

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:

2010 USGS ARRA Michigan TriCounty Lidar

1.2. Summary description of the data:

TASK NAME: Michigan Tri-County LiDAR (ARRA Lidar Task Order)

LiDAR Data Acquisition and Processing Production Task

USGS CONTRACT: G10PC00057

TASK ORDER NUMBER: G10PD00844

CONTRACTOR: Woolpert, Inc.

LiDAR data is a remotely sensed high resolution elevation data collected by an airborne platform. The LiDAR sensor uses a combination of laser range finding, GPS positioning, and inertial measurement technologies. The LiDAR systems collect data point clouds that are used to produce highly detailed Digital Elevation Models (DEMs) of the earth's terrain, man-made structures, and vegetation. This data was collected at a resolution of one and one half point per square meter. The final products include first, last, and at least one intermediate return LAS, a bare earth model, and intensity data in separate files.

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:

2010-04-02, 2010-04-03, 2010-04-04, 2010-04-05, 2010-04-10, 2010-04-12, 2010-04-13, 2010-04-14

1.5. Actual or planned geographic coverage of the data:

W: -85.10322794768, E: -84.11897982348, N: 43.13268688125, S: 42.40315017724

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):

Process Steps:

- 2010-04-14 00:00:00 - Using a LH Systems ALS50 Light Detection And Ranging (LiDAR) system, 68 flight lines of high density data, one and one half point per square meter, were collected over Clinton, Eaton and Ingham Counties (approximately 1,810 square miles). Multiple returns were recorded for each laser pulse along with an intensity value for each return. A total of eight missions were flown over a 12 day period: April 02, 2010 through April 14, 2010. A minimum of two airborne global positioning system (GPS) base stations were used in support of the LiDAR data acquisition. The mean baseline length was 28 miles, with a maximum baseline length of 52 miles. In addition, 31 ground control points were surveyed through static methods. The geoid used to reduce satellite derived elevations to orthometric heights was Geoid03. All data for the task order is referenced to Michigan State Plane South Zone (2113), NAD83/2007, NAVD88, in international feet. Airborne GPS data was differentially processed and integrated with the post processed IMU data to derive a smoothed best estimate of trajectory (SBET). The SBET was used to reduce the LiDAR slant range measurements to a raw reflective surface for each flight line. The coverage was classified to extract a bare earth digital elevation model (DEM) and separate last returns. Two layers of coverage were delivered in the ArcINFO ArcGrid binary format: bare-earth and intensity. System Parameters:
- Type of Scanner = LH Systems ALS50 - Data Acquisition Height = 7,800-feet AGL - Scanner Field of View = 40 degrees - Scan Frequency = 35.3 Hertz - Pulse Repetition Rate = 99.0 Kilohertz - Aircraft Speed = 130 Knots - Swath Width = 5,200-feet - Number of Returns Per Pulse = Maximum of 4 - Distance Between Flight Lines = 4,200-feet
- 2010-09-17 00:00:00 - The ALS50 calibration and system performance is verified on a periodic basis using Woolpert's calibration range. The calibration range consists of a large building and runway. The edges of the building and control points along the runway have been located using conventional survey methods. Inertial measurement unit (IMU) misalignment angles and horizontal accuracy are calculated by comparing the position of the building edges between opposing flight lines. The scanner scale factor and vertical accuracy is calculated through comparison of LiDAR data against control points along the runway. Field calibration is performed on all flight lines to refine the IMU misalignment angles. IMU misalignment angles are calculated from the relative displacement of features within the overlap region of adjacent (and opposing) flight lines. The raw LiDAR data is reduced using the refined misalignment angles.
- 2010-09-17 00:00:00 - Once the data acquisition and GPS processing phases are complete, the LiDAR data was processed immediately to verify the coverage had no voids. The GPS and IMU data was post processed using differential and Kalman

filter algorithms to derive a best estimate of trajectory. The quality of the solution was verified to be consistent with the accuracy requirements of the project.

- 2010-09-17 00:00:00 - The individual flight lines were inspected to ensure the systematic and residual errors have been identified and removed. Then, the flight lines were compared to adjacent flight lines for any mismatches to obtain a homogenous coverage throughout the project area. The point cloud underwent a classification process to determine bare-earth points and non-ground points utilizing "first and only" as well as "last of many" LiDAR returns. This process determined bare-earth points (Class 2), Noise (Class 7), Water (Class 9) Ignored ground (Class 10) and unclassified data (Class 1). The bare-earth (Class 2 - Ground) LiDAR points underwent a manual QA/QC step to verify that artifacts have been removed from the bare-earth surface. The surveyed ground control points are used to perform the accuracy checks and statistical analysis of the LiDAR dataset.
- 2019-01-01 00:00:00 - Data were processed by Hobu, Inc to convert to Entwine Point Tiles and web mercator projection. Data were not tagged with vertical georeferencing. (Citation: Lidar from USGS)

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/60152>

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=9132/details/9132>

https://s3-us-west-2.amazonaws.com/usgs-lidar-public/ARRA-MI_TriCounty_2010/ept.json

7.3. Data access methods or services offered:

Data is available online for bulk or 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.