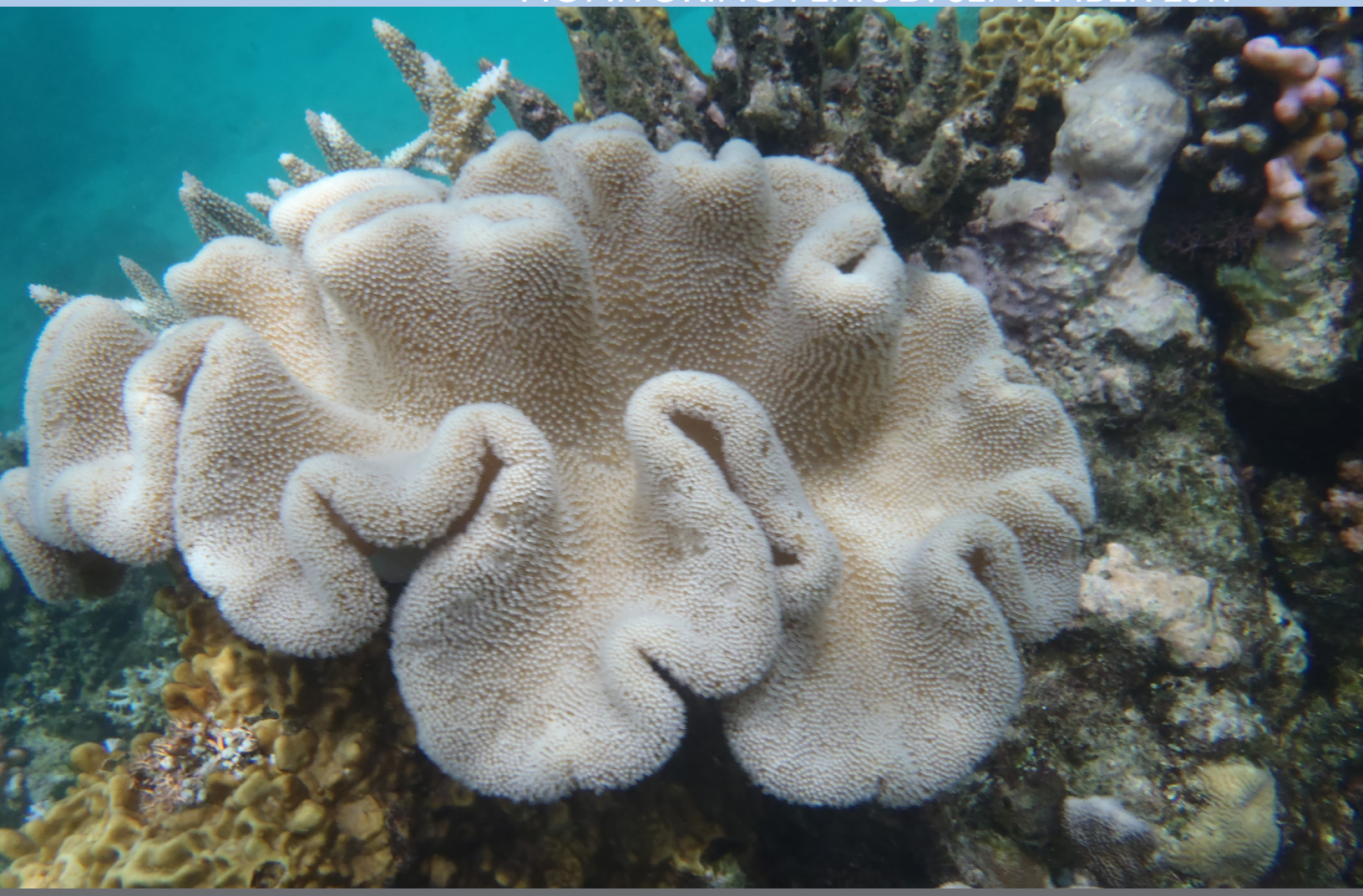
CORAL TRIANGLE INITIATIVE
ON CORAL REEFS, FISHERIES AND FOOD SECURITY

PAPUA NEW GUINEA

NUAKATA COMMUNITY BASED RESOURCE MONITORING PROGRAM SURVEY REPORT #: 4

MONITORING PERIOD: SEPTEMBER 2011



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Nuakata Community Based Resource Monitoring Program Survey Report #: 4 Monitoring Period: September 2011

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4

NUAKATA COMMUNITY BASED RESOURCE MONITORING PROGRAM

SURVEY REPORT #: 4
MONITORING PERIOD: September 2011

Images taken from monitoring of Nuakata Island Community Managed Marine Area

MONITORING REPORT WRITTEN BY JOEL ARAEA & SIMEON ISAAC
(CMMA Data Specialist)

PREFACE

I warmly welcome you to this 4th monitoring report for Nuakata Island Community Marine Managed Area (NICMMA). I would sincerely like to thank the Nuakata management committees and the marine monitoring team for a wonderful effort in this September monitoring. This monitoring was a lot tougher than the three previous monitoring programs. The tough conditions induced by continuous strong south-east winds driving rough seas, swells and strong surface and underwater currents which you all felt during your assessment. I am pleased to say that despite these obstacles, the monitoring was pursued, further completing all 15monitoring sites inside and outside no-take. With the perseverance and determination shown by the monitoring team, we now have this 4th monitoring report prepared to inform our community on the status of our resources.

