CORAL TRIANGLE INITIATIVE
ON CORAL REEFS, FISHERIES AND FOOD SECURITY

PAPUA NEW GUINEA

IABAM & PAHILELE COMMUNITY BASED RESOURCE MONITORING PROGRAM SURVEY REPORT #: 9

MONITORING PERIOD: DECEMBER 2012

June 2013

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Iabam & Pahilele Community Based Resource Monitoring Program
Survey Report #: 9
Monitoring Period: December 2012

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9

IABAM & PAHILELE COMMUNITY BASED RESOURCE MONITORING PROGRAM

SURVEY REPORT #: 9
MONITORING PERIOD: December 2012

MONITORING REPORT WRITTEN BY
JAMESON SOLIPO
(Iabam-Pahilele CMMA Data Specialist)

PREFACE

On behalf of the Chairman for Iabam and Pahilele CMMA I welcome you once again to this 9th and final 2012 monitoring report for Iabam/Pahilele Community Manage Marine Areas (CMMA).Before I proceed firstly I'd like to thank the youth for those who participated during the December monitoring period and for making it possible.

I would like to sincerely thank the Conservation International and the USAID through its financial assistance through the Coral Triangle Support Partnership (CTSP) for providing this opportunity to our community to be able to understand the needs and manage the resources on our islands and reefs.

I also like to extend my word of thanks to Mr Tom Paul from Conservation International for making this monitoring interesting and enjoyable, by, jokes which made the team spirit alive.

Mr. Jameson Solip (on behalf of the chairman)

Chairman
Iabam & Pahilele CMMA

ABOUT THIS REPORT

This December Monitoring Report has been written in two parts. Part 1 of the report presents the results for data gathered during the December 2012 monitoring period while Part 2 of the report shows the population trend for all data from December 2010 to December 2012. Population trend for the 2 years shows provides us some indication of our resources since we adopted the concept of resource management.

1. INTRODUCTION

The community of Iabam and Pahilele has again completed its December 2012 community based monitoring program and their data have been analyzed and the findings for the monitoring period is presented in this report. This report is also special as all monitoring data collected since December 2010 and December 2012 has been analyzed to demonstrate population trend for the different monitoring parameters. Thus, population trend in reef fish distribution and abundance, particularly those in the 3 target monitoring groups (herbivore/carnivore/IUCN endangered species). This December monitoring has been a great challenge for the youths of Iabam and Pahilele as it was organized and conducted with any direction and assistance from the Iabam-Pahiele community managed marine area (IPCMMA). Furthermore, all coordination, data collection, data analysis and report writing has been done by Mr. Solipo for the people of Iabam and Pahilele and for the general Nuakata, Iabam and Pahilele CMMA.

2. METHODS

2.1. Field Data Collection

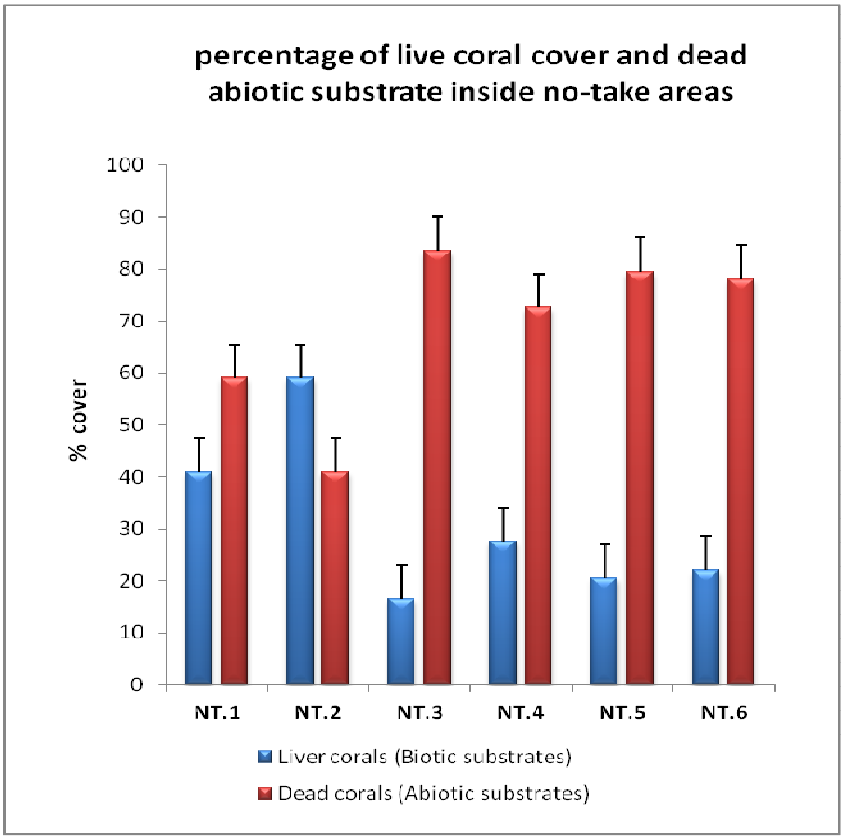
The community based monitoring program was done in the same way using all survey methods described in most of the monitoring reports. There was no introduction of new survey techniques nor was there any changes or alteration to the way we collect our data or to the monitoring stations.

2.2. Data analysis

All data have been prearranged after each day's monitoring and have been filled into a mock database as that kept and used by Conservation International. These "paper" database or raw data is then being entered into the electronic database on a Microsoft Excel spreadsheet where relevant analysis was then conducted to produce the results shown in Section 3 (Results) of this report.

