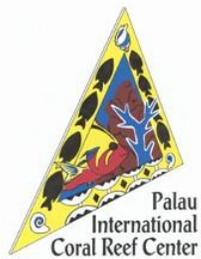


Baseline Assessment of Ngerchebal Conservation Area



Shirley Koshiba, Geory Mereb, Randa Jonathan, Dawnette Olsudong, Kevin Polloi



Palau International Coral Reef Center

PICRC Technical Report No. 14-12

March 2014

INTRODUCTION

Marine Protected areas (MPA) have become widely used in Palau and throughout Micronesia, as well as the rest of the world. In Palau, past and recent efforts have tried to evaluate the effectiveness of MPAs as they provide many benefits, especially for coastal communities. In managing and measuring the effectiveness and progress of MPAs, biological monitoring is an essential component of adaptive management as it is a way for resource managers to make informed management decisions. Resource managers and relevant stakeholders need information on the changes and trends in the conditions of resources overtime in order to effectively manage protected areas.

In 2006, the state of Aimeliik located in the western side of Babeldaob island in Palau, designated the Ngerchebal Conservation Area as a legislated Marine Protected Area (MPA). The Ngerchebal Conservation Area is comprised of the land, water and all plants and animals on the island known as Ngerchebal island and its boundary is measured at 500 feet to a mile around the island and also includes all patch reefs within such boundary. As a designated conservation area, it was declared as a no take and no entry zone for ten years. In addition, it may be opened to the people of Aimeliik state at the discretion of the Traditional Chiefs and the Governor of Aimeliik State.

This report is based on a baseline assessment that was conducted by the Palau International Coral Reef Center on July 26, 2013. The objectives of this assessment of the Ngerchebal conservation area, were to examine fish populations, benthic coverage, and invertebrate densities to obtain baseline data. The information presented in this report will serve as the baseline data for the Ngerchebal conservation area, and will be used for future biological monitoring of the conservation area.

