NROC Council Meeting  
Portsmouth, NH  
March 14, 2014

Meeting Materials

This was the Winter NROC meeting, during which Council members and partners provided updates; an update on the Sandy Comprehensive Study was given, along with a presentation on associated modeling efforts; the potential for a regional sand management working group was discussed; as well as an overview and results of the ROP Benefits project.

Attached are the following materials and presentations from the meeting:

- North Atlantic Coast Comprehensive Study: Resilient Adaptation to Increasing Risk (Lynn Bocamazo, USACE)
- North Atlantic Coast Comprehensive Study: Overview of Numerical Coastal Storm Modeling (Lynn Bocamazo, USACE)
- Marine Minerals Program: Restoring and Protecting Our Nation’s Coasts through Stewardship of OCS Resources (Renee Orr, BOEM)
- Value of Regional Ocean Partnerships (Andy Lipski, SeaPlan and Arleen ODonnell, ERG)
North Atlantic Coast Comprehensive Study: Resilient Adaption to Increasing Risk

U.S. Army Corps of Engineers
Coastal Storm Risk Management Planning Center of Expertise

13 February 2014
Outline

- Background and Sandy’s Impact
- North Atlantic Coast Comprehensive Study (NACCS) Study Area and Future Scenarios
- NACCS Framework
  - Flooding Exposure
  - Planning Reaches
  - Risk Reduction Measures and Nature-Based Features
- Collaborative Efforts
- Preliminary Findings, Outcomes and Opportunities
- Schedule
- Way Ahead
Background

“That using up to $20,000,000* of the funds provided herein, the Secretary shall conduct a comprehensive study to address the flood risks of vulnerable coastal populations in areas that were affected by Hurricane Sandy within the boundaries of the North Atlantic Division of the Corps…” (*$19M after sequestration)

- Complete by Jan 2015

Goals

- Provide a Risk Reduction Framework, consistent with USACE-NOAA Rebuilding Principles
- Support Resilient Coastal Communities and robust, sustainable coastal landscape systems, considering future sea level rise and climate change scenarios, to reduce risk to vulnerable population, property, ecosystems, and infrastructure
Background

- Hurricane Sandy impacted the Atlantic coastline in October 2012
- Affected entire east coast from Florida to Maine; and west to Great Lakes
- Greatest areas of impact NJ, NY, CT
- Public Law 113-2, enacted 29 January 2013
Sandy’s Impact

**Human**
- 286 lives lost (159 in the US)
- 500,000 people affected by mandatory evacuations
- 20,000 people required temporary shelter
- Extensive community dislocations – continuing today in some areas

**Economic**
- $65B in damages in the U.S.
- 26 states affected (10 states and D.C are in the study area)
- 650,000 houses damaged or destroyed
Sandy’s Impact

**Infrastructure**
- **Telecommunications** significantly disrupted (25% of cell towers in study area were out of service at one period of time)
- **Mass transit** shut down (3 weeks for many NYC subway lines)
- **Bridges, tunnels** damaged
- **Fuel** shortages (2 refineries shut down, 4 operations reduced)
- 8.5M people lost **power** (some for several months)
- **Barrier islands (natural coastal features) breached** in 4 locations

**Existing Coastal Projects**
- **Beaches/Dunes**
  - Significant volumes of **sand lost** (~ 3 million cubic yards in NYC alone)
  - Hazards to **Navigation** from sand movement
- **Walls, Revetments and Levees**
  - Most not significantly damaged; some with toe scouring
  - **Cliff Walk, RI revetment** notable exception, extensive damage
9 Focus Areas:
Locations not having partnered projects/studies at time of Sandy event
NACCS Future Scenarios

- **Climate Change and Sea Level Rise**
  - Sea level is increasing throughout the study area
  - Increased populations and infrastructure exposed to storm surge and frequency of flooding
  - Shorelines are changing in response to sea level rise
  - Historic erosion patterns will continue and accelerate

- **Socioeconomic Factors**
  - Population is aging (complicates evacuation/relocation during flooding)
  - Population is increasing in coastal zone (greater exposure)
  - Vulnerability of operating channels and ports critical to regional and national economy

- **Environmental**
  - Coastal Habitats increasingly challenged by expanding built environment
  - Climate change and related habitat transitions with potential for altering species distribution and competition
Future Scenarios

Sea level rise* evaluated for the years 2018, 2068, 2100** and 2118

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* SLR evaluated using both USACE’s Engineer Circular (EC) 1165-2-212 (low, intermediate high) and NOAA ‘s highest SLR scenarios

