

Greenforce Kubulau Progress Report December 2009

Greenforce are a not for-profit London based Non-Governmental Organisation. Greenforce Fiji has been based in Kubulau District, Bua since 2005, after moving from a successful project in Yadua. The project has developed well in the 5 years Greenforce have been in Kubulau. We have become an integrated part of the Kubulau community, with over 80 volunteers coming to assist the project each year.

Our current project is running under guidance of The Wildlife Conservation Society (WCS). During the past two and a half years we have undertaken data collection on 11 sites in Kubulau to provide reinforcement of WCS' data set collected twice annually in the region. The sites surveyed have been designated, by the local communities as Tabu and Control sites. Until January 2009 we were surveying under WCS protocol recording 200 reef fish species commonly found in the area. In the December 2008 meetings with WCS we discussed the survey methods being used and it was decided that our contribution to WCS work would be adapted to incorporate FLMMA into our work and created a more community based conservation effort.

Our survey protocols were then revised accordingly and we are now undertaking reef monitoring surveys for Fiji's Locally Managed Marine Areas (FLMMA). The staff attended a weeklong FLMMA workshop, held in Navatu, where we were trained in the survey method with the representatives from the district survey team. This method still allows comparisons between Tabu and Control sites, but gives the extra benefit of working alongside the community in Kubulau. Kubulau District has a team of locally trained surveyors as trained by Greenforce who also survey the reefs twice annually. Our data collected at 6m and 12m can now be used to support the data the Kubulau team collects on the reef crest, this in depth monitoring allows for improved understanding of the reef system in the area. The FLMMA method also allows improved accuracy of our results as only important food fishes to the local people are surveyed. The intention of introducing FLMMA into Kubulau is that in the future the local community can manage their own network of protected areas throughout the district and sustain them for the future.

We have also had the privilege of starting a partnership with Reef Check in April 2009. Reef Check is a worldwide organisation and has sites throughout Fiji and was happy to have sites in Kubulau to add to their database. Surveys for Reef Check collect data on important reef fish families in order to gain insight into the status of coral reefs. We also record the life forms of coral that make up the reef to build a picture of reef structure, complexity and health. Reef Check work in conjunction with Global Coral Reef Monitoring Network (GCRMN) and together they collate the collected data to publish the Status of Coral Reefs report for both the South West Pacific and the world.

In the past two years we have also worked with Coral Reef Alliance (CORAL) on several occasions, we have helped with the research and funding into suitable mooring sites at Namena Marine Reserve, using photo transects. We also attended a workshop with other dive operators in the area and local community members on sustainable marine recreation, helping to educate tourists and the locals about the management of marine tourism. Our work with CORAL has also involved educating divers about sustainable diving practices and the environment. We are also involved

in recording whales and dolphins spotted in the area to support the work of the Fiji Cetacean Database.

Community

Our work here involves significant interaction with the local community; strong links have been made to all 11 villages in Kubulau district through our attendance at local church services, fundraisers and community events such as funerals, weddings and sporting events. We currently alternate spending Sundays in Navatu and other villages in the district, this allows us the opportunity to maintain a good relationship with the community and also ensures that we are aware of the communities views and opinions that affect their lives. We also feel that following local customs and traditions such as attending church is important to maintain a good relationship. This awareness of the village's needs and opinions is key in maintaining our work here as we are dependant on the communities support in order for the project to be successful. We have created such a strong bond with Kubulau villages we are now regarded as part of Kubulau's community rather than tourists to the area.

We have also given many of the local villagers the opportunity to undertake dive training. In the last two years we have qualified 8 people from Navatu as divers ranging from PADI Open Water Divers up to Divemaster. This has lead to further employment in both resorts and with the Wildlife Conservation Society. We hope to continue to provide this opportunity to the community, not only improve employment credentials but also to improve environmental awareness through first hand experiences of the reefs in the area that are of importance to the whole community. We have also assisted in the implementation of FLMMA in Kubulau by training members of the local community on the surveying methods that are used so that the community understand the importance of sustaining the coral reefs as a resource and so they can also manage their own conservation efforts.

During November 2008 we participated in The Great Fiji Butterflyfish Count lead by The Coral Reef Alliance. An invitation was extended to 11 volunteers from Navatu to spend the day in Nukubalavu alongside the staff and volunteers of the Greenforce Team. The day consisted of several 30-minute snorkels along the Nasonisoni Passage. The aim of this research was to establish the health of Fiji's Coral Reefs through a census of Butterflyfish, which are a good indication of a healthy reef. The day was a good opportunity for the Greenforce volunteers and the Navatu volunteers to work together and encourage continued participation of community members in conservation efforts. The Kubulau District was the only collector of data for the whole of Vanua Levu, emphasising the commitment made by the people of Kubulau to actively protect their coral reef and our commitment to helping the community.

The last two years has also seen us continue with school visits to the Kubulau District School to raise the environmental awareness of the children who attend the school here and to also raise awareness of Greenforce's presence in Kubulau. Previous visits have included plays about conservation and activities for the children as well as the chance to try SCUBA equipment. We are also in the process of setting up beach clean events for the school children to be involved in, if successful it is hoped that it would

be come a regular event that would increase environmental awareness and pride in the local area.

