

Data Documentation
NCCOS Saipan Lagoon Mapping: Habitat Prediction Maps

Data Documentation	
Data Collection Title	NCCOS Assessment: Benthic Habitat Maps of Saipan Lagoon, Commonwealth of the Northern Mariana Islands
Dataset Title	Habitat predictions and composite map for the Saipan Lagoon, CNMI
Principal Investigators	Matthew Kendall, Bryan Costa US DOC; NOAA; NOS; National Centers for Coastal Ocean Science (NCCOS)
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Authors	Matthew Kendall, Bryan Costa, Steve McKagan and Lyza Johnston
Abstract	<p>Boosted regression trees (BRTs) and boosted classification trees (BCTs) are machine-learning techniques that combine regression or classification trees with boosting to model the complex, non-linear relationships between habitats and environmental predictors. We developed 12 separate, spatial predictions for the presence of five substrate and seven cover types using BRTs. These predictions describe the likelihood (%) that a particular substrate or cover type is present in a pixel. Larger probabilities indicate that the habitat is more likely to be present. We also quantified the precision associated with each probability of occurrence prediction, reported as the coefficient of variation (CV). CV is a measure of model precision, and represents the standard deviation as a proportion of the mean. Larger CVs indicate there is more uncertainty associated with the spatial prediction. We also created one composite habitat map using BCTs and these 12 spatial predictions. This composite map shows the spatial distribution of seven commonly co-occurring substrate and cover types in Saipan Lagoon. This work was conducted primarily in ArcGIS 10.4 and R software using the dismo, caret and raster packages. This data package includes the following geospatial datasets (below). For complete descriptions of these datasets and the methods used to generate them, please see: Kendall et al. (2017).</p> <ol style="list-style-type: none"> 1. Cover: <ol style="list-style-type: none"> a. Algae and Cyanobacteria (Mean and CV Probability of Occurrence) b. Bare (Mean and CV Probability of Occurrence) c. Live Coral, Staghorn <i>Acropora Formosa</i>, <i>Acropora aspera</i> or <i>Acropora pulchra</i> (Mean and CV Probability of Occurrence) d. Live Coral, <i>Isopora palifera</i> (Mean and CV Probability of Occurrence) e. Live Coral, Other Species (Mean and CV Probability of Occurrence) f. Seagrass, <i>Enhalus acoroides</i> (Mean and CV Probability of Occurrence) g. Seagrass, <i>Halodule uninervis</i> (Mean and CV Probability of Occurrence) 2. Substrate: <ol style="list-style-type: none"> a. Coral Rubble (Mean and CV Probability of Occurrence) b. Live Coral, All Species (Mean and CV Probability of Occurrence) c. Pavement (Mean and CV Probability of Occurrence) d. Sand (Mean and CV Probability of Occurrence) e. Upright Dead Coral Reef (Mean and CV Probability of Occurrence) 3. Composite habitat map 4. Project area
Purpose	CNMI's Bureau of Environmental and Coastal Quality (BECQ) and NOAA's Pacific Islands Regional Office (PIRO) partnered with NOAA's National Centers for Coastal Ocean Science (NCCOS) to develop updated habitat maps and assess habitat changes in Saipan Lagoon, CNMI. NCCOS developed these spatially resolved maps using environmental predictors, underwater videos/photos and mathematical modeling techniques. The new maps were designed to inform the Saipan Lagoon Use Management Plan (SLUMP), which is being updated in response to changes in lagoon habitats, user activities, and increases in tourism. Understanding the present spatial distribution of benthic habitats is an important part of the Territorial Government's process to evaluate zoning scenarios, minimize user conflicts, ensure public safety, and prevent environmental degradation inside the lagoon. Products from this assessment may also support coastal and ocean management efforts by other territorial and federal agencies working in Saipan. This work was funded by NOAA Coral Reef Conservation Program (CRCP Project #31100).
Methods	See Kendall et al. (2017).

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Citations	Kendall, M., B. Costa, S. McKagan, L. Johnston, and D. Okano. 2017. Benthic Habitat Maps of Saipan Lagoon. NOAA Technical Memorandum NOS NCCOS 229. Silver Spring, MD. 79 pp.
Start Date	2016-02-05
End Date	2016-08-09
Northern Boundary	15.2742160669
Southern Boundary	15.1209203637
Western Boundary	145.684723941
Eastern Boundary	145.794770192
Projection	World Geodetic System 1984 (WGS84), Universal Transverse Mercator, Zone 55 North (UTM 55N)
Resource Provider	NCCOS Data Manager < nccos.data@noaa.gov >
Comment	This data documentation describes numerous geospatial datasets archived together as a NOAA NCEI data collection, and is intended to provide dataset-level metadata for the purposes of discovery, use, and understanding.
Use Limitation	Please note: NOAA makes no warranty, expressed or implied, regarding these data, nor does the fact of distribution constitute such a warranty. NOAA cannot assume liability for any damages caused by any errors or omissions in these data.

Datasets: Habitat Predictions	Mean Probability of Occurrence	CV Probability of Occurrence
Cover: Algae and Cyanobacteria	Probability (percent) that habitat type is present in a pixel. Larger probabilities indicate that the habitat is more likely to be present. Format geotiff; no compression; spatial resolution 2x2 meters; units percent 1=100%; time period 2016-03 to 2016-08; data source Kendall et al. 2017.	Precision associated with habitat type prediction. CV represents the standard deviation as a proportion of the mean. Larger CVs indicate there is more uncertainty associated with the spatial prediction. Format geotiff; no compression; spatial resolution 2x2 meters; units n/a; time period 2016-03 to 2016-08; data source Kendall et al. 2017.
Cover: Bare		
Cover: Live Coral, Staghorn <i>Acropora Formosa</i> , <i>Acropora aspera</i> or <i>Acropora pulchra</i>		
Cover: Live Coral, <i>Isopora palifera</i>		
Cover: Live Coral, Other Species (other than <i>I. palifera</i> , <i>A. formosa</i> , <i>A. aspera</i> , and massive <i>Porites</i> species)		
Cover: Seagrass, <i>Enhalus acoroides</i>		
Cover: Seagrass, <i>Halodule uninervis</i>		
Substrate: Coral Rubble		
Substrate: Live Coral, All Species		
Substrate: Pavement		
Substrate: Sand		
Substrate: Upright Dead Coral Reef		

Datasets: Habitat Map & Area	Definition
Composite Habitat Map	Seven commonly co-occurring substrate and cover types in Saipan Lagoon. Format geotiff; no compression; spatial resolution 2x2 meters; units n/a; time period 2016-03 to 2016-08; data source Kendall et al. 2017.
Project Area	Geographic extent of habitat predictions and composite map. Format polygon shapefile; no compression; spatial resolution n/a; units n/a; time period n/a; data source Kendall et al. 2017.