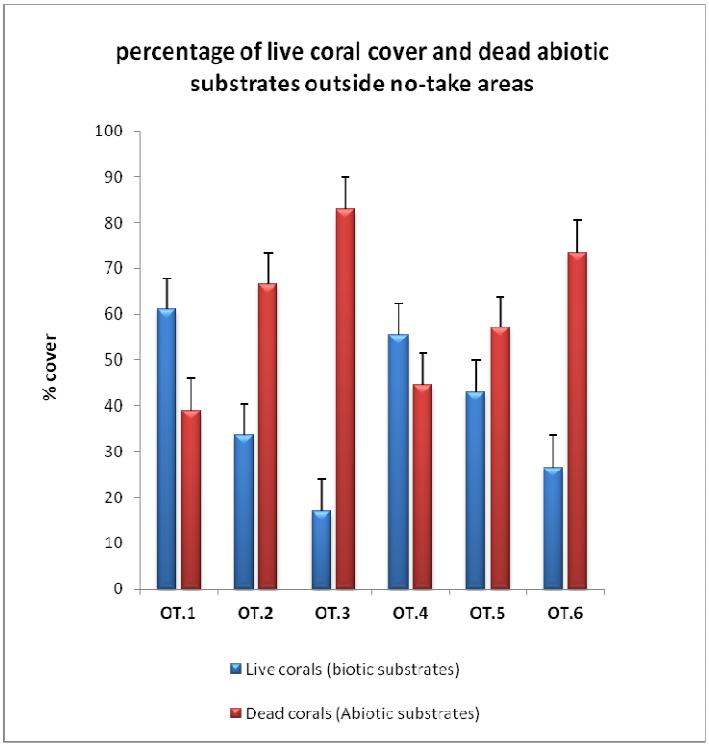
3. RESULTS

3.1.1 Benthic substrate for reefs inside no-take



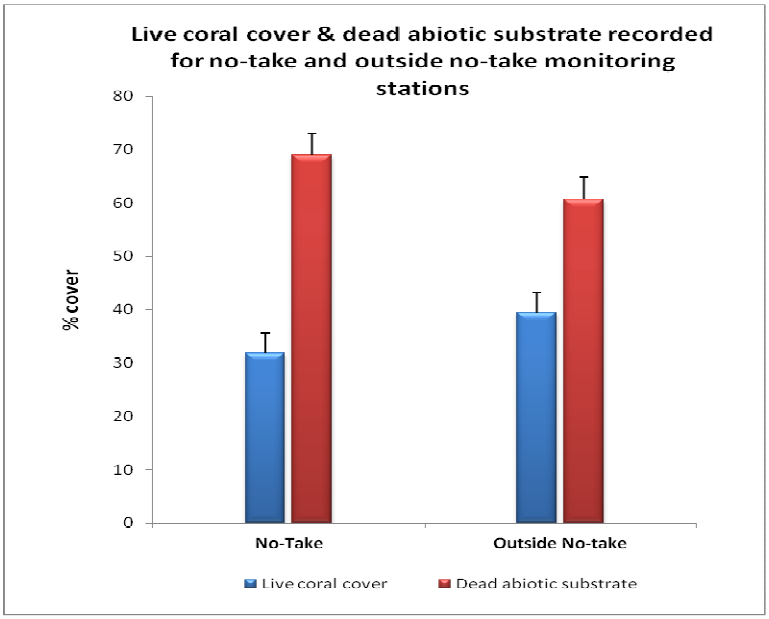
Distribution for dead abiotic substrates dominated most the monitoring transacts inside no-take areas. The only site to have a near equal distribution of live coral and dead abiotic substrate was Luluwalagena (NT.2). This monitoring station recorded 59% coral cover and 41% dead coral and other abiotic materials. Sites NT.3, NT.4, NT.5 and NT.6 showed very high dead coral and abiotic substrates. The dead and abiotic substrates that dominated these 4 stations were dead coral rubble (DCR) followed by hard bedrock (RK) substratum and Sand patches (S).

3.1.2. Benthic substrates for reefs outside no-take areas



Live coral cover was recorded the highest at Iabam (NW) (OT.1) with 61% and at Tawali Balabala (OT.4) recording 55.5%. The monitoring stations with the lowest coral cover was Pahilele (SE) (OT.2) and Kiwakiwalina (OT.6) both recording well below 40%.

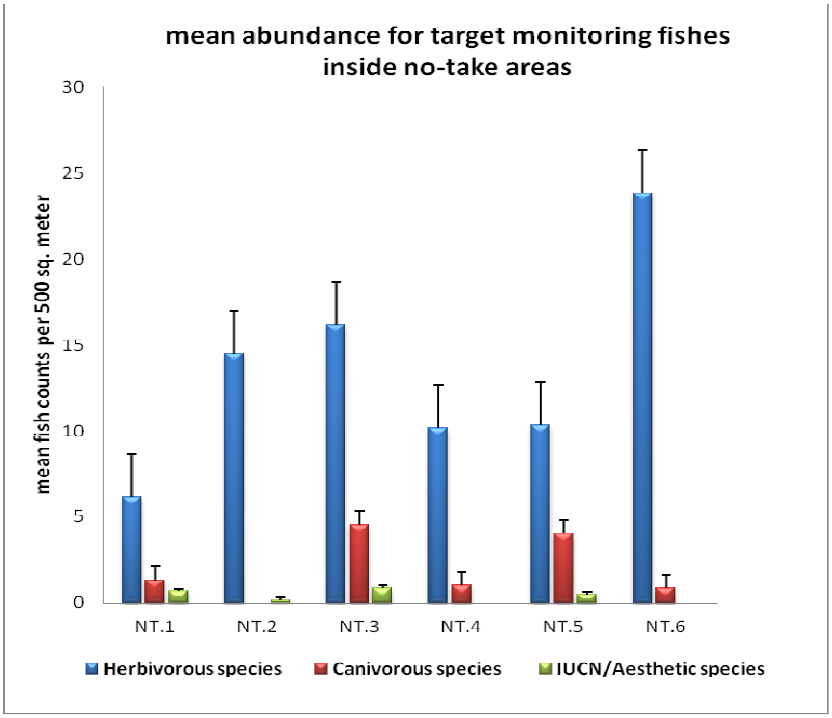
3.1.3. Benthic substrates for monitoring stations inside and outside no-take combined



Looking at the overall distribution for no-take and outside no-take; the 6 monitoring stations inside no-take zones continued to show very low coral cover (31.8%) while the other 6 monitoring stations recorded a similar low coral cover with 39..4%. In general, abiotic substrates continued to show high dominance for reefs inside no-take and for reefs outside no-take.

