EBC 11th Annual Dredging Conference: Beneficial Use of Dredged Material
Welcome

Payson Whitney

Chair, EBC Ocean & Coastal Resources Committee

Vice President, ESS Group, Inc.
Program Introduction & Overview

Lisa Lefkovitz

Program Chair and Moderator

Vice Chair, EBC Ocean & Coastal Resources Committee; Senior Research Scientist, Battelle
Beneficial Re-use of Sediment and State Regulatory Programs

Lealdon Langley

Director, Wetlands and Waterways Program
Massachusetts Department of Environmental Protection
BENEFICIAL RE-USE OF SEDIMENT

Lealdon Langley, Director
MassDEP
Wetlands and Wastewater Program
Environmental Business Council
October 27, 2017
Regulatory Programs

- Wetlands Protection Act
- Water Quality Certification
- Chapter 91
- Combined WQC and Ch 91 Dredge Permit
- CZM Consistency Review
- ACOE 404/Rivers and Harbors Act
- Solid Waste Beneficial Use Determination (BUD)
- 21E
Dredging Process

- Sampling
- Analysis
- Use Determination
- Dewatering
- Handling
- Transport
- Tracking
LANDFILL CAPPING
Landfill Daily Cover
Water Dependent Uses
Bulkhead Backfill
Water Dependent Uses
Artificial Reef Construction?
Coastal Engineering Structure?
Confined Aquatic Disposal

1. Harbor bottom as is
2. Excavation of top silts
3. Excavation of clean sand
4. Placement of sediments
5. Placement of initial cap
6. Surface fills in over time

For illustrative purposes only – NOT TO SCALE
Dam Removal

- Restores nutrient transport
- Restores sediment transport
- Improves Dissolved Oxygen
- Converts habitat
- Sedimentation
- Restores aquatic organism assemblage
- Facilitates aquatic organism passage and exchange of genetic material
What does ‘sediment release’ look like downstream?

Photo sequence by Alex Hackman (MA DFG DER) and Robin MacEwan (Stantec Consulting Services)

Amethyst Brook, Pelham
Bartlett Rod Shop Co. Dam Removal
Bartlett Rod Shop Co. Dam Removal
Amethyst Brook (Pelham)

20 feet
During removal in 2012
October 26, 2012

Downstream...just before dam removal

Photo credit: Robin MacEwan, Stantec Consulting Services
2 years later
November 9, 2012

During dam removal

Photo credit: Robin MacEwan, Stantec Consulting Services
During dam removal
June 6, 2013

6 months post dam removal

Photo credit: Robin MacEwan, Stantec Consulting Services
June 6, 2013

Sea lamprey return for first time in decades.

Photo credit: Robin MacEwan, Stantec Consulting Services
Innovative Use of Processed Dredged Material (PDM) as Structural Fill

Steve Sands

Executive Vice President
Clean Earth Inc.
Innovative Use of Processed Dredged Material (PDM) as Structural Fill

EBC 11th Annual Dredging Conference
Beneficial Use of Dredged Material
Battelle – Norwell, MA

October 27, 2017

Soil Treatment & Recycling | Dredge | Drill Cuttings
Hazardous Waste | Beneficial Reuse

23 Facilities | 26 Years Experience
• Brief Introduction to Clean Earth
• What is “Innovative Use” of Dredged Material?
• Overview of Dredged Material Processing Operations
• Beneficial Uses of Dredged Material
• Path Forward in New England
• Questions/Open Panel Discussion
Introduction
Who is Clean Earth?

Size
• 23 Locations
• 530 Employees
• 2,000+ Customers
• Private $200mm Company (CT Ownership)
• Nationwide Transportation Network

Materials we Handle
• Hazardous & Non-Hazardous Waste
• Contaminated Soil
• Dredged Material
• Industrial Byproducts
• Mining Operations
• Consumer Goods/Commodities

Industries We Serve
• Commercial, Industrial, Infrastructure, Energy, Healthcare, and Consumer
2016

- 3.7 million tons moved companywide
- 3.6 million tons soil & dredge recycled
- 8.8 million aerosol products recycled
- 95% of our materials are recycled/re-used
- Since 1996: 8.25 million CYs dredge re-used

#54 ENR Top 200 Environmental Firms
#10 ENR New York Top Specialty Contractors
#54 ENR Top 600 Specialty Contractors
#25 Waste 360 Waste 100 List
Dredging Experience & Capability