** Intergovernmental Panel on Climate Change scenario
NACCS Framework

- **Who and what** is exposed to flood risk?
- **Where** is the flood risk?
- What are the **appropriate strategies** and measures to reduce flood risk and how do they align with **each other and other regional plans**?
- What is the **relative cost** of a particular strategy compared to the anticipated risk reduction?
- What **data are available** to make a **RISK INFORMED decision**?
- What **data gaps exist/can be closed** through the NACCS?
Flooding Exposure

**Exposure Index**
- Population **density and infrastructure** (number of people and infrastructure in communities subject to flooding)
- **Socio-economic groups** (populations that may have more difficulty preparing and responding to flooding)
- **Environmental** (critical habitat, wetlands and other areas that maintain resiliency of coastal systems)

**Mapping**
- Areas of highest exposure during Sandy
- Majority were highly populated/urban core
  - Boston
  - NY/northern NJ metropolitan region
  - Connecticut shoreline
  - Monmouth and Cape May Counties
  - Upper Delaware Bay portion of NJ
Planning Reaches

36 reaches: Divided by the physical properties of the coastline (either man made or natural)
Risk Reduction Measures

- **Structural**
  - Storm surge barriers, levees, breakwaters, groins, beach fill, dunes
  - **Natural and nature-based features**
    (e.g. living shorelines, wetlands, oyster reefs, Sub-Aquatic Vegetation restoration)

- **Non-Structural**
  - Floodproofing, elevation, acquisition
  - Evacuation, flood warning systems

- **Policy/Programmatic**
  - Floodplain management, land use planning
  - State/Local Coastal Zone Policies, Flood Insurance Programs
  - Natural resources/surface water management

http://www.corpsclimate.us/ccacrrr.cfm
**Nature-Based Features**

- Natural landscapes or engineered ecosystems, and blended solutions
- Intrinsically dynamic, adaptive, and potentially more resilient than built systems

**Closing Data Gaps**

- Evaluate performance during Sandy
- Identify storm resilient features
- Provide tools for benefit evaluation
- Integrate nature-based features in coastal risk management systems
- Work towards building consensus on nature-based infrastructure, and its coastal storm risk management benefits

- State/Local Government Initiatives
- Inter-agency Policy Review
- International Technical Workshop
- HUD Initiative: Rebuild by Design
- Rockefeller Initiative: Structures of Coastal Resilience
Collaborative Efforts

- **Interagency, State, Tribal, and Local Government Input**
  - Formal coordination letters establishing single point of contact
  - Technical working meetings
  - Agency Subject Matter Experts embedded in team and via outreach
  - Federal Register notices and public website with subscribe list and opportunity for input on resilience [www.nad.usace.army.mil/compstudy](http://www.nad.usace.army.mil/compstudy)
  - News releases and media events
  - Participation in public events and panel discussions

- **Interagency Webinar Collaboration Series (archived)**
  - Webinar 1 (30 July 2013) Green/Nature Based Infrastructure
  - Webinar 2 (29 August 2013) Ecosystem Goods and Services
  - Webinar 3 (12 September 2013) Numerical Modeling and Sea Level Rise
  - Webinar 4 (25 September 2013) Vulnerability Assessments
  - Webinar 5 (December 2013) Adaptive Management
  - Webinar 6 (December 2013) Policy Challenges
NACCS Preliminary Findings

- **Shared** responsibility of all levels of Government and partnerships
- Rethink approaches to **adapting to risk**
- Areas of highest (and growing) population density and economically critical urban centers are most **vulnerable**
- Resilience and sustainability must consider a **combination and blend** of measures
- Consider **stormwater and fluvial** aspects of coastal risk management
- **Interior, low-lying** areas highly susceptible to small changes in water level
NACCS Preliminary Outcomes

- State-by-State Risk Reduction Frameworks informing, strengthening and catalyzing the focus on regional resiliency, redundancy and robustness in ongoing coastal planning and project implementation

- System-wide framework and best practices

- Interagency and Regional alignment

- Closed data gaps
  - Broadened the pool of benefits for benefit-cost-ratio evaluations
  - Developed detailed modeling for future use, including sea level rise scenarios
  - Identified critical habitats and opportunities for using nature-based features (USFWS Planning Aid Report)
  - Developed conceptual regional sediment budget
  - Community Resiliency Survey (NOAA)
  - Collated Technical input
NACCS Preliminary Opportunities

- Identify acceptable **flood risk at a community** and state scale
- **Mitigate** future risk
- **Prioritize** critical infrastructure
- **Rebuild with redundancy**
- Develop **creative incentives** to promote use of resiliency measures
- Utilize a **collaborative regional governance structure**
- Develop **Public-Private Partnerships** for coastal risk management
- Integrate **natural-based features** in coastal risk management systems
- Encourage design **flexibility and adaptive management**
- Advance efforts in the 9 focus areas:

1) Rhode Island Coastline
2) Connecticut Coastline
3) Nassau County Back Bays, NY
4) New York Bay, its Tributaries and Jamaica Bay
5) New Jersey Back Bays
6) Delaware Back Bays
7) City of Baltimore, MD
8) Washington, D.C.
9) City of Norfolk, VA
North Atlantic Coast Comprehensive Study Schedule

Current Status

29 Jan 2013

Quarterly IPR
20 May 13

Public Web Site

Quarterly IPR
19 Jul 13

Quarterly IPR
21 Nov 13

Quarterly IPR
Feb 14

Quarterly IPR
Apr 14

Quarterly IPR
Jul 14

Quarterly IPR
Oct 14

28 Jan 2015

PDT Milestone 1
8 May 13

PDT Milestone 2
19 Jun 13

PDT Milestone 3
20 Aug 13

Draft Final to HQUSACE
Sep 2014

Further Opportunities for Input

Develop draft PMP and SOW (NLT 15 Mar; approved 27 Mar 13)

Phase 1 [Months 1-14]
Interagency & NGO coordination to assemble existing/future conditions. Assessment & formulation of measures
ATR and HQUSACE
Review of Draft Analyses

PHASE 1 Products
- Coastal Geographic Information System Geo-database & Analysis
- Economic Depth-Damage Estimation Tool
- Sea Level Rise and Vulnerability Assessment & Maps
- Identification of risk and preliminary approaches for system resilience

Phase 2 [Months 15-18]
Interagency & international validation & collaboration

PHASE 2 Products
- Align with other Regional Plans
- Receive interagency, partner and international comments
- Institutional Barriers
- Additional Analyses that may be warranted.

PHASE 3 Products
- Draft Comprehensive Study to HQUSACE (Sep 2014)
- Draft comprehensive study to OASA(CW) (Dec 2014)
- Submission of final report to Congress
- Storm Suite Modeling

Further Opportunities for Input
Way Ahead

- Significant work **completed** ... and **continuing** ...
  - High population and urban areas most vulnerable
  - Primarily **structural** measures anticipated in most vulnerable areas in combination with other measures
  - Other areas of vulnerability; likely to have more opportunities for use of **nature-based features**
  - All vulnerable areas benefit from **redundancy and full use of measures portfolio in a systems approach**
  - Significant **challenges exist in policy alignment** to create implementation incentives at local and regional scale

- Significant interagency and partner **collaboration** and sharing

- Ongoing **review** of analyses

- Identification of **Institutional and Other Barriers to Comprehensive Storm Risk Management**
Policy Challenges and Institutional Barriers

Six themes presented with Policy Challenges, Successes, Opportunities for Actions

► Theme 1: Risk/Resilience Standards
► Theme 2: Risk Communication and Outreach
► Theme 3: Risk Management
► Theme 4: Science, Engineering and Technology
► Theme 5: Leadership and Institutional Coordination
► Theme 6: Economic Stressors and Resources
National Planning Center for Coastal Storm Risk Management
US Army Corps of Engineers

North Atlantic Coast Comprehensive Study

Overview of Numerical Coastal Storm Modeling

U.S. Army Corps of Engineers
Coastal Storm Risk Management Planning Center of Expertise

13 February 2014
NACCS Scope

- Coastal Framework
  - Regional scale
  - Interagency collaboration
  - Opportunities by region/state
  - Identify range of potential solutions and parametric costs by region/state
  - Identify activities warranting additional analysis

- Technical Teams

Future Mean Sea Level and Other Climate

Computing the Joint Probability of Hurricane Sandy and Historical Coastal Storm Forcing Parameters from Maine to Virginia
Engineering in NACCS

- **Tasks**
  - Summarize historical data and existing conditions
  - Review and update as warranted engineering design criteria for resiliency, robustness and redundancy
  - Incorporate performance evaluation results
  - **Refine regional storm suites and storm surge, wave forces**
    - Identify range of engineering risk reduction measures for range of regional conditions (berms, levees, floodwalls, nature-based infrastructure, etc.)
  - Hydrodynamics modeling workshop

- **Tools**
  - Digital elevation model
  - ADCIRC model, wave model
  - FEMA Region II/III coastal storm modeling
  - National Hurricane Program data/models (SLOSH, etc.)
Coastal Storm Modeling

Compute joint probability of Hurricane Sandy and plausible coastal storm forcing parameters from ME to VA

- Statistical storm population selection using Optimum Sampling Joint Probability Method (JPM-OS) for tropical and Empirical Simulation Technique (EST) for extratropical surge hazards
- Coastal Storm Modeling System (CSTORM-MS) simulation
- Data archival, analysis and visualization (CSTORM-DB)
ERDC’s Coastal Storm-Modeling System (ERDC CSTORM-MS)

Application of high-resolution, highly skilled numerical models in a tightly integrated modeling system with user friendly interfaces

Not just hurricanes and not just in the Gulf of Mexico.