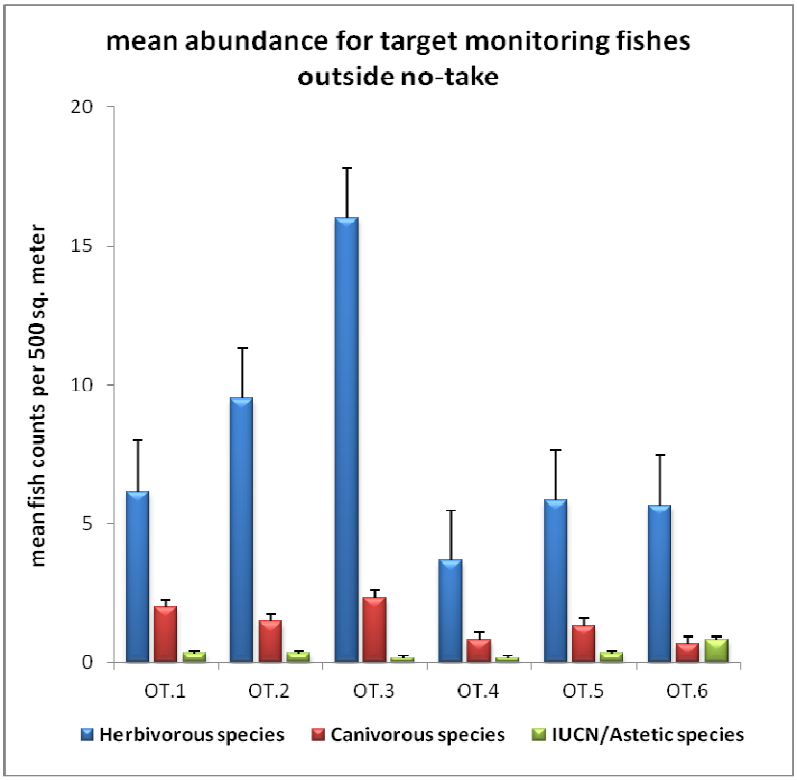
3.2 REEF FISH INDICATORS INSIDE & OUTSIDE NO-TAKE AREAS

3.2.1. Target Reef Fish indicators inside no-take



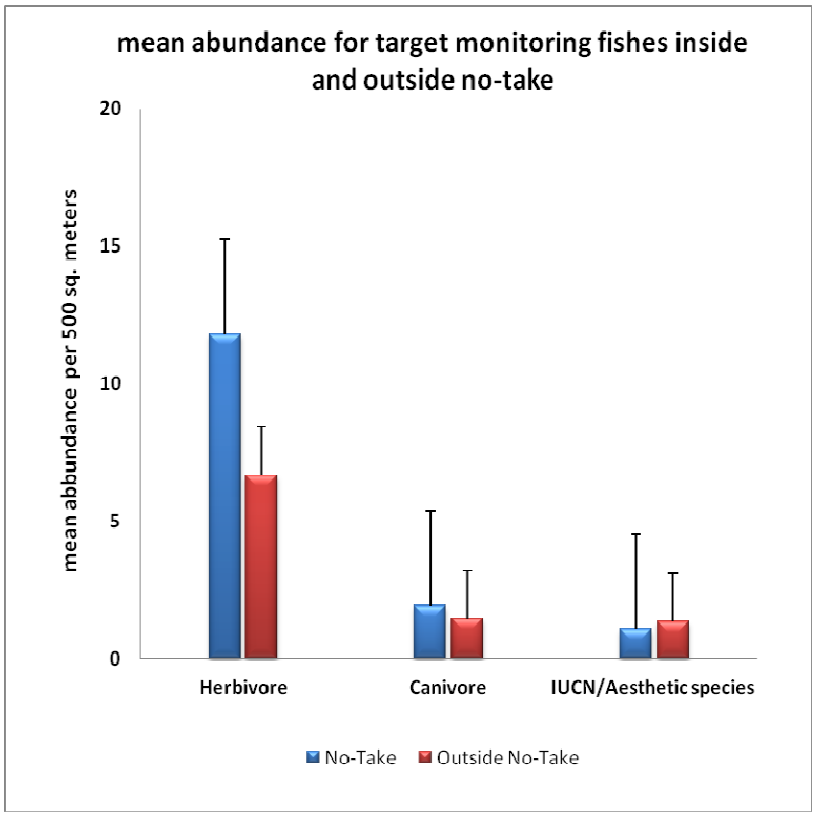
Population of herbivore fishes continued to show high averages in comparision to carnivore and IUCN endangered species. Highest individual abundance was 23.8 herbivore/500m^2 and was recorded at Banibani Siga (NT. 6). Dana Gedu (NT. 3) and Luluwalagena (NT.2) also recorded good averages of 16.3 herbivore/500m^2 and 14.2 herbivore/500m^2. The other 3 monitoring stations recorded low averages of less than 12 herbivore/500m^2. Abundance of carnivorous fishes was lower than expected. Thus, the high record was at Dana Gedu (NT.3) recording 4.55 carnivore/500m^2 and at Hanakubakuba (NT. 5) recording an average off 4.0 carnivore/500m^2. All other monitoring stations had very low counts and/or averages. Averages for the IUCN endangered species per 500m^2 was significantly low. Thus, all 6 monitoring stations reccorded low average of less than 1 species/500m^2.

