Republic of the Philippines
Department of Environment and Natural Resources
Provincial Environment and Natural Resources Office
MIMAROPA Region
Bgy. Sta. Monica, Puerto Princesa City, Palawan
E-mail: penropalawan@denr.gov.ph
Telfax No. (048) 433-5638 / (048) 433-5638

RED

1/2848

June 09, 2023

MEMORANDUM

FOR : **The Regional Executive Director**
DENR MIMAROPA Region
1515 DENR by the Bay Building,
Roxas Boulevard, Bgy 668, Ermita, Manila

FROM : The Provincial Environment and
Natural Resources Officer

SUBJECT : **FINAL REPORT ON SEAGRASS MONITORING OF EL NIDO MANAGED RESOURCE PROTECTED AREA (ENTMRPA)**

Forwarded is the memorandum from the In Charge Office of the CENRO of Taytay, DMO IV, Mariano P. Lilang, Jr. dated May 30, 2023 along with the memorandum from the PASu of El Nido with its attachment dated May 24, 2023 regarding the Final Report on Seagrass Monitoring .of El Nido Taytay Managed Resource Protected Area.

A total of 522 hectares of seagrass representing the four (4) established monitoring sites was monitored . The said activity was jointly done by PAMO staff together with the Municipal ENRO of LGU El Nido, Palawan. Monitoring of seagrass has been completed in accordance with the BMB TB 2019-04, hence it resulted to 100% completed for CY 2023.

This served as MOV for our target activity for 2023.

For information and record.

FELIZARDO B. CAYATOC

Conservation and Development Section
RELEASED
BY
DATE 6-14-23
CN 23-15-23
5187
DENR PENRO

DENR-PALAWAN
PENRO-RECORDS
RELEASED
By
Date: 15 JUN 2023 1646

Republic of the Philippines
Department of Environment and Natural Resources
Region IV- MIMAROPA
COMMUNITY ENVIRONMENT AND NATURAL RESOURCES OFFICE
by the National Highway, Poblacion, Taytay, Palawan 5312
Contact No.: 09265059335 (Globe) / 09121713889 (Smart)
Email address: cenrotaytay@denr.gov.ph

DENR-PENRO PALAWAN RECORDS RECEIVED BY: DATE: 06-06-2023 CN 23-5787

May 30, 2023

MEMORANDUM

FOR : The Provincial Environment and Natural Resources Officer- Palawan

FROM : The Community Environment and Natural Resources Officer

SUBJECT : **ACCOMPLISHMENT REPORT ON ACTIVITY PER WFP**
El Nido Managed Resource Protected Area (ENMRPA)

Activity: Monitoring of Corals, Mangroves and Seagrass

Performance Indicator: Hectarage of habitats per PA monitored (Seagrass) to be submitted on 2nd and 3rd quarter

Current submission:
Memo report of Protected Area Superintendent/SvEMS Mildred A. Suza dated May 24, 2023 (CN 3348 in the eDATS) submitting the final report on Seagrass monitoring for Protected Area Management Office of El Nido Managed Resource Protected Area (ENMRPA). Per report, the activity was conducted in the four (4) established monitoring sites which represents the five hundred twenty-two (522) hectares of seagrass within the Protected Area.

Attachment:
1. Memo report of CMEMP E.O Mariel M. Paladan dated May 24, 2023
2. Comprehensive report (17 pages)
3. Maps (5 pages)
4. Seagrass monitoring data sheet (4 pages)

Gender & Development (GaD) data	Male = 1	Female = 2	LGBTQ+ = 0	Prefer not to say = 0
	The data hereon refers to the PAMO-ENMRPA Staff			
Age Grouping	60 and above	18-59	17 and below	TOTAL
	0	3	0	3
Environmental Management System (EMS Compliance	✓ Compliant to **5S** organization techniques (**SORT** – keep only necessary items, **SET IN ORDER** – arrange items to promote efficient workflow, **SHINE** – clean the work area so it is neat and tidy, **STANDARDIZE** – set standards for a consistently organized workplace and **SUSTAIN** – maintain and review standard) ✓ Organizing of travel to maximize conveyance and observance of speed limit to practice the minimized used of fuel ✓ Carpooling ✓ No single use plastic ✓ PENRO Memo No. 2023-001 dated February 21, 2023			

This is our **Means of Verification (MoV)** on the activity. Please confirm your receipt hereof. Thank you.

DENR CENRO TAYTAY, PALAWAN RELEASED BY: DATE: JUN 01 2023 CN 2076

For and in the absence of the CENRO:

JUN 01 2023

MARIANO P. LILANG, JR.
Development Management Officer IV
Per DAO-2022-09, page 3

Copy furnished:
PAMO-ENMRPA

Republic of the Philippines
Department of Environment and Natural Resources
MIMAROPA Region
Community Environment and Natural Resources
EL NIDO-TAYTAY MANAGED RESOURCE PROTECTED AREA
Calle Real, Barangay Masagana, El Nido, Palawan, 5313
Telephone No. 048-716-0674
Email: entmrpa@gmail.com

MAY 2 4 2023

MEMORANDUM

DENR CENRO
TAYTAY, PALAWAN
RECEIVED
BY: MM
DATE: 05.25.23 C.N. 3348

FOR : **The Community Environment and Natural Resources Officer**
Taytay, Palawan

FROM : **The Protected Area Superintendent**
El Nido Managed Resource Protected Area

SUBJECT : **FINAL REPORT ON SEAGRASS MONITORING OF EL NIDO MANAGED RESOURCE PROTECTED AREA (ENMRPA)**

This pertains to the target 001 Monitoring of Seagrass per Protected Area (PA) under Marine Protected Area Strengthening and Networking of El Nido Managed Resource Protected Area (ENMRPA) – Protected Area Management Office (PAMO).

Please be informed that on March 9, 2023, April 18 and 20, 2023, this office together with Municipal Environment and Natural Resources Office (MENRO) conducted seagrass monitoring at four (4) established monitoring sites which represents the 522 hectares of seagrass within the Protected Area.

Moreover, the monitoring of seagrass in ENMRPA has been completed in accordance to BMB Technical Bulletin No. 2019-04, hence 100% accomplished for CY 2023.

This serves as our Means of Verification (MOV) of the target.

For information and record.

MILDRED A. SUZA

DENR - PAO
ENTMRPA,
Elnido, Palawan
RELEASED
By:
Date: 05-24-2023
C.N.: 20526

Republic of the Philippines
Department of Environment and Natural Resources
MIMAROPA Region
Community Environment and Natural Resources
EL NIDO-TAYTAY MANAGED RESOURCE PROTECTED AREA
Calle Real, Barangay Masagana, El Nido, Palawan, 5313
Telephone No. 048-716-0674
Email: entmrpa@gmail.com

May 24, 2023

MEMORANDUM

DENR - PAO
ENTMRPA,
Elnido, Palawan
RECEIVED
By: Sgbubongal
Date: 05-24-23
C.N.: 2023-1043

FOR : **The Protected Area Superintendent**
El Nido Managed Resource Protected Area

FROM : **CMEMP Extension Officer**
El Nido Managed Resource Protected Area

SUBJECT : **FINAL REPORT ON SEAGRASS MONITORING OF EL NIDO MANAGED RESOURCE PROTECTED AREA (ENMRPA)**

This pertains to the target activity 001 Monitoring of Seagrass per Protected Area (PA) under Marine Protected Area Strengthening and Networking of El Nido Managed Resource Protected Area (ENMRPA) – Protected Area Management Office (PAMO).

Please be informed that on March 9, 2023, April 18 and 20, 2023 the undersigned, together with ENMRPA-PAMO staff Steven John Andao and Reina Rose Abordo with the participation of Municipal Environment and Natural Resources Office (MENRO) staff conducted seagrass monitoring within established monitoring sites which located at So. Seminaytay, Bgy. Manlag (57.34 ha), Snake Island, Bgy. Bebeladan (14 ha), So. Simpian, Bgy. Aberawan (36.36 ha), and So. Caalan, Bgy. Masagana, El Nido, Palawan (6 ha). All established monitoring sites represents the 522 hectares of seagrass within the Protected Area.

Attached is the narrative report of the activity.

This serves as Means of Verification (MOV) of the target.

For information and record.

MARIEL M. PALADAN

Name of Protected Area: **El Nido Managed Resource Protected Area (ENMRPA)**

Name of PAMB: **El Nido Managed Resource Protected Area (ENMRPA)**

Monitoring of Seagrass Year **2023**

Contents

Prepared by:

MARIEL M. PALADAN
CMEMP Extension Officer

INTRODUCTION

Seagrass are marine flowering plants that contribute significantly to the activities along the shore and are a vital part of a highly productive coastal ecosystem. It is also known as "blue carbon" ecosystems because of their ability to absorb significant amounts of atmospheric organic carbon, which lessens its detrimental effects on both humans and the environment (Fortes, M.D., Ocean and Coastal Management, 2018). Seagrass beds also provide the transitional pathway or buffer necessary for coral reefs to protect coasts and mangroves from strong waves and streams and for mangroves to protect reefs from erosion and sedimentation (Fortes, 1995). Seagrass losses can be attributed to human-related activities as well as climate change, which includes sea level rise, an increase in sea surface temperature, and a decrease in salinity (Tamondong, A., Nakamura, T., Quiros, T. E. A., & Nadaoka, K., 2021, June 28). Furthermore, seagrass species are declining and threatened by various anthropogenic factors and coastal development, and their ecological value is unknown to most.

A total of eighteen (18) species of seagrass have been found and identified in the Philippines under three (3) families belonging to Cymodoceaceae, Hydrocharitaceae, and Ruppiaceae. The seagrass distribution is affected by physicochemical factors such as nutrients, which affect the survival and growth of seagrass; salinity, which may influence the abundance and distribution; dissolved oxygen; and total suspended solids (TSS), which may also affect and influence the distribution. Seagrass has also been used as a biological indicator by marine biologists to identify changes in ecosystems, especially those caused by human activity (Brazas, F. P. Jr., & Lagat, R.D.,2022).

According to University of the Philippines – Marine Science Institute (UP-MSI), there are eight (8) species of seagrass within El Nido Managed Resource Protected Area (ENMRPA). As with other associated flora and fauna, including dugongs, marine turtles, and fish from the family Siganidae, the biomass, distribution, and epiphytic growth of seagrasses are seasonal. (El Nido-Taytay Managed Resource Protected Area Management Plan 2020-2029). Based on the seagrass study in 2004, they recorded nine (9) species in four (4) sampling sites which are predominated by *Halodule uninervis* and *Syringodium isoetifolium,* and accompanied by *Halophila ovalis, Thalassia hemprichii, Cymodocea rotundata,* and *Cymodocea serrulata* in both Barangay Bebeladan and Barangay Corong-corong. It showed that seagrass abundances within El Nido are moderate to dense while species diversity is also within the moderate range for seagrass communities of the Indo-West Pacific (PCSD, 2006).

Based on the 2022 ground-truthing conducted by El Nido Managed Resource Protected Area (ENMRPA) – Protected Area Management Office (PAMO), the protected area covers a total of five hundred twenty-two (522) hectares of seagrass beds. They are more frequently found in Barangay Masagana, Barangay Corong-corong, Barangay Manlag, Barangay Maligaya, Barangay Manlag, Barangay Aberawan, and Barangay Bebeladan.

This year, the ENMRPA-PAMO has target on Monitoring of Seagrass under MPA Management Strengthening and Networking (Coastal and Marine Ecosystems Rehabilitation Sub-Program).

METHODOLOGY

The DENR BMB- Technical Bulletin No. 2019-04 "TECHNICAL GUIDE ON BIODIVERSITY ASSESSMENT" pursuant to Republic Act (RA) No. 7586, or the "National Integrated Protected Areas System (NIPAS)Actof1992", as amended by RA No. 11038, or the "Expanded NIPAS Act of 2018"; Section 9 of DENR Administrative Order No. 2016-26, "Guidelines for the Implementation of the Coastal and Marine Ecosystems Management Program (CMEMP)"; is the method used during the monitoring.

Monitoring of seagrass in Snake Island, Bgy. Bebeladan was conducted on March 9, 2023, in So. Simpian, Bgy. Aberawan and So. Seminaytay, Bgy. Manlag on April 18, 2023, while April 20, 2023 in So. Caalan, Bgy. Masagana, El Nido, Palawan.

Site Selection

There are seven (7) considerations during the selection of monitoring sites which are;

1. Determination of monitoring stations (15-25%) of the established sampling stations.
2. Relatively evenly shaped and homogenous area.
3. Relatively high seagrass cover.
4. No obvious impact.
5. Accessible.
6. High biodiversity indices.
7. High cover/density.

Monitoring Site

A total of four (4) established monitoring sites has been monitored in 522 hectares of seagrass beds within ENMRPA, which located at So. Seminaytay, Bgy. Manlag (57.43 ha), So.Simpian, Bgy. Aberawan (36.36), Snake Island, Bgy. Bebeladan (14 ha), and So. Caalan, Bgy. Masagana (6 ha), El Nido, Palawan (Figure1).

