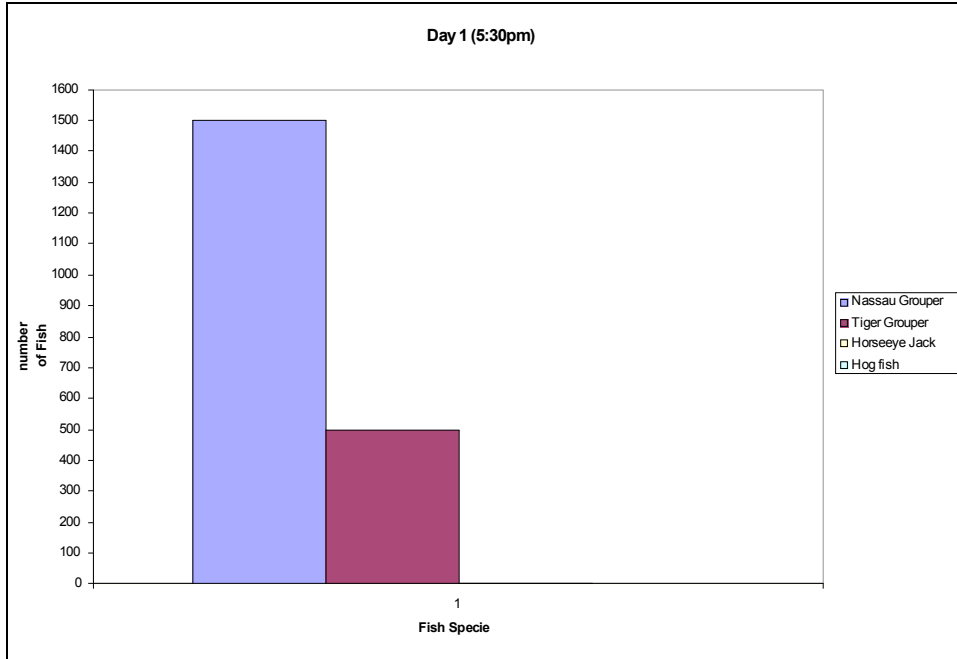
Finally in December several fishers were given warnings about fishing without a valid fisher folk license.

3.0 Monitoring

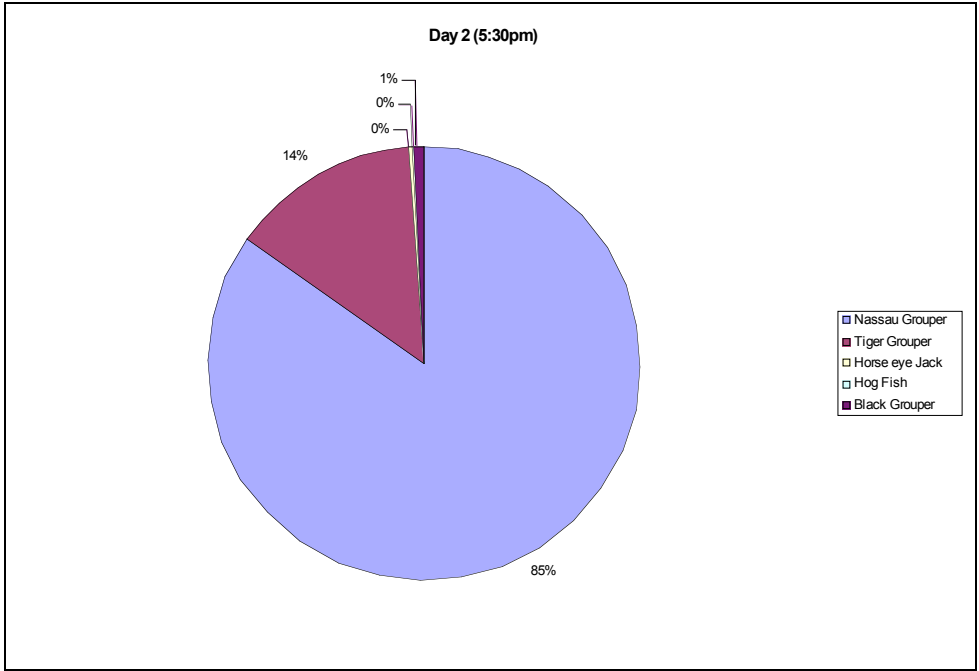
3.1 Nassau Grouper Aggregation

Spawning monitoring for January was commenced 22nd to 26th with WCS scientist. The area that the monitoring took place was the north point of the atoll, also call the Grouper Bank, the Aquarium directly in front of Middle Caye and at the south point near South West Caye. On the 22nd at the north point an estimated one thousand five hundred Nassau Grouper (*Epinephelus striatus*) were observe displaying color changes, and around five hundred Tiger Grouper (*Mycteroperca tigris*) where seen. On the 23rd around three thousand Nassau Grouper where view displaying spawning activity and seven Horse eye Jack. At the south point around fifty Tiger Grouper (*Mycteroperca tigris*) where view displaying fighting behavior at the south point. The SPAG dive began eight days after

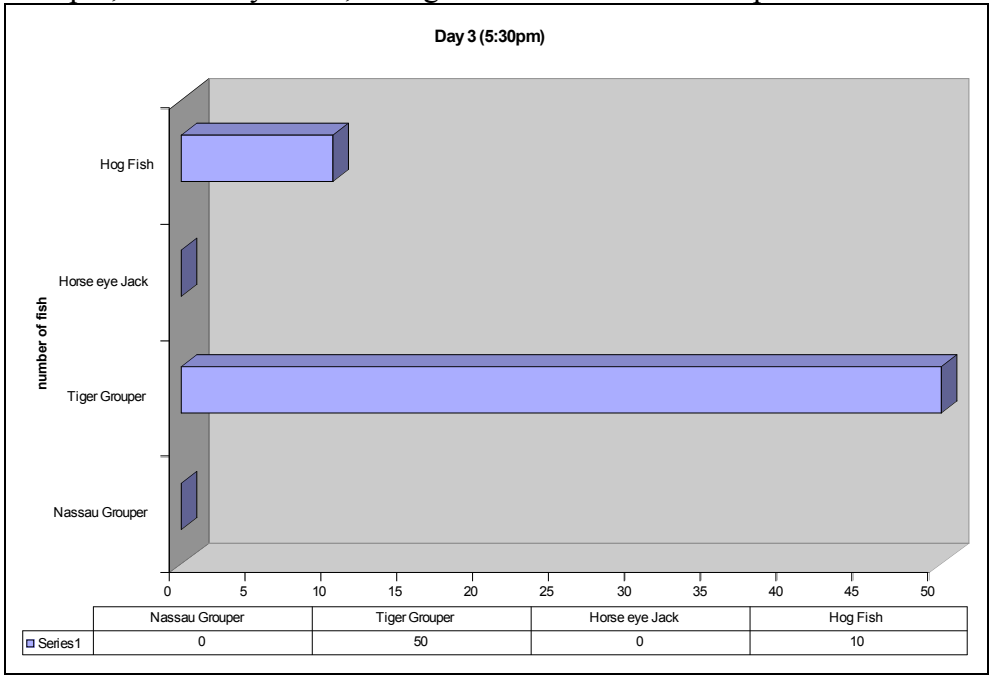
the full moon usual around 12:00pm and at 5: 30pm. On day one and two it was observed that the Groupers where at the site in large number, but by day three of the dive the Grouper where already leaving the site.



