

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:

2014 USGS/NRCS Lidar: Central MS

1.2. Summary description of the data:

TASK NAME: USGS-NRCS Laurel MS 0.7m NPS LIDAR

Lidar Data Acquisition and Processing Production Task

USGS Contract No. G10PC00057

Task Order No. G13PD01086

Woolpert Order No. 073741

CONTRACTOR: Woolpert, Inc.

This data set is comprised of lidar point cloud data for the project area. This task order required lidar data to be acquired in two separate AOI's over 10 counties in Mississippi; Attala, Leake, Lexington, Montgomery, Scott, Smith, Webster Counties and a portion of Carroll, Choctaw and Jasper Counties and two counties in Alabama; Washington and Choctaw. AOI is approximately 7,400 square miles. The lidar data were acquired and processed under the requirements identified in this task order. 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. The task required the LiDAR data to be collected at a nominal pulse spacing (NPS) of 0.7 meters. The final products include classified LAS, one (1) meter pixel raster DEMs of the bare-earth surface in ERDAS IMG Format, and 8-bit intensity images. Each LAS file contains lidar point information, which has been calibrated, controlled, and classified. Additional deliverables include hydrologic breakline data, control data, tile index, lidar processing and survey reports in PDF format, FGDC metadata files for each data deliverable in .xml format, and LAS swath data. Collected swath files that were larger than 2GB were provided in multiple sub-swath files, each less than 2GB. Ground conditions: Water at normal levels; no unusual

inundation; no snow; leaf off.

Original contact information:

Contact Org: Woolpert

Phone: (937) 461-5660

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:

2014-01-07, 2014-01-08, 2014-01-09, 2014-01-11, 2014-01-12, 2014-01-14, 2014-01-15, 2014-01-16, 2014-01-17, 2014-01-18, 2014-01-19, 2014-01-20, 2014-01-21, 2014-01-22, 2014-01-25, 2014-02-15

1.5. Actual or planned geographic coverage of the data:

W: -90.277723, E: -88.899496, N: 33.738538, S: 31.779659

1.6. Type(s) of data:

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

Lidar point cloud

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?

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:

- 2014-02-15 00:00:00 - USGS-NRCS Laurel MS 0.7m NPS Lidar Acquisition - Using one Leica ALS70 (lidar) and one Optech Gemini (lidar) system on board a Cessna 404 and Cessna 310 aircraft respectively, high density data, at a nominal pulse spacing (NPS) of 0.7 meters, were collected for this task order (approximately 7,400 square miles). Leica Specs- AGL = 1981 meters - Aircraft Speed = 150 Knots, Field of View (Full) = 40 degrees, Pulse Rate = 272 kHz, Scan Rate = 41.6 Hz, with an average side lap of 25%. Optech Specs- AGL = 1524 meters - Aircraft Speed = 130 Knots, Field of View (Full) = 24 degrees, Pulse Rate = 125 kHz, Scan Rate = 46 Hz, with an average side lap of 30%. Multiple returns were recorded for each laser pulse along with an intensity value for each return. Forty-one (41) missions were flown between January 7, 2014 and February 15, 2014. Twelve (12) Global Navigation Satellite System (GNSS) Base Stations were used in support of the lidar data acquisition. Specific information regarding latitude, longitude, and ellipsoid height to the L1 phase center is included in the lidar processing report. The geoid used to reduce satellite derived elevations to orthometric heights was GEOID12A. Data for the task order is referenced to the UTM Zone 16N, North American Datum of 1983 (2011), and NAVD88, in meters. 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. 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. The ALS70/Optech Gemini 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.

- 2013-11-14 00:00:00 - USGS-NRCS Laurel MS 0.7m NPS Lidar ground control and QAQC control Acquisition - Ground control and QAQC control point survey for the Mississippi AOI was performed by Woolpert surveyors, to support the USGS-NRCS Laurel MS 0.7m NPS Lidar project. All surveys were performed in such a way as to achieve ground control that supports lidar data at 9.25 cm RMSE accuracy and satisfy a local network accuracy of 5 cm at a 95% confidence level. All ground control survey field activities took place from 11/13/2013 thru 11/23/13. Woolpert collected control data for data processing as supplemental QAQC points. The supplemental QAQC points were collected to be used in independent accuracy testing. The field crew utilized Real-Time Kinematic (RTK) GPS surveying throughout most of the ground control data collection process. Using RTK GPS techniques, observations were performed on 26 ground control points and 161 quality control check points. The survey was conducted using a 1-second epoch rate, in a fixed solution RTK mode, with each observation lasting between 60 to 180 seconds. Each station was occupied twice to insure the necessary horizontal and vertical accuracies were being met for this photogrammetric project. In addition to the RTK GPS techniques, the project field crew utilized rapid-static (RS) GPS surveying techniques to establish RTK Base stations within areas lacking sufficient NGS control monument stations. Using Rapid-Static GPS techniques, observations were performed on one (2) RTK Base stations (110 & 111). The survey was conducted at a 5-second sync rate with each observation lasting between 40-360 minutes. All horizontal GPS control was based on UTM Zone 16N, NAD83 (2011) expressed in meters. The vertical datum used for this project was based on the North American Vertical Datum of 1988 (NAVD88), GEOID12A, also expressed in meters.