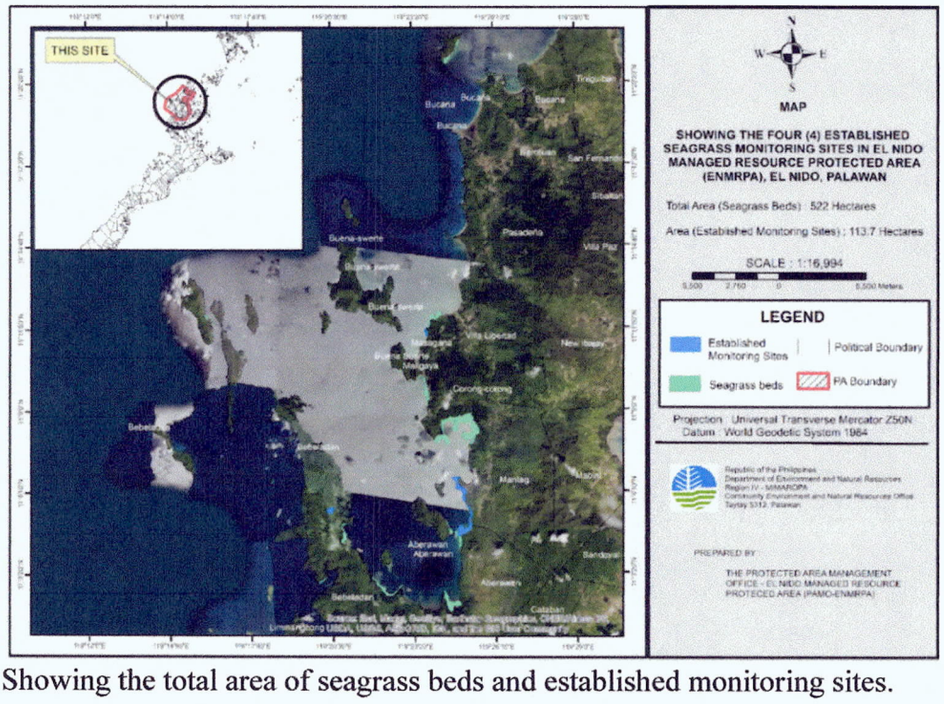


Figure 1. Showing the total area of seagrass beds and established monitoring sites.

Fixed Transect Site

Three (3) 50 meters transect lines were lay perpendicular to the shore separated by a 25 - meter distance parallel to each other. A 0.5 meter by 0.5-meter quadrat was laid starting from the 0-meter mark on the right side of each transect with 5 meters interval.

Taking Photographs

Photographs of quadrat was done before any measurements are taken to avoid sediment disturbance, it was taken at 5 meters, 25 meters and 45 meters in every transect.

Estimating Seagrass Cover

The percent cover per species was estimated using the standard seagrass percent cover for seagrass as seen in illustration below (Figure 2).

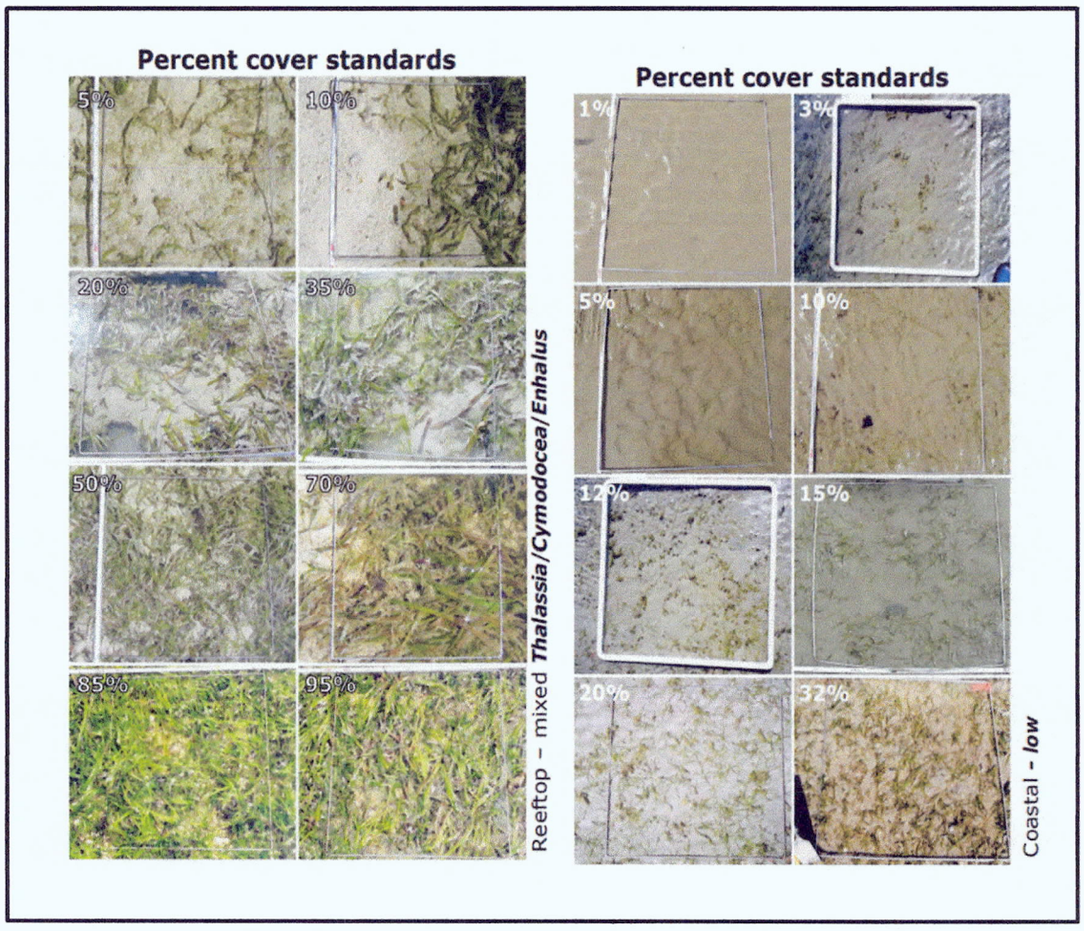


Figure 2. Illustration of percent cover standards for seagrass

Estimating Seagrass Shoot Density

The 0.5-meter by 0.5-meter quadrat was divided into four (4) grids to easily count the actual seagrass shoot. The formula used to compute the seagrass shoot density is;

$$seagrass\ shoot\ density\ = \frac{total\ shoot\ count}{quadrat\ area\ (0.25m^2)}$$

Canopy Height

In every quadrat, measurements were done from the sediment to the leaf tip of the seagrass using a ruler. It was determined by haphazardly selecting 3-5 leaf blades and ignoring the tallest 20% of leaves.

Algae and Epiphyte Cover

The percentage of algae cover was measured using the same technique used for estimating seagrass cover, while the percentage of epiphyte cover was determined by estimating the total surface area of leaves covered by algae.

Categorical Condition

According to Amran, 2010, the seagrass condition will be categorized based on the mean percent seagrass cover (Table 1.)

Table 1. Mean percent seagrass cover categories

Condition	Coverage
• Very Good	• >75.4%
• Good	• 50.5 – 75.4%
• Fair	• 25.5 – 50.4%
• Poor	• 5.5 – 25.4%
• Very Poor	• <5.5%

RESULT AND DISCUSSION

Table 2 shows that a total of eight (8) species of seagrass were recorded in So. Seminaytay, Bgy. Manlag composed of *Enhalus acoroides, Thalassia hemprichii, Cymodocea serrulata, Halodule pinifolia, Syringodium isoetifolium, Halophila minor, Halophila ovalis, and Cymodocea rotundata,* while five (5) species were recorded in Snake Island, Bgy. Bebeladan and So. Caalan, Bgy. Masagana which composed of *Enhalus acoroides, Thalassia hemprichii, Halodula pinifolia, Halophila ovalis, and Cymodocea rotundata.* Also, in So. Simpian, Bgy. Manlag which also have 5 species recorded where *Cymodocea serrulata,* instead of *Halodule pinifolia.*

Table 2. List of seagrass species identified in four (4) established monitoring sites

	Seagrass species							
								
SITES	***Enhalus acoroides***	***Thalassia hemprichii***	***Cymodocea serrulata***	***Halodule pinifolia***	***Syringodium isoetifolium***	***Halophila minor***	***Halophila ovalis***	***Cymodocea rotundata***
So. Seminaytay, Bgy. Manlag	√	√	√	√	√	√	√	√
So. Simpian, Bgy. Aberawan	√	√	√	X	X	X	√	√
Snake Island, Bgy. Bebeladan	√	√	X	√	X	X	√	√
So. Caalan, Bgy. Masagana	√	√	X	√	X	X	√	√

Note: √ = present, X = absent

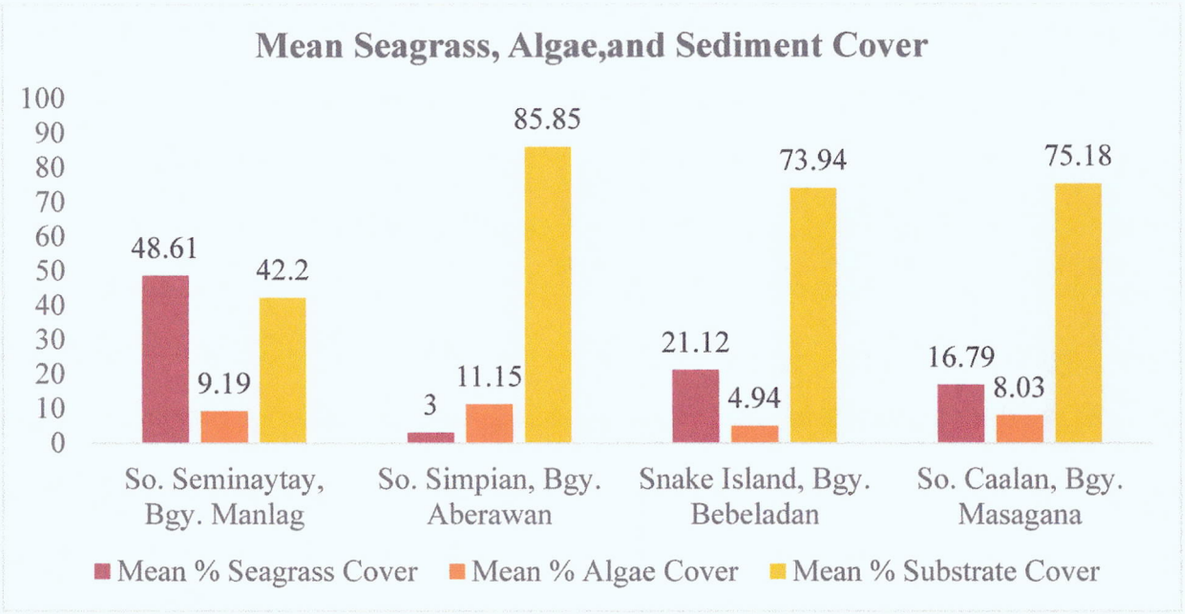
Out of eight (8) species of seagrass recorded, *Enhalus acoroides* is the most occurring species found thriving in four (4) established monitoring sites in terms of percent cover (Table 3). In So. Seminaytay, Bgy Manlag, transect 2 has the highest average percentage seagrass cover which *Halodule pinifolia* is the most dominant species with 18.36 % seagrass cover and transect 1 has the highest percentage seagrass cover in So. Simpian, Bgy. Aberawan and So. Caalan, Bgy. Masagana which *Halophila ovalis* and *Thalassia hemprichii* is the most dominant species with 2.91 % and 12.27 % seagrass cover, respectively. Moreover, in Snake Island, Bgy. Bebeladan, transect 3 has the highest average percentage seagrass cover and *Enhalus acoroides* is the most dominant species with 17.61% average seagrass cover (Table 3).