Innovation = 20+ years of Success for our Clients

• Inventor/provider of alternative solutions to in-water disposal of dredged material
• Largest and longest-standing operator in NY/NJ Harbor (since 1995)
• Two Fully Commercial DMRFs
• Up to 8,000 CYs per day
• Over 8 Million CYs processed to date
• Used in over 35 redevelopment & remediation projects
• Over $200 MM real estate value creation
  – 19+ MM s.f. of industrial warehouse built on our PDM
Problem: NY/NJ UPLAND Disposal

History & Origin – Dredging Dilemma

- Since the early 20th century, very heavy vessel traffic in NY
- "Spoils" were historically dumped at sea (since 1890!)
- 1990s - Hypodermic needle scare = end ocean dumping
- 1995 - Ocean disposal banned by Gov. Whitman (NJ)
- 1997 - Federal mandate closed “Mud Dump” forever
- Critical need for estimated 3 to 5 million CYs annually
- Required "UPLAND" solutions (out of the ocean)
- In response, CE created technology to allow dredged material to be taken on a real time basis and transformed into a useful material for construction.
• Past experience with S/S of various wastes (ash, sludges).
• Penn State’s Materials Research Laboratory - research in the creation of cementitious grouts from pozzolanic materials
• Clean Earth created proprietary mix designs using would-be waste materials
  – DM, fly ash, and lime-based activators to create manufactured fill
  – Suitable for use in land creation & mine reclamation
• Results from the R & D project showed success at promising throughput rates
• Later generations used Portland cement and binders to optimize PDM product.
• Physical Dredging using customary bucket dredges
• & hopper scows
• Transported to fixed-base off-loading and processing facility (DMPF)
• Unloading directly into debris removal system
• In-line processing through large Pugmill system
• Addition of 8-12% admixture (Portland cement; binders)
• Curing for 24 to 48 hours
• Transportation on-site, over-road, or by rail
• Placement & compaction as structural fill for beneficial use
### Benefits of the Process

**Characteristics of Raw vs. Processed Material**

<table>
<thead>
<tr>
<th>Raw Dredged Sediment</th>
<th>Processed Dredged Material (PDM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contains low levels of contaminants: metals, organics, PCBs; sometimes pesticides, dioxin</td>
<td>Chemically stable.</td>
</tr>
<tr>
<td>Potentially dangerous in aquatic environment</td>
<td>Safe in upland environment - meets existing regulations for placement.</td>
</tr>
<tr>
<td>High water content</td>
<td>Good structural strength.</td>
</tr>
<tr>
<td>Muck - minimal/no structural integrity</td>
<td>Soil like in transit.</td>
</tr>
<tr>
<td>Contains debris: wood, steel, refuse</td>
<td>Easily handled with standard construction equipment.</td>
</tr>
<tr>
<td>Difficult to handle, transport, &amp; dispose</td>
<td>Functions as select fill.</td>
</tr>
<tr>
<td>Has value - numerous beneficial uses.</td>
<td></td>
</tr>
</tbody>
</table>
Innovative Use Process
Dredging
Compatible with Typical Dredging Equipment

Mechanical Dredging
Into Hopper Scows

New NY Bridge Project
Tarrytown, NY

CAPACITY VARIES
• Up to 20,000 CYs per day
• Depends on Cut and Depth
• Smaller Marina Projects use similar assets
Dredged Material Processing Facility (DMPF)
Serving the Maritime Community

TREATMENT
Solidification/Stabilization

KOPPERS DMRF
Kearny, NJ

CLAREMONT DMPF
Jersey City, NJ

CAPACITY
- 6,000 CYs per day each facility
Dredged Material Processing Facilities
Raw Dredge Off-loading
Dredged Material Processing
Screening of Oversize

SCREENING/DEBRIS REMOVAL
- to 4-inch minus
POST -TREATMENT
After Initial Cement Stabilization
Dredged Material Processing
Load-out of PDM

LOAD-OUT
After 24-48 Hour Curing Process
Dredged Material Beneficial Use

PDM Placement Operations – Mine Reclamation

PDM PLACEMENT
- Uses Standard Equipment
- 95% Compaction
Dredged Material Beneficial Use

