Implementation of Beneficial Use of Dredged Material Projects in the Great Lakes

aka “Engineering With Nature®”

Lessons Learned, Remaining Challenges, and Further Opportunities

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Detroit District

Scudder Mackey
Ohio Department Natural Resources
Progressive Evolution

1977/1991

2008

2018
Engineering With Nature®

…the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration.

Key Elements:

▪ Science and engineering that produces operational efficiencies
▪ Using natural process to maximum benefit
▪ Broaden and extend the benefits provided by projects
▪ Science-based collaborative processes to organize and focus interests, stakeholders, and partners

www.engineeringwithnature.org
EWN Across USACE Mission Space

• Navigation
  – Strategic placement of dredged material supporting habitat development
  – Habitat integrated into structures
  – Enhanced Natural Recovery

• Flood Risk Management
  – Natural and Nature-Based Features to support coastal resilience
  – Levee setbacks

• Ecosystem Restoration
  – Ecosystem services supporting engineering function
  – “Natural” development of designed features

• Water Operations
  – Shoreline stabilization using native plants
  – Environmental flows and connectivity
Natural and Nature-Based Features

NNBF are landscape features that are developed to provide engineering functions relevant to flood risk management while producing additional economic, environmental and social benefits.
International Guidelines for Use of Natural and Nature-Based Features for Sustainable Systems

- Publish coastal NNBF technical guidelines by 2020:
  - Multi-author: government, academia, NGOs, engineering firms, construction companies, etc.
  - Addressing the full project life cycle: planning, design, engineering, construction, and maintenance
  - Guidelines in 3 Sections
    - Overarching topics
    - Coastal Applications
    - River/Inland Applications
Role of Guidance and Standards in Innovation
Great Lakes specific documents

https://greatlakesdredging.net/publications/
Examples of Beneficial Uses of Dredged Material and Engineering With Nature® Outside of the Great Lakes Basin
Deer Island, Biloxi, MS

- Biloxi Harbor Navigation Project - 12-ft deep navigation channel
- BU of dredged material to restore marsh, create terrestrial and aquatic habitat, provide a more resilient shoreline for future storm events, create long term disposal capacity
- Hurricanes over time destroyed forests, significantly eroded shoreline, and left elevations too low to support marsh vegetation
- Filled breach in west end of the island
- 1.95 mcy DM to restore southern shoreline using 2.5-mile long wave barrier
- Strategic vegetation plantings (625,000+ plants)
- Construction of a 1 mcy lagoon for BU dredged material from navigation channels
- Providing significant environmental, coastal storm, and recreational benefits
Middle Harbour Port of Oakland, USA

2018 PIANC Working with Nature Award Winner
USACE Philadelphia District: EWN in Back Bay New Jersey

Mordecai Island
Stone Harbor
Avalon
Mobile Bay: Applying RSM and EWN

WRDA86:
Place all dredged sediments in ODMDS
- 4.0 mcy/yr, Hopper Dredge, 20-Miles
- Tripled maintenance costs
2014 decision reversed:
- EWN approaches and techniques
- RSM Interagency Work Group

$12M annual value

Thin Layer Placement in Mobile Bay
Sand Island Beneficial Use Area (SIBUA)
- Downdrift benefits to Dauphin Island
- Protect lighthouse
Fill dredge holes
- Brookley Hole, Oyster Holes
Gaillard Island
- Biodegradable Containment
- Marsh Creation
- Brown Pelican
Future in-Bay placement:
Thin Layer Placement
- 1000 acre emergent marsh
Engineering With Nature in Rivers

Upper Mississippi River Training Structures: Chevrons

Horseshoe Bend Island, Atchafalaya River
Navigation and Climate Benefits

- Island formation reduced dredging requirements
- Natural channel formed east of the island due to self-scouring
- US Coast Guard realigned channel
  - channel length reduced
  - sharp bends eliminated
  - improved navigation safety
- Reduction in long-term dredging requirements
- Resultant carbon savings and reduced air pollution
Beneficial Use/EWN Strategies in the Great Lakes

Broaden Benefits

- Create natural and nature based elements via BUDM to promote:
  - Emergent wetland restoration
  - Sub-aquatic habitat restoration
  - Coastal resiliency
  - Recreation
  - Commercial fisheries

- Harvest and reuse DM from upland confined placement areas as a BU strategy

“Skate to where the puck is going to be”.  
Wayne Gretzky