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:

2020 SC DNR Lidar: 5 County (Cherokee, Chester, Fairfield, Lancaster, Union), SC

1.2. Summary description of the data:

Original Dataset Description: Aerial lidar data was collected as part of a 5-county project area which encompassed the South Carolina Counties of Cherokee, Union, Chester, Lancaster, and Fairfield. Lidar data for the project was collected by Quantum Spatial as part of the ESP team, between January 16, 2020 and February 15, 2020 using 2 Leica ALS80 sensors; serial numbers 3061 and 3546. Data was collected at a 0.7 meter aggregate nominal post spacing (ANPS). ESP Associates (ESP) used commercial off the shelf software as well as proprietary software and methods to classify the lidar point cloud to the following classifications: 1-Unclassified, 2-Ground, 3-Low Vegetation 0.5-3ft in height, 4-Medium Vegetation 3-10ft in height, 5-High Vegetation 10-220ft in height, 6-Buildings at 500 sq ft of area or more, 7-Low Noise, 8-Model Keypoints, 9-Water, 11-Witheld Points (exceed scan angle limit), 13-Roads contained in SC road centerlines database, 17-Bridge Decks, 18-High Noise, 20-Ignored Ground due to breakline proximity, 21-Culverts. ESP produced 3D breaklines to supplement the lidar ground and road classifications to produce hydro flattened DEMs for the project area. All data were tiled to the SC DNR tile scheme consisting of 5,000 feet by 5,000 ft tiles and named in accordance with the "ORTHOGRID" attribute of the scheme.

The NOAA Office for Coastal Management (OCM) received a copy of this data from the South Carolina Department of Natural Resources (SC DNR). The data were processed to the NOAA Digital Coast Data Access Viewer (DAV) to make the data available for bulk and custom downloads. In addition to the lidar point data, the bare earth Digital Elevation Models (DEMs) at a 5 ft grid spacing, created from the lidar point data, and the breakline and building polygon data are also available from the NOAA Digital Coast Data Access Viewer (DAV). These data are available for download at the links provided in the URL section of this metadata record.

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:
2020-01-16 to 2020-02-15

1.5. Actual or planned geographic coverage of the data:
W: -81.88, E: -80.39, N: 35.194, S: 34.16

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):

Lineage Statement:

The NOAA Office for Coastal Management (OCM) received the elevation data for the 5 County (Cherokee, Chester, Fairfield, Lancaster, Union) lidar project from the South Carolina Department of Natural Resources (SCDNR). NOAA OCM processed the data to the NOAA Digital Coast Data Access Viewer (DAV) to make the data publicly available for bulk and custom downloads.

Process Steps:

- 2020-04-01 00:00:00 - Data for was acquired by Quantum Spatial for the 5-county lidar project. The project area encompassed approximately 3,016 square miles, of which: 1. Cherokee County covered 450 square miles 2. Chester County covered 608 square miles 3. Fairfield County covered 762 square miles 4. Lancaster County covered 645 square miles 5. Union County covered 556 square miles Data were collected using linear mode Leica ALS-80 sensors, serial numbers 3061 and 3546. The data were delivered in the State Plane coordinate system, international feet, South Carolina, horizontal datum NAD83, vertical datum NAVD88, U.S. Survey Feet, Geoid 12B. Deliverables for the project included a raw (unclassified) calibrated lidar point cloud and an acquisition report The lidar calibration process was conducive to postprocessing an accurate data set. Significant attention was given to GPS baseline distances and GPS satellite constellation geometry and outages during the trajectory processing. Verification that proper ABGPS surveying techniques were followed including: pre and post mission static initializations and review of In-air Inertial Measurement Unit (IMU) alignments, if performed, both before and after on-site collection activities to ensure proper self-calibration of the IMU accelerometers and gyros were achieved. Cross flights were planned throughout the project area across all flightlines and over roadways where possible. The cross-flights provided a common control surface used to remove any vertical discrepancies in the lidar data between flightlines and aided in the bundle adjustment process with review of the roll, pitch, heading (omega, phi, kappa). The cross-flight design was critical to ensure flight line ties across the sub-blocks and

