Hurricane Sandy Resiliency Efforts at Seatuck National Wildlife Refuge: Sediment Enrichment Using Old and New Dredged Material to Increase Marsh Platform Elevation

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• Timothy Simmons
• Carolyn Comber
• Megan Gallagher

Any errors are mine.
Long Island NWR Complex

- Seatuck NWR is one of 3 Hurricane Sandy Resiliency Sites at this NWR Complex
- Wertheim NWR
- Lido Beach
Site Alterations

- Dredging 1957-87*
- Dredge disposal 1957-87*
- Culverts to Bay 1980s
- Restoration Project 1992

Road

- Ditch Plugging 1983-88
- Ditching 1930s?
Pre-Storm Ecology

• SMI Monitoring Results**

<table>
<thead>
<tr>
<th>Nekton Sampling 2013 (20 throw traps/ditch nets)</th>
<th>Total fish caught 1226</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprinodon variegatus (775)</td>
<td></td>
</tr>
<tr>
<td>Fundulus heteroclitus (385)</td>
<td></td>
</tr>
<tr>
<td>Fundulus luciae (2)</td>
<td></td>
</tr>
<tr>
<td>Lucania parva (28)</td>
<td></td>
</tr>
<tr>
<td>Palaemonetes pugio (34)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Salinity</th>
<th>Nekton Density</th>
<th>Average Fundulus length</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 ppt</td>
<td>72.4/m²</td>
<td>31mm</td>
</tr>
<tr>
<td>+1 ppt</td>
<td>+90.2</td>
<td>0.42mm</td>
</tr>
</tbody>
</table>

** Toni Mikula, “From Rapid Assessment to Management Action”, This Session
Pre-Project Monitoring

• Vegetation:  
  *S. alterniflora* with *S. patens* & *Iva* on ditch levees

• Inundated 49 % of the time (based on 1 wll)

• Birds
  
  =0.25 TMO/ survey point
  
  =0.45 Willets/survey point
Hurricane Sandy Water Levels on Salt Marshes in NJ to RI

10/28 to 10/31

- Water level (cm)
- ATT
- Dinner Point Creek
- Motts Nacote
- Oyster Creek 3
- Oyster Creek 4
- Wilderness
- Great Marsh Unit
- Sachuest
Hurricane Sandy Storm Damage

- Storm surge Suffolk Co: 5.5-9.3Ft NAVD88
- Cleanup: 34.5 tons, household garbage, docks, construction, outdoor furniture
Post-Storm Conditions

- Impounded/ditch plug areas
- Over-ditching/subsidence
- Lack of direct tidal connection
SALT MARSH RESTORATION AND ENHANCEMENT
AT SEATUCK NATIONAL WILDLIFE REFUGE
ISLIP, NEW YORK

CONTRACT NO. 98210AD002
TASK ORDER NO. F15PD00003

100% DESIGN SUBMISSION
SUBMISSION DATE: JANUARY 25, 2016

ISSUED FOR CONSTRUCTION

1) PROJECT KEY MAP
2) SEATUCK MARSH
Larger channel
Move dredge spoil
New channels
Fill waterlogged areas; remove ditch plugs
Issues

• Pre-project elevation =?
• Target elevation= 0.5- 0.9 ft NAVD88
  – Where to get enough sediment to bring to target elevation
  – Sediment contamination/ State permits
New Dredge Material from Champlin Creek

December 2015
14,256 cu yds
Mobilizing dry dredge sediment

2,500 cu yds used
Pumping Sediment into Waterlogged Areas
Grading fill areas
Grading fill areas
Remaining Work

• **Spread & grade** additional dredge spoil
• **Widen** main East/West channel
  – Fill waterlogged areas
• **Excavate** new sinuous channels
  – Fill waterlogged areas
• **Plant – Seeds of Success** program
  – local source *S. alterniflora* seeds collected & grown to plugs
• **Monitor/ Adaptive Management**

Bombay Hook NWR; S. Guiteras
Lesson Learned: Robin Donohue

1. **Waterlogged areas can grow quite large** if left unchecked. Many of the Seatuck cells took up the entire marsh panel.

2. **Moving soil short distances as a slurry** can be an effective way to avoid excessive equipment traffic over the marsh.

3. **Coupling a thin-layer deposition project with a municipal maintenance project** (e.g. channel dredging) can be a free source of local sediment.
Lessons Learned

• Process lessons
  – Don’t be pushed into a limited vision
  – Don’t be afraid to make last minute changes (if they’re beneficial)
  – Have your own inspectors on-site 24/7
  – Document, document, document
Acknowledgements

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• Megan Gallagher
• Toni Mikula
• Liz Tymkiw
• Erin King

• Tutor Perini Management Services Inc.
• AKRF
• Galvin Bros. Inc.
Lessons Learned

• Marsh lessons
  – What is the landscape trying to create if left to itself
  – ID and follow marsh sustaining processes
    • Climate Ready/Resilient Features
    • Anti-invasive Species Resilient Features
  – Incorporate Mosquito Reduction Features
  – ID tide-sheds and follow those or know how to create new ones