PDM Placement Operations – Landfill Closure

PDM PLACEMENT
- Uses Standard Equipment
- 95% Compaction
Environmental Dredging
Passaic River Mile 10.9
Innovative Use
Project Experience
• Projects requiring large amounts of fill for grading
  – General construction fill (high strength material)
  – Raise elevation due to floodplain concerns/compliance
  – Increase visibility from highways
  – Valley fills, former strip pits or quarries
• Brownfields remediation and capping (Re-development)
• Geotechnical Improvement
  – Preload/Surcharge to consolidate unsuitable subsurface
  – Typically desirable versus pilings or dynamic compaction
• Landfill Closure
  – For redevelopment of pad sites
  – Recreational opportunities (golf course)
Reclamation of Abandoned Coal Surface Mine for PADEP. Demonstration project utilized 500,000 cubic yards of amended dredged material from NY/NJ to reclaim almost 2 miles of dangerous highwall free of charge to the state. Project used 400K tons of coal combustion products as amendments to the PDM for project.
200-acre former Tankport site in Jersey City NJ; Applied Development used over 675,000 CYs of recycled soils and processed dredged materials to grade, cap and develop the site into New Jersey’s most expensive golf course ever and host to past PGA Tour Barclays Tournaments and this year’s 2017 President’s Cup.
100-acre site in Jersey City NJ prepared for development. 775,000 CYs of recycled and direct-imported soils and processed dredged materials were used to fill, cap and develop the site. Fill revenue offset cost of major wetland creation/enhancement. Site is now a FEDEX crossdock facility.
Catellus/Prologis’ 315-acre Port Reading Business Park used over 900,000 CY of alternative fill material; 3.6 Million sf (8 buildings) are constructed at this site without need for expensive pilings.
Viridian purchased the 135-acre former Hercules Chemical Brownfield Site; 265,000 CYs of alternative fill, including PDM was used in preparation for redevelopment. Photo shows pads built for 3-building (1.7MM s.f.) warehouse complex currently under construction by Frank Greek.
Catellus’ 63-acre Teterboro Landing mixed-use retail/commercial development used 650,000 CYs of soil and dredged fill to cap and reclaim the century-old manufacturing facility; over 1 million sf. are being constructed at this site without need for pilings; Costco and a Walmart Supercenter have recently opened.
• Requirements and Approvals/Permits vary by state (and by site)
• Work within existing programs in MA/CT to create a pathway to success
  – Pilot Project (RD&D)
  – Beneficial Use Determination (BUD)
• Evaluate Funding Alternatives & Availability (Public/Private)
• Site Processing Facility & Implement Required Improvements
• Work with Developers/Real Estate to generate interest
• Tour Existing CEDT Operations with stakeholders as needed to facilitate approval efforts
• Public Outreach – avoid/manage NIMBY effect
Current Range = $38 to $65 per Survey Cubic Yard
- Volume of Project
- Contaminant levels – BU vs. Disposal
- Type of Material (Physical Characteristics)
- Transport Cost – Distance to End Use site
Contact Information

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Thank You!
Town of Sandwich Sand Bypassing Project

Dave Walsh

Senior Project Manager / Coastal Scientist
Woods Hole Group
Town of Sandwich
Sand Bypassing Project

David Walsh, Leslie Fields

EBC 11th Annual Dredging Conference
Beneficial Use of Dredged Material

Friday, October 27, 2017
EBC Conference Context

• Much of the several hundred million cubic yards of sediment dredged each year from U.S. ports, harbors, and waterways could be used in a beneficial manner, yet most of this dredged material is instead disposed of in open water, confined disposal facilities, and upland disposal facilities.

• The most commonly cited hurdles to using dredged material beneficially are increased costs, the need for earlier planning and more coordination, lack of complementary federal and state regulatory frameworks for evaluating dredged material as a resource, and a widespread misperception that dredged material is a waste instead of a resource.
Program Overview

• Seeks to permit a sustainable source(s) of compatible sand that can be used to periodically renourish the Town of Sandwich Dune and Beach Reconstruction Project

• Sources include:
  1. **Beneficial Reuse of Sand Dredged from Canal by USACE**
  2. Offshore Borrow Site
  3. Upland
History of Erosion at Town Neck

- The shoreline has a long-standing history of erosion caused by construction of jetties at the east end of the Cape Cod Canal in 1906.
- The jetties intercept the natural longshore sediment transport that moves from northwest to southeast, causing shoreline accretion on the west side of the Canal and erosion on the east side.
- Canal acts as a barrier to sediment transport, exacerbating natural erosional pressures arising from coastal storms and sea-level rise, increasing the potential for community-wide flooding, and reducing valuable habitat for threatened shorebirds.
Engineering at Town Neck

• 1990: Rebuilt the dunes at the eastern end of Town Neck Beach by placing 45,000 c.y. of sand dredged from the Cape Cod Canal in front of the public beach parking lot

