



1st Annual Report 2005

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1.0 Introduction

During the first year of operating, Reef Conservation International Ltd (ReefCI) has coordinated many survey techniques, each focusing on either the general health of the coral reef or targeting individual species that are clearly in need of protection and constant monitoring. The aims and objectives at the start of the year were to gather as much information as possible throughout primarily the Sapodilla Cays in order to have a baseline of data that can be used for comparison in future years. For the first year it is difficult to analyse data on a large temporal scale however, it has been possible to gain an understanding of the change in the reef on a spatial scale.

2.0 Lobster Data

The Caribbean Spiny lobster *Panulirus argus* is one of the most commercially important species in Belize. To keep stocks high enough for a continual annual harvest that is not damaging to the population and still creates high economic revenue for the country, it needs constant monitoring and a certain amount of protection.

To gain an understanding of the movements and behaviour of the lobster population in the Sapodilla Cays, it was important to look at the ratios of males to females in different areas. This gives an idea of the most productive regions of the Cays and indicates where the females may migrate to when they release their eggs. It has been well documented that many species of female lobsters in the world migrate to the continental shelf in order to release these eggs, though it was not known what stretch of the wall in the Sapodilla Cays was used most frequently for this behaviour.

A 1m plastic stick was taken down with the divers conducting the survey, and a roaming technique was used in order to survey the maximum number of lobsters possible in the area. This was not changed for each individual survey to eliminate bias. Using a transect line was not providing us with a true representation of the lobster population, as the numbers were so low.

To identify the sex of the lobster the diver slowly tapped the rear of the species with a stick in order to remove it from its crevice. The fifth pair of legs was used as an indicator. On female lobsters the fifth back leg has evolved into a small claw in order to shield its eggs, while the male leg has similar features to the other four pairs. The results were recorded on a spreadsheet and analysed on a spatial and temporal scale.

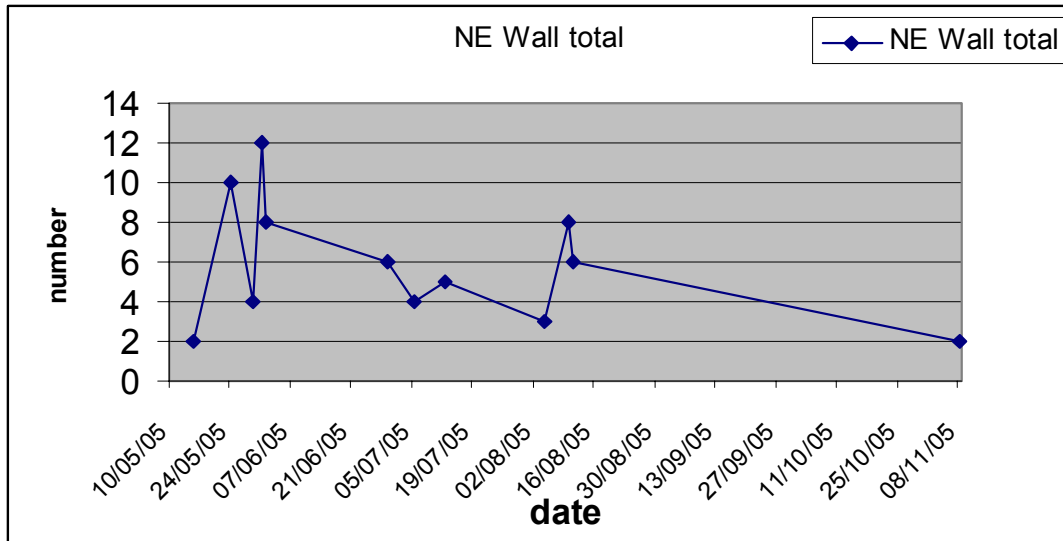


Figure 1 showing the total numbers of lobsters counted at Northeast Wall throughout the year.

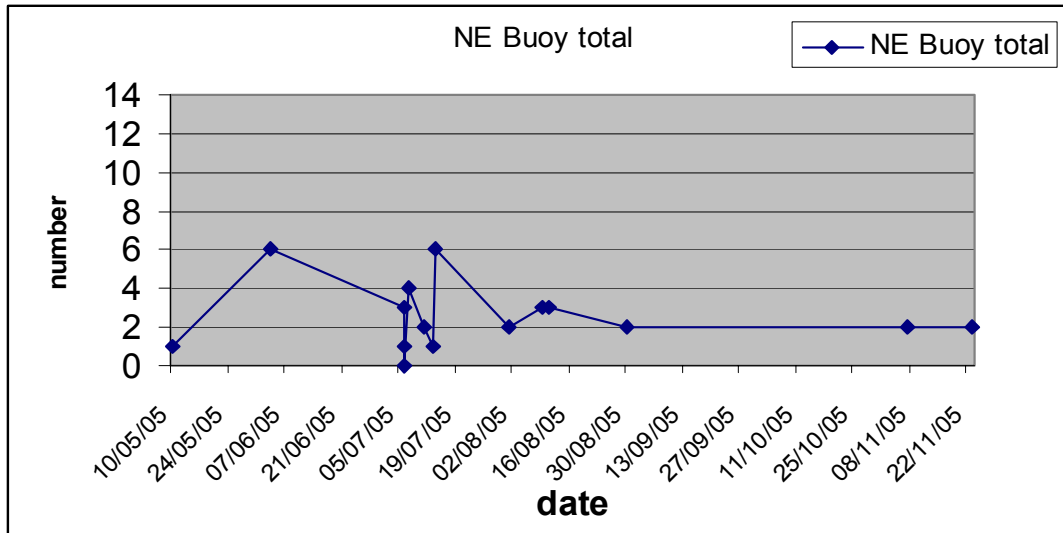


Figure 2 showing the total number of lobsters counted at the Northeast Buoy throughout the year.

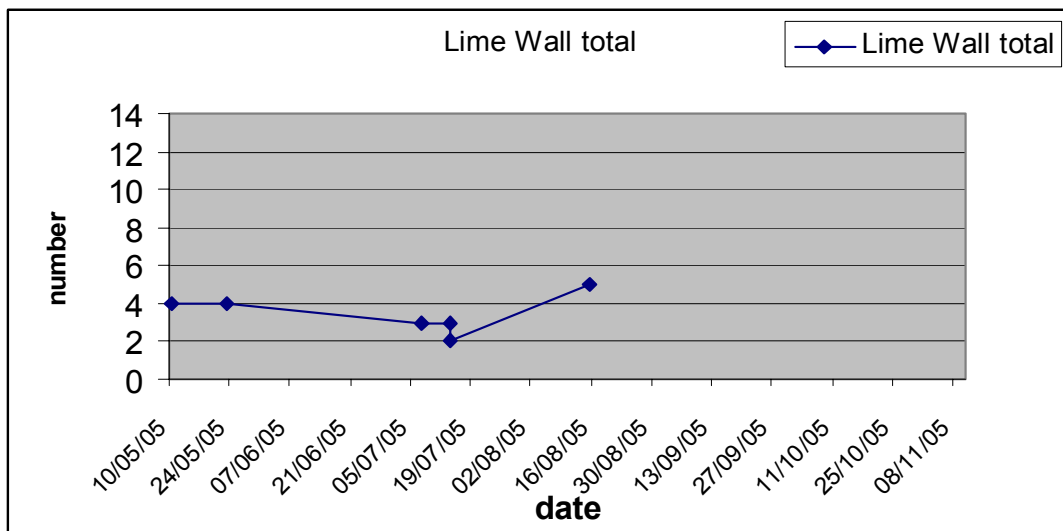


Figure 3 showing the total number of lobsters counted at Lime Cay Wall throughout the year.

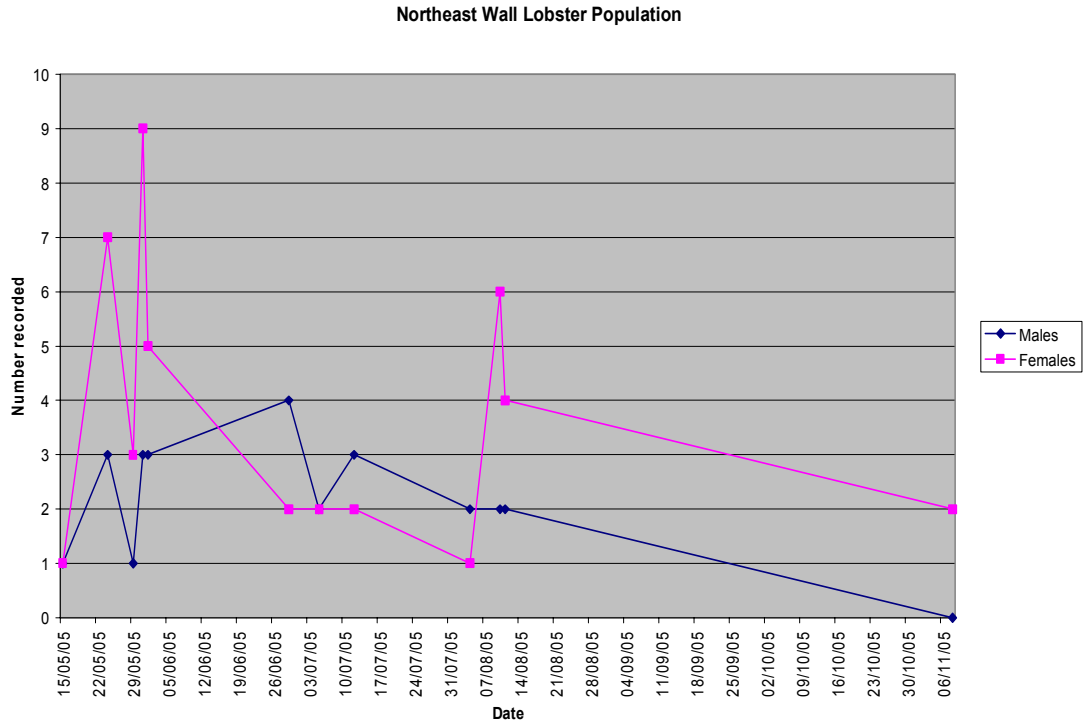


Figure 4 showing the total number of males and female counted at Northeast Wall throughout the year.

