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:

2012-2013 Puget Sound LiDAR Consortium (PSLC) Topographic LiDAR: Hoh River Watershed, Washington (Deliveries 1 and 2)

1.2. Summary description of the data:

Watershed Sciences, Inc. (WSI) collected Light Detection and Ranging (LiDAR) data on the Hoh River watershed survey area for the Puget Sound LiDAR Consortium and the Hoh Tribe Department of Natural Resources. This data set covers

approximately 270 square miles. Due to spring snow on the ground WSI was unable to acquire data for the complete survey during the initial flights in April and returned to finish the collection at a later date. Delivery 1 of the

survey area was collected on April 14th, 15th, 17th, 19th, 20th and 21st. Delivery 2 was collected between April 14th, 2012 and July 24th, 2013. Each delivery was processed by NOAA OCM separately using identical methods.

See processing steps below for additional information.

The LiDAR survey utilized both a Leica ALS60 and a Leica ALS50-II sensor in a Cessna Caravan 208B.All areas were surveyed with an opposing flight line side-lap of =60% (= 100% overlap) to reduce laser shadowing and increase

surface laser painting. The Leica laser systems allow up to four range measurements (returns) per pulse, and all discernible laser returns were processed for the output dataset.

This Lidar survey for Deliveries 1 and 2 achieved a point density of 9.54 points per square meter.

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:

2012-04-14 to 2013-07-24

1.5. Actual or planned geographic coverage of the data:
W: -124.519909, E: -123.856406, N: 47.883319, S: 47.590862

1.6. Type(s) of data:
(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)
las

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:

- 2012-01-01 00:00:00 - Delivery 1: 1. Resolved kinematic corrections for aircraft position data using kinematic aircraft GPS and static ground GPS data. Software: Waypoint GPS v.8.10, Trimble Business Center 2.6 2. Developed a smoothed best estimate of trajectory (SBET) file that blends post-processed aircraft position with attitude data. Sensor head position and attitude were calculated throughout the survey. The SBET data were used extensively for laser point processing. Software: IPAS TC v.3.1 3. Calculated laser point position by associating SBET position to each laser point return time, scan angle, intensity, etc. Created raw laser point cloud data for the entire survey in *.las (ASPRS v. 1.2) format. Data were then converted to orthometric elevations (NAVD88) by applying a Geoid03 correction. Software: ALS Post Processing Software v.2.74, Corpscon 6 4. Imported raw laser points into manageable blocks (less than 500 MB) to perform manual relative accuracy calibration and filter for pits/birds. Ground points were then classified for individual flight lines (to be used for relative accuracy testing and calibration). Software: TerraScan v.12.004 5. Using ground classified points per each flight line, the relative accuracy was tested. Automated line-to-line calibrations were then performed for system attitude parameters (pitch, roll, heading), mirror flex (scale) and GPS/IMU drift. Calibrations were performed on ground classified points from paired flight lines. Every flight line was used for relative accuracy calibration. Software: TerraMatch v.12.001 6. Position and attitude data were imported. Resulting data were classified as ground and non-ground points. Statistical absolute accuracy was assessed via direct comparisons of ground classified points to ground RTK survey data. Software: TerraScan v.12.004, TerraModeler v.12.002 7. Bare Earth models were created as a triangulated surface and exported as ArcInfo ASCII grids at a 3-foot pixel resolution. Highest Hit models were created for any class at 3-foot grid spacing and exported as ArcInfo ASCII grids. Software: TerraScan v.12.004, ArcMap v.10.0, TerraModeler v.12.002 8. Intensity images were created as Geo TIFFs and mosaicked to the final delineation. Software: TerraScan v.12.004, ArcMap v.10.0, TerraModeler v.12.002
- 2013-07-24 00:00:00 - Delivery 2: Acquisition. WSI collected the Hoh Watershed LiDAR data between 04/14/12 and 07/24/13. The survey used a Leica ALS60 laser

