A National Outer Continental Shelf Sand / Sediment Inventory

Lora Turner

December 12, 2016

Restoring and Protecting Our Nation’s Coasts through Stewardship of OCS Resources
Agenda

MMPGIS Overview

Sand Resource Analysis Tool Prototype
  — How the tool works
  — Preliminary results

Collaboration
  — Partner data incorporated into the MMPGIS
  — Managing multiuse conflicts

Future
What problem are we trying to solve by developing a Marine Minerals Geodatabase?

The need to know where compatible sand / sediment resources in the OCS to support coastal restoration and marine spatial planning.

What questions will the MMPGIS support?

- Where are the OCS sand / sediment resources to inform management decisions within ocean planning and lease use?
- What is the extent of compatible sand / sediment resources in the OCS to support restoration?
- Where is the authoritative source data for sand resources?
- What vital marine mineral products and data on national, regional, and local scales do managers, planners, and scientists need?
- How do we improve sharing marine mineral datasets with our partners?

MMPGIS will provide capability for a National OCS Sand / Sediment Inventory
MMPGIS Overview

Developing a Marine Minerals Enterprise Geodatabase
Collect, Analyze, and Process

Bathymetry
Sub-bottom seismic
BOEM Line NY 107

Sidescan
BOEM Line NY 102 East Montauk

Vibracores

Transform

Bathymetry & Backscatter

Environmental Data

Bottom Characteristics

Leasing / Planning/Construction

Lease Areas
Dredge Areas
Beach Placement Areas
Outer Continental Shelf Study Area
Beach Study Areas
Avoidance Areas
Sand Resources
16% of the data inventoried still requires manual extraction
MMPGIS Overview

Sand Resource Analysis Tool

SRAT to support the National OCS Sand / Sediment Inventory
Historical Data

New Jersey Sediment Resources

Tracking Sediment Resources through Time

- 2004, 12.4 mcy
- 2007, 17.9 mcy
- 2015, 31.3 mcy
Prototype

Sand Resource Analysis Tool

Inputs

- Minimum Volume
- Min Grain Size
- Max Grain Size
- Munsell

Reconnaissance look at finding potential sediment resources for coastal restoration
Prototype

Sand Resource Analysis Tool
Prototype

Sand Resource Analysis Tool

X,Y, New Z → Bottom horizon surface raster

Coastal Relief Model – New Raster → Isopach raster
Prototype

Sand Resource Analysis Tool
Prototype

Sand Resource Analysis Tool

- With only limited core samples, able to identify major resources
- Still in prototype
- Need to incorporate more data into MMPGIS
  - Additional core data
  - Manual data entry of current core data supporting documents
- Version 2
  - Input bathymetry raster
  - Additional criteria
  - Output report with summary statistics
Collaboration

Developing a Marine Minerals Enterprise Geodatabase

Maryland Department of Natural Resources, Maryland Geological Survey
Baseline Acoustic Seafloor Classification of Offshore Borrow Area

New Jersey Geological and Water Survey
Department of Environmental Protection

Organize

- Bathymetry & Backscatter
- Environmental Data
- Bottom Characteristics
- Leasing / Planning/Construction

Sand Resource Area Thickness

Bottom Classification

Figure 1. Significant Sand Resource Areas in State and Federal Waters offshore Monmouth County, GMS 15-3, Plate 1.
Collaboration

Marine Spatial Planning

Multiple Uses
- Lease Areas
  - Representation: LeaseAreas_Rep
    - Complete
    - Active
    - Proposed
    - Expired
  - Sand Resources
    - Representation: SandResources_Rep
      - Proven
      - Probable
      - Potential
      - Possible
      - Unusable
    - Ocean Disposal Sites
    - Wind Planning Areas
Knowing where resources are allows for faster engagement with other OCS stakeholders

In the Atlantic

Renewable Industry
- Wind Planning Areas
- Renewable Leases
- Hydrokinetic Leases

Telecom Industry
- Submarine Cables

Shipping Industry
- Shipping Channels

Dredging Operations

Fishing Industry

Multi-Use Management – Marine Spatial Planning
Knowing where resources are allows for faster engagement with other OCS stakeholders

In the Gulf of Mexico

Oil and Gas Industry
- Wells
- Platforms
- Pipelines

Telecom Industry
- Submarine Cables

Shipping Industry
- Shipping Channels

Dredging Operations

Fishing

Multi-Use Management – Marine Spatial Planning
Identification and Analysis of Sediment / Sand Resources

Marine Minerals Program Geospatial and Information System (MMPGIS)

- Regional Offshore Sand Source Inventory (ROSSI)
- Single Beam Survey Depth
  - Single Beam Survey Backscatter
- Multibeam Sonar Survey Depth
  - Multibeam Sonar Survey Backscatter
- LiDAR Survey Depth
- Magnetometer Surveys
- Sidescan Sonar

