

*Please provide the following information, and submit to the NOAA DM Plan Repository.*

### **Reference to Master DM Plan (if applicable)**

*As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.*

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

## **1. General Description of Data to be Managed**

### **1.1. Name of the Data, data collection Project, or data-producing Program:**

La Parguera, Puerto Rico Benthic Composition Assessment and Monitoring Data (2002 - Present)

### **1.2. Summary description of the data:**

This fish and benthic composition database is the result of a multifaceted effort described below. The intent of this work is five fold: 1) To spatially characterize and monitor the distribution, abundance, and size of both reef fishes and macro-invertebrates (conch, lobster, *Diadema*); 2) To relate this information to in-situ data collected on associated benthic composition parameters; 3) To use this information to establish the knowledge base necessary for enacting management decisions in a spatial setting; 4) To establish the efficacy of those management decisions; and 5) To work with the National Coral Reef Monitoring Program to develop data collection standards and easily implemented methodologies for transference to other agencies and to work toward standardizing data collection throughout the US states and territories.

Toward this end, the Center for Coastal Monitoring and Assessment's Biogeography Branch (BB) has been conducting research in Puerto Rico and the US Virgin Islands since 2000 and 2001, respectively. It is critical, with recent changes in management at both locations (e.g. implementation of MPAs) as well as proposed changes (e.g. zoning to manage multiple human uses) that action is taken now to accurately describe and characterize the fish/macro-invertebrate populations in these areas. It is also important that BB work closely with the individuals responsible for recommending and implementing these management strategies. Recognizing this, BB has been collaborating with partners at the University of Puerto Rico, National Park Service, US Geological Survey and the Virgin Islands Department of Planning and Natural Resources.

To quantify patterns of spatial distribution and make meaningful interpretations, we must first have knowledge of the underlying variables determining species distribution.

The basis for this work therefore, is the nearshore benthic habitats maps (less than 100 ft depth) created by NOAA's Biogeography Program in 2001 and NOS' bathymetry models. Using ArcView GIS software, the digitized habitat maps are stratified to select sampling stations. Sites are randomly selected within these strata to ensure coverage of the entire study region and not just a particular reef or seagrass area. At each sit

e, fish, macro-invertebrates, and benthic composition information is then quantified following standardized protocols. By relating the data collected in the field back to the habitat maps and bathymetric models, BB is able to model and map species level and community level information. These protocols are standardized throughout the US Caribbean to enable quantification and comparison of reef fish abundance and distribution trends between locations. Armed with the knowledge of where "hot spots" of species richness and diversity are likely to occur in the seascape, the BB is in a unique position to answer questions about the efficacy of marine zoning strategies (e.g. placement of no fishing, anchoring, or snorkeling locations), and what locations are most suitable for establishing MPAs. Knowledge of the current status of fish/macro-invertebrate communities coupled with longer term monitoring will enable evaluation of management efficacy, thus it is essential to future management actions.

**1.3. Is this a one-time data collection, or an ongoing series of measurements?**

Ongoing series of measurements

**1.4. Actual or planned temporal coverage of the data:**

2002-08 to Present

**1.5. Actual or planned geographic coverage of the data:**

W: -67.14, E: -66.9, N: 17.98, S: 17.88

**1.6. Type(s) of data:**

*(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)*

**1.7. Data collection method(s):**

*(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)*

**1.8. If data are from a NOAA Observing System of Record, indicate name of system:**

**1.8.1. If data are from another observing system, please specify:**

**2. Point of Contact for this Data Management Plan (author or maintainer)**

**2.1. Name:**

NCCOS Scientific Data Coordinator

**2.2. Title:**

Metadata Contact

**2.3. Affiliation or facility:**

**2.4. E-mail address:**

NCCOS.data@noaa.gov

## 2.5. Phone number:

## 3. Responsible Party for Data Management

*Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.*

### 3.1. Name:

NCCOS Scientific Data Coordinator

### 3.2. Title:

Data Steward

## 4. Resources

*Programs must identify resources within their own budget for managing the data they produce.*

### 4.1. Have resources for management of these data been identified?

### 4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):

## 5. Data Lineage and Quality

*NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.*

### 5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible

*(describe or provide URL of description):*

Process Steps:

- 2002-08-01 00:00:00 - Site selection begins by stratifying NOAA's nearshore benthic habitat maps into predetermined habitat strata. Utilizing ArcGIS, sites are then randomly selected within strata throughout the region. Using a handheld GPS unit, the boat captain navigates to previously selected sites. A weighted buoy is dropped to mark any site where "live boating" is necessary. Once on site, divers are deployed and maintain contact with each other throughout the entire census. One diver is responsible for collecting data on the benthic composition. The habitat diver follows the belt-transect diver and records data on small-scale benthic habitat composition and structure along the 25m transect. The habitat diver places a 1m<sup>2</sup> quadrat divided into 100 (10 x 10cm) smaller squares (1 square equals 1 percent cover) at 5 separate positions. Each position is randomly chosen before entering the water such that there is one random point within every 5m interval along the transect. Percent cover is obtained as if looking at the quadrat in a two dimensional plane (i.e. a photograph) vs. three dimensions where percent cover could add up to greater than 100

%. Data are collected on the following: 1) Logistic information - diver name, dive buddy, date, time of survey, site code, and meter numbers at which the quadrat is placed. 2) Habitat structure - to characterize the benthic habitats of the dive site, the habitat diver first categorizes the habitat structure of the site: hard, soft or mangrove. 3) Proximity of structure - on seagrass and sand sites, the habitat diver records the absence or presence of reef or hard structure within 3m of the belt transect.