Provides for a robust, standardized approach to establishing the risk of coastal communities to future occurrences of storm events.

Expandable and upgradeable system.
CSTORM System Components 2013

- **Winds/Pressure:** PBL Cyclone Model
- **Waves:**
  - Regional: WAM
  - Nearshore: STWAVE*
- **Circulation/Surge:**
  - ADCIRC*
  - ADH*
- **Morphology:** SEDLIB/C2Shore
- **Coupling Framework:** CSTORM-MS*
- **Graphical User Interface:** SMS

**Earth System Modeling Framework (ESMF) Compliance**

- Multiple federal agency support ESMF
- ESMF compliant models are readily available to be linked with each other and with other agencies’ ESMF compliant models.
- Individual models stay virtually autonomous when coupling.
ADCIRC Coastal Circulation and Storm Surge Model

- An unstructured finite element hydrodynamics model
- 2D and 3D simulations
- Wetting/Drying algorithm allows for storm surge inundation over previously dry land
- Highly portable code
- Tides, Rivers, Winds/Pressure, and Waves
- A part of ERDC’s Coastal Storm Modeling System

Preliminary Surge Modeling for Sandy

- Used two meshes
  - EC2001FIMP Grid
  - FEMA Region 2 Grid
- Used tidal forcing
- Used an imbedded asymmetric vortex Holland wind/pressure model with inputs derived from the NHC forecast using the ASGS
- Used winds/pressure from NOAA’s GFDL models
Tight Two-Way Coupling Circulation $\leftrightarrow$ Wave

- One unstructured finite element circulation mesh
  - A single instance of ADCIRC/ADH
- One or more structured wave grids
  - Multiple instances of STWAVE
  - Half-Plane
  - Full-Plane

Information to Exchange

- Elevation & Velocities: $\zeta, u, v$
- Radiation Wave Stresses: $\tau_x, \tau_y$

For consistency use the same winds and bathymetry (can be passed also)

Need to be able to synchronize both time and spatial frames of reference.

Innovative solutions for a safer, better world
Innovative solutions for a safer, better world

Grids and Save Points

ADCIRC Mesh Resolution

~ 6.2 million nodes
Resolution from 10 m to 100 km
ADCIRC Mesh Development

Example Location: Boston Harbor

Bathymetry – NGIA DNC/NOAA ENC
Topography – USGS 10-m DEM
Cape Cod Mesh Resolution

Note: ADCIRC mesh nodes shown in background
Boston Harbor Mesh Resolution

Note: ADCIRC mesh nodes shown in background
High Frequency Collocation Points  
(Formerly Known as “Save Points”)

- Global solution files will still be available; however, “save points” (ADCIRC and STWAVE model results; i.e. WSE, water and wind velocity, and wave conditions) will be saved more often.
- These time-series results can provide useful information at District project sites and/or can be applied as boundary forcing conditions for local refined numerical models.
USACE District Feedback

- ADCIRC mesh elevation and resolution for each save point location has been examined.
- ERDC provided each District with a section of the mesh and XY output locations to ensure that previously identified projects are included and adequately resolved within the mesh.
- Enhancements/updates made to the mesh, as necessary.
# Status of Collocation Points

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<th>Feedback Received from District?</th>
<th>Approximate* Number of Save Points</th>
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**Total # High Frequency Collocation Points: 9000***

*Subject to change based on computational run-times for simulations.*
New England District (NAE)
Save Points along Depth Contours

Note: Still under development
Estimate: > 4000 save points*

*Subject to change based on computational run times.
CSTORM-DB: Tropical Storm Censoring Module

For validation, SLR analysis, and for synthetic storm development
CSTORM-DB: ET Storm Censoring Module

24 water levels gages
30-yr record length
250 storms identified

**Note: original FEMA 2 mesh**

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<th>LONGITUDE</th>
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SMS GUI for Cyclone Models

- Setup and run the MORPHOS-PBL Cyclone Wind Model*
  *Updated version of TC96
- Import storms from HURDAT

Synthetic storm profile generation routine

Easily create perturbations for storm track/characteristic

Storm Parameters applied in JPM-OS

For any location,... each red box (parameter set) has a joint probability density and a response (surge).
WAM

WAM is a third generation global ocean wave prediction model.