During each phase we attend 3 fundraisers throughout Kubulau, these fundraisers vary from raising money for the school, churches, local weddings or any other events that the local community need to raise money for such as raising funds for an anchor for Natokalau’s youth boat. This is a chance for us to get to know the villages more, and talk to them about the work we are doing here in Kubulau and to find out more about their opinions on local issues.

Our involvement with the community in Kubulau has also involved the employment of several local villagers to help with the running of our camp and surveying. Current roles given to villagers include boat drivers, Divemasters, surveyors and helpers to assist with the running of our camp such as cooking, training volunteers and helping on supply runs to Savusavu. Our close links with the local community has also allowed for the development of small business opportunities such as the provision of a laundry service to the volunteers and the sale of cakes by Navatu ladies at our camp. This opportunity is greatly received by the village and volunteers alike. Greenforce have also contributed to the installation of moorings on the reef system throughout the district to prevent damage to the reefs from anchors of dive operators in the area and from our survey boat.

Data

When interpreting data, our focus is largely on fish population, substrate cover and Holothurians and Tridacna species. Outlined below are some of our more significant findings from the past few years.

Fish Populations

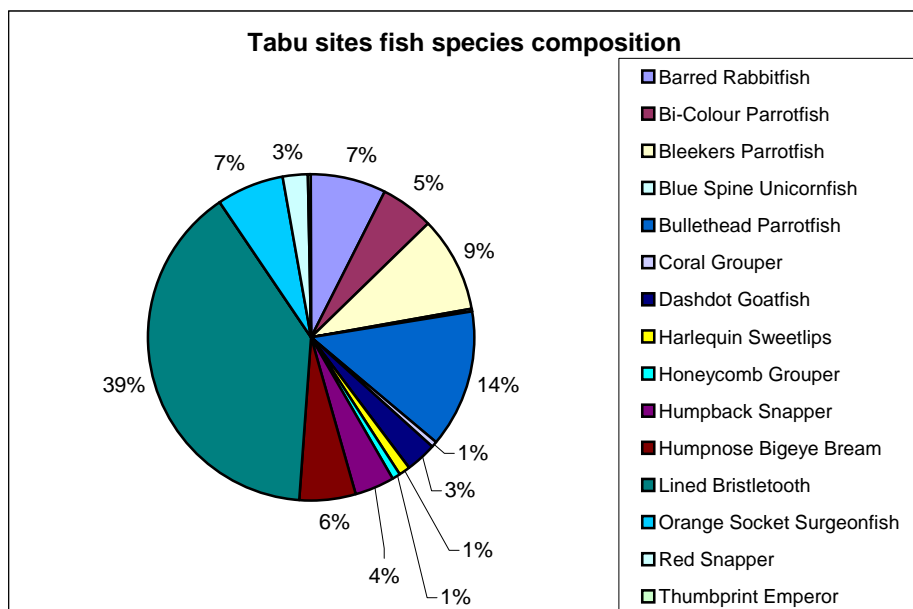


Figure 1: Average fish species composition of Tabu sites.

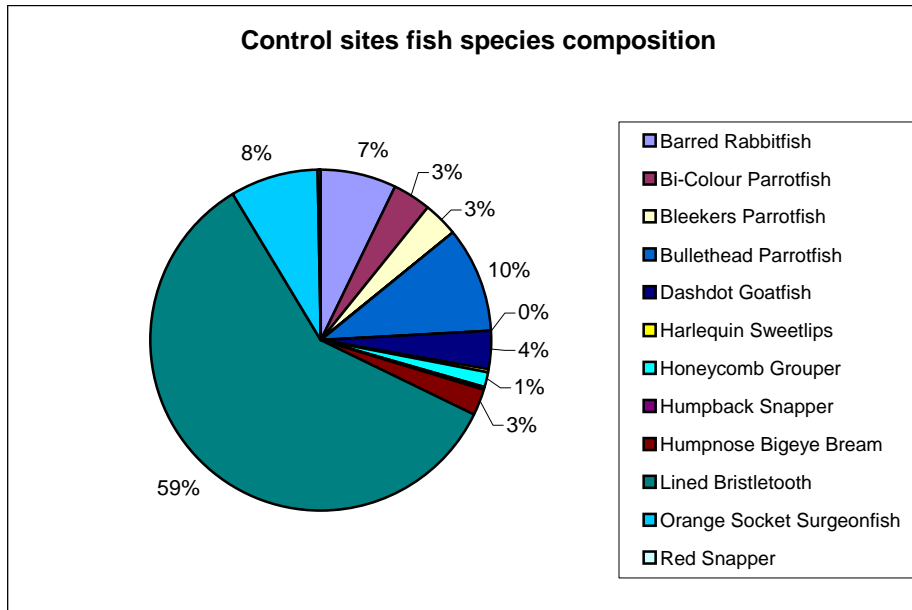


Figure 2: Average fish species composition of Control sites.