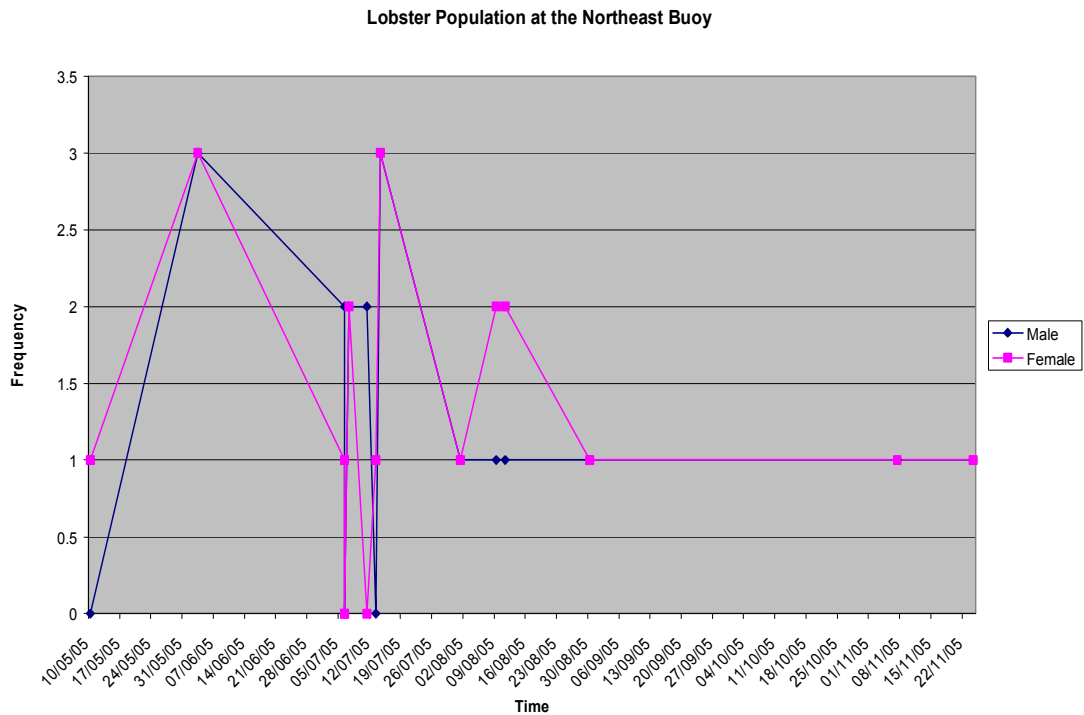


Figure 5 showing the total number of males and females counted at the Northeast Buoy Line throughout the year.

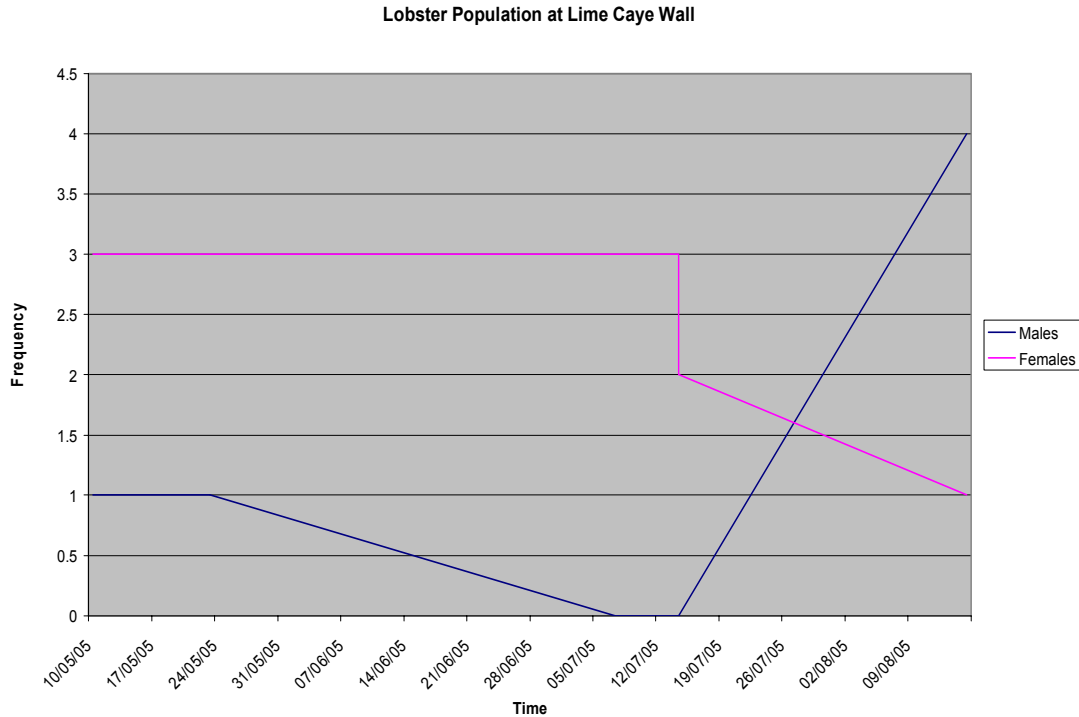


Figure 6 showing the total number of males and females counted at Lime Cay Wall.

The total numbers of lobsters were recorded at different locations on the wall in the Cays. There was no extensive study done at Seal Cay wall and Tom Owens wall, though the results showed a very small population of lobsters when surveys were conducted. Seal Cay contained the smallest lobster count on average. As for the locations off Northeast Cay, Franks Cay and Lime Cay the results showed an extensive lobster population all year round, with increased numbers at certain times of the year. The Northeast Wall was the most attractive site of all in terms of the lobster population. At one point during the closed season 12 lobsters were counted on a single dive.

From figures 1, 2 and 3 it is clear that the abundance of lobsters was highest around May, June, July and August. The topography of the Northeast Wall differs from the Buoy line because of its sheer drop off, instead of a gradual slope. This indicates that the lobsters prefer this type of topography to inhabit than a gradual slope. Due to the proximity of the two sites in question it is assumed that the physical oceanographic condition of the area does not affect the difference in abundance. In terms of Lime Cay wall this may have played a part in the distribution of lobsters, as the drop off is very steep there.

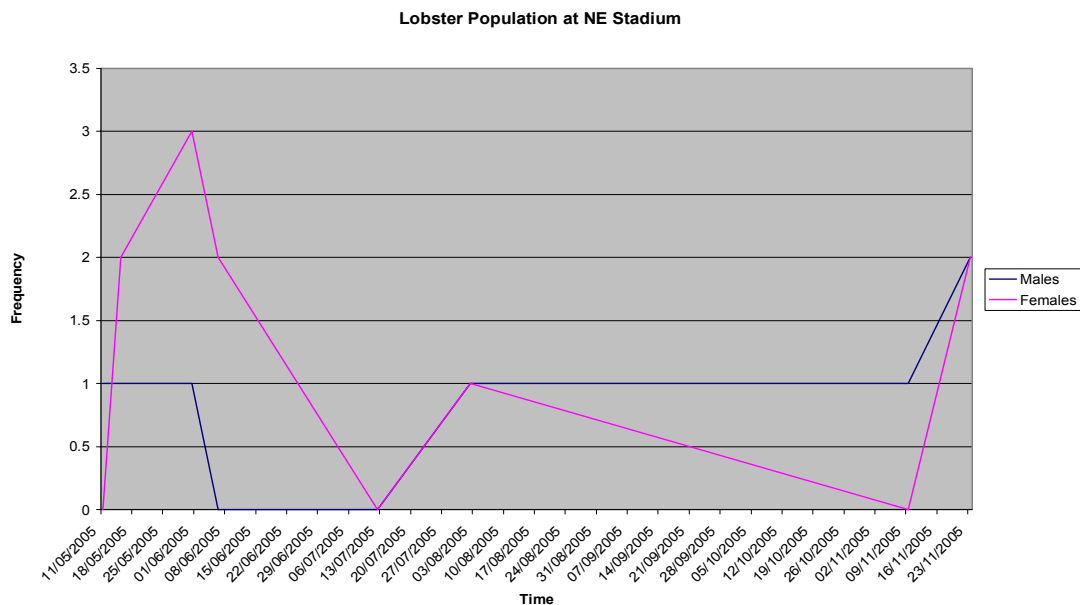
The large numbers of lobsters found during the months of May, June, July and August can be explained when looking at Figures 4, 5 and 6. These figures show the number of males compared to the number of females in the three sites described above. Figure 4 has a larger scale on the y axis due to the high numbers of lobsters recorded. It is very clear that one of the reasons for the high numbers between May and August is because of the increased number of females migrating to the area. This can be applied to the other two sites, though the results are not as conclusive. The reason why lobsters

migrate to the shelf in order to lay their eggs is because they want to ensure that currents transport the larvae inland to an area where there is a food source and which they can settle. The inner reef and wall sites surveyed showed no or limited decrease in the female lobster population. Therefore, it can be concluded that there is a strong sign of lobsters migrating from another region outside the Cays. For this reason it is essential that the Northeast Wall has some form of protection in order to ensure there is a high level of recruitment for not only the Sapodilla Cays, but other fisheries in Belize.

Due to the shape of the Cays there is a high possibility that female lobsters migrate from the West and the North in order to release their eggs on the Wall. The topography and strong currents on the wall makes it an ideal place for egg release. The fact that Lime Cay wall has a smaller number of females migrating to it, may be due to the greater distance away from the underwater entrance into the reef, as it is surrounded by deep water. The findings at Northeast Wall will provide more evidence that the preservation zone will be of great importance to Belizean fisheries. There is a lower abundance of lobsters throughout the year at the south of Northeast Wall; however they are crucial to the total population of the Cays. Therefore, it is still vital that the area is protected.

During 2006 it will be important to obtain some current meters and place them strategically around the Cays. Work should also be carried out on lobster recruitment.

There were two sites sampled in a very close proximity to the wall on the eastern side of the Cays. The Northeast stadium is less than 100m from the wall, and contains a sharp drop off to 30m resembling a wall, and on the other side has a gradual slope increasing up to the wall again. The second site is a mount opposite Hunting Cay and the reverse shape to the Stadium. The depth at the edge of the mount measures an average of 30m. The Stadium is close to Northeast wall and resembles a wall on the side that the lobsters would migrate from. Therefore, it is no surprise that between the dates of May and August there was a significant increase of females at this site (see Figure 7).