Graph 1: The graph below illustrate that a total of 1500 Nassau Grouper, 500 Tiger Grouper, 7 Horse eye Jack and 0 Hog Fish was recorded.



Graph 2: The graph below illustrates that a total of 3000 Nassau Grouper, 500 Tiger Grouper, 7 Horse eye Jack, 0 Hog Fish and 30 Black Grouper was recorded.



Graph 3: the graph below illustrates that a total of 0 Nassau Grouper, 50 Tiger Grouper, 0 Horse eye Jack, and 10 Hog Fish were observed.

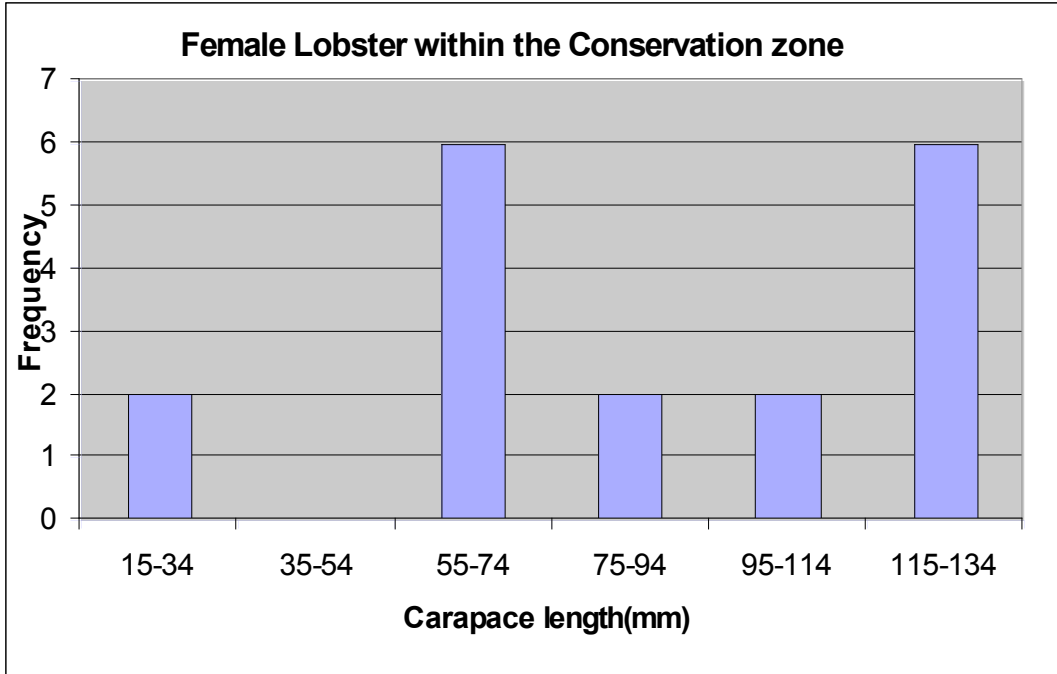
3.2 Lobster Survey

The lobster survey was carried out from 20th-23rd February 2006 by Mr. Enriquez, Mr. Martinez and Ms. Annike of WCS. In the survey a total of 14 patches were surveyed following the Field Protocol for Monitoring Coral Reef Fisheries Resources in Belize 2003 edition. Seven of these sites were in the conservation zone and seven were in the general use zone.

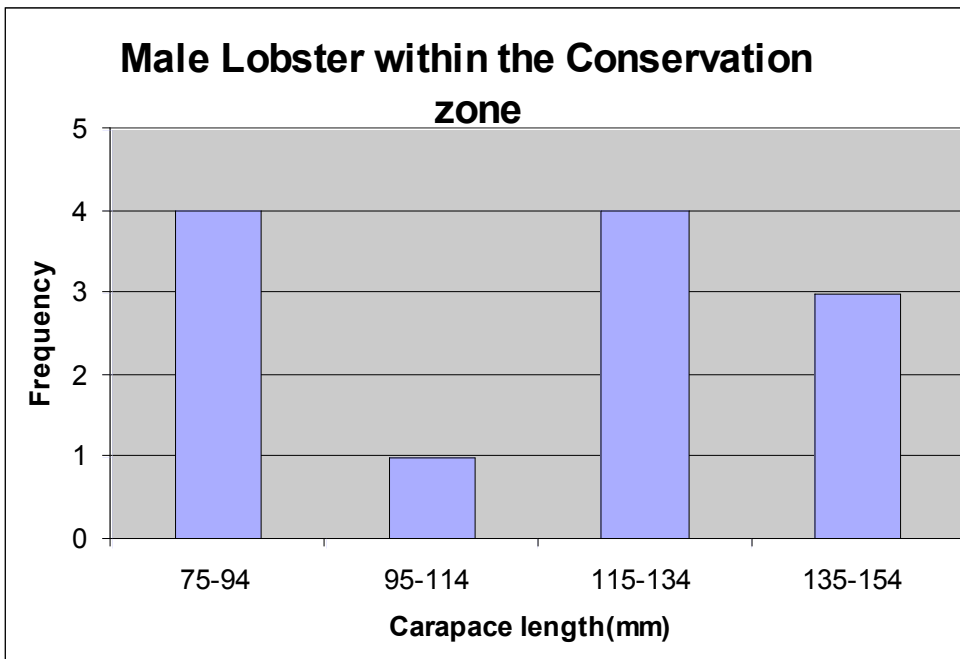
An average of one hour was spent at each patch. In which the surveyors took different parameters for example, temperature, salinity, depth, and visibility. A total of 52 lobsters were sampled in which 58% were from the conservation zone and 42% were from the general use zone.