Table 3. Percent cover of seagrass across transect stations in four (4) established monitoring sites

Sites	Species	T1	T2	T3	Average
So. Seminaytay, Bgy. Manlag	*Enhalus acoroides*	2.45	12.45	0.35	**5.08**
	Thalassia hemprichii	1.09	1.55	1	**1.21**
	Cymodocea serrulata	1.82	0	0	**0.61**
	Halodule pinifolia	21.18	18.36	14.73	**18.09**
	Syringodium isoetifolium	8.64	9.91	0	**6.18**
	Halophila minor	0.64	1.36	1.27	**1.09**
	Halophila ovalis	2.09	4.09	3.27	**3.15**
	Cymodocea rotundata	7.27	15.91	17.27	**13.48**
	Subtotal	**5.65**	**7.95**	**4.74**	
So. Simpian, Bgy. Aberawan	*Enhalus acoroides*	0.91	1.36	0.36	**0.88**
	Thalassia hemprichii	0.18	0	0	**0.06**
	Cymodocea serrulata	0	0	0.45	**0.15**
	Halophila ovalis	2.91	0.27	0	**1.06**
	Cymodocea rotundata	2.55	0	0	**0.85**
	Subtotal	**1.31**	**0.33**	**0.16**	
Snake Island, Bgy. Bebeladan	*Enhalus acoroides*	15.27	10.64	26.91	**17.61**
	Thalassia hemprichii	1.55	2	2	**1.85**
	Halodule pinifolia	1.45	0	0.82	**0.76**
	Halophila ovalis	0	3.45	0.09	**1.18**
	Cymodocea rotundata	0.09	0	0.55	**0.21**
	Subtotal	**3.67**	**3.22**	**6.07**	
So. Caalan, Bgy. Masagana	*Enhalus acoroides*	3.91	0.64	3.55	**2.70**
	Thalassia hemprichii	12.27	10	4.64	**8.97**
	Halodule pinifolia	6.18	6.73	0	**4.30**
	Halophila ovalis	0	0.91	0	**0.30**
	Cymodocea rotundata	0.18	3.27	0	**1.15**
	Subtotal	**4.51**	**4.31**	**1.64**	

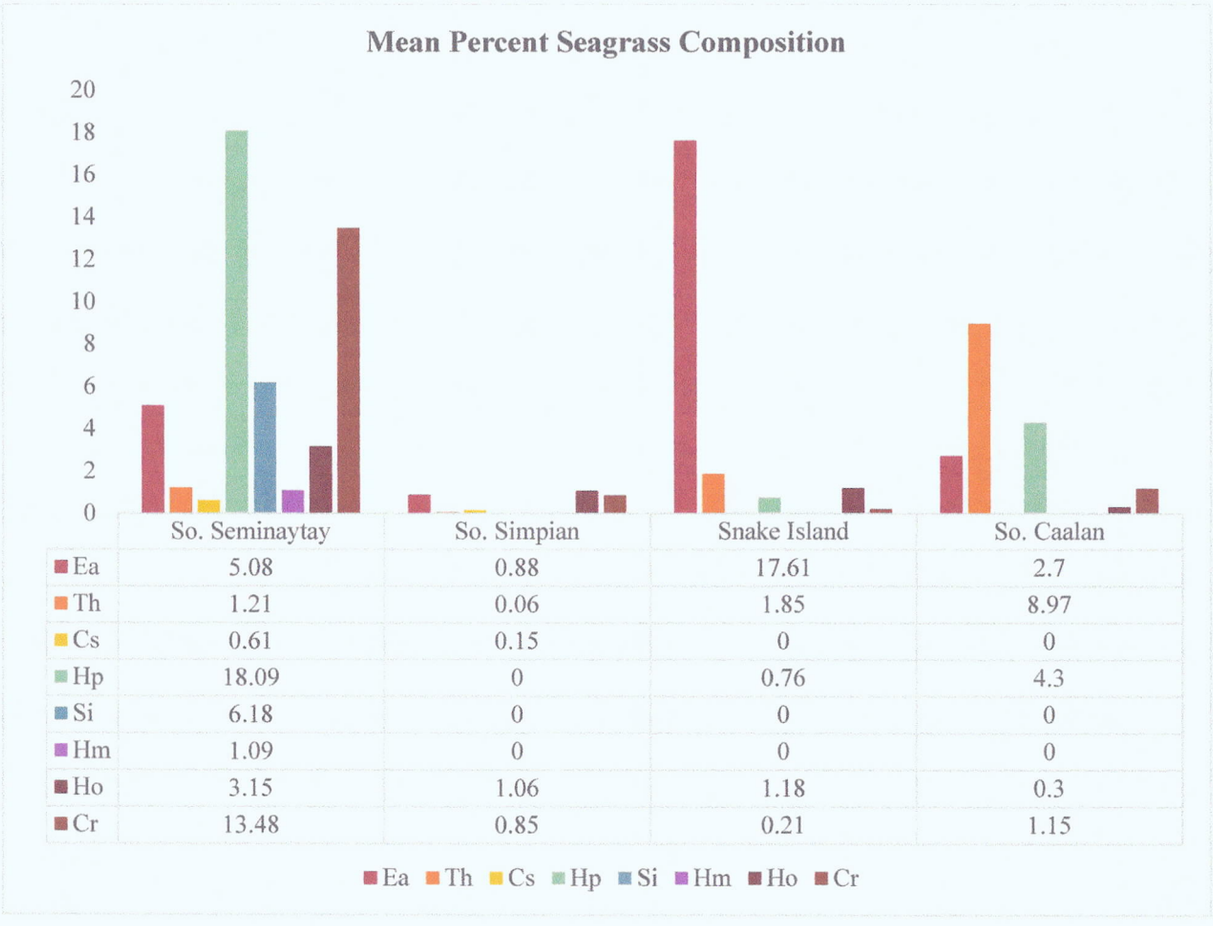
Among the four (4) established monitoring sites, So. Seminaytay, Bgy. Manlag obtained the highest percentage mean seagrass cover with 48.61% which categorized as fair condition based on Amran, 2010. However, Snake Island, Bgy. Bebeladan and So. Caalan, Bgy. Masagana, are categorized as poor condition, while So. Simpian, Bgy. Aberawan is categorized as very poor condition (Figure 3).

Figure 3. Graph showing the computed mean seagrass, algae and sediment cover in four (4) established monitoring sites



In terms of seagrass composition (Figure 4), four (4) species was found in four (4) established monitoring sites which are *Enhalus acoroides, Thalassia hemprichii, Haliphila ovalis, and Cymodocea rotundata. Halodule pinifolia* is the most dominant species found in So. Seminaytay, Bgy. Manlag with a value of 18.09% followed by *Enhalus acoroides* which found in Snake Island, Bgy Bebeldan with a value of 17.61% and *Cymodocea rotundata* which also found in Snake Island, Bgy. Bebeladan with a value of 13.48%.

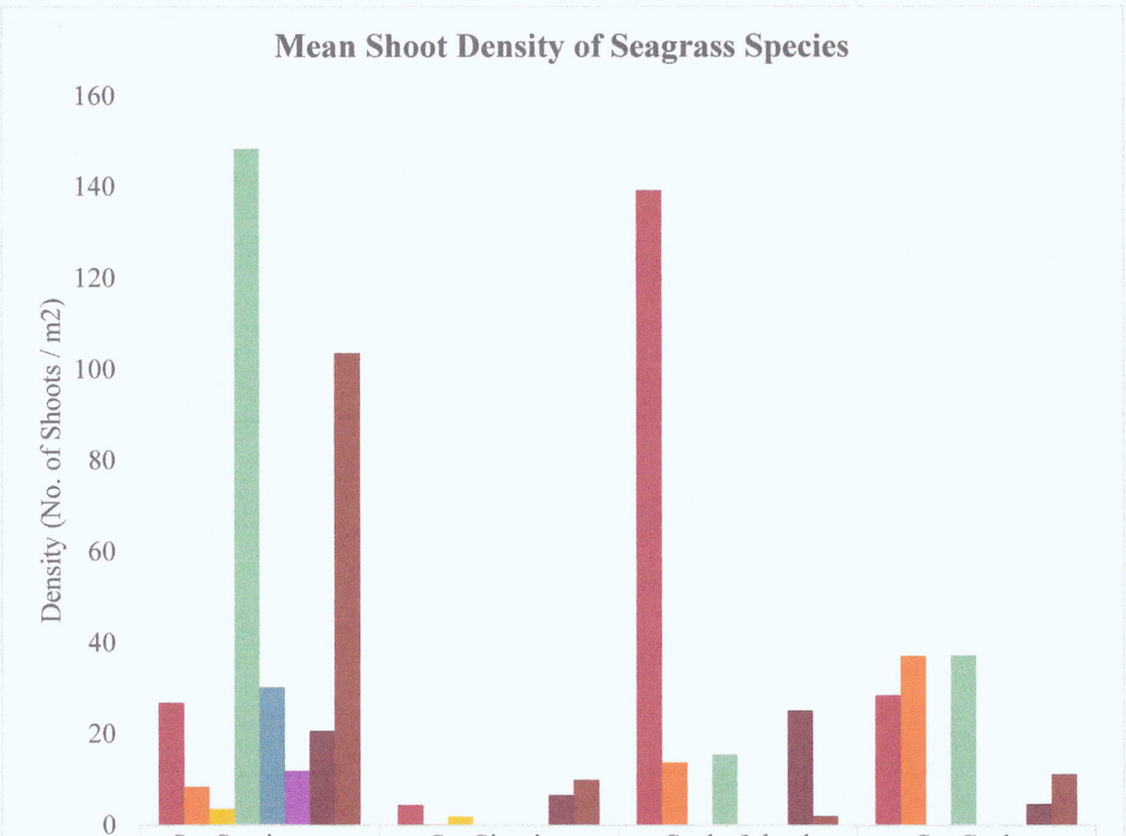
Figure 4. Graph showing the computed mean composition in four (4) established monitoring sites



	So. Seminaytay	So. Simpian	Snake Island	So. Caalan
Ea	5.08	0.88	17.61	2.7
Th	1.21	0.06	1.85	8.97
Cs	0.61	0.15	0	0
Hp	18.09	0	0.76	4.3
Si	6.18	0	0	0
Hm	1.09	0	0	0
Ho	3.15	1.06	1.18	0.3
Cr	13.48	0.85	0.21	1.15

In terms of shoot density (individual/m^2) (Figure 5) *Halophila pinifolia* is the most dominant species found in So. Seminaytay with 148.37 (indv. /m^2) followed by *Enhalus acoroides* which found in Snake Island with 139.17 (indv. /m^2). However, *Thalassia hemprichii* is the least dominant species in So. Simpian followed by *Cymodocea serrulata* which also found in So. Simpian.

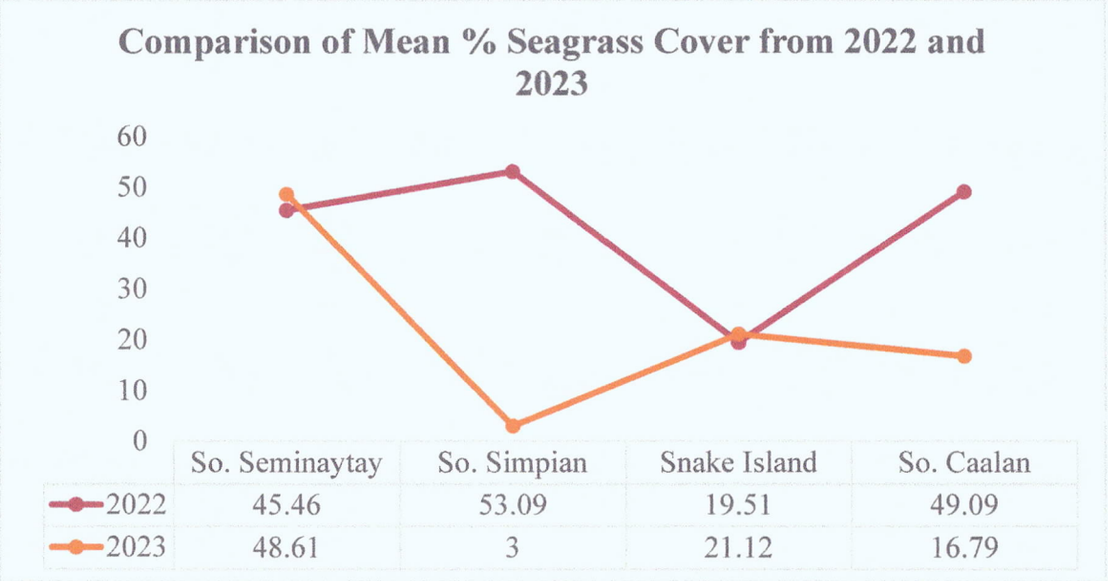
Figure 5. Graph showing the computed mean shoot density (inv./m2) in four (4) established monitoring sites



	So. Seminaytay	So. Simpian	Snake Island	So. Caalan
Ea	26.8	4.37	139.17	28.47
Th	8.37	0.23	13.7	37.1
Cs	3.53	1.9	0	0
Hp	148.37	0	15.53	37.33
Si	30.33	0	0	0
Hm	11.87	0	0	0
Ho	20.6	6.57	25.1	4.6
Cr	103.53	9.93	1.97	11.17

As shown in figure 6, there is a significant difference in four (4) established monitoring sites from 2022 and 2023. The mean % seagrass cover in So. Seminaytay and Snake Island from 2022 was increased on 2023, while in So. Simpian and So. Caalan the mean % seagrass cover from 2022 was decreased on 2023. According to Fernandez-Torquemada, et. al., 2005, the presence of seagrass is influenced by a variety of elements, including physical variables that control its physiological activity, such as temperature, salinity, depth, and turbidity, as well as natural processes (such as climate change) and anthropogenic influences.

Figure 6. Graph showing the comparison of mean % seagrass cover from 2022 and 2023



In Table 4 shows the result and findings on site characteristics and biodiversity indices. Shannon-Weiner Diversity Index was used to determine the seagrass diversity and categorized based on Odum, 1983, species evenness pertains to the number of individuals of each species in a given sampling area and species richness pertains to the number of species in a given sampling area. Based on the result, all established monitoring sites fall under low diversity category. So. Seminaytay recorded a total of eight (8) species, while five (5) species recorded in So. Simpian, Snake Island, and So. Caalan.

Table 4. Site characteristics and biodiversity indices in four (4) established monitoring sites

SITE CHARACTERISTICS	Bgy. Manlag	Bgy. Aberawan	Bgy. Bebeladan	Bgy. Masagana
Sitio	So. Seminaytay	So. Simpian	Snake Island	So. Caalan
Latitude	11° 6'18.96"N	11° 4'46.06"N	11° 5'33.97"N	11°11'38.48"N
Longitude	119°24'50.47"E	119°24'56.35"E	119°20'22.48"E	119°23'49.21"E
Number of quadrats	11	11	11	11
Sediment type	Sandy-silt	Sandy-silt	Sandy	Coarse Sand and Sandy
Water condition	Low Tide	High Tide	High Tide	High Tide
Other observations/remarks	Dense Seagrass	Sparse and Patchy Seagrass	Tourist Spot	Near Resort
Estimated seagrass (ha)	56.7	36	14	6
Diversity Indices				
Shannon-Weiner diversity index (H')	1.51	1.29	0.19	1.30
Simpson's diversity index	0.29	0.31	0.53	0.32
Evenness of Species (E)	0.73	0.80	0.12	0.81
Number of seagrass species (in quadrats)	8	5	5	5

Water Body Classification and Water Parameters are based on DENR Administrative Order 2016-08. All established monitoring sites failed to meet the desired temperature for protected and recreational waters, which is not less than twenty-six (26) degrees Celsius nor greater than thirty (30) degrees Celsius. Moreover, in dissolve oxygen (mg/L) Snake Island and So. Caalan failed to meet the standard classification, while in pH only So. Seminaytay failed to meet the desired pH. As per DAO 2016-08 guidelines "(b) The natural background temperature as determined by EMB shall prevail if the temperature is lower or higher than the WQG; provided

that the maximum increase is only up to 10 percent and that it will not cause any risk to human health and the environment."

