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:

National Coral Reef Monitoring Program: Benthic Cover from Annotated Benthic Images Collected During Photoquadrat Surveys at Climate Stations across the Mariana Archipelago since 2014

1.2. Summary description of the data:

The coral reef benthic community data described here result from the annotation (classification) of benthic images collected during photoquadrat surveys conducted by the NOAA Pacific Islands Fisheries Science Center (PIFSC), Ecosystem Sciences Division (ESD, formerly the Coral Reef Ecosystem Division) as part of NOAA's ongoing National Coral Reef Monitoring Program (NCRMP). The photoquadrat surveys were conducted at coral reef sites according to protocols established by ESD and NCRMP during ESD-led NCRMP missions to the islands of the Mariana Archipelago in 2014 and 2017.

SCUBA divers conducted benthic photoquadrat surveys at permanent sites established in coral reef habitats by ESD. A select number of these sites were chosen in hard-bottom habitat at ~15-m depths, and a subset of the permanent sites (climate stations) were established at north, south, east, and west points around each of the islands. The divers estimated and delineated each site's rectangular perimeter by temporarily placing measuring tapes with 1-m markers starting from a permanently installed reference stake on the reef. Along the nearshore 10-m side of the survey site and the downslope 5-m side, the measuring tapes marked every meter of the L-shaped 15-m transect used for photoquadrat documentation. The divers photographed the reef at 1-m intervals on both sides of the 15-m tape, generating 30 photographs per survey site.

The benthic habitat images were quantitatively analyzed using Coral Point Count with Excel extensions (CPCe; Kohler and Gill, 2006) software from 2010-2014 and the web-based annotation tool, CoralNet (Beijbom et al. 2015), from 2015 to present. Ten points were randomly overlaid on each image and human analysts identified the organism or type of substrate beneath, with 300 annotations (points) generated per site. Benthic elements falling under each point were identified to genus/morphology for hard corals, and to genus/functional group for algae, invertebrates, and other taxa following Lozada-Misa et al. (2017). In general, the analysis resulted in three levels of benthic community

data, including taxa group (Tier 1: hard coral, soft coral, macroalgae, turf algae, etc.), morphology (Tier 2: massive, branching, upright macroalgae, etc.), and genus (Tier 3). These benthic data can ultimately be used to produce estimates of relative abundance (percentage of benthic cover), frequency of occurrence, benthic community taxonomic composition, and relative generic richness.

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

1.4. Actual or planned temporal coverage of the data:
2014-03-25 to 2014-05-05, 2017-05-03 to 2017-06-21

1.5. Actual or planned geographic coverage of the data:
W: 144.6259167, E: 145.81568649, N: 20.0356706, S: 13.24126317

1.6. Type(s) of data:
(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)
Table (digital)

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:
Annette M DesRochers

2.2. Title:
Metadata Contact

2.3. Affiliation or facility:

2.4. E-mail address:
annette.desrochers@noaa.gov

2.5. Phone number:
(808)725-5461

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:
Bernardo Vargas-Angel

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?
Yes

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

Lineage Statement:
Benthic photographs were collected during photoquadrat surveys conducted at permanent sites and climate stations in coral reef habitats by the PIFSC Ecosystem Sciences Division. The imagery was later analyzed using Coral Point Count with Excel Extentions (CPCe; 2014 and prior) or CoralNet (starting in 2015) to generate benthic community data.

Process Steps:
- SCUBA divers conduct benthic photoquadrat surveys at permanent sites established in hard-bottom habitat at ~15-m depths. A subset of the permanent sites (climate stations) were established at north, south, east, and west points around the island/atoll. The divers estimate and delineate each site's rectangular perimeter by temporarily placing measuring tapes with 1-m markers starting from a permanently installed reference stake on the reef. Along the nearshore 10-m side of the survey site and the downslope 5-m side, the measuring tapes mark every meter of the L-shaped 15-m transect used for photoquadrat documentation. Divers photograph the reef at 1-m intervals on both sides of the 15-m tape, generating 30 photographs per survey site. Photoquadrat images are organized by site, color-corrected (if necessary), and quality controlled to remove non-photoquadrat/poor quality images. An optical validation script is used to re-name photos and enforce several validation checks.
- Benthic habitat images collected during photoquadrat surveys at permanent sites

and climate stations (30 images per site) were quantitatively analyzed using Coral Point Count with Excel extensions (CPCe; Kohler and Gill 2006) software through 2014 or by using the web-based annotation tool CoralNet (Beijbom et al. 2015) from 2015 to present. Ten points were randomly overlaid on each image by CPCe or CoralNet and human analysts identified the organism or type of substrate beneath, with 300 annotations (points) generated per site. Benthic elements falling under each point were identified to genus/morphology for hard corals, and to genus/ functional group for algae, invertebrates, and other taxa following Lozada-Misa et al. (2017). The analysis resulted in three levels of benthic community data, including taxa group (Tier 1: hard coral, soft coral, macroalgae, turf algae, etc.), morphology (Tier 2: massive, branching, upright macroalgae, etc.), and genus (Tier 3). The detailed list of each functional group level or tier is included in the benthic image analysis classification scheme. (Citation: Lozada-Misa P, Schumacher BD, Vargas-Angel B. 2017. Analysis of benthic survey images via CoralNet : a summary of standard operating procedures and guidelines. Pacific Islands Fisheries Science Center, PIFSC Administrative Report, H-17-02, 169 p.)
- Raw survey data includes unique image name, individual point observations identified at three levels, and the corresponding physical data that reflect the description of the site. The physical data includes: region, island, site, date, latitude, longitude, reef zone, and depth.

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):
Quality control is enforced by means of point-to-point, inter-observer calibration exercises that are conducted before each image analysis production series. Additionally, training modules and standard operating procedures have been developed and documented to ensure improved performance and consistent analysis results produced by multiple analysts.

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:
- 1.7. Data collection method(s)

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/36147

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

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?
Yes

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:
National Centers for Environmental Information - Silver Spring, Maryland (NCEI-MD)

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

7.2.2. URL of data access service, if known:
http://accession.nodc.noaa.gov/0157721
http://accession.nodc.noaa.gov/0202299
https://accession.nodc.noaa.gov/0157633

7.3. Data access methods or services offered:
Data can be accessed online via the NOAA National Centers for Environmental Information (NCEI) Ocean Archive.

7.4. Approximate delay between data collection and dissemination:
Unknown

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)
NCEI_MD

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):
Pacific Islands Fisheries Science Center - Honolulu, HI

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

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
Quality control is enforced by means of point-to-point, inter-observer calibration exercises that are conducted before each image analysis production series. Additionally, training modules and standard operating procedures have been developed and documented to ensure improved performance and consistent analysis results produced by multiple analysts.

9. Additional Line Office or Staff Office Questions

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