Method

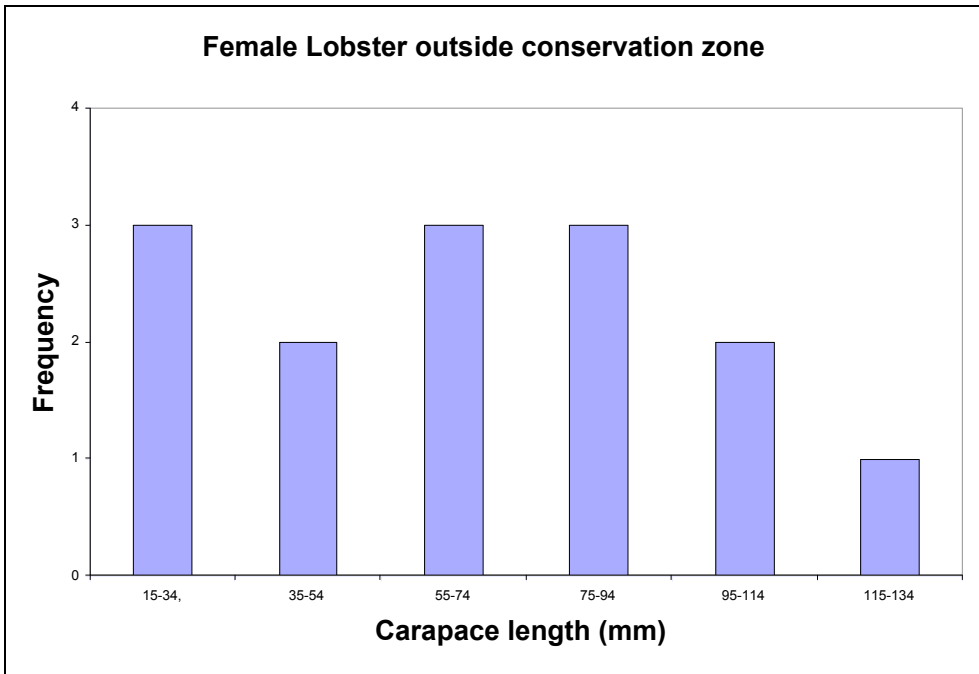
The survey was done following the Field Protocol for Monitoring Coral Reef Fisheries Resources in Belize 2003 edition. While carrying out this survey different parameters were collected. The average temperature at each site was about 26.5^o C. The average conductivity was around 54ms, the average salinity at the different sites was around 35ppt, the average visibility at the different sites was 78m, and the depth at the different sites was about 5m. The time that the survey was carried out was around 9:30 am in the morning and around 2:00pm in the afternoon. At the different patch reef the survey was carried out by swimming crossing patterns across the whole reef structure (2003 edition), All the rock crevices were searched to find the lobsters an average of an hour was spent at each sites. This was depended on the amount of lobsters founded at the particular sites. When the Lobsters were found they were measured for size, sexed, and checked for egg masses, without capturing the animal if possible (2003 edition). The size length was measured by placing a marked stick over the dorsal surface of the carapace and it was estimated to the nearest cm. The sex was determined by, the adult male have a third walking leg that is much longer than all other legs, the adult female have swimmerets with frilly tips under the abdomen, under the ventral side of the abdomen of the female sometimes an egg mass is visible. (2003 edition)



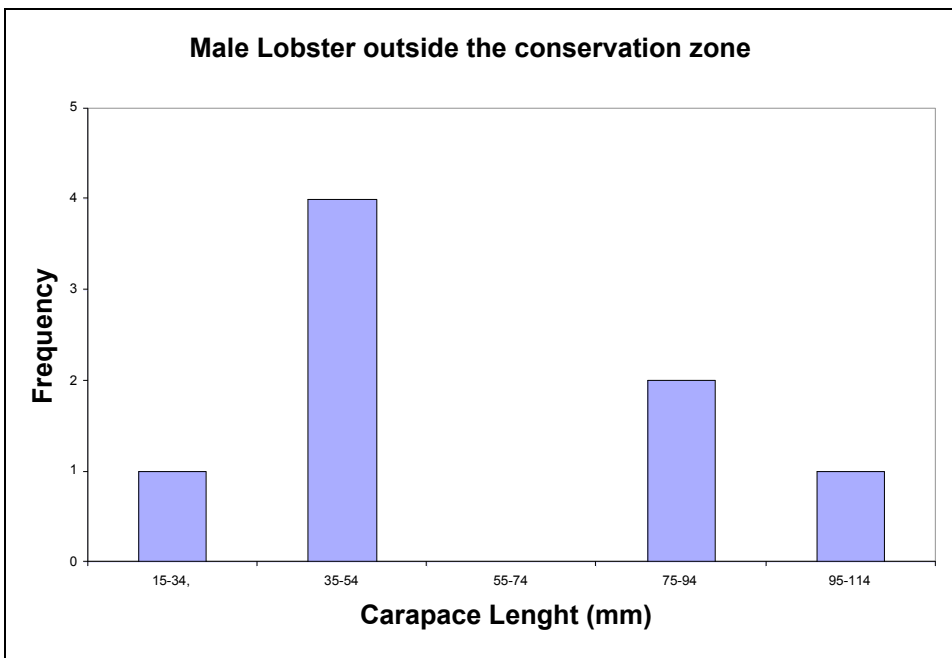
Graph 4. The graph above illustrates the female lobsters found in the conservation zone.



Graph 5. The graph above illustrates the male lobsters found in the conservation zone.



Graph 6. The graph above shows female lobster sample in the general use zone.



Graph 7. The graph above illustrates male lobster sample in the general use zone.

Results

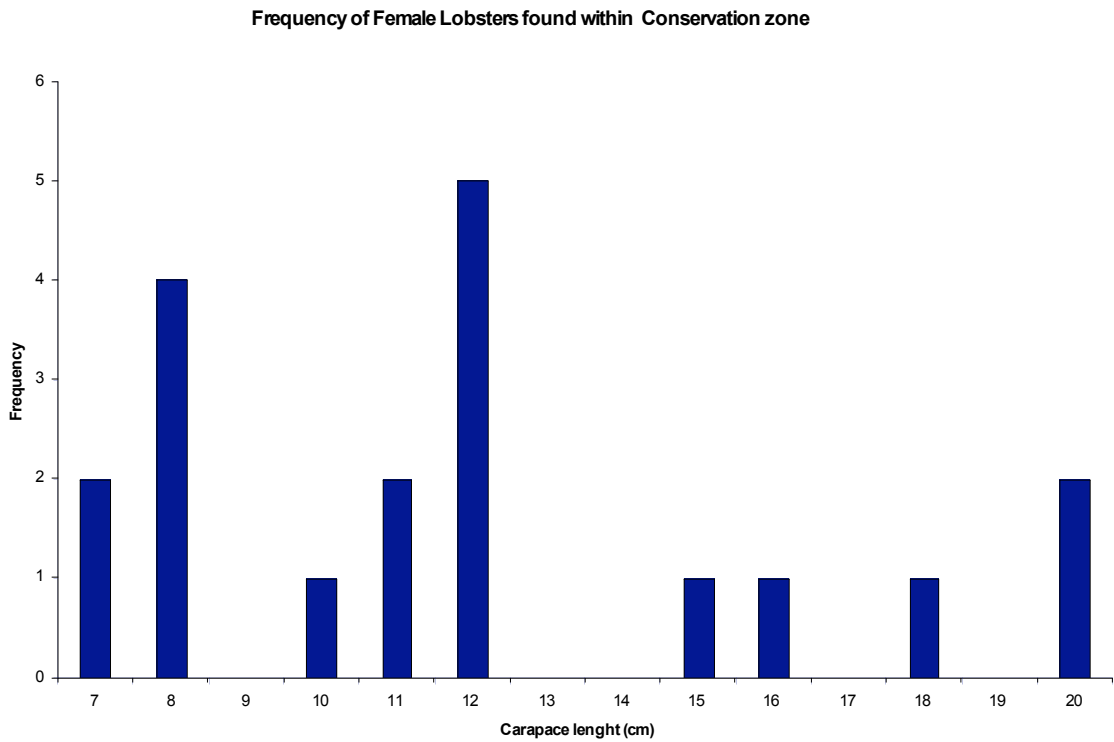
A total of 52 lobsters were found within the 14 patches, 7 of which was in the conservation zone and 7 of which was in the general use zone. Graph 1 illustrates the

