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:

2018 NOAA National Geodetic Survey Topobathy Lidar DEM (void): Potomac River, Chesapeake Bay

1.2. Summary description of the data:

These data were collected by Quantum Spatial, Inc. (QSI) for the National Oceanic and Atmospheric Administration (NOAA), National Geodetic Survey (NGS), Remote Sensing Division (RSD), Coastal Mapping Program (CMP) using a Riegl VQ880G system. The Initial Award lidar data were acquired from 20180215 - 20180417 in eighteen missions. The dataset includes topobathy data in a LAS 1.2 format file with the following classification: unclassified (1), ground (2), noise (7), overlap default (19), overlap ground (20), overlap water column (21), water column (25), bathymetric bottom or submerged topography (26), submerged feature (29), submerged aquatic vegetation (30), temporal bathy bottom (31), and unclassified withheld/edge clip (129) in accordance with project specifications. The contracted project consists of approximately 309.125 square miles (197,840 acres) of the states of Virginia and Maryland covering the confluence of the Potomac River and the Chesapeake Bay. To ensure complete coverage and adequate point densities around survey area boundaries, the Area of Interest (AOI) was buffered by 100m. The full Initial Award project area including buffered area is approximately 478.151 square miles (306, 017 acres). LAS files were compiled by 500 m x 500 m tiles. The final classified LiDAR data were then transformed to orthometric heights and used to create topobathymetric DEMs in IMG format with 1m pixel resolution.

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:

2018-02-15 to 2018-04-17

1.5. Actual or planned geographic coverage of the data:

W: -76.791568, E: -76.176395, N: 38.332869, S: 37.715495

1.6. Type(s) of data:

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

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:

- 2018-08-31 00:00:00 - Data was acquired by Quantum Spatial (QSI) using a Riegl VQ-880G Topobathy LiDAR system. All delivered LiDAR data is referenced to: Horizontal Datum-NAD83 (2011) epoch: 2010 Projection-UTM Zone 18N Horizontal Units-meters Vertical Datum-GRS 80 Ellipsoid Vertical Units-meters The dataset encompasses 5,974 500m x 500m tiles covering the states of Virginia and Maryland at the confluence of the Potomac River and the Chesapeake Bay. Green and NIR (for water surface model creation that is used during refraction of the green bathymetric data) LiDAR data were acquired with the Riegl sensor VQ-880G. QSI reviewed all acquired flight lines to ensure complete coverage and positional accuracy of the laser points. QSI creates an initial product call Quick Look Coverage Maps. These Quick Look files are not fully processed data or final products. The collected LiDAR data is immediately processed in the field by QSI to a level that will allow QA\QC measures to determine if the sensor is functioning properly and assess the coverage of submerged topography. An initial SBET was created in POSPAC MMS 8.1 and used in RiProcess which applies pre-calibrated angular misalignment corrections of scanner position to extract the raw point cloud into geo-referenced LAS files. These files were inspected for sensor malfunctions and then passed through automated classification routines (TerraScan) to develop a rough topobathymetric ground model for an initial assessment of bathymetric coverage. To correct the continuous onboard measurements of the aircraft position recorded throughout the missions, QSI concurrently conducted multiple static Global Navigation Satellite System (GNSS) ground surveys (1 Hz recording frequency) over established monuments located in or around the project area. After the airborne survey, the static GPS data were triangulated with nearby Continuously Operating Reference Stations (CORS) using the Online Positioning User Service (OPUS) for precise positioning. Multiple independent sessions over the same monument were processed to confirm antenna height measurements and to refine position accuracy. QSI then resolved kinematic corrections for aircraft position data using kinematic aircraft GPS and static ground GPS data. A final smoothed best estimate trajectory (SBET) was developed that blends post-processed aircraft position with attitude data. Sensor head position and attitude are calculated throughout the survey. The SBET data are used extensively for laser point processing. The software Trimble Business Center v.3.90, Blue Marble Geographic Calculator 2017, and PosPac MMS 8.1 SP3 are used for these processes.
- 2018-08-31 00:00:00 - Next, QSI used RiProcess 1.8.5 to calculate laser point positioning of the Riegl VQ-880G data by associating SBET positions to each laser