The site at Hunting Cay was found in August 2005, therefore there are only limited results. They do however show a high proportion of females to males in general. This may be due to the close proximity to the wall (see Table 1).

| date | site | Male | Female | total |
|------------|---------------|------|--------|-------|
| 10/08/2005 | Hunters Mount | 0 | 4 | 4 |
| 16/08/2005 | Hunters Mount | 0 | 0 | 0 |
| 16/11/2005 | Hunters Mount | 1 | 2 | 3 |

Table 1 showing the number of males and females recorded at Hunters Mount from August.

The channel between Hunting and Nicholas Cay (Nicolas Cut) was surveyed a few times, the general trend was an increased male population compared to the females. This site, together with Hunters mount will need more focus in terms of lobster survey work next year.

There is low adult lobster abundance in the inner reef, with no more than one lobster found in any single dive. However there is still a strong juvenile population in the shallow waters surrounding many of the Cays.

During 2006, it is increasingly important that we can incorporate many of the methodologies used by the Belizean Fisheries Department in order to utilise the data more efficiently. The initial results shown have created a great baseline for the continued lobster work during 2006. There still remains some room for improvement in terms of the size of the area covered, sizes of species, current data, recruitment work and the possibility of using tags.

3.0 Conch Data

The queen conch (*Strombus gigas*) is a commercial species that is in serious threat of being severely overharvested. When diving the Sapodilla Cays, it was clear that there are only patches of queen conch in certain locations at varying depths. There are however no aggregations of a significant density found anywhere in the Cays. The patches where conchs are present throughout the year were found at Northeast Stadium, Nicholas Cut and Franks Cay inner (shallow site). Other areas contained a very small abundance of conch.

In August 2005, ReefCI conducted an experiment in which 200 conchs were tagged for future monitoring. Throughout a four week period all of the tags were attached to conch located at the three major sites of aggregations. Although there are limited results recorded the experiment should prove to be of great importance in terms of locating the migratory paths and breeding grounds of conch.

While conducting the experiment it was clear where there was mating activity, egg release, nurseries and a difference in conch sizes at different sites. When a conch was found there were observations that were recorded before the tag was tied around the spire and fixed in place using a cable tie (see below).

1. Tag number
2. Date
3. Site name
4. Depth
5. Location within site
6. Qualitative size (S small, M medium, L large)
7. Other observations (mating, eggs, etc)

The channel located between Hunting Cay and Nicholas Cay (Nicholas Cut) had a high density of Queen Conchs and had a total of six recorded mating observations, which agrees with some previous work documented. There was also a report of one conch laying eggs at the same site. Another deep water breeding site was found at the Northeast Stadium (as described above), which has an average depth of 30m. In general the sizes of the conch located at this site were large in comparison to the other sites used for analysis. This site has never been documented and is of great importance in terms of the conch population and rare deep water breeding grounds of the Cays. During the early stages of the closed season there were great abundances of conch at this site, which would be very difficult to catch by free diving due to the depth. However, the shallow end of Nicholas Cut is commonly used as a fishing ground for conch, and will need some form of protection in order to keep stock levels high. Another site found with high conch abundance though no sign of reproduction was a shallow channel between grass beds on the western side of Franks Cay. The conchs tagged at this site were of a smaller size and are thought to be migrating somewhere as there have been no sightings so far after the month of August. This is untrue for sites at Northeast Stadium and Nicholas Cut, where there have been a number of sightings of the tagged conch with little or no movement. This suggests that the area acts as a permanent habitat as well as a breeding ground. Another breeding sight has been documented off Lawrence Rock, though no research has been conducted by ReefCI in this location as yet.

Currently we are aware that queen conch nurseries are located in shallow water at the reef cuts between Hunting Cay and Nicholas Cay and between Franks Cay and Nicholas Cay. These areas have still acted sufficiently this year in providing a food source and shelter for juvenile conch, with high abundances observed.

The conch population of the Sapodilla Cays is slowly beginning to be mapped out. With the results of this experiment and a subsequent 200+ more tags planned to be used during 2006 the migratory patterns will become clearer. There is still a significant amount of work to be done that will prove to be very useful in terms of monitoring densities of stocks in all three major sites described above. There is also a greater need for further underwater exploration to identify more permanent groups of conch in the Cays throughout the year. The exact size of tagged conch will be measured in future, in order to monitor changes in growth rates. All of these issues will be a focus of ReefCI next year in order to improve our understanding of behaviour, habitat and physiological changes in the Sapodilla Cays.

4.0 Reef Check Results

Reef Check is a simple data collection methodology. It was designed to obtain a snap shot of the condition of the coral reefs world wide. It was also designed as a simple tool that recreational divers can easily adapt to. The species collected are key species only and are only counted at the family level.

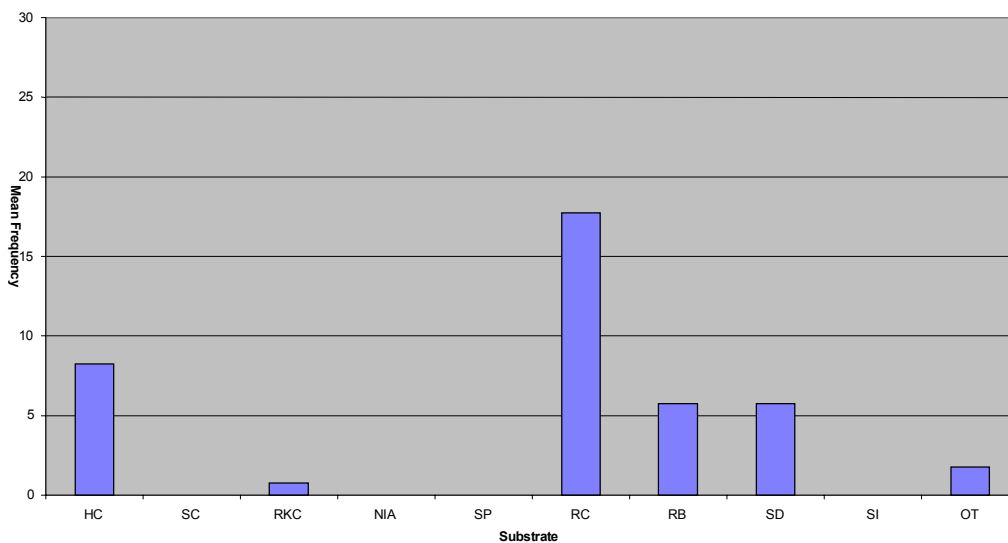
4.1 Substrates

A number of surveys were conducted at several sites in the Sapodilla Cays and two in Laughing Bird Cay. When conducting a substrate survey there are four 20m transects laid in line with each other and a plum line dropped every 50cm where the substrate is then identified. The first thing the plum line touches is the substrate recorded. This is in order to eliminate any bias. The abbreviations of the substrate can be seen below.

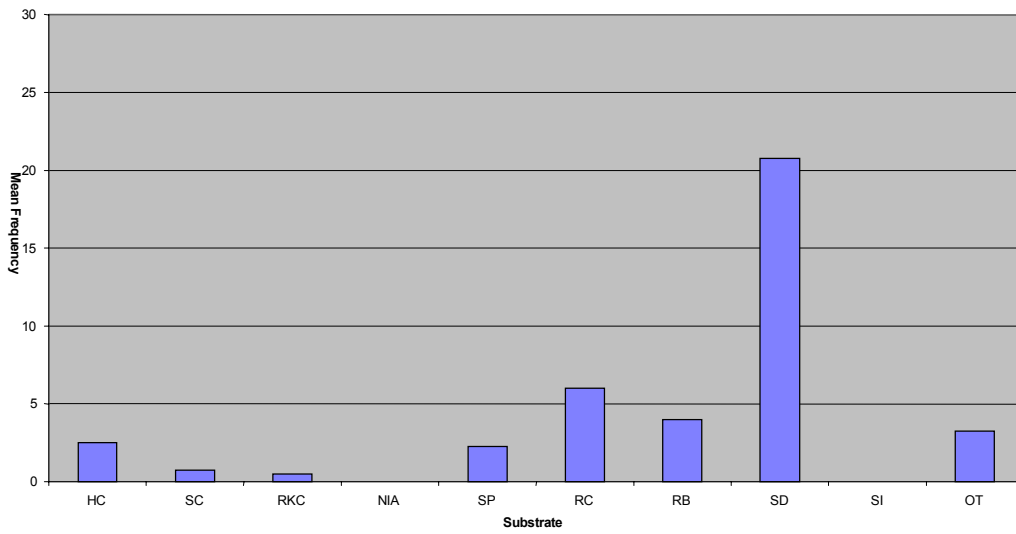
- RC – rock (including algae cover)
- SD – sand
- RB – rubble
- HC – hard coral
- SC – soft coral
- RKC – recently killed coral
- SP – sponge
- OT – other
- NIA – nutrient indicator algae
- SI – silt

To ensure that the results are reliable an average value is calculated from all four transects for a single site. The surveys have recently been conducted, therefore it is difficult to analyse any changes in a site over time. However, it has been possible to compare all sites with each other for any spatial variance.

