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:

2017 USGS Lidar DEM: Upper Delta Plain, LA

1.2. Summary description of the data:

Product: These are Digital Elevation Model (DEM) data. Class 2 (ground) lidar points in conjunction with the hydro breaklines were used to create a 1 meter hydro-flattened Raster DEM.

Geographic Extent: Upper Delta Plain, Louisiana, covering approximately 3843 square miles.

Dataset Description: This Upper Delta Plain QL2 Lidar project called for the planning, acquisition, processing, and derivative products of lidar data to be collected at an aggregate nominal pulse spacing (ANPS) of 0.7 meters (2ppsm). Project specifications are based on the U.S. Geological Survey National Geospatial Program Base Lidar Specification, Version 1.2. The data was developed based on a horizontal projection/ datum of NAD83 (2011), Universal Transverse Mercator (zone 15 N), meters and vertical datum of NAVD88 (GEOID12B), meters. Lidar data was delivered as flightline-extent unclassified LAS swaths, as processed Classified LAS 1.4 files, formatted to 4802 individual 1500 m x 1500 m tiles, as tiled Intensity Imagery, as tiled bare earth DEMs, and as tiled digital surface models; all tiled to the same 1500 m x 1500 m schema.

Ground Conditions: Lidar was collected in early 2017, while no snow was on the ground and rivers were at or below normal levels. In order to post process the lidar data to meet task order specifications and meet ASPRS vertical accuracy guidelines, Terrasurv, Inc. established a total of 63 ground control points that were used to calibrate the lidar to known ground locations established throughout the Upper Delta Plain, Louisiana project area. An additional 179 independent accuracy checkpoints, 101 Bare Ground/ Low Grass landcovers (101 NVA points), 67 in Tall Weeds/Brush categories, and 11 in Woods category (78 VVA points), were used to assess the vertical accuracy of the data. These checkpoints were not used to calibrate or post process the data.

The NOAA Office for Coastal Management (OCM) downloaded the LA_UpperDeltaPlain_2017 Digital Elevation Model (DEM) files from this USGS site: ftp://

rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/OPR/ and processed the data to the Data Access Viewer (DAV) and https.

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

Hydro breaklines are also available. These data are available for download at the link provided in the URL section of this metadata record. Please note that these products have not been reviewed by the NOAA Office for Coastal Management (OCM) and any conclusions drawn from the analysis of this information are not the responsibility of NOAA or OCM.

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:

2017-01-23, 2017-01-26, 2017-01-27, 2017-01-28, 2017-01-30, 2017-01-31, 2017-02-15, 2017-02-22, 2017-02-25, 2017-03-02, 2017-03-03, 2017-03-14, 2017-03-15, 2017-03-16, 2017-03-20, 2017-04-24

1.5. Actual or planned geographic coverage of the data:

W: -91.53485, E: -89.51626, N: 30.50229, S: 29.457351

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?

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:

- 2017-04-26 00:00:00 - Flight status was communicated during data collection. All acquired lidar data went through a preliminary review to assure that complete coverage had been obtained and that there were no gaps between flight lines before the flight crew left the project site. Once back in the office, the data was run through a complete iteration of processing to ensure that it is complete, uncorrupted, and that the entire project area has been covered without gaps between flight lines. There are essentially three steps to this processing: 1) GPS/IMU Processing - Airborne GPS and IMU data was processed using the airport GPS base station data. The following GPS base stations were utilized: Fugro (016), CORS (MOON), and CORS (SJHS). 2) Raw Lidar Data Processing - Technicians processed the raw data to LAS format flight lines with full resolution output before performing QC. A starting configuration file is used in this process, which contains the latest

