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:
    2008 USACE NCMP Topographic Lidar: Lake Superior

    1.2. Summary description of the data:
    Fugro Pelagos contracted BLOM Aerofilms Limited to carry out the bathymetric laser data acquisition and part

    of the hyperspectral imagery capture for these 3 areas which totals approximately 240km2. This data was collected

    using a Hawk Eye II hydrographic and topographic LiDAR sensor. Imagery was acquired using a uEye 2250-M/C USB2.0

    CCD UXGA Camera. The laserdata was processed onsite using Coastal Survey Studio and POSpac software to check

    for coverage and quality. The data was then processed at the Cheddar office using the Terrasolid OY software;

    the necessary macros were applied and manual reclassification was performed. Each individual wave form

    was analysed in Coastal Survey Studio and reflectance values were gained; these values were then combined

    with the classified laser data A conversion tool was then used to give the correct projections (IGLD85 and

    NAD83) and the data was exported in an ASCII format.

    Original contact information:

      Contact Org: JALBTCX

      Title: Data Production Manager

      Phone: 228-252-1111

      Email: shoals-info@sam.usace.army.mil

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:
2008-11-03 to 2008-11-11

1.5. Actual or planned geographic coverage of the data:
W: -91.208258, E: -85.164464, N: 47.003618, S: 46.536586

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

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:
- 2009-01-01 00:00:00 - The laser data was collected using the HawkEye Mk II airborne system, the Hawkeye MKII system consists of two lasers scanners; one green (wavelength 532um) which is used for capturing the Bathymetric data and one red (wavelength 1.064um) for the Topographic data. The system emitted 64 000 pulses per second (topographic) and 4 000 pulses per second (bathymetric) with up to 4 returns and one reflectance value per pulse. The laser data collected was flown using a fixed wing platform mounted to the Rockwell Aero Commander 690 aircraft registration N690CL. The Aircraft was crewed with one pilot and one operator who was responsible for flight line planning, mission planning and aircraft control during the survey. The operator used the AHAB Airborne Operator Console software to do this Sensor orientation was measured using POS AV 410 with GPS running at 10Hz. The aerial acquisition starting on the 01st October 2008; the flying height for the survey was 400m (approx 1300ft) with a swathe of 220m and a 30m flightline overlap, with the flight speed some 150 knots (approx 290 km/h). A total of 145 flight-lines were required and a total of 17 online hours to cover the 3 survey areas in order to achieve 100% coverage. Area 1 required 88 lines and 11 online hours, Area 5 required 24 lines and 3 online hours and Area 6 required 33 lines and 3 online hours. The raw LiDAR data was checked for matching and coverage following each flight; trajectory files were produced using POSpac v5.2 and the data was then processed using Coastal Survey Studio (CSS) v2.1. A final check at the end of the acquisition period confirmed that all requirements had been met and all the data acquired to specification. On completion of all the QC checks the laser data for each flight line was exported as individual files for import into Terrascan for cleaning and classification. Topographic and hydrographic data was processed to different criteria, however during processing all data sets were kept together so it

was possible to edit and visualise both datasets in the same environment simultaneously. Both the topographic and hydrographic laser data was imported into the TerraSolid OY software running in the MicroStation v8 environment. The laser data was passed through a number of automated macros for classification. The topographic laser data was then checked with the imagery by an experienced editor to remove any hits from the sea areas and to ensure that the ground was correctly classified. To ensure the quality of the data it was compared with topographic land survey data and overlapping or crossing flightlines are checked. The hydrographic laser data was "cleaned", removing any rogue points, floating structures, deep points or null points with no bottom returns. Overlapping or crossing flightlines were checked and comparison with topographic points took place to ensure quality. To gain reflectance values, the wave form of each individual laser sounding was analyzed in CSS (Coastal Survey Studio); the echo intensity was extracted and the data was corrected for several system biases. These included 'receiver gain', 'flight altitude' and 'scanner angle'. Several clear sand areas with known reflectance were used as a reference sample for the creation of a reflectance calibration model which took both theoretical bias and environmental bias into account. This model was used to further correct the data gained. An internal tool was then used to take those values and match them with the 'cleaned' data set by time and position. The tool was used to change the projection of the points and produce a hydrographic return ASCII file which contains data regarding longitude, latitude, UTM zone, easting, northing, elevation(IGLD85), elevation (ellipsoid), date (YYYY.MM.DD), time (HH:MM:SS:ssssss) and Bottom reflectance data relative to both NAD83 ellipsoid and International Great Lakes Datum 1985 (IGLD85) .