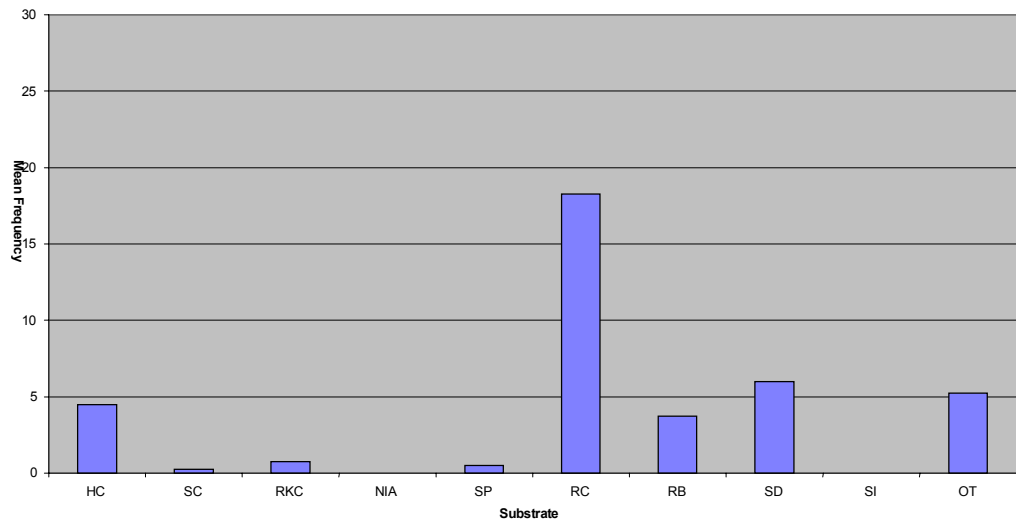
Substrates at Bungee Backside on 07/12/04



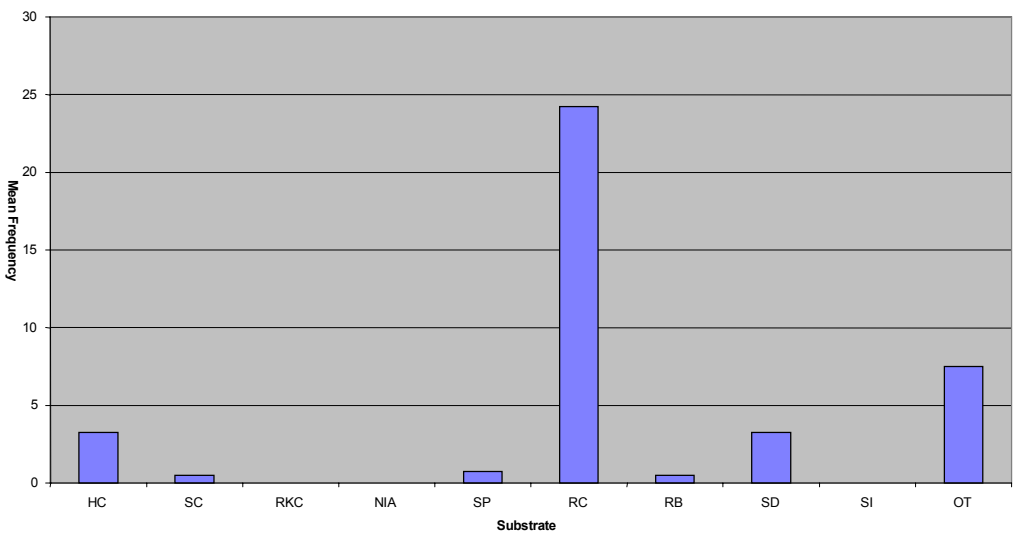
Substrates at Pelican on 26/11/04



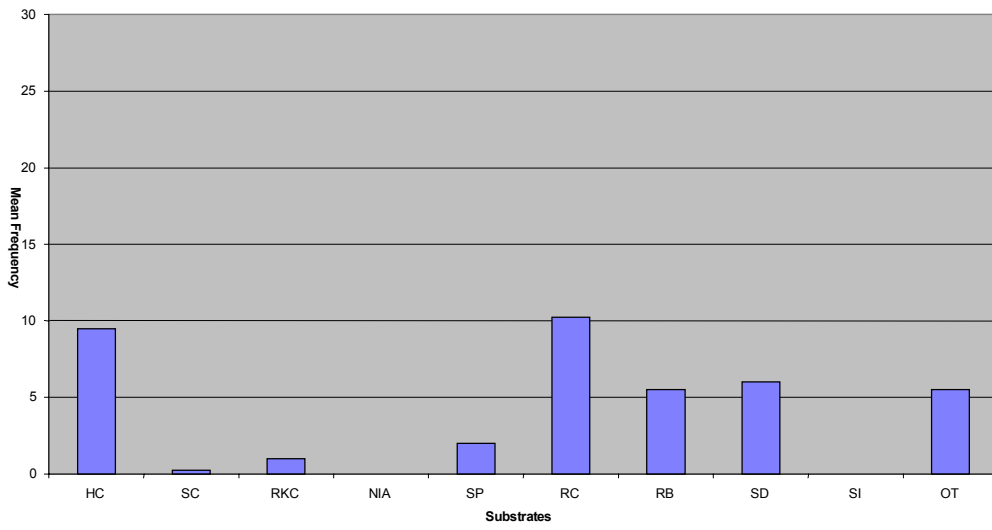
Mean Substrates at Lime Cay Wall on 09/06/05



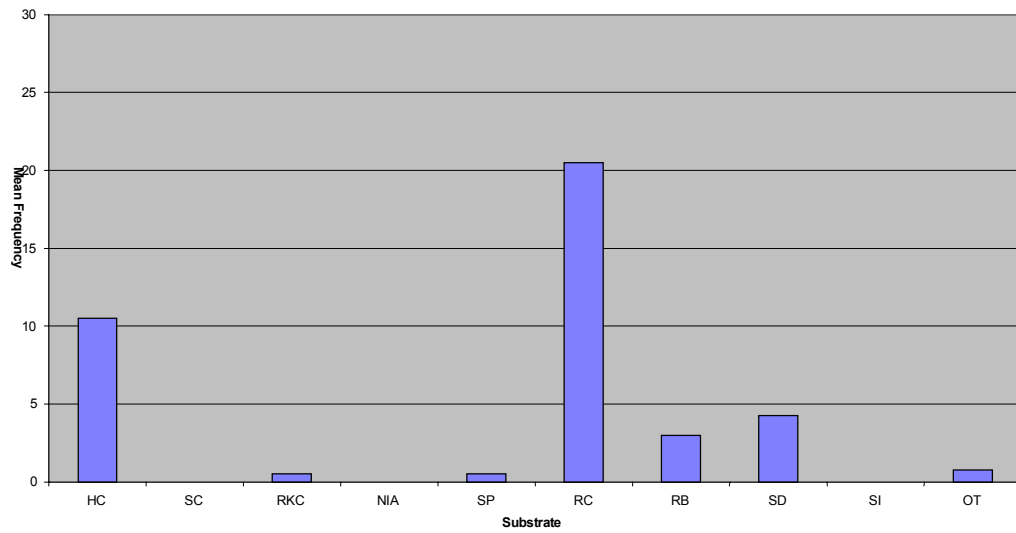
Mean Substrates at Lime Cay Wall on 18/08/05



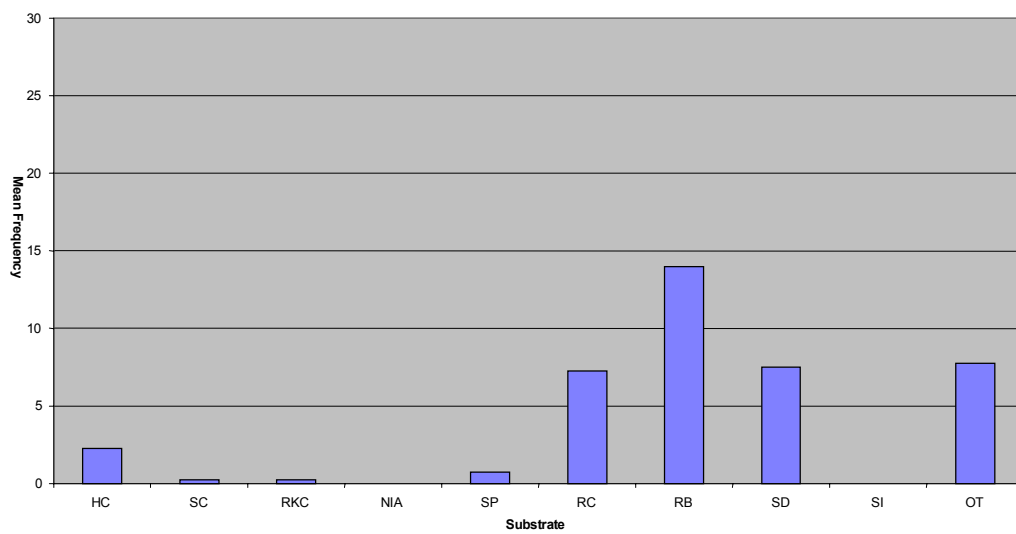
Mean values for Substrates at Ragged Cay on 04/08/05



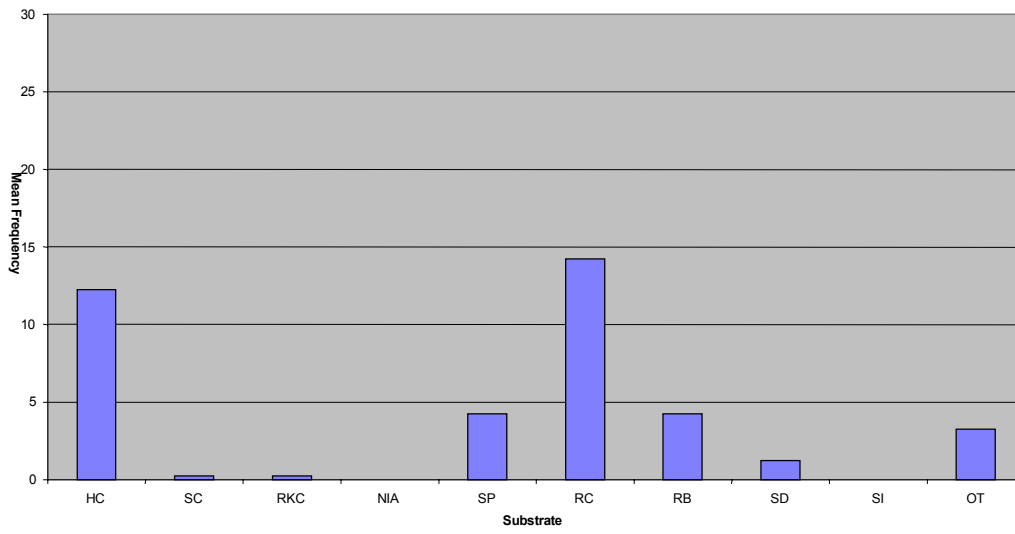
Substrate types at Ragged Cay on 21/04/05