• 2001: Failure to nourish Town Neck with dredge spoils (power plant) resulted in offshore disposal

• 2004: Beneficial reuse of 65,000 c.y. sand dredged from Mirant Canal, LLC approach channel in the Canal as nourishment on Town Neck Beach
• **2006**: Section 111 Review filed with USACE (started in 2014)

• **2007**: Section 204 Review filed with USACE (started in 2014)

• **2010**: Failure to nourish Town Neck with dredge spoils (USACE) resulted in offshore disposal

• **2012/2013**: Several smaller post storm restoration projects have been carried out at the eastern end of the beach to repair dune overwash areas created during hurricane Sandy in 2012 and winter storm Nemo in 2013.
• **2014**: Town of Sandwich Dune and Beach Reconstruction Project was successful permitted for the placement of approximately 432,000 c.y. of clean beach compatible sand along approximately 1 mile of shoreline, extending from just south of the Cape Cod Canal to Sandwich Harbor Inlet.
• **2016**: Approximately 110,000 cubic yards of sand was dredged from the Canal by the USACE for improved navigation, and placed on the eastern end of Town Neck Beach. This project placed 25% of the total permitted volume of 432,000 cubic yards of sand.
  – Summer dune grass planting/stabilization
USGS Monitoring

Sandwich 21 September 2016 (Provisional data)

UAS Surveys:
Mar. 30, 2016; Sep. 21, 2016;

Courtesy of Chris Sherwood, USGS-WHSC
Top: shaded relief map at Sandwich, MA after reshaping the nourished dune on 30 March 2016.

Bottom: difference map, comparing top map with a newer map made on 21 September, 2016. Sand movement, vegetation growth, and changes in parked cars over the summer are evident. Erosion is blue, accumulation is red. Changes less than five cm are gray/white. These highly accurate maps were made in a few hours with a small drone, and verified with survey-grade GPS.

Courtesy of Chris Sherwood, USGS-WHSC
Required Monitoring

- Biannual topography (DEP, NHESP), annual eel grass (DMF)
Need for Additional Sand

• Beneficial reuse of sand dredged from the Cape Cod Canal as nourishment material is certainly welcome as part of the Sand Bypassing Program, but an additional source is needed.
Alternatives Considered

Study Funded by a Coastal Community Resilience Grant in 2014 by the Massachusetts Office of Coastal Zone Management
Evaluation and Assessment

- Sediment characterization:
  - Surface grabs, vibracores, dune borings, side-scan and subbottom CHIRP sonar
- Benthic habitat:
  - Eel grass, shellfish endangered species
- Engineering:
  - Bathymetry, topography/ beach profiles
  - Wave modeling/ impacts
  - Sediment transport/ infilling
  - Spreading analysis
- Archaeological (MA BUAR)
## Evaluation and Assessment

<table>
<thead>
<tr>
<th>Offshore/Nearshore Alternatives</th>
<th>Volume</th>
<th>Wave Impacts</th>
<th>Sediment Transport Impacts</th>
<th>Sediment Infilling Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A: Bar skimming</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>1B: Bar skimming</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2A: Offshore borrow site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2B: Offshore borrow site¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A: Intertidal extraction</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3B: Intertidal extraction</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7: No action</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8: Offshore borrow site</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beach/Dune Alternatives</th>
<th>Volume</th>
<th>Storm Damage Protection Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A: Profile Translation (90 ft)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4B: Profile Translation (60 ft)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4C: Profile Translation (30 ft)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5A: Dune extraction (300 ft)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5B: Dune extraction (150 ft)¹</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Preferred Alternative

Legend
- Proposed Borrow Site - Alternative 2A
- Elevation (ft NAVD88)
- Scusset Beach Reservation
- High : 30
- Low : -25

<table>
<thead>
<tr>
<th>Alternative #</th>
<th>Description</th>
<th>Area (acres)</th>
<th>Dredge Volume (cy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td>Offshore Borrow Site</td>
<td>23.1</td>
<td>224,476</td>
</tr>
</tbody>
</table>

CAPE COD BAY

Cape Cod Canal
Offshore Borrow Site Plan

- 224,500 c.y. (52%) template
- 23 acres
  - 1,700 ft. alongshore
  - 600 ft. seaward
- Infill rate = 5.9 years
- Hydraulically dredged by hopper and pumped onto beach
Offshore Borrow Site Sections

