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:

1885 - 2021 USGS CoNED Topobathy DEM (Compiled 2022): Northern Gulf of Mexico

1.2. Summary description of the data:

To support U.S. Army Corps of Engineers (USACE) storm surge modeling for the Louisiana Coastal Protection and Restoration Authority (CPRA), Lowermost Mississippi River Management Program (LMRMP), the U.S. Geological Survey (USGS) Coastal National Elevation Database (CoNED) Applications Project has created an integrated 1-meter topobathymetric digital elevation model (TBDEM) for the Northern Gulf of Mexico (NGOM)-2. High-resolution coastal topobathymetric data are required to model flooding, storms, and sea-level rise inundation hazard zones and other earth science applications, such as the development of sediment transport and storm surge models. The new TBDEM consists of the best available multi-source topographic and bathymetric elevation data for the region including neighboring islands, bays, marsh, waterways, and inlets. The NGOM-2 TBDEM integrates 286 different data sources including topographic and bathymetric data, such as lidar point clouds and acoustic surveys obtained from USGS 3D Elevation Program (3DEP), the National Oceanic and Atmospheric Administration, USACE, U.S. Department of Agriculture Natural Resources Conservation Service, Louisiana CPRA, Louisiana Department of Transportation, Lake Pontchartrain Basin Foundation, and the Texas Natural Resources Information System. The topographic and bathymetric surveys were sorted and prioritized based on survey date, accuracy, spatial distribution, and point density to develop a model based on the best available elevation and bathymetric data. Because bathymetric data are typically referenced to tidal datums, such as Mean High Water or Mean Low Water, all tidally referenced heights were transformed into orthometric heights based on the GEOID12B datum, which is normally used for mapping elevation on land using the North American Vertical Datum of 1988. The spatial horizontal resolution is 1-meter. The general location ranges from the old river control structure on the Mississippi River in the north to the Mississippi River delta in the south and extending from the Texas/Louisiana border on the west to the Alabama/Florida border on the east. The overall temporal range of the input topography and bathymetry is 1885 to 2021 with a maximum depth extending to 2,358 meters. The topography surveys are from 2002-2020. The bathymetry surveys were acquired between 1885 and 2021. The data release and all related items of information were prepared by USGS through a sub-contract with the Louisiana Coastal Protection and Restoration Authority, who was funded under Award No. GNTCP18LA0035 from the Gulf Coast Ecosystem Restoration Council (RESTORE Council). The data, statements, findings, conclusions, and recommendations are those of the author[s] and do not necessarily reflect any determinations, views, or policies of the RESTORE Council. This data release was also co-funded by the USGS Coastal and Marine Hazards and Resources Program (CMHRP) for the Northern Gulf of Mexico (NGOM2).

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:
1885-01-01 to 2021-12-31

1.5. Actual or planned geographic coverage of the data:
W: -93.9995, E: -87.5072, N: 31.1266, S: 28.6991

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

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):

Lineage Statement:
This CoNED data set for the northern Gulf of Mexico (TX, LA, MS, AL) was provided to NOAA OCM by USGS for inclusion in the NOAA Digital Coast Data Access Viewer.

Process Steps:

- 2021-07-08 00:00:00 - The principal methodology for developing the integrated topobathymetric digital elevation model (TBDEM) can be organized into three main components. The "topography component" consists of the land-based elevation data, which is primarily comprised from high-density lidar data. The topographic source data will include lidar data from different sensors (Topographic, Bathymetric) with distinct spectral wavelengths (NIR-1064nm, Green-532nm). The "bathymetry component" consists of hydrographic sounding (acoustic) data collected using watercraft rather than bathymetry acquired from green laser lidar within an airborne platform. The most common forms of bathymetric acquisitions include are multi-beam, single-beam, and swath. The final component, "integration", encompasses the assimilation of the topographic and bathymetric data along the near-shore based on a predefined set of priorities. The land/water interface is the most critical area, and green laser systems, such as the Experimental Advanced Airborne Research lidar (EAARL-B) and the Coastal Zone Mapping and Imaging

Lidar (CZMIL) that cross the near-shore interface are valuable in developing a seamless transition. The TBDEM created from the topography and bathymetry components is a raster with associated spatial masks and metadata that can be passed to the integration component for final model incorporation. Topo/Bathy Creation Steps: Topography Processing Component: a) Quality control check the vertical and horizontal datum and projection information of the input lidar source to ensure the data is referenced to the North American Vertical Datum of 1988 (NAVD88), the North American Datum of 1983 (NAD83), and the Universal Transverse Mercator (UTM) projection. If the source data is not NAVD88, transform the input lidar data to NAVD88 reference frame using current National Geodetic Survey (NGS) geoid models and NOAA's Vertical Datums Transformation (VDatum) software. Likewise, if required, convert the input source data to NAD83 and reproject to UTM. b) Check the classification of the topographic lidar data to verify the data are classified with the appropriate classes. If the data have not been classified, then classify the raw point cloud data to non-ground (class 1) ground (class 2), and water (class 9) classes using LP360-Classify. c) Derive associated breaklines from the classified lidar to capture internal water bodies, such as lakes and ponds and inland waterways. Inland waterways and water bodies were hydro-flattened where no bathymetry is present. Hydro-flattening is the process of creating a lidar-derived DEM in which water surfaces appear and behave as they would in traditional topographic DEMs created from photogrammetric digital terrain models (DTMs). d) Extract the ground returns from the classified lidar data and randomly spatial subset the points into two point sets based on the criteria of 95 percent of the points for the "Actual Selected" set and the remaining 5 percent for the "Test Control" set. The "Actual Selected" points will be gridded in the terrain model along with associated breaklines and masks to generate the topographic surface, while the "Test Control" points will be used to compute the interpolation accuracy, Root Mean Square Error (RMSE) from the derived surface. e) Generate the minimum convex hull boundary from the classified ground lidar points that creates a mask that extracts the perimeter of the exterior lidar points. The mask is then applied in the terrain to remove extraneous terrain artifacts outside of the extent of the ground lidar points. f) Using a terrain model based on triangulated irregular networks (TINs), grid the "Actual Selected" ground points using breaklines and the minimum convex hull boundary mask at a 1-meter spatial resolution using a natural neighbor interpolation algorithm. g) Compute the interpolation accuracy by comparing elevation values in the "Test Control" points to values extracted from the derived gridded su

- 2021-07-08 00:00:00 - Bathymetry Processing Component: a) Quality control check the vertical and horizontal datum and projection information of the input bathymetric source to ensure the data is referenced to NAVD88 and NAD83, UTM. If the source data is not NAVD88, transform the input bathymetric data to NAVD88 reference frame using VDatum. Likewise, if required, convert the input source data to NAD83 and reproject to UTM. b) Prioritize and spatially sort the bathymetry based on date of acquisition, spatial distribution, accuracy, and point density to

eliminate any outdated or erroneous points and to minimize interpolation artifacts. c) Randomly spatial subset the bathymetric points into two point sets based on the criteria of 95 percent of the points for the "Actual Selected" set and the remaining 5 percent for the "Test Control" set. The "Actual Selected" points will be gridded in the empirical Bayesian kriging model along with associated masks to generate the bathymetric surface, while the "Test Control" points will be used to compute the interpolation accuracy (RMSE) from the derived surface. d) Spatially interpolate bathymetric single-beam, multi-beam, and hydrographic survey source data using an empirical Bayesian kriging gridding algorithm. This approach uses a geostatistical interpolation method that accounts for the error in estimating the underlying semivariogram (data structure - variance) through repeated simulations. e) Cross validation - Compare the predicted value in the geostatistical model to the actual observed value to assess the accuracy and effectiveness of model parameters by removing each data location one at a time and predicting the associated data value. The results will be reported in terms of RMSE. f) Compute the interpolation accuracy by comparing elevation values in the "Test Control" points to values extracted from the derived gridded surface; report the results in terms of RMSE.
- 2021-07-08 00:00:00 - Integration Component: a.) Analyze the input data priority based on project characteristics, including acquisition dates, cell size, retention of features, water surface treatment, visual inspection, and presence of artifacts. b.) Prioritize and spatially sort the input topographic, topobathymetric, and bathymetric raster layers based on date of survey acquisition date, accuracy, spatial distribution, and point density to sequence the raster data in the integrated elevation model. c.) Develop an ArcGIS geodatabase (Mosaic Dataset) and spatial seamlines for each individual topographic, topobathymetric, and bathymetric raster layer included in the integrated elevation model. d.) Create an overview project masking polygon (based on final study AOI) e.) Using Grid Index Features, create a 6000x6000 fishnet feature class for tile-based integration processing f.) Create simple raster (vector) boundaries (custom simple_raster_bnd_batch tool) from the final set of input rasters based on the input priority. The rasters should be prioritized with the highest priority ranking on top and so forth. g.) Generate spatially referenced metadata for each input raster (custom make spatial metadata tool) from the simple raster boundary files, based on the input priority. The boundaries should be prioritized with the lowest priority (input raster layer) ranking on top and so forth. The spatially referenced metadata consists of the group of geospatial polygons that represent the spatial footprint of each data source used in the generation of the TBDEM. Each polygon is populated with raster metadata attributes that describe the source data, such as, resolution, acquisition date, source name, source organization, source contact, source project, source URL, and data type (topographic lidar, topobathymetric lidar, multibeam bathymetry, single-beam bathymetry, etc.). h.) Generalize seamline edges to smooth transition boundaries between neighboring raster layers and split complex raster datasets with isolated regions into individual unique raster groups. i.) Using the spatial metadata and tile fishnet, spatially mosaic (custom make micro mosaic dataset tool) the input raster

data sources based on priority to create a seamless topobathymetric composite at a cell size of 1-meter using a linear spatial blending (ten pixel overlapping area) technique between input source layers. j.) Perform a visual quality assurance (Q/A) assessment on the output TBDEM composite to review the integrated mosaic for artifacts and anomalies.
- 2022-08-01 00:00:00 - The NOAA Office for Coastal Management (OCM) received one tif file for the topobathymetric data for northern Gulf of Mexico (TX, LA, MS, AL) from the USGS Coastal National Elevation Database (CoNED) Applications Project for inclusion in the NOAA Digital Coast Data Access Viewer. The data were in UTM Zone 15 NAD83(2011), meters coordinates and in NAVD88 (Geoid12B) elevations in meters. The data were at a 1m grid spacing. The data were retiled to 8512, cloud optimized GeoTiffs using gdal_retile.py and the horizontal (6344) and vertical (5703) EPSG codes were assigned.

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/67613

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=9562/details/9562
https://noaa-nos-coastal-lidar-pds.s3.us-east-1.amazonaws.com/dem/CoNED_NGOM2_DEM_2022_956

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)

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.