CORAL TRIANGLE INITIATIVE
ON CORAL REEFS, FISHERIES AND FOOD SECURITY

PAPUA NEW GUINEA

IABAM & PAHILELE COMMUNITY BASED RESOURCE MONITORING PROGRAM SURVEY REPORT #: 5

MONITORING PERIOD: DECEMBER 2011

June 2013

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Iabam & Pahilele Community Based Resource Monitoring Program
Survey Report #: 5
Monitoring Period: December 2011

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5

IABAM & PAHILELE COMMUNITY BASED RESOURCE MONITORING PROGRAM

SURVEY REPORT #: 5
MONITORING PERIOD: DECEMBER 2011

Monitoring Report Written by Jameson Solipo & Wellington Wamula
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Edited by
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(Conservation International)

PREFACE

Welcome everyone to this 5th and final monitoring report for Iabam & Pahilele CMMA. Before I proceed with some highlights of this repot, I would like to sincerely thank the men, women and youths of Iabam and Pahilele Islands who have participated in the December monitoring program, and for making it successful.

I also sincerely thank Conservation International and the USAID through its financial assistance through the Coral Triangle Support Partnership (CTSP) for providing this great opportunity to my community to be able to understand the need to managed the limited resources we have surrounding our island.

I also would like to extend my world of thanks to Mr. George Aigoma from Conservation International for making this monitoring period a worthwhile experience especially by sharing his humorous jokes which kept the team alive and enthusiastic during the monitoring period.

Mr. Terry Abaijah

Chairman
Iabam & Pahilele Community Managed Marine Area (IPCMMA)

About this report

This report is divided into two sections. The first section labeled PART A provides the findings from the December 2011 monitoring program and PART B provides an analysis of a 12 month monitoring program i.e. December 2010 – December 2011. This sections focus on determining population trend for the monitoring parameters that are often monitored in each monitoring period. Relevant graphs to show population increase or decrease in live coral cover, target monitoring fish species, sea cucumber and other marine invertebrates have been also provided to help you better understand what has been happening to our resources over the 12 month period.

The population trend presented at this stage is preliminary (*meaning, for only one year*) however; as we continue to monitoring our resources over a long period of time we can begin to see the real changes taking place in our marine environment as a result of our management efforts.

1. INTRODUCTION

The Iabam-Pahilele CMMA has successfully completed its December 2011 monitoring program and this paper presents the findings of that monitoring period. Moreover, the later part of this paper provides simple population trend done for 1 year of monitoring that has taken place between December 2010 and December 2011.

2. METHODS

2.1. Field Data Collection

All field sampling methods and equipments used in this survey are similar to those used in past surveys. All logistics and financial support for this monitoring was coordinated by Conservation International's office in Alotau. The Iabam-Pahilele community dinghy was used to ferry local monitors to each monitoring stations for assessment and all camping and catering have been done for participants on Iabam Island.

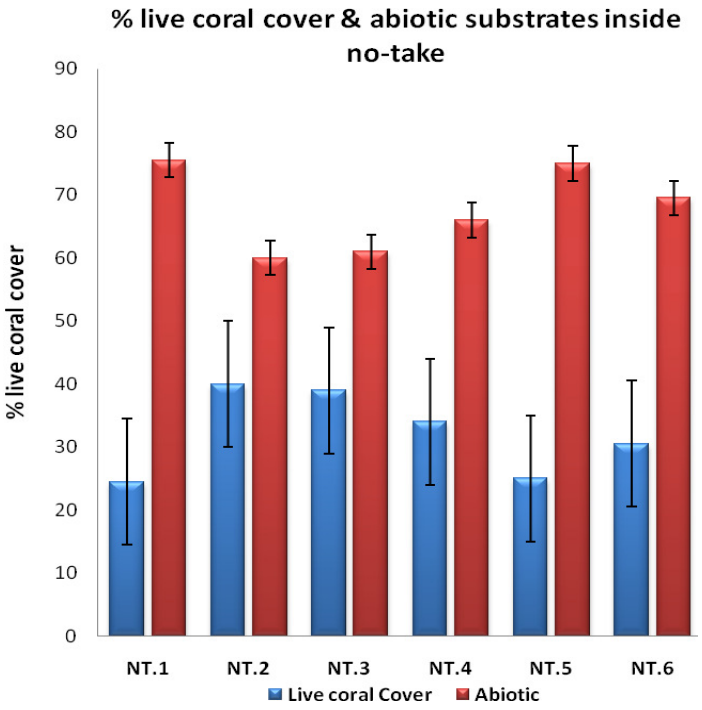
2.2. Data analysis

Analyses of all data in this monitoring were done by Mr. Jameson Solipo and Mr. Wellington Wamula at the Conservation International in Alotau. The procedures by which these monitoring data were analyzed have been the same as those done for previous monitoring. Further analyses on population trend for the last 12 months were done under the supervision of CI's marine biologist, based in Alotau.

3. RESULTS

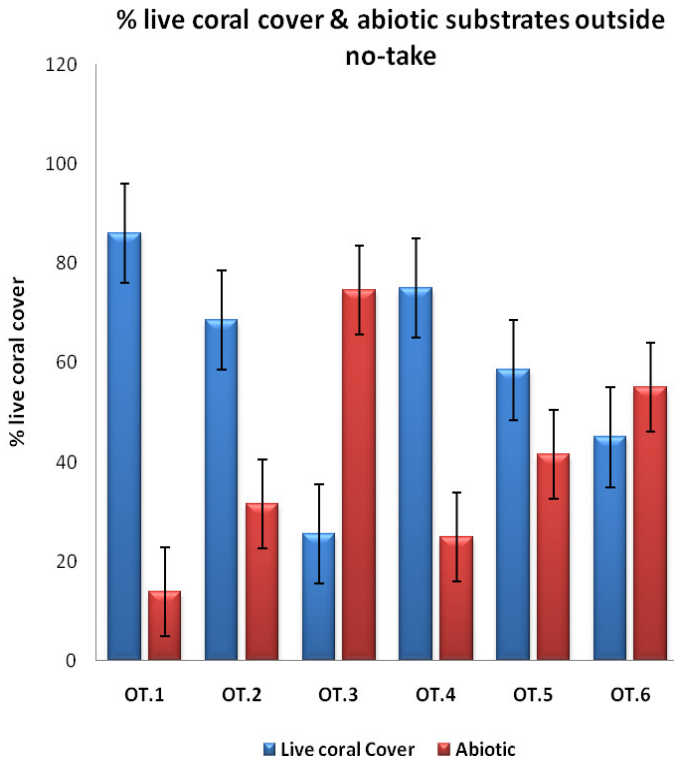
PART A. MONITORING RESULTS FOR DECEMBER 2011, RESULTS FOR LIVE CORAL COVER/BENTHIC SUBSTRATE; FISH AND INVERTEBRATES