female lobsters found in the conservation zone. A total of 16 lobsters were found ranging from 20 mm to 130 mm of which 10 was of legal size. Only one of these females was found with sign of eggs. Graph 2 illustrates the male lobsters found in the conservation zone. A total of 12 lobsters were sample in the conservation zone ranging from 80 mm to 150 mm, all of legal size. Where it shows that between 95-114 mm there was only one lobster found in that size range. Graph 3 shows female lobster sample in the general use zone. A total of 14 lobsters were sample two of which had eggs and only six where of legal size. These females range from 20 mm to 120 mm, in which only one lobster was found to be 120. Graph 4 illustrates male lobster sample in the general use zone. The total number of lobsters found was 8 and 3 of these were of legal size. These lobster ranges from 30 mm to 110. In which between 15-34 and 95-114 only one lobster was found in each case.

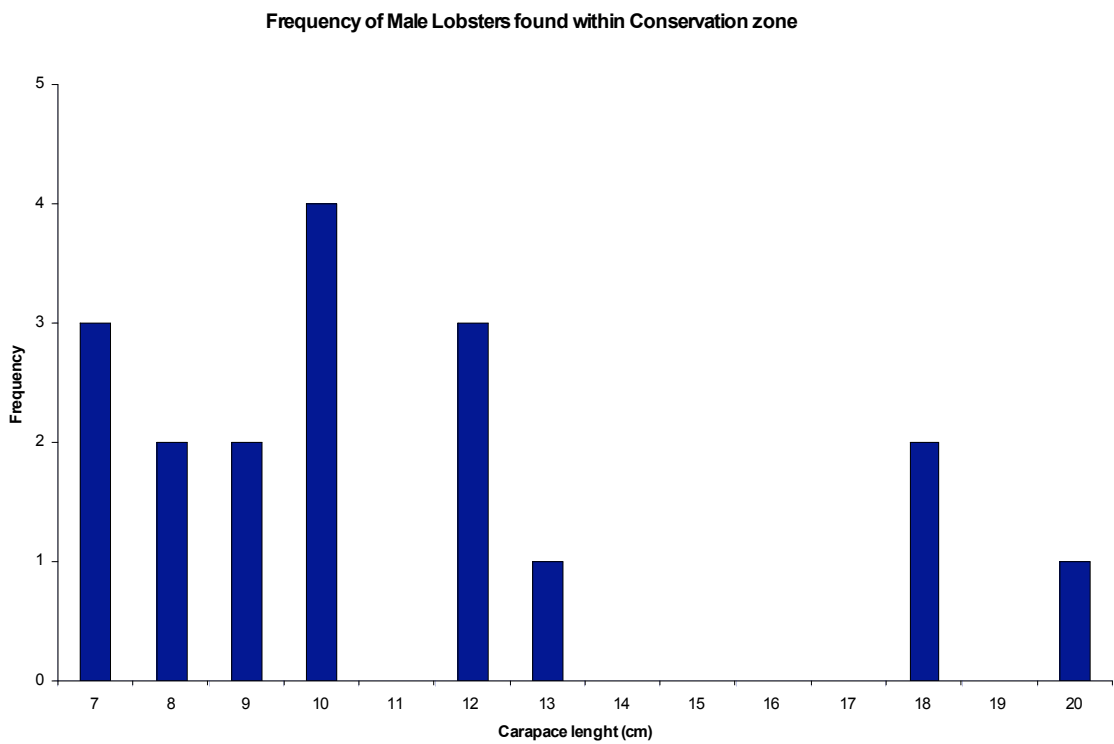
Conclusion

The survey show that of the 52 lobsters sample 21 were of illegal size and 31 of legal size, and most of this number occurred in the general use zone. So there is more mature, reproductive lobster protected in the conservation zone that could add to the population. The survey shows 52% of the lobsters occurring in conservation zone and 42% of the lobsters occurring in the general use zone, but in actual numbers that is only a difference of 6 lobsters. In the earlier parts of the month before the survey was carried out, there were a number of successive cold front which change the environment of the lobsters example increase in temperature and decrease in visibility. This condition may have cause the lobster to have change there habitat, for example move to a different part of the atoll or move to deeper waters.

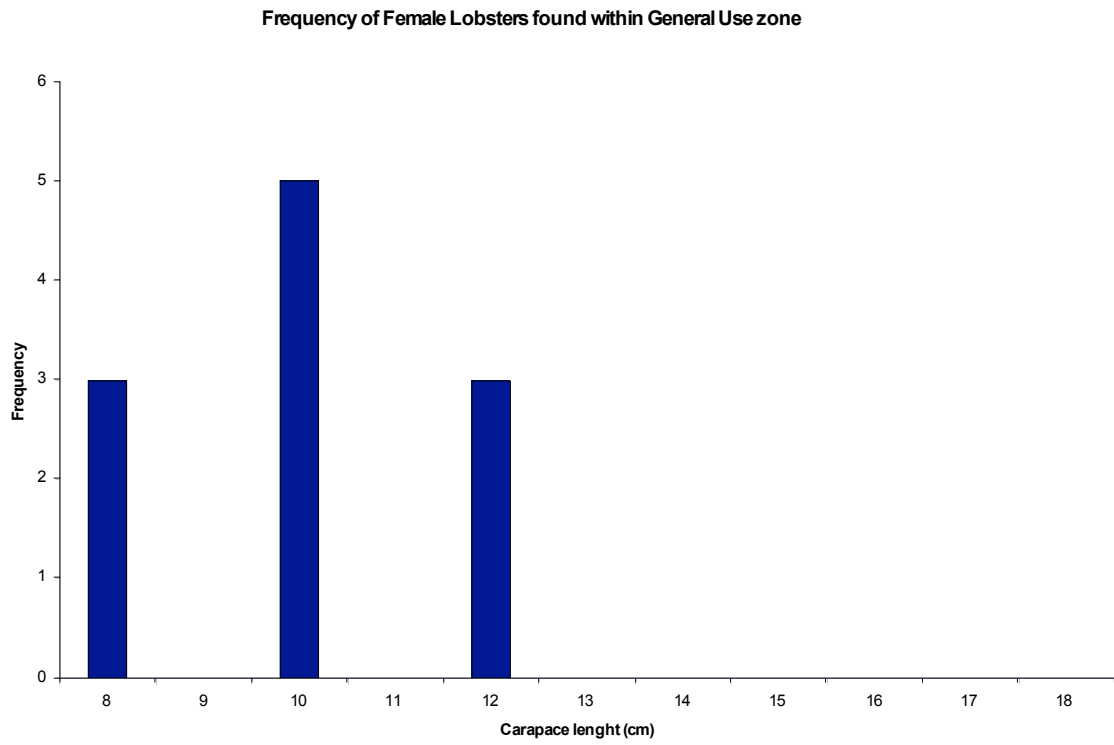
The graphs below show the results of the lobster survey carried out in June.