calibration parameters for the sensor. The technicians also generated flight line trajectories for each of the flight lines during this process. 3) Verification of Coverage and Data Quality - Technicians checked trajectory files to ensure completeness of acquisition for the flight lines, calibration lines, and cross flight lines. The intensity images were generated for the entire lift at the required 0.7 meter ANPS. Visual checks of the intensity images against the project boundary were performed to ensure full coverage to the 100 meter buffer beyond the project boundary. The intensity histogram was analyzed to ensure the quality of the intensity values. The technician also thoroughly reviewed the data for any gaps in project area. The technician generated a sample TIN surface to ensure no anomalies were present in the data. Turbulence was inspected for each flight line; if any adverse quality issues were discovered, the flight line was rejected and re-flown. The technician also evaluated the achieved post spacing against project specified 0.7 meter ANPS as well as making sure there is no clustering in point distribution.
- 2017-05-15 00:00:00 - The boresight for each lift was done individually as the solution may change slightly from lift to lift. The following steps describe the Raw Data Processing and Boresight process: 1) Technicians processed the raw data to LAS format flight lines using the final GPS/IMU solution. This LAS data set was used as source data for boresight. 2) Technicians first used Fugro proprietary and commercial software to calculate initial boresight adjustment angles based on sample areas within the lift. These areas cover calibration flight lines collected in the lift, cross tie and production flight lines. These areas are well distributed in the lift coverage and cover multiple terrain types that are necessary for boresight angle calculation. The technician then analyzed the results and made any necessary additional adjustment until it is acceptable for the selected areas. 3) Once the boresight angle calculation was completed for the selected areas, the adjusted settings were applied to all of the flight lines of the lift and checked for consistency. The technicians utilized commercial and proprietary software packages to analyze the matching between flight line overlaps for the entire lift and adjusted as necessary until the results met the project specifications. 4) Once all lifts were completed with individual boresight adjustment, the technicians checked and corrected the vertical misalignment of all flight lines and also the matching between data and ground truth. The relative accuracy was ≤ 6 cm within individual swaths (smooth surface repeatability) and ≤ 8 cm RMSD within swath overlap (between adjacent swaths) with a maximum difference of ± 16 cm. 5) The technicians ran a final vertical accuracy check of the boresighted flight lines against the surveyed check points after the z correction to ensure the requirement of RMSEZ (non-vegetated) ≤ 10 cm, NVA ≤ 19.6 cm 95% Confidence Level was met.
- 2018-01-25 00:00:00 - Once boresighting was complete for the project, the project was first set up for automatic classification. The lidar data was cut to production tiles. The low noise points, high noise points and ground points were classified automatically in this process. Fugro utilized commercial software, as well as proprietary, in-house developed software for automatic filtering. The parameters used in the process were customized for each terrain type to obtain optimum

results. Once the automated filtering was completed, the files were run through a visual inspection to ensure that the filtering was not too aggressive or not aggressive enough. In cases where the filtering was too aggressive and important terrain were filtered out, the data was either run through a different filter within local area or was corrected during the manual filtering process. Bridge deck points were classified as well during the interactive editing process. Interactive editing was completed in visualization software that provides manual and automatic point classification tools. Fugro utilized commercial and proprietary software for this process. All manually inspected tiles went through a peer review to ensure proper editing and consistency. After the manual editing and peer review, all tiles went through another final automated classification routine. This process ensures only the required classifications are used in the final product (all points classified into any temporary classes during manual editing will be re-classified into the project specified classifications). Once manual inspection, QC and final autofilter is complete for the lidar tiles, the LAS data was packaged to the project specified tiling scheme, clipped to project boundary including the 100 meter buffer and formatted to LAS v1.4. It was also re-projected to UTM Zone 15 north; NAD83 (2011), meters; NAVD88 (GEOID12B), meters. The file header was formatted to meet the project specification with File Source ID assigned. This Classified Point Cloud product was used for the generation of derived products. This product was delivered in fully compliant LAS v1.4, Point Record Format 6 with Adjusted Standard GPS Time at a precision sufficient to allow unique timestamps for each pulse. Correct and properly formatted georeference information as Open Geospatial Consortium (OGC) well known text (WKT) was assigned in all LAS file headers. Each tile has unique File Source ID assigned. The Point Source ID matches to the flight line ID in the flight trajectory files. Intensity values are included for each point, normalized to 16-bit. The following classifications are included: Class 1 – Processed, but unclassified; Class 2 – Bare earth ground; Class 3 – Low Vegetation (3 meters or less); Class 7 – Low Noise; Class 9 – Water; Class 10 – Ignored Ground; Class 17 – Bridge Decks; and Class 18 – High Noise. The classified point cloud data was delivered in tiles without overlap using the project tiling scheme.
- 2017-10-01 00:00:00 - Upon the completion of lidar point cloud product creation, First Return points were used for intensity image generation automatically. The software considers points from neighboring tiles while creating the images for seamless edge matching. The initial intensity images were generated at 1.0 meter resolution in 16bit TIFF format. They were then converted to 8bit format. Georeferencing information was assigned to all images. The technician QC'ed the final intensity images before delivery. The intensity images were delivered in GeoTIFF with TFW format.
- 2018-01-30 00:00:00 - Hydro linework is produced by heads-up digitizing using classified lidar datasets. Additionally, products created from lidar including intensity images, shaded-relief TIN surfaces, and contours are used. Hydrographic features were collected as separate feature classes: 1) Inland Ponds and Lakes approximately 2-acre or greater surface area (Lakes) and 2) Inland Streams and