TRANSECT 1

Scusset Beach
State Preservation Dunes

500-550 feet

7-10 feet

~600 feet

TRANSECT 4

Scusset Beach
State Preservation Dunes

300 feet

-10 MLW

~575 feet
Summary: 6 Lessons Learned

1. This project faced hurdles (e.g., cost, planning/coord., etc.), but because of importance to Town Neck Beach the Town persisted, and is succeeding;

2. Capital outlay for town has been large, but sources of external funding have been identified and tapped when possible (USACE Continuing Authorities Programs, CZM grants, FEMA Hazard Mitigation grants, etc.);

3. Different regulatory frameworks for use of dredged materials – overcome through use of Continuing Authorities Programs;
Summary: 6 Lessons Learned

4. Long range planning and coordination with regulatory agencies has been critical; this has facilitated evolution of project into a 3-pronged sand bypassing program;

5. Public outreach also key to overcome misperceptions of poor sand quality/aesthetics;

6. Requirement for public access easements by private property owners receiving sand from publicly funding projects can be an issue – outreach early and often may help ease this issue but no silver bullet yet;
Oak Island Natural Recolonization Approach for Marsh Restoration

Alan Fowler

Senior Principal
Geosyntec Consultants, Inc.
Oak Island: Natural Recolonization Approach for Marsh Restoration

Alan Fowler
Geosyntec Consultants

EBC 11th Annual Dredging Conference
Beneficial Use of Dredged Material

Friday, October 27, 2017
Presentation Overview

- Background information
- Oak Island setting
- Natural recolonization approach
- Restoration results
Why Restoration was Needed
Oak Island

- 30-acre salt marsh
- Hydraulically connected to Rumney Marsh
- Saltwater flow to Oak Island is restricted by a tide gate
- Development activities and tide gate operations are critical drivers
- Marsh was dominated by Phragmites
Local Concerns

- Flooding
- Mosquitos
- Fires
Tidal Inundation at 1.0 NGVD29
Tidal Inundation at 3.0 NGVD29
Tidal Inundation at 3.5 NGVD29
Tidal Inundation at 5.6 NGVD29
Tidal Inundation at 7.2 NGVD29 (High Tide)
Salt marsh Dominated by Phragmites
2003 - Self Regulating Tide Gate Installed
New Tide Gate, Channel and Island (2004)

~ 1.0 NGVD29

~ 3.0 NGVD29
Post-Construction Conditions (2004 – 2011)

- Tide gate set to 1.0 NGVD29
- 20 plus adjustments made to reach 2.5 NGV29
- Limited restoration at 2.5 NGVD29
- Vandals steal tide gate parts in 2007
- Leakage only from 2007 to 2011
New Tide Gate and Marsh Restoration

- New tide gate installed in 2011 as part of mitigation for the Island End River project
- Mitigation also included removal of soils over 4.38 acres in 2013 to an elevation 1.0 NGVD29
- Additional soils over 1.2 acres removed in 2014 by NOAA with funding from an Natural Resource Damage settlement
Design included natural recolonization of native vegetation
Construction Activities in 2013

Removal of ~ 7,000 cubic yards of marsh soils
Construction Activities in 2013

Channels cut to distribute tidal flow
Monitoring Natural Recolonization

- Monitoring required for 5 years following construction
- Currently 4 years into the monitoring process
- Monitoring includes:
  - Tidal elevations (one year)
  - Erosion and sediment stability
  - Invasive species
  - Assess recolonization at 20 fixed stations
  - Quarterly photos from fixed stations
Surface Water Elevations in Late 2014
Vegetation Monitoring Locations
Monitoring Results

- **Natural recolonization species include:**
  - Smooth Cordgrass (*Spartina alterniflora*)
  - American Glasswort (*Salicornia virginica*)

- **Percent recolonization**
  - 2014: 0%
  - 2015: 6%
  - 2016: 8%
  - 2017: 36%

- Invasive species are limited
- Secondary flow channels are naturally developing
- Tide gate operation is mission critical for success
Station H-1 Looking northeast

October 2016

August 2017
Take Away Messages

• Natural recolonization can work, but needs time
• Interagency cooperation and a regulatory champion were key ingredients for success
• For Oak Island, proper tide gate operation is mission
• We will be seeing more tide gates and impacts to habitat will be a key consideration
Rhode Island South Shore Habitat and Community Resiliency Project

Caitlin Chaffee

Coastal Policy Analyst
Coastal Resources Management Council
State of Rhode Island
Beneficial Reuse and Marsh Elevation Enhancement on Rhode Island’s South Shore

EBC 11th Annual Dredging Conference: Beneficial Use of Dredged Material
October 27, 2017