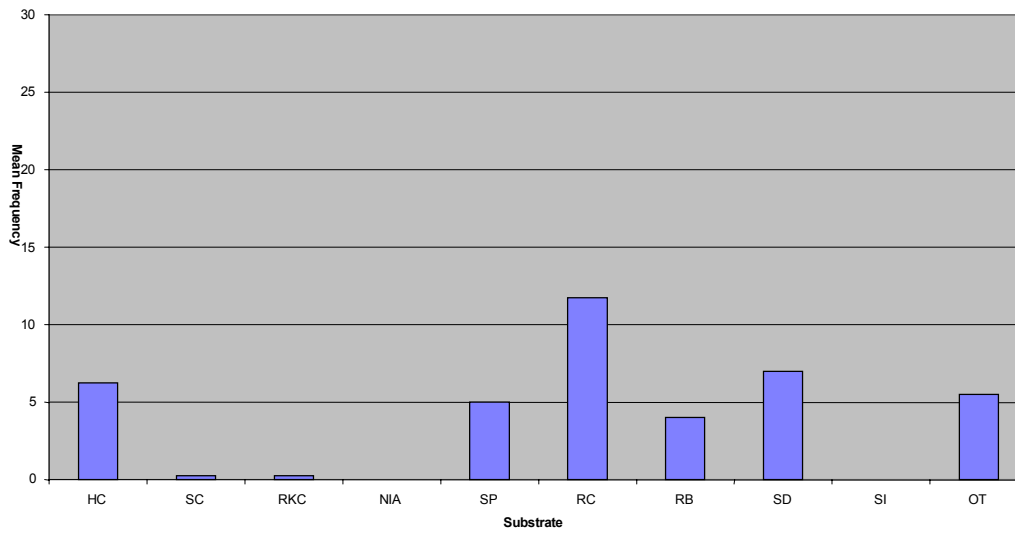
Substrates at Seal Cay Point on 08/12/04



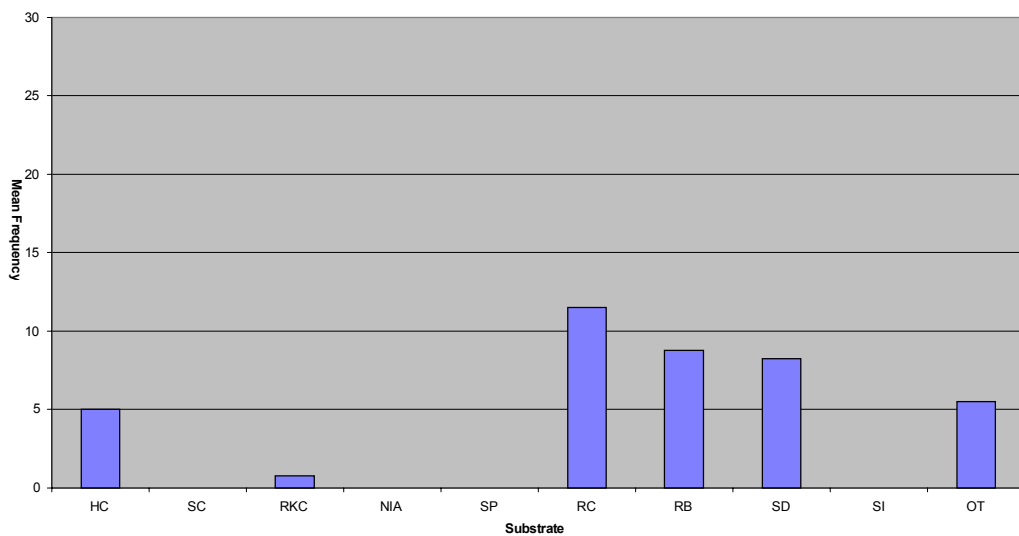
Substrates at Vigilance on 04/05/05



Substrates at White Sands on 17/03/05



Substrates at Laughing Bird Cay on 16/08/04



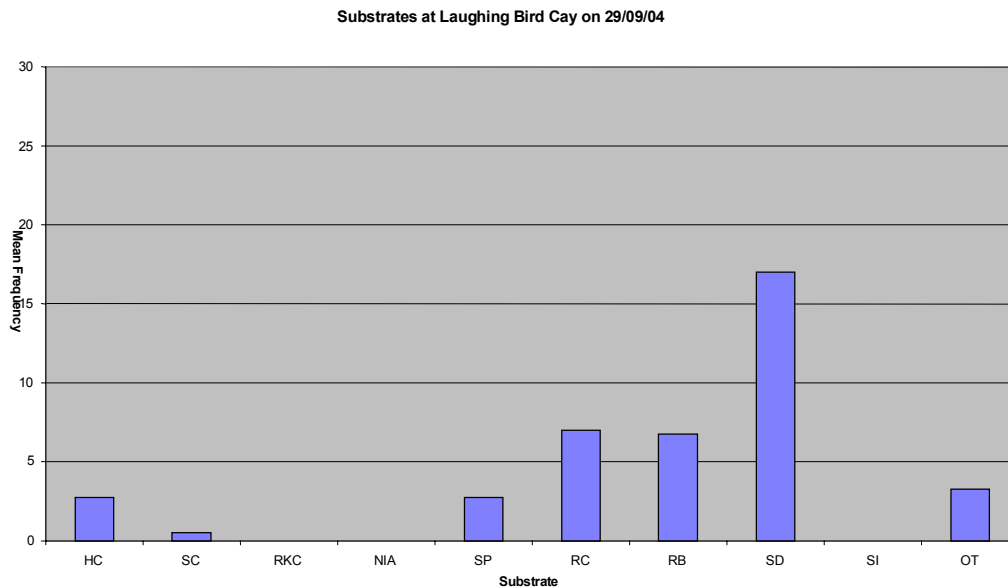


Figure 8 showing the results of 11 transects taken at different locations throughout the Sapodilla Cays and Laughing Bird Cay. Each transect shows the frequency of different substrates occurring at each location. Three sites are shown twice at different times of the year (Ragged Cay, Lime Cay Wall and Laughing Bird Cay), with the remainder of the sites only surveyed once throughout the year.

The results illustrated in figure 8 show a high proportion of rock, sand and rubble in all sites surveyed. This is common in terms of modern day global coral reef systems. However, the data presented in figure 8 is an extreme of such a pattern. Currently the proportion of living organisms to non living organisms in all sites is extremely low and therefore causes a great concern to the health of the reef. With more surveys conducted in future years it will become clearer if the reef is in a current decline or is in recovery. Interviews with local fishermen have indicated that there is a gradual decline occurring within the Cays at present. Figure 9 shows a direct comparison of all the sites surveyed in order to gain an understanding of the most productive areas.

Percentage Cover of Substrates for Eight Named Sites

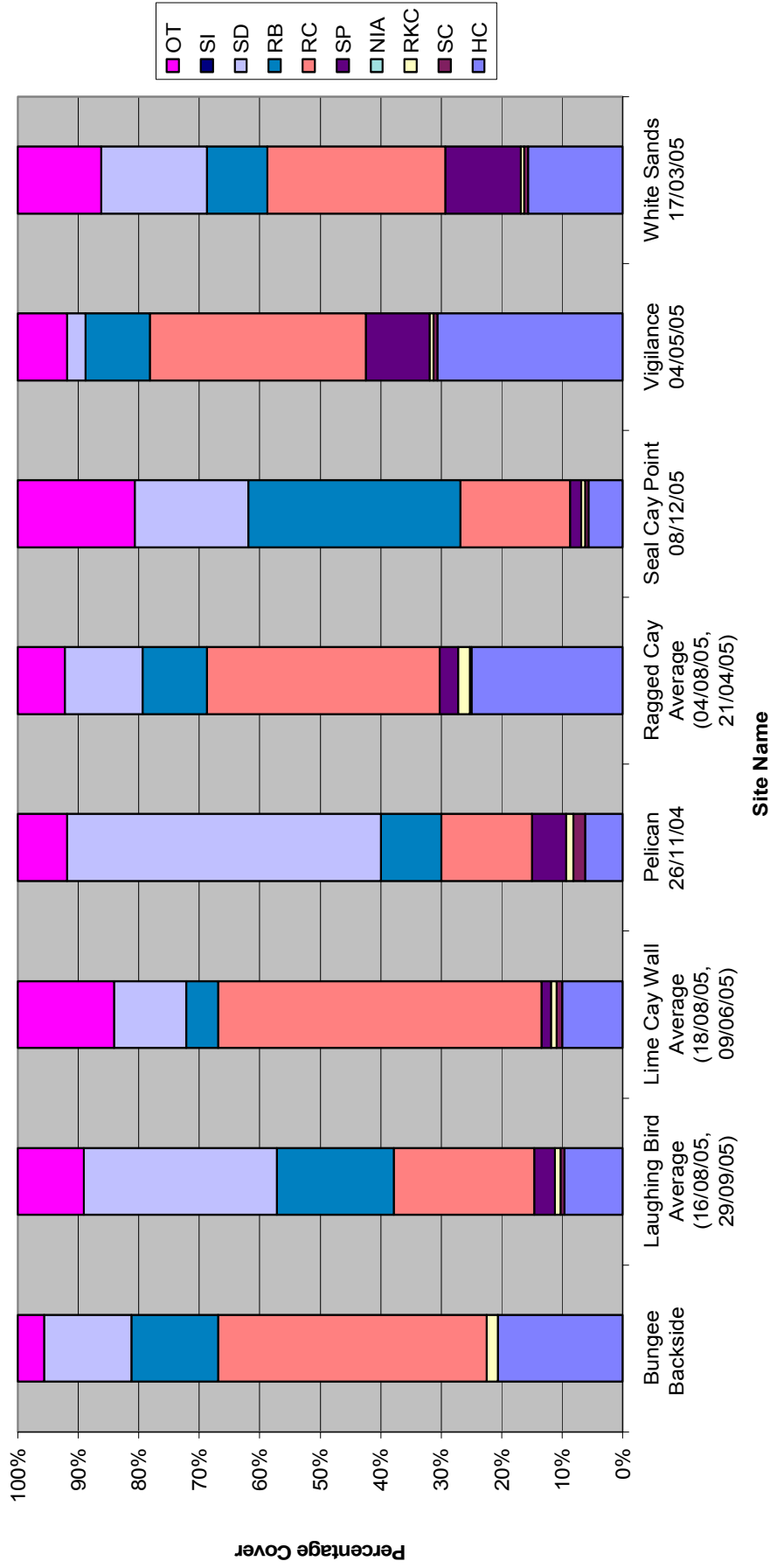


Figure 9 showing the percentage cover of different substrates for seven sites in the Sapodilla Cays and one site at Laughing Bird Cay.