A score of zero (0) indicates that no reef or other hard structure is present; one (1) indicates that a reef or hard structure smaller than 4m<sup>2</sup> is present; and (2) indicates that a reef or hard structure larger than 4m<sup>2</sup> is present within 3m of the diver. The point-count diver also uses this scoring system to record the absence, presence, and proximity of reef or hard structures within their cylinder. 4) Transect depth profile - the depth at each quadrat position. Depth is measured with a digital depth gauge to the nearest 1ft. (continued...)

- 2002-08-01 00:00:00 - (continued from above) 5) Abiotic footprint - defined as the percent cover (to the nearest 1 percent) of sand, rubble, hard bottom, and fine sediments within a 1m<sup>2</sup> quadrat. Rubble refers to rocks and coral fragments that are moveable; immovable rocks are considered hard bottom. The percent cover given as a part of the abiotic footprint should total 100 percent. In a seagrass area for example, despite the fact that seagrass may provide 50 percent cover the underlying substrate is 100 percent sand so this is what is recorded. To estimate percent cover, the habitat diver first positions the quadrat at the chosen meter mark along the transect tape. If the meter mark is an odd number, then the quadrat is placed on left side of the tape; if even, it is placed on the right. Next, the habitat diver lays the quadrat along the substrate (regardless of the slope) and estimates percent cover based on a two-dimensional (planar) view (e.g. if bottom is sloping, the quadrat is not held horizontally). Also, the diver should try to use the same planar view for all estimates of percent cover. The habitat diver then estimates, for each quadrat, the height (in centimeters) of the hardbottom from the substrate to get a sense of bottom relief. Note: Height is collected for all hardbottom substrates, excluding rubble; height is not collected for softbottom substrate. 6) Biotic footprint - defined as the percent cover (to the nearest 0.1 percent) of algae, seagrass, live corals, sponges, gorgonians, and other biota (tunicates, anemones, zooanthids, and hydroids) within a 1m<sup>2</sup> quadrat. The remaining cover is recorded as bare substrate to bring the total to 100 percent. Again, the diver must use a planar view to estimate percent cover of the biota. Seagrasses and gorgonians should not be stacked upright. For example, e.g., if a single seagrass blade crosses 10 squares, then total seagrass coverage should be the sum of the area taken up by that blade in all 10 squares instead of the area covered if the blade was held upright. Species covering less than 0.1 percent of the area are not recorded. Taxa are identified to the following levels: stony coral-species, algae-morphological group (macro, turf, crustose, rhodolith, filamentous, cyanobacteria), sponge-morphological group, and gorgonians-morphological group. When estimating percent cover, it is important to realize there is a balance between precision and time. For stony corals, the approximate area covered by living coral tissue is recorded. Coral skeleton (without living tissue) is usually categorized

d as turf algae or uncolonized substrate. Data on the condition of coral colonies are also recorded. When coral is noticeably bleached, the percentage of bleached coral is estimated to the nearest 0.1 percent. Diseased/dead coral refers to coral skeleton that has recently lost living tissue because of disease or damage that is still visible, and has not yet been colonized by turf algae. Turf algae include a mix of short (less than 1cm high) algae that colonizes dead coral substrate. 7) Maximum canopy height - for each soft biota type (e.g., gorgonians, seagrass, algae), structure is recorded to the nearest 10cm. 8) Number of individuals - for sponges, gorgonians and "other"; biota type (non-encrusting anemones and non-encrusting hydroids), the number of individuals at the quadrat level are recorded. (continued...)

