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:
2015 USGS Lidar DEM: Mt. Baker, WA

1.2. Summary description of the data:
No metadata record was provided with the data. This record is populated with information from the Quantum Spatial, Inc. (QSI) technical report downloaded from the Washington Dept. of Natural Resources Washington Lidar Portal. The technical report is available for download from the link provided in the URL section of this metadata record.

In August 2015, Quantum Spatial (QSI) was contracted by the United States Geological Survey (USGS) to collect Quality Level 1 (8ppsm) Light Detection and Ranging (LiDAR) data in the fall of 2015 for the Mt. Baker site in Whatcom County, Washington. Mount Baker is the third highest peak in the state of Washington and is the second most thermally active mountain in the Cascade Range, surpassed only by Mt. Saint Helens. Data were collected to aid USGS in assessing the topographic and geophysical properties of the study area to support increased seismic monitoring and volcanic hazard assessment to neighboring communities and infrastructure.

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:
2015-08-26 to 2015-09-27

1.5. Actual or planned geographic coverage of the data:
W: -122.008733, E: -121.59796, N: 48.914427, S: 48.61497

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) downloaded the GeoTiff files from the Washington Lidar Portal.

Process Steps:

- Planning: In preparation for data collection, QSI reviewed the project area and developed a specialized flight plan to ensure complete coverage of the QL1 Mt. Baker LiDAR study area at the target point density of greater than or equal to 8.0 points/m2. Acquisition parameters including orientation relative to terrain, flight altitude, pulse rate, scan angle, and ground speed were adapted to optimize flight paths and flight times while meeting all contract specifications. Factors such as satellite constellation availability and weather windows must be considered during the planning stage. Any weather hazards or conditions affecting the flights were continuously monitored due to their potential impact on the daily success of airborne and ground operations. In addition, logistical considerations including private property access and potential air space restrictions were reviewed.
- Ground Survey Points Ground survey points were collected using real time kinematic, post-processed kinematic (PPK), and fast-static (FS) survey techniques. A Trimble R7 and Trimble R10 base unit was positioned at a nearby monument to broadcast a kinematic correction to a roving Trimble R8 and Trimble R10 GNSS receiver. All GSP measurements were made during periods with a Position Dilution of Precision (PDOP) of less than or equal to 3.0 with at least six satellites in view of the stationary and roving receivers. When collecting RTK and PPK data, the rover records data while stationary for five seconds, then calculates the pseudorange position using at least three one-second epochs. FS surveys record observations for up to fifteen minutes on each GSP in order to support longer baselines for post-processing. Relative errors for any GSP position must be less than 1.5 cm horizontal and 2.0 cm vertical in order to be accepted. GSPs were collected in areas where good satellite visibility was achieved on paved roads and other hard surfaces such as gravel or packed dirt roads. GSP measurements were not taken on highly reflective surfaces such as center line stripes or lane markings on roads due to the increased noise seen in the laser returns over these surfaces. GSPs were collected within as many flightlines as possible; however the distribution of GSPs depended on ground access constraints and monument locations and may not be equitably distributed throughout the study area. Monumentation The spatial configuration of ground survey monuments provided redundant control within 13 nautical miles of the mission areas for LiDAR flights. Monuments were also used for collection of ground survey points using real time kinematic (RTK), post processed kinematic (PPK), and fast-static (FS) survey techniques. Monument locations were selected with consideration for satellite visibility, field crew safety, and optimal location for GSP coverage. QSI utilized four existing monuments and established six new monuments for the Mt. Baker LiDAR project. New monumentation was set using 5/8

inch x 30 inch rebar topped with stamped 2 1/2 inch aluminum caps. QSI's professional land surveyor, Christopher Glantz (WA PLS #48755) oversaw and certified the establishment of all monuments. To correct the continuously recorded onboard measurements of the aircraft position, QSI concurrently conducted multiple static Global Navigation Satellite System (GNSS) ground surveys (1 Hz recording frequency) over each monument. During post-processing, the static GPS data were triangulated with nearby Continuously Operating Reference Stations (CORS) using the Online Positioning User Service (OPUS1) for precise positioning. Multiple independent sessions over the same monument were processed to confirm antenna height measurements and to refine position accuracy. Monuments were established according to the national standard for geodetic control networks, as specified in the Federal Geographic Data Committee (FGDC) Geospatial Positioning Accuracy Standards for geodetic networks.2 This standard provides guidelines for classification of monument quality at the 95% confidence interval as a basis for comparing the quality of one control network to another. For the Mt. Baker LiDAR project, the monument coordinates contributed no more than 5.4 cm of positional error to the geolocation of the final ground survey points and LiDAR, with 95% confidence.