Secondly, I would like to extend my sincere word of thanks to Celsius (VET), Lester and other members of the committee who took out their time in collecting data during the monitoring period .Your time and commitment has significantly contributed to the overall success of or program.

I also will like to extend my word of thanks to the local boat operators especially Esron and Damasi for leading your boats for use during this monitoring period. Lastly, a final word of appreciation is extended to Conservation International and to the Coral Triangle Support Partners (CTSP) for your commitment and funding in building up this level of skills in our community. We thank you for your commitment and look forward to continue our work with you as you continue to provide important management skills and knowledge to manage our resources for today's use and for our future generation's benefit.

This report has been prepared by Mr. Joel Araea and Mr. Simeon Isaac with supervision from Conservation International's marine biologist, Mr. Noel Wangunu therefore; any queries or questions you have regarding any findings should be directed to these personnel for further clarification.

Mr. Anania Mesegai
Chairman (NICMMA)

About this report

This report present finding from the September 2011 community monitoring program for the reefs inside Nuakata Island Community Marine Managed Area (NICMMA). Results from this monitoring have been made in comparison to those from the previous monitoring reports to provide you with an up to date summary on what is found in each monitoring stations both inside and outside our conservation areas (or no-take areas).

1. INTRODUCTION

The Community Managed Marine Area (CMMA) in Nuakata has completed its fourth (4) monitoring program for September 2011. This successful completion marks another milestone in the local community's ability to conduct assessment surveys for long term monitoring of their marine resources.

Faced with challenges like strong SE Trade Winds, the local monitors have again successfully completed their scheduled monitoring program. The monitoring results for this period showed slight changes in the population and abundance of monitoring species when compared to the earlier monitoring results. An outstanding feature was the amount of new coral recruits found within and outside transact areas. Thus, many reefs showed positive results indicating coral growth; increase in numbers for target fish species and slight increase in the distribution and abundance of sea cucumber, giant clam and other marine resources.

2. METHODS

2.1. Field Data Collection

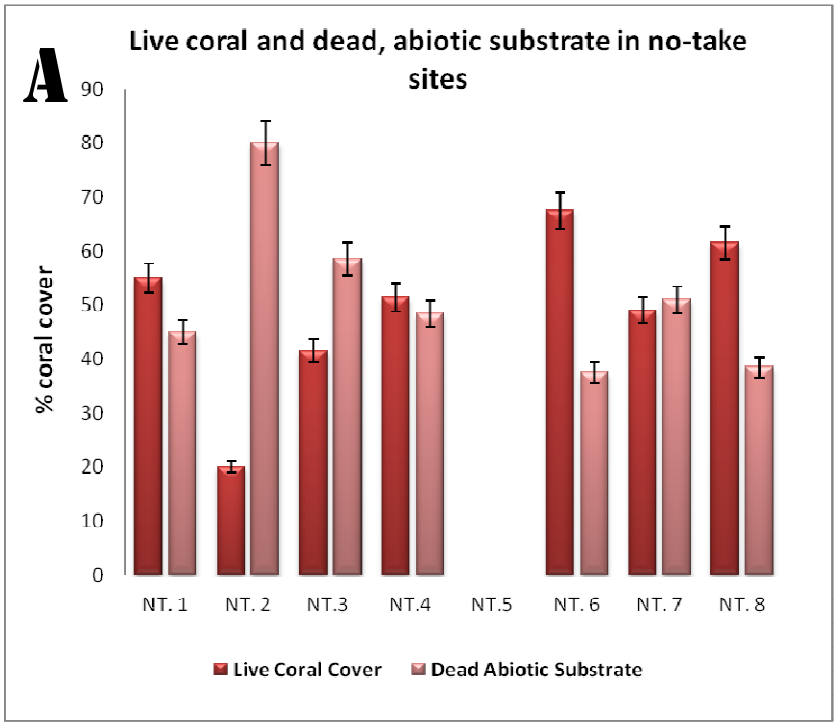
All field sampling methods, equipments and personnel involved in this monitoring period are the same as those in the past 3 monitoring programs.

2.2. Data analysis

Analysis of all data in this monitoring is the same as those done in March and June. Same methods and procedures were again followed here to provide the results displayed in this report.