From figure 9 there is one clear trend in the results. There is a far greater abundance of hard corals in sites situated further from the continental shelf (Vigilance and Ragged Cay). This would indicate higher stress levels in the areas of close proximity to the wall. It is unclear at this moment in time whether the stress maybe initiated by the chemistry, biology or physics of the water column. With the increase in chemical fertilizers used in the three countries surrounding the Cays in the past decades the emphasis must be on the chemical composition of the water column. Any pollutant reaching the Cays would have a direct effect on organisms close to the wall than further inside the reef, though there would still be a great threat to those organisms inside. Due to the close proximity to river mouths, sedimentation in these areas may also have played a role in the lower percentage of living organisms. The percentage cover of recently killed corals is highest at Ragged Cay, further inside the reef, possibly indicating a decrease in coral cover that will soon match the sites closer to the wall.

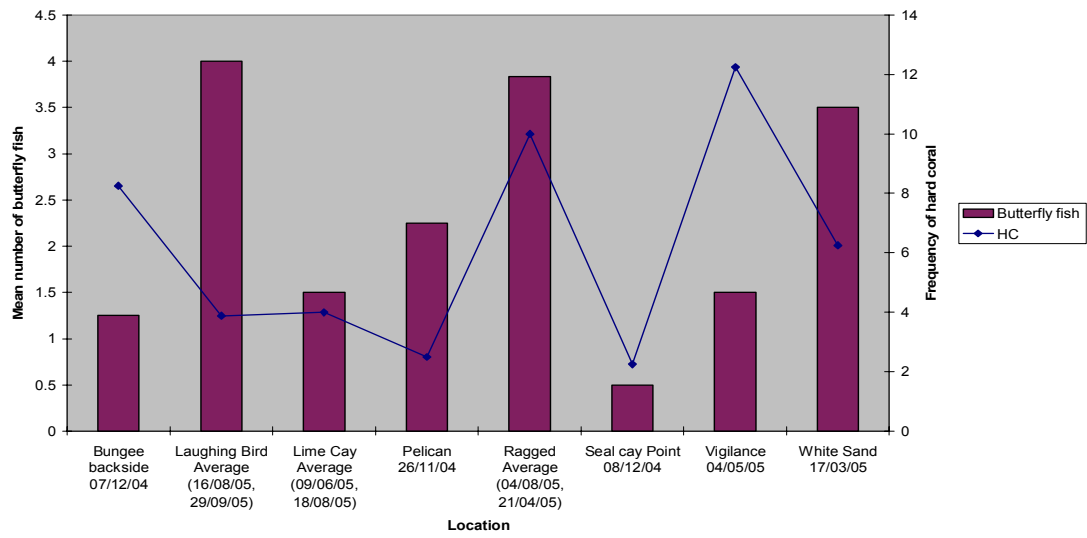
The sites closest to the wall are the sites that have the lowest abundance of living organisms and the highest proportion of rock, sand and rubble. There is a considerable amount of chemical analysis that needs to be conducted in the Cays, measuring both key nutrients such as nitrates, phosphates, silicates and iron, as well as pollutants. There should also be some physical data collected in order to analyse the possibilities of harsher conditions creating a major stress on coral growth. This may be a controlling factor rather than chemical changes in the water, though the sites surveyed on the Western side of the Cays show just as much degradation as the Eastern side, which face much rougher conditions. Sedimentation rates and visibility will need to be measured frequently during 2006 in order to analyse the differences throughout the Cays. To understand the difference in tolerance levels and optimal habitats, it will also be necessary to identify all the coral species for each site.

The preliminary results shown above have created a baseline of data that will be used as part of a monitoring programme over the next few years, though there must be more chemical and physical analysis in order to conclude why there is this pattern and how it could be mitigated.

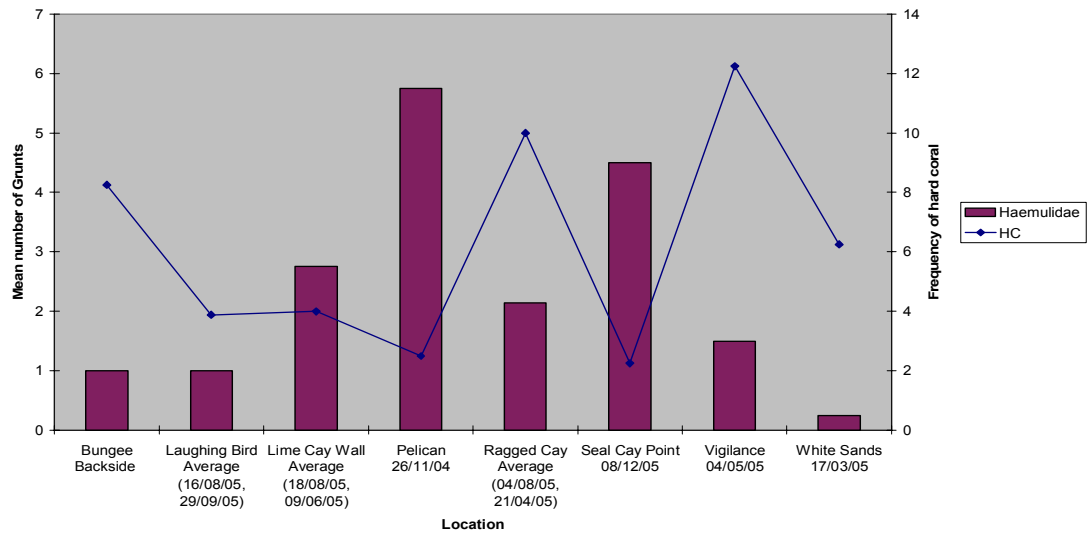
4.2 Fish

The population of the major fish species in the Cays varied significantly at different locations. The Nassau Grouper was counted once during a survey at Lime Cay Wall, suggesting that the species is still in decline and is showing no signs of recovery. There was never more than 2 types of groupers sampled in an area of 400m² for any transect. This was at Vigilance and White Sands. The situation is similar for the moray eel; this species was only counted once in two separate locations where we conducted surveys (Lime Cay wall and Ragged Cay). The remainder of the fish species sampled include Snappers, Grunts, Parrotfish and Butterflyfish, which showed a far greater abundance than groupers or eels, though in comparison to many of the world's reef systems was very low. The results can be seen on figure 10, which shows the mean abundances of each fish species in 100m², together with the percentage cover of hard coral.