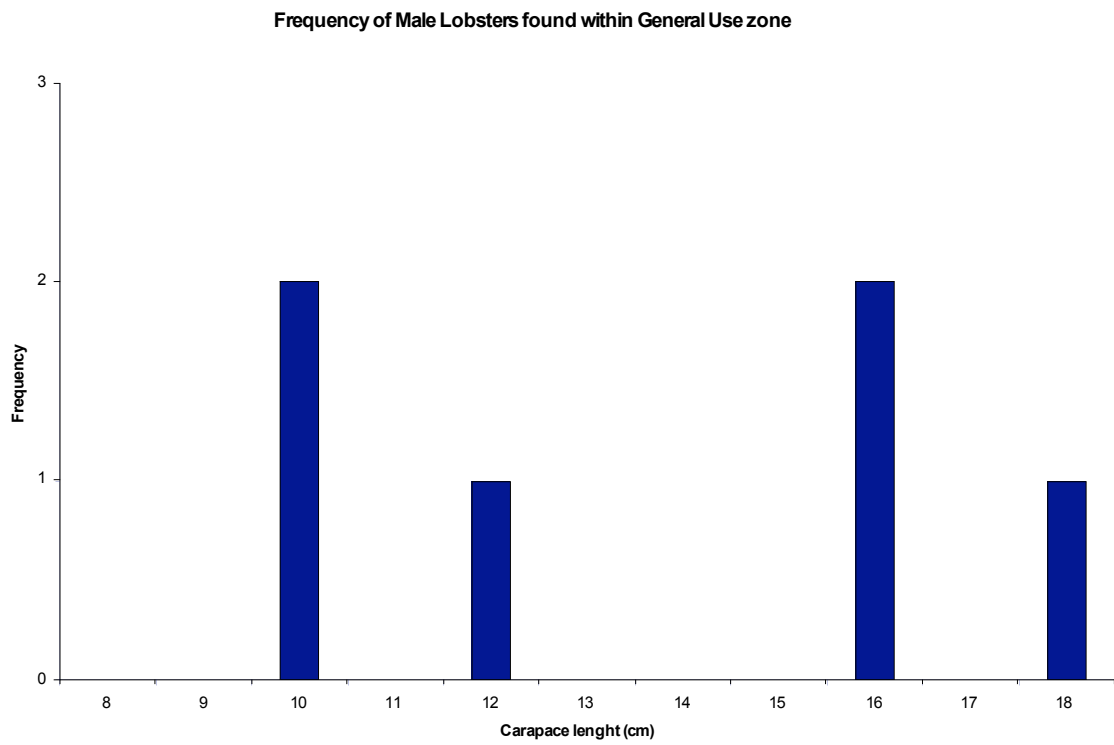
Graph 8 Frequency of female lobster found within Conservation Zone.



Graph 9 Frequency of male lobsters found within Conservation Zone



Graph 10. Frequency of female lobsters found within General Use Zone



Graph 11. Frequency of male lobsters found within General Use Zone

3.3 Juvenile Lobster Trap Collectors

On March 15th to 18th two individuals from the targeted research project went to Glovers to set up several juvenile lobster collectors. Twelve collectors were built using $\frac{3}{4}$ inch PVC pipe, rope and hogs' hair. The hogs' hair serves as a habitat where the lobsters will settle during the juvenile stage. The collectors were anchored down with cement blocks that were filled with cement and a pin set in place to which the collected would be clipped to.

Next two main sites were chosen and at each site two location were pick. At each location two collectors were deployed at approximately ten meters apart. These collectors would remain at these locations until approximately 7 days after the new moon in April at which point they would be removed from the water simultaneously. A net bag would be placed in the water around the collector and raised to the surface. Once the collector is obtained the juvenile lobsters would be counted and the collector replaced at its location.

This would be repeated for two consecutive months. At this point the location at the site that seems to be collecting more individuals would be used as the sampling site. Once established an additional collector would be placed at the site thus increasing the number of collectors from two to three.

This data will finally provide an idea of the juvenile population of lobsters that settle at Glovers. It will also provided information that will be useful to draft an estimate of the adult population in the up coming years.

In April eight lobster collectors were deployed at Glover's reef at two designated locations, which are the northeast caye channel and the northern point channel. Two sites were chosen at each designated locations and two collectors were placed at each site.

Since then we've been monitoring and collecting data on a monthly basis, however we haven't collect no data for the past two month due to the fact that we haven't receive any finance to purchase the necessary equipments to rebuild the collectors. In July we went up to the northern point channel to collect data and noticed that four of the collectors were missing. A search was then conducted at the two chosen sites and found one collector at each site on the bottom of the sand flat. It was noticed that the two which were found at the bottom didn't have any floating buoys to keep them up or any of the of the hogs hair. After close inspection of the collectors it was discovered that all the collectors had been cut off. At the northeast channel two sites were also designated and two collectors were placed at each location, they too needed some repairs. It was noticed that two were not floating in a parallel position and were just hanging by one buoy. They were also taken out and were inspected and discovered that the hog's hair needed to be changed.

Since April the collectors has been checked twice for lobster recruits. Below is a table showing the results gotten:

Lobster Collectors at Northern Point Channel

Table 14. Lobsters found in June

Collector I.D.	Number of individuals found			Comment
	Transparent	Pigmented	Juvenile	
C1			3	
C2		2		One of the buoys removed
D1			2	
D2			4	

Table 15. Lobsters found in July

Collector I.D.	Number of individuals found			Comment
	Transparent	Pigmented	Juvenile	
C1			0	Buoys removed and collector on seafloor
C2	1	4		Had only two buoys.
D1	1	6		
D2	2	3		

Lobster Collectors at Northeast Caye Channel

Table 16. Lobsters found in June

Collector I.D.	Number of individuals found			Comment
	Transparent	Pigmented	Juvenile	
A1			2	
A2	5			
B1	3			
B2			2	

Table 17. Lobsters found in July

Collector I.D.	Number of individuals found			Comment
	Transparent	Pigmented	Juvenile	
A1	2	9		
A2	1	5		
B1	2	8		
B2	2	2		

A total of seventy one recruits were found within the lobster collectors for both collection periods. Thirteen were juveniles, thirty nine were pigmented and nineteen were transparent. The level of settlement at each location and each site showed several differences from one period to the next.