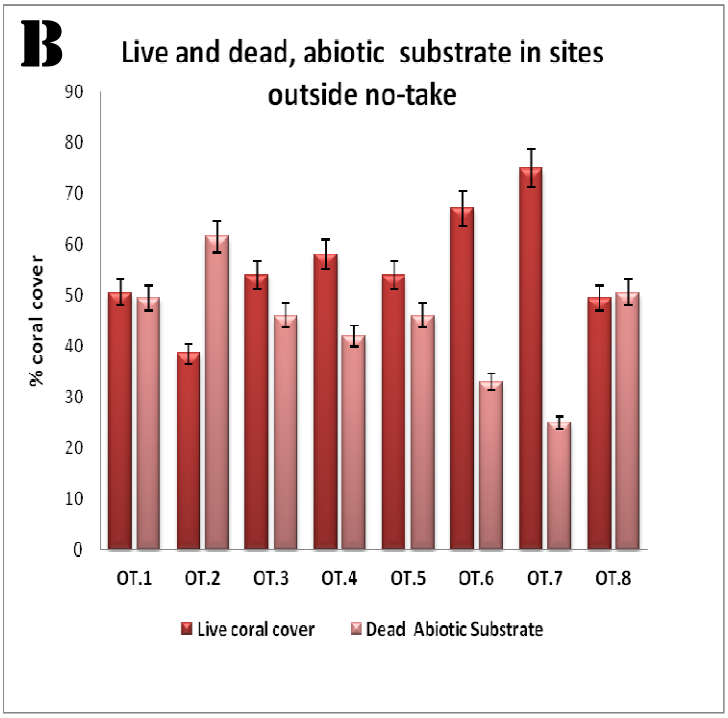
3. RESULTS

3.1. Benthic substrate for reefs inside no-take or conservation areas

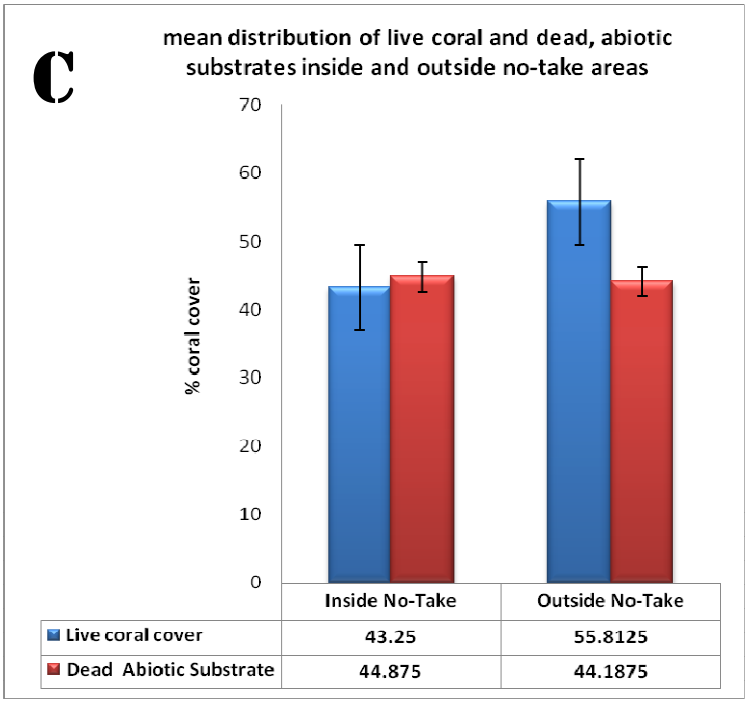


Presence of live coral cover and dead abiotic substrates inside no-take monitoring stations are fairly equal. Average calculations for 8 monitoring stations inside and outside no-take

indicate 43.9% live corals and 44.9% per 500m^2 inside no-take areas. Gallows Reef (NT.6); Grace Island (NT.8); and Hibwa Reef (NT.1) where the 3 reef areas with high percentage of live coral cover (67.5%; 61.8% and 55%) respectively. Dead abiotic substrates were more dominant at Batutuli (80%) and Tawali Iks (58.5%). Monitoring station at Northeast Gallows (NT.5) was not assessed during this monitoring period.