Rivers of 100 feet nominal width (Rivers). Additionally, all breaklines used to enforce a logical terrain surface below a bridge were delivered as a separate shapefile. After initial collection, features were combined into working regions based on watershed sub-basins. Linework was then checked for the following topological and attribution rules: 1) Lines must be attributed with the correct feature code and 2) Lake and stream banklines must form closed polygons. Hydro features were collected as vector linework using lidar and its derived products listed above. This linework is initially 2D, meaning that it does not have elevation values assigned to individual line vertices. Vertex elevation values were assigned using a distance weighted distribution of lidar points closest to each vertex. This is similar to draping the 2D linework to a surface modeled from the lidar points. After the initial 'drape', the linework elevation values were further adjusted based on the following rules: 1) Lake feature vertices were re-assigned (flattened) to lowest draped vertex value and 2) Double stream bankline vertices were re-assigned based on the vertices of the closest adjusted double stream connector line. Fugro proprietary software was used to create profiles to ensure bank to bank flatness, monotonicity check, and lake flatness. The hydro breaklines were delivered as polygons in Esri ArcGIS version 10.3 geodatabase format.
- 2018-01-25 00:00:00 - The bare earth DEM was generated using the lidar bare earth points and 3D hydro breaklines to a resolution of 1.0 meter. Where needed, supplemental breaklines were collected and used in DEM generation under the bridges to ensure a logical terrain surface below a bridge. This was delivered as a separate shapefile. The bare earth points that fell within 1*NPS along the hydro breaklines (points in class 10) were excluded from the DEM generation process. This is analogous to the removal of mass points for the same reason in a traditional photogrammetrically compiled DTM. This process was done in batch using proprietary software. The technicians then used Fugro proprietary software for the production of the lidar-derived hydro flattened bare earth DEM surface in initial grid format at 1.0 meter GSD. Water bodies (inland ponds and lakes), inland streams and rivers, and island holes were hydro flattened within the DEM. Hydro flattening was applied to all water impoundments, natural or man-made, that are larger than approximately 2 acres in area and to all streams that are nominally wider than 100 feet. This process was done in batch. Once the initial, hydro flattened bare earth DEM was generated, the technicians checked the tiles to ensure that the grid spacing met specifications. The technicians also checked the surface to ensure proper hydro flattening. The entire data set was checked for complete project coverage. Once the data was checked, the tiles were then converted to industry-standard, GIS-compatible, 32-bit floating point raster format (LZW compressed 32-bit GeoTIFFs). Georeference information is included in the raster files. Void areas (i.e., areas outside the project boundary but within the tiling scheme) are coded using a unique "NODATA" value.
- 2018-07-02 00:00:00 - The NOAA Office for Coastal Management (OCM) downloaded 4802 LA_UpperDeltaPlain_2017 Digital Elevation Model (DEM) files from this USGS site: ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Elevation/OPR/. The data

were in UTM Zone 15 North coordinates and NAVD88 (Geoid12B) elevations in meters. The bare earth raster files were at a 1 meter grid spacing. OCM performed the following processing on the data for Digital Coast storage and provisioning purposes: 1. Copied the files to https

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/52969

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=8568
https://coast.noaa.gov/htdata/raster2/elevation/LA_UpperDeltaPlain_DEM_2017_8568

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)

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.