In June a total of eleven individuals recruited at the Northern point channel. At site A five individuals were found of which three were juveniles and two were pigmented. Six recruits were found at site B of which they were all juveniles. On the other hand at the Northeast Caye Channel a total of twelve individuals were found for the same period. At site A two were juveniles and five were transparent, while at site B two were juveniles and three were transparent.

In July a total of seventeen recruits were found within the collectors at the Northern point Channel. At site C a total of five individuals were found of which one was transparent and four were pigmented. Twelve recruits were discovered at site D of which three were transparent and nine were pigmented. At the Northeast Caye Channel a total of thirty one recruits were found. Seventeen recruits were found within site A of which three were transparent and fourteen were pigmented. Fourteen recruits were found at site B of which four were transparent and ten were pigmented.

The collectors were checked twice and it shows that the pigmented stage of the lobsters life cycle tend to recruit in more numbers within the collectors than the other two stages which are transparent and juvenile. Another interesting observation was that in July no juveniles were found in the collectors.

3.4 MBRS Coral and Adult fish Surveys

On March 24th to 28th the MBRS coral and adult fish surveys were carried out at Southwater Caye Marine Reserve. The team included Alex Jones, Jason Edwards, Grant, and Roberto Carballo. Jason's role was captain of the vessel and the other three individuals were divers.

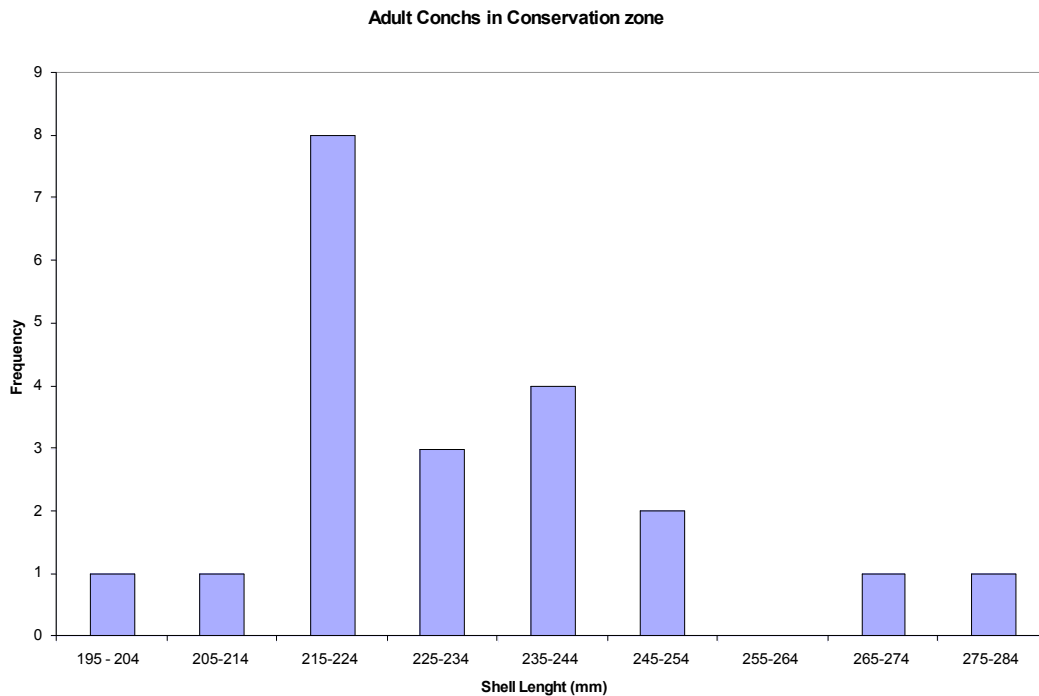
A total of four sites were studied; two fore reef sites and two back reef sites. In regards to the adult fish survey at each site eight 30 meter transects were laid approximately five meters apart along the coral and from a list of fish species their abundance was noted. In addition for coral surveys both point intercept and benthic data were collected using 30 meters transects. The point intercept data included marking the transect tape at every twenty five centimeter point. A total of five transects were laid out and the substrate under each twenty five cm point was recorded. Using the same transects the benthic data was collected by recording each hard coral found that was less than ten cm in diameter. A total of fifty species of coral is to be collected per site for the benthic data and once this number is met no more is documented.

3.5 LAMP Survey

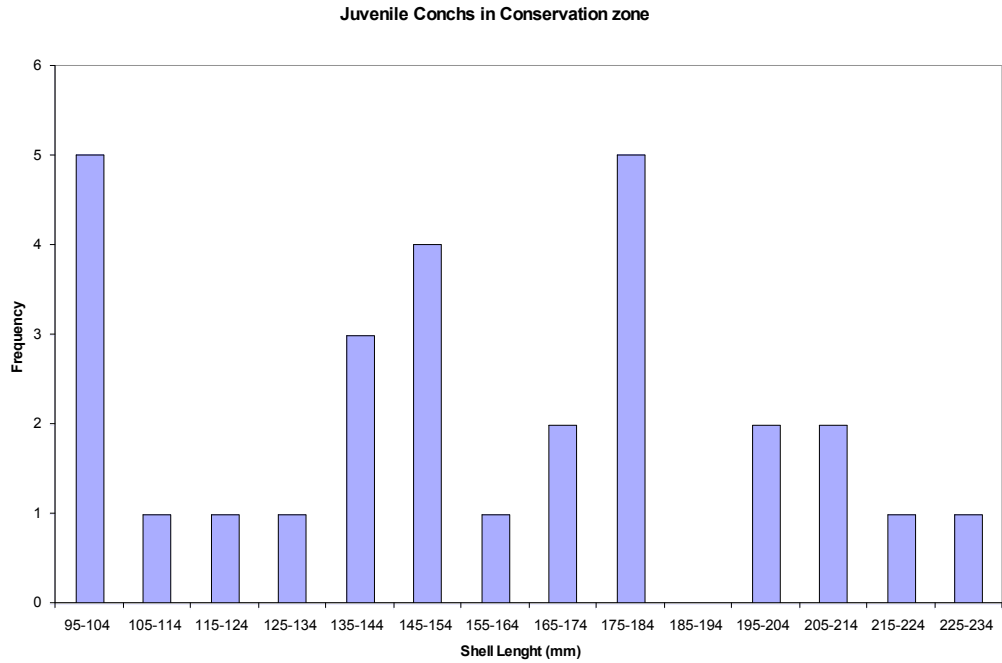
In July a Conch monitoring team consisted of 3 individuals; Mr. Cantun, Mr. Carballo from Fisheries Dept. and Mr. Hoare from WCS carried out the LAMP survey. The survey was conducted in the latter part of July using the Lamp protocol. This protocol involved two different methods, one involve setting fifty meter transects in both sea grass and sand flat areas, to record the number of conch found within a two meters span on each side of the transect. The other involves snorkeling or diving around patches.