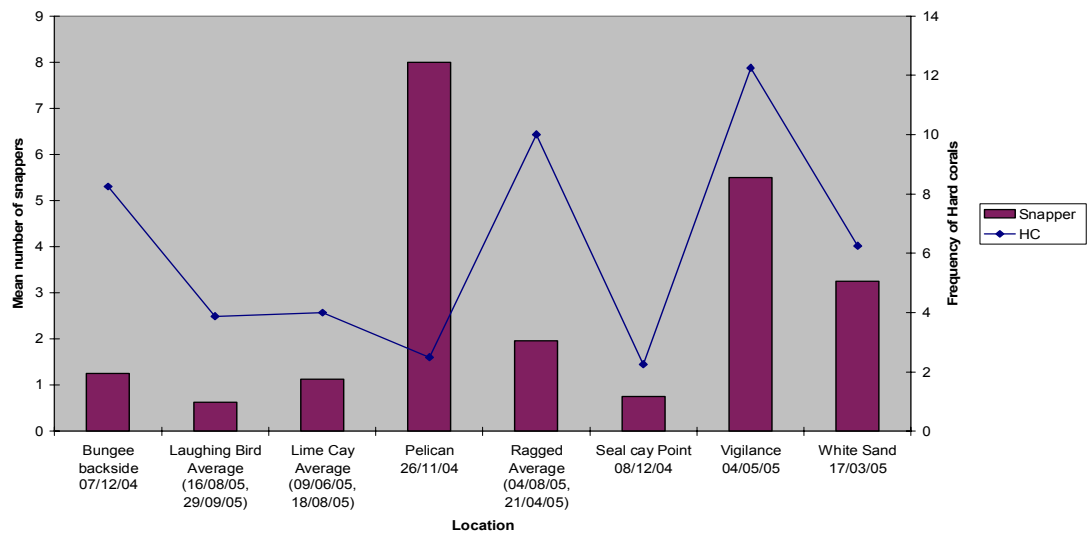
Butterfly Fish



Grunts



Snappers



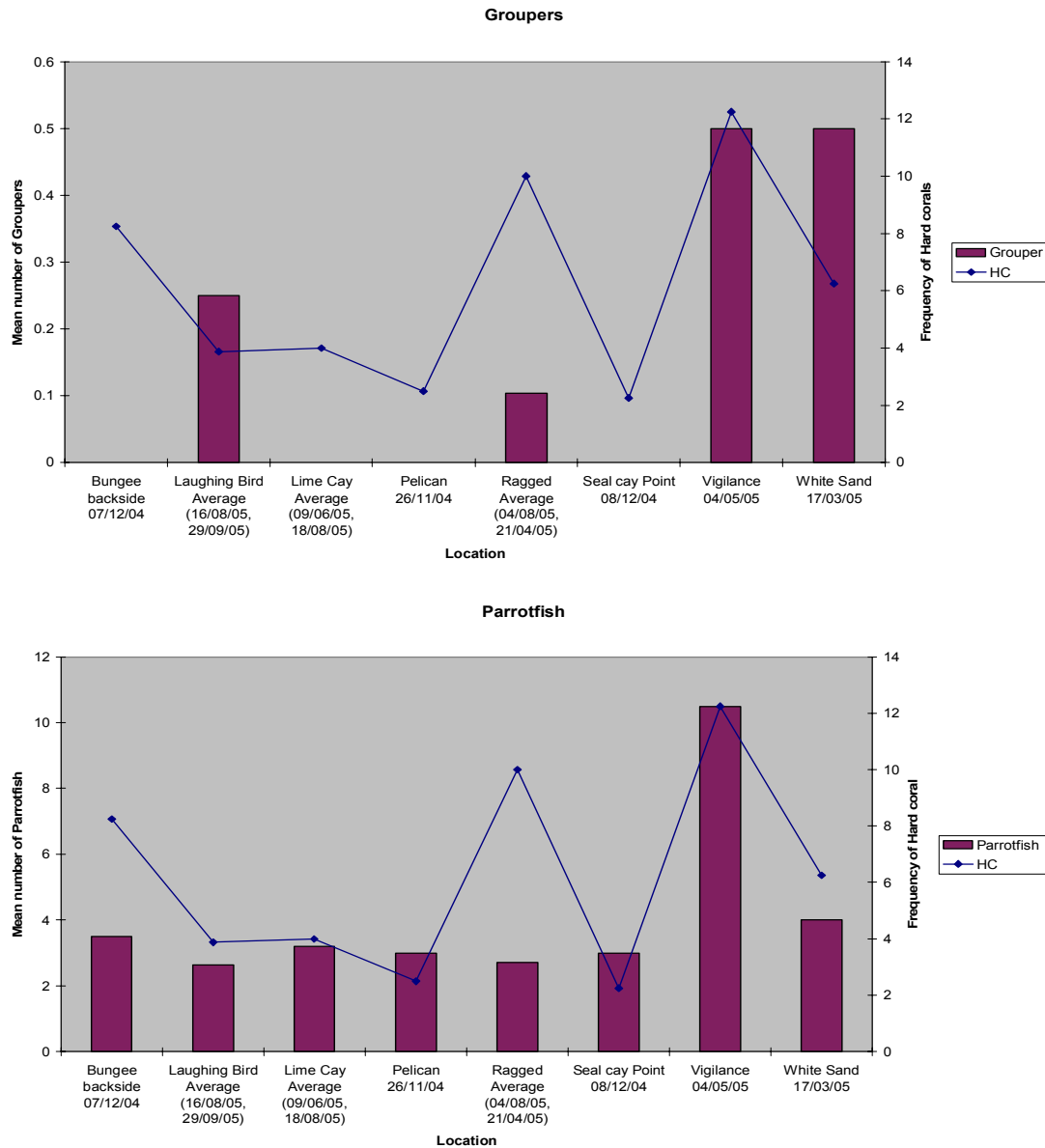


Figure 10 shows the mean number of each fish species at the 8 different locations. The transect area is 100m². The frequency of hard coral cover is also shown in the linear form.

It is hard to quantify the results for fish species due to their mobility, though the results produced have shown some patterns in terms of spatial variance. Vigilance showed the highest percentage of hard coral, which correlated with the high numbers of parrotfish, groupers and snappers compared to the other eight sites. The number of Butterflyfish showed some correlation with the percentage cover of hard corals as the site at Ragged Cay had the greatest abundance. This was untrue for grunts, as there was no correlation with coral in any of the sites.

At Lime Cay wall, the abundance of all fish species was very low, except for grunts, which showed no correlation with the percentage of hard coral cover. As mentioned in the previous section Lime Cay wall had a very small proportion of living organisms compared to non living organisms in terms

of the substrate type, which would explain the high abundance of grunts compared to other sites.

The three sites situated on the northern side of Seal Cay (Pelican, Seal Cay Point and White Sands) showed a significant abundance of certain species compared to the percentage cover of hard coral. These areas seem to act as a suitable habitat, regardless of the lack of living substrates present. Vigilance and Ragged however have a high abundance of fish species and a high proportion of the substrate is living.

Although there is an extent of correlation between substrates and fish abundance for all the species except grunts, there are some anomalies in the sites situated north of Seal Cay. Fish are mobile species; therefore there will need to be many more surveys conducted in all of the above locations in order to understand the relationship between corals and fish better in the Sapodilla Cays. This is crucial in terms of future conservation. The total abundance of all fish species has been seriously depleted in terms of over fishing in the Sapodilla Cays, therefore the implication of the preservation and conservation zones should help the populations to recover. Pollution from river sources may also have had a direct and indirect effect on the total population, impairing their ability to reproduce efficiently.

4.3 Invertebrates

The number of lobsters and conch were noted when a survey was conducted, though the results showed a very low abundance for each. In the previous sections it was concluded that there were certain patches of each species around the Cays. The areas that were used for Reef Check surveys showed no areas of high abundances, with there rarely being any sightings at all. The average densities for lobster and conch cannot be calculated using the Reef Check data for this reason.

The number of banded coral shrimp in the Cays was generally high, with no signs of any significant depletion from the aquarium trade. The areas having the highest percentage of rock cover tended to have the highest number of banded coral shrimp present (Figure 11).

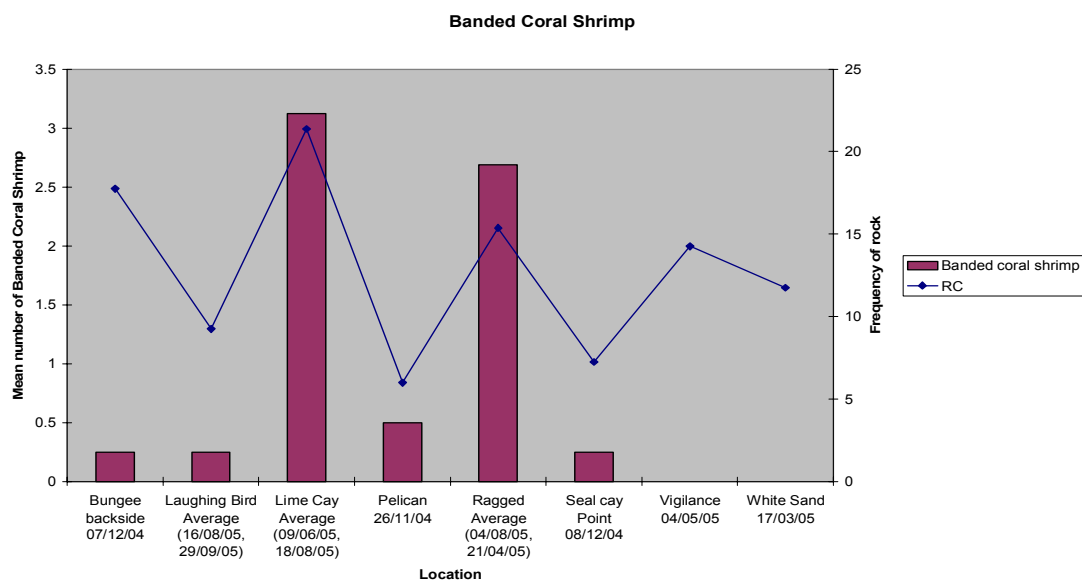


Figure 11 showing the average number of banded coral shrimp in 100m² for eight locations in the Cays. The frequency of rock cover is also represented linearly.

Similar to the banded coral shrimps, the flamingo tongue is also stable and shows no sign of depletion through both the curio and aquarium trade. It also shows a correlation with its habitat, the gorgonians (Figure 12). The number of gorgonians in the Cays is significantly high and is made up of many different species. There seems to be no threat of depletion at this present time, with numbers often exceeding 300 in 100m².

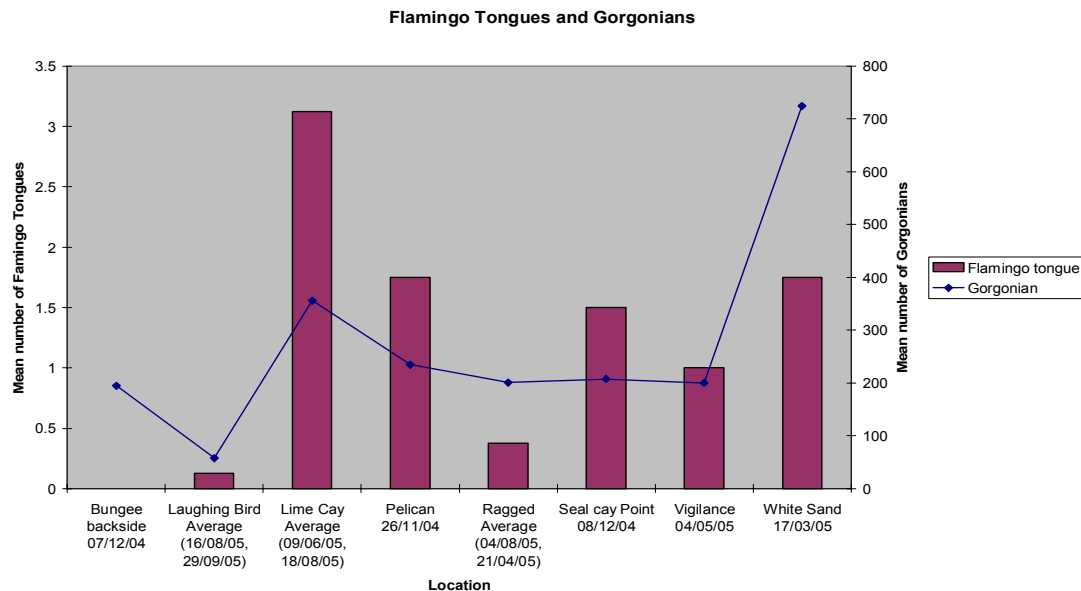


Figure 12 showing the mean number of flamingo tongues found in 100m² at eight locations in the Cays. The number of gorgonians is represented in a linear form.

The long spine diadema urchin plays an important role in maintaining the balance between corals and algae in an ecosystem. The urchins feed primarily on algae; though will scrape the polyps off corals if algae is not present. Their habitat is therefore on rock where they will graze what food is available. Therefore, the highest values of rock cover had the highest number of urchins occupying the areas. The majority of these sites also showed a low percentage of living organisms present in terms of substrates (excluding algae). These include Lime Cay wall and Bungee backside (Figure 13). Ragged Cay had a high percentage of rock cover and a high number of diadema urchins, though the amount of living substrate was still high. This suggests that there is a significant supply of algae present for the urchins to feed on instead of live corals. The percentage rock cover at Vigilance was significantly high, though there is a small abundance of diadema urchins. This is highly likely because of the significantly higher number of parrotfish that occupy the area, which feed on the urchins (Figure 10). No other site used for surveys had a population of parrotfish as high as Vigilance. From these results it is clear that the population of diadema urchins plays such an important role in maintaining a balance between the corals and algae. It has been proved that if there is a decline in parrotfish and triggerfish there will be an increase in the urchin population, which may prove to be highly detrimental to the coral cover in the Cays. From the data shown in Figure 13 the abundance of diadema urchins is not a major threat to corals at present, though if there is a further decline in parrotfish then there is a strong possibility of Belize suffering a massive degradation of corals like many global reefs have experienced in the

past. There has been significant over fishing of herbivore fish species in the region therefore, it is preferred if the abundance of diadema urchins increase. This would in turn reduce the macroalgae density and allow the coral to grow through the reduction of interspecific competition.

