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:

2010 U.S. Geological Survey (USGS) Topographic LiDAR: San Francisco Bay, California

1.2. Summary description of the data:

The primary purpose of this project was to develop a consistent and accurate surface elevation dataset

derived from high-accuracy Light Detection and Ranging (LiDAR) technology for the USGS San Francisco

Coastal LiDAR project area. The LiDAR data were processed to a bare-earth digital terrain model (DTM).

Detailed breaklines and bare-earth DEMs were produced for the project area. Data was formatted according

to tiles with each tile covering an area of 1500 m by 1500 m. A total of 712 tiles were produced for the

project encompassing an area of approximately 610 sq. miles.

This metadata relates to LAS that were classified in the following classes:

Class 1 = Unclassified. This class includes vegetation, buildings, noise etc.

Class 2 = Ground

Class 7= Noise

Class 9 = Water

Class 10= Ignored Ground (due to proximity to breakline)

Original contact information:

Contact Name: Robert Kelly

Contact Org: USGS

Title: USGS NGTOC

Phone: (573) 308-3612

Email: ckelly@usgs.gov

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:
2010-06-11 to 2011-03-04

1.5. Actual or planned geographic coverage of the data:
W: -123.029672, E: -121.894576, N: 38.14676, S: 37.384922

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:

- 2010-11-01 00:00:00 - - Establishment of survey points to support the LiDAR data collection. Three existing published CGPS stations (CHAB, P181, P222) were observed in a GPS control network and used to establish three new points for the primary control for this site. 101U01,101U02, 101U04,AY0887 and AY1499 were observed and used to control all flight missions and static ground surveys. The following are the final coordinates of the control points used for this project: Station Id;Latitude;Longitude;Easting;Northing;Ellipsoidal_Height; 1010601; 37 30 52.26391; -122 29 41.86434; -16.6617 1010602; 37 27 16.57733; -122 06 37.48309; -29.7404 1010603; 37 39 48.24857; -122 07 23.10831; -23.1470 1010604; 37 59 35.03464; -122 03 44.26783; -26.2030 1010605; 37 59 49.29391; -122 45 33.01378; 50.3610
- 2010-01-01 00:00:00 - - Airborne acquisition of Lidar Terrapoint used one Optech ALTM 3100EA system to collect the data. The Optech System was configured in the following method: Aircraft Speed 150 knots Data Acquisition Height 1300 m AGL Swath Width 755 m Distance between Flight Lines 377 m Overlap 50 % Scanner Field Of View 19.2 +/- degrees Pulse Repetition Rate 70 KHz LiDAR Scan Frequency 38.7 Hz Number of Returns per Pulse 4 Discrete returns Beam Divergence 0.3 mRad Flight Line Length <30km Base Station Distance <35km Resultant Raw Point Density ~2 point pt/m2 with overlap 2 missions (o110292a, o110293a) were flown at higher altitude with different parameters to accommodate air traffic control restrictions Aircraft Speed 125 knots Data Acquisition Height 2300 m AGL Overlap 50 % Scanner Field Of View 15 +/- degrees Pulse Repetition Rate 50 KHz LiDAR Scan Frequency 25. 5 Hz Number of Returns per Pulse 4 Discrete returns Beam Divergence 0.3 mRad

Resultant Raw Point Density ~2 point pt/m2 with overlap Aircraft platforms were used in the collection of this project: A Piper Navaho aircraft, registered as FVTL was used to conduct the aerial survey. The Navaho is a fixed wing aircraft that have an endurance of approximately 6-7 hours. -GPS-IMU: High accuracy IMU and GPS information concerning the attitude and position of the sensor were acquired at the same time as the Laser data. Ground based GPS stations also acquired consecutive GPS information for the duration of the flights. A combination of Sokkia GSR 2600 and NovAtel DL-4+ dual-frequency GPS receivers were used to support the airborne operations of this survey. -Number of Flights A total of 14 missions were flown total under good meteorological and GPS conditions to provide complete coverage. The LiDAR data were collected under tidal restrictions at or below Mean Lower Low Water. 10 missions were acquired during spring 2010 (between June 11, 2010 and June 30, 2010) and 4 missions were acquired during fall (between October 19, 2010 and November 7, 2010)
- 2010-01-01 00:00:00 - - Airborne GPS Kinematic processing Airborne GPS kinematic data was processed on-site using GrafNav kinematic On-The-Fly (OTF) software. Flights were flown with a minimum of 6 satellites in view (13o above the horizon) and with a PDOP of better than 4. Distances from base station to aircraft were kept to a maximum of 30 km, to ensure a strong OTF (On-The-Fly) solution. For all flights, the GPS data can be classified as excellent, with GPS residuals of 3cm average but no larger than 10 cm being recorded. The Geoid09 geoid model, published by the NGS, was used to transform all ellipsoidal heights to orthometric.
- 2010-01-01 00:00:00 - - Generation and Calibration of laser points Laser data points are generated using Terrapoint's proprietary laser post-processing software for Midrange data and using Optech's software Dashmap for data acquired with Optech systems. Those software combine the raw laser range and angle data file with the finalized GPS/IMU trajectory information. Each mission is evaluated in Terrasolid's Terramatch software to correct any residual roll pitch heading misalignments, if necessary those values are to the data. The resulting point cloud is projected into the desired coordinate system and created in LAS format. One file per swath. On a project level, a coverage check is carried out to ensure no slivers are present.
- 2010-01-01 00:00:00 - - Mission to mission adjustments of Lidar data All missions are validated and adjusted against the adjoining missions for relative vertical biases and collected GPS kinematic ground truthing points for absolute vertical accuracy purposes. The following adjustments were applied to the data (vertical shifts in meters, + means raise the Lidar points and - means lower the Lidar points) o110163a, Dz= 0.05 o110164a, Dz= 0.15 o110173a, Dz= -0.25 o110178a, Dz= -0.1 o110179a, Dz= 0.05 o110292a, Dz= 0.2 o110293a, Dz= 0.2 o110305a, Dz= 0.2 o110306a line 30608 - 30615, Dz= 0.15 o110306a line 30616 - 30623, Dz= 0.2 o110306a line 30602 - 30607, Dz= 0.05
- 2010-11-01 00:00:00 - - Data Classification and Editing The data was processed using the software TerraScan, and following the methodology described herein. The initial step is the setup of the TerraScan project, which is done by importing project defined tile boundary index encompassing the entire project areas. The acquired