Each species of seagrass has a unique ability to adapt to extreme salinity 10-65 ppt of salinity is the range in which seagrass can thrive. It shows that the salinity in four (4) established monitoring sites was within seagrass tolerance limits (Table 5).

Table 5. Physico-chemical parameters recorded in four (4) established monitoring sites

Primary Parameters	Standard as per DAO 2016-08	Established Monitoring Sites			
		So. Seminaytay	So. Simpian	Snake Island	So. Caalan
pH	7.0-8.5	6.85	8.28	8.16	8.18
Temperature [(b)] (°C)	26-30	34.08	34.42	32.64	32.64
Dissolve Oxygen (mg/L)	6	6.95	6.70	5.71	5.63
Other Parameters					
Conductivity (mS/cm)		41	40.1	40.8	40
Salinity (ppt)		26.25	25.56	26.03	26.04
Total Dissolved Solid (g/L)		26.25	24.5	28.9	24.9
Oxidation Reduction Potential or ORP (m/V)		186	73	122	95

CONCLUSION AND RECOMMENDATION

A total of eight (8) species of seagrass were recorded among the established monitoring sites within the protected area, composed of Enhalus acoroides, Thalassia hemprichii, Cymodocea serrulata, Halodule pinifolia, Syringodium isoetifolium, Halophila minor, Halophila ovalis, and Cymodocea rotundata. This year, So. Simpian and So. Caalan significantly decreased in terms of seagrass cover while So. Seminaytay and Snake Island recorded high seagrass cover. Further, in terms of physico-chemical parameters, all sites were recorded with high temperature, while So. Simpian, So. Caalan, and Snake Island are within the standard pH level except So. Seminaytay.

Hence, it is recommended to conduct continuous monitoring and conduct of Communication Education and Public Awareness (CEPA) on the importance of seagrass to the environment and community in order to conserve and protect from anthropogenic disturbances.

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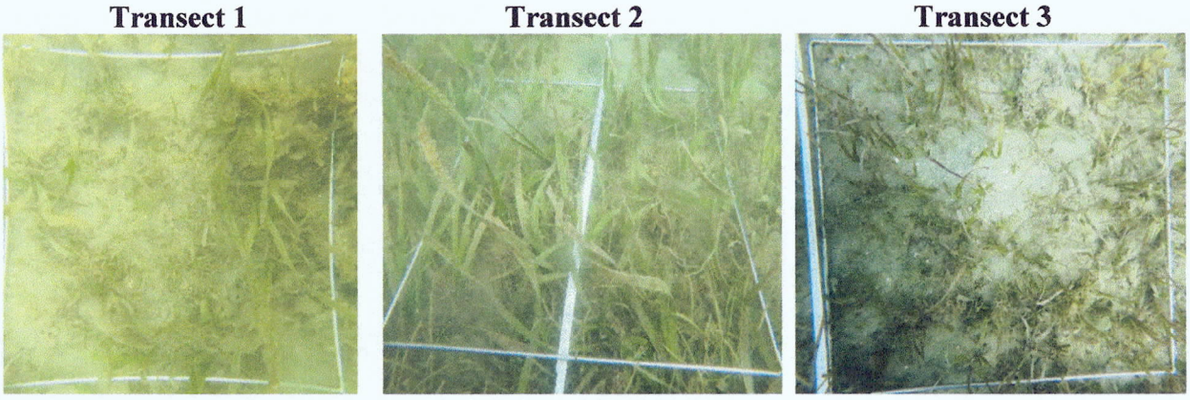
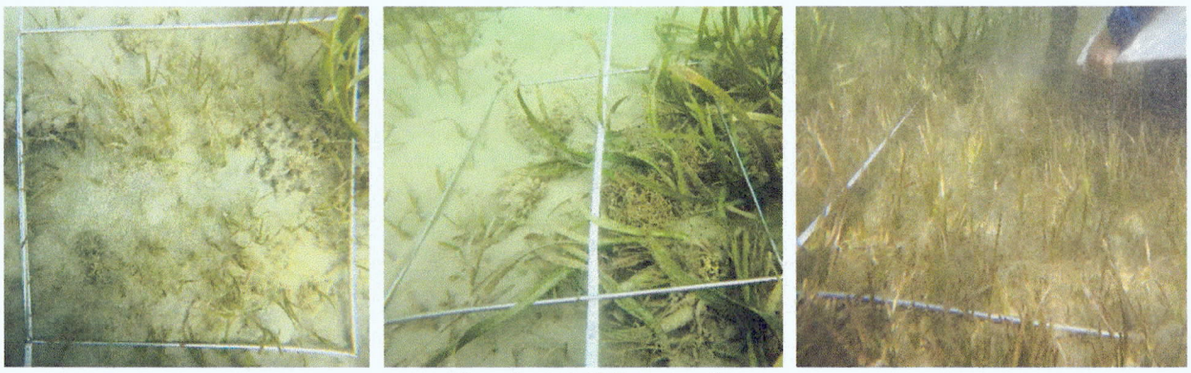
PHOTOGRAPHS OF QUADRAT TAKEN AT 5-, 25-, AND 45-m

So. Seminaytay, Bgy. Manlag, El Nido, Palawan (Monitoring Site 1)

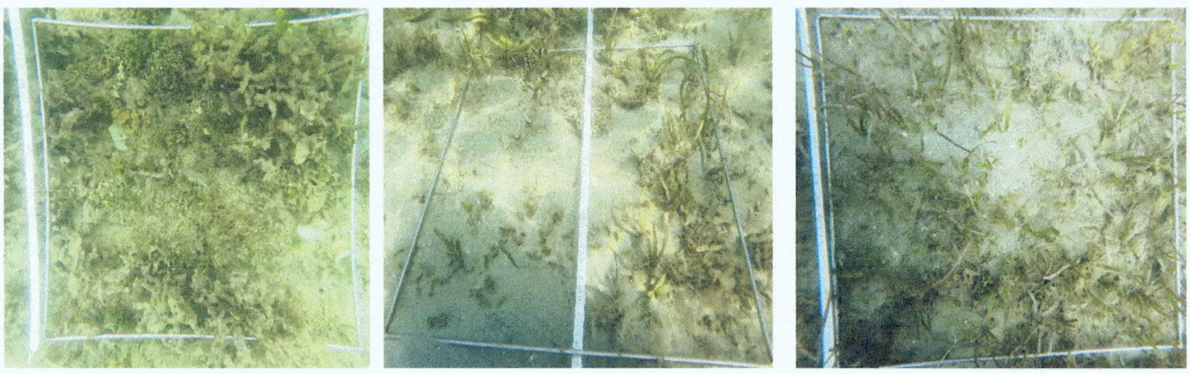
Transect 1 **Transect 2** **Transect 3**



Quadrat 2 (5 meters)



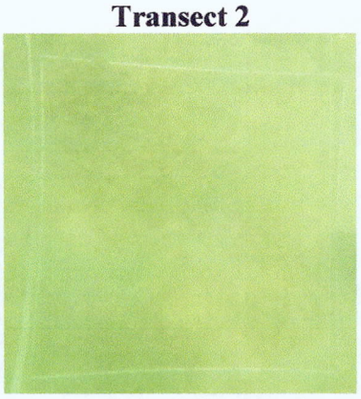
Quadrat 6 (25 meters)



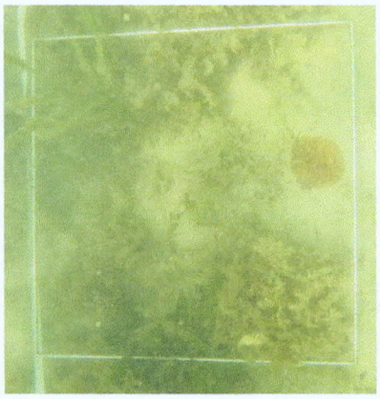
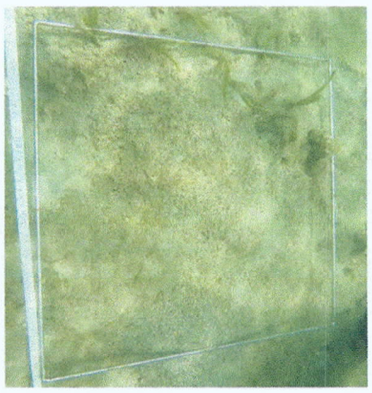
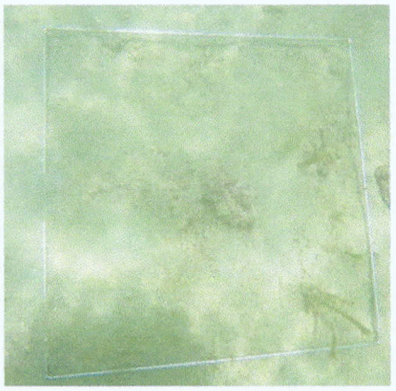
Quadrat 10 (45 meters)

PHOTOGRAPHS OF QUADRAT TAKEN AT 5-, 25-, AND 45-m

So. Simpian, Bgy. Manlag, El Nido, Palawan (Monitoring Site 2)

Transect 1	Transect 2	Transect 3
		

Quadrat 2 (5 meters)

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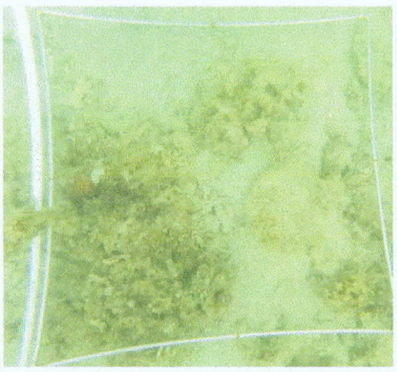
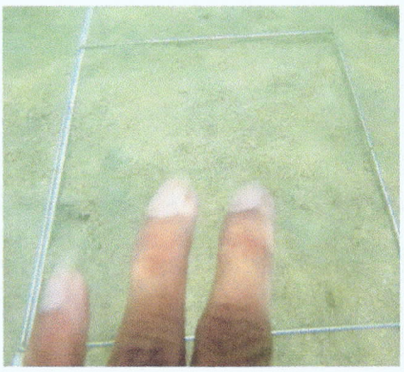
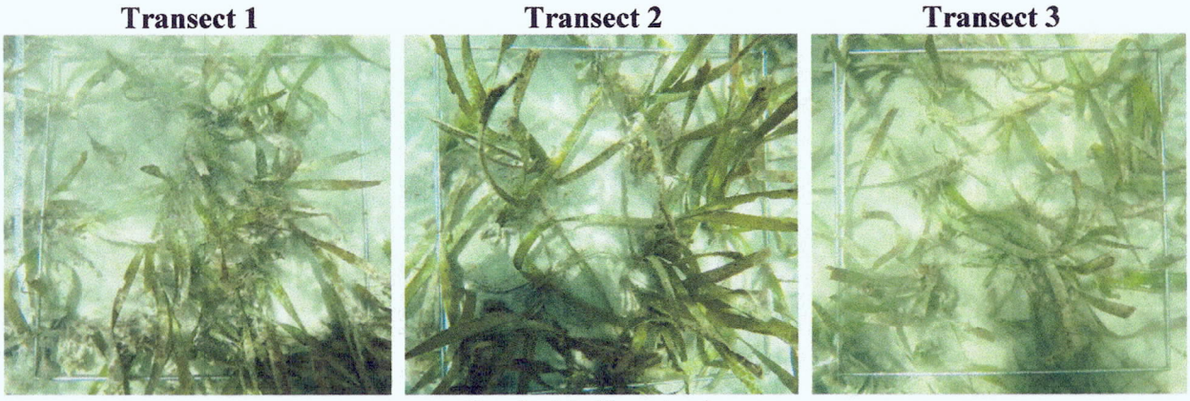
		

Quadrat 10 (45 meters)

PHOTOGRAPHS OF QUADRAT TAKEN AT 5-, 25-, AND 45-m

Snake Island, Bgy. Bebeladan, El Nido, Palawan (Monitoring Site 3)