3.1.1 Benthic substrate for reefs inside no-take



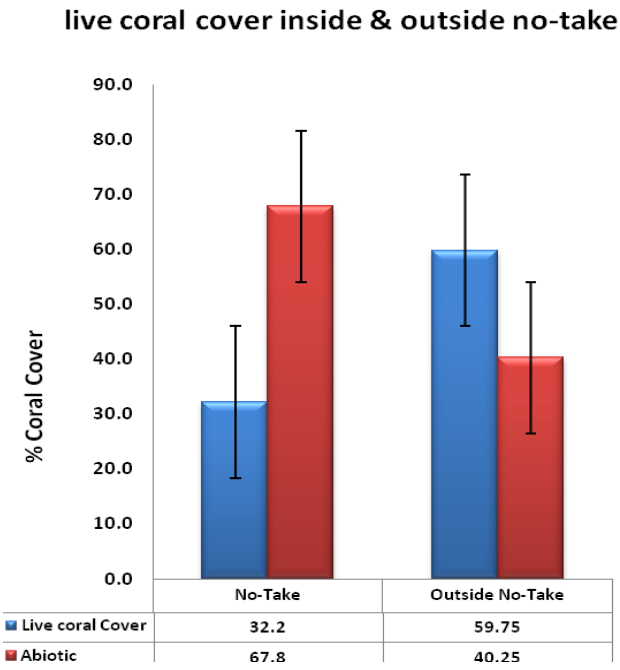
Benthic substrate for 6 monitoring stations inside no-take basically comprised more dead and abiotic materials than live corals. On average, live coral cover constitute 32.2% and abiotic materials made up the other 67.8%. It was apparent that live coral cover in all 6 monitoring stations was lower than 40% where NT.1 (Tawali Namonamo) and NT.5 (Hanakubakuba Island) had the lowest coral cover with percentages of 24.5% and 25% respectively. Data for abiotic substrate for each sites showed that NT. 1 was comprised 42.5% bedrock; NT.2 33.5% hard calcareous bedrock; NT.3 recording 39.5% hard rocky substrate while NT.4, NT.5 and NT.6 comprised dead coral rubble (DCR) as dominant substrate with respective percentages of 49% for NT.4; 43.5% for NT.5 and 30.5% for NT.6.

3.1.2. Benthic substrates for reefs outside no-take areas



Benthic substrate for sites outside no-take showed equal distribution of live coral cover and dead, abiotic substrates. OT.1, OT.2, OT.4 and OT.5 had higher live coral cover than dead, abiotic substrates distributed within its transact areas while OT.3 and OT.6 stations were dominated by dead, abiotic materials. On average, live coral cover for all 6 monitoring stations was 59.5% and abiotic substrate was 40.3%. Indivdually, OT.1 was dominated by sponge (SP) comprising 20%; OT. 2 comprised entirely of soft corals (SC) with 41.5%; OT.4 was dominated by branching corals (BC) with 57% and OT.5 was also dominated with branched corals (BC) making up 42.5% of the entire assessed 100m transact. The highest abiotic substrate was recorded at OT.3 where 56% of that benthic substrate was hard bedrock substrate.

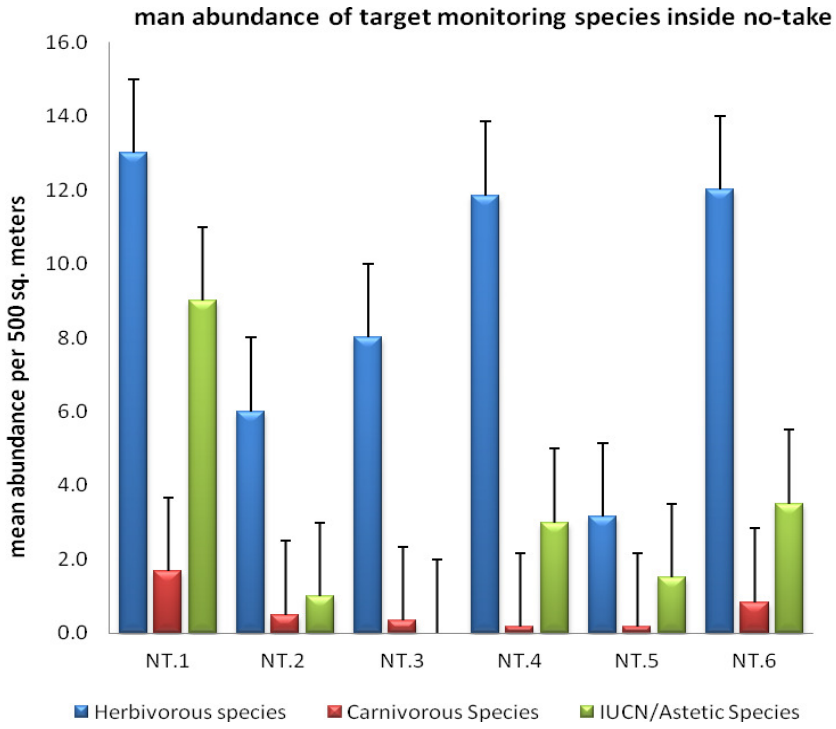
3.1.3. Benthic substrates for monitoring stations inside and outside no-take combined



A combined graph of benthic substrates inside and outside no-take clearly illustrates there was less live coral cover in sites inside no-take with 32.2% live coral cover while many monitoring stations recorded high amount of dead and abiotic substrates. As described in previous graphs, the high values for abiotic materials comprised entirely of hard rocky substratum and patches of dead coral rubble particularly in NT. 4, NT.5 and NT.6. Monitoring stations outsider no-take had a different record where a lot more live coral particularly branched corals dominated many of its monitoring stations, giving an average of 59.8% while abiotic substrate for many areas observed attributed to rocky bedrock substrate.