3D laser point clouds, in LAS binary format, were imported into the TerraScan project and divided into file size optimized tiles. Once tiled, the laser points were classified using a proprietary routine in TerraScan. This routine removes any obvious outliers from the dataset following which the ground layer is extracted from the point cloud. The ground extraction process encompassed in this routine takes place by building an iterative surface model. This surface model is generated using three main parameters: building size, iteration angle and iteration distance. The initial model is based on low points being selected by a "roaming window" with the assumption is that these are the ground points. The size of this roaming window is determined by the building size parameter. The low points are triangulated and the remaining points are evaluated and subsequently added to the model if they meet the iteration angle and distance constraints. This process is repeated until no additional points are added within iteration. A second critical parameter is the maximum terrain angle constraint, which determines the maximum terrain angle allowed within the classification model.
- 2010-12-01 00:00:00 - -Deliverable Product Generation >Tiling Index Classified point cloud products were delivered in 695 tiles based on provided a tile scheme given by the client. >Raw LIDAR Point Cloud Raw LiDAR point cloud, was provided in the following formats/parameters: - LAS V1.2, point record format 1, georeferencing information populated in header - The following fields are included in the LAS file: 1. Adjusted GPS time reported to the nearest microsecond 2. Flight line ID 3. Easting (reported to the nearest 0.01m) 4. Northing (reported to the nearest 0.01m) 5. Elevation (reported to the nearest 0.01m) 6. intensity 7. Echo number 8. Classification 9. Scan angle 10. Edge of scan 11. Scan direction - Full swaths, all collected points delivered (except planned cut-off and discarded flightline) - 1 file per swath, 1 swath per file (except when swath had to be divided in section for size or calibration) >Classified LIDAR Point Cloud, tiled Classified LiDAR point cloud, was provided in the following formats/parameters: - LAS V1.2, point record format 1, georeferencing information populated in header - The LAS files adhere to the ASPRS classification scheme as outlined below: 1 : Unclassified, 2 : Ground, 7 : Noise, - The following fields are included in the LAS file: 1. Adjusted GPS time reported to the nearest microsecond 2. Flight line ID 3. Easting (reported to the nearest 0.01m) 4. Northing (reported to the nearest 0.01m) 5. Elevation (reported to the nearest 0.01m) 6. intensity 7. Echo number 8. Classification 9. Scan angle 10. Edge of scan 11. Scan direction
- 2011-03-01 00:00:00 - Dewberry utilizes a variety of software suites for inventory management, classification, and data processing. All LiDAR related processes begin by importing the data into the GeoCue task management software. GeoCue allows the data to retain its delivered tiling scheme (1500 m by 1500 m). After the a review of the Terrapoint ground classification was completed, the dataset was processed through a water classification routine that utilizes breaklines compiled by Dewberry to automatically classify hydrographic features. The water classification routine selects ground points within the breakline polygons and automatically classifies them as class 9, water. During this water classification routine, points

which are in close proximity (0.5 m) to the hydrographic features are moved to class 10, an ignored ground. In addition to classes 1, 2, 9, and 10, the project allows for a Class 7, noise points. This class was only used if needed when points could manually be identified as low/high points. The fully classified dataset is then processed through Dewberry's comprehensive quality control program. The data was classified as follows: Class 1 = Unclassified. This class includes vegetation, buildings, noise etc. Class 2 = Ground Class 7= Noise Class 9 = Water Class 10= Ignored Ground The LAS header information was verified to contain the following: Class (Integer) GPS Week Time (0.0001 seconds) Easting (0.001 m) Northing (0.001 m) Elevation (0.001 m) Echo Number (Integer 1 to 4) Echo (Integer 1 to 4) Intensity (8 bit integer) Flight Line (Integer) LiDAR Scan Angle (Integer degree)
- 2012-10-01 00:00:00 - The NOAA Office for Coastal Management (OCM) received topographic files in LAS format. The files contained lidar elevation and intensity measurements. The data were received in UTM Zones 10 coordinates and were vertically referenced to NAVD88 using the Geoid09 model. The vertical units of the data were meters. OCM performed the following processing for data storage and Digital Coast provisioning purposes: 1. The topographic las files were converted from orthometric (NAVD88) heights to ellipsoidal heights using Geoid09.

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/50115

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=1406
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/1406/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=1406

;

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.