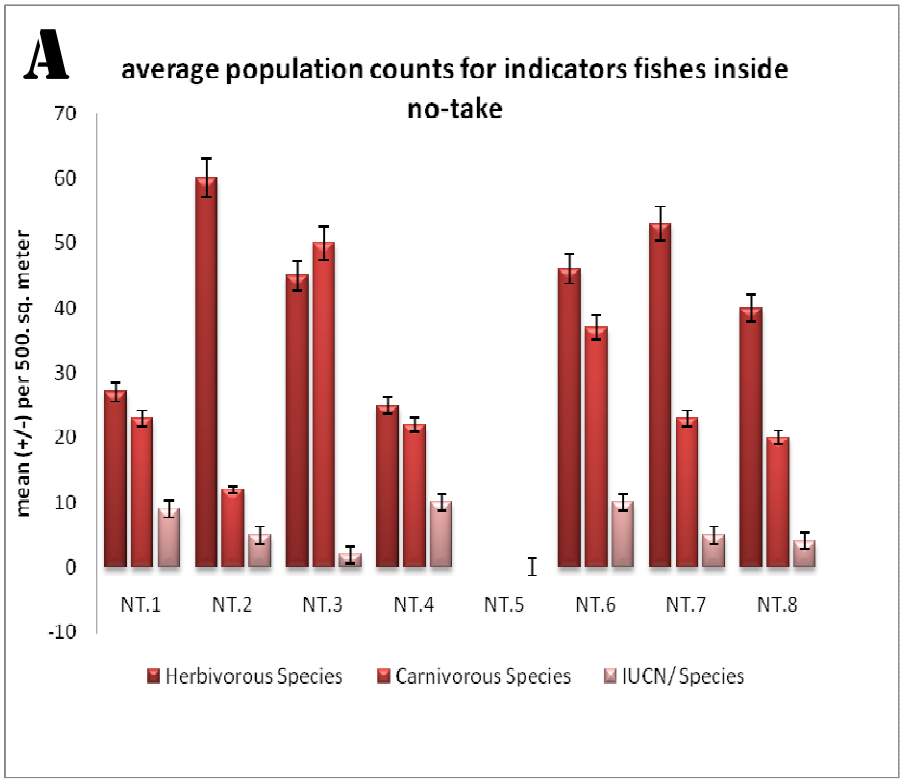
Many reefs outside no-take showed high live coral cover distribution (55.8%) while dead and abiotic substrates recorded low average of 44.2%. Looking at each sites individually, Sioayoaoya (OT.1), Gaima Niugini (OT.3), Illabo (OT.4) Tawali Gadohoa (OT.5), Boirama (OT.6) and Daiwari (OT.7) all had high live coral cover percentages. In particular, Daiwari recorded the highest percent of 75% while Boirama recorded the second with 67%. All other sites had almost equal percentages of live and dead abiotic substrate except Sobasoba which had the highest abiotic substrate percentage of 61%.



Representative sites inside no-take showed equal distribution of live corals cover (43.3%) and dead abiotic substrate (44.9%). The highest recorded live coral morphology was at (Gallows NE with 17.5% per monitoring areas while dead abiotic substrate was more dominant at Batutuli (NT.2) with 80% where much of that comprised entirely of dead corals (62%), dead coral rubble (46%) and rock (29%). Monitoring stations outside no-take clearly showed high live coral cover (55.8%), with Daiwari (OT.7) recording 55.8% where 75% of its study transacts comprised Acropora branching, table and digitate corals.