Caitlin Chaffee, RI Coastal Resources Management Council
Maren Frisell, Fuss & O’Neill, Inc.
2014 South Shore Habitat & Community Resilience Project: Project Overview

- Focused on RI southern coastal ponds and back-barrier marshes
- Planning and design for three ponds
- Dredging and marsh restoration in Ninigret Pond

Partners:

Funding:
Sea Level Affecting Marshes Model Results: 3ft SLR

- Potential Marsh Zone
- Persistent Marsh Zone
- Potential Marsh Loss
- Open Water and Tidal Flat
- Current Fresh Wetlands
- Protected Open Space
Observed Impacts to Project Site

- Vegetation die-off
- Shallow ponded areas with algal mats
- Loss of high marsh species
Design: Vegetation Elevation Ranges

Graph showing the elevation ranges of different vegetation types including:
- Bare
- Short S. alterniflora
- S. alterniflora
- Transition
- S. patens
- J. gerardii/D. spicata
- Phrag
- J. frutescens

Design: Sediment Analysis

- Estimated compaction/consolidation evaluated based on bulk density and depth of organic layers
Design: Fill Elevations and Grading

- Set max target elevation at elevation 1.2 ft NAVD88
  - Compaction
  - Sea Level Rise
  - 20% Contingency Volume

- Grading/ Runnels for drainage

- Historic creeks and pools to remain
Design: Dredging Plan

- Basin volumes determined using bathymetric survey and target elevations
- Established segments of basin for specific marsh restoration units
Stakeholder and Community Engagement: Proposal to Implementation

- **Town of Charlestown**
  - GIS Coordinator
  - Town Administrator
  - Harbor Master
  - Police Dept.

- **Salt Ponds Coalition**
  - Community support and outreach

- **Save The Bay**
  - Volunteer mobilization

- **Press and Public Events**

**Partners:**
Permitting and Regulatory Compliance

- NEPA EA /Section 106 (USFWS lead federal agency)
- USACE Section 404 Category 2 General Permit (includes sign-off by EPA, NOAA Nat. Marine Fisheries Service)
- State Section 401 Water Quality Certification
- CRMC Assent
Lessons Learned: Permitting

- Meet early and often with permitting agencies to identify issues up-front
- Conduct site visits
- Provide sound documentation of impacts to project sites as well as future projections if possible
- Plan for extensive data collection to support project design and application development
- Plan and budget for measures to avoid adverse impacts
Minimization of Adverse Impacts

- Time of year restrictions
- Equipment specifications (LGP, discharge pipe size, flow diffusers)
- Sediment control
- Establishment of no-go zones
- Performance specifications for unavoidable impacts to existing habitats
- **Construction oversight** is key to identifying potential problems!
- Develop RFP to ensure a contractor with the right expertise, equipment and capacity
Implementation
Implementation
Implementation
Implementation
Implementation
Implementation
Implementation
May 2017
Photos: Save The Bay
May 2017
Photos: Save The Bay
Monitoring/ Adaptive Management

- Coordination with Save The Bay, SHARP program, EPA AED and USFWS
- BACI design, reference site at adjacent National Wildlife Refuge
- Implementation and performance monitoring
Approx. 68,000 cy dredged material to restore approx. 20 acres of marsh

- Design, Engineering and Permitting: $110,453
- Construction
  - Mobilization / Demobilization: $334,400
  - Dredging, spreading and grading of material: $543,900
  - Alternate dredging: $530,812
- Planting: $100,000
- TOTAL: $1,619,565
September 2017
(photo by Caitlin Chaffee)
October 2017
(photo by Caitlin Chaffee)
Thanks!

Caitlin Chaffee
cchaffee@crmc.ri.gov
Beneficial Use of Dredged Materials for Resilient Tidal Marsh Restoration and Creation: Workshop Outcomes

Rebecca French

Director of Community Engagement
Connecticut Institute for Resilience and Climate Adaptation

Environmental Business Council of New England
Energy Environment Economy
Beneficial Use of Dredged Materials for Resilient Tidal Marsh Restoration and Creation: Workshop Summary

Dr. Rebecca French
Connecticut Institute for Resilience and Climate Adaptation
EBC Dredging Conference
October 27, 2017
CIRCA Mission

Increase the resilience and sustainability of vulnerable communities in Connecticut’s coastal and inland areas to severe storms and the growing impacts of climate change on the natural, built, and human environment in response to critical, identified needs and priorities.
Priorities