system mounted in a Cessna Caravan 208B and a ALS50 laser system mounted in a Partenavia. Data was collected using a single pulse flight plan. Near nadir scan angles were used to increase penetration of vegetation to ground surfaces. Ground level GPS and aircraft IMU were collected during the flight. Leica ALS 60 Instrument Parameters (4/14/12, 4/15/12, 4/17/12, 4/19/12, 4/20/12, 4/21/12); Beam diameter: 21 cm, Pulse rate: 196-107.8 kHz, Maximum returns: 4, Speed: 105 knots, Overlap: 60 %, Laser output power: 17% Field of view (FOV): 28 degrees, Beam wavelength: 1064 nm, Frequency of GPS sampling: 2 Hz, Frequency of IMU sampling: 200 Hz, Swath width: 449 m AGL: 900 m Average pulse density: 8 Leica ALS 50 Phase II Instrument Parameters (4/15/12, 4/21/12); Beam diameter: 21 cm, Pulse rate: 96-107.8 kHz, Maximum returns: 4, Speed: 105 knots, Overlap: 60 %, Laser output power: 26% Field of view (FOV): 28 degrees, Beam wavelength: 1064 nm, Frequency of GPS sampling: 2 Hz, Frequency of IMU sampling: 200 Hz, Swath width: 449 m AGL: 900 m Average pulse density: 8 Leica ALS 50 Phase II Instrument Parameters (10/6/12, 10/7/12, 10/10/12); Beam diameter: 21 cm, Pulse rate: 93-107.8 kHz, Maximum returns: 4, Speed: 105 knots, Overlap: 65 %, Laser output power: 26% Field of view (FOV): 28 degrees, Beam wavelength: 1064 nm, Frequency of GPS sampling: 2 Hz, Frequency of IMU sampling: 200 Hz, Swath width: 448 m AGL: 900 m Average pulse density: 8 Leica ALS60 Instrument Parameters (3/31/13, 4/1/13): Beam diameter: 21 cm, Pulse rate: 93 - 107.8 kHz, Maximum returns: 4, Speed: 105 knots, Overlap: 65 %, Laser power: 17 %, Field of view (FOV): 28 degrees, Beam wavelength: 1064 nm, Frequency of GPS sampling: 2 Hz, Frequency of IMU sampling: 200 Hz, Swath width: 449 m, AGL: 900 m, Average pulse density: 8 Leica ALS60 Instrument Parameters (6/29/13, 6/30/13): Beam diameter: 21 cm, Pulse rate: 93 - 107.8 kHz, Maximum returns: 4, Speed: 105 knots, Overlap: 65 %, Laser power: 26 %, Field of view (FOV): 28 degrees, Beam wavelength: 1064 nm, Frequency of GPS sampling: 2 Hz, Frequency of IMU sampling: 200 Hz, Swath width: 449 m, AGL: 900 m, Average pulse density: 8 Leica ALS60 Instrument Parameters (7/24/13): Beam diameter: 23 cm, Pulse rate: 85-99.2 kHz, Maximum returns: 4, Speed: 105 knots, Overlap: 60 %, Laser power: 28.9 %, Field of view (FOV): 30 degrees, Beam wavelength: 1064 nm, Frequency of GPS sampling: 2 Hz, Frequency of IMU sampling: 200 Hz, Swath width: 536 m, AGL: 1000 m, Average pulse density: 8 - 2013-08-28 00:00:00 - Delivery 2: 1. Flight lines and data were reviewed to ensure complete coverage of the study area and positional accuracy of the laser points. 2. Laser point return coordinates were computed using ALS Post Processor and IPAS TC software based on independent data from the LiDAR system, IMU, and aircraft. 3. The raw LiDAR file was assembled into flight lines per return with each point having an associated x, y, and z coordinate. 4. Visual inspection of swath to swath laser point consistencies within the study area were used to perform manual refinements of system alignment. 5. Custom algorithms were designed to evaluate points between adjacent flight lines. Automated system alignment was computed based upon randomly selected swath to swath accuracy measurements that consider elevation, slope, and intensities. Specifically, refinement in the combination of system pitch, roll and yaw offset parameters optimize internal

consistency. 6. Noise (e.g., pits and birds) was filtered using ALS postprocessing software, based on known elevation ranges and included the removal of any cycle slips. 7. Using TerraScan and Microstation, ground classifications utilized custom settings appropriate to the study area. 8. The corrected and filtered return points were compared to the RTK ground survey points collected to verify the vertical accuracy. 9. The highest hit algorithm was used to create this highest hit DSM.
- 2015-01-01 00:00:00 - The NOAA Office for Coastal Management (OCM) downloaded topographic files in .LAZ format from PSLC's website in two separate deliveries. The files contained lidar elevation and intensity measurements. The data were received in Washington State Plane South Zone 4602, NAD83 coordinates and were vertically referenced to NAVD88 using the Geoid03 model. The vertical units of the data were feet. OCM performed the following processing for data storage and Digital Coast provisioning purposes: Delivery 1: 1. The topographic laz files were converted from orthometric (NAVD88) heights to ellipsoidal heights using Geoid03. 2. The topographic laz files were converted from a Projected Coordinate System (WA SP South) to a Geographic Coordinate system (NAD83). 3. The topographic laz files' vertical units were converted from feet to meters. 4. The topographic laz files' horizontal units were converted from feet to decimal degrees. Delivery 2: 1. The topographic laz file 'q47124f1103' was found to contain Class 15 points. These points were changed to Class 2 (Ground). 2. The topographic laz files were converted from orthometric (NAVD88) heights to ellipsoidal heights using Geoid03. 3. The topographic laz files were converted from a Projected Coordinate System (WA SP South) to a Geographic Coordinate system (NAD83). 4. The topographic laz files' vertical units were converted from feet to meters. 5. The topographic laz files' horizontal units were converted from feet to decimal degrees.

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/50166

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=2492
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/2492/index.html

7.3. Data access methods or services offered:
This data can be obtained on-line at the following URL:

https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=2492

;

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.