- 2009-01-01 00:00:00 - The laser data was collected using the HawkEye Mk II airborne system, the Hawkeye MKII system consists of two lasers scanners; one green (wavelength 532um) which is used for capturing the Bathymetric data and one red (wavelength 1.064um) for the Topographic data. The system emitted 64 000 pulses per second (topographic) and 4 000 pulses per second (bathymetric) with up to 4 returns and one reflectance value per pulse.   The laser data collected was flown using a fixed wing platform mounted to the Rockwell Aero Commander 690 aircraft registration N690CL. The Aircraft was crewed with one pilot and one operator who was responsible for flight line planning, mission planning and aircraft control during the survey. The operator used the AHAB Airborne Operator Console software to do this. Sensor orientation was measured using POS AV 410 with GPS running at 10Hz. The aerial acquisition starting on the 01st October 2008; the flying height for the survey was 400m (approx 1300ft) with a swathe of 220m and a 30m flightline overlap, with the flight speed some 150 knots (approx 290 km/h). A total of 145 flight-lines were required and a total of 17 online hours to cover the 3 survey areas in order to achieve 100% coverage. Area 1 required 88 lines and 11 online hours, Area 5 required 24 lines and 3 online hours and Area 6 required 33 lines and 3 online hours. The raw LiDAR data was checked for matching and coverage following each flight; trajectory files were produced using POSpac v5.2

and the data was then processed using Coastal Survey Studio (CSS) v2.1. A final check at the end of the acquisition period confirmed that all requirements had been met and all the data acquired to specification. On completion of all the QC checks the laser data for each flight line was exported as individual files for import into Terrascan for cleaning and classification. Topographic and hydrographic data was processed to different criteria, however during processing all data sets were kept together so it was possible to edit and visualise both datasets in the same environment simultaneously. Both the topographic and hydrographic laser data was imported into the TerraSolid OY software running in the MicroStation v8 environment. The laser data was passed through a number of automated macros for classification. The topographic laser data was then checked with the imagery by an experienced editor to remove any hits from the sea areas and to ensure that the ground was correctly classified. To ensure the quality of the data it was compared with topographic land survey data and overlapping or crossing flightlines are checked. The hydrographic laser data was "cleaned", removing any rogue points, floating structures, deep points or null points with no bottom returns. Overlapping or crossing flightlines were checked and comparison with topographic points took place to ensure quality. The data was then exported from Terrascan into a conversion tool; this was used to change the projection of the points and produce ASCII files which contain data relative to both NAD83 ellipsoid and International Great Lakes Datum 1985 (IGLD85). Four ASCII tiles were produced for each 5km tile; topographic first return, topographic last return, hydrographic return and a combined topographic last return and hydrographic return. The topographic first return and topographic last return files were then reopened in Terrascan. Using the trajectories produced by POSpac and deducing by time, all points were put into their respective flightline. Each individual flightline was then exported in 5km tiles in LAS1.0 format.

- 2013-08-08 00:00:00 - The NOAA Office for Coastal Management (OCM) received topo and hydro files in ASCII format. Topography data was provided within GeoClassified LAS files and original LAS strips. The files contained LiDAR elevation and intensity measurements. The points were classed as 'never classified.' The data were provided in Geographic coordinates and ellipsoidal heights and in orthometric heights. OCM performed the following processing to the ellipsoidal height data to make it available within the Digital Coast: 1. ASCII formatted files were converted to LAS files using LAStools. The ASCII files contained topography/ bathymetry data. Bathyemtric LAS files, along with provided GeoClassified LAS files and original LAS strips were processed to remove high and and low error (or "air") points. 2. All points classified as 21 were reclassified to 17 to fit the defined a scheme for NOAA Data Access Viewer. 3. All LAS files were then shifted vertically using NOAA's Vdatum software algorithms from IGLD85 to NAVD88. 4. All LAS files were then shifted horizontally and shifted from NAD83, UTM zone 16 to Geographic decimal degrees. 5. Metadata were created, along with a KMZ for the project and ancillary information provided in metadata record. 6. Finally, since original provided were differentiated by data type (i.e. GeoClassified LAS files, LAS strips

and ASCII txt files, all data were compiled into one dataset. 7. Due to vertical and horizontal datum shifting in order to have ASCII, geoclassified and las strips to match NOAA OCM requirements, the data has been reverted to all unclassified points, although data contains bathymetric and topographic points.

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:
- 1.6. Type(s) of data
- 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/49797

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=2517
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/2517/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;

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.