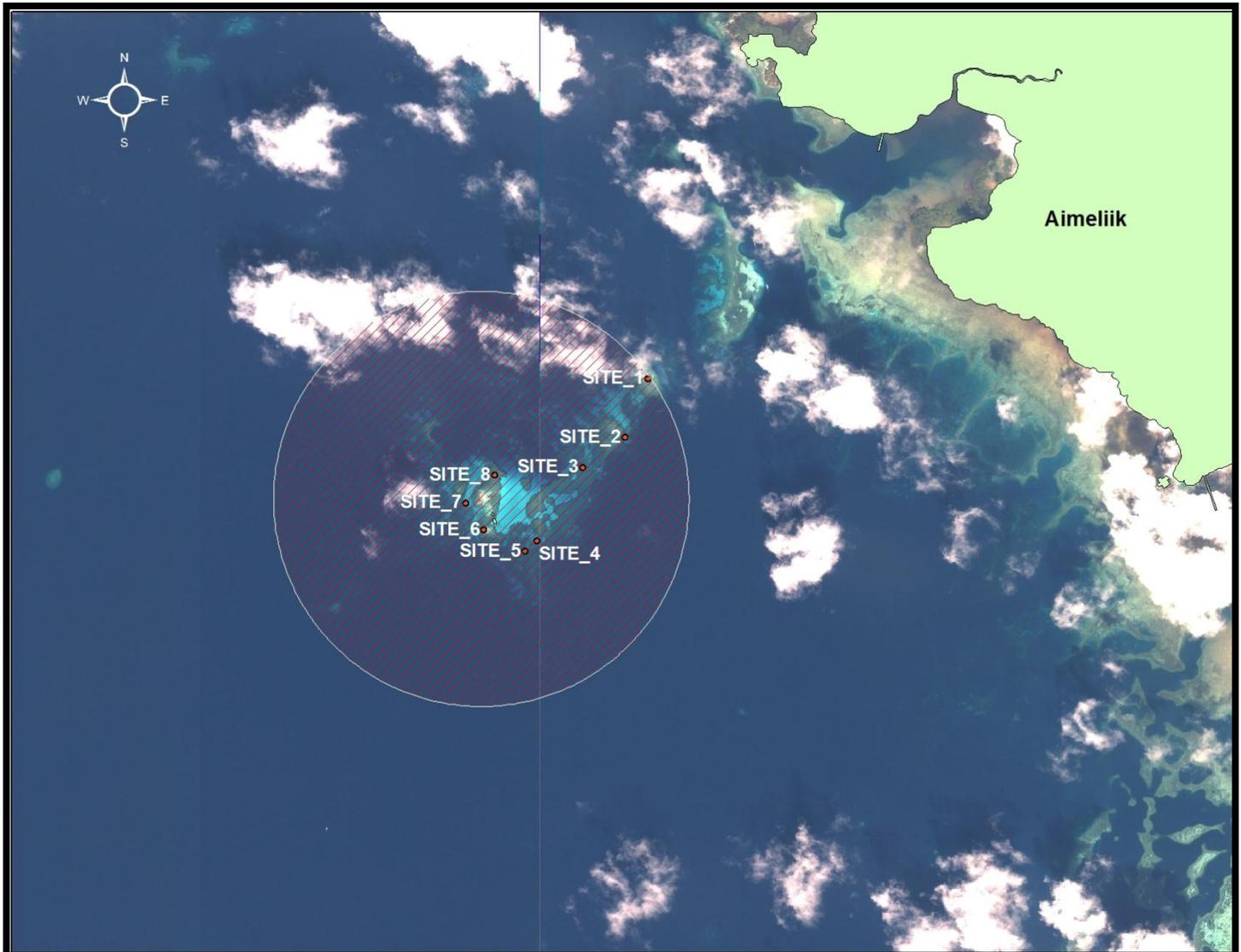


Figure 1. Shows the Ngerchebal conservation area and the 8 sites that were surveyed.

METHODS

This study was conducted on July 26, 2013 and targeted shallow coral-reef assemblages at a depth of 2-5 m. A total of 8 randomly selected sites were surveyed, and at each site three 30 m belt transects were laid on the reef to examine commercially targeted fish assemblages and macro-invertebrates, benthic composition, and coral diseases. Fish surveys were conducted on 30 x 5 m (total area per transect = 150 m²) belt transects, where the length of each fish was estimated to the nearest centimeter. Commercially targeted macro-

invertebrates were identified and recorded along a reduced belt width of 30 x 2 m (total area per transect = 60 m²) and coral diseases were recorded along 30 x 1 m (total area per transect = 30 m²) within each site. At each site, benthic coverage including coral cover were surveyed by photographing the entire 30 m transect using a 1 m² photoquadrat with a wide angle camera. In the laboratory, the benthic composition and coral cover were analyzed using CPCe (Coral Point Count with excel extentions). Five random points from each quadrat were used to determine coral cover, which was identified to the genus level. Fish surveys were conducted to estimate size, density and biomass, where size was recorded in centimeters, and biomass was calculated using the length-weight relationship, $a(L^b)$, where L= length in centimeters, and a and b as constants obtained from fish base. At the Palau International Coral Reef Center, all data were entered into Microsoft (MS) excel spread sheets and later analyzed using MS excel.

RESULTS

Fish

Fish Density

Mean fish density in Ngerchebal Conservation Area was 6.6 fish per 150 m², with the lowest fish density occurring in site 2 which had an average density of 4 fish per 150 m². The site showing the highest fish density was site 4, which had a mean fish density of 9 fish per 150 m² (Fig. 2).