Model Assumptions
- Time dependent wave action balance equation.
- Wave growth based on sea surface roughness and wind characteristics.
- Nonlinear wave and wave interaction by Discrete Interaction Approximation (DIA).
- Free form of spectral shape.
- High dissipation rate to short waves.

Close-up view of WAM Grid

SMS GUI for WAM
- Create and visualize WAM grids and model results
- Setup input/control files
- Execute WAM
STWAVE Version 6.0

- STWAVE is a steady-state finite difference model based on the wave action balance equation.
- The model is used to compute wave transformation (refraction, shoaling, and breaking) and wind-wave generation.

Some features of the full-plane model include:
- Wave transformation and generation on the full 360-deg plane.
- Option for spatially variable winds and surge.
- Option for spatially constant or spatially variable bottom friction.
- Option for one-dimensional wave transformation on lateral boundaries.
STWAVE Grid Overview

- 10 STWAVE grids
  - UTM Zones 18 and 19
- offshore boundaries at depths of at-least 130 ft (40 m)
- proposed resolution of 656 ft (200 m) for all grids except Chesapeake Bay (328 ft or 100 m)
- offshore wave forcing provided by WAM
- local winds interpolated from ADCIRC
STWAVE Modes

- half-plane allows for wave energy to propagate from offshore to nearshore
  - neglects all waves traveling in the negative x-direction
  - generally appropriate for most nearshore applications

- full-plane allows for wave transformation and generation of wind-waves in all directions
  - mostly used in semi-enclosed bays and lakes
  - considerably higher memory requirements and slower execution compared to half-plane
  - iterative solution
Half-plane vs Full-plane

- majority of grids in HP
- Chesapeake Bay will be a nested FP ‘child’ grid, with spectra provided by a HP ‘parent’ grid
- testing required to determine mode for some grids
  - Delaware Bay, Long Island Sound, Cape Cod Bay
Coastal Storm - Database and Data Mining Tool

**Goals**

- Develop long-term archive/database of measured and modeled coastal storm data
- Make data easily accessible and understandable to team members
- Integrate contextual data products and tools that support federal decision making
  - Emergency management
  - Risk management/assessment/communication
  - Project design and evaluation


**POC:** Jeffrey A. Melby, PhD
USACE ERDC Coastal and Hydraulics Lab
Jeffrey.A.Melby@usace.army.mil
CSTORM-DB Initial Screen

- Home
- Storm query tool
- Add existing storm to map
- Google Earth client map
- List of selected storms
- List of storms available for that region
- Layers
  - Bathymetry
  - Model Grid
  - Data Stations
  - Live Stations
  - Storm Tracks
  - Plotset
  - Bathymetry
  - Model Grid
  - Data Stations
  - Live Stations
  - Storm Tracks
  - Plotset
  - Max. Water Height
  - Max. Velocity
  - Max. Wind Velocity
  - Max. Surface Current Velocity
  - Plotset
  - Map Options
  - Saved Runs
  - Navigation Control
  - Overlay Map
  - Base Legend
  - Annotations
  - Marine Topography
  - Grid
  - Roads
  - Corps Layers
  - Fix 1
  - Fix 2
  - Fix 3
  - Fix 4
  - Fix 5
  - Fix 6
  - Fix 7
  - Fix 8
  - Fix 9
  - Fix 10
  - Select
- Turn on and off various layers such as bathymetry, model grid, model save stations, and live gages
- For a select storm, turn on and off maximum contour plots: water level, wind speed, wave height, animations
- Turn on and off standard Google Earth map tools
- Add any user-defined layer to map
Maximum Water Level Elevation in CSTORM-DB

Select Storm 1

- Turn on track
- Turn on maximum water elevation contour plot
- Turn on standard Google Earth map tools
HPC Resources

For this project two separate DSRC systems will be used, ERDC’s Garnet and AFRL’s Spirit

Garnet’s is a Cray XE6

4716 compute nodes with 32 cores/node = 150,912 processors

Spirit is an SGI Ice X

4590 compute nodes with 16 cores/node = 73,440 processors
Summary

- CSTORM-MS is an efficient, robust, extensible modeling system for quantifying the risk of coastal communities to storm events
- Its’ streamlined workflow saves time and reduces both computational and personnel cost
- Model data feeds into CSTORM-DB for easy access and reuse purposes
Utilization of Modeling Products: CSTORM

- Summary: An expanded suite of storm simulation and statistical analysis tools is being applied in support of the North Atlantic Comprehensive Coastal Study. Specifically, the CSTORM-MS and CSTORM-DB are being used to define the coastal storm probability space for the study area to for coastal risk assessment and project design.