Figures 1 and 2 shows the species diversity in Tabu and Control sites during surveying undertaken in July 09. It can be seen in both figures that Lined Bristletooth is the most abundant species making up 39% of the population recorded at Tabu sites and 59% of the population recorded at Control sites. There is a higher diversity of fish in the Tabu sites with 15 out of the 20 species recorded being present compared with only 12 of the surveyed species being present in the Control sites. The abundance of each fish species is higher in Tabu sites than in Control sites (Figure 3) except for Lined Bristletooth and Orange Socket Surgeonfish.

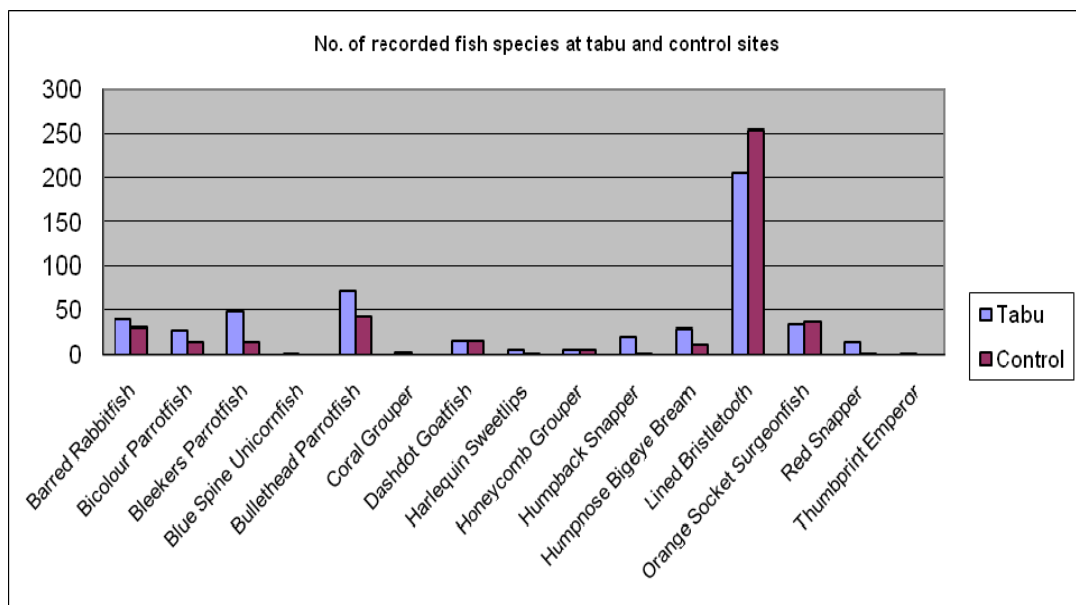


Figure 3: Abundance of fish species recorded in Tabu and Control sites during July 2009