the entire project area. The areas of overlap between flightlines were used to calibrate (aka boresight) the lidar point cloud to achieve proper flight line to flight line alignment in all 6 degrees of freedom. This included adjustment of IMU and scanner-related variables such as roll, x, y, z, pitch, heading, and timing interval (calibration range bias by return) Each lidar mission flown was independently reviewed, bundle adjusted (boresighted), and/if necessary, improved by a hands-on boresight refinement in the office. Once the relative accuracy adjustment was complete, the data was adjusted to the high order GPS calibration control to achieve a zero-mean bias for fundamental accuracy computation, verification, and reporting. Internal accuracy testing procedures and methods were compliant with SCDNR and USGS specifications.
- 2020-02-01 00:00:00 - Field survey was conducted for Cherokee, Lancaster, Fairfield, Chester, and Union Counties to establish ground survey control in support of lidar data calibration processes and to establish independent lidar checkpoints used to internally verify calibration results. A total of 70 calibration survey points were established for the purpose of data calibration and a total of 161 checkpoints comprised of bare earth, forested, urban, low and medium height vegetation types were used to verify calibration results independent of the calibration process. Each location was double-occupied to validate accuracy. The control was used to facilitate calibration of lidar flight lines/blocks, perform mean adjustment, and test final fundamental accuracy of the data. Control was established under the following conditions: 1. Located only in open terrain where there is a high probability that the sensor will have detected the ground surface without influence from surrounding vegetation. 2. On flat or uniformly sloping terrain at least five (5) meters away from any breakline where there is a change in slope. 3. Checkpoint accuracy satisfied a Local Network accuracy of 5 cm at the 95% confidence level. 4. Field photos will be taken of each point, in multiple directions (generally cardinal directions). ESP prepared and delivered a Report of Survey which included a “as collected” control locations map, survey methodology, QA/QC methodology, control coordinates, field pictures, and any field comments. As part of this deliverable, Excel .CSV files were delivered with the control coordinates and elevation values for calibration and checkpoint locations. The report was signed and sealed by the surveyor in charge. National Geodetic Survey data sheets were included for any Network Control Points used to control the topographic data acquisition and ground surveys
- 2020-06-01 00:00:00 - The ESP team utilized multiple software and data management methods throughout the lidar processing workflow. The workflow post-acquisition began at team member Quantum’s production facility with the lidar calibration process. The calibration process ensured that all lidar acquisition missions were carried out in a manner conducive to postprocessing an accurate data set. Significant attention was given to GPS baseline distances and GPS satellite constellation geometry and outages during the trajectory processing. Verification that proper Airborne GPS (AGPS) surveying techniques were followed including: pre and post mission static initializations and review of In-air IMU alignments, if

