Concept and Approaches for Adding Environmental Enhancements to Great Lakes Breakwaters and Jetties

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GLRI Breakwater Ecosystem Improvement 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
Identify Environmental Enhancements (EE) Inventory & Classify Structures

Conduct Webinars to Elicit EE Ideas & ID Candidate Sites

Identify Environmental Map Layers

Create Compatibility Matrix of Breakwater Classes & EE

Case Study & Candidate Sites

Tech Note - Detailed

Technical Report

Tech Note – PR Style

Great Lakes Green Breakwaters Overall Concept & Approach

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Current Activities
The Enterprise Coastal Inventory Database (ECID) application and database houses information on over 900 coastal structures as well as associated inlet data. ECID uses a Google Earth interface to allow users to access basic project information, aerial photographs, project and inspection reports, bathymetry and lidar data, and wave and water level data.
GLRI Goal Compatibility

- **Focus Area 1** Toxic Substances and Areas of Concern
  - Areas of Concern are cleaned up, *restoring the areas* and removing the beneficial use impairments.

- **Focus Area 3** Nearshore Health and Nonpoint Source Pollution
  - *Nearshore aquatic communities consist of healthy, self-sustaining plant and animal populations* dominated by native and naturalized species.

- **Focus Area 4** Habitat and Wildlife Protection and Restoration
  - Protection and restoration of Great Lakes aquatic and terrestrial habitats, including physical, chemical, and biological processes and ecosystem functions, *maintain or improve the conditions of native fish and wildlife*.
  - *Development activities are planned and implemented in ways that are sensitive to environmental considerations and compatible with fish and wildlife and their habitats.*
Environmental Enhancements and Navigation Infrastructure (EENI) Project Approach

• Webinars
• On-line Survey*
• Telephone Follow-up
• Meeting/Conference Presentations
• Data Summary
• Report

*Initial Target Group: US Federal Agencies (USACE, USEPA, etc.)
Information Needs

- Key policies, regulations, & laws
- Things we already do
- Ideas for new possibilities
- Things tried that haven’t worked and why
- Impediments to improvement
- Potential solutions to impediments
- Items needing further research to support use
- Case studies and relevant reports
Who Took the Survey?

What USACE district do you primarily work with?

- Alaska District: 24.3%
- Baltimore District: 8.1%
- Buffalo District: 2.7%
- Charleston District: 2.7%
- Chicago District: 2.7%
- Detroit District: 2.7%
- Jacksonville District: 2.7%
- Los Angeles District: 5.4%
- Memphis District: 2.7%
- Mobile District: 2.7%
- New England District: 2.7%
- New York District: 2.7%
- Norfolk District: 2.7%
- Omaha District: 2.7%
- Portland District: 2.7%
- San Francisco District: 2.7%
- Savannah District: 2.7%
- Seattle District: 2.7%
- Wilmington District: 2.7%
- Other: 5.4%
EENI Ideas

- Pea gravel apron – fish spawning habitat
- Mixed rock gradation, shelves, and caverns
- Add substrate at bottom of sheet pile structures
- Fish spawning stones
- Create submerged spurs/sinuous toe
- Rock headlands
- Develop wetlands on sediment trapped by structures
- Tern nesting habitat
- Osprey nesting platforms
- Create littoral sediment bypass
- Create flow channels
Selected Existing EENI

*Inland River Systems*

- Dike notching/chutes
- Nature-inspired fish ladders
- Groove articulated concrete mats
- Chevron notching

Upper Mississippi River
Restoration Environmental Management Program (UMRR-EMP)
River Training Structures

Center section of chevron at lower elevation (e.g., notched)
Views on Impediments

How high of an impediment do you believe cost sharing is to EENI?

- Very High
- High
- Neither High nor Low
- Low
- Very Low
- No Opinion
Inclusion of environmental enhancements may be believed to constrain/complicate future maintenance operations of navigational infrastructure. How important of an impediment do you think this belief may be to consideration of EEN1?
Suggestions to Reduce Impediments

- Greater stakeholder interaction
- Interagency agreements
- Special program funding
- Promote the EENI concept
- Document case studies
- Develop agency goals/metrics
Top Research Needs

- Document case studies and benefits
- Conduct demonstration projects
- Develop success assessment tools
- Prioritization of sites where EENI might work
Next Steps

• Promote concept
• Consider establishing goals
• National workshop
  “Designing Navigation Infrastructure: Toward Greater Environmental Sustainability” 6-8 September 2011, Charleston, South Carolina
• Pilot projects of innovative ideas