- 2002-08-01 00:00:00 - (continued from above) 9) Rugosity - measured by placing a 6-m chain at two randomly selected positions along the 25m belt transect. The chain is placed such that it follows the substrate's relief along the centerline of the belt transect. Two divers measure the straight-line horizontal distance covered by the chain. The chain is placed on top of any hard substrate encountered, but not on top of soft corals or sponges since we are measuring hard bottom rugosity. Data on rugosity are collected for reef sites only. Rugosity measurements typically are made by the point-count and belt-transect divers while awaiting the completion of other benthic habitat measurements by the habitat diver. Upon completion of the dive, the rugosity data are transferred from the fish data sheet to the habitat data sheet by the habitat diver. 10) Abundance and maturity of queen conchs (*Strombus gigas*) - a count of the total number of conch encountered within the 25m x 4m belt transect are enumerated. The maturity of each conch is determined by the presence or absence of a flared lip and labeled mature or immature, respectively. If conch abundance is counted by a fish diver, the data are then reported to habitat diver. The decision of who will collect conch data should be made prior to entering the water. 11) Abundance of spiny lobsters (*Panilaurus argus*) - a count of the total number of lobsters encountered within the 25m x 4m belt transect. No measurements are taken. If lobster abundance is counted by a fish diver, the data are then reported to habitat diver. The decision of who will collect lobster data should be made prior to entering the water. 12) Abundance of long-spined urchin (*Diadema antillarum*) - a count of the total number of urchins encountered within the 25m x 4m belt transect. No measurements are taken. If urchin abundance is counted by a fish diver, the data are then reported to habitat diver. The decision of who will collect urchin data should be made prior to entering the water. 13) Marine debris - type of marine debris within the transect is noted. The size of marine debris and the area that it is affecting is also recorded along with a note identifying any flora or fauna that has colonized it.

Data Caveats: Over time, some changes were made to the stratified random site selection process as follows: 1) Habitat strata initially consisted of hard bottom, sand, and seagrass. Sand and seagrass strata were subsequently combined into one soft bottom strata at all three locations (Puerto Rico, St. Croix, and St. John). This action was taken after the February 2002 mission to Puerto Rico. In Puerto Rico, mangroves are sampled in addition to the above strata. 2) In addition to the habitat strata, Puerto Rico originally contained three strata representing levels of pro

tection from waves and currents. These strata were the Bank Shelf, Outer Lagoon and Inner Lagoon. This was changed beginning with the December 2002 mission to simply Protected and Unprotected. After the January 2005 mission, strata of Protected and Unprotected was removed leaving only habitat strata. 3) A small subset of sites were resampled during each mission through June 2002 in Puerto Rico. These station names contain the letter 'P' indicating they are permanent stations. 4) In 2007, algae data collection changed from identification of each alga to the genus level to grouping algae into six morphological groups: macro, turf, crustose, filamentous, rhodolith, and cyanobacteria for more efficient data collection. Marine debris data collection began in 2007. (end continuation)

**5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:**

**5.2. Quality control procedures employed (describe or provide URL of description):**

## 6. Data Documentation

*The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.*

**6.1. Does metadata comply with EDMC Data Documentation directive?**

No

**6.1.1. If metadata are non-existent or non-compliant, please explain:**

Missing/invalid information:

- 1.6. Type(s) of data
- 1.7. Data collection method(s)
- 4.1. Have resources for management of these data been identified?
- 4.2. Approximate percentage of the budget for these data devoted to data management
- 5.2. Quality control procedures employed
- 7.1. Do these data comply with the Data Access directive?
  - 7.1.1. If data are not available or has limitations, has a Waiver been filed?
  - 7.1.2. If there are limitations to data access, describe how data are protected
- 7.2. Name of organization of facility providing data access
  - 7.2.1. If data hosting service is needed, please indicate
- 7.3. Data access methods or services offered
- 7.4. Approximate delay between data collection and dissemination
- 8.1. Actual or planned long-term data archive location
- 8.3. Approximate delay between data collection and submission to an archive facility
- 8.4. How will the data be protected from accidental or malicious modification or

deletion prior to receipt by the archive?

**6.2. Name of organization or facility providing metadata hosting:**

NMFS Office of Science and Technology

**6.2.1. If service is needed for metadata hosting, please indicate:**

**6.3. URL of metadata folder or data catalog, if known:**

<https://www.fisheries.noaa.gov/inport/item/39060>

**6.4. Process for producing and maintaining metadata**

*(describe or provide URL of description):*

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive:

[https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC\\_PD-Data\\_Documentation\\_v1.pdf](https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf)

**7. Data Access**

*NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.*

**7.1. Do these data comply with the Data Access directive?**

**7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?**

**7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:**

**7.2. Name of organization of facility providing data access:**

**7.2.1. If data hosting service is needed, please indicate:**

**7.2.2. URL of data access service, if known:**

<https://www8.nos.noaa.gov/bpdmWeb/queryMain.aspx>

**7.3. Data access methods or services offered:**

**7.4. Approximate delay between data collection and dissemination:**

**7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:**

## **8. Data Preservation and Protection**

*The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.*

### **8.1. Actual or planned long-term data archive location:**

*(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)*

**8.1.1. If World Data Center or Other, specify:**

**8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:**

### **8.2. Data storage facility prior to being sent to an archive facility (if any):**

National Centers for Coastal Ocean Science - Silver Spring, MD

### **8.3. Approximate delay between data collection and submission to an archive facility:**

### **8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?**

*Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection*

## **9. Additional Line Office or Staff Office Questions**

*Line and Staff Offices may extend this template by inserting additional questions in this section.*