Great Lakes EWN Demonstration Projects

Tom Fredette
USACE-ERDC-EL
Concord, MA

Burton Suedel
USACE-ERDC-EL
Vicksburg, MS

FRM/EWN Workshop
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Great Lakes (GL) Green Breakwaters Study

- Evaluate alternatives for enhancing aquatic ecosystem benefits at existing breakwaters and navigation structures
- During routine repairs and maintenance, as part of modifications, or during comprehensive structural repairs and replacements
- Concept extends to shore protection structures, non-USACE structures
Demonstration Projects - Approach

- Demonstrate potential improvements
- GL coastal structures during routine maintenance activities
- Simple design modifications to structural elements
- Potential to reduce beneficial use impairments within GL region
Cleveland East Arrowhead Breakwater Project Approach

- Beyond indirect and unplanned habitat creation
- Modify design of featureless toe blocks used for breakwater maintenance
- Provide features creating habitat opportunities for GL fish and other aquatic life
- Examines creation of habitat surfaces on toe blocks
  - Protected indented shelf
  - Dimpled block surface
  - Grooved block surface
Cleveland East Arrowhead Breakwater – Lake Erie
Cleveland & Ashtabula, OH

Control

Dimpled

Grooved

Grooved Shelf
Texture Scale
Preliminary Implications

- Initial colonization (Oct. 2012) greater for most groups on grooved blocks
  - Invertebrate secondary production increase
- Potential to provide juvenile fish refuge
- Longer term? – awaiting sample processing and analysis from monitoring events
- Extended monitoring?
Cleveland Harbor
Products and Awards

Brochures  Trade Publications

PIANC WwN Certification
Ashtabula Harbor Breakwater Project Approach

• Beyond indirect and unplanned habitat creation
• Modify design of breakwater to create bird habitat during routine maintenance
• Provide features creating habitat opportunities for the common tern
• Examines creation of tern habitat using modified toe blocks
  - Nesting pea gravel
  - Predator/competitor exclusion grid
  - Side fencing
  - Chick shelters
Ashtabula Harbor Tern Habitat Construction
Ashtabula Harbor Breakwater Project Status

• Winter ice conditions delayed installation of decoys, tern call box, predator cable grid, and shelters until late April
• Site discovery and colony establishment could take 2-3 years
• Tern monitoring ongoing
• Doubling habitat size during Phase 2 to sixteen blocks will further increase the chances of success
Milwaukee Harbor Project Approach

• Extend beyond indirect and unplanned habitat creation
• Modify design of rubble mound breakwater during maintenance
• Provide features creating habitat opportunities for GL fish and other aquatic life
• Examine creation of habitat surfaces using rubble mound
  ➢ Stone size
  ➢ Gentler sloping shelf
• Create spawning bed for fish such as walleye, northern pike, lake perch, and smallmouth bass
Milwaukee Harbor, WI
Lake Michigan
Modified Rubble Mound Breakwater
Fish Spawning Shelf

A - Spawning Shelf Substrate: 4-8” stone free of fines
B - Spawning Shelf Sub-base: 8-18” stone
C - Normal B/W Stone: 6-10 ton stone
Fish Spawning Bed Location

500’ demonstration section
Spring 2014 construction

- Length of Spawning Bed: 500 ft
- Width of Spawning Bed: 6 ft
Post Construction Monitoring

Multi-beam Bathymetry

Visual Confirmation
Green Breakwaters Path Forward

- Assess and report on project findings
- Integrate more fully into organizational culture
- Communicate goals with partners, academia, and public
- Seek opportunities to conduct demonstrations or full scale projects with partners