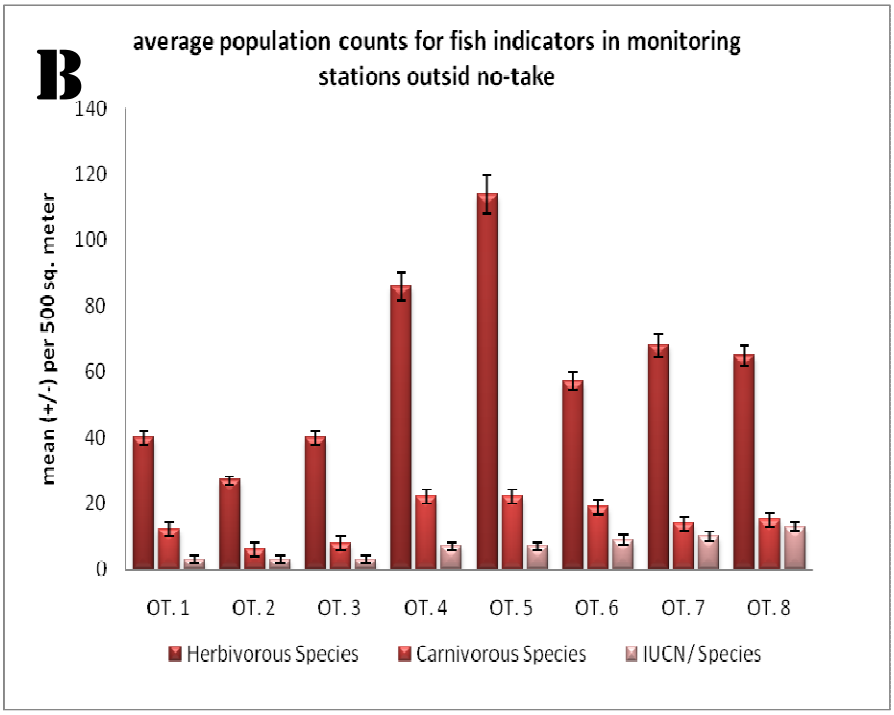
3.2. TARGET REEF FISH INDICATORS

3.2.1. Target reef fish indicators inside no-take



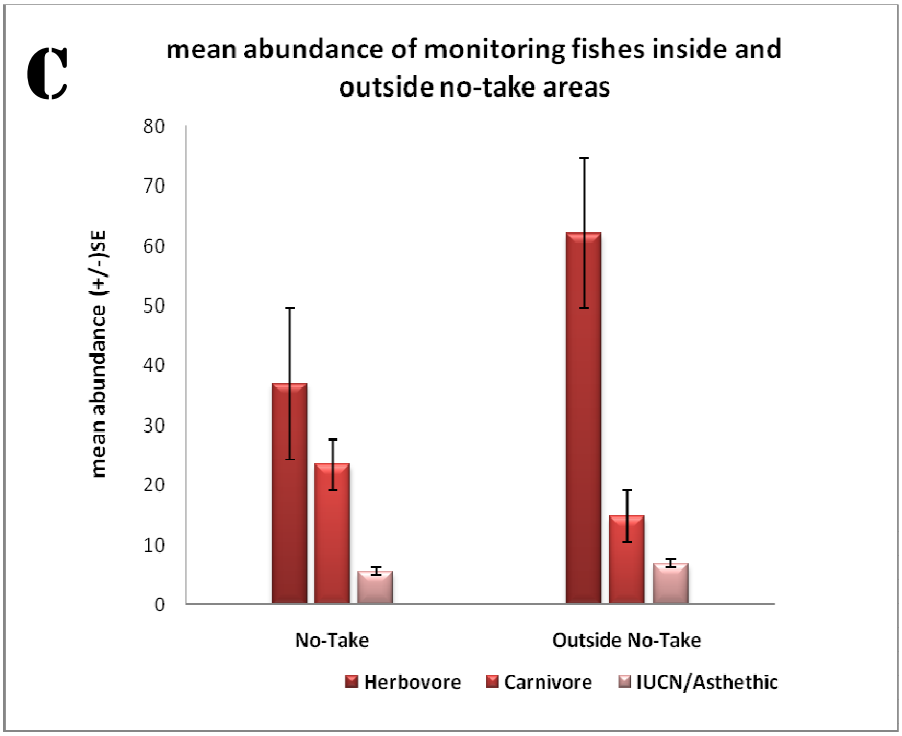
Data on target reef fishes inside no-take areas clearly show high abundance of herbivore fishes then carnivore and IUCN Redlist and Aesthetic species. Abundance of herbivore fishes was clearly marked at Batutuli (NT.2) with 60 counts per 500m^2 and SE Grace Island (NT.7) with 53 records per 500m^2. Other sites had on average, counts of fewer than 50 individuals. Reef carnivore fishes appeared to have the second high abundance with counts of 50 individuals recorded at Tawali Iks (NT.3) and 37 at south Gallows. There were few counts of IUCN Aesthetic species which Badila Dabobona (NT.4) and Gallows south (NT.6) equally recorded 10 individuals. Considering sites with high target fish abundance, Tawali Iks recorded 97; Gallows south having 93 and SE Grace Island recording 81 fishes per 500m^2.

3.2.2. Target reef fish indicators in reefs outside no-take



Population counts for herbivore fishes in sites outside no-take continue to have high mean abundance in all 8 monitoring stations. Hence, sites with high records include Tawali Gadohoa (OT.5) with 114 target herbivore fishes. Illabo (OT.4) with 86 and Daiwari (OT.7) recording 68 individuals. Other monitoring stations had abundance of less than 57 records per 500m^2 transact area. Population counts for carnivore fishes were lower than records for herbivore. Abundance figures for IUCN/Redlist species which was still low in abundance as those found at monitoring stations inside no-take areas.

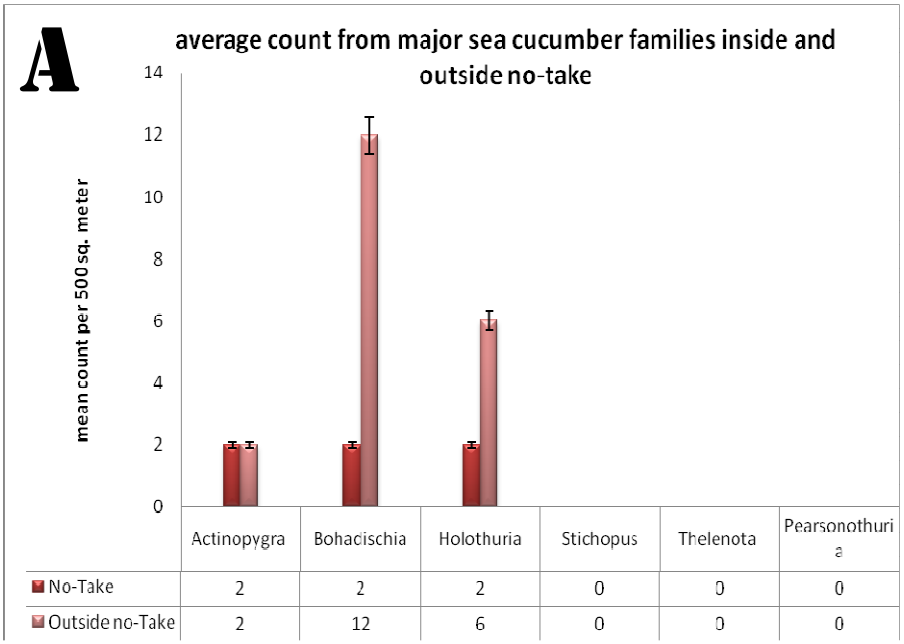
3.2.3. Mean abundance of target monitoring reef fishes inside and outside no-take areas.



