

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:

2019 - 2020 NOAA NGS Topobathy Lidar DEM: Hurricane Michael (NW Florida)

1.2. Summary description of the data:

The 2019 - 2020 NOAA NGS Topobathy Lidar DEM: Hurricane Michael data were collected by multiple contractors including NV5 and Dewberry. The 100 meter buffered project area consists of approximately 2,120,060 acres encompassing the Florida Panhandle and extending south to New Port Richey, Florida, and was collected between November 2019 - July 2020 using a Leica Chiroptera 4X system. The dataset includes topobathymetric digital elevation model data in geoTIFF format at 1 meter horizontal 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:

2019-11-26 to 2020-04-28, 2019-11-27 to 2020-04-09, 2019-11-27 to 2020-02-22, 2019-11-27 to 2020-07-30, 2019-12-04 to 2020-05-02, 2019-12-15 to 2020-06-27, 2020-01-01 to 2020-07-30, 2020-01-27 to 2020-04-28, 2020-02-15 to 2020-05-19

1.5. Actual or planned geographic coverage of the data:

W: -85.668247, E: -85.270902, N: 30.177297, S: 29.909435

The NOAA Michael Topobathymetric Lidar Delivery 1 extent covers 95,557 acres of the full project boundary. This Delivery 1 dataset is comprised of 2,286 - 500 m x 500 m LAS tiles.

W: -85.451502, E: -83.989269, N: 30.177686, S: 29.544044

The NOAA Michael Topobathymetric Lidar Delivery 3 UTM 16 extent covers 341,153 acres of the full project boundary.

W: -84.010594, E: -83.337362, N: 30.161341, S: 29.526019

The NOAA Michael Topobathymetric Lidar Delivery 3 UTM 17 extent covers 341,153 acres of the full project boundary.

W: -86.27383, E: -85.490947, N: 30.38344, S: 30.047483

The NOAA Michael Topobathymetric Lidar Delivery 41 (Block 04) extent covers 192,811 acres of the full project boundary.

W: -88.05557, E: -82.55326, N: 30.662192, S: 28.186447

W: -84.830004, E: -84.301645, N: 30.123719, S: 29.663345

The NOAA Michael Topobathymetric Lidar Delivery 2 extent covers 166,578 acres of the full project boundary. This Delivery 2 dataset is comprised of 3,549 - 500 m x 500 m LAS tiles.

W: -87.313157, E: -86.029265, N: 30.665212, S: 30.291658

The NOAA Michael Topobathymetric Lidar Delivery 42 (Block 05) extent covers 95,557 acres of the full project boundary. This Block 05 dataset is comprised of 9,006 - 500 m x 500 m LAS tiles.

W: -88.062939, E: -87.311719, N: 30.506921, S: 30.209728

The NOAA Michael Topobathymetric Lidar Delivery 43 (Block 06) extent covers 153,351 acres of the full project boundary. This Block 06 dataset is comprised of 3,539 - 500 m x 500 m LAS tiles.

W: -83.435325, E: -82.558583, N: 29.550452, S: 28.861074

The NOAA Michael Topobathymetric Lidar Delivery 44AA (Block 07) extent covers 276,009 acres of the full project boundary. This Block 07 dataset is comprised of 5,706 - 500 m x 500 m LAS tiles.

W: -82.841248, E: -82.543431, N: 28.918952, S: 28.184556

The NOAA Michael Topobathymetric Lidar Delivery 44B (Block 08) extent covers 327,801 acres of the full project boundary. This Delivery 44B dataset is comprised of 5,826 - 500 m x 500 m LAS tiles.

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:

NGS Communications and Outreach Branch

2.2. Title:

Metadata Contact

2.3. Affiliation or facility:

NGS Communications and Outreach Branch

2.4. E-mail address:

ngs.infocenter@noaa.gov

2.5. Phone number:

(301) 713-3242

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:

- 2020-06-26 00:00:00 - Data for the NOAA Michael Topobathymetric Lidar project area was acquired by Quantum Spatial (QSI) using a Leica Chiroptera 4X Topobathy lidar system. All derived LAS data was referenced to: Horizontal Datum-NAD83(2011) epoch: 2010.00 Projection-UTM Zone 16N and UTM17N Horizontal Units-meters Vertical Datum-GRS80 Ellipsoid Vertical Units-meters The collected Lidar data were 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 8.3 SP3 and loaded into 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 raster generation using LAStools to develop an initial assessment of bathymetric coverage. QSI reviewed all acquired flight lines to ensure complete coverage and positional accuracy of the laser points. These rasters were also used to create an initial product in Quick Look Coverage Maps. These Quick Look files are not fully processed data or final products but provide rapid assessment of approximate coverage and depth penetration. QSI resolved kinematic corrections for aircraft position data using aircraft GNSS and Applanix's proprietary PP-RTX solution. When PP-RTX was not used QSI conducted static Global Navigation Satellite System (GNSS) ground surveys (1 Hz recording frequency) using base stations over known monument locations during flights. After the airborne survey, 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 base station were performed to confirm antenna height measurements and to refine position accuracy. This data was used to correct the continuous on board measurements of the aircraft position recorded throughout the flight. A final smoothed best estimate trajectory (SBET) was developed that blends post-processed aircraft position with attitude data. Using the SBETs, sensor head position and attitude were then calculated throughout the survey. Trimble Business Center v.3.90, Blue Marble Geographic Calculator 2019, and PosPac MMS 8.3 SP3 were used for these processes. Following final SBET creation, QSI used Leica Lidar Survey Studio (LSS) to calculate laser point positioning by associating SBET positions to each laser point return time, scan angle, and intensity. Leica LSS was used to derive a synthetic water surface to create a water surface model. All LiDAR data below water surface models were classified as water column to correct for refraction. Light travels at different speeds in air versus water and its direction of travel or angle is changed or refracted when entering the water column. The refraction tool corrects for this difference by adjusting the depth (distance traveled) and horizontal positioning (change of angle/direction) of the LiDAR data. Using raster-based QC methods, the output data is verified to ensure the refraction tool functioned properly. Dewberry performed the calibration of the NOAA Michael Delivery 1 Lidar dataset in addition to the point cloud classification in order to create the final topobathymetric lidar deliverables which were subsequently reviewed by QSI. (Citation: Processed Lidar)

- Relative accuracy of the green swaths compared to overlapping and adjacent green swaths as well as the relative accuracy of green swaths compared to overlapping and adjacent NIR swaths was verified through the use of Delta-Z (DZ) orthos. Dewberry created DZ rasters using proprietary processing tools. The intraswath or within a swath accuracy were verified using GIS software. Profiles of elevated planar features, such as roofs, were used to verify horizontal alignment

between overlapping swaths. All lidar data was peer-reviewed. QAQC also included creating void polygons for use during review. All necessary edits were applied to the dataset. NV5 Geospatial's proprietary software, LAS Monkey, was used to update LAS header information, including all projection and coordinate reference system information. The final lidar data is in LAS format 1.4 and point data record format 6. The contractor delivered classification scheme is as follows: 1- Unclassified 2- Ground 7- Noise 40- Bathymetric bottom or submerged topography 41- Water surface 43- Submerged object 45- water column 46- overlap bathy bottom - temporally different from a separate lift 71- unclassified associated with areas of overlap bathy bottom/temporal bathymetric differences 72- ground associated with areas of overlap bathy bottom/temporal bathymetric differences 81- water surface associated with areas of overlap bathy bottom/temporal bathymetric differences 85- water column associated with areas of overlap bathy bottom/temporal bathymetric differences 10Overlap- Edge clip 11Withheld- Green laser returns in topo only areas 42Synthetic- derived water surface All data was then verified by an Independent QC department. The independent QC was performed by separate analysts who did not perform manual classification or editing. The independent QC involved quantitative and qualitative reviews. (Citation: Processed Lidar)

- Dewberry transformed the final LiDAR data from ellipsoid heights to orthometric heights referenced to NAVD88, Geoid12b to create the final topobathymetric void clipped DEMs. The topobathymetric bare earth DEMs were output at 1 meter resolution in GeoTIFF format into 5000 m x 5000 m tiles. The rasters are clipped to the extent of the project boundary and named according to project specifications. A bathymetric 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 than 9 square meters without bathymetric returns. This shapefile was used to clip and exclude interpolated elevation data from these areas in the bathymetric void clipped topobathymetric bare earth model. (Citation: Processed Lidar)

- The NOAA Office for Coastal Management (OCM) received tiff files in UTM Zone 17N and 16N NAD83(2011), meters coordinates. Vertical positions were provided in NAVD88 (Geoid18) elevations and in meters. OCM performed the following processing for data storage and Digital Coast provisioning purposes: 1. The data were converted to Cloud Optimized GeoTiff (COG) format and the projection and vertical datum EPSG codes were assigned. 2. The data were copied 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
- 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/69338>

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=9708/details/9708>

https://noaa-nos-coastal-lidar-pds.s3.us-east-1.amazonaws.com/dem/NGS_NW_Florida_Topobathy_DI

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.