point return time, scan angle, intensity, etc. A raw laser point cloud is created in Riegl data format and erroneous points are filtered. Within RiProcess the RiHydro tool was used to classify water surface and create a water surface model. QSI used the green water surface points and as needed NIR water surface points to create water surface models. These models are used in the RiHydro refraction tool to determine angle of incidence and ranging time under water. They are created for a single swaths to ensure temporal differences and wave or water surface height variations between flight lines do not impact the refraction correction of the bathymetric data. All lidar data below water surface models were classified as water column and corrected for refraction. The green laser light travels at slower speed in water than air and its direction of travel is changed when entering water. The refraction tool corrects positioning of under water points by adjusting the ranging distance in water and horizontal position change due to the angle of refraction. Using raster-based QC methods, the output data is verified to ensure the refraction tool functioned properly. QSI used their proprietary LASMonkey refraction tool to correct some refraction in back bay/inland pond areas where RiHydro refraction was found to be inadequate. Once all green data had been refracted by flight line all data was exported to LAS 1.2 format and are combined into 500 m x 500 m tiles. Data was then further calibrated using TerraScan, TerraModeler, and TerraMatch. QSI used custom algorithms in TerraScan to create the initial ground/submerged topography surface. Relative accuracy of the green swaths was compared to overlapping and adjacent swaths and verified through the use Delta-Z (DZ) orthos created using QSI's DZ Ortho creator. Absolute vertical accuracy of the calibrated data was assessed using ground RTK survey data and complete coverage was again verified. QSI then performed manual editing to review all classification and improve the final topobathy surface. QSI's LasMonkey was used to update LAS header information, including all projection and coordinate reference system information. The final LiDAR data are in LAS format 1.2 and point data record format 3. Once all green data had been refracted by flight line all data was exported to LAS 1.2 format and are combined into 500 m x 500 m tiles. Data was then further calibrated using TerraScan, TerraModeler, and TerraMatch. QSI used custom algorithms in TerraScan to create the initial ground/submerged topography surface. Relative accuracy of the green swaths was compared to overlapping and adjacent swaths and verified through the use Delta-Z (DZ) orthos created using QSI's DZ Ortho creator. Absolute vertical accuracy of the calibrated data was assessed using ground RTK survey data and complete coverage was again verified. QSI then performed manual editing to review all classification and improve the final topobathy surface. QSI's LasMonkey was used to update LAS header information, including all projection and coordinate reference system information. The final LiDAR data are in LAS format 1.2 and point data record format 3. The classification scheme is as follows: 1-Unclassified 2-Ground 7-Noise 19-Overlap Default 20-Overlap Ground 21-Overlap Water Column 25-Water Column 26-Bathymetric Bottom or Submerged Topography 29-Submerged feature 30-Submerged Aquatic Vegetation* 31-Temporal Bathymetric Bottom *Class 30 was

submerged aquatic vegetation QSI identified within the bathymetric void shapes that precluded bathymetric bottom returns.
- 2018-08-31 00:00:00 - QSI then transformed the ellipsoid heights of the final LiDAR data to into orthometric heights referenced to NAVD88 using Geoid 12B to create the DEMs. The topobathymetric DEM was output at 1 meter resolution in IMG format into 5000 m x 5000 m tiles. Void DEM dataset- A void shapefile was created to indicate areas where there was a lack of bathymetric returns. This shape was created by triangulating bathymetric bottom points with an edge length maximum of 4.56m to identify all areas greater then 9 square meters without bathymetric returns. This shapefile was used to exclude interpolated elevation data from this dataset.

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:
- 1.6. Type(s) of data
- 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/56297

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=8734
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid12b/8727/supplemental/2018_ngs_top
https://noaa-nos-coastal-lidar-pds.s3.us-east-1.amazonaws.com/dem/NGS_PotomacRiver_DEM_Void_2

7.3. Data access methods or services offered:
Users may access the data from either a custom download or bulk download link.

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.