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:

Dominant Benthic Structure and Biological Cover Habitat Maps for West Maui and West Hawaii

1.2. Summary description of the data:

Benthic habitat maps depict dominant substrate type and biological cover in depths between 0 and ~150 m for two priority sites in the Main Hawaiian Islands; the NOAA Habitat Blueprint West Hawaii Focus Area (WHFA) and the Hawaii Division of Aquatic Resources (DAR) West Maui priority watersheds.

The primary data source for these maps was a 5-m resolution bathymetry synthesis grid, collected from a number of sources and maintained by the University of Hawaii at Manoa (UH) Hawaii Mapping Research Group (HMRG). Geomorphic derivatives of slope, slope of slope, rugosity and curvature were created from the bathymetry grid using the Benthic Terrain Modeler (https://esriurl.com/5754) in ArcGIS.

New optical seafloor imagery was collected by the NOAA Coral Reef Ecosystem Program (CREP) to produce these maps, and seafloor imagery was also provided from a number of partners including the United States Geological Survey (USGS) the Nature Conservancy, NOAA Biogeography group and the Hawaii Institute of Marine Biology. All images were visually analyzed by CREP to classify dominant substrate type and biological cover.

A Principle Component Analysis performed in ArcGIS removed highly correlated information from the suite of geomorphic surfaces derived from the bathymetry synthesis grid. This was followed by an unsupervised classification using the Iso Cluster Classification tool in ArcGIS. The resulting image was examined and manually corrected using the classification data from the analyzed seafloor imagery as validation. The resulting benthic habitat map delineates eight dominant substrates (Complex Reef, Boulder, Rubble, Mixed Substrate, Pavement, Sand, Mud, and Manmade) and six dominant biological cover types (Coral, Coralline Algae, Turf Algae, Macroalgae, Uncolonized and Unclassified) that extend from the shoreline to ~150 m.

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:
2006 to 2014, 2015 to 2016, 2012, 2015, 2012

1.5. Actual or planned geographic coverage of the data:
W: -156.100504, E: -155.822838, N: 20.061727, S: 19.772429
West Hawaii

W: -156.750736, E: -156.587004, N: 21.058597, S: 20.889148
West Maui

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

Rhonda Suka

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:

The Iso Cluster Unsupervised Classification tool was used to classify the three-band Principle Component Analysis (PCA) image into distinct structure and cover classes. The unsupervised classification produced a delineated image of substrate and cover of the seafloor across the entire West Hawaii and West Maui priority areas.

Process Steps:

- Multibeam bathymetry data collected by NOAA CREP was processed and integrated with existing bathymetry datasets maintained by the University of Hawaii, Hawaii Mapping Research Group (HMRG) to produce a high-resolution (5m) bathymetry synthesis for the entire NOAA Habitat Blueprint West Hawaii Focus Area (WHFA). The Main Hawaiian Islands bathymetry synthesis maintained by HMRG was used as is for West Maui. (Citation: Main Hawaiian Islands Multibeam Bathymetry Synthesis)
- The Benthic Terrain Modeler in ArcGIS 10.3 was used to derive a series of surface complexity layers using the bathymetry synthesis. Eight surface complexity layers (mean depth, standard deviation of depth, curvature, plan curvature, profile curvature, slope, slope of slope, and rugosity) were produced for both priority areas. (Citation: Wright, D.J., Pendleton, M., Boulware, J., Walbridge, S., Gerlt, B., Eslinger, D., Sampson, D., and Huntley, E. 2012. ArcGISBenthic Terrain Modeler (BTM), v. 3.0, Environmental Systems Research Institute, NOAA Coastal Services Center, Massachusetts Office of Coastal Zone Management.)
- A Principle Component Analysis (PCA) using ENVI 5.3 software was performed on the bathymetry synthesis and eight complexity surface layers to remove highly correlated data by transforming the image into nine principle components. The first

three principle components described 99% of the data variability. The complexity surfaces that contributed the most variance were depth, mean depth and rugosity. These three principle components were retained for use in the benthic classification process. (Citation: Costa BM and Battista TA (2013) The semi-automated classification of acoustic imagery for characterizing coral reef ecosystems. International Journal of Remote Sensing 34(18):6389–6422.)
- The Iso Cluster Unsupervised Classification tool in ArcGIS was used to classify the three-band Principle Component Analysis image into distinct structure and cover classes. (Citation: Iso Cluster Unsupervised Classification Tool)
- To verify the accuracy of the automated delineation, the classified optical validation points were overlaid onto the delineated image to confirm or correct the dominant substrate and biological cover composition of the seafloor at a given location. The delineated polygon classifications were manually corrected or modified if they disagreed with the optical validation points. When optical validation points were absent, the USGS and NOAA Biogeography Branch benthic habitat maps were used as validation. For areas where no validation data existed, the polygon was considered unclassified.

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):
Corrections for tide variation and vessel attitude are applied to the multibeam data and a CTD (Conductivity, Temperature, and Depth instrument) cast is performed regularly during data collection to correct for variance within the water column.

Multibeam data are tested for internal consistency; however, no effort is made to compare these data to external references or to other published data.

Corrections to unsupervised classification were made by comparing to classified imagery.

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)
- 7.2. Name of organization of facility providing data access

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

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/32811

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:

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

7.2.2. URL of data access service, if known:
ftp://ftp.soest.hawaii.edu/pibhmc/website/data/mhi/benthichabitatlayers/WestHawaii_dominant.zip
ftp://ftp.soest.hawaii.edu/pibhmc/website/data/mhi/benthichabitatlayers/WestMaui_dominant.zip

7.3. Data access methods or services offered:
Data can be accessed online via the Pacific Islands Benthic Habitat Mapping Center website at https://www.soest.hawaii.edu/pibhmc/pibhmc_mhi.htm.

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
University of Hawaii School of Ocean and Earth Science and Technology, NOAA IRC and NOAA Fisheries ITS resources and assets.

9. Additional Line Office or Staff Office Questions

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