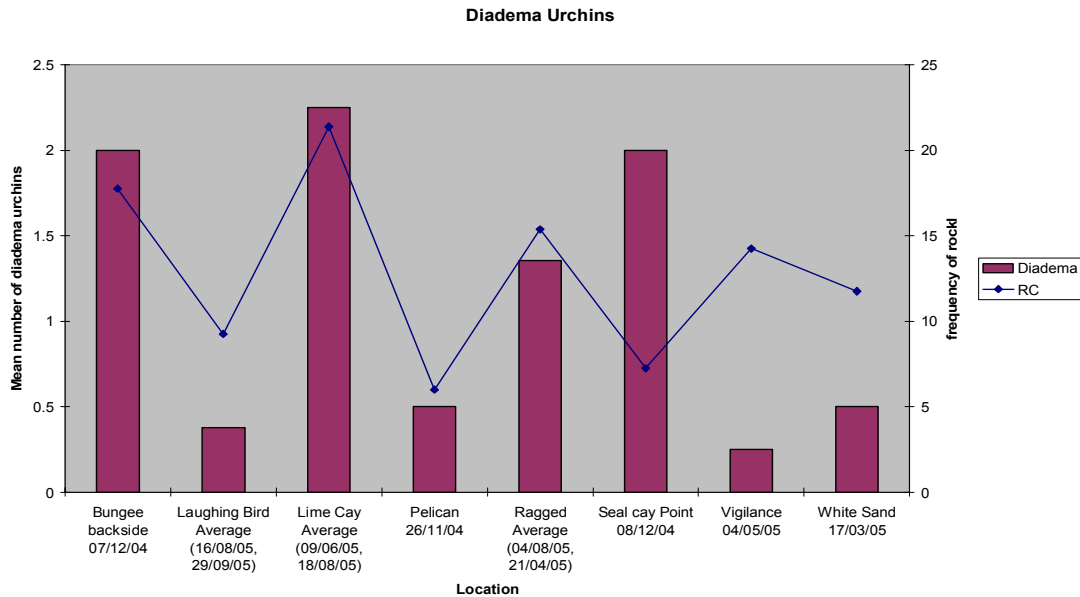


Figure 13 showing the average number of diadema urchins in 100m² for eight sites in the Cays. The percentage cover of rock is represented linearly.

The number of pencil urchins found in the Cays is very low. Only four out of the eight sites surveyed contained at least 1 pencil urchin. It is unclear why there is such a low abundance of pencil urchins in the Cays, as there is a low demand for the curio trade in the region. The four sites where the pencil urchin was present can be seen in figure 14.

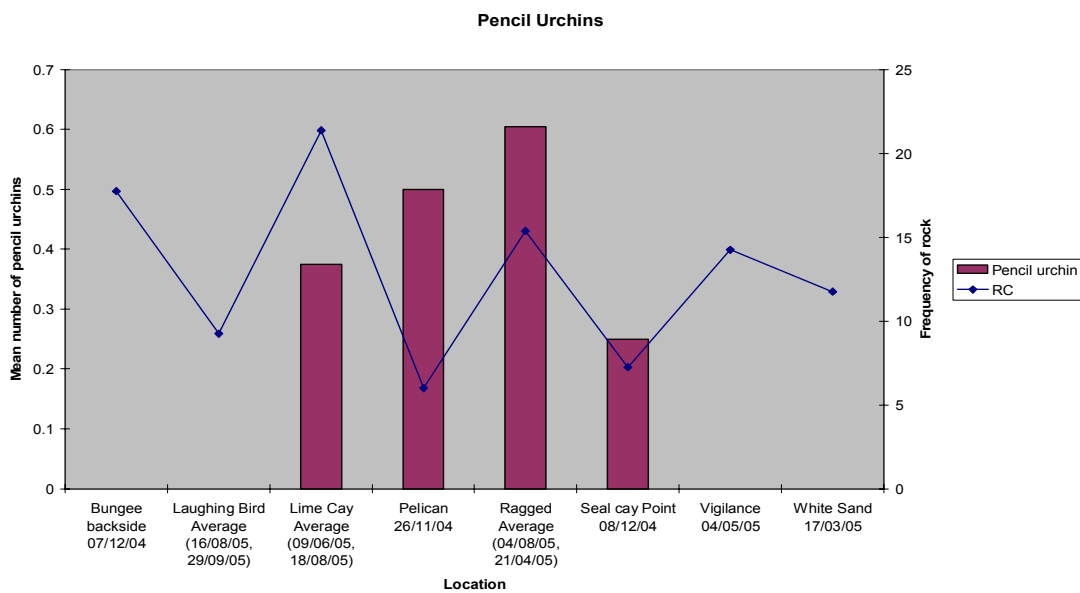


Figure 14 showing the average number of pencil urchins in 100m² for eight sites in the Cays. The percentage cover of rock is represented linearly.

5.0 Diseases, Bleaching and Damage

There were a number of diseases recorded throughout the year, which showed a correlation with the low invertebrate population and some correlation with a low fish count. There was however a maximum of 8% of the coral population that was diseased in all the surveys conducted. The majority of sites never contained more than 2% diseased coral in 100m². The worst site for coral diseases occurred at Lime Cay wall, further increasing the likelihood of pollutants and other chemical stressors impairing the corals immune system. The identity of these diseases will be useful in determining some of the possible causes.

The general trash and fish nets that were found on the sea bed were minimal, with only a few sights showing a low amount, and the rest were absent. However, there was a low/medium amount of damage created by anchors in the inner reef, at the sites Ragged and Vigilance. The other sights either showed no or low damage created by anchors. The amount of other physical damage to the reef was generally low throughout the Cays. It is likely that the damage was due to some of the recent storms the area had experienced.

The reef check surveys are conducted in water no deeper than 10m. There was a massive bleaching event that occurred in September 2005, which affected the deep waters, mainly between 20m and 30m+. The coral species that were affected will be discussed later in this section.

There was some bleaching reported at all sites throughout the year. During August and September last year the most bleaching was found at Laughing Bird Cay, with at least 10% of the coral population bleached. The colonies were at least 40% bleached. The average percentage of the population that was bleached in the Sapodilla Cays was 3%. There was no difference in bleaching between the inner and outer reef.

5.1 Recent Bleaching Phenomena

Between the spring and the late summer of 2005, there was an unusual change in bleaching activity. The bleaching decreased in the shallow waters and increased in the deeper waters. The intensive heat had evaporated the fresh water above the thermocline to an extent where it became unstable. Due to the high saline content, the density of the water became greater than the cool water below. This caused the two water bodies to overturn, with warmer water occurring between 20m and 30m. Therefore, the less tolerant corals that thrive in deep waters became bleached. **This was a major bleaching event that occurred around the Caribbean.** Some of the areas in the Caribbean observed surface bleaching, due to the warm water on the surface never becoming so dense that the thermocline became unstable. The surface corals in the Sapodilla Cays were not threatened by increasing temperatures. The increased temperature is associated with the high hurricane activity during 2005. It is predicted that every 40 years there will be a similar event. The high temperatures and increased hurricane activity was also observed in the 1920's and 1960's. Oceanographic past studies predict that a similar event will occur during the next few years.

The major corals that were bleached between the depths of 20m and 30m were boulder star coral, massive starlet coral, lamarcks sheet coral and the two variations of mustard hill coral.

A survey was carried out during a 2 month period during late October, November and the beginning of December. The divers used simple techniques of recording the depth, type of coral and area bleached primarily by taking photos of boulder star, lamarks sheet coral and mustard hill coral. The data was recorded at one site, NE Buoy. Further research needs to be done in order to ascertain what the long term damage is, however it is perceived that in general the bleaching is beginning to repair itself.

6.0 Spawning aggregations

During 2005 ReefCI found a total of 3 new spawning sites. These were found during various times of the year and were each of a different variety of fish. The first spawning site was found during the March full moon. The site was on Tom Owens wall. It was an aggregation of Dog Snapper with about 1,000 in number (figure 15).



Figure 15 showing the spawning aggregation of Dog Snappers at Tom Owens Wall.

The next spawning aggregation to be found was a group of Yellow Tail Snappers at Hunters Mount.

During the December full moon an aggregation of spawning Black Groupers were found at a site called 'Honeymoon' which is between Northeast Cay and Tom Owens. There were about 20+ at a depth of 40-50 metres. Each grouper was at least 3-4 foot long, primarily the dark black colour and showing typical Grouper spawning behaviour and colour change.

All of the new spawning sites found during 2005 were by accident during our routine dives. This is due to ReefCI consistently diving in the area. These sites will be monitored again during 2006.

7.0 Conclusion

ReefCI has based our report during our first full year of operating on the need to obtain baseline data throughout the Sapodilla Cays Marine Reserve. ReefCI is a conservation company that obtains its funding from the private sector. This is achievable by offering conservation trips to Belize for the general diving public in the UK. Due to the setup of the operation, the valuable human and financial resources are available, which enables us to consistently dive and collect data throughout the year.

Lobster and Conch are of great economic value to Belize. The data collected throughout 2005 was achievable due to the consistency of the diving. It is generally conceived that conch breed in shallow waters. The data collected from the Sapodilla Cays Marine Reserve during 2005 shows that this is highly unlikely. ReefCI will continue to monitor lobster breeding patterns during 2006.

The Reef Check data that can be easily adapted for recreational divers, has given us a start with regards to a base line of data for the area. This can continue to give us a general view of the changing condition of the reef ecosystem on a spatial and temporal scale.

Coral bleaching and the outbreaks of coral diseases are subjects that can be continued to be studied due to the growing knowledge that ReefCI has of the area.

This report indicates a strong need for preservation zones to be enforced in the Sapodilla Cays Marine Reserve. ReefCI can collect more complex data with regards to the condition of the environment if we utilize other methodologies such as the Mesoamerican Barrier Reef Synoptic Monitoring Program (MBRSMP), whilst working closer with the Fisheries Department. There is currently not a major problem with regards to anchor damage in the area. However, as tourism begins to grow, to prevent this becoming a problem in the future, it is advised that there are more mooring buoys placed in areas that are of interest and in need of preservation around the Cays.