3.2.2 Target reef fish monitoring indicators outside no-take



Mean population counts for herbivore fishes continued to be higher than carnivore and IUCN endangered species for all monitoring stations. The monitoring station at Pahilele (OT.3) recorded the same high average (16 herbivore/500m^2) as that recorded at NT. 6. Iabam (SE) and (NW) also had high average, recording 9.5 herbivore/500m^2 and 6.16 herbivore/500m^2 respecctively. Calculated avergae for target carnivore fishes clearly showed low abundance for many of the monitoring stations. The highest average in this monitoring was 2.33 carnivore/500m2. All other monitoring stations reccorded averages that were lower than 2.0 carnivore/500m^2. IUCN/redlisted or endangered spcecies also had low reccords for all monitoring stations. The only high average was reccorded at Kiwakiwalina (OT.6) with average value of 0.83 fish/500m^2.

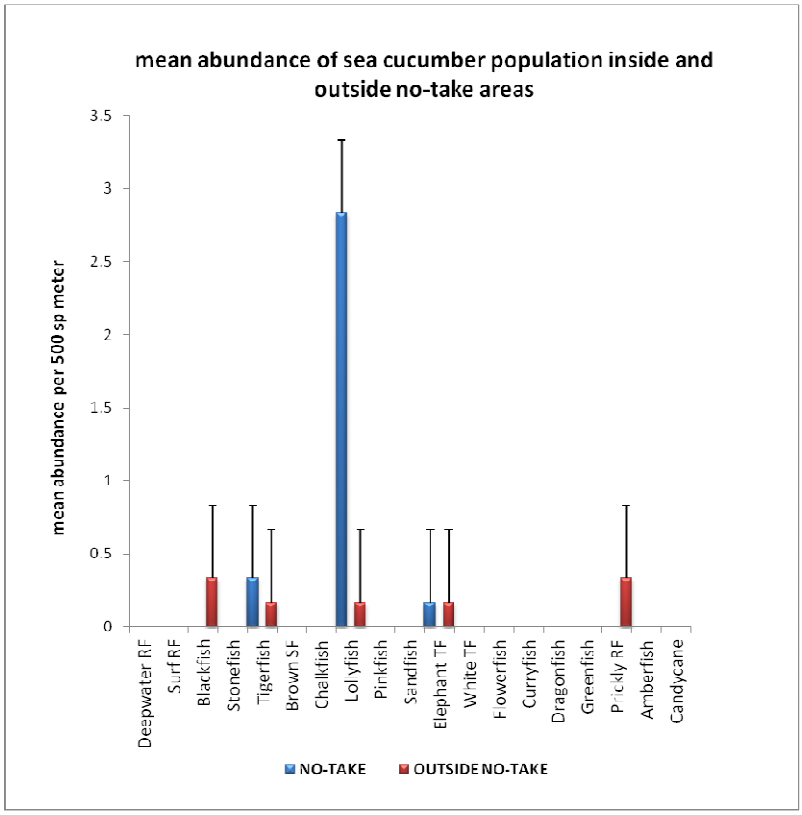
3.2.3. Mean abundances for target monitoring fishes inside & outside no-take areas combined



As shown in the graph above and the previous 2 graphs, the no-take monitoring station recorded high averages for herbivore fishes (11.79 herbivore/500m^2) and carnivore (1.92 carnivore/500m^2) while monitoring stations outside no-take recorded a slightly higher average of 1.33 fish/500m^2 in its 6 monitoring stations.

3.3 MARINE INVERTEBRATE

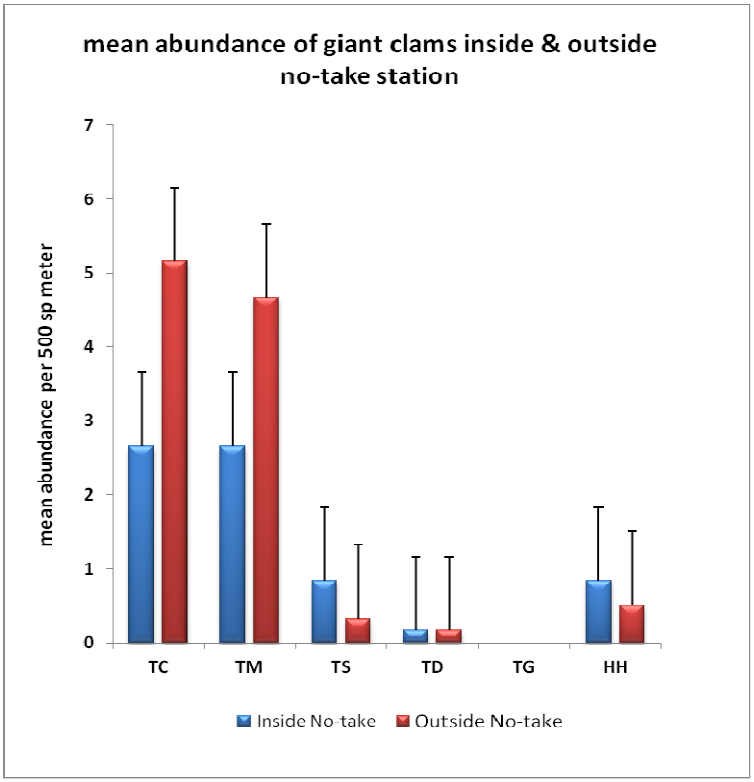
3.3.1. Sea cucumber



This monitoring period showed high averages for lollyfish inside no-take (2.83 sp/500m2). There were other sea cucumber spcies present inside no-take areas and outside no-take areas as well but had very low averages (See table below)