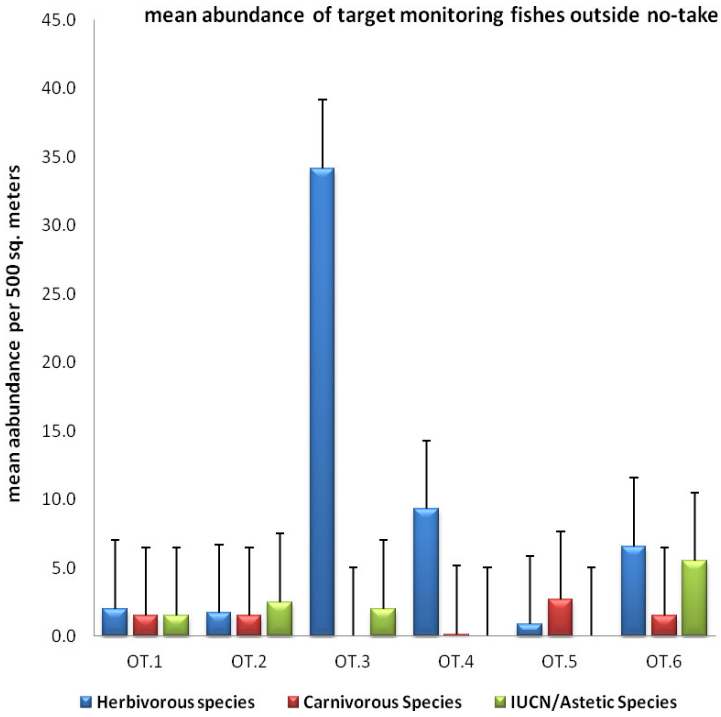
3.2 REEF FISH INDICATORS INSIDE & OUTSIDE NO-TAKE AREAS

3.2.1. Target Reef Fish indicators inside no-take



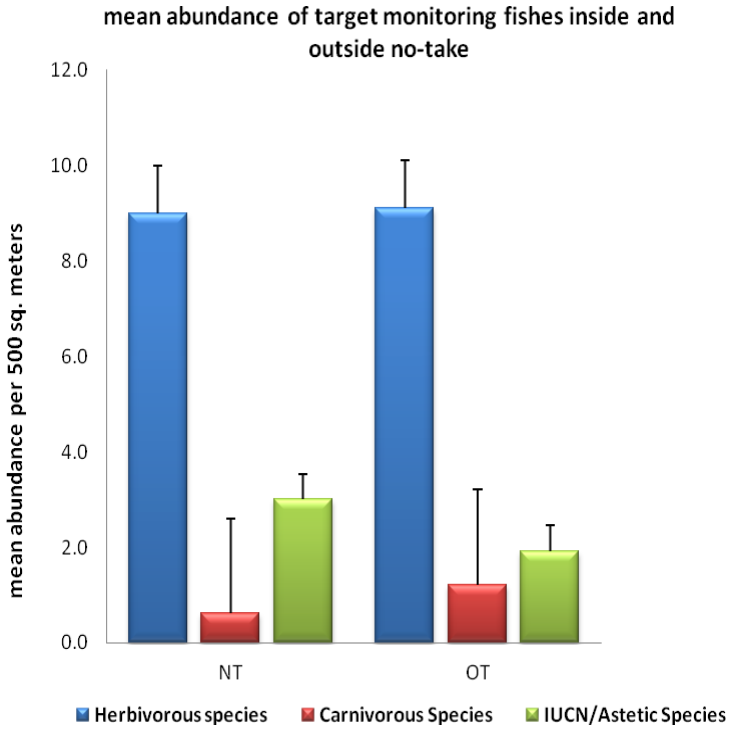
This December 2011 monitoring results for target monitoring reef fishes inside 6 no-take monitoring stations clearly showed high abundance of herbivore fishes with average records of 13 herbivores/500m^2 for NT.1; 6 and 8 herbivores/500m^2 for NT.2 and NT.3 respectively; 11.9 herbivore/500m^2 for NT.4; 3.9 herbivore/500m^2 for NT.5 and 12 herbivore/500m^2 for NT.6. These averages for each monitoring species were higher than those recorded for carnivore and IUCN/asthetic species. Monitoring station with the highest mean abundance of carnivore fishes was NT.1 with an average of 1.7 carnivore fishes/500m^2. All other sites recorded low mean averages. Records for the number of IUCN/asthetic species recorded in this monitoring period are the highest when compared to previous monitoring periods. Thus, an average of 3.0 species/500m^2 for all 6 sites inside no-take shows gradual increase particulaly for the humphead maori wrasse (*Cheilinus undulatus*) or **Mamli** (Iabam local name). NT.1 recorded the highest individual species of 9 species/500m^2 followed by NT.6 with and average of 3.6 species/500m^2.

3.2.2 Target reef fish monitoring indicators outside no-take



All monitoring indicators for sites outside of no-take showed very low abunadance. Averages for herbivore fishes was 9.1 herbivore/500m^2; carnivores fishes was 1.2 species/500m^2 and IUCN/asthetic species was 1.9 species/500m^2. Records for individual sites showed high records for herbivore fishes in OT.3 with average count of 34.1 herbivore/500m^2 and at OT.4 with 9.3 herbivore/500m^2. High average for carnivore fishes was at OT.5 with 2.7 carnivore fish/500m^2 while IUCN red list species especially the humphead maori wrase showing a high mean count at OT.6 with 5.5 species/500m^2. For some reason population for carnivore fishes decreased by 14% when compared to data gatrhered in September 2011.

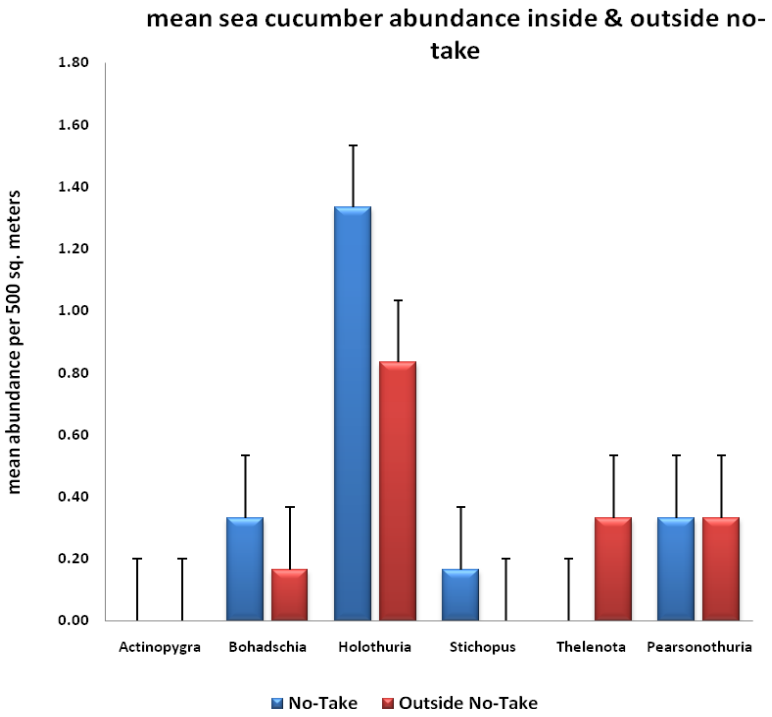
3.2.3. Mean abundances for target monitoring fishes inside & outside no-take areas combined



The general pattern displayed when we compare our monitoring species inside no-take with those outside no-takes clearly showed that there was high abundance of herbivore fishes in both no-take and outside no-take. Sites inside no-take recorded an average abundance of 9.0 herbivores/500m^2 while sites outside no-take recorded an average of 9.1 herbivores/500m^2. Presences of carnivore fishes continued to be low for both no-take and outside no-take with averages of 0.6 carnivores/500m^2 for 6 monitoring stations and 1.2 carnivores/500m^2 for sites outside no-take. Averages for humphead Maori wrasse was a little higher for all monitoring stations inside no-take with mean abundance of 3.0 species/500m^2 and 1.9 species/500m^2 for sites outside no-take.