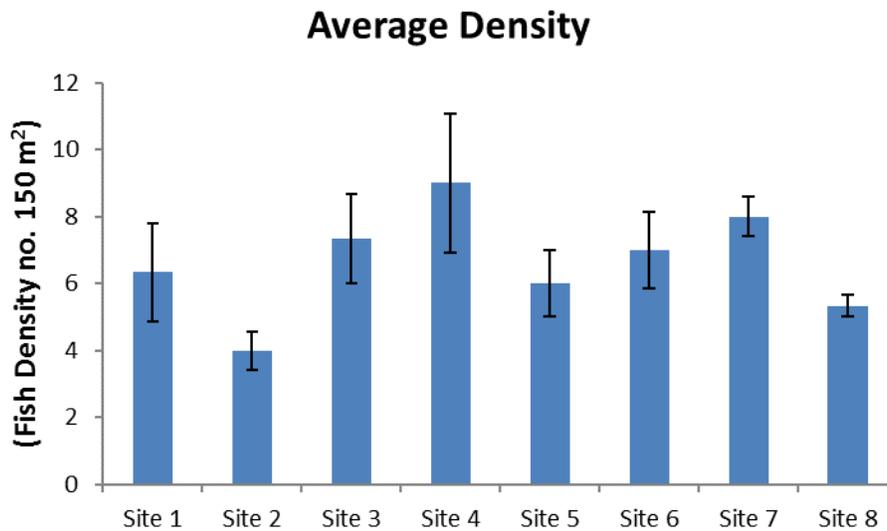


Figure 2. Shows the average fish density per site in Ngerchebal conservation area. Error bars indicate standard errors.

Fish Biomass

The mean fish biomass for Ngerchebal Conservation Area was 446.7 g per 150 m². The site showing the highest fish biomass was site 5, with a mean fish biomass of 845.4 g per 150 m², while the site showing the lowest fish biomass was site 6, which had a mean value of 204.4 g per 150 m² (Fig. 3).

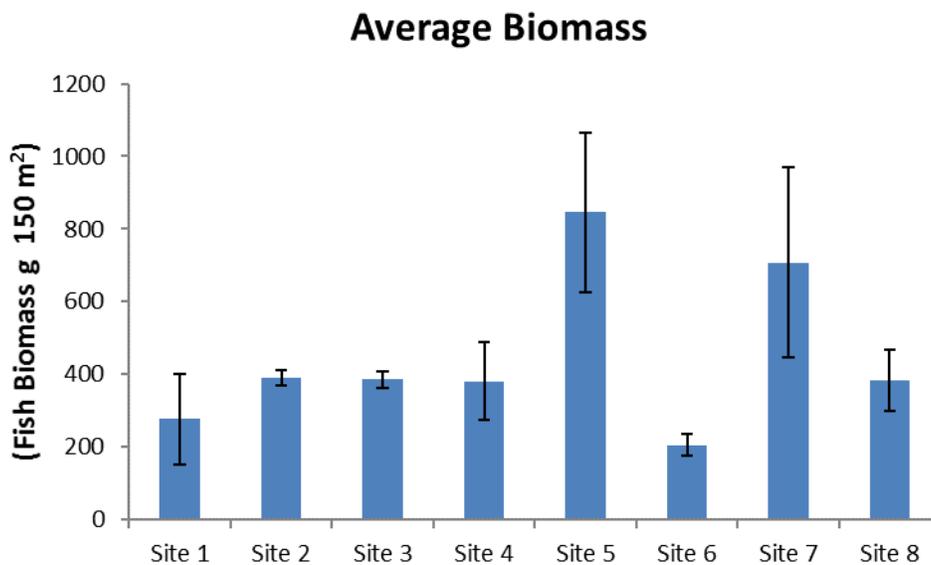


Figure 3. Shows the average fish biomass per site in Ngerchebal conservation area. Error bars indicate standard errors.

Table 1 summarizes the total count of commercially targeted fish species that were visually recorded by the fish surveyor in Ngerchebal Conservation Area. The most commonly observed fish species was *Scarus dimidiatus* or *Mellemau*, which had a total quantity of 32.

Table 1. Total fish species count in Ngerchebal Conservation Area.