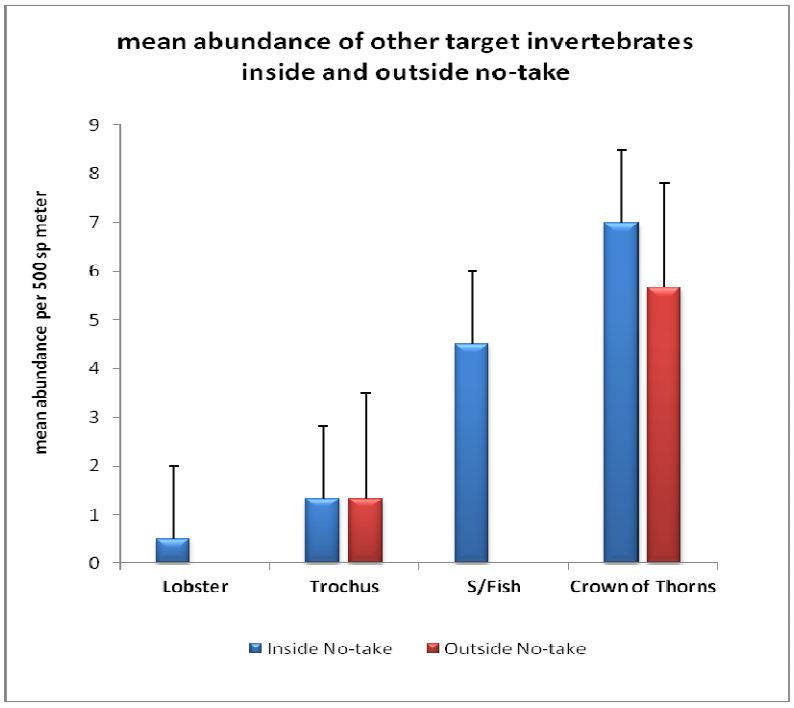
	Blackfish	Tigerfish	Lollyfish	Elephant trunkfish	Prickly redfish
Inside No-Take	0	0.33	2.83	0.17	0
Outside No-Take	0.33	0.17	0.17	0.17	0.33

3.3.2. Giant Clam



Data gathered for giant clam in this monitoring shows us that the crocus clam (TC) and maxima clam (TM) were more abundant in reefs located outside no-take areas. The averages for this monitoring station outside is even much lower than the same data from previous monitoring data. Mean abundance for scaly clam (TS), southern giant clam (TD) and bearpaw clam (HH) continue to show low abundance for all areas inside and outside no-take zones.

3.3.3. Other Marine sedentary resources (Lobster, trochus crown-of-thorn starfish)



There appeared to be a lot of crown-of-thorn starfish in many of of the monitoring stations. The no-take areas recorded an average abundance of 7.0 CoT/500m^2 while sites outside no-take recorded an average of 5.7 CoT/500m^2. There was also high mean abundance for starfish particularly the blue starfish (Linckia lavigata) with an average of 4.5 species/500m^2. Abundance counts for trochus continued to be low with average of 1.33 trochus/500m^2 for all monitoring stations inside and outside no-take areas. Presence of rock lobster continued to be found inside no-take with an average count of 0.5 lobster/500m^2 for all 6 monitoring stations.

4. DISCUSSION

4.1. Benthic substrate

Data gathered for substrate for this December monitoring period showed a very similar distribution and abundance pattern to the data gathered in October 2012. The monitoring stations at Luluwalagena (NT.2) recorded a percentage cover of 59% while Tawali Namonamo (NT.1) showed a slight reduction in cover from 51.5% recorded in July to 41% in this monitoring period. No conclusive evidence can be drawn from these disparities as the data collected is often based on how the transact is laid and what substrate lies beneath. All other monitoring stations had similar percentage coverage inside no-take and outside no-take. All other environmental factors remain constant between the two monitoring periods. There was never any major storm or rough and bad weather which could be used to warrant these slight fluctuations in the monitoring data. Live coral cover continued to be lower than dead and abiotic substrates. The results gathered in this monitoring period and from the past 8 monitoring program must not be interpreted that the reefs are damaged or in bad condition. The low coral cover seen in many no-take areas are due to the fact that many of the no-take sites are located on the outer barrier reefs which are exposed to surf, swells and

strong currents. Indeed, these barrier reefs serves as a barricade for strong currents and waves. Under such circumstance corals growth in these barrier areas a limited to those species that can withstand those wave action. On the shallow reef flat areas of these barrier reefs you can then expect to see corals with morphologies like branched corals, plate, digitate and table corals. The reef edges are often colonized by large boulder corals, encrusting and to less extent, digitate and submassive corals. This would be different when we move from a barrier reef to a mainland fringing reef such as the monitoring station OT.1 (NW of Iabam). Areas where you have constant currents and less swells and breaks are more conducive for branching and other less resistant coral species. Having said that, it is important to understand that you will find more coral reefs in shallow water areas with less wave action, areas with good sunlight, clear water with less mud and silt and sites which generally receives constant currents associated with tides.

The trend that we observed in our continuous monitoring program will most likely be the same for a number of years however, it is important to take note of new coral settlement and growth. Our monitoring has shown that should our reef areas are not faced with any natural disasters (Cyclone, Tsunami etc) we have a high chance of getting more coral recruitment and growth in these areas described today as barren.

4.2. Reef Fish

4.2.1. Distributions herbivore, carnivore and Humphead Maori Wrasse.

Distribution and abundance of herbivore fishes was higher than carnivore and the IUCN endangered species. The average for herbivore fishes in this monitoring was 11.79 herbivore/500m^2 while that recorded in October monitoring was 14.46 herbivore/500m^2. It is interesting to see that the record for July 2012 (20.1 herbivore/500m^2) was much higher than October and December and further indicate a decline in the averages for herbivore fishes. The decline in numbers inside no-take areas cannot be attributed to fishing but may have been caused by some environmental cues. Timing by which surveys were conducted during these periods have not been consistent and may been a contributing factor to this. The averages for monitoring stations outside no-take also showed a similar declining trend. In July 2012 the team recorded an average of 9.85 herbivore/500m^2 then in October the average reduced to 8.44 herbivore/500m^2 and this December 2012 monitoring we recorded an average of 6.62 herbivore/500m^2. As mentioned earlier, the probable cause for this decline cannot be determined at this stage but may become known as we continue to monitor their populations over a period of time.

Averages for reef carnivore fishes have been low in comparison to those recorded for herbivore. The average for this December monitoring is 1.50 carnivore/500m^2 while in October, the team estimates an average of 1.50 carnivore/500m^2 and in July the average recorded was 5.1 carnivore/500m^2 for all monitoring stations inside no-take areas. Averages for stations outside no-take also showed a similar declining trend with July recording 2.0 carnivore/500m^2, October with an average of 1.05 carnivore/500m^2 and this December a mean of 1.45 carnivore/500m^2 was estimated. In the last 3 monitoring program there appeared to be a declining trend in the distribution and abundance of reef fishes.

The means for the endangered Maori Wrasse and moray eel fluctuated between July and December 2012. The monitoring stations inside no-take recorded an average of 5.4 species/500m^2 in July; then 0.42 species/500m^2 in October and 1.08 species/500m^2 in December. The similar trend was displayed by data from outside no-take areas where 1.48

species/500m^2 was recorded for July, 0.14 species/500m^2 in October and the recent December monitoring recorded an average abundance of 1.33 species/500m^2.

4.3. Sea Cucumber

Lollyfish was the only species to record a high mean of 2.83 species/500m^2 for 6 monitoring stations inside no-take. The monitoring station at Dana Gedu (NT.3) recorded 10 individuals/500m^2 while Banibani Siga (NT.6) recorded 5 individuals/500m^2 and Siasialina (NT.4) recorded 4 individuals within its 500m^2 monitoring area. Other species recorded include; 2 individuals per 500m^2 sampling area at Hanakubakuba Island and 1 record for Elephant Trunkfish at Siasialina (NT.4).

Monitoring stations outside the no-take areas showed 1 record for Black fish, Tigerfish, Lollyfish, Elephant Trunkfish and Prickly Redfish. These records have been gathered from Manikutu (OT.5 = 2 blackfish); Tawali Balabala (OT.4 = 1 Tigerfish; 1 Elephant Trunkfish) and in Kiwakiwalina (OT.6 = 1 Lollyfish).

4.4. Clam Shell

Population of giant clam observed in this survey showed very little very little variation and appeared to be the same those documented in previous monitoring. Misidentification of species especially the crocus or boring clam (TM) and the scaly clam (TS) remain a standing problem) for the local monitors

4.5. Other invertebrates (Lobster, trochus, crown-of-thorn starfish)

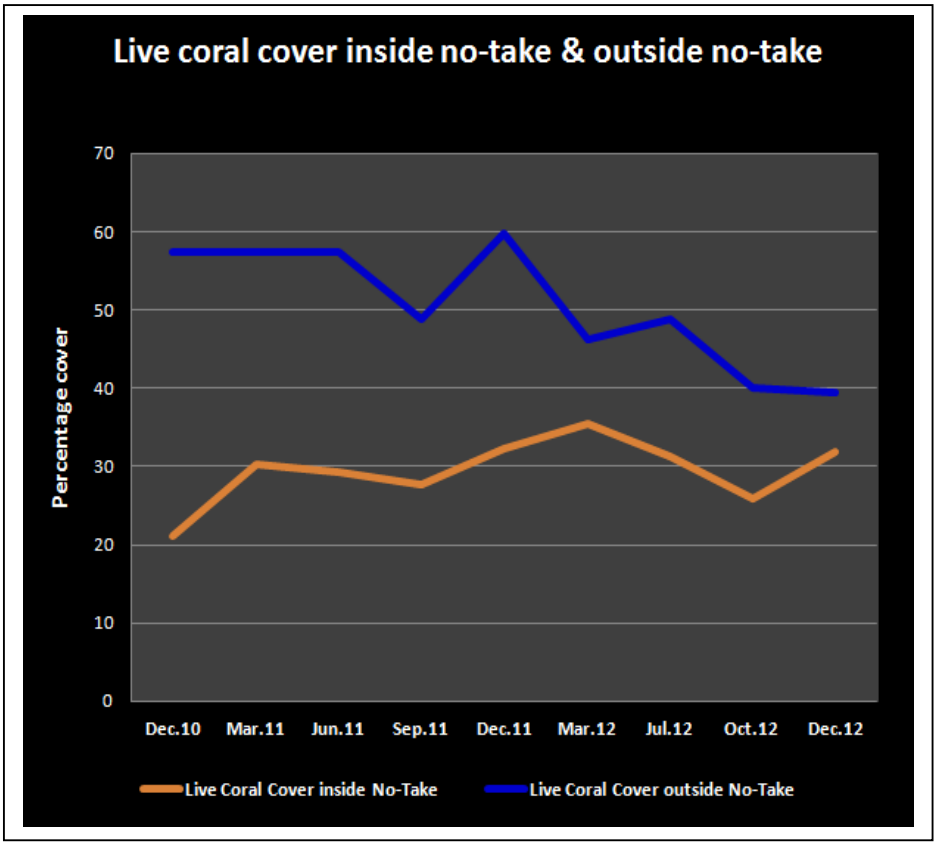
There were presence of other marine invertebrates on the reefs that were surveyed however many of these target marine invertebrates happen to be outside the 500m^2 monitoring area. Only those recorded within the defined study area were recorded during the monitoring program. Having said that when we look at individual site record, many sites did not have any records while some sites had 1 or more than 1 individuals. As the mean average for lobster within 6 monitoring station showed 0.5 lobster/500m^2 for 6 monitoring stations, 2 records for lobster came from Hanakubakuba (NT.5) and 1 species was recorded in Banibani Siga (NT.6). The same was the case for trochus. Population and abundance of crown-of-thorn starfish appeared to be on the rise between July and December. Thus, in July there was no record for CoT in both no-take and outside no-take. In October the monitoring team recorded 1.83 CoT/500m^2 from which 4 individuals were from Dana Gedu (NT.3) and 3 individuals from Luluwalagena (NT.2) and Banibani Siga (NT.6). Then in this monitoring period we now see an increased mean of 7.0 CoT/500m^2) as a result of the following individual records. 15 individuals/500m^2 recorded in Dana Gedu (NT.3); 10 individuals/500m^2 for Hanakubakuba Island (NT.5); 6 individuals/500m^2 for Luluwalagena (NT.2) and 5 individuals/500m^2 for Banibani Siga (NT.6). Monitoring outside no-take also showed a similar, high mean abundance 5.7 CoT/500m^2 where its records were obtained from Kiwakiwalina (OT.6) recording 17 individuals/500m^2; Manikutu (OT.5) recording 8 individuals/500m^2 and Tawali Balabala (OT.4) with an individual record of 4 individual/500m^2. There has been a significant increase over the last 6 months and the high indication from within each 500m^2 area further indicate that there were more crown-of-thorn starfish outside the monitoring stations in both reefs under no-take management and the open access reefs.

PART B. POPULATION TREND FOR TARGET MONITORING PARAMETERS OVER 1 YEAR (December 2010 – December 2012)

Population trend shown in the relevant sections of this report has been calculated for all data collected in the monitoring period December 2010, March 2011, July 2011, September 2011, December 2011, March 2012, July 2012, October 2012 and December 2012. A total of 2 years worth of data collection done every quarter of a year has been put together to show what the status of resources are over the 2 year period. Population trend has been only calculated for live coral cover and for reef fishes. Population trend in the abundance of herbivore, carnivore and IUCN, endangered or aesthetic species for all monitoring stations inside no-take zones and outside no-take zones. We will begin with live coral cover than reef fishes.

1. Live Coral Cover for Monitoring Stations Inside and Outside No-Take between December 2010 and December 2012

A. Live coral cover percentage for sites inside no-take & sites outside no-take



The above graph shows the live coral cover trend for monitoring stations inside no-take and outside no-take for the 2 year monitoring period (December 2010 - December 2012). Results from the analysis shows that live coral cover was more abundant on reefs located outside of the no-take zones. The percentage cover ranged between 39.4% and 59.8% while live coral cover for monitoring stations inside no-take areas was between 21% and 35.4%. Taking the averages for the 9

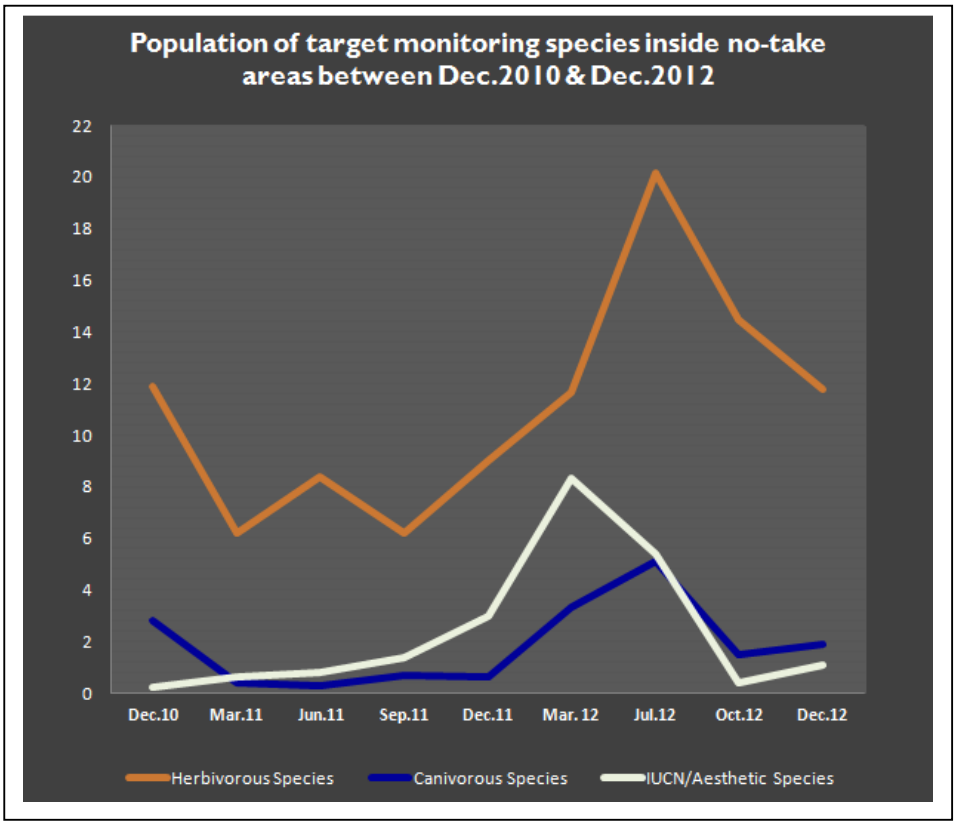
monitoring periods we can generally see that sites outside no-take have live coral cover of 50.6% while sites inside no-take has an average of 29.4%. The graph also showed high levels of fluctuations for sites inside no-take and sites outside no-take. The monitoring period in March 2012 recorded the highest live corals cover percentage while the lowest percentage was in December 2010.

Monitoring stations outside no-take appeared to be having a downward trend in its percentage cover although there were fluctuations observed in that 2 year period. These fluctuations are not caused by any significant alterations like natural disasters or human induced anthropogenic impacts. The fluctuations in data for each monitoring period attributes to the monitoring method used for gathering data. In theory, the estimation of live coral cover should somewhat be of the magnitude (+/-5%) meaning the data gathered in the permanent transacts will not always be exact and/or be accurate as that gathered in the previous monitoring period. Data collected should be within the range of (+/-5%) which is the margin of accepted value. Thus, should the percentage cover be greater than the marginal difference than explanations have to be provided for that difference.