performed, both before and after on-site collection to ensure proper self-calibration of the IMU accelerometers and gyros were achieved. Relative accuracy was achieved by establishing cross flights throughout each project block area across all flight lines and over roadways where possible. The cross-flight provides a common control surface used to remove any vertical discrepancies in the lidar data between flight lines and aids in the bundle adjustment process with review of the roll, pitch, heading (omega, phi, kappa). The cross-flight is critical to ensure flight line ties across the sub-blocks and the entire project area. The areas of overlap between flight lines are used to calibrate (aka boresight) the lidar point cloud to achieve proper flight line to flight line alignment in all 6 degrees of freedom. This includes adjustment of IMU and scanner-related variables such as roll, x, y, z, pitch, heading, and timing interval (calibration range bias by return) Each LiDAR mission flown was independently reviewed, bundle adjusted (bore sighted), and/if necessary, improved by a hands-on boresight refinement in the office. Once the relative accuracy adjustment was complete, the data was adjusted to the high order GPS calibration control to achieve a zero-mean bias for fundamental accuracy computation, verification, and reporting. Internal accuracy testing procedures, methods were compliant with ASPRS and USGS specifications. ESP utilized a combination of Terrasolid products and proprietary software such as ESP Analyst and ESP Utilities to conduct post-calibration, lidar point cloud processing tasks. The lidar classification process encompassed a series of automated and manual steps to classify the calibrated point cloud dataset. Each project represents unique characteristics in terms of cultural features (urbanized vs. rural areas), terrain type, and vegetation coverage. These characteristics were thoroughly evaluated at the onset of the project to ensure that the appropriate automated filters were applied and that subsequent manual filtering yielded correctly classified data. Automated filtering macros, which may contain one or more filtering algorithms, were developed and executed to derive LAS files with points separated into the different classification groups as defined in the ASPRS classification table. The macros were tested in several portions of the project area to verify the appropriateness of the filters. At times, a combination of several filter macros optimized the filtering based on the unique characteristics of the project. Automatic filtering generally yields a ground surface that is 85-90% valid, so additional editing (hand filtering) was required to produce a more robust ground surface. The data were classified as follows: Class 1 = Unclassified (non-ground) Class 2 = Ground (bare earth) Class 3 = Low Vegetation Class 4 = Medium Vegetation Class 5 = High Vegetation Class 6 = Buildings Class 7= Low Noise Class 8 = Model Keypoints Class 9 = Water Class 11 = Withheld Points Class 13 = Roads Class 17 = Bridge Decks Class 18 = High Noise Class 20 = Ignored Ground (breakline proximity buffer) Class 21 = Culverts Header records for the LAS files were reviewed to ensure that the expected classifications were present along with projec

- 2020-11-01 00:00:00 - ESP technicians reviewed the auto-classified lidar point clouds to manually re-classify (or hand-filter) “noise” and other features that may have remained in the ground classification as well as to correct any gross mis-

classifications by the software. Cross-sections and TIN surfacing tools were used to assist technicians in the reclassification of non-ground data artifacts. Certain features such as berms, hilltops, cliffs and other features that may have been aggressively auto-filtered had points re-classified into the ground classification. Conversely, above-ground artifacts such as decks, bushes, and other subtle features that may have remained in the ground classification after automated filtering were corrected via a manual editing process.
- 2024-10-16 00:00:00 - The NOAA Office for Coastal Management received the 2020 SCDNR 5 County Lidar dataset from the SCDNR. The data were in SC State Plane NAD83(2011), int feet coordinates and the elevations were in NAVD88(Geoid12B), US survey feet. The data were classified as: 1-Unclassified, 2-Ground, 3-Low Vegetation 0.5-3ft in height, 4-Medium Vegetation 3-10ft in height, 5-High Vegetation 10-220ft in height, 6-Buildings at 500 sq ft of area or more, 7-Low Noise, 8-Model Keypoints, 9-Water, 11-Witheld Points (exceed scan angle limit), 13-Roads contained in SC road centerlines database, 17-Bridge Decks, 18-High Noise, 20-Ignored Ground due to breakline proximity, 21-Culverts. OCM processed all classifications of points to the Digital Coast Data Access Viewer (DAV). Classes available on the DAV are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 17, 18, 21. OCM performed the following processing on the data for Digital Coast storage and provisioning purposes: 1. An internal OCM script was run to check the number of points by classification and by flight ID and the gps and intensity ranges. 2. Internal OCM scripts were run on the laz files to: a. Convert the files from SC State Plane NAD83(2011), International feet coordinates to geographic coordinates b. Convert the files from NAVD88 (Geoid12B) elevations to ellipsoid (NAD83 2011) elevations c. Convert the files from elevations in feet to meters d. Convert the points classified as 20 - Ignored Ground to 10 - Ignored Ground to conform to an OCM internal lidar domain profile e. Assign the geokeys, to sort the data by gps time and zip the data to database and to AWS S3

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/73545

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=10177/details/10177
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/10177/index.html

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)

NCEI_NC

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 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.