Scientific Name	Palauan Name	Quantity
<i>Acanthurus nigricauda</i>	Chesengel	4
<i>Bolbometopon muricatum</i>	Berdebed	4
<i>Cetoscarus bicolor</i>	Beyadel	3
<i>Cheilinus undulatus</i>	Ngimer	1
<i>Chlorurus blekeeri</i>	Besachel otengel	16
<i>Chlorurus sordidus</i>	Mellemau	8
<i>Hipposcarus longiceps</i>	Ngiaoch	13
<i>Monitaxis grandoculis</i>	Besechamel	1
<i>Mulloidichthys flavolineatus</i>	Dech	6
<i>Naso lituratus</i>	Cherangel	16
<i>Naso unicornis</i>	Chum	1
<i>Scarus altipinnis</i>	Udoud ungelel	3
<i>Plectropomus areolatus</i>	Tiau	2
<i>Scarus dimidiatus</i>	Mellemau	32
<i>Scarus gohbban</i>	Mertebetabek	2
<i>Scarus oviceps</i>	Mellemau	10
<i>Scarus prasiognathos</i>	Melechotech a chau	1
<i>Scarus Niger</i>	Kiuiid	1
<i>Scarus sp.</i>	Mellemau	14
<i>Siganus doliatus</i>	Reked	18
<i>Siganus punctatus</i>	Bebael	3

Invertebrates

Mean density of invertebrates in Ngerchebal Conservation Area was 6.5 individuals per 60 m², with the highest density of invertebrates occurring in site 1, which had 10.3 individuals per 60 m². The site with the lowest invertebrate density was site 3, which had a mean value of 4 individuals per 60 m² (Fig. 4).

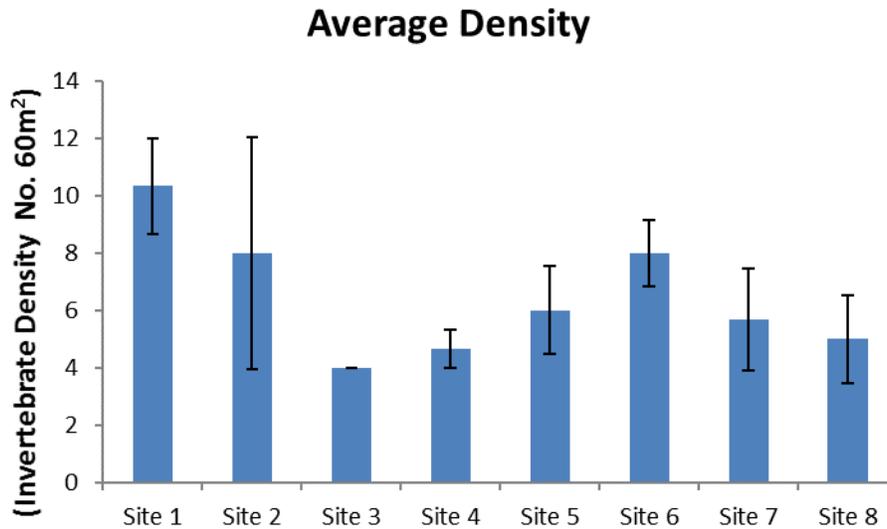


Figure 4. Shows the average density of invertebrates per site in Ngerchebal conservation area. Error bars indicate standard errors.

Table 2 summarizes the total count of invertebrates within the 8 survey sites in Ngerchebal conservation area.

The most commonly observed invertebrate was *Tridacna crocea* or *Oruer* which had a total quantity of 140 individuals.

Table 2. Total invertebrate count in Ngerchebal Conservation Area.

Scientific Name	Palauan Name	Quantity
<i>Tridacna crocea</i>	Oruer	140
<i>Tridacna maxima</i>	Melibes	2
<i>Tridacna squamosa</i>	Ribkungel	12

Benthos

The mean benthic coverage in Ngerchebal Conservation Area was 58% coral cover, 12.5% carbonate, 6.8% rubble, and 2.4% turf. For coral cover, site 1 had the highest coverage with 69.6%, and site 6 had the lowest coral cover with 49.9%. Coral coverage was mainly composed of *Porites* which was 44%, followed by *Porites*

massive at 35% and *Porites rus* which was 20%. Of the total coral cover surveyed in Ngerchebal Conservation Area, 11% of the coral coverage showed signs of coral disease.

