NAVIGATION DREDGING WITH INNOVATIVE PLACEMENT TO SUPPORT COASTAL RESILIENCE: AVALON, NJ THIN LAYER PLACEMENT PROJECT

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Organizational Perspective

USACE Philadelphia District Coastal Projects

- **Navigation Mission:** maintain federal channels in the Philadelphia District
- **Flood Risk Management:** strong beach nourishment program in NJ & DE and NJ Back Bay Study
- **Ecosystem Restoration**
- **Regulatory Mission**
A “PERSISTENT” APPROACH
Past, Present & Future

• **Navigation and Nature**: District took action to restore navigation after Sandy, but also looked for opportunities to assist with shoreline & ecosystem recovery and build coastal system resilience with *clean* dredged sediment

• **Technical Expertise**: Use *Regional Sediment Management (RSM)* and *Engineering with Nature (EWN)* concepts to develop short-term (post-Sandy) and long-term dredging strategies

• **Team Approach**: Actions were aided by support from USACE North Atlantic Division and other districts including Galveston, Mobile & Baltimore, ERDC, NJDEP and other partners

*Progression from caution and risk aversion to being proactive and innovative*
NJ Intracoastal Waterway Federal Channel Dredging and Placement:
Ring Island and Avalon NJ

Land Owned By New Jersey Division Of Fish & Wildlife (NJDFW)

Constructed With Emergency Supplemental Operation & Maintenance Funds

And

A National Fish And Wildlife Foundation Grant TO NJDFW, The Nature Conservancy And Green Trust Alliance

Contractor: Barnegat Bay Dredging Co.
NJWW Dredging & Avalon Thin Layer Placement

Constructed Dec 2014 to Feb 2016
NJWW Avalon Pilot Project:
Dredging “The Football Field” And Thin-layer Placement

- Small pilot accomplished in Dec 2014
- Larger project completed in Feb 2016
- Primarily fine-grained channel material, *sediment type and constructability are key factors!!*
- USACE funded dredging, NFWF grant funded placement design, construction oversight
- Monitoring to continue for several years, NFWF Grant Team & ERDC
Project Objective

Test methodologies that would enhance stressed salt marshes and help them persist into the future in the face of climate change and sea level rise.

- Success Criteria #1: Increase and then maintain an elevation that provides ideal tidal flooding and flushing for native salt marsh species.
- Success Criteria #2: More robust native salt marsh vegetation.
- Success Criteria #3: Return to baseline conditions for all other metrics unless they were expected to decline due to habitat conversion.
1. Phase 1 Project (Winter 2014-2015)
   • Small scale - testing of techniques
   • 5 acres
   • 5,000 CY

2. Phase 2 Project (Winter 2015-2016)
   • First “large-scale” project implemented
   • 35 acres
   • 49,300 CY
   • **Mix of sand, silt & clay**
   • **Average 8” of sediment**
Operational Lessons Learned

- Coordination is key
- Establish success criteria early
- Minimize containment
- Establish long-term funding for monitoring
- Include contingency funds for adaptive management
## What’s the Timeline?

<table>
<thead>
<tr>
<th>Phase-Step</th>
<th>Time to Complete</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1: Marsh Assessment and Placement Area Selection</td>
<td>1.5+ years</td>
<td></td>
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<tr>
<td>Phase 2: Project Design</td>
<td>6+ months</td>
<td>Design both placement areas &amp; dredging design</td>
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<tr>
<td>Phase 3: Permitting</td>
<td>6 months</td>
<td>Varies</td>
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<tr>
<td>Phase 4: Bidding and Contracting</td>
<td>3-6 months</td>
<td></td>
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<tr>
<td>Phase 5: Construction</td>
<td>3+ months</td>
<td>Set-up, construction and clean-up</td>
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<td>Phase 6: Adaptive Management</td>
<td>Continuous</td>
<td></td>
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<tr>
<td>Phase 7: Project Assessment</td>
<td>6 years</td>
<td>Minimum. 1 year baseline + 5 years post-construction</td>
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<tr>
<td>Total Estimated Time</td>
<td>8+ years</td>
<td>Depending on size of project</td>
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Post-Construction Monitoring Program

**Formal Monitoring**

- Vegetation**
- Elevation & Topography**
- Surface Water Levels
- Wildlife communities
  - Fish
  - Birds**
  - Macroinvertebrates
  - Benthic infauna**
- Sediment Testing
- Wave Energy & Flood Modeling
- Soil and Water Chemistry**

**Monthly Site Inspections**

- Started in April 2016
- Real-time observations to identify significant issues and guide adaptive management
- Observations of:
  - Vegetation recovery/die-off
  - Containment
  - Dredged material
  - Planted material
  - Wildlife
- Fixed photo points

**Prioritized for future monitoring, plus site inspections every three months.**
Preliminary Vegetative Regrowth

Vegetation cover has increased from 6% to 18% over the 3 years since placement.
General Observations

• No correlations between veg cover and placement depth*
• Regrowth seems to be fastest from the edge of the placement areas and from interior clumps
• *Salicornia* was the first to recolonize in some areas, then primarily *Spartina Alterniflora* in the following year.
• Recolonization of benthic infauna in the site within a year of placement.

*Preliminary results
Ecological Elevation Monitoring Results

- 2” or more below target
- Within 2” target
- 2” or more above target
- Pool
Cost Analysis

• Cost varied at each site:
  o $45/CY @ Avalon - $136/CY @ Fortescue
  o $56,000 - $405,000/acre

• Construction is largest cost category
  o 60% - 80% of project budget
Thank You!