Environmental Data

- Grab Samples
- Core Samples
- Water Samples
- Camera Stations
- Endangered Species Impacts

Bottom Characteristics

- Faults
- Isopachs
- Contours
- Tracklines
- Seabed Features (geological/acoustic/magnetic)
- Primary and Secondary Sediments
- Seismic (anomalies/facies)
- Paleo Channels
- Acoustic Profiles

Mapping offshore resources with our partners

Capturing where it is, what it is, how much is there

ROSSI registered with DATA.GOV

Cooperative Agreements
Collaboration

Identification and Analysis of Sediment / Sand Resources

Marine Minerals Program Geospatial and Information System (MMPGIS)

- Grab Samples
- Core Samples
- Water Samples
- Camera Stations
- Endangered Species Impacts

Seabed Features (geological/acoustic/magnetic)

Primary and Secondary Sediments

Seismic (anomalies/facies)

Paleo Channels

Acoustic Profiles

Bathymetry & Backscatter

- Single Beam Survey Depth
- Single Beam Survey Backscatter
- Multibeam Sonar Survey Depth
- Multibeam Sonar Survey Backscatter
- LiDAR Survey Depth
- Magnetometer Surveys
- Sidescan Sonar

Environmental Data

- Grab Samples
- Core Samples
- Water Samples
- Camera Stations
- Endangered Species Impacts

Bottom Characteristics

- Faults
- Isopachs
- Contours
- Tracklines
- Seabed Features (geological/acoustic/magnetic)
- Primary and Secondary Sediments
- Seismic (anomalies/facies)
- Paleo Channels
- Acoustic Profiles

Louisiana Sand / Sediment Resources Database (LASARD)

Work with LA DNR to register the updated LASARD with DATA.GOV

Mapping offshore resources with our partners

Capturing where it is, what it is, how much is there
Identification and Analysis of Sediment / Sand Resources

Bathymetry & Backscatter

Environmental Data

Bottom Characteristics

Marine Minerals Program Geospatial and Information System (MMPGIS)

BOEM Environmental Studies Program
Collaboration

Federal Agencies

• BOEM
• DOI OCIO
• USGS
• BSEE
• USACE
• NOAA

State Entities

• New Jersey Department of Environmental Protection
• New York State Department of State
• Virginia Department of Mines, Minerals and Energy
• Maryland Department of Natural Resources
• Florida Department of Environmental Protection
• South Carolina Department of Natural Resources
• Maine Geological Survey
• Louisiana Geological Survey
• Geological Survey of Alabama
• Mississippi Department of Marine Resources

Educational Institutions

• University of Delaware - Delaware Geological Survey
• University of Rhode Island
• University of New Hampshire
• University of Massachusetts Amherst - Massachusetts Geological Survey
• Dept of Geological Sciences, East Carolina University & UNC Coastal Studies Institute
• Skidway Institute of Oceanography, University of Georgia
• Louisiana State University
• The University of Texas
• Texas A&M University

Industry

• Coastal Engineering Consulting Firms
• Geospatial Services
• Cloud Services
BOEM MARINE MINERALS PROGRAM RECOGNIZES ITS FEDERAL AND STATE PARTNERS IN PROMOTING COASTAL RESILIENCE
### 2017 – 2018 Objectives

<table>
<thead>
<tr>
<th>2017 – 2018 Objectives</th>
<th>Success Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrate MMP and partner agency geospatial data and related non-geospatial information into a uniform data model that enables MMP to characterize and delineate sand resources on the Outer Continental Shelf (OCS) and support resource decisions</td>
<td>MMP Relational Geodatabase capability utilized by BOEM within 2 years</td>
</tr>
<tr>
<td>Create an OCS sand resource inventory for MMP</td>
<td>Establish a national inventory in 2017 for the Gulf of Mexico and Atlantic</td>
</tr>
<tr>
<td>Create custom reporting and analysis tools to facilitate use by scientists, managers, and planners</td>
<td>Applications realized within 3 years</td>
</tr>
<tr>
<td>Establish data stewardship and data structure for the Marine Minerals Program (Leverage historic data by converting to a standardized, digital format)</td>
<td>85% of digital data structured and 10% of manual core data incorporated by 2017</td>
</tr>
<tr>
<td></td>
<td>Sand Resource Area datasets (authoritative data) registered on Marine Cadastre / Data.gov</td>
</tr>
<tr>
<td>Support productive local, state, and Federal collaboration and geospatial information exchange across all levels of government</td>
<td>Data retrievable by BOEM offices within 3 years and our Federal / State partners within 4 years</td>
</tr>
</tbody>
</table>
Thank you

Lora Turner
Physical Oceanographer
Bureau of Ocean Energy Management
lora.turner@boem.gov
703-787-1747

Alexa Ramirez
Marine Geologist
Quantum Spatial
aramirez@quantumspatial.com
727-329-0947