Transect 1 **Transect 2** **Transect 3**



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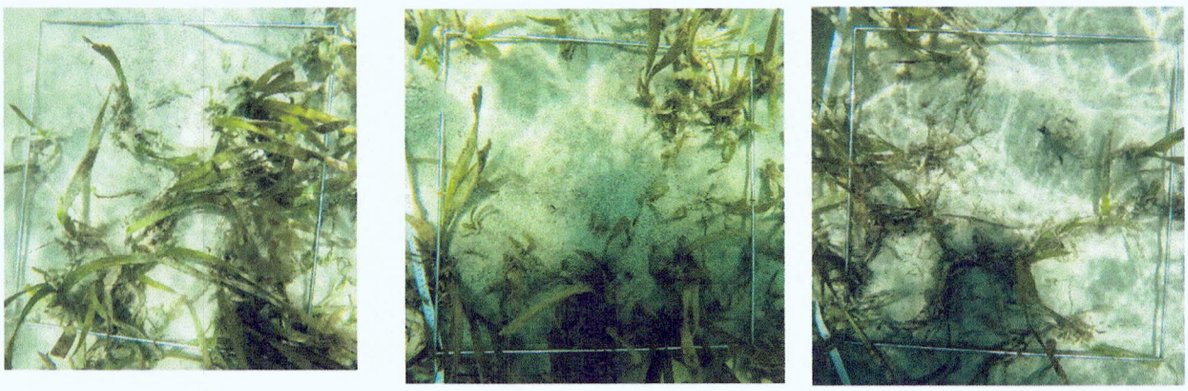

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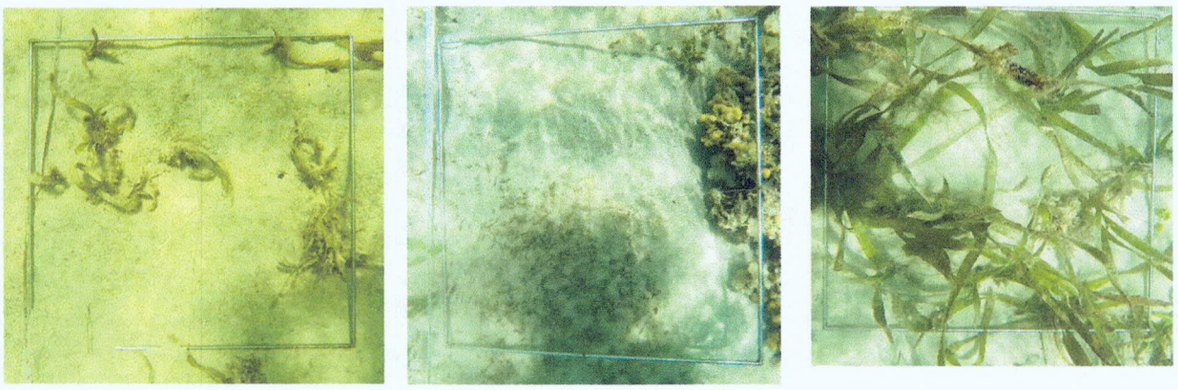
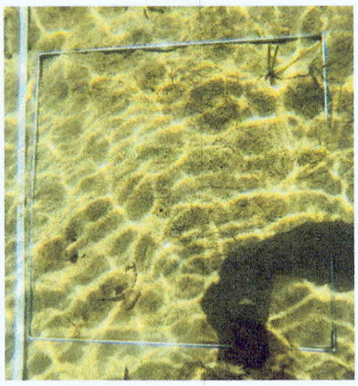


Quadrat 10 (45 meters)

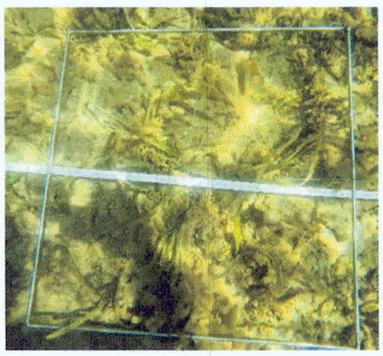
PHOTOGRAPHS OF QUADRAT TAKEN AT 5-, 25-, AND 45-m

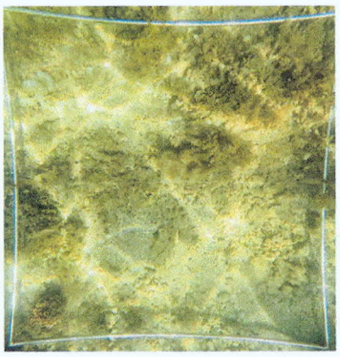
So. Caalan, Bgy. Masagana, El Nido, Palawan (Monitoring Site 4)

Transect 1 **Transect 2** **Transect 3**

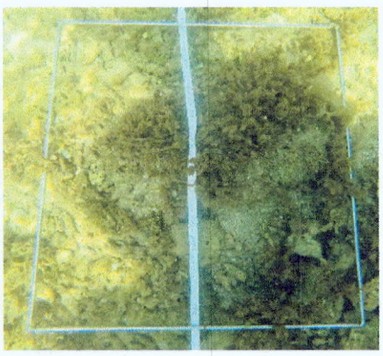
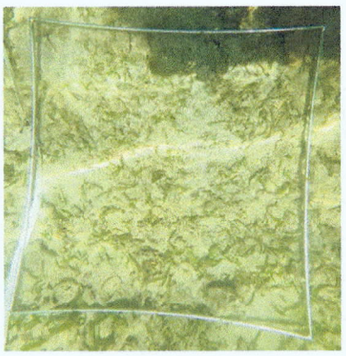
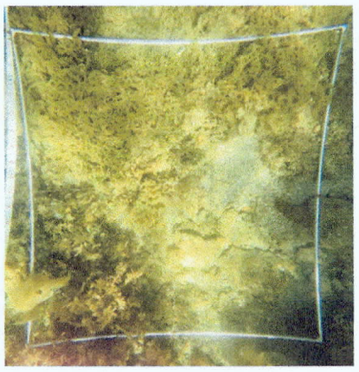


Quadrat 2 (5 meters)





Quadrat 6 (25 meters)

Quadrat 10 (45 meters)

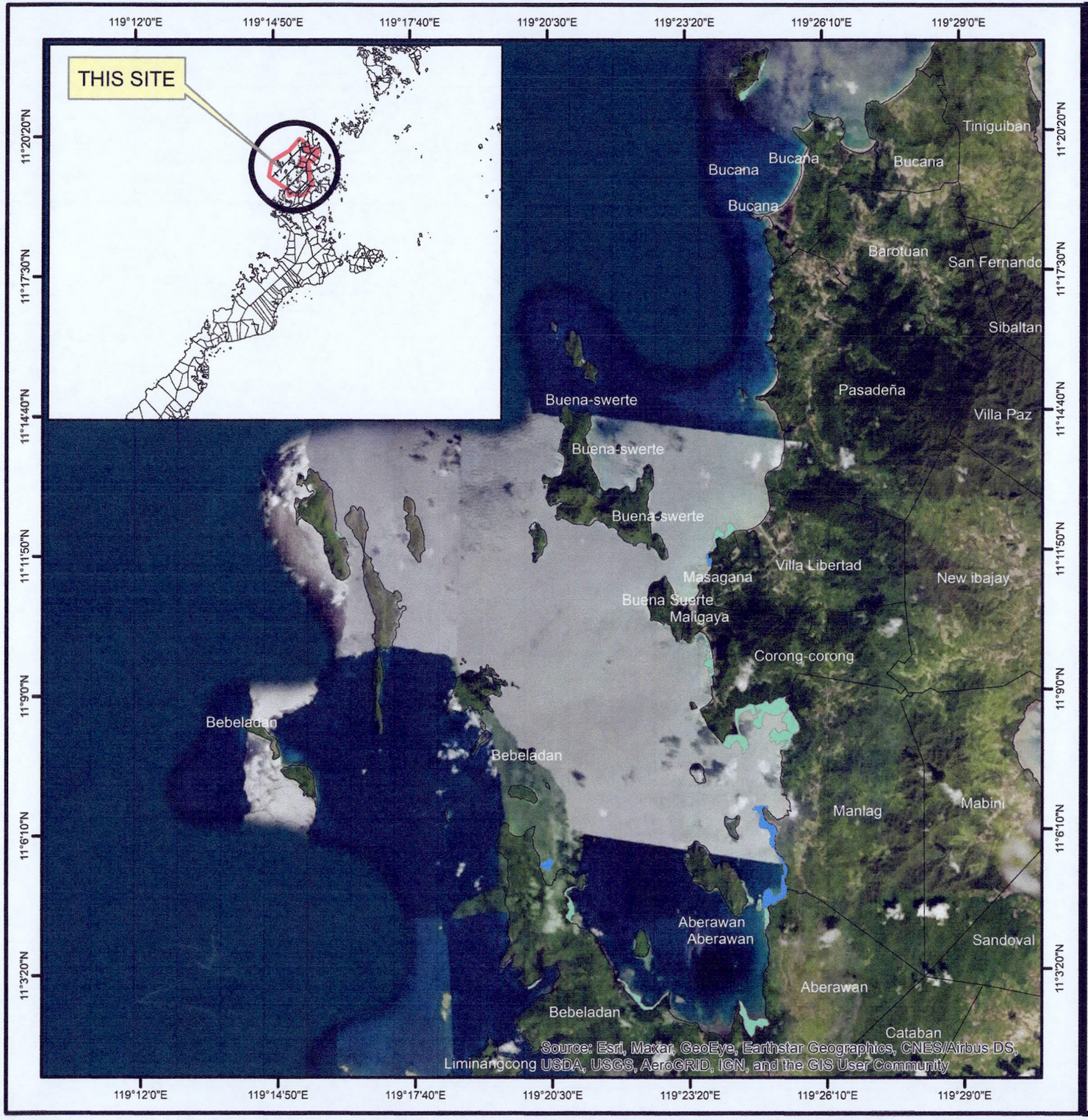
PHOTO DOCUMENTATION

(Left) Snake Island, Bgy. Bebeladan; (Right) So. Seminaytay, Bgy. Manlag

CERTIFICATION

I hereby certify that the above photos were true and correct and taken during monitoring of seagrass.

MARIEL M. PALADAN
CMEMP Extension Officer



N
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MAP

SHOWING THE FOUR (4) ESTABLISHED SEAGRASS MONITORING SITES IN EL NIDO MANAGED RESOURCE PROTECTED AREA (ENMRPA), EL NIDO, PALAWAN

Total Area (Seagrass Beds) : 522 Hectares

Area (Established Monitoring Sites) : 113.7 Hectares

SCALE : 1:16,994

5,500 2,750 0 5,500 Meters

LEGEND

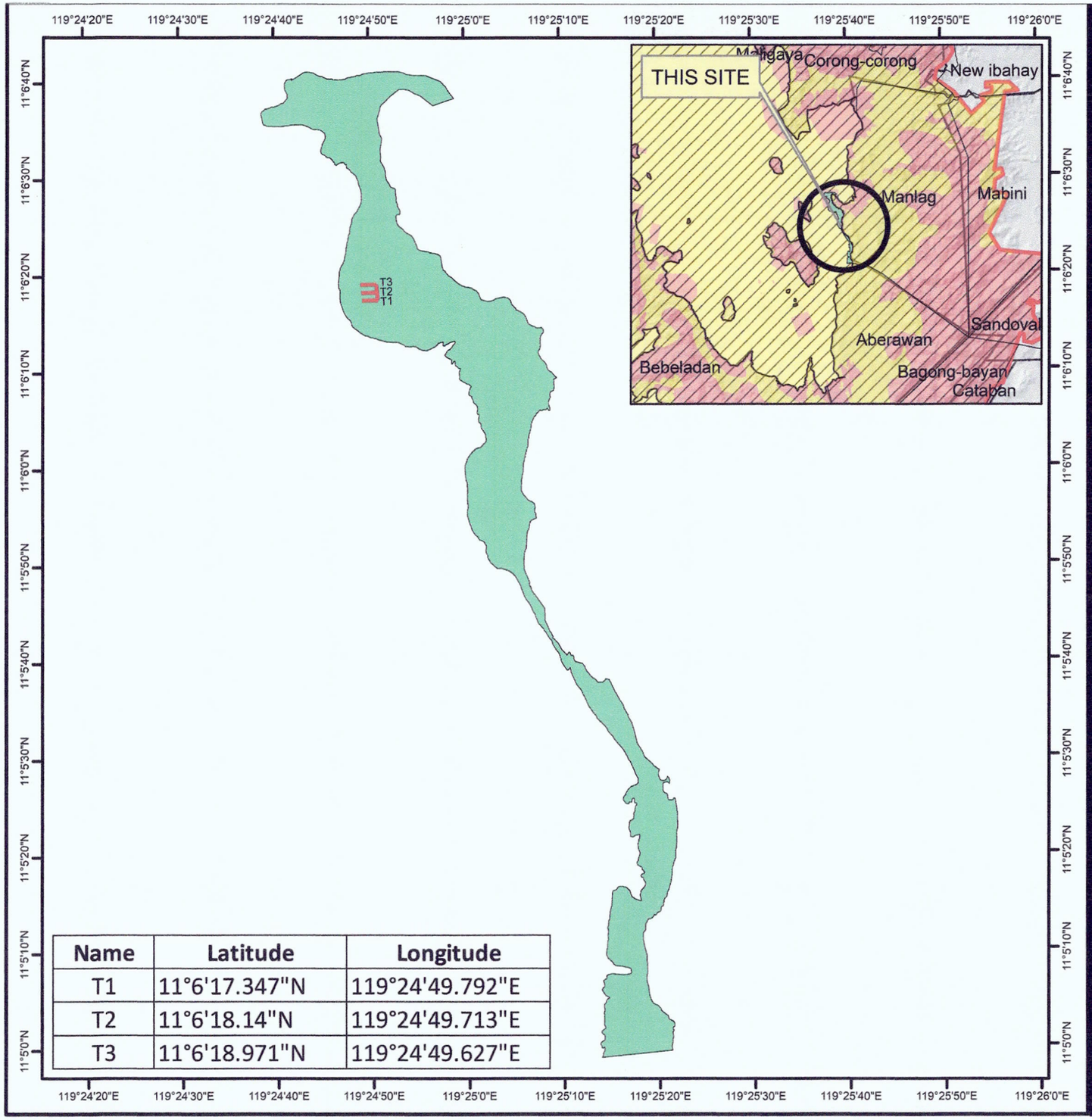
- Established Monitoring Sites
- Political Boundary
- Seagrass beds
- PA Boundary