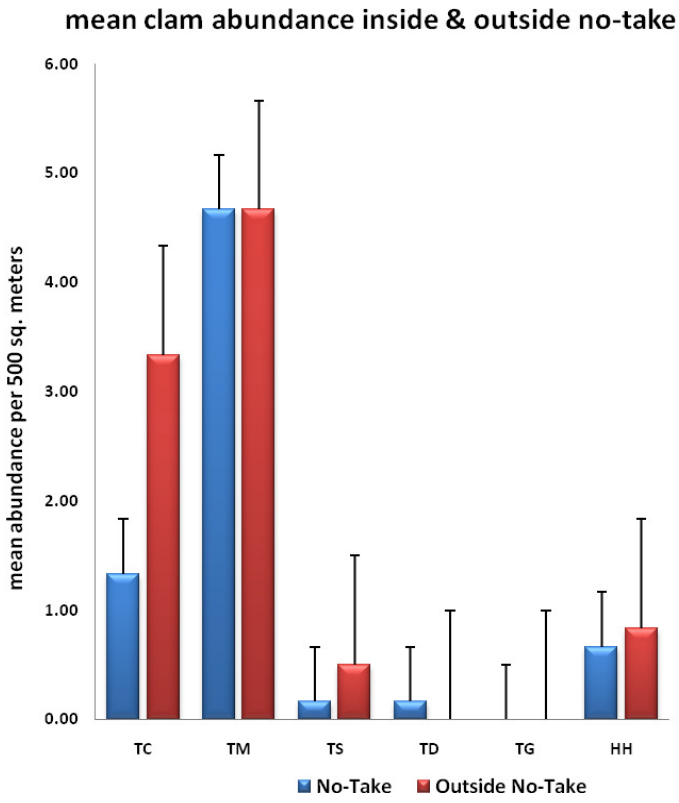
3.3 MARINE INVERTEBRATE

3.3.1. Sea cucumber



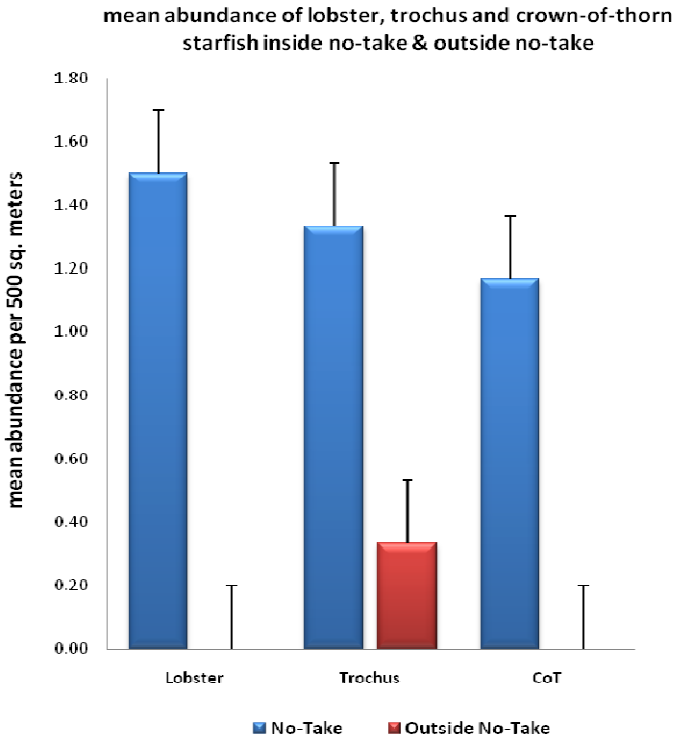
Monitoring data for December 2011 shows high presence of Holothuria particularly lollyfish (Holothuria atra) in the sites inside and outside no-take. Mean abundance of 1.33 holothuria per 500m^2 for no-take and 0.83 holothuria per 500m^2 outside no-take. Other sea cucumber species also recorded include Tigerfish (*Bohadschia argus*) with averages of 0.33 species/500m^2 inside no-take and 0.17 species/500m^2 for sites outside no-take. There was also presence of Prickly redfish (*Thelenota ananas*) and Amberfish (*T. anax*) found in some monitoring stations outside no-take which provided an average of 0.33 species/500m^2. Flowerfish (*Pearsonothuria graffei*) was also recorded in two sites inside and outside no-take areas providing mean averages of 0.33 species/500m^2 in both no-take and outside no-take.

3.3.2. Giant Clam



December monitoring data for 6 giant clam species continued to show high distribution and abundance of maxima clam in both no-take areas and outside no-take with the same average of 4.6 TM/500m^2 in both areas. Boring clam (TC) was more common in the sites outsdie no-take while the scaly clam (TS) also showed a similar abundance in monitoring stations outside no-take. Mean counts for TC inside no-take was 1.33 TC/500m^2 and outside no-take was 3.33 TC/500m^2. TS had a record with high mean for sites outside no-take than sites inside no-take (0.50 TS/500m^2). The bear pow clam HH was also recorded at individual sites inside and outside no-take. Respective averages include 0.67 HH/500m^2 and 0.88 HH/500m^2. TD was only recorded inside no-take at site NT.3 with a general mean abundance 0.17TD/500m^2. There was no record for the giant clam (TG) inside all monitoring stations both inside and outside no-take.

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



Records for lobster, trochus and crown-of-thorn (CoT) starfish that make up other marine sedentary resources showed high averages for lobster (1.50 species/500m^2), trochus (1.33 species/500m^2) and CoT (1.17 species/500m^2) inside no-take areas. Thus, highest counts for lobster was at NT.3 and NT.4 with 4 species recorded while high counts for trochus was recorded in NT.6 with 3 individuals recorded in a single 500m^2 transact area. Values for crown-of-thorn showed high indivisual counts of 5 inside NT.2 while other sites NT recorded 2 individuals within their monitoring peremeters. Monitoring stations outside of no-take only yield results for trochus where an average of 0.33 species/500m^2 was obtained from individual site records from OT. 2 with 2 indivisuals counted withing its 500m^2 sampling area.

4. DISCUSSION

4.1. Benthic substrate

Explanations for the different growth characteristics of corals are dependent on the benthic substrate which these explanations have been repeatedly provided in the September and previous monitoring report. There has not been any significant catastrophic impact from cyclone or from strong surge currents experienced between September and December 2011 therefore, no external factors can be held accountable for any fluctuation in the amount of live coral cover both inside and outside no-take areas. The variations observed in percentage of live coral cover can be attributed to where transact lines are placed during each monitoring period. The monitoring transacts only provides us with a snapshot of estimated live coral cover at each particular monitoring period. It is however correct to assume that live coral cover percentages may not vary much by large percentage between each period data is collected unless there is a natural catastrophic event that may have significantly affect live coral cover.

Inconsistency in data recording by different monitors in different monitoring period is another as there is no designation of who is to be responsible for substrate which can ascertain standardization of data acquisition during each monitoring period.

Levels of anthropogenic impacts assessed during this period were lower as there was no rain and/or other major land based discharges from land. All conditions appeared to be natural however; coral and evidences of coral diseases were observed on many corals. Crown-of-thorn population recorded in this monitoring period was very similar to those recorded in June and September 2011.

4.2. Reef Fish

4.2.1. Distributions herbivore, carnivore and Humphead Maori Wrasse.

The overall average for herbivore fishes in this December monitoring period showed an increase of 24.4% and an increase of 52.7% in the abundance of IUCN Red Listed species. This significant increase was from increased number of Humphead Maori wrasse population record within each monitoring transacts for 6 stations inside no-take. Population for carnivore fishes saw a significant decline of 92%. From an average of 7.58 carnivore/500m^2 in September, the December monitoring program recorded a very low average of 0.6 carnivore/500m^2. Monitoring stations outside no-take also showed average increase in the number of herbivore fishes with averages of 30%, and additional 40% increase in the abundance of carnivore fishes and a 51% increase in the population of Maori Wrasse (IUCN Red Listed Species).

The increase and decrease in fish population shows seasonal variation among species meanwhile, the significant decline in the number of carnivore fishes between December and September monitoring periods would require further investigations in determining these changes. There were a lot more Humphead Maori Wrasse found in this monitoring period for sites inside and outside no-take than previous monitoring periods thus, shows good representation for this species in many sites both inside and outside no-take. Data gathered for the March monitoring period will determine if populations of these target fishes do increase or decrease and further investigations into declining population can be investigated by CI technical team.

4.3. Sea Cucumber

Calculated averages for sea cucumbers inside no-take for the December monitoring period were lower than those observed in June and September 2011. All averages for sites inside no-take indicated population decline or reduced abundance. Sites outside no-take indicated increase in some species while some species also showed decline in their average abundance per 500m^2 studied areas. Sea cucumber population showing increase in population numbers include Bohadschia, Holothuria, Thelenota and Pearsonothuia all showed signs of increase.