• Environment, Climate and Coasts

• Infrastructure Resilience

• Policy Analysis and Design
CIRCA Program Areas

- Research and Engagement Projects
- Matching Funds Program
- Municipal Resilience Grants Program
Scoping of Dredge Material Islands and Wetlands for Green Infrastructure Resiliency Projects Along the CT Shoreline in Fairfield and New Haven Counties

• Community Development Block Grant Disaster Recovery (CDBG-DR) Planning Application
• Funded through State of Connecticut Department of Housing

• Jennifer O’Donnell, Dept. of Marine Sciences
• Jamie Vaudrey, Dept. of Marine Sciences
• Craig Tobias, Dept. of Marine Sciences
• Rebecca French, CIRCA
• Paula Schenck, UConn Health
• Carolyn Lin, Dept. of Communication
• Kim Bradley, CIRCA
Workshop Goals

• Framing of cross-regional collaboration of MidAtlantic/New England Regions, including a comparison across federal regions.
• Identification of resources with an emphasis on networking and information sharing.
• Models for resilient and sustainable restored and created wetlands using dredged sediments to address barriers for implementation of projects.
Workshop Agenda

• Case Studies from RI, NY, NJ
• Group Discussions of Barriers and Topics of Interest – Working Lunch
• Project Partner Panel
• CT Project Status Update
• The Way Forward
Project Integration – Brian Thompson, CTDEEP
Project Integration – Brian Thompson, CTDEEP
Case Study - Topics

• Project Assessment/ Project Goals
• Design
• Stakeholder and Community Engagement
• Federal and State Policy and Permitting
• Implementation & Monitoring
Case Studies – Rhode Island

• Caitlin Chaffee, RI CRMC
• “Beneficial Reuse and Marsh Elevation Enhancement on Rhode Island’s South Shore”
  – Combined dredging and marsh restoration in Ninigret Pond.
Case Studies – New Jersey

• Metthea Yepsen, NJDEP

• “Beneficial Use of Dredged Material to Restore Salt Marsh Resiliency: A New Jersey Case Study”
  – Reviewed three pilot sites from design through post construction monitoring.
Case Studies – New Jersey

Enhancement project goals and assessment

Enhancement project goals:
1. Test the idea that the application of dredged sediment on existing, stressed salt marshes would provide ecological enhancement and help them persist into the future in the face of sea level rise, erosion, and subsidence.
2. Test out a variety of different sediment types, placement methods, and thicknesses on a range of baseline conditions.

Project assessment:
1. Track how the ecology responds initially
2. The methods would be deemed successful if there was
   a. Return to baseline conditions for all metrics*
   b. Lasting elevation increase
   c. More robust native salt marsh vegetation
Case Studies – New Jersey

Monitoring

- Vegetation
- Avian use
- Elevation and depth of placement
- SETs and marker horizons
- Nekton
- Benthic infauna
- Epifaunal macro invertebrates
- Soil properties
- Wave energy
- Changes in habitat type (pool, pannes, low marsh, high marsh, dune)
- Damage cost avoided (HAZUS/CHAMP)
- Water chemistry
- Site visits
Case Studies – New Jersey

Implementation: Fortescue

Placed sediments
Damage from machines
Containment

Photo: Damon Noe, TNC
Case Studies – New Jersey

Design: major lessons learned

- Sandy sediments are not well suited to being hydraulically spread in a thin and even layer on existing marsh
- Selecting proper target elevations is key:
  - bio-benchmarks
  - thinner is better
  - aim lower rather than higher to maintain tidal flushing and reduce need for containment
  - study how channel sediments will dewater and consolidate
- Work with dredging company to design constructible projects
  - distance that sediments can be pumped from channel
  - distance from marsh edge that sediments can be pumped into marsh
- Clearly document as-built goals AND post construction goals
Case Studies – New Jersey

Is using dredged material for marsh enhancement a “win-win” situation? The jury is still out.

“Big” project-specific questions to answer include:
- How long does it take for the marsh to be enhanced?
- Are there long-term negative impacts of such projects?
- Are there really cost savings by combining projects?
- Is this a once and done solution or will we need to place sediment on the marsh repeatedly over time?