Monitoring stations inside no-take shows an upward trend in the amount of live coral cover from a 21% live coral and biotic cover in December 2010, the latest monitoring data for December 2012 now shows 31.8%. From this data we can say that there was an increase of 10% in the distribution of live corals and other biotic substrate. We should also be very cautious not to say that our corals have recovered by 10% as the figures provided does not indicate this. Many biophysical factors could attribute to this change and we can say that our monitoring data is giving us the chance to see what has taken place over the last two years. Between 2010 and 2012 there was no major natural perturbation or disaster in the area. As a result of this the reef systems are expected to be the same as it was 2 years ago. There was significant evidences of coral recovery through larvae settlement and growth in many of the monitoring sites we observe.

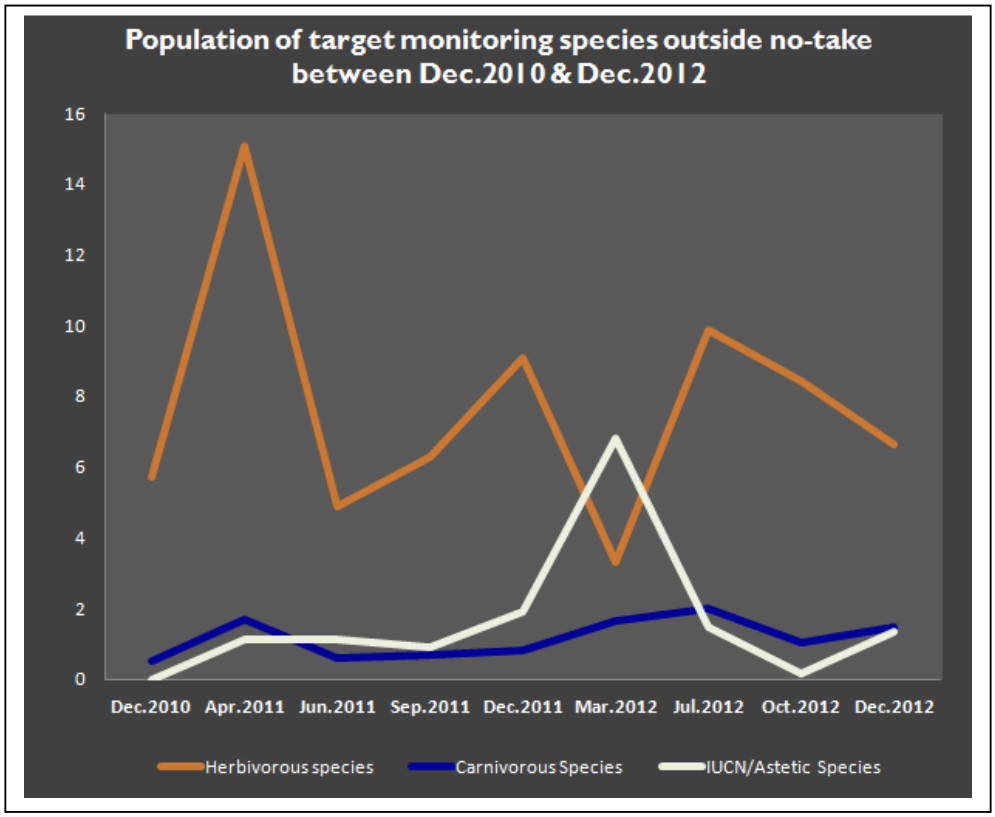
2. Population of Target Monitoring Reef Fishes in the No-Take Zones and outside of the No-Take for December 2010-December 2012.

A. Population Trend for Monitoring Stations Inside No-Take



Herbivore showed high population density than carnivore and the endangered Humphead Maori Wrasse. The general trend indicate a slight decrease in abundance between December 2010 and March 2011 then fluctuates between March 2011 and September 2011 before increasing to its peak in July 2012 with mean counts of 20.1 fishes/500m^2 then declined abruptly to a mean of 11.8 fishes/500m^2.

B. Population Trend for Monitoring Stations Outside No-Take



There was high fluctuations for herbivore population over the last two years of monitoring. From a low mean value of (5.70 herbivore/500m^2) in December 2010, the was a sharp increase to mean of 15.1 herbivore/500m^2, then a sharp decline to 4.9 herbivore/500m^2 in June 2011. The data continued to fluctuate to a very low mean value of 3.3 herbivore/500m^2 in March 2012. The same fluctuation continued from June 2012 to December 2012. Abundance for carnivore fishes showed very low population with an average of 1.16 carnivore/500m^2 for all monitoring data collected between December 2010 and December 2012. Although there were individual species which has good abundance in specific areas, the overall trend shows an almost linear distribution throughout 24 months. The presences of carnivore fishes, especially the reef fishes will always be lower than many other species as this fish group are nocturnal meaning many of these species are active feeders at night and rests throughout the day. Other species in the same group are have different feeding preferences and can be seen during the day. The depth of which many of the transacts have been placed was also shallow and in many case, you do not get to see many of those target species in all shallow reefs.

The population trend for the endangered Humphead Maori Wrasse and giant moray eel showed some high abundance counts for the two year monitoring program. Between December 2010 and September 2011 the averages recorded for these indicator species were lower than those recorded for carnivore fishes. After December 2012 monitoring the average rose remarkably to its peak average of 8.3 individuals/500m^2 for all 6 monitoring stations inside no-take areas.

5. CONCLUSION

Data gathered from the December 2012 monitoring program is similar to those in the previous monitoring reports. There was not much in terms of species recovery or devastation of the marine ecosystem by any form of natural cause of anthropogenic impacts. Population trend for live coral cover clearly showed that the fringing and patch reefs that are outside no-take zones continue to have high coral growth and good cover in compared to the outer barrier reefs. Despite having low coral cover, the habitats are good as there were a lot of sea cucumber, trochus, clam and fishes found in those reefs. There is a high chance of coral recovery as there is constant flow of currents which can mediate transfer of coral larvae from one point to another during coral spawning periods.

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