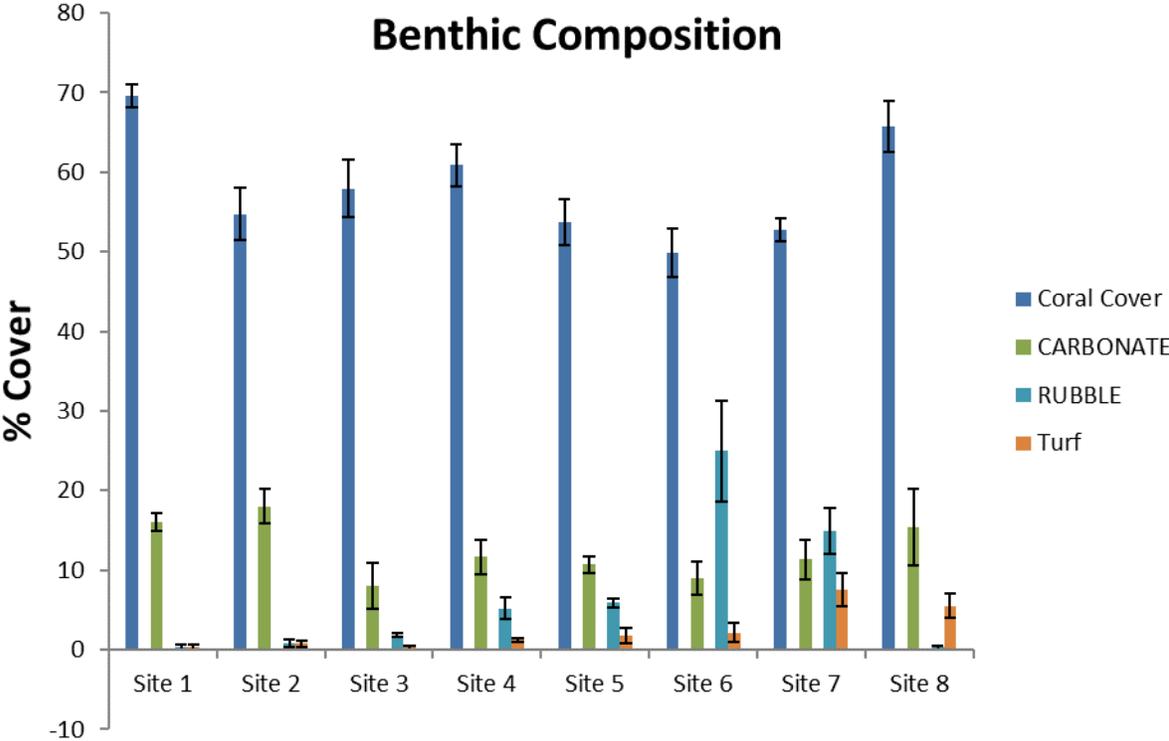


Figure 5. Shows the benthic coverage in Ngerchebal conservation area. Error bars indicate standard errors.

DISCUSSION

As a baseline assessment, Ngerchebal Conservation Area shows a mean fish density of 6.6 fish per 150 m², and fish biomass with a mean value of 446.7 g per 150 m². Mean invertebrate density in Ngerchebal Conservation Area was 6.5 individuals per 60 m² and coral coverage was 58% with 11% of the coral coverage having coral disease. Similar to other protected areas, Ngerchebal has the potential to create spillover of marine organisms such as fishes and corals, and in turn provide more resources to surrounding reefs. Additionally, the conservation area will continue to protect valuable marine life as well as habitats. As with all protected areas in Palau, the effectiveness and progress of protected areas can be measured, given that information from monitoring of resources overtime is obtained and analyzed as necessary and provided to resource managers. Resource managers and relevant stakeholders will then be able to extract valuable information from monitoring and use this monitoring information in adaptively managing their protected areas.

The evaluation of Ngerchebal Conservation Area will require future monitoring of the marine resources within the conservation area overtime to assess changes and trends. Identification of a control site with similar habitats as that of Ngerchebal is necessary in order to be able to compare differences between protected areas and unmanaged areas. In addition, monitoring of fish, benthic composition, and invertebrates must apply standard monitoring protocols, such as that of the Palau Protected Areas Monitoring Protocol. Lastly, monitoring should be done consistently with trained individuals as well.

REFERENCES

Aimeliik State Legislature. "ASPL No. 8-17 Bill No. 8-22: A bill for an act to designate the Ngerchebal Island and its surrounding as a Wildlife Conservation area for the State of Aimeliik, and for other related purposes". (May 2006).