Projection : Universal Transverse Mercator Z50N
Datum : World Geodetic System 1984

Republic of the Philippines
Department of Environment and Natural Resources
Region IV - MIMAROPA
Community Environment and Natural Resources Office
Taytay 5312, Palawan

PREPARED BY :

THE PROTECTED AREA MANAGEMENT OFFICE - EL NIDO MANAGED RESOURCE PROTECED AREA (PAMO-ENMRPA)



Name	Latitude	Longitude
T1	11°6'17.347"N	119°24'49.792"E
T2	11°6'18.14"N	119°24'49.713"E
T3	11°6'18.971"N	119°24'49.627"E

N
W E
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MAP

SHOWING THE SEAGRASS SITE MONITORED WITHIN EL NIDO-TAYTAY MANAGED RESOURCE PROTECTED AREA (ENTMRPA), EL NIDO, PALAWAN

Area : 57.34 Hectares

Specific site : So. Seminaytay, Bgy. Manlag, El Nido, Palawan

SCALE : 1:16,994

490 245 0 490 Meters

LEGEND

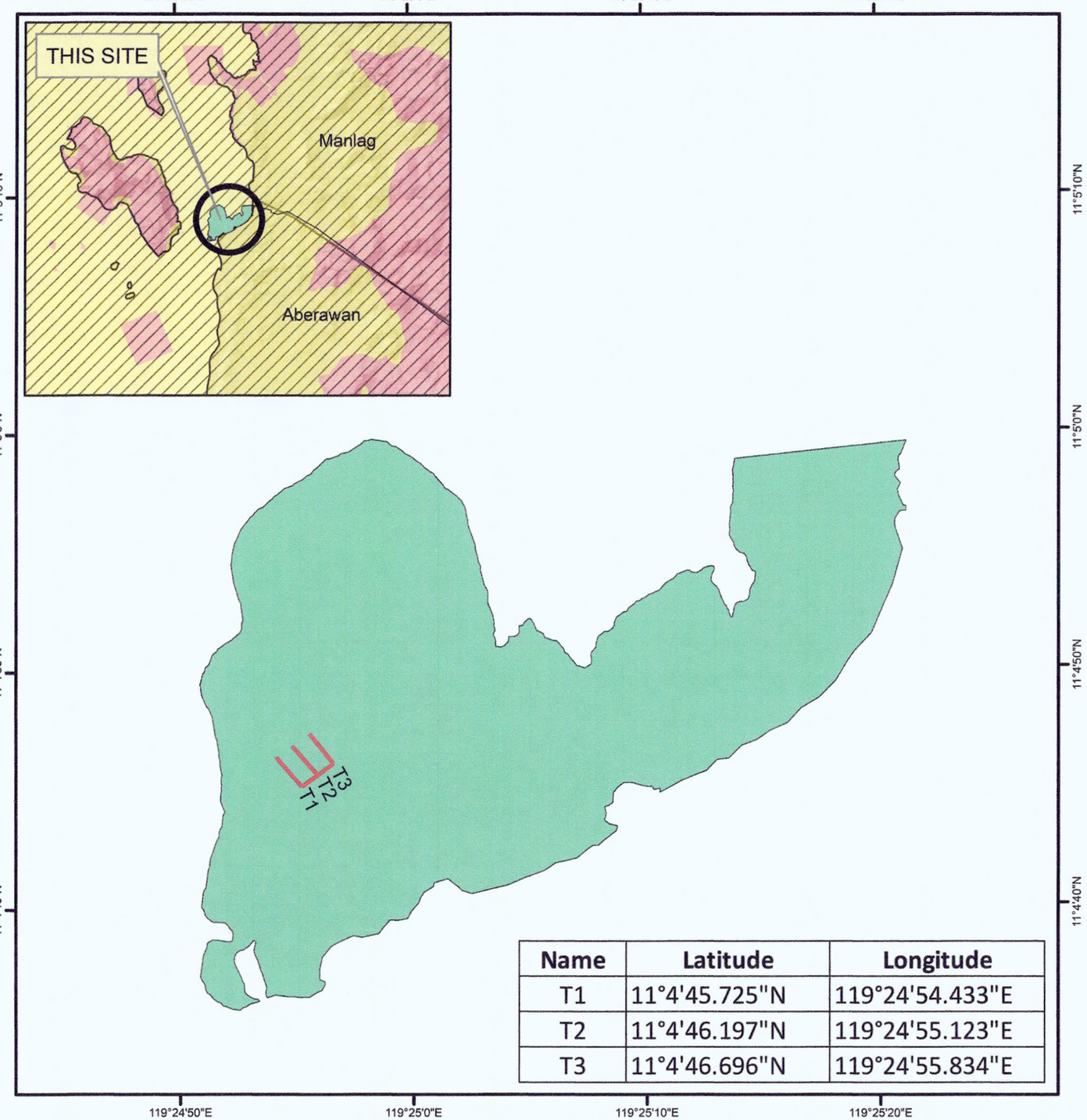
- Transect Line
- Seagrass
- Political Boundary
- PA Boundary

Projection : Universal Transverse Mercator Z50N
Datum : World Geodetic System 1984

Republic of the Philippines
Department of Environment and Natural Resources
Region IV - MIMAROPA
Community Environment and Natural Resources Office
Taytay 5312, Palawan

PREPARED BY :

THE PROTECTED AREA MANAGEMENT OFFICE - EL NIDO-TAYTAY MANAGED RESOURCE PROTECED AREA (PAMO-ENTMRPA)



Name	Latitude	Longitude
T1	11°4'45.725"N	119°24'54.433"E
T2	11°4'46.197"N	119°24'55.123"E
T3	11°4'46.696"N	119°24'55.834"E

N
W E
S

MAP

SHOWING THE SEAGRASS SITE MONITORED WITHIN EL NIDO-TAYTAY MANAGED RESOURCE PROTECTED AREA (ENTMRPA), EL NIDO, PALAWAN

Area : 36.36 Hectares

Specific site : So. Simpian, Bgy. Aberawan, El Nido, Palawan

SCALE : 1:7,185

200 100 0 200 Meters

LEGEND

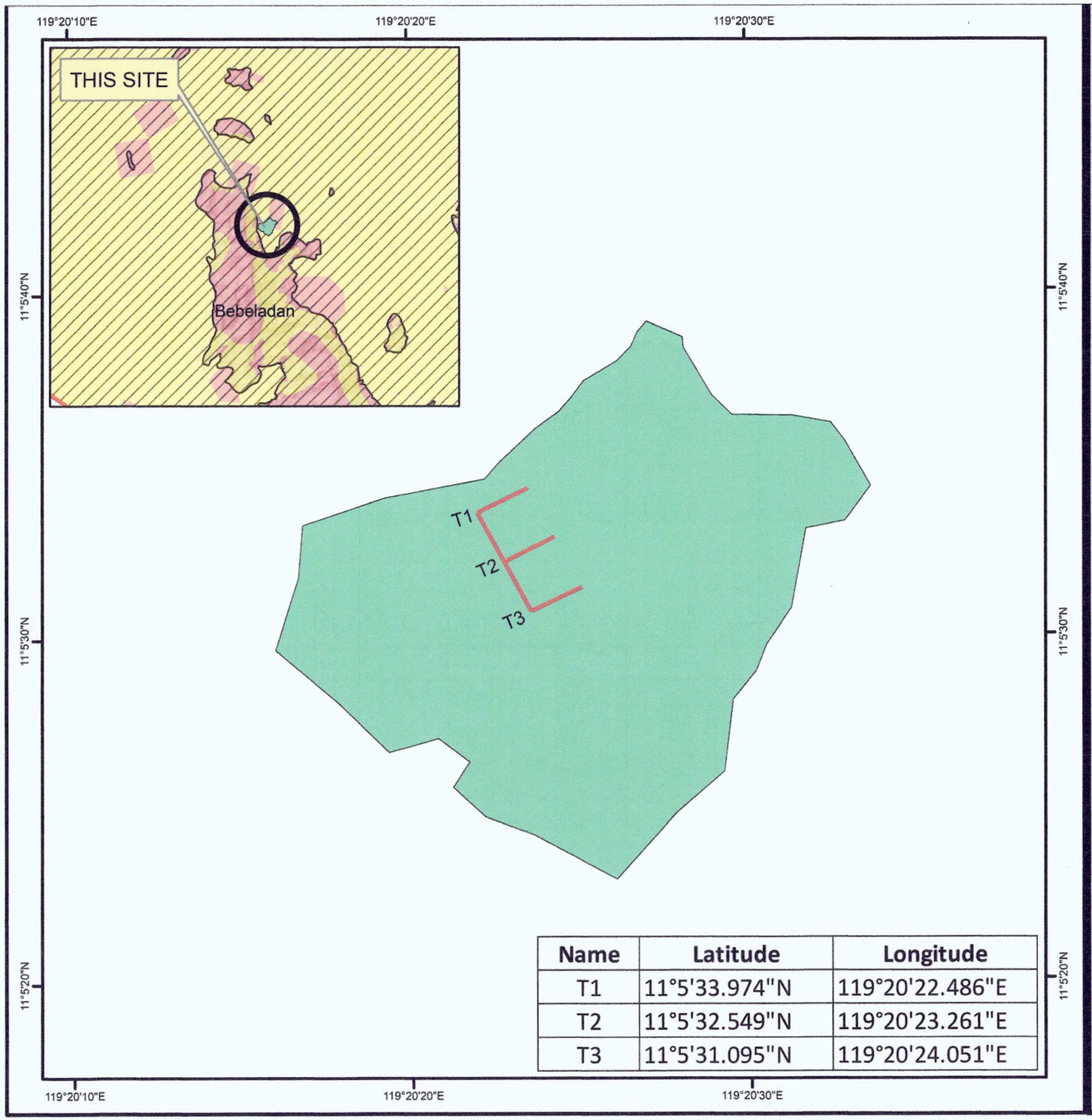
- Transect Line
- Seagrass
- Political Boundary
- PA Boundary

Projection : Universal Transverse Mercator Z50N
Datum : World Geodetic System 1984

Republic of the Philippines
Department of Environment and Natural Resources
Region IV - MIMAROPA
Community Environment and Natural Resources Office
Taytay 5312, Palawan

PREPARED BY :

THE PROTECTED AREA MANAGEMENT OFFICE - EL NIDO-TAYTAY MANAGED RESOURCE PROTECED AREA (PAMO-ENTMRPA)



Name	Latitude	Longitude
T1	11°5'33.974"N	119°20'22.486"E
T2	11°5'32.549"N	119°20'23.261"E
T3	11°5'31.095"N	119°20'24.051"E

N
W E
S

MAP

SHOWING THE SEAGRASS SITE MONITORED WITHIN EL NIDO-TAYTAY MANAGED RESOURCE PROTECTED AREA (ENTMRPA), EL NIDO, PALAWAN

Area : 14.0 Hectares

Specific site : Snake Island, Bgy. Bebeladan, El Nido, Palawan

SCALE : 1:4,762

130 65 0 130 Meters

LEGEND

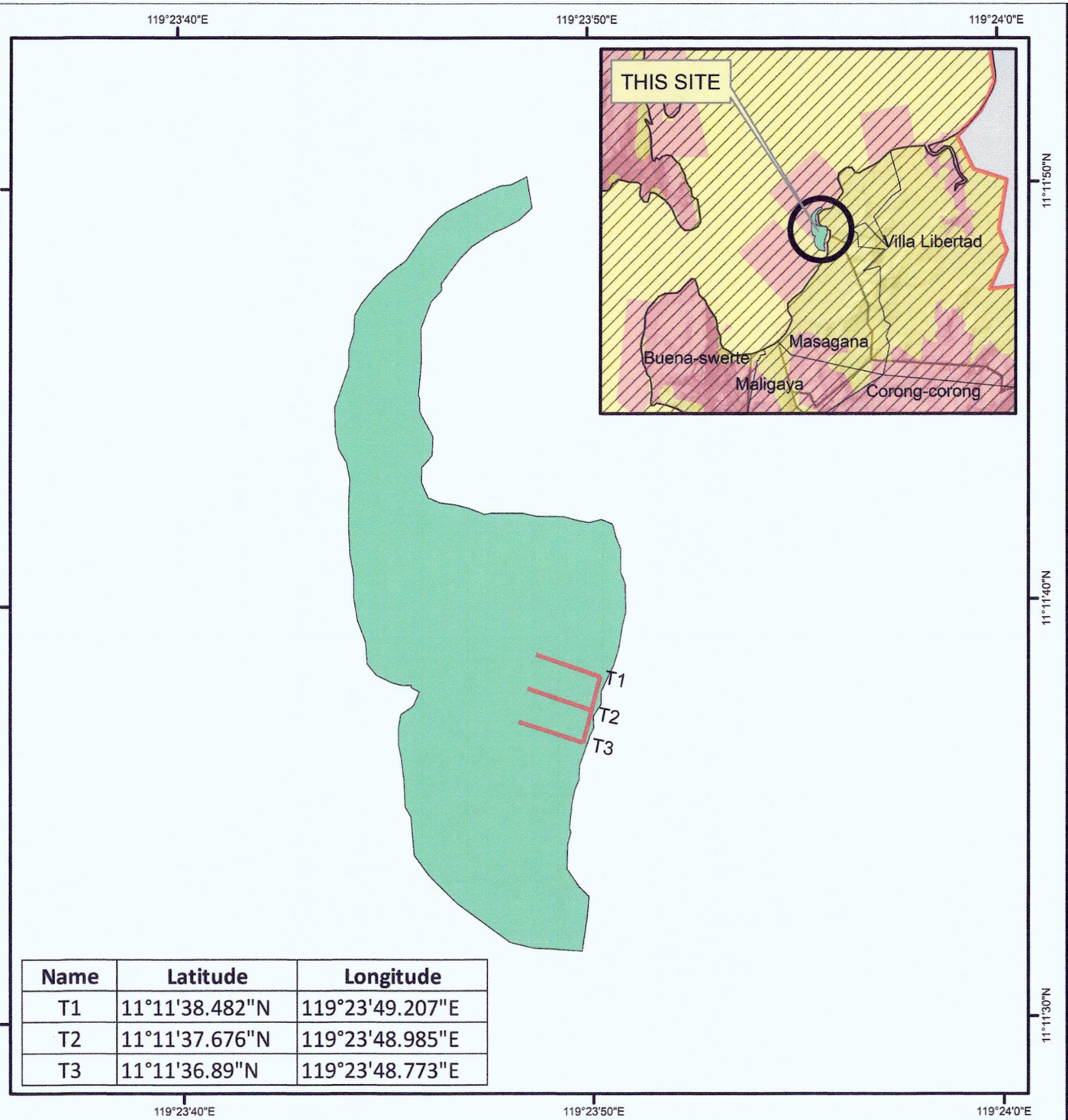
- Transect Line
- Seagrass
- Political Boundary
- PA Boundary