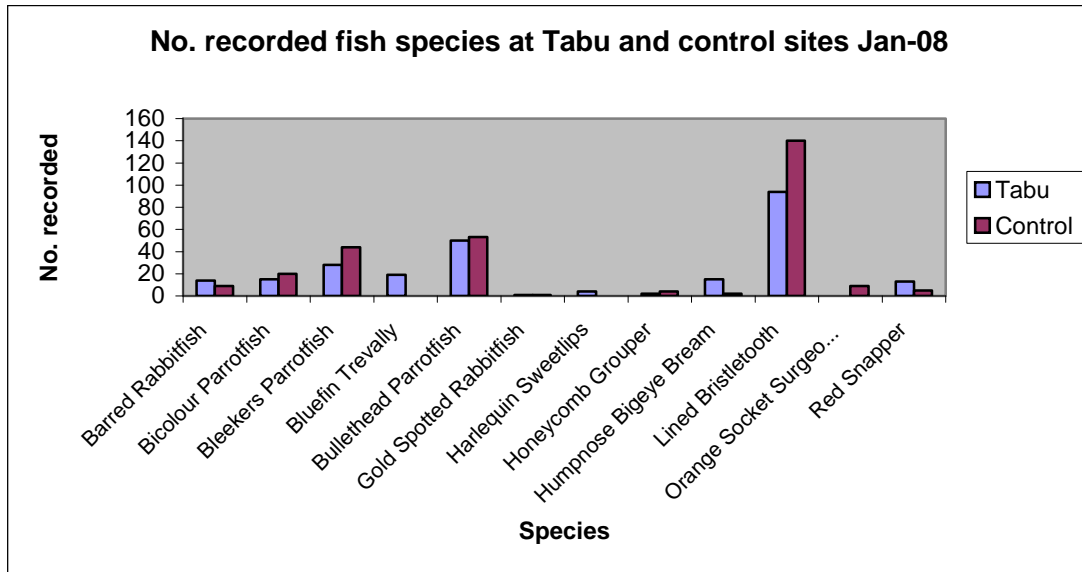


Figure 4: Abundance of fish species at 3 Tabu and 3 Control sites during Jan-08

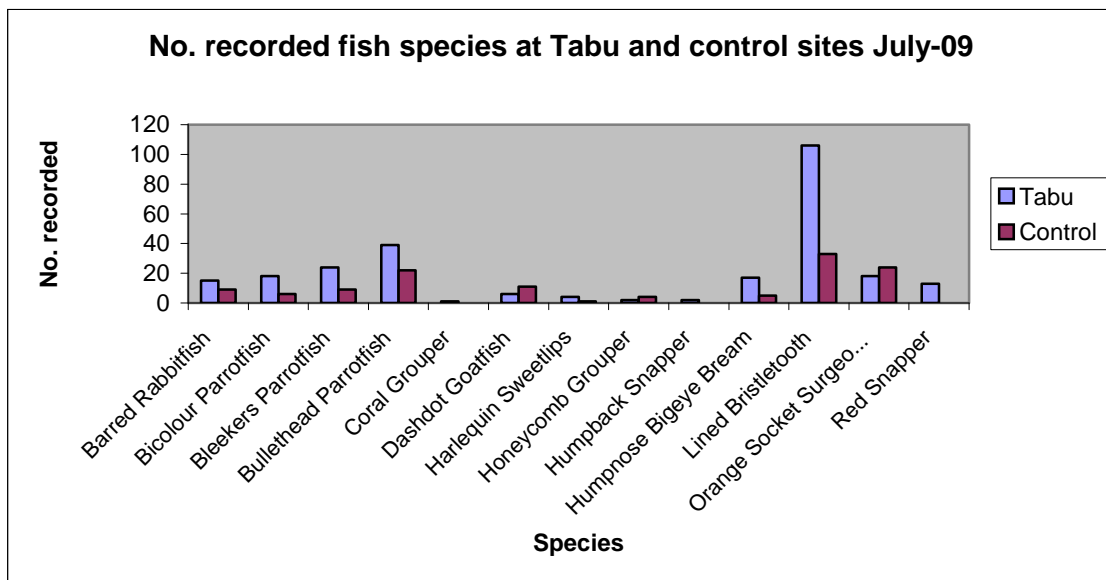


Figure 5: Abundance of fish species recorded in 3 Tabu and 3 control sites during Jan-08

Figures 4 and 5 show comparison of the abundance of fish species between 3 Tabu sites (KP1, NP1, NTP1) and 3 Control sites (NC2, NC3, NWC1). Figure 4 shows that 12 species out of a possible 19 species have been recorded in Tabu and Control. It can also be seen that there are more individuals of each species at Control sites apart from Barred Rabbitfish, Bluefin Trevally, Harlequin Sweetlips, Humpnose Big Eye Bream and Red Snapper. Figure 5 shows that 13 species out of the 19 survey species have been recorded; Coral Groupers and Dash-Dot Goatfish are now being sighted in the survey areas. In the Tabu areas there are more individuals of each species present when compared to Control sites apart from Dash-Dot Goatfish, Honeycomb Groupers and Orangesocket Surgeonfish, there are also more species present in Tabu sites than in Control sites.

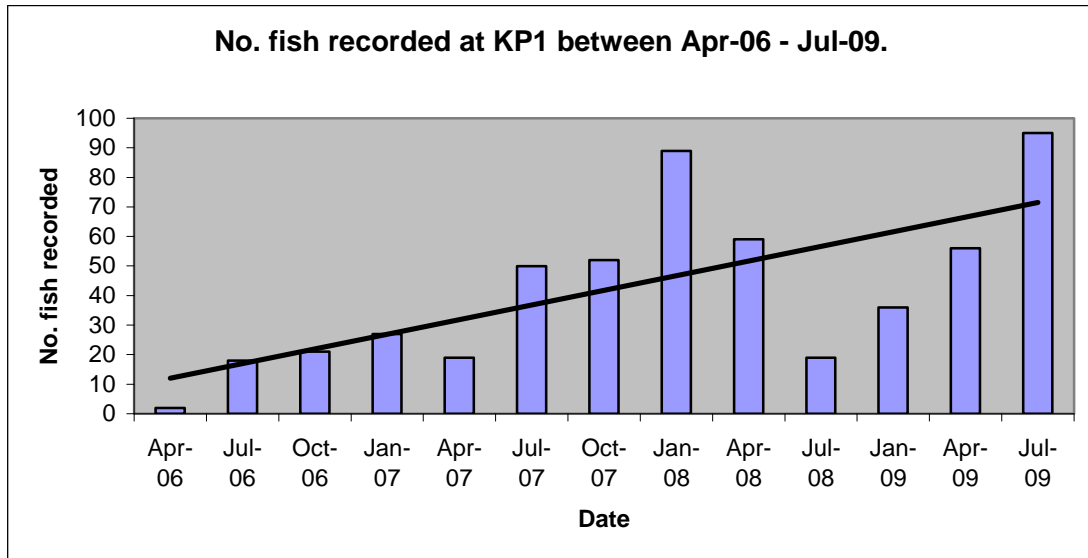


Figure 6: Abundance of fish recorded at KP1 Tabu.