- 2014-01-25 00:00:00 - USGS-NRCS Laurel MS 0.7m NPS Lidar ground control and QAQC control Acquisition - Ground control and QAQC control point survey for the

Alabama AOI was performed by Magnolia River surveyors, to support the USGS-NRCS Laurel MS 0.7m NPS Lidar project. All surveys were performed in such a way as to achieve ground control that supports lidar data at 9.25 cm RMSE accuracy and satisfy a local network accuracy of 5 cm at a 95% confidence level. All ground control survey field activities took place from 01/24/2014 thru 04/03/14. Magnolia River surveyors collected control data for data processing as supplemental QA/QC points. The supplemental QA/QC points were collected to be used in independent accuracy testing. The field crew utilized Real-Time Kinematic (RTK) GPS surveying utilizing the Alabama Department of Transportation (ALDOT) Continually Operating Reference Station (CORS) network, via the internet using TCP/IP protocol and MiFi cellular connection. ALDOT provides single base corrections from the nearest operating GPS reference station. Using RTK GPS techniques, observations were performed on 21 ground control points and 115 quality control check points. The survey was conducted using a 1-second epoch rate, in a fixed solution RTK mode, with each observation lasting between 60 to 180 seconds. Each station was occupied twice to insure the necessary horizontal and vertical accuracies were being met for this photogrammetric project. A Sokkia Set330R3 total station in combination with a Trimble TSC3 data collector was used in areas where sufficient satellite coverage was not available for some quality control check points. All horizontal GPS control was based on UTM Zone 16N, NAD83 (2011) expressed in meters. The vertical datum used for this project was based on the North American Vertical Datum of 1988 (NAVD88), GEOID12A, also expressed in meters.

- 2014-01-08 00:00:00 - USGS-NRCS Laurel MS 0.7m NPS Lidar Deliverable Processing

- 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 homogeneous 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 Default (Class 1), Ground (Class 2), Noise (Class 7), Water (Class 9), Ignored Ground (Class 10), Overlap Default (Class 17) and Overlap Ground (Class 18). The bare-earth (Class 2 - Ground) lidar points underwent a manual QA/QC step to verify the quality of the DEM as well as a peer-based QC review. This included a review of the DEM surface to remove artifacts and ensure topographic quality. Classification of water (class 9) and ignored ground (class 10) was completed via the use of the hydrologic breaklines collected for the hydro-flattening phase. The overlap classes were determined by first identifying the overlapping areas and reclassifying the LAS data by offset from a corridor. This allows the returns located on the edge of the swath to be removed from the bare earth coverage in an effort to produce a more uniform data density. The returns determined to be overlap are then further classified to produce overlap default (class 17) and overlap ground (class 18). The surveyed ground control points are used to make vertical adjustments to the data set and to perform the accuracy checks and statistical analysis of the lidar dataset. Supervisory QC monitoring of work in progress and completed editing ensured consistency of classification

character and adherence to project requirements across the entire project area. The resulting deliverables for this task order consist of classified LAS file in LAS 1.2 format, Raw Swath LAS files in LAS 1.2 format, 1 meter pixel size DEM files in ERDAS IMG format, 1 meter pixel size 8-bit Intensity files in GeoTIFF format, and Hydrologic Breakline data in ESRI shape file format.

- 2017-05-24 00:00:00 - The NOAA Office for Coastal Management (OCM) received 7516 files in las 1.4 format. The files contained lidar intensity and elevation measurements for the Central MS project area. The data were in UTM 16 (NAD83 2011) coordinates and in NAVD88 elevations in meters. OCM performed the following processing on the data for Digital Coast storage and provisioning purposes:

1. The LAsTools software scripts lasinfo and lasvalidate were run on the las files to check for errors.
2. Internal OCM scripts were run to convert the files from UTM Zone 16 coordinates to geographic coordinates and to convert from NAVD88 elevations to ellipsoid elevations using Geoid12A.
3. Internal OCM scripts were run on the las files to assign the geokeys, to sort the data by gps time and zip the data to database and to http.

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
- 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
- 7.4. 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/49826>

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?

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=5181>

<https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/5181/index.html>

7.3. Data access methods or services offered:

This data can be obtained on-line at the following URL: <https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=5181>;

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):

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

9. Additional Line Office or Staff Office Questions

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