Each conch found was briefly observed for the presence of eggs and then measured. The measurement done for all conchs was shell length, and in addition if a shell lip was present the shell lip width and shell lip thickness were recorded.

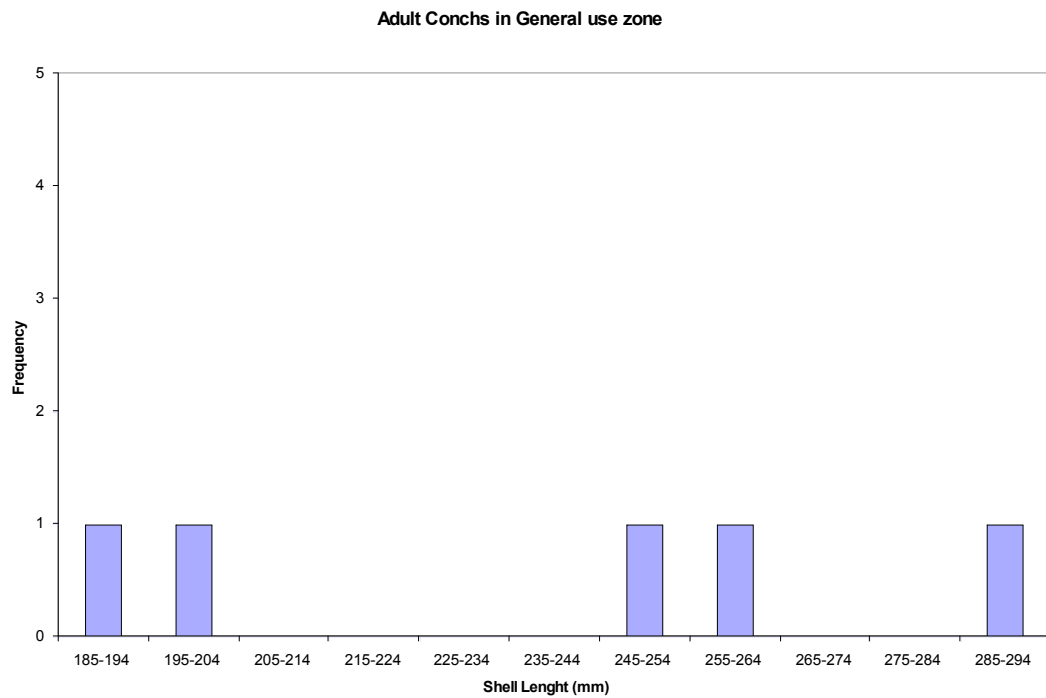
A total of thirty three sites were surveyed, fourteen occurred in the Conservation zone and nineteen in the general use zone. The results found are shown in grafts below.



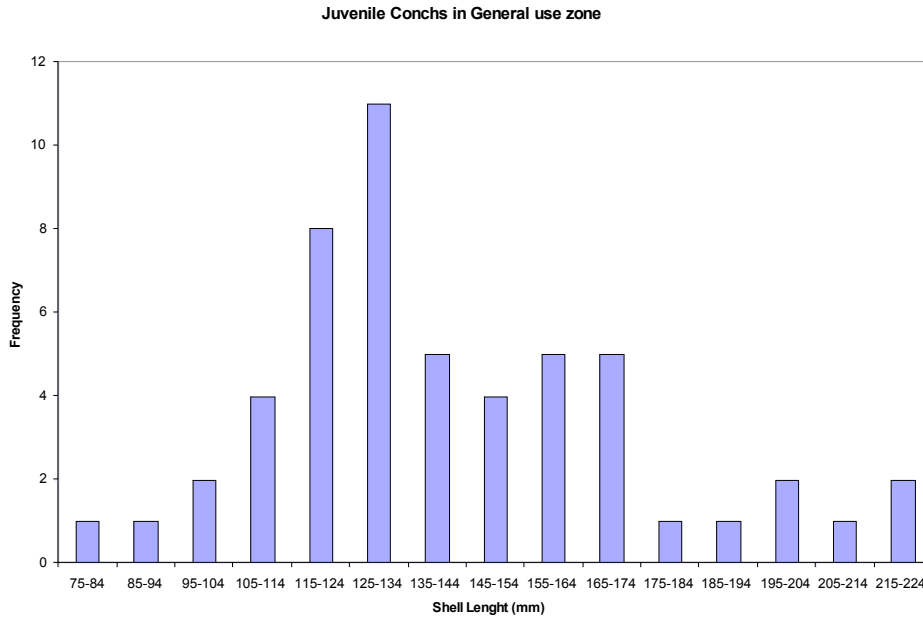
Graph 12. Adult Conchs in Conservation zone



Graph 13. Juvenile Conchs in Conservation zone



Graph 14. Adult Conchs in General use zone



Graph 15. Juvenile Conchs in General use zone

A total of one hundred and eight conchs were found during the survey of which fifty occur in the Conservation zone and fifty eight within the General use zone. Of the fifty conchs found in the Conservation zone twenty nine were juveniles and twenty one were adults. Of the fifty eight found in the General use zone fifty three were juveniles and five were adults. The juvenile conch population of the General use zone was higher than in the Conservation zone; a ratio of 2:1 existed. However majority of the juvenile conchs found in the Conservation zone were larger in shell length when compare to those found in the General use zone. Fisheries Laws permits the harvesting of conch at a shell length of one hundred seventy five millimeters (mm). Forty one percent of the juvenile conch that occur in the Conservation zone had a shell length of one hundred and seventy five mm or more and in the General use zone thirteen percent had a shell length of one hundred seventy five mm or more. The ratio of adult conch found in the Conservation and General use zone was 4:1 respectively and all adults had shell length of one hundred and seventy five or more.

Seven of the conchs found were laying eggs. A very interesting discovery was that two of the conch found laying eggs had no shell lip and measured two hundred and thirty mm and one hundred and eighty three mm. This is very contradicting because science states that in order for a conch to reproduce it has to be an adult. Furthermore it also states that in order for a conch to be an adult it has to have a shell lip. The two discoveries made proofs otherwise. Could it be that the conchs are adults or could it mean that once juveniles have reached a specific stage in life they can also reproduce?

In the last week of September another LAMP survey was carried out by Mr. Hoare and Mr. Cantun. The results of the survey will be documented in the other report.

3.6 Marker Buoys

To date the conservation zone has been properly marker with maker buoys in order to allow user's of the atoll especially fishermen to see clearly where they are. Only a few buoys that have been lost have to be replaced.