Projection : Universal Transverse Mercator Z50N
Datum : World Geodetic System 1984

Republic of the Philippines
Department of Environment and Natural Resources
Region IV - MIMAROPA
Community Environment and Natural Resources Office
Taytay 5312, Palawan

PREPARED BY :

THE PROTECTED AREA MANAGEMENT OFFICE - EL NIDO-TAYTAY MANAGED RESOURCE PROTECED AREA (PAMO-ENTMRPA)



Name	Latitude	Longitude
T1	11°11'38.482"N	119°23'49.207"E
T2	11°11'37.676"N	119°23'48.985"E
T3	11°11'36.89"N	119°23'48.773"E

N
W E
S

MAP

SHOWING THE SEAGRASS SITE MONITORED WITHIN EL NIDO-TAYTAY MANAGED RESOURCE PROTECTED AREA (ENTMRPA), EL NIDO, PALAWAN

Area : 6.0 Hectares

Specific site : So. Caalan, Bgy. Masagana, El Nido, Palawan

SCALE : 1:3,992

110 55 0 110 Meters

LEGEND

- Transect Line
- Seagrass
- Political Boundary
- PA Boundary

Projection : Universal Transverse Mercator Z50N
Datum : World Geodetic System 1984

Republic of the Philippines
Department of Environment and Natural Resources
Region IV - MIMAROPA
Community Environment and Natural Resources Office
Taytay 5312, Palawan

PREPARED BY :

THE PROTECTED AREA MANAGEMENT OFFICE - EL NIDO-TAYTAY MANAGED RESOURCE PROTECED AREA (PAMO-ENTMRPA)

APPENDIX I. Seagrass Monitoring Data Sheet at So. Seminaytay, Bgy. Manlag, El Nido, Palawan (Site 1)

Seagrass Monitoring Data Sheet

Observer: Mariel M. Paladan and Reina Rose C. Abordo
Location: So. Seminaytay, Bgy. Manlag, El Nido, Palawan
Site: 1
Date: April 18, 2023
Transect No. 1

Start time: 14:04
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hm	Ho	Cr	Ea	Th	Cs	Hp	Si	Hm	Ho	Cr			
1 (0m)	Sandy silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (5m)	Sandy silt	Forams	x	70	0	0	0	50	0	0	0	20	0	0	0	340	0	0	0	240	11,10,10	2	25
3 (10m)	Sandy silt	Forams		85	0	3	0	50	0	2	0	30	0	28	0	420	0	20	0	268	10,9,9	10	50
4 (15m)	Sandy silt	Forams		70	0	5	0	40	0	5	0	20	0	28	0	360	0	32	0	208	12,10,10	5	30
5 (20m)	Sandy silt	Forams		95	4	0	0	85	0	0	3	3	32	0	0	680	0	0	24	28	14,12,12	10	40
6 (25m)	Sandy silt	Forams	x	50	8	1	20	8	0	0	8	5	60	4	16	96	0	0	60	28	17,14,50	5	50
7 (30m)	Sandy silt	Forams		85	5	3	0	0	75	0	2	0	32	20	0	0	180	0	24	0	12,14,16	15	40
8 (35m)	Sandy silt	Forams		35	3	0	0	0	20	0	10	2	20	0	0	0	100	0	72	12	12,12,16	10	40
9 (40m)	Sandy silt	Forams		5	5	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	12,11,7	10	20
10 (45m)	Sandy silt	Forams	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0
11 (50m)	Sandy silt	Forams		2	2	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	12,12,14	5	70
			SUM	497	27	12	20	233	95	7	23	80	188	80	16	1896	280	52	180	784		0	365
			AVERAGE	45.18	2.45	1.09	1.82	21.18	8.64	0.64	2.09	7.27	17.1	7.3	1.5	172.4	25.5	4.7	16.4	71.3		12.67	33.18

End Time: 14:16
End of Transect:

Observer: Steven B. Andao and MENRO
Location: So. Seminaytay, Bgy. Manlag, El Nido, Palawan
Site: 1
Date: April 18, 2023
Transect No. 2

Start time: 14:12
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hm	Ho	Cr	Ea	Th	Cs	Hp	Si	Hm	Ho	Cr			
1 (0m)	Sandy	Forams		95	35	10	0	0	30	0	0	10	120	40	0	0	200	0	0	40	60,25,15	10	80
2 (5m)	Sandy	Forams	x	85	40	0	0	0	35	0	0	10	200	0	0	0	160	0	0	40	60,70,10	15	80
3 (10m)	Sandy silt	Forams		70	20	0	0	15	25	0	0	10	140	0	0	100	200	0	0	60	50,10,5	5	60
4 (15m)	Sandy silt	Forams		50	0	4	0	0	12	7	10	17	0	20	0	40	100	52	48	180	18,20,10	10	50
5 (20m)	Sandy silt	Forams		95	2	0	0	20	0	0	20	53	8	0	0	108	0	0	104	240	15,16,12	5	60
6 (25m)	Sandy	Forams	x	20	15	0	0	2	0	0	0	3	40	0	0	20	0	0	0	20	15,16,18	10	60
7 (30m)	Sandy	Forams		70	5	0	0	60	0	0	0	5	20	0	0	320	0	0	0	20	40,10,15	20	60
8 (35m)	Sandy	Forams		85	5	0	0	40	0	0	0	40	36	0	0	360	0	0	0	360	60,10,20	20	70
9 (40m)	Sandy	Forams		70	10	0	0	50	0	0	0	10	72	0	0	360	0	0	0	60	50,20,15	10	70
10 (45m)	Sandy	Forams	x	20	0	3	0	0	7	8	0	2	0	36	0	0	60	100	0	32	16,14,8	10	70
11 (50m)	Sandy	Forams		50	5	0	0	15	0	0	15	15	36	0	0	120	0	0	100	108	30,10,18	15	40
			SUM	710	137	17	0	202	109	15	45	175	672	96	0	1428	720	152	252	1160		0	700
			AVERAGE	64.55	12.45	1.55	0.00	18.36	9.91	1.36	4.09	15.91	61.1	8.7	0.0	129.8	65.5	13.8	22.9	105.5		10.83	63.64

End Time: 14:29
End of Transect:

Seagrass Monitoring Data Sheet

Observer: Mariel M. Paladan and Reina Rose C. Abordo
Location: So. Seminaytay, Bgy. Manlag, El Nido, Palawan
Site: 1
Date: April 18, 2023
Transect No. 3

Start time: 14:20
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hm	Ho	Cr	Ea	Th	Cs	Hp	Si	Hm	Ho	Cr			
1 (0m)	Sandy silt	Forams		2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	12	5,7,7	0	0
2 (5m)	Sandy silt	Forams	x	35	2	0	0	25	0	0	0	8	8	0	0	412	0	0	0	192	14,12,9	5	40
3 (10m)	Sandy silt	Forams		20	0	0	0	2	0	0	0	18	0	0	0	20	0	0	0	128	9,9,10	5	40
4 (15m)	Sandy silt	Forams		50	0	0	0	30	0	8	2	10	0	0	0	320	0	112	12	104	7,10,9	0	50
5 (20m)	Sandy silt	Forams		35	0	1	0	9	0	5	0	20	0	8	0	88	0	60	0	200	10,11,9	2	30
6 (25m)	Sandy silt	Forams	x	95	0	5	0	20	0	0	20	70	0	28	0	60	0	0	92	256	14,13,12	10	50
7 (30m)	Sandy silt	Forams		35	0	0	0	8	0	0	7	20	0	0	0	100	0	0	80	136	10,9,9	10	40
8 (35m)	Sandy silt	Forams		20	0	2	0	5	0	0	1	12	0	32	0	60	0	0	8	112	10,9,9	5	50
9 (40m)	Sandy silt	Forams		20	0	1	0	18	0	1	0	0	0	12	0	120	0	16	0	0	40,10,9	5	60
10 (45m)	Sandy silt	Forams	x	50	0	0	0	30	0	0	5	15	0	0	0	300	0	0	40	252	14,12,12	2	50
11 (50m)	Sandy silt	Forams		35	2	2	0	15	0	0	1	15	16	20	0	92	0	0	16	80	10,12,17	5	60
			SUM	397	4	11	0	162	0	14	36	190	24	100	0	1572	0	188	248	1472		0	470
			AVERAGE	36.09	0.36	1.00	0.00	14.73	0.00	1.27	3.27	17.27	2.2	9.1	0.0	142.9	0.0	17.1	22.5	133.8		4.08	42.73

End Time: 14:32
End of Transect:

APPENDIX II. Seagrass Monitoring Data Sheet at So. Simpian, Bgy. Aberawan, El Nido, Palawan (Site 2)

Seagrass Monitoring Data Sheet

Observer: Mariel M. Paladan and Reina Rose Abordo
Location: So. Simpian, Bgy. Aberawan, El Nido, Palawan
Site: 2
Date: April 18, 2023
Transect No. 1

Start time: 9:57
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0
2 (5m)	Sandy Silt	Forams	x	20	0	0	0	0	0	0	15	5	0	0	0	0	0	0	88	168	8,10,10	5	80
3 (10m)	Sandy Silt	Forams		5	3	2	0	0	0	0	0	0	16	8	0	0	0	0	0	0	10,12,12	10	40
4 (15m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
5 (20m)	Sandy Silt	Forams		20	2	0	0	0	0	0	0	18	12	0	0	0	0	0	0	112	14,10,15	10	80
6 (25m)	Sandy Silt	Forams	x	5	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	48	8,6,7	20	70
7 (30m)	Sandy Silt	Forams		20	3	0	0	0	0	0	17	0	8	0	0	0	0	0	112	0	10,12,5	0	70
8 (35m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 (40m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 (45m)	Sandy Silt	Forams	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
11 (50m)	Sandy Silt	Forams		2	2	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	27,34,38	5	20
			SUM	72	10	2	0	0	0	0	32	28	44	8	0	0	0	0	200	328		155	360
			AVERAGE	6.55	0.91	0.18	0.00	0.00	0.00	0.00	2.91	2.55	4.0	0.7	0.0	0.0	0.0	0.0	18.2	29.8		25.83	32.73

End Time: 10:52
End of Transect:

Observer: Steven B. Andao and MENRO
Location: So. Simpian, Bgy. Aberawan, El Nido, Palawan
Site: 2
Date: April 18, 2023
Transect No. 2

Start time: 10:38
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (5m)	Sandy Silt	Forams	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0
3 (10m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 (15m)	Sandy Silt	Forams		5	4	0	0	0	0	0	1	0	32	0	32	0	0	0	8	0	40,15,7	0	90
5 (20m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 (25m)	Sandy Silt	Forams	x	5	3	0	0	0	0	0	2	0	8	0	0	0	0	0	8	0	20,15,3	0	90
7 (30m)	Sandy Silt	Forams, Boring clam		3	3	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	21,20,10	0	90
8 (35m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 (40m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 (45m)	Sandy Silt	Forams	x	5	5	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	20,8,15	0	90
11 (50m)	Sandy Silt	Formas		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			SUM	18	15	0	0	0	0	0	3	0	80	0	32	0	0	0	16	0		0	360
			AVERAGE	1.64	1.36	0.00	0.00	0.00	0.00	0.00	0.27	0.00	7.3	0.0	2.9	0.0	0.0	0.0	1.5	0.0		1.25	32.73

End Time: 10:52

Observer: Steven B. Andao and MENRO
Location: So. Simpian, Bgy. Aberawan, El Nido, Palawan
Site: 2
Date: April 18, 2023
Transect No. 3