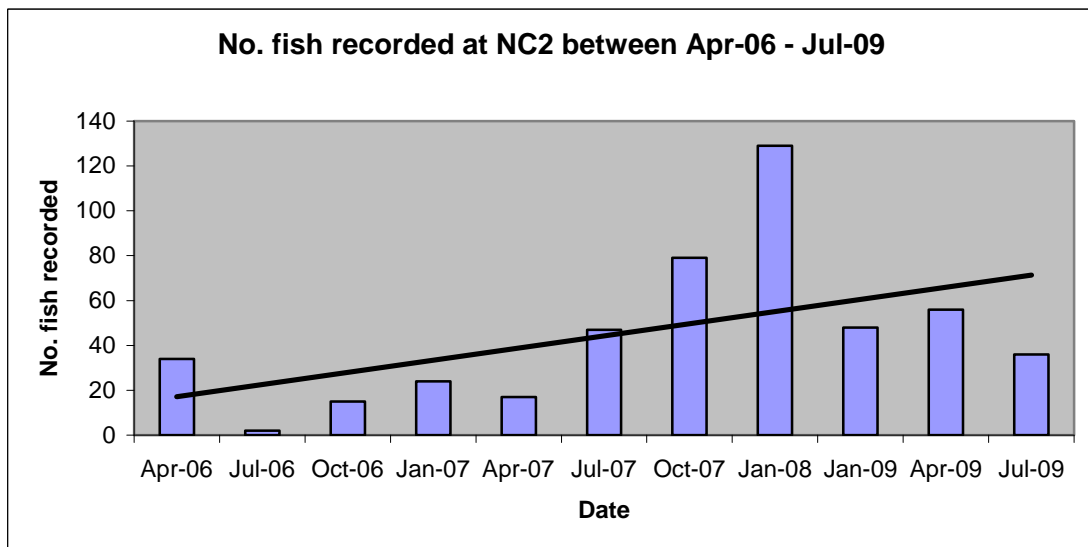


Figure 7: Abundance of fish recorded at NC2 Control.

Figures 6 and 7 show that the number of individuals in the fish population has increased in both Tabu and Control sites over time. In Tabu sites there is a cycle of population numbers, there is a significant peak before a trough (e.g. Jan 08 to Jul 08, with 89 individuals and 19 individuals recorded respectively). The trend line of the data for both the Tabu and Control does show a gradual increase over time suggesting that the overall fish populations have increased. The trend line also shows that the fish population in the Tabu area has increased at a quicker rate than in the Control area.

Coral cover

Figure 7.1: Pie Chart Showing Percentage Live and Dead Coral Cover at Tabu Sites.

Figure 7.2: Pie Chart Showing Percentage Live and Dead Coral at Control Sites.

Figure 7.1 shows that the average percentage live coral cover at all Tabu sites totals 35%. Figure 7.2 shows that the average percentage live coral cover at all Control sites totals 29%. The percentage difference between Tabu and Control for live coral is +6%. The average percentage dead coral for Tabu and Control sites totals 65% and 71% respectively, with a percentage difference of +6%.

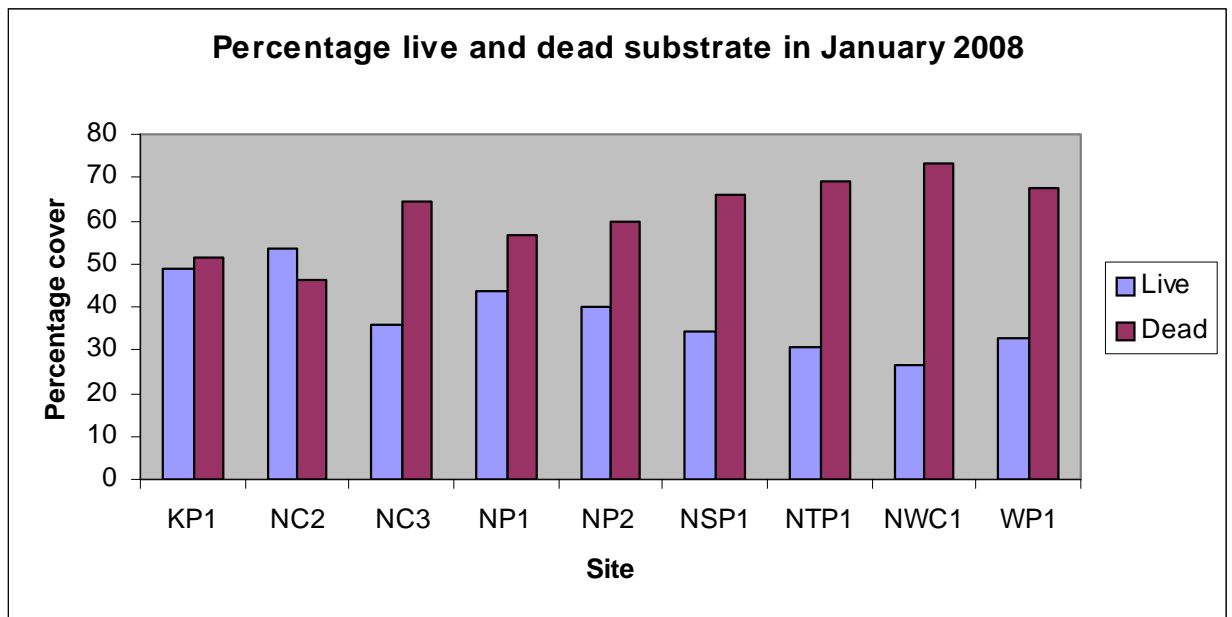


Figure 8: Bar chart showing the percentage live and dead benthic cover at survey sites in January 2008.

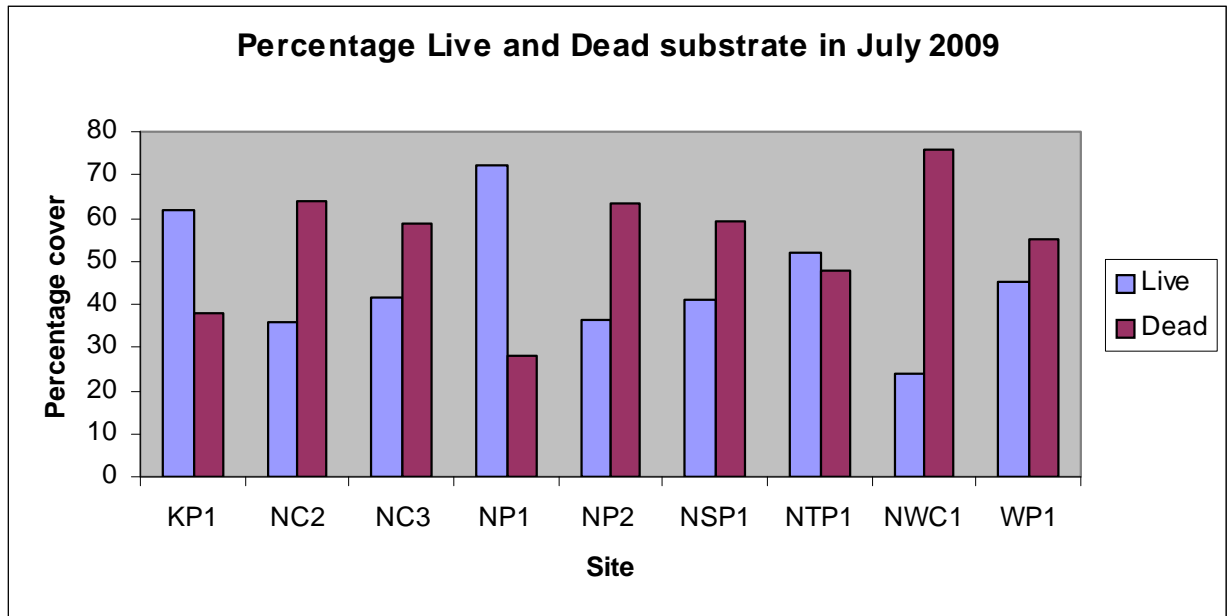


Figure 9: Bar chart showing the percentage live and dead benthic cover at survey sites in July 2009

In figure 8, from data collected in January 2008, it can be seen that there is a higher percentage of dead substrate than live substrate at all sites except for NC2, where live substrate is 53.63% and dead substrate is 46.37%. There is also a greater percentage difference between live and dead substrate at the Control sites, with an average of 27.48% difference at control sites and 23.3% difference at Tabu sites. Figure 9 shows that 18 months later in July 2009, 50% of Tabu sites have greater live substrate cover than dead substrate (KP1, NP1, NTP1). However all the Tabu sites have seen an increase in live substrate cover apart from NP2, which has 36.5% live coral coverage down from 40.25% in Jan 08. Live substrate cover has also improved in the NC3 Control area from 35.68% in Jan 08, to 41.5% in July 09.

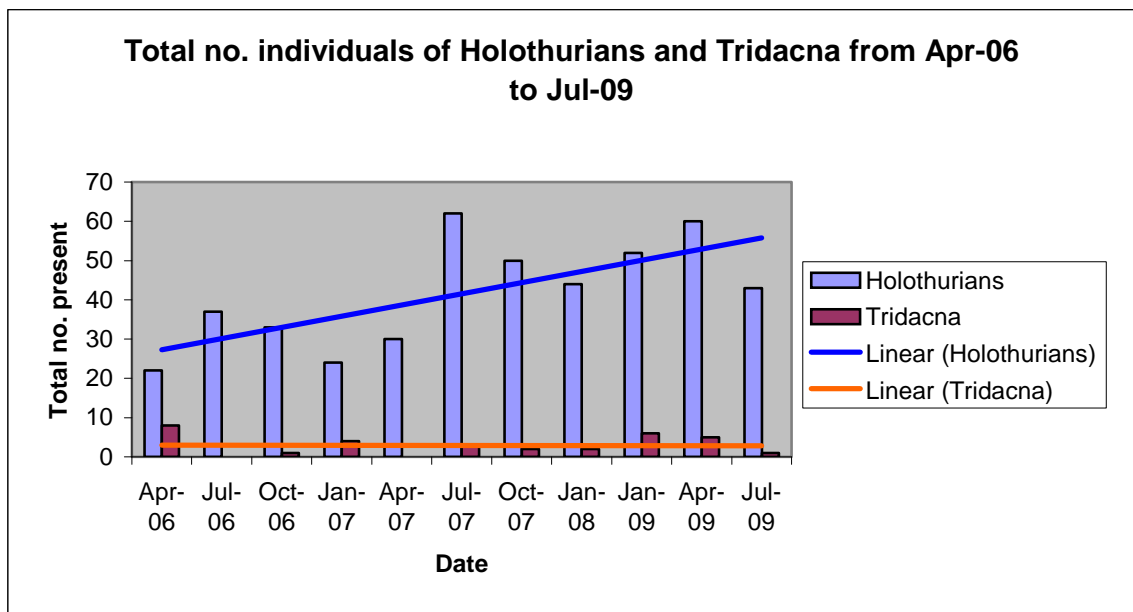


Figure 10: Total abundance (Tabu and Control combined) of Holothurians and Tridacna sp. from Apr-06 to Jul-09.

Figure 8 shows that the total number of *Tridacna* sp. present has remained constant over the 3 year time period with a small amount of fluctuation between surveys undertaken. The total number of Holothurians present has increased over time with higher numbers being recorded since July-07 where the population peaked at 62 specimens.

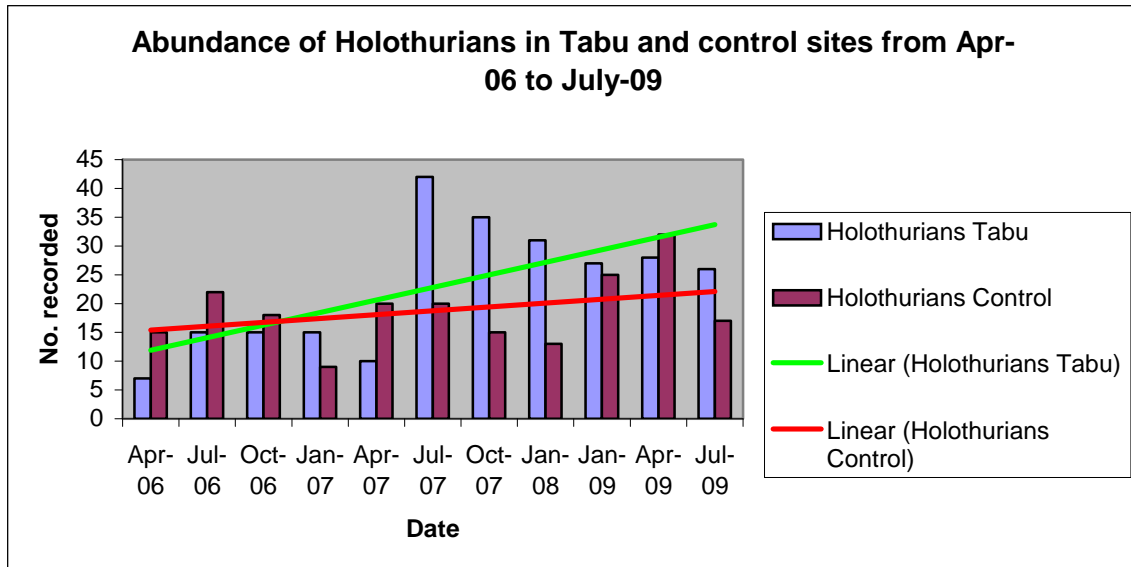


Figure 11: Abundance of Holothurians in Tabu and control sites from Apr-06 to Jul-09.

From Figure 11 it can be seen that the number of Holothurians present in both Tabu and Control sites has increased over time, however Tabu sites have seen a greater population increase over an 3 year time period compared to Control sites. Since July 2007 there have been higher numbers of individuals in Tabu sites than in Control sites with the exception of April 2009. The peak in population occurred in Jul-07 after which the population has been in a slight decline in Tabu sites.

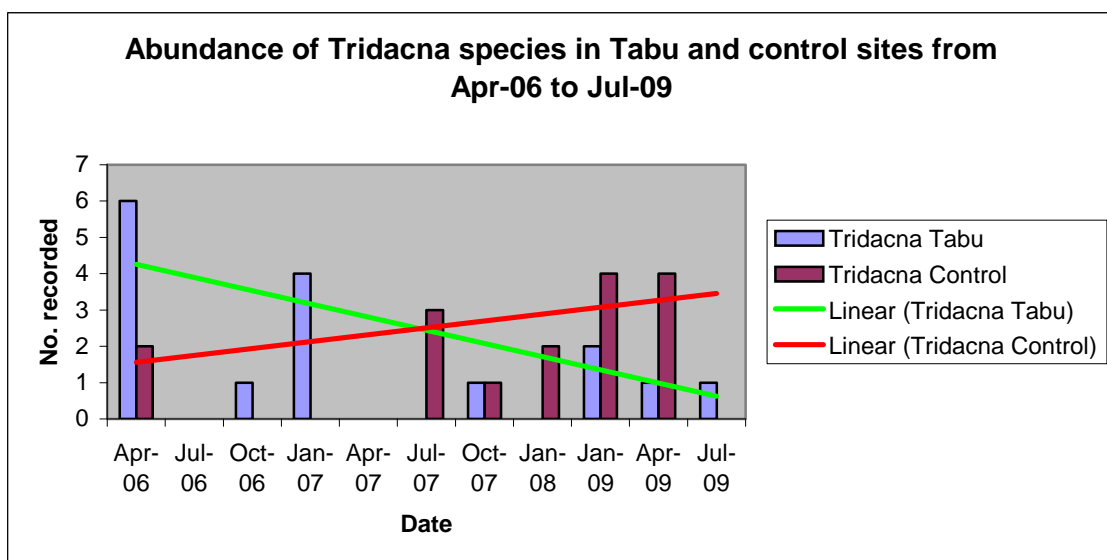


Figure 12: Abundance of Tridacna sp. in Tabu and control sites from Apr-09 to Jul-09.