As provided in the above graph, there appeared to be more herbivore fishes in areas outside no-take than areas inside no-take. Population counts for carnivore fishes inside no-take were a little higher than that recorded for areas outside no-take. Populations of IUCN/aesthetic species remain low for both no-take and outside no-take.

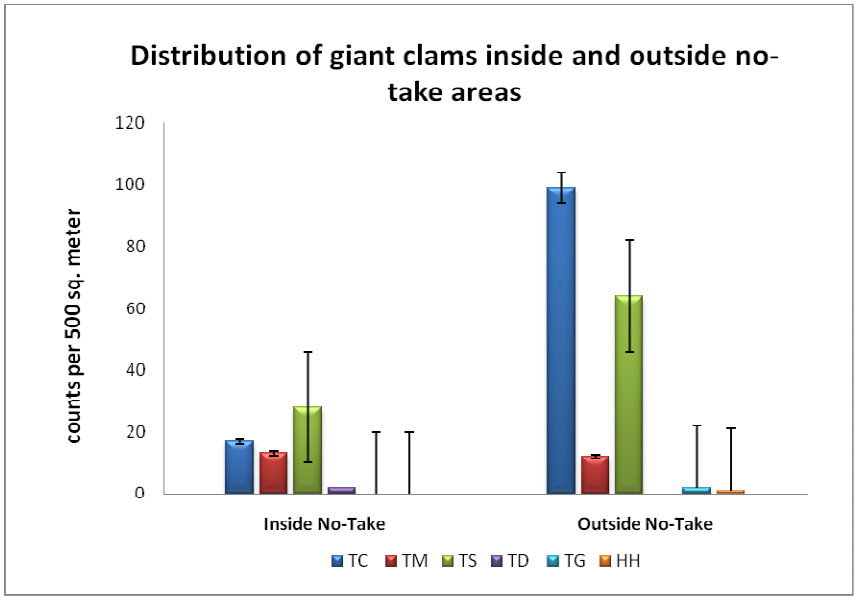
3.3. MARINE INVERTEBRATES

3.3.1. Sea cucumber population in no-take sites and outside no-take areas.



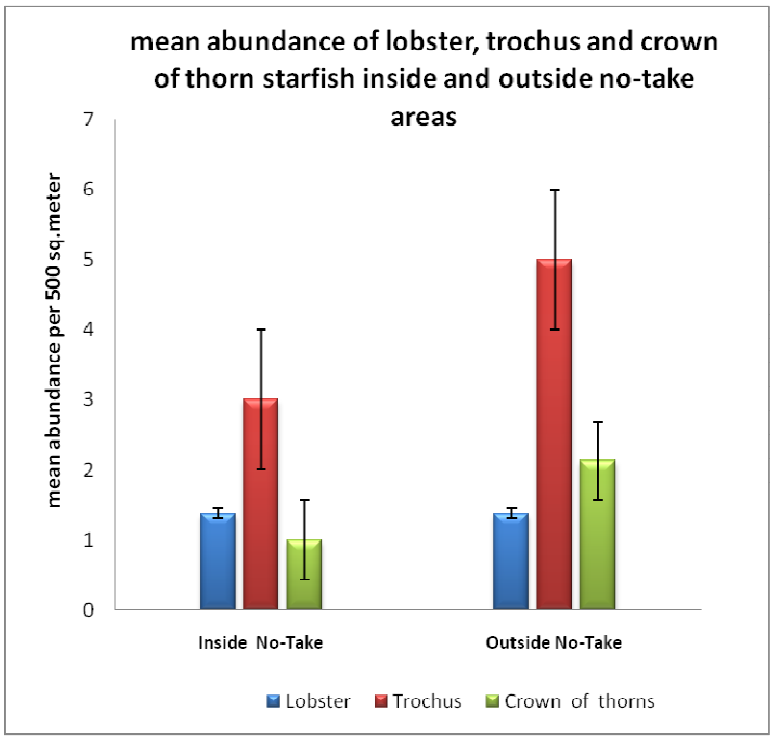
Data gathered from inside 8 no-take areas include; Hibwa (NT.1) recorded 1 species of Holothuria, Tawali Iks (NT.3) showing 2 counts of Bohadschia and 1 count of Holothuria and Badila Dabobona with 2 counts of Actinopygra. Sea cucumber data for monitoring stations outside no-take clearly indicate high presence of Bohadschia which 5 individuals were recorded at Illabou (OT.4), 3 at Gaima Niugini (OT.3) and 1 at Sobasoba (OT.2), Boirama (OT.6), Daiwari (OT.7) and Tupahilihili (OT.8). Other sea cucumbers found include Holothuria with 4 counts at Illabo (OT.4), 1 record at Tawali Gadohoa (OT.5) and Boirama (OT.6). Actinopygra was recorded again at Illabo (OT.4) and at Tawali Gadohoa (OT.5)

3.3.2. Distribution of giant clam inside no-take and outside no-take areas



Mean abundance for giant clams inside and outside no-take showed significant abundance of boring clam (TC) and scaly clam (TS). Maxima clam (TM) had similar abundance in areas inside and outside no-take while population numbers for giant clam (TG) was extremely low for no-take and outside no-take. Southern giant clam (TD) was limited to only some reefs inside no-take but was not recorded for any reef areas outside no-take. Bear paw clam (HH) was recorded only at Gaima Niugini (OT.3) during this monitoring period.

