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:

2021 NOAA Bathymetric Lidar: Sleeping Bear Dunes National Lakeshore, MI

1.2. Summary description of the data:

Woolpert, Inc. was contracted to acquire and process high-resolution topo-bathy lidar to support mapping and modeling needs at the Sleeping Bear Dunes National Lakeshore (SLBE), which will be used for the creation of new benthic mapping products using the Coastal and Marine Ecological Classification Standard (CMECS). Woolpert sub-contracted NV5 to acquire the lidar data using their HawkEye 4X topo-bathy lidar sensor, to provide high density topo lidar with an ANPS of greater than or equal to 1 pulse per square meter with a vertical accuracy of less than or equal to a 15 cm RMSE for the bathymetric lidar.

Woolpert also collected topographic ground control and check points covering some extended survey lines.

This dataset is the classified lidar point cloud in LAS v. 1.4 format. collected on August 31 and September 3, 2021 using a Leica HawkEye4X sensor. Classifications are as follows: 1 - Unclassified, 2 - Ground, W7 - Low Point (Noise), 9 - Water Surface Topo, W18 - High Noise, 40 - Bathymetric Point, 41 - Water Surface Bathy, S42 - Derived Water Surface, 43 - Submerged Object, W45 - No Bottom Found At

In addition to these lidar point data, the bare earth Digital Elevation Models (DEM) created from the lidar point data are also available. These data are available for custom download at the link provided in the URL section of this metadata record.

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:

2021-08-31 to 2021-09-03

1.5. Actual or planned geographic coverage of the data:

W: -86.179879, E: -85.75604, N: 45.061938, S: 44.941411

1.6. Type(s) of data:
(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)
Model (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:
NOAA Office for Coastal Management (NOAA/OCM)

2.2. Title:
Metadata Contact

2.3. Affiliation or facility:
NOAA Office for Coastal Management (NOAA/OCM)

2.4. E-mail address:
coastal.info@noaa.gov

2.5. Phone number:
(843) 740-1202

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:

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 NOAA Office for Coastal Management (OCM) received the bathymetric lidar data from Woolpert, Inc. for the Sleeping Bear Dunes National Lakeshore project area.

Process Steps:

- All lidar data were acquired using a Leica HawkEye4X topographic and bathymetric lidar system. The main sensor head, which contains the topographic laser, shallow bathymetric laser and RCD30 camera, was mounted in a Leica PAV100 gyro-stabilized mount integrated with a NovAtel SPAN GNSS and LCI-100C IMU. The deep channel bathymetric sensor head was installed using a separate fixed mount, with its own LCI-100C IMU. Real time navigation and GNSS/IMU data logging was provided by Leica FlightPro software. Lidar data were logged on the Airborne Hydrography, AB (AHAB) operator console. The HE4X provided 300 kHz topographic data, 140 kHz shallow bathymetric data and 40 kHz deep bathymetric data. 4-band 80 MP digital camera imagery was also collected simultaneously with the sensor's RCD-30 camera to assist with editing. Trajectory data were post-processed using NovAtel Inertial Explorer software to provide a tightly coupled precise point position (PPP) and orientation solution. Lidar data were processed in Leica's Lidar Survey Studio (LSS) using calibration data and final processed trajectory information to create an accurately georeferenced lidar point cloud for the entire survey in LAS v1.4 format. All points from the topographic and bathymetric laser include 16-bit intensity values. LAS files from LSS were imported to a Terrascan project where spatial algorithms were used to remove noise and classify bare earth/ground. Manual review was conducted in Terrascan prior to product creation. Woolpert used proprietary in-house scripts to compute project specific correction parameters and normalize the raw bathymetric intensity data for depth. This provides intensities that more closely represent the reflectance of the actual seabed. Corrected values are included in the provided LAS files. During lidar processing any line to line vertical mismatches are removed. Due to the lack of ground control in the survey area, a lidar QC flightline was acquired over the same area for every flight. This line covered ground control on land, out to full bathymetric depth. This line was used to test for accuracy. Interswath or overlap consistency for the topographic laser was assessed in all areas of overlap with slopes of less than 10 degrees. The topographic RMSDz for the project lines is 0.022 m. Interswath or overlap consistency for the bathymetric laser was assessed in all

areas of overlap with slopes of less than 10 degrees. The bathymetric RMSDz for the project lines is 0.064 m. All data are provided in NAD83(2011) Epoch 2010.0. All units in meters. All lidar data was transformed to the NAVD88 vertical datum using GEOID18. Delivered LAS Classes include: 1-Unclassified, 2-Ground, W7-Low Point(Noise), 9-Water Surface Topo, W18-High Noise, 40-Bathymetric Point, 41-Water Surface Bathy, S42-Derived Water Surface, 43-Submerged Object, W45-No Bottom Found At. One charted wreck was found during data editing. The approximate location of this wreck is 45 degrees 02'21.6"N, 85 degrees 59'6.5"W and is captured in the anomalies shapefile included with the project deliverables.
- 2022-01-21 00:00:00 - The NOAA Office for Coastal Management (OCM) received 631 LAS files from Woolpert. The files contained lidar elevation and intensity measurements. The data were in UTM Zone 16N NAD83(2011), meters coordinates and NAVD88 (Geoid18) elevations in meters. OCM performed the following processing on the data for Digital Coast storage and provisioning purposes: 1. Converted from UTM Zone 16N NAD83(2011), meters coordinates to geographic coordinates 2. Converted from NAVD88 elevations to ellipsoid elevations using the Geoid18 model 3. Sorted by gps time 4. Compressed the data using laszip

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:
- 1.7. Data collection method(s)
- 3.1. Responsible Party for Data Management
- 5.2. Quality control procedures employed
- 7.1.1. If data are not available or has limitations, has a Waiver been filed?
- 7.4. Approximate delay between data collection and dissemination
- 8.3. Approximate delay between data collection and submission to an archive facility

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/66448

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:
NOAA Office for Coastal Management (NOAA/OCM)

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

7.2.2. URL of data access service, if known:
https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=9446/details/9446
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/9446/index.html

7.3. Data access methods or services offered:
Data is available online for bulk and custom downloads.

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)

NCEI_CO

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):

Office for Coastal Management - Charleston, SC

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

Data is backed up to tape and to cloud storage.

9. Additional Line Office or Staff Office Questions

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