

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:

2011 USFS/EPA Lidar DEM: Blue River

### 1.2. Summary description of the data:

No metadata record for this data set was provided to the NOAA Office for Coastal Management (OCM). This record was created with information from the data report. A link to the data report is provided in the URL section of this metadata record.

Watershed Sciences, Inc. (WSI) collected Light Detection and Ranging (LiDAR) data on October 27th, 28th and November 1st, 2011 for the United States Forest Service and Environmental Protection Agency. The data are in the Blue River Watershed and Big Springs Sno-Park in Linn and Lane Counties, OR. Per agreement the two Blue River Watershed areas were combined for processing and flight efficiency. The requested areas (30,817 acres) were expanded to include a 100m buffer to ensure complete coverage and adequate point densities around survey area boundaries. The total acreage in this delivery of LiDAR data is 32,275 acres. The resolution of the bare earth digital elevation models (DEMs) is 1 m.

In addition to these bare earth Digital Elevation Model (DEM) data, the lidar point data that these DEM data were created from, are also available. These data are available for custom download at the link 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:

2011-10-27, 2011-10-28, 2011-11-01

### 1.5. Actual or planned geographic coverage of the data:

W: -122.333697, E: -121.974889, N: 44.466269, S: 44.203871  
Blue River project area.

### 1.6. Type(s) of data:

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

Point Cloud (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:

Watershed Sciences, Inc., collected Light Detection and Ranging (LIDAR) data in the Blue River project area for the USDA Forest Service and EPA. NOAA OCM received the data from DOGAMI and ingested it into the Digital Coast Data Access Viewer for distribution.

Process Steps:

- 2011-11-01 00:00:00 - Acquisition. The LiDAR survey utilized a Leica ALS60 Phase II sensor in a Cessna Caravan 208B. The sensors operate with Automatic Gain Control (AGC) for intensity correction. The Leica systems were set to acquire 105,000 laser pulses per second (i.e. 105 kHz pulse rate) and flown at 900 meters above ground level (AGL), capturing a scan angle of  $\pm 14^\circ$  from nadir. These settings were developed to yield points with an average native pulse density of 8 pulses per square meter over terrestrial surfaces. It is not uncommon for some types of surfaces (e.g. dense vegetation or water) to return fewer pulses than the laser originally emitted. These discrepancies between native and delivered density will vary depending on terrain, land cover, and the prevalence of water bodies. All areas were surveyed with an opposing flight line side-lap of greater than or equal to 50% (greater than or equal to 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. To accurately solve for laser point position (geographic coordinates x, y, z), the positional coordinates of the airborne sensor and the attitude of the aircraft were recorded continuously throughout the LiDAR data collection mission. Aircraft position was measured twice per second (2 Hz) by an onboard differential GPS unit. 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/sensor position and attitude data are indexed by GPS time.
- Ground Survey During the LiDAR survey, static (1 Hz recording frequency) ground surveys were conducted over set monuments. After the airborne survey, the static GPS data are processed using triangulation with Continuously Operating Reference Stations (CORS) and checked using the Online Positioning User Service (OPUS1) to quantify daily variance. Multiple sessions are processed over the same monument to confirm antenna height measurements and reported position accuracy. Indexed by time, this GNSS2 data is used to correct the continuous onboard measurements of aircraft position recorded throughout the mission. Control monuments were located within 13 nautical miles of the survey area. For this study area all Global

Navigation Satellite System survey work utilized a Trimble GPS receiver model R7 with a Zephyr Geodetic antenna with ground plane (OPUS ID: TRM41249.00) or Trimble GNSS receiver model R7 with a Zephyr Geodetic Model 2 antenna with ground plane (OPUS ID: TRM55971.00) for static control points. A Trimble model R8 GNSS unit was used for collecting check points using real time kinematic (RTK) survey techniques. For RTK data, the collector begins recording after remaining stationary for 5 seconds then calculating the pseudo range position from at least three epochs with the relative error under 1.5cm horizontal and 2cm vertical. All GPS measurements are made with dual frequency L1-L2 receivers with carrier-phase correction.

- Laser Point Processing Laser point coordinates were computed using the IPAS and ALS Post Processor software suites based on independent data from the LiDAR system (pulse time, scan angle), and aircraft trajectory data (SBET). Laser point returns (first through fourth) were assigned an associated (x, y, z) coordinate along with unique intensity values (0-255). The data were output into large LAS v. 1.2 files with each point maintaining the corresponding scan angle, return number (echo), intensity, and x, y, z (easting, northing, and elevation) information. These initial laser point files were too large for subsequent processing. To facilitate laser point processing, bins (polygons) were created to divide the dataset into manageable sizes (<500 MB). Flightlines and LiDAR data were then reviewed to ensure complete coverage of the survey area and positional accuracy of the laser points. Laser point data were imported into processing bins in TerraScan, and manual calibration was performed to assess the system offsets for pitch, roll, heading and scale (mirror flex).

Using a geometric relationship developed by Watershed Sciences, each of these offsets was resolved and corrected if necessary. LiDAR points were then filtered for noise, pits (artificial low points), and birds (true birds as well as erroneously high points) by screening for absolute elevation limits, isolated points and height above ground. Each bin was then manually inspected for remaining pits and birds and spurious points were removed. In a bin containing approximately 7.5-9.0 million points, an average of 50-100 points are typically found to be artificially low or high. Common sources of non-terrestrial returns are clouds, birds, vapor, haze, decks, brush piles, etc. Internal calibration was refined using TerraMatch. Points from overlapping lines were tested for internal consistency and final adjustments were made for system misalignments (i.e., pitch, roll, heading offsets and scale).

Automated sensor attitude and scale corrections yielded 3-5 cm improvements in the relative accuracy. Once system misalignments were corrected, vertical GPS drift was then resolved and removed per flight line, yielding a slight improvement (<1 cm) in relative accuracy. The TerraScan software suite is designed specifically for classifying near-ground points (Soininen, 2004). The processing sequence begins by ‘removing’ all points that were not ‘near’ the earth based on geometric constraints used to evaluate multi-return points. The resulting bare earth (ground) model is visually inspected and additional ground point modeling was performed in site-specific areas to improve ground detail. This manual editing of ground often occurs in areas with known ground modeling deficiencies, such as: bedrock outcrops, cliffs,

deeply incised stream banks, and dense vegetation. In some cases, automated ground point classification erroneously included known vegetation (i.e., understory, low/dense shrubs, etc.). These points were manually reclassified as default. Ground surface rasters were then developed from triangulated irregular networks (TINs) of ground points.

- 2019-09-27 00:00:00 - The NOAA Office for Coastal Management (OCM) received 2 bare earth DEM files in Arc Grid format from DOGAMI. The data were in UTM Zone 10N, NAD83, meters, coordinates and NAVD88 (Geoid03) elevations in meters. The EPSG code (Vertical - 5703), was assigned. The data were converted to GeoTIFF format for ingest into the Digital Coast Data Access Viewer and to adhere to the Open Data Policy. (Citation: processed lidar data)

**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/57801>

**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](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=8830>

[https://noaa-nos-coastal-lidar-pds.s3.us-east-1.amazonaws.com/dem/OLC\\_Blue\\_River\\_DEM\\_2011\\_883](https://noaa-nos-coastal-lidar-pds.s3.us-east-1.amazonaws.com/dem/OLC_Blue_River_DEM_2011_883)

### **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.*