3.3.3. Other marine invertebrates (lobster, trochus and crown-of-thorns)



Lobster, trochus and crown of thorn starfish

Lobster

Averages for trochus shell (*Trochus nilothicus*) showed 1 record for all monitoring stations inside and outside conservation areas. Individual records indicate that 3 individuals were recorded at the northwestern side of Grace and northeast section of Gallows reef. 5 lobsters were recorded at Badila Dabobona (NT.4) and SE Grace Island while 2 at Batutuli NT.2. and SE Gallows respectively. Monitoring stations outside no-take had same average of 1 lobster per 8 monitoring areas. Individuals' site data further showed that Illabo (OT.4) and Tawali Gadohoa (OT.5) with 3 records while Tupahilihili (OT.8) recorded the highest of 7 record followed by Boirama with 6; Sobasoba (OT.2) and Tawali Gadohoa (OT.5) had 5 records each.

Trochus

Data for trochus showed averages of 3 trochus per site for 8 no-take and 5 outside no-take. In general, a total of 24 trochus shells were recorded for all 8 sites inside conservation areas and 40 for 8 stations outside no-take.

Crown-of-thorn starfish (CoT)

On average, sites inside no-take have 1 CoT per transact for 8 monitoring sites. Data gathered from 8 monitoring sites. Data gathered from each station showed that Hibwa (NT.1) had the highest individual counts of CoT, recording 5 inside its 500m^2 areas while Sobasoba (OT.2) and Illabo (OT.4) had 4 records inside their monitoring areas. In total, 8 CoT was recorded for 8 sites inside no-take and 14 for sites outside no-take.

4. DISCUSSION

4.1. Benthic substrate

Reefs around Nuakata are still in its pristine condition despite our data's representation of high abiotic substrate and low live coral cover percentage, hence there is no uniformity with regard to where these reefs are located. Thus, outer barrier reefs do not have the same biophysical characteristics as those on the mainland fringing areas. Conditions faced by different reefs also vary in different seasons experienced in the province. Coral growth and distribution around Nuakata are subject to different environmental conditions and as such, growth characteristics and morphologies appeared different for each reef areas.

On a general note, it is clear that conditions faced by exposed, seaward reefs would not be the same as that on a back reef or leeward reef. Being different in exposure to different environmental conditions, species distribution for corals and reef fishes significantly vary from site to site. The variation and in exposure and different environmental conditions explains some of our monitoring findings. As such, coral distribution and growth on leeward reefs will comprise entirely of branching, table and soft corals as opposed by seaward reefs which are often made up of calcareous bedrock with rocks, boulder corals, digitate, encrusting and a lot more abiotic substrates like dead coral rubbles. Live corals in the exposed sea front are likely to be those with high stress tolerance to meet the harsh environmental conditions.

Similar observations as those made in the previous reports regarding new coral growth and larval settlement on areas with less coral cover were further observed in this survey. It is highly likely that reefs surrounding Nuakata can be described as self seeding reefs (coral larvae produced by corals within Nuakata itself) or is a receiving reef where supply of larvae and spats are from outside sources.