- Airborne Survey The LiDAR survey was accomplished using a Leica ALS80 system mounted in a Cessna Caravan 208B. The settings werer used to yield an average pulse density of greater than or equal to 8 pulses/m2 over the Mt. Baker project area. The Leica ALS80 laser system can record unlimited range measurements (returns) per pulse. It is not uncommon for some types of surfaces (e.g., dense vegetation or water) to return fewer pulses to the LiDAR sensor than the laser originally emitted. The discrepancy between first return and overall delivered density will vary depending on terrain, land cover, and the prevalence of water bodies. All discernible laser returns were processed for the output dataset. All areas were surveyed with an opposing flight line side-lap of greater than or equal to 50 percent (greater than or equal to 100 percent overlap) in order to reduce laser shadowing and increase surface laser painting. To accurately solve for laser point position (geographic coordinates x, y and z), the positional coordinates of the airborne sensor and the attitude of the aircraft were recorded continuously throughout the LiDAR data collection mission. Position of the aircraft was measured twice per second (2 Hz) by an onboard differential GPS unit, and aircraft attitude was measured 200 times per second (200 Hz) as pitch, roll and yaw (heading) from an onboard inertial measurement unit (IMU). To allow for post-processing correction and calibration, aircraft and sensor position and attitude data are indexed by GPS time.
- Upon completion of data acquisition, QSI processing staff initiated a suite of automated and manual techniques to process the data into the requested deliverables. Processing tasks included GPS control computations, smoothed best estimate trajectory (SBET) calculations, kinematic corrections, calculation of laser point position, sensor and data calibration for optimal relative and absolute accuracy, and LiDAR point classification. Processing methodologies were tailored for the landscape. Brief descriptions of these tasks are shown below. Lidar

Processing Steps Resolve kinematic corrections for aircraft position data using kinematic aircraft GPS and static ground GPS data. Develop a smoothed best estimate of trajectory (SBET) file that blends post-processed aircraft position with sensor head position and attitude recorded throughout the survey. Software used - Waypoint Inertial Explorer v.8.6 Calculate laser point position by associating SBET position to each laser point return time, scan angle, intensity, etc. Create raw laser point cloud data for the entire survey in *.las (ASPRS v. 1.2) format. Convert data to orthometric elevations by applying a geoid 03 correction. Software used - Waypoint Inertial Explorer v.8.6, Leica Cloudpro v. 1.2.2 Import raw laser points into manageable blocks (less than 500 MB) to perform manual relative accuracy calibration and filter erroneous points. Classify ground points for individual flight lines.. Software used - TerraScan v.15 Using ground classified points per each flight line, test the relative accuracy. Perform automated line-to-line calibrations for system attitude parameters (pitch, roll, heading), mirror flex (scale) and GPS/IMU drift. Calculate calibrations on ground classified points from paired flight lines and apply results to all points in a flight line. Use every flight line for relative accuracy calibration. Software used - TerraMatch v.15 Classify resulting data to ground and other client designated ASPRS classifications (Table 8). Assess statistical absolute accuracy via direct comparisons of ground classified points to ground control survey data. Software used - TerraScan v.15, TerraModeler v.15   Generate bare earth models as triangulated surfaces. Generate highest hit models as a surface expression of all classified points. Export all surface models in EDRAS Imagine (.img) format at a 1 meter pixel resolution. Software used - TerraScan v.15, TerraModeler v.15, ArcMap v. 10.1
- 2022-08-30 00:00:00 - The NOAA Office for Coastal Management (OCM) downloaded 14 raster DEM files in GeoTiff format from the Washington Lidar Portal. The data were in Washington State Plane South NAD83(HARN), US survey feet coordinates and NAVD88 (Geoid03) elevations in feet. The bare earth raster files were at a 3 feet grid spacing. No metadata record was provided with the data. This record is populated with information from the Quantum Spatial, Inc. technical report downloaded from the Washington Dept. of Natural Resources Washington Lidar Portal.   OCM performed the following processing on the data for Digital Coast storage and provisioning purposes: 1. Used internal an script to assign the EPSG codes (Horizontal EPSG: 2927 and Vertical EPSG: 6360) to the GeoTiff formatted files. 2. 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
- 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/67791

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=9575/details/9575
https://noaa-nos-coastal-lidar-pds.s3.us-east-1.amazonaws.com/dem/WA_Baker_DEM_2015_9575/inde

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_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.