The above figure (12) shows that *Tridacna* sp. populations have increased in Control areas and decreased in Tabu areas. The population in Control areas has had some

consistency since Jul-07, however the Tabu areas have remained at a low population level since Oct-07.

Discussion and Conclusions

Our studies in Kubulau have shown improvements in all areas that we survey. Since 2006 we have seen increases in fish diversity in Tabu areas, each species recorded in Tabu areas also have greater population numbers. Encouragingly we have also seen an increase in population numbers in Control areas. This shows that there are good prospects for the sustainability and future of the reefs in Kubulau if protection of the Tabu areas is maintained. The improvements in population sizes in Tabu areas can be associated with the protection that Tabu provides to the reef with the prohibition of fishing in these areas. The increases in Control areas may be linked to the improvement in Tabu areas through the process of a spill over effect, where by increasing numbers of fish in Tabu areas creates increased competition for space and food causing some fish to move out of Tabu areas into the surrounding Control areas with more available resources. We have also noticed that Tabu areas have faster population growth than Control areas this would be expected as human pressures on the reef are minimal and allow for improved growth and repair. Over the past three years we have become aware of a cycle in the population size in the Tabu areas, with a peak (Jan 08) followed by a trough (Jul 08), this could be a result of the protection on the reef being lifted every 100 days following local traditions. Our research has also shown indications of improvements in the occurrences of endangered species in the area, such as Napoleon Wrasse, Bumphead Parrotfish, Sharks, Moray Eels, Manta Rays, Eagle Rays and Turtles.

Our research on the substrate of the coral reefs has shown Tabu areas have a higher percentage of live coral cover than at Control sites, over time there has also been an increase in the total of live substrate present at all Tabu sites and recently we have been seeing increases in live substrate at some Control sites. One benefit of the Tabu areas is that 50% of these Tabu areas now exhibit a greater percentage live substrate cover than dead substrate. These improvements of the coral and substratum may be linked to the decrease in human impacts due to reef protection and also increased coral recruitment from healthy areas of the reefs.

Our main focus when studying invertebrate populations are Holothurians and Tridacna species, this is because they have a economic benefit to the local community and also include rare species in Fiji that have previously been unsustainably harvested. We have found that the Giant Clam populations in Kubulau have been consistent over the past 3 years although they may not always be present on our surveys but it is still encouraging that we are recording them on some of our surveys and also finding them in Control areas where they have little protection. Over the 3-year survey period studied Holothurian populations have increased in both Tabu and Control areas showing improvements in the provision of suitable environments and improved management in regards to harvesting.

Overall we feel that there is an improvement in the quality of the reefs in Tabu areas, with increased populations of fish, invertebrates and also higher diversity of species being sighted in these areas. We have also seen improvements in the substrate at Tabu sites with increased live coverage and greater reef complexity providing niches in the coral reef ecosystem. It is also encouraging that we are now seeing some improvements in the Control areas and are hoping that with further surveying and analysis of results we will see this trend continue along with the sustained management of Kubulau's reefs.

The future of Greenforce in Kubulau

Over the next 5 years we would like to see Greenforce's work in Fiji be maintained by continuing our work with the Kubulau community, The Wildlife Conservation Society and FLMMA. We will continue our diving surveys of the reef systems in Kubulau in the hope of seeing further improvements to health of the community selected Tabu areas, we hope that the continued protection and surveying of the reefs would yield further positive results in the Control areas therefore improving fishing prospects in the area for the communities. However we would like to see a greater portion of our work involve further training of community members, both with diving qualifications and science knowledge, so that we can establish our final goal of a locally self-sustained monitoring network. Prior to this our more pressing need is to help further develop the communities surveying team to improve their surveying by providing consistency in undertaking surveys twice annually and providing support to enable this when needed.

Further aims would be to continue with our community involvement and fundraising, allowing us to further raise the profile of our work and the importance of it for Kubulau. We will further our work with the Kubulau District School educating the district's youth on environmental issues and environmental awareness, Which we believe is critical for the future of Kubulau's reefs and sustaining the work set up in the area. This would be undertaken through teaching regular classes to the older children, setting up beach cleaning events so that the younger generation of all ages could be involved in improving their environment and evoking pride in Kubulau. Our further presence in Kubulau would also allow for continued environmental awareness in all groups of the community as we have become a valued part of the district.

Our work will also focus on the future protection in Kubulau after the need for us working here has been reduced and the local community are managing their own reefs. We would ensure that management strategies are in place and can be acted upon by the local people and also help encourage eco-tourism business enterprises run by locals. Providing support to allow the development of the reef management plan in Kubulau to contain the opportunity for the reefs to be used as a tourist attraction and source of income to the community would be hugely beneficial for the profile of Kubulau's conservation efforts.