The general decline in the mean abundance of each sea cucumber population could have been resulted from vertical movements by different species. These movements could also attribute to different ecological and biophysical factor which we do not know at this stage. Furthermore, it is understood that the December period is the breeding season for many sea cucumber which could be a possible reason for the sea cucumber movement to sites that is suitable for their breeding. This is only a speculative idea and will require detailed study to provide an accurate statement on the decline observed.

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. Observer error or data collecting error

continued to be another common source. Misidentification between maxima clam (TM) and scaly clam (TS) has yet to be resolved for better identification and distinction between TM and TS.

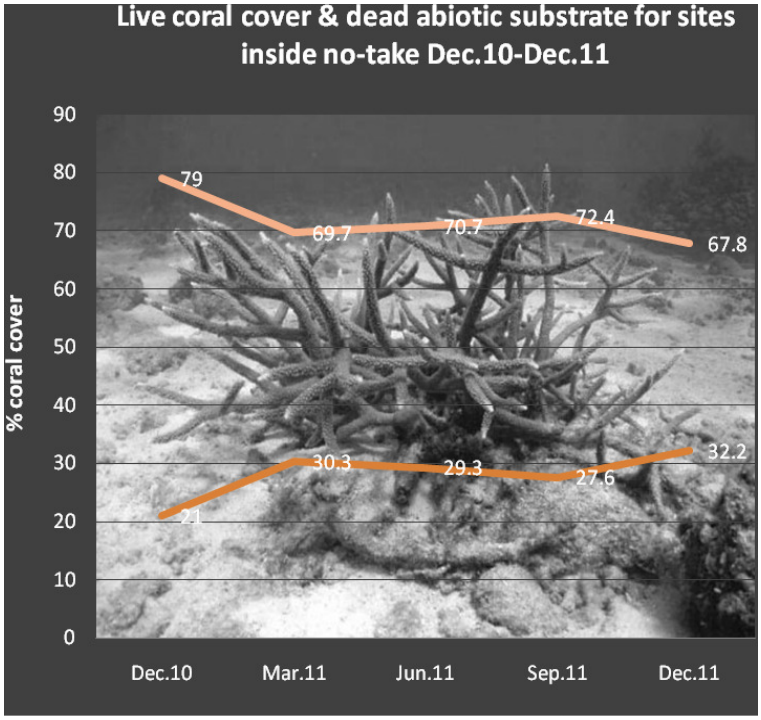
4.5. Other invertebrates *(Lobster, trochus, crown-of-thorn starfish)*

There was increase in the number of lobster counts inside 6 monitoring stations inside no-take areas. An increase abundance of 87% when we compared this monitoring results with the September results. Mean abundance for trochus shells decreased by 13% while population of crown-of-thorns (CoT) further decreased by mean value of 11.8 CoT/500m^2 to 1.17 CoT/500m^2. Increase in the number of lobsters could be either permanent or temporal which at the time of their residency within the no-take this survey was undertaken. Results for the next monitoring period (March 2012) shall further confirm if the settlement are permanent or temporary. Results obtained for trochus showed slight decrease which could have directly related to misidentification during this monitoring period. Crown-of-thorn (CoT) population had showed a remarkable decrease in the many assessed sites inside and outside no-take. The 90% reduction of their population must not be taken as a significant decrease in population numbers as these animals could have moved from places to places scouring healthy branching corals to feed on. The coming monitoring program will be used to further confirm if these populations have reduced or is the same as those recorded in September 2011.

PART B. POPULATION TREND FOR TARGET MONITORING PARAMETERS OVER 1 YEAR (December 2010 – December 2011)

LIVE CORAL COVER & BENTHIC SUBSTRATE

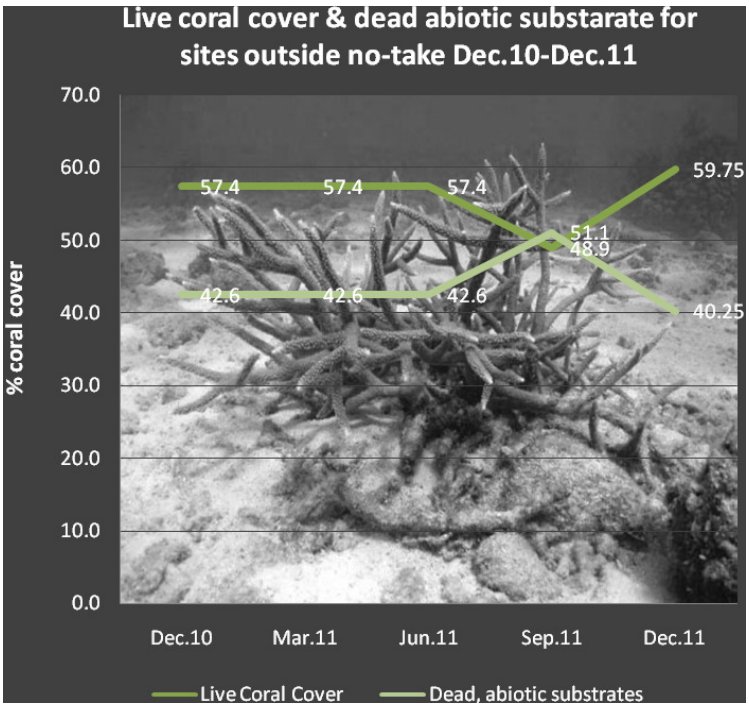
Live coral cover for monitoring stations inside no-take



The trend displayed for live coral cover for monitoring stations inside no-take showed that in December 2010, all monitoring stations sampled had 20.8% live coral corals within a 100m stretched transact line. In March 2011, the monitoring team observed and recorded 32.9% live coral cover and again 47% live coral cover in June 2011. In the September 2011, there was a significant decline in live coral cover which recorded 29.3% cover and finally 38.4% cover in December 2011. The period by which data showed decline is relates to inconsistency and inaccuracy in data recording by local

monitors as during that time a lot of new youths were given training by the old monitoring team members where these new monitors were not competent and accurate in their data collection. There was no significant storm, cyclone and/or disaster which could have contributed to this. Therefore, we can conclusively say that live coral cover for 8 monitoring stations inside no-take is on average lower than 50% where much of the benthic substrate comprises abiotic materials that comprised hard bedrock and sand in many exposed, outer, offshore reefs.

