

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

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