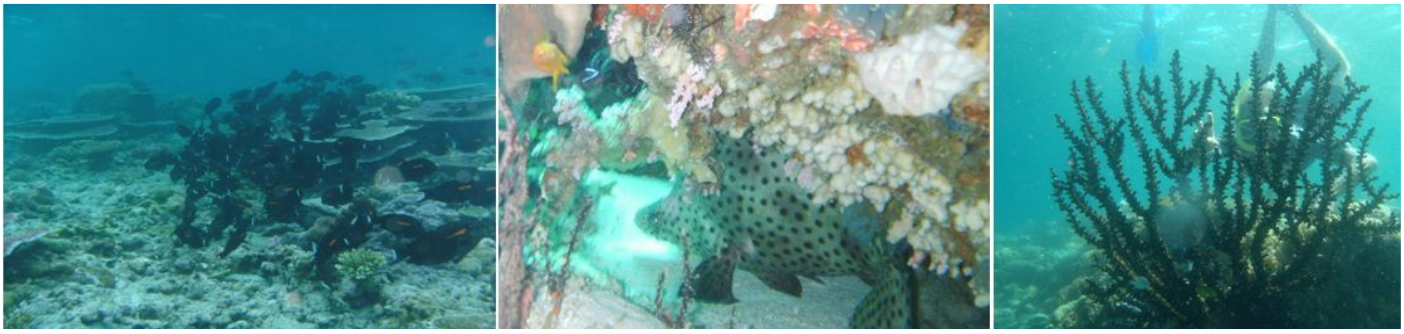
4.2. Reef Fish

Fish data from this monitoring period continue to show similar trend to the two earlier surveys. No-take areas continue to record more carnivore fishes than herbivore (mean abundance of 23.38 fishes for no-take and 14.75 for sites outside no-take). Results for herbivore fishes was the opposite. Herbivore fishes dominated many mainland fringing reefs than outer barrier, patch and pinnacle reefs inside no-take zones (mean abundance of 62.13 for outside no-take and 37 for no-take). Records for IUCN/Aesthetic species remained low for many sites inside and outside conservation areas.

The high abundance of carnivore fishes in the conservation areas could be attributes of the following;

- Location and isolation of reef habitats from continuous community fishing pressure.
- Medium – large predatory reef fishes are more distributed on patch, barrier and outer pinnacle reefs than inner mainland fringing reefs. Many reef fishes are territorial and require reef system with high reef complexity which the mentioned reefs provide therefore distribution is abundant.

- Fishing pressure considered on a daily and weekly basis is focused on mainland fringing reefs could have been a potential explanation for the observed result.



Abundance of herbivore fishes was observed to be greater (with mean abundance of 62.13 fishes per 500m^2 outside no-take).

Reef fish assemblage observed here have also been described by Fabricius et al. (2005) where distribution of herbivore fishes particularly, surgeonfishes (Acanthuridae) and parrotfish (Scaridae) were found to be richer on reefs closer to land. The higher population distribution of these two fish groups are associated with increase nutrient and microalgae supplied from land base discharges. Nuakata may not have the exact conditions as those in Great Barrier Reef however; it is evident that its immediate fringing reefs often receive discharge from land supplying the ingredients for microalgae growth, providing food supplies for herbivore fish.

Reef complexity is another factor that could have supported the differences in high abundance and distribution between large carnivore and reef herbivore fishes on the outer barrier, patch and pinnacles than mainland fringing reefs. Complexities created by rock crevices and coral ledges provided important shelter for coral trout, rock cods and snappers. The habitats found on the fringing reefs comprised low complexity which is unsuitable for these large predatory reef fishes.

Presence of IUCN Maori Wrasse (*Cheilinus undulatus*) was present in many reefs inside and outside no-take and in both fringing, patch and barrier reefs. There were good representation or presence of the IUCN Red listed Maori wrasse (*C. undulatus*) in many reefs observed however; data presented here was only for those that were recorded inside the 500m^2 monitoring transact.

4.3. Sea Cucumber

Sea cucumber population continued to be low in numbers although there have been vertical movements between deep and shallow water for some species observed in the last 3 monitoring surveys. Species records from this survey clearly showed that Lollyfish (*Holothuria atra*), Tigerfish (*Bohadschia argus*), Stonefish (*Actinopygra lecanora*) appeared to be common on many reefs inside and outside no-take sites. There has been some new species addition recorded which include White teatfish (*Holothuria fuscogilva*), Blackteat *(H. nobilis)* fish and sandfish (*H. scraba*) that were recorded on one or two reefs during this monitoring period.

Despite that, the last 2 surveys inside NIPCMMA confirm that local recruitment is taking place on many reefs. Data from the monitoring transacts and from opportunistic surveys outside monitoring transacts inside no-take and outside no-take showed presence of large sized individuals.

As summarized by Araea (2011) in his monitoring report, recovery of sea cucumber is occurring at a rapid rate for some species while others are showing very slow sign as a result of their overexploitation history. For management purpose, the sea cucumber fishery is not ready for exploitation at this stage if the national fishery is open for the people of Nuakata Island.



4.4. Clam Shell

Monitoring results for giant clam remain unchanged for all species. Data from deepwater transacts shall complement this survey finds when presented as it shall provide if there is enough large brood stock on the deeper reef areas that can seed many shallow reefs in the coming years.

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

As presented in each species graphs (Section, there were not many differences in the abundance of the 3 monitoring parameters. Population counts for lobster, trochus and crown-of-thorn starfish remained the same as there were, in the last two surveys. Population trend for each of the 3 organisms as well as for fish and sea cucumber will be calculated after completion of the last 2011 monitoring which will be in December. From the trend it becomes apparent which organisms have undergone positive changes and which has not.

Summary and conclusion

Result from this monitoring survey confirms that carnivore fish population is the greatest on reefs inside no-take than those outside no-take. Distribution and abundance of herbivore fishes are higher on many fringing reefs outside no-take zones while distribution and abundance of IUCN, aesthetic species remain low in many sites inside and outside no-take. Population and abundance of sea cucumber shows similar values as the results described in the June monitoring. Population for other marine invertebrates showed very little fluctuations.

5. REFERENCE

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