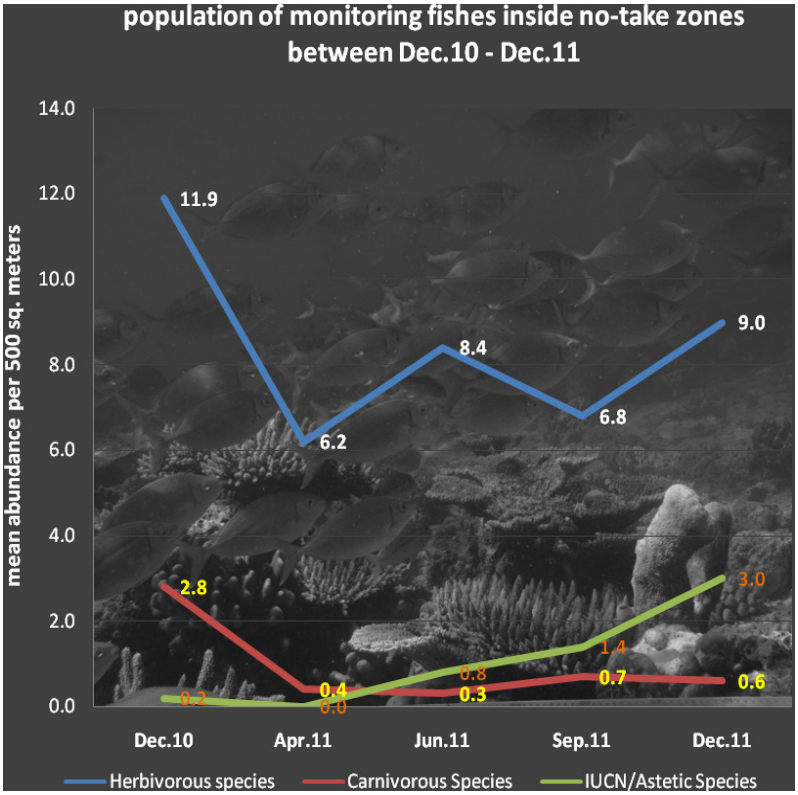
Live coral cover for monitoring stations outside no-take



The trend displayed over the 12 months for live coral cover for sites outside no-take was similar to that shown for sites inside no-take. There was steady increase in the percentage of live coral cover from monitoring periods Dec.10 – Jun. 11 then, there was significant reduction in the value of live corals recorded. Thus, from 45.5% to 37% recorded showed a reduction of 18.7% in the amount of coral cover for that period. The December monitoring displayed significant live coral cover with 61.75%. The decline in coral cover recorded in September is directly attributed to incorrect data recording by newly trained members of the NIPCMMA monitoring team. As described for data inside no-take, the same error is repeated for sites outside no-take.

TARGET FISH MONITORING INDICATORS

Population trend for monitoring species inside no-take for monitoring period Dec.10-Dec.11

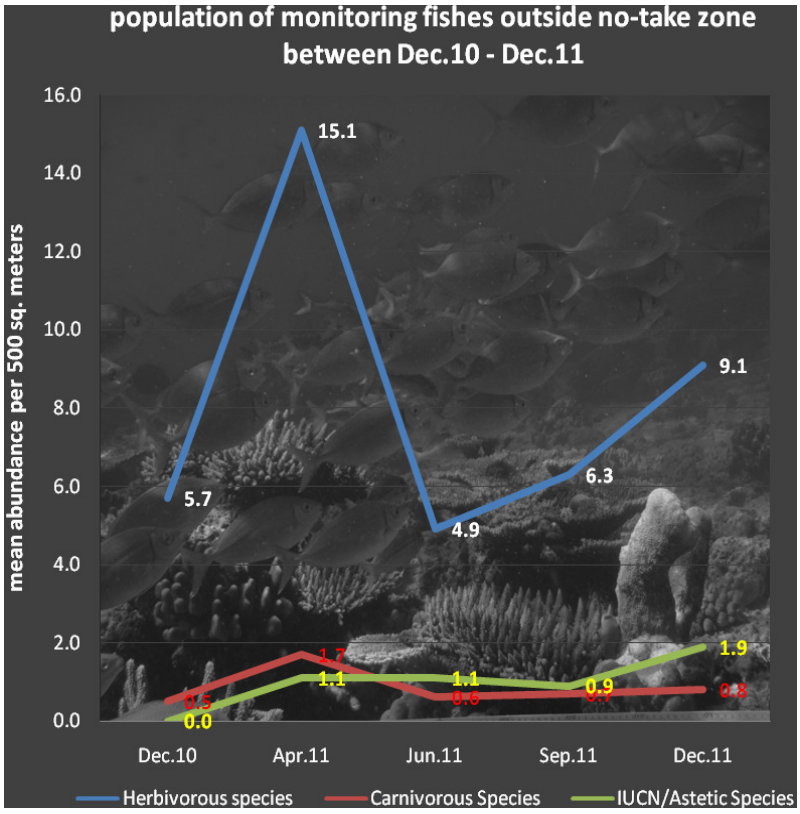


A. Herbivore fishes – Herbivore fishes appeared to have the highest mean averages per 500m^2 monitoring areas inside 6 no-take monitoring stations. The initial monitoring program in December 2010 recorded an average of 11.9 herbivore per 500m^2 transact. In April 2011, this average dropped off to 6.2 herbivore per 500m^2 the increased to 8.4 per 500m^2 in June. The mean value for September decreased again to 6.8 herbivore per 500m^2 in September 2011 and finally increased to 9.0 herbivore per 500m^2 in the December 2011 monitoring period.

B. Carnivore fishes – Population trend for carnivore fishes showed low average at the beginning of the monitoring program with 1.1 carnivore fish per 500m^2 and continued to stay that way in March 2011 before increasing to 1.6 fish per 500m^2. The highest average recorded was in September 2011 where an average of 4.5 carnivore fish was recorded per 500m^2. This value further reduced to an average record of 2.5 carnivore fish per 500m^2 in December 2011.

C. IUCN Red List Species – This fish group continue to have low mean abundance in three monitoring periods (Dec.10, Mar.11 and Jun.11) before recording its highest for the 12 month period with average of 3.2 fish per 500m^2 in September and 3.25 fish per 500m^2 in December 2011.

Population trend for monitoring species outside no-take for monitoring period Dec.10 – Dec.11.



A. Herbivore fishes

There were significant fluctuations observed for this fish group over the last 12 months. At the beginning of the monitoring program, herbivore fish recorded high averages of 5.7 fishes per 500m^2 then increased to 15.1 herbivore per 500m^2 and declined remarkably in June, recording an average of 4.9 herbivore/500m^2. The average value then rose to 6.3 herbivore/500m^2 in September 2011 and further increased to 9.1 herbivore/500m^2 in December 2011.

B. Carnivore fishes

The initial record for carnivore fish at the beginning of the monitoring was as low as 0.5 carnivores per 500m^2. This average value rose to 1.7 carnivore/500m^2 in April 2011 then declined again in June with mean abundance of 0.6 carnivores per 500m^2. This mean remained the same during September and in December it slightly rose to 0.8 carnivores per 500m^2.

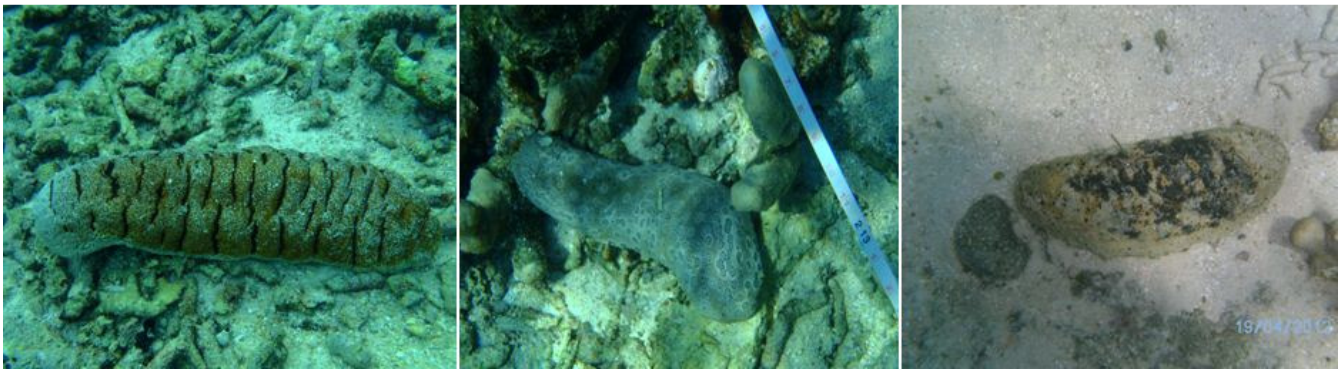
C. IUCN Red List Species

Records for IUCN Red Listed Species and aesthetic species were quiet higher than values for carnivore fishes with high averages recorded over the last 12 months. At the beginning of the monitoring program in December 2010, there was no record for this fish group. In April and June 2011 monitoring there was an average record of 1.1 species per 500m^2. In September, the average dropped slightly then increased remarkably in December 2011 with average record of 1.9 species per 500m^2. This group have been largely indicated by humphead wrasse (*Cheilinus undulatus*) or (***Mamli***) in the local Iabam-Pahilele dialect.

Population trend for monitoring species inside no-take for monitoring period Dec.10-Dec.11

SEA CUCUMBER POPULATION

Population of sea cucumber is slowly recovering in many areas we have studied. This is a good sign of stock recovery. Other sea cucumber species which have been found in significant populations in the previous 2006 marine surveys have not been found in many sites inside and outside no-take. For instance, the population of candycane fish (*Thelenota rubralineata)* has significantly been reduced to a stage where even the deepwater monitoring surveys using SCUBA inside Iabam-Pahilele CMMA has not collected one record. A similar recommendation made for the nearby Nuakata CMMA on management is again repeated here for Iabam-Pahilele CMMA. It is important that the current sea cucumber fishery be closed for another 3 years which will allow some of the species which have disappeared to return. More importantly, this time extension will allow enough time for the existing stock to optimize their full adult stage as brood stock (large adults) to reproduce and continue supply new sea cucumber stocks in inside Iabam and Pahilele CMMA.



OTHER BENTHIC INVERTEBRATES (Giant clam, trochus, lobster & crown-of-thorn starfish)

Population for giant clam, trochus, lobster and crown-of-thorn starfish within Iabam-Pahilele no-take and sites outside no-take could be described as relatively stable over the last 12 months of monitoring. This monitoring period we have observed a slight increase in the abundance of lobster per 500m^2 however; this animal is highly mobile therefore we cannot say that their population has increased until we have a continuous long term data to confirm. What has been observed over the last 12 months simply illustrated slight increase in populations within no-take areas. Population of crown-of-thorn was observed to be the highest in the September monitoring however; declined in the December monitoring period. Key explanations for these fluctuations over the last 12 months cannot be fully established as it will require long term monitoring data or a specific CoT targeted assessment survey to fully determine the ecological aspects of the increase and decrease observed.

SUMMARY & CONCLUSION

To conclude, a similar conclusion as that provided for Nuakata is herby used. Population trend for those monitoring species over the last 12 months did show some increase in the number of individual target monitoring species. Conclusions on these increases cannot be provided at this stage as more sampling and a longer time period in monitoring is required to observe trend in species population. It is good to know that resources are recovering at this stage. More time is needed to see further changes happening in the population of fishes and other marine organisms around Nuakata and Iabam-Pahilele CMMA.

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