Engineering with Nature – In Action: SLR AOC Living Shoreline Design Basis

Engineering With Nature and Buffalo District Collaborative Meeting
Introducing the EWN Opportunity and Implementation Guide
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Joseph P. Kreitinger, PhD
US Army Engineer Research and Development Center
Ithaca, NY

Adam C. Wagner, PE
USACE –LRE
Detroit, MI

Dan Breneman
Minnesota Pollution Control Agency
Lake Superior Unit
Duluth, MN
DULUTH EWN
21st Ave West Habitat Restoration Project

Project Goals and Objectives

- **Removal of SLR AOC beneficial use impairments (BUIs)**
  - Loss of fish and wildlife habitat
  - Degraded Benthos

- **Cost effective and environmentally acceptable dredged material (DM) management**

- **Maximize habitat improvements using EWN approach**
  - Given budget, schedule and engineering constraints

- **Evaluate engineering feasibility of shallow water DM in pilot study**
  - Data & experience needed for two more habitat restoration sites in the AOC!!
STAKEHOLDERS and Stakeholders, and stakeholders...

Maximizing the economic, environmental, and social benefits of the project requires collaboration!

- City of Duluth
- Duluth Seaway Port Authority
- Fond du Lac Tribe
- Minnesota DNR
- Minnesota Land Trust
- Minnesota PCA
- Wisconsin DNR
- University of MN*
- USACE – LRE, MVP
- USEPA/GLNPO
- USEPA/ORD MED *
- USFWS
- USGS*
- Western Lake Superior Sanitary District (WLSSD)
- And more NGOs!

* Providing significant technical support

BUILDING STRONG®
21st Ave West Habitat Design Basis

Ecological Concept Plan Goals

✓ Create 30 acres of new shallow water habitat
  +++ emergent marsh, invertebrate richness, waterfowl habitat and
  SAV associated fish

✓ Create 22 acres of near shore island/upland habitat
  + +Piping Plover and Common Tern habitat
  ++ migratory songbird habitat

✓ Soften bulkhead / riprap shoreline by creating emergent
vegetation beds given constraints on construability and
sustainability

✓ Maintain ¼ mile distance predation barrier from new
shoreline and existing Interstate Island PP habitat
Restoration Program Specific Guidelines For Evaluating Sediment Quality are Being Drafted by MPCA

✓ MPCA Guidelines being developed specifically for AOC Habitat Restoration program
✓ Close coordination with USACE’s federal requirements!
✓ Tiered approach for risk management decisions
✓ Recognition that sediment screening values are predictors of potential toxicity
✓ Biological effects data maybe required in addition to sediment screening values
✓ Consistent with existing MPCA guidance and Federal guidelines
Biological Outcome Models For Predicting Aquatic Vegetation Habitat Zones Have Been Developed

- Statistical models predict probability of Emergent marsh, Floating Leaf and Submerged Aquatic vegetation
- Incorporates water depth and Relative Exposure Index (fetch) as primary variables
- Used for evaluating design options
- UM-Duluth NRRI and USEPA-MED developed models - significant technical support!!
Biological Outcome Models For Predicting Macroinvertebrate Communities Have Been Developed

- Macroinvertebrate multimetric index (SLRLCI) developed based on least impaired sites within AOC
- Graphical models created for predicting total taxa and SLRLCI
- Incorporates water depth and Relative Exposure Index (fetch) as primary variables
- Used for evaluating design options
- USEPA-MED providing technical support!!
Hydrodynamic/Sediment Transport Model to Evaluate Sediment Stability, Habitat Resiliency, Climate change

- Short term stability and constructability of new shoreline, shoals and islands
- Impact of bathymetric design on modeled REI, aquatic vegetation and benthic macroinvertebrates
- Predicted long term resiliency of aquatic macrophyte beds
Other Design Constraints For Habitat Restoration

- Hydraulic placement of DM in shallow water
- Contaminated sediments at depth
- Mixing zone for WLSSD outfall
- 1/4 mile offset for islands to prevent predation of T&E species
- Federal navigation channel
- Dredged material availability and schedule
- Public land/real estate ownership
- Design calibration: construction tolerances
A 3-year Pilot Demonstration To Evaluate Construction Methods and Outcomes.