Stay tuned for answers …
Case Studies – New York

- Peter Weppler & Lisa Baron, USACE NY District
- “Jamaica Bay Marsh Island Restoration”
  - Funded through USACE Section 204/207 Process
  - Implementation began 2006, reviewed projects through monitoring results.
Case Studies – New York

42,000,000 Cubic Yards of Dredged Material
From the Harbor Deepening Program
From 2004 to completion in 2014

Would fill:

- Central Park, New York City (an area of 1.32 square miles) to a depth of 31 feet.
- 3 buildings the size of the Empire State Building each year for ten years (total = 30 Empire State buildings)

- A standard size football stadium (100 x 50 yards) to a height of 4.8 miles, nearly the height of Mount Everest (5.4 miles high)
Case Studies – New York

JAMAICA BAY MARSH ISLANDS

Elders East
Elders West
John F. Kennedy Airport
Gassy Bay
JoCo

Yellow Bar
Big Egg
Little Egg

UCON
Case Studies – New York

RESTORATION OF ELDERS EAST

October 2006

July 2010

Photo courtesy of Galvin Brothers, Inc.
Case Studies – New York

ELDERS WEST (near completion)

July 2010
Case Studies – New York

MONITORING RESULTS

Elders East (West and Yellow Bar)

- Total live vegetated canopy cover, above- and belowground productivity do not differ between the restored and reference marshes
- Low root:shoot ratios could indicate allocation of resources to aboveground annual tissue which could limit sediment organic accumulation
- The overall condition of nekton at these marshes has been stable
- Reference and restored marshes are more resilient to sea level rise when compared to control marshes

http://dx.doi.org/10.21079/11681/23952
Case Studies – New York

YELLOW BAR, BLACK WALL AND RULERS BAR MARSH ISLAND RESTORATION 2012

Yellow Bar: 46 acres, $17.3M
Black Wall: 20 acres, $2.1M 2007
Rulers Bar: 10 acres, $1.311M
Lunch Topic Discussions

1. Marsh Creation/Restoration for Community Resilience
2. Resource Conflict/Conversion/Trade-offs (a.k.a. Habitat Tradeoffs)
3. Design Standards Integrating Sea Level Rise
4. Design Parameters
5. Monitoring
6. Successful Projects: What defines Success?
7. Regulatory Themes
8. Funding: Linking Resilience to Economic Development
9. Dredge or Restoration: The Chicken or the Egg
10. Community and Stakeholder Engagement
Project Partner Panel

• Panel Members included:
  – Larry Oliver, USACE New England District
  – Sacha Spector, Doris Duke Charitable Foundation
  – Walker Golder, National Audubon Society
  – James Turek, NOAA

• Take-away Points:
  – Funding
    • There are federal source including USACE Section 204/207 Process, NOAA Habitat Restoration and Coastal Resilience Grants, NFWS.
    • Innovative and higher risk projects can be funded through private foundations.
    • Federal and Private partnerships are key.
Connecticut – Status of the Feasibility Assessment
Wetlands and Wetlands Island Creation Using Dredged Material

• Jennifer O’Donnell, UCONN Marine Sciences
  – Two problems – one solution?
  – Multiple interrelated challenges
    • Design/Technical
    • Social/Policy
  – Success depends on interdisciplinary cooperative approach
  – Project is ongoing.
The Way Forward

- Carolyn Lin UCONN Dept. of Communications & Kimberly Bradley CIRCA
- Partner with local communities, project partners up front, in the design phase.
- Funding sources drive project purpose and objectives (or vice versa)? This in turn, defines monitoring metrics and evaluation of success.
- Project is ongoing, will it hold up to a changing future baseline?
- Adaptive strategies – communication and technical approaches
- Inventory and prioritize tidal wetland restoration projects and integration with dredge needs.
- Integration of socio-economic metrics to monitoring approaches
- Diversification of funding sources
- Cost effectiveness vs. cost efficiency
Workshop Proceedings

• Workshop Agenda and all workshop presentations can be found on CIRCA website: http://circa.uconn.edu/2017/08/10/a-workshop-on-beneficial-use-of-dredged-materials-for-resilient-tidal-marsh-restoration-and-creation/

• Workshop Proceedings Report in preparation
Next Steps in Connecticut

• WIIN Act 2016 – USACE 10 Pilot Projects for Nature-based infrastructure
• Connecticut submitted three project locations to USACE
• Stratford Point, West Haven and Long Wharf
Stratford Point

Jennifer Mattei, SHU
Sandy Point, West Haven and Long Wharf, New Haven
Questions?

Rebecca.French@uconn.edu
Panel Discussion: How to Facilitate Beneficial Use Projects

Moderator: Lisa Lefkovitz, Battelle

Panel Members:

- Robert Boeri, MA CZM
- Norm Farris, U.S. Army Corps of Engineers
- Lealdon Langley, MA DEP
- Caitlin Chaffey, RI CRMC