Start time: 10:17
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (5m)	Sandy Silt	Forams	x	1	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	20,25,32	10	80
3 (10m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
4 (15m)	Sandy Silt	Forams		5	0	0	5	0	0	0	0	0	0	0	32	0	0	0	0	0	15,14,17	0	70
5 (20m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 (25m)	Sandy Silt	Forams, Cut leaf	x	3	3	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	25,38,32	0	90
7 (30m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
8 (35m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
9 (40m)	Sandy Silt	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 (45m)	Sandy Silt	Forams	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 (50m)	Sandy Silt	Formas		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
			SUM	9	4	0	5	0	0	0	0	0	20	0	32	0	0	0	0	0		70	240
			AVERAGE	0.82	0.36	0.00	0.45	0.00	0.00	0.00	0.00	0.00	1.8	0.0	2.9	0.0	0.0	0.0	0.0	0.0		6.36	21.82

End Time: 10:29

APPENDIX III. Seagrass Monitoring Data Sheet at Snake Island, Bgy. Bebeladan, El Nido, Palawan (Site 3)

Seagrass Monitoring Data Sheet

Observer: Mariel M. Paladan and Reina Rose Abordo
Location: Snake Island, Bgy. Bebeladan, El Nido, Palawan
Site: 3
Date: March 9, 2023
Transect No. 1

Start time: 10:12
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy	Forams		50	50	0	0	0	0	0	0	0	152	0	0	0	0	0	0	0	20,18,15	10	50
2 (5m)	Sandy	Forams	x	20	15	0	0	5	0	0	0	0	80	0	0	112	0	0	0	0	15,20,17	5	50
3 (10m)	Sandy	Forams		50	35	5	0	10	0	0	0	0	112	8	0	200	0	0	0	0	10,15,12	5	60
4 (15m)	Sandy	Forams		20	17	2	0	1	0	0	0	0	104	16	0	8	0	0	0	0	10,15,18	0	80
5 (20m)	Sandy	Forams/Sponge		10	8	2	0	0	0	0	0	0	60	32	0	0	0	0	0	0	10,10,14	0	70
6 (25m)	Sandy	Forams	x	20	10	5	0	0	0	0	0	0	64	96	0	0	0	0	0	0	15,15,12	10	80
7 (30m)	Sandy	Forams		10	8	2	0	0	0	0	0	0	68	12	0	0	0	0	0	0	10,12,15	0	80
8 (35m)	Sandy	Forams		10	10	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	12,14,15	0	70
9 (40m)	Sandy	Forams		10	9	0	0	0	0	0	0	1	48	0	0	0	0	0	0	4	10,10,11	0	70
10 (45m)	Sandy	Forams	x	5	4	1	0	0	0	0	0	0	40	4	0	0	0	0	0	0	10,10,8	80	80
11 (50m)	Sandy	Forams		2	2	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	10,8,7	0	80
			SUM	207	168	17	0	16	0	0	0	1	784	168	0	320	0	0	0	4		110	770
			AVERAGE	18.82	15.27	1.55	0.00	1.45	0.00	0.00	0.00	0.09	71.3	15.3	0.0	29.1	0.0	0.0	0.0	0.4		10.00	70.00

End Time: 10:48
End of Transect:

Observer: Mariel M. Paladan and Reina Rose Abordo
Location: Snake Island, Bgy. Bebeladan, El Nido, Palawan
Site: 3
Date: March 9, 2023
Transect No. 2

Start time: 11:17
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy	Forams		35	30	5	0	0	0	0	0	0	92	16	0	0	0	0	0	0	20,15,12	0	60
2 (5m)	Sandy	Forams	x	35	32	3	0	0	0	0	0	0	96	4	0	0	0	0	0	0	12,10,14	0	40
3 (10m)	Sandy	Forams		20	18	2	0	0	0	0	0	0	80	4	0	0	0	0	0	0	10,14,14	0	40
4 (15m)	Sandy	Forams		10	10	0	0	0	0	0	0	0	88	0	0	0	0	0	0	0	10,10,7	0	60
5 (20m)	Sandy	Forams		10	10	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,14,13	0	50
6 (25m)	Sandy	Hard Corals	x	10	10	0	0	0	0	0	10	0	0	0	0	0	0	0	512	0	4,4,2	10	70
7 (30m)	Sandy	Dead Corals		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 (35m)	Sandy	Forams		5	5	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	10,17,14	0	60
9 (40m)	Sandy	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 (45m)	Sandy	Forams	x	10	0	0	0	0	0	0	10	0	0	0	0	0	0	0	120	0	4,2,3	5	20
11 (50m)	Sandy	Forams		20	2	0	0	0	0	0	18	0	4	0	0	0	0	0	180	0	12,4,3	10	90
			SUM	155	117	22	0	0	0	0	38	0	400	24	0	0	0	0	812	0		25	490
			AVERAGE	14.09	10.64	2.00	0.00	0.00	0.00	0.00	3.45	0.00	36.4	2.2	0.0	0.0	0.0	0.0	73.8	0.0		2.27	44.55

End Time: 11:26
End of Transect:

Observer: Steven John Andao
Location: Snake Island, Bgy. Bebeladan, El Nido, Palawan
Site: 1
Date: March 9, 2023
Transect No. 3

Start time: 10:48
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy	Forams		20	9	0	0	9	0	0	1	0	192	0	0	192	0	0	16	0	12,10,5	5	50
2 (5m)	Sandy	Forams	x	35	25	10	0	0	0	0	0	0	300	100	0	0	0	0	0	0	25,10,12	0	50
3 (10m)	Sandy	Sponge/Forams		70	68	0	0	0	0	0	0	2	360	0	0	0	0	0	0	8	35,10,15	0	60
4 (15m)	Sandy	Forams		35	30	5	0	0	0	0	0	0	360	40	0	0	0	0	0	0	30,25,10	10	70
5 (20m)	Sandy	Forams		35	35	0	0	0	0	0	0	0	400	0	0	0	0	0	0	0	45,30,30	5	20
6 (25m)	Sandy	Forams/Univalves	x	20	18	0	0	0	0	0	0	2	280	0	0	0	0	0	0	40	25,20,12	1	40
7 (30m)	Sandy	Forams		10	10	0	0	0	0	0	0	0	320	0	0	0	0	0	0	0	35,30,50	2	30
8 (35m)	Sandy	Forams		20	20	0	0	0	0	0	0	0	400	0	0	0	0	0	0	0	40,30,50	5	30
9 (40m)	Sandy	Forams/Cut leaf		35	33	0	0	0	0	0	0	2	388	0	0	0	0	0	0	12	20,15,10	0	70
10 (45m)	Sandy	Forams	x	35	28	7	0	0	0	0	0	0	28	120	0	0	0	0	0	0	30,10,10	0	60
11 (50m)	Sandy	Forams/Cut leaf		20	20	0	0	0	0	0	0	0	380	0	0	0	0	0	0	0	8,18,15	0	70
			SUM	335	296	22	0	9	0	0	1	6	3408	260	0	192	0	0	16	60		28	550
			AVERAGE	30.45	26.91	2.00	0.00	0.82	0.00	0.00	0.09	0.55	309.8	23.6	0.0	17.5	0.0	0.0	1.5	5.5		2.55	50.00

End Time: 11:16
End of Transect:

APPENDIX IV. Seagrass Monitoring Data Sheet at So. Caalan, Bgy. Masagana, El Nido, Palawan (Site 4)

Seagrass Monitoring Data Sheet

Observer: Steven John B. Andao
Location: So. Caalan, Bgy. Masagana, El Nido, Palawan
Site: 4
Date: April 20, 2023
Transect No. 1

Start time: 9:46
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy	Forams		3	0	3	0	0	0	0	0	0	0	24	0	0	0	0	0	0	18,10,12	2	30
2 (5m)	Sandy	Forams	x	20	0	0	0	18	0	0	0	2	0	0	0	148	0	0	0	8	16,10,6	5	20
3 (10m)	Sandy	Forams		70	10	10	0	50	0	0	0	0	32	32	0	480	0	0	0	0	30,14,12	0	50
4 (15m)	Sandy	Forams		50	10	90	0	0	0	0	0	0	36	240	0	0	0	0	0	0	30,18,14	0	50
5 (20m)	Sandy	Forams		10	0	10	0	0	0	0	0	0	0	136	0	0	0	0	0	0	12,10,10	5	40
6 (25m)	Sandy	Forams	x	10	8	2	0	0	0	0	0	0	80	20	0	0	0	0	0	0	17,15,15	10	30
7 (30m)	Sandy	Forams		10	10	0	0	0	0	0	0	0	72	0	0	0	0	0	0	0	50,40,30	30	60
8 (35m)	Sandy	Forams		20	0	20	0	0	0	0	0	0	0	120	0	0	0	0	0	0	14,16,12	10	60
9 (40m)	Sandy	Forams		5	5	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	14,16,12	20	30
10 (45m)	Sandy	Forams	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 (50m)	Sandy	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			SUM	198	43	135	0	68	0	0	0	2	252	572	0	628	0	0	0	8			370
			AVERAGE	18.00	3.91	12.27	0.00	6.18	0.00	0.00	0.00	0.18	22.9	52.0	0.0	57.1	0.0	0.0	0.0	0.7		7.45	33.64

End Time: 10:12
End of Transect:

Seagrass Monitoring Data Sheet

Observer: Mariel M. Paladan and Reina Rose Abordo
Location: So. Caalan, Bgy. Masagana, El Nido, Palawan
Site: 4
Date: April 20, 2023
Transect No. 2

Start time: 10:15
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Sandy	Forams		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 (5m)	Sandy	Forams	x	5	0	5	0	0	0	0	0	0	0	68	0	0	0	0	0	0	12.10,14	5	40
3 (10m)	Sandy	Forams		5	0	3	0	0	0	0	0	2	0	32	0	0	0	0	0	8	12,17,15	0	30
4 (15m)	Sandy	Forams		12	0	0	0	9	0	0	0	3	0	0	0	192	0	0	0	12	20,18,15	10	30
5 (20m)	Sandy	Forams		20	2	2	0	6	0	0	0	10	8	0	0	148	0	0	0	128	20,10,7	0	20
6 (25m)	Sandy	Forams	x	10	0	0	0	6	0	0	0	4	0	0	0	112	0	0	0	92	10,12,15	10	20
7 (30m)	Sandy	Forams		20	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	48	14,19,13	0	25
8 (35m)	Sandy	Forams		35	2	0	0	18	0	0	0	15	12	0	0	180	0	0	0	68	14,20,23	0	15
9 (40m)	Sandy	Forams		50	3	35	0	0	0	0	10	2	8	188	0	0	0	0	152	8	40,28,19	0	10
10 (45m)	Sandy	Forams	x	70	0	35	0	35	0	0	0	0	0	100	0	180	0	0	0	0	17,17,22	0	10
11 (50m)	Sandy	Forams		30	0	30	0	0	0	0	0	0	0	208	0	0	0	0	0	0	12,17,22	10	10
			SUM	257	7	110	0	74	0	0	10	36	28	596	0	912	0	0	152	364			210
			AVERAGE	23.36	0.64	10.00	0.00	6.73	0.00	0.00	0.91	3.27	2.5	54.2	0.0	82.9	0.0	0.0	13.8	33.1		3.18	19.09

End Time: 10:49
End of Transect:

Seagrass Monitoring Data Sheet

Observer: Mariel M. Paladan and Reina Rose Abordo
Location: So. Caalan, Bgy. Masagana, El Nido, Palawan
Site: 4
Date: April 20, 2023
Transect No. 3

Start time: 9:43
Start of Transect:

QUADRAT	SEDIMENT	COMMENTS	PHOTO	SEAGRASS COVER	% SEAGRASS COMPOSITION								SHOOT COUNT (m2)								CANOPY HEIGHT (CM)	% ALGAE COVER	% EPIPHYTE COVER
					Ea	Th	Cs	Hp	Si	Hu	Ho	Cr	Ea	Th	Cs	Hp	Si	Hu	Ho	Cr			
1 (0m)	Coarse sand	Forams		10	0	10	0	0	0	0	0	0	0	96	0	0	0	0	0	0	15,13.20	5	20
2 (5m)	Coarse sand	Sponge/Rubbles	x	20	20	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	50,30,40	10	30
3 (10m)	Coarse sand	1 sea cucumber		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0
4 (15m)	Coarse sand	Sponge		20	2	18	0	0	0	0	0	0	12	88	0	0	0	0	0	0	15,10,20	10	20
5 (20m)	Coarse sand	Forams		10	0	10	0	0	0	0	0	0	0	104	0	0	0	0	0	0	12,14,15	0	20
6 (25m)	Coarse sand	Sponge	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
7 (30m)	Coarse sand	Sponge		10	0	10	0	0	0	0	0	0	0	152	0	0	0	0	0	0	10,15,12	10	30
8 (35m)	Coarse sand	Sponge		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
9 (40m)	Coarse sand	Sponge, 1 Gastropod		20	17	3	0	0	0	0	0	0	72	20	0	0	0	0	0	0	20,22,18	10	20
10 (45m)	Coarse sand	Sponge	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0
11 (50m)	Coarse sand	Formas		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0
			SUM	90	39	51	0	0	0	0	0	0	128	460	0	0	0	0	0	0			140
			AVERAGE	8.18	3.55	4.64	0.00	0.00	0.00	0.00	0.00	0.00	11.6	41.8	0.0	0.0	0.0	0.0	0.0	0.0		18.64	12.73

End Time: 10:08
End of Transect: