Environmental Studies Program: Studies Development Plan FY 2015-2017

Region: Headquarters, Marine Minerals Program

Planning Area(s): All

Title: Using Dredge Plant Operational Data to Measure Cumulative Use and Cumulative Impacts

BOEM Information Need(s) to be Addressed: BOEM does not currently have an efficient and systematic method of tracking the "operational time" a dredge is operating in a particular location within a borrow area, the cumulative use of a borrow area, or time-recovery intervals between uses. BOEM's MMP needs to more accurately document and track dredging intensity (location, duration, and frequency) and vessel movement within and surrounding borrow areas. This intensity information will be used to document environmental performance, improve environmental analyses and consultations, develop and adapt mitigation strategies, and support good stewardship and management of OCS borrow areas and environmental resources.

Approximate Cost: (in thousands) $200 **Period of Performance:** FY 2016-2017

Description:

Background: Many OCS borrow areas are targeted by multiple users and at regular dredging intervals. Dredge operational data represents an untapped, but useful measure of cumulative use and bottom disturbance. The National DQM Program, housed within the USACE Mobile District, currently supports nationwide, automated monitoring of dredging operations for federally funded or federally regulated beach nourishment, coastal restoration, and navigation projects. Sensors monitor all operating parameters of the dredging operation (i.e. dredging location, vessel speed, material density, pump RPM, etc.). These operational data can be filtered based on material recovery and pump-out status and are logged every 10 seconds. The DQM Support Center provides and supports all information technology infrastructure, data analyses tools, and web-based data delivery systems. BOEM has worked cooperatively with the DQM Support Center and USACE districts to obtain DQM data for monitoring OCS dredging operations to (1) ensure dredge contractors are operating within the authorized footprint of the borrow area(s) and to (2) track the physical/spatial attributes of the dredging process. Leveraging the existing DQM program for the purpose of tracking dredge operational data to measure cumulative use and impacts is a new application of DQM data and will facilitate improved BOEM and USACE environmental analyses.

Frequently, the footprint leased by BOEM is notably larger than the area actually disturbed in a single construction cycle. The comparatively larger leased footprint provides flexibility to access sufficient sand volume in the event that production challenges are encountered during dredging. DQM currently provides the dredge location and operating status data which BOEM uses to determine where the dredge has been operating within a leased area. Additionally, BOEM also monitors the volumetric change, cut depth, and cumulative use of a borrow area through complementary pre-

and post-construction bathymetric surveys, collected separately using single-beam, swath, or multi-beam sonar.

To adequately gather necessary data, BOEM must be able to measure physical and temporal dredge intensity. BOEM needs a more efficient and standardized method to query the existing DQM database to produce cumulative dredging intensity data maps within repetitive OCS borrow areas. The dredge intensity data, measured as a function of time in location, would be complementary to existing volumetric change and depth cut determined from bathymetric isopachs. Exposure time, or the cumulative time the dredge operates in a defined area, would be determined from the dredge time stamp and operational code in the DQM data. Similarly, BOEM would also characterize the transit of dredge plants between the borrow area and the pump-out location in instances when a hopper dredge is used.

Objectives: Leverage the existing USACE National DQM program to:

- Develop a process to generate cumulative use and time related spatial analysis/reports of both area of seabed dredged and/or transited in a defined location.
- Develop cumulative use and time related spatial reports/analysis for both single and muti-load dredge and track plots.
- Develop interpolation procedures necessary to address gaps in time series data.
- Develop a geospatial framework to convert the point location-time data into a defined exposure time grid.
- Develop geospatial metadata for the output product including the relevant processing history metadata sections.
- Provide a report documenting the methodologies to develop the dredging intensity algorithm.

Methods: Identify cost-sharing and leveraging opportunities with the USACE DQM Program. Utilize existing operational dredge data from the DQM database to develop a dredging intensity algorithm and cumulative impact surface performance model. Develop an automated process to generate cumulative use spatial maps and time series line charts of area of seabed dredged and/or transited versus time in a defined location. Develop the geospatial framework to convert point location data into a defined exposure time grid using said algorithm. Perform geostatistical analyses to address any spatial and temporal autocorrelation issues to ensure the statistical validity and quality of time-exposure data. Test and validate different gridding approaches using structured and unstructured grid formats. Develop interpolation procedures necessary to address gaps in time series data. Develop suitable workflow model for use in GIS.

Revised Date: January 13, 2015