3.7 Turtle monitoring

For some reason or the other locating the true turtle nests at Glovers have been a very difficult task. To date two false nests have been discovered and two reports have also been received. One report was of a turtle crawling up onto the beach at Southwest Caye where Isla Marisol is located; however the dog disturbed the turtle until she returned back to the sea. The other report was of turtle egg shells being seen on the beach at Southwest Caye where Manta Resort is. The two false nests found occurred one on Long Caye and the other on South West Caye (Manta Resort).

In September no turtle activities were recorded.

4.0 Infrastructure & Equipments

At the reserve presently a lot is needed when it comes to equipments. The building is still in good condition. Currently only the biologist is equip with full diving gear and therefore equipment has to be burrowed when it comes to doing certain research.

4.1 Equipments

There are several different type of equipments used at the reserve. The reserve provides the staff with sleeping facilities, marine equipment, kitchen utensils, boat, and fuel containers. In the table below is a list of the equipments that are at the reserve.

Table 18. Equipments present at the reserve.

Item	Quantity	Condition
<i>Boat</i> 25' fiberglass skiff	1	Fair
40 hp two stroke Yamaha engine	2	Good
6 gallon container	2	Good
60 gallon container (blue)	2	Good
12 volt battery	1	Good
<i>Monitoring</i> Fins	3	Good
Mask (blue and black)	3	Good
BCD (black)	2	1 Good other poor
Regulator	2	1 Good other poor

30 meter measuring tape	2	1 Good other poor
<i>Kitchen</i>	2	Not Good
Large gas tank		
Medium gas tank	1	Not Good
Pot	2	Excellent
Frying pan	2	Excellent
Stove (four hole plus comal)	1	Good
Pressure Cooker	1	Excellent
Mug	1	Excellent
Cups	6	Excellent
Flat Plates	6	Excellent
Deep Plates	6	Excellent
Forks	6	Excellent
Spoons	6	Excellent
Butter Knife	4	Excellent
Knife	2	Excellent
Spatula	1	Excellent
Large fork	1	Excellent
Large spoon	1	Excellent
<i>Building</i>		
Beds	3	Good
Mattress	3	Poor
Television	1	Good
Office desk	1	Good

4.2 Building facilities

The building facilities at Glovers Reef are in good conditions. The upper flat is equipped with three bedrooms and an area to be established as an informational center, store room for monitoring equipment and an additional bedroom. The lower flat of the building needs minor adjustments. A fourth room has to be established to allow space for a fourth staff member. The kitchen has to be enclosed and provided with necessary utensils in case the need for its use arises.

In addition all the rooms are in need of locks and some of doors in order to provide security.

5.0 Fuel Consumption

Fuel is used by the reserve staff for a number of activities which include: patrols, monitoring, transportation, collection of park fees, and collection of data from local fisher folks. Anytime the reserve staff go out to collect park fees a small patrol of the conservation zone is also done. This enables us to use our fuel to carry out more than one activity on the same fuel used. The collection of park fees also causes us to use a lot of

fuel at times; for example when we have already done a patrol of that area and later a tourist vessel visit the specific area. Fuel then has to be used to go collect park fees; nonetheless it enables us to have regular presence especially within the conservation zone.

An average of two hundred gallons of fuel is issued for each month until October when the department started issuing two hundred and fifty gallons. At times however different activities may arise that call for more fuel to be issued. For example in October an extra one hundred and fifty gallons was issued for coral monitoring.

6.0 Staff Training

There are three staff members at Glovers Reef Marine Reserve. On staff are Mr. Roberto Carballo, reserve manager, Mr. Elias Cantun; reserve biologist and Mr. Gilford Martinez; reserve ranger. The staff still is in need of a second ranger to make the team complete.

August was a very successful month when it came to the training of Glover's Reef staff. All staff members were lucky to receive training in their respective fields.

The ranger Mr. Gilford Martinez attended a ranger's workshop in Belize City. At this workshop Mr. Martinez received training in the field of GPS, navigation, communication and others that are necessary tools needed to carry out his work effectively and efficiently.

The manager Mr. Roberto Carballo attended a manager's workshop where he was trained in different subject matters that would equip him with required management skills. At this workshop he was thought various ways of getting an issue across to different audiences. Another special skill received at the training was that of effective and efficient presentation making.

The biologist Mr. Elias Cantun attended LAMP training at Glover's Reef. Here Mr. Cantun received the knowledge of the methodology used to carry out the LAMP survey. This survey includes the study of five different species of fishes, three species of lobsters and three species of conch. All three types of marine life (fish, lobster, and conch) use different kinds of methods to study them.

7.0 Tourism Visitation

This year has been quite a slow year, however towards the ending of the year it was noticed that finally in December the number of tourist increased largely. Presently Manta Resort is no longer operating and has closed its doors leaving only five operating resorts in the atoll.

Park fees for the last quarter of the year are still outstanding for Off the Wall Dive Resort and Isla Marisol who have both agreed to settle all outstanding fees in early January. The table below shows the record of park fees for the year 2006.

Table 19. Park Fees Collected at the reserve.

Month	Amount Collected (Bze \$)
January	10,105
February	7,585
March	1,830
April	9,670
May	1,150
June	3,320
July	130
August	150
September	1810
October	40
November	--
December	7,020
Total	42,810

A total of \$ 42,810.00 was collected in park fees, \$ 225.00 in fly fishing fees and 180 from the Easter fishing tournament. In addition park fees are collected from Hamanasi by the department itself.

8.0 Work plan

Table 20. Work Plan for the First half of 2007

Activity	Jan	Feb	Mar	Apr	May	June
<i>Administration</i>						
a. Advisory Committee Meeting						
b. Conduct Staff Meeting	√	√	√	√	√	√
<i>Surveillance and Enforcement</i>						
a. Patrols	√	√	√	√	√	√
b. Install missing marker buoys		√				
<i>Research and Monitoring</i>						
a. Lobster collectors	√	√	√	√	√	√
b. Lobster Monitoring		√				√
c. Turtle Monitoring	√	√	√	√	√	√
d. Daily Measurements	√	√	√	√	√	√
e. Weekly Measurements	√	√	√	√	√	√
f. Spawning Aggregation	√	√	√	√	√	√
g. Coral Monitoring						√
<i>Tourism and Visitors</i>						
a. Collect park fees	√	√	√	√	√	√
b. Keep records of tourist visitation	√	√	√	√	√	√
c. Keep records of researchers who visit the atoll	√	√	√	√	√	√

d. Keep records of Belizeans who visit the atoll	√	√	√	√	√	√
--	---	---	---	---	---	---

9.0 Conclusion

2006 has proven to be a year of success and very good learning experience for the staff at Glover's Reef Marine Reserve. Many things were accomplished and a few were not nevertheless the staff has learnt a lot working with each other and the coming year should bring further success than any other year in the history of Glovers. The current team is willing to start working hand in hand with each other for the betterment of the marine reserve.