- CSTORM data will develop water levels and other storm parameters for future, more detailed studies by the completion of the NACCS study (Jan 2015).

- The product of this simulation work will serve the coastal engineering and management communities of practice from VA to ME for years to come.
Thank you...
Marine Minerals Program

Restoring and Protecting Our Nation’s Coasts through Stewardship of OCS Resources
Submerged Lands Act Boundary
(3 nautical miles)
Marine Minerals Program’s Purpose

Responsible for managing development of OCS marine mineral resources in an environmentally and economically responsible way.

– Outer Continental Lands Act (OCSLA)
– Public Law 103-426
  • Authorizes BOEM to negotiate, on a noncompetitive basis the rights to OCS sand gravel or shell resources for shore protection, beach or wetlands restoration projects, or for use in construction projects funded in whole or part or authorized by the Federal Government
  • A 1999 amendment prohibits BOEM from charging federal, state and local government agencies a fee for OCS sand
**Program Statistics**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of Marine Minerals Management</td>
<td>20</td>
</tr>
<tr>
<td>Research Projects</td>
<td>130</td>
</tr>
<tr>
<td>Offshore Borrow Areas Used</td>
<td>22</td>
</tr>
<tr>
<td>Million Yd³ of Offshore Sand Conveyed</td>
<td>77</td>
</tr>
<tr>
<td>Miles of Coastline Constructed</td>
<td>230</td>
</tr>
<tr>
<td>Projects Completed</td>
<td>42</td>
</tr>
</tbody>
</table>
Completed and Active Projects/Leases

Equipment Deployment
Upland vs. Marine

Sand truck route for Collier beach project irks Lee County leaders
By ERIC STAATS
Posted September 17, 2013 at 9:13 p.m.

Hopper dredge used at the NASA Wallops Flight Facility on Wallops Island, VA. Photo by Charlie Broadwater, BOEM.
Offshore Dredging and Transport to Shore

Trailer Suction Hopper Dredge

Wallops Island, VA
Agreement/Lease Stipulations

• Borrow Site Boundaries
• Dredge Positioning
• Dredge Operating Requirements
• Extraction Volume
• Notice to other Users
• Marine Pollution Control and Contingency Plan
• Discovery of Munitions of Explosive Concern (MEC) Procedures
• Bathymetric Surveys
• Protection of Archaeological Resources
• Project Completion Reporting
• Environmental Compliance Monitoring & Reporting
OCS Example Project NASA Wallops Island, VA
Shoreline Stabilization Project

SLA Boundary

OCS Shoal A Borrow Area (~17 nm from project)
• 800,000 yd$^3$ of OCS Sand
• **Resources Evaluated:**
  – Coastal Processes
  – Water and Air Quality
  – Noise
  – Benthos
  – Finfish and Habitat
  – Marine Mammals
  – Threatened and Endangered Species
  – Cultural Resources
Sand Material Costs
Upland vs. Marine

Sand Material Cost ($ per cubic yard)

- Winthrop, MA: 0.6 mcy, $43.00
- Misquamicut, RI: 0.09 mcy, $37.00
- Prospect Beach, CT: 0.30 mcy, $40.00
- Woodmont, CT: 0.03 mcy, $75.00
- Wallops Island, VA: 3.22 mcy, $11.05

Cost figures courtesy USACE New England District and USACE Norfolk District
Total Sand Material Costs (millions) by Project

- **Winthrop, MA** 0.6 mcy
  - MOB-DMOB (millions): $25.8
  - Final Material Cost (millions): $3.50

- **Misquamicut, RI** 0.09 mcy
  - MOB-DMOB (millions): $3.3
  - Final Material Cost (millions): $3.7

- **Prospect Beach, CT** 0.30 mcy
  - MOB-DMOB (millions): $1.3
  - Final Material Cost (millions): $3.50

- **Woodmont, CT** 0.03 mcy
  - MOB-DMOB (millions): $3.50
  - Final Material Cost (millions): $3.50

- **Wallops Island, VA** 3.22 mcy
  - MOB-DMOB (millions): $35.6
  - Final Material Cost (millions): $35.6

Cost figures courtesy USACE New England District and USACE Norfolk District
Identification of OCS Sand Resources
- Cooperative Agreements w/ States (rec’d & reviewing proposals from 13 East Coast states)
- Upcoming Broad Agency Announcement (BAA) for OCS Data Acquisition

Current Sandy Related Projects/Leases

Environmental Studies
Identification of OCS Sand Resources

Sand Resource Delineation

• Geophysical & Geological Data Collection
• Location
• Quantity
• Grain Size Distribution
Integrating Environmental Requirements

- NEPA
- E.O. 12898: Environmental Justice
- Magnuson Stevens Fishery Conservation and Management Act
- Federal Water Pollution Control Act
- Clean Air Act
- Coastal Zone Management Act
- Marine Mammal Protection Act
- National Historic Preservation Act
- Endangered Species Act
- Coastal Zone Management Act
• $15 million spent on MMP Studies since 1994

• More than 40 site specific and programmatic studies

• Mitigation and minimization measures derived from research findings such as improved borrow area design and management

• Identify critical data gaps to guide future research needs
Questions/Further Information

Renee Orr, Chief Office of Strategic Resources
renee.orr@boem.gov
202-208-3515

Jeff Reidenauer, PhD  Chief, Marine Minerals Branch
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703-787-1851

Jeff Waldner, Physical Scientist/Oceanographer MMB
jeffrey.waldner@boem.gov
703-787-1779
• End of presentation

Extra slides follow:
### Marine Minerals Program: Active Project Dashboard

**Project Details**

<table>
<thead>
<tr>
<th>Project</th>
<th>Volume (cy$)</th>
<th>Volume Lead</th>
<th>LD Lead</th>
<th>Envelope Lead</th>
<th>Date of First Contact</th>
<th>Type of Project</th>
<th>Response Letter Sent</th>
<th>Kick Off Meeting Held</th>
<th>EA / EIS</th>
<th>RO/ROD</th>
<th>Final Decision</th>
<th>Deliverables Received</th>
<th>Fire Closed Out</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin County, FL</td>
<td>800,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Sep-12</td>
<td>2-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>More likely will not be dredging in the next year</td>
</tr>
<tr>
<td>Sandbridge Beach, VA</td>
<td>2,000,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>May-13</td>
<td>2-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>Almost done</td>
</tr>
<tr>
<td>Brevard County (Mid-Reach), FL</td>
<td>900,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Mar-13</td>
<td>2-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>DEA is one week behind schedule due to SAJ non-responsiveness regarding NEPA</td>
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<td>Collier County, FL</td>
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<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>May-13</td>
<td>2-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>More likely will not be dredging in the next year</td>
</tr>
<tr>
<td>Flagler County, FL</td>
<td>3,000,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Feb-13</td>
<td>2-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>Still waiting for Navy to sign MOA, sent in February</td>
</tr>
<tr>
<td>Brenton Island (NRDA), LA</td>
<td>3,000,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Nov-09</td>
<td>2-Party lease/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
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<tr>
<td>Cameron Parish Restoration, LA</td>
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<td>CB</td>
<td>JW</td>
<td>GOMR</td>
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<td>2-Party lease/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
</tr>
<tr>
<td>Caminada Headland, LA (phase 1)</td>
<td>5,000,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Sep-09</td>
<td>2-Party lease/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
</tr>
<tr>
<td>Caminada Headland, LA (phase 2)</td>
<td>6,100,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Feb-13</td>
<td>2-Party lease/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
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<tr>
<td>Pelican Island, LA</td>
<td>5,500,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Jan-08</td>
<td>3-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
</tr>
<tr>
<td>Raccoon Island, LA</td>
<td>1,100,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Sep-09</td>
<td>3-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
</tr>
<tr>
<td>Whisky Island, LA</td>
<td>10,000,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Feb-13</td>
<td>2-Party lease/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
</tr>
<tr>
<td>McCLIP, MS</td>
<td>16,000,000</td>
<td>CB</td>
<td>JW</td>
<td>GOMR</td>
<td>Feb-13</td>
<td>2-Party MOA/EA/FONSI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Begun</td>
<td>In progress</td>
<td>No comments</td>
</tr>
</tbody>
</table>

**Completed MMP Milestones**

- **Updated**
- **Volume**
- **Volume Lead**
- **LD Lead**
- **Envelope Lead**
- **Date of First Contact**
- **Type of Project**
- **Response Letter Sent**
- **Kick Off Meeting Held**
- **EA / EIS**
- **RO/ROD**
- **Final Decision**
- **Deliverables Received**
- **Fire Closed Out**
- **Notes**

---

1. Anticipated Date of MOA/Lease Completion
2. Hurricane Sandy Response Project
3. If a milestone is delayed, there is a strong likelihood that a critical date may be missed and/or upper management may be looped in to help resolve issues.
Value of Regional Ocean Partnerships

Arleen O’Donnell, ERG and Andy Lipsky, SeaPlan
Valuation of Regional Ocean Partnerships

• Making the Business Case for Regional Ocean Partnerships
Project Purpose

• Assess the economic benefits

• Examine Results of Three ROPs -- NROC, GOMA, and WCGA

• Demonstrate how ROPs provide benefit

• Inform future expenditures
Approach

• Hundreds of activities reviewed

• Categorized by type of activity, date completed, role of the ROP, location, and type(s) of benefits

• Narrowed list to select one major effort for each ROP
Selection Criteria

• ROP significantly contributed towards achieving objectives*
• Activity is completed or ongoing and has generated some (at least preliminary) results
• Benefits are measurable
• Represent a good cross-section of ROP work
• Available supporting info to conduct an assessment

* did not attempt cause and effect attribution
West Coast Governors Alliance - Marine Debris

- Marine debris strategy & implementation plan
- Marine debris database
- Convener and coordinator - Individual states very active
WGCA – Marine Debris Benefits

• Over 1,600 tons of benthic marine debris
• Reduction of up to $2.4 million in incurred cleanup costs
• Potential gain of up to $210 million in tourism revenues
Gulf of Mexico Alliance - Beneficial Re-use of Sediment

- 70% of dredged sediment is disposed of
- Sediment is needed to stem the loss of over 70K acres of coastal wetlands each year
- Sediment has value and wetlands have value
GOMA – Benefits of Regional Sediment Management Plan

• Based on Mississippi, calculated for Gulf:
  • $600 million and $1.2 billion annually
  • Over ten years - $12.5 billion (including ESV)
Northeast Regional Ocean Council

Northeast Ocean Data Portal

• Publicly accessible online spatial data server

• Provides access to data, interactive maps, tools, and other information needed for decision-making.
### Approximate Costs for MORIS

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Real cost/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Contributions</td>
<td>$170,000.00</td>
<td>$170,000.00</td>
<td>$228,500.00</td>
<td>$228,500.00</td>
<td>$797,000.00</td>
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<tr>
<td>Producer Price Index</td>
<td>175.8</td>
<td>167.1</td>
<td>175.4</td>
<td>189.1</td>
<td></td>
</tr>
<tr>
<td>Real cost (2011$)</td>
<td>$182,861.21</td>
<td>$192,381.81</td>
<td>$246,347.49</td>
<td>$228,500.00</td>
<td>$850,090.50</td>
</tr>
</tbody>
</table>

|                  |          |          |          |          |              |
| Projected cost for 5 states | $1,062,613.13 |

### Estimated Costs to Establish, Maintain, and Create Data Products for NE Ocean Data Portal

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>2008-2009*</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Total</th>
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<tbody>
<tr>
<td>Data Portal Working Group Member Funding</td>
<td>87,000</td>
<td>$345,000</td>
<td>$323,000</td>
<td>$335,000</td>
<td>$410,000</td>
<td>$1,500,000</td>
</tr>
</tbody>
</table>

** Does not include all coastal and ocean data products that have been developed and integrated into the portal as many of these products may have been funded as separate products. In addition, much data served through the portal are developed and maintained by third parties.
NROC - Value

- $3.8$ million (based Massachusetts cost)
- $13.5$ million (based on ROI study showing 6 or 9 times ROI)
Snapshot of Data Portal Usage

Northeast Ocean Data provides maps and data for ocean planning in the northeastern U.S.

Easy-to-use interactive maps provide information on selected topics.

The Data Viewer and Data pages provide more types of data and downloadable data files.

NOAA Coastal Services Center
Linking People, Information, and Technology
Case Examples of Integrated Data for Ocean Planning Benefitting Local Projects
Anticipated Benefits Being Realized

Time and cost savings due to:

- Enhanced agency & organizational coordination for project review
- Better access to important data, including stakeholder info
- Agreement on data, protocols, and planning information
- Avoiding upfront data collection efforts
- Avoiding need for developing alternative plans/subsequent reviews
- *Increased Predictability & Transparency*
- *Identification of Data Gaps and Narrowing data acquisition*

Many Indirect Benefits
Challenges

• No new data or research

• Cooperative nature of ROPs makes causal attribution next to impossible

• Difficulty in reasonable and appropriate counterfactuals
Discussion Questions

• How can NROC use or supplement this information?
• Is expressing value in $$$ an abstraction?
• What activity do you think would be most important to value to make the business case for NROC?
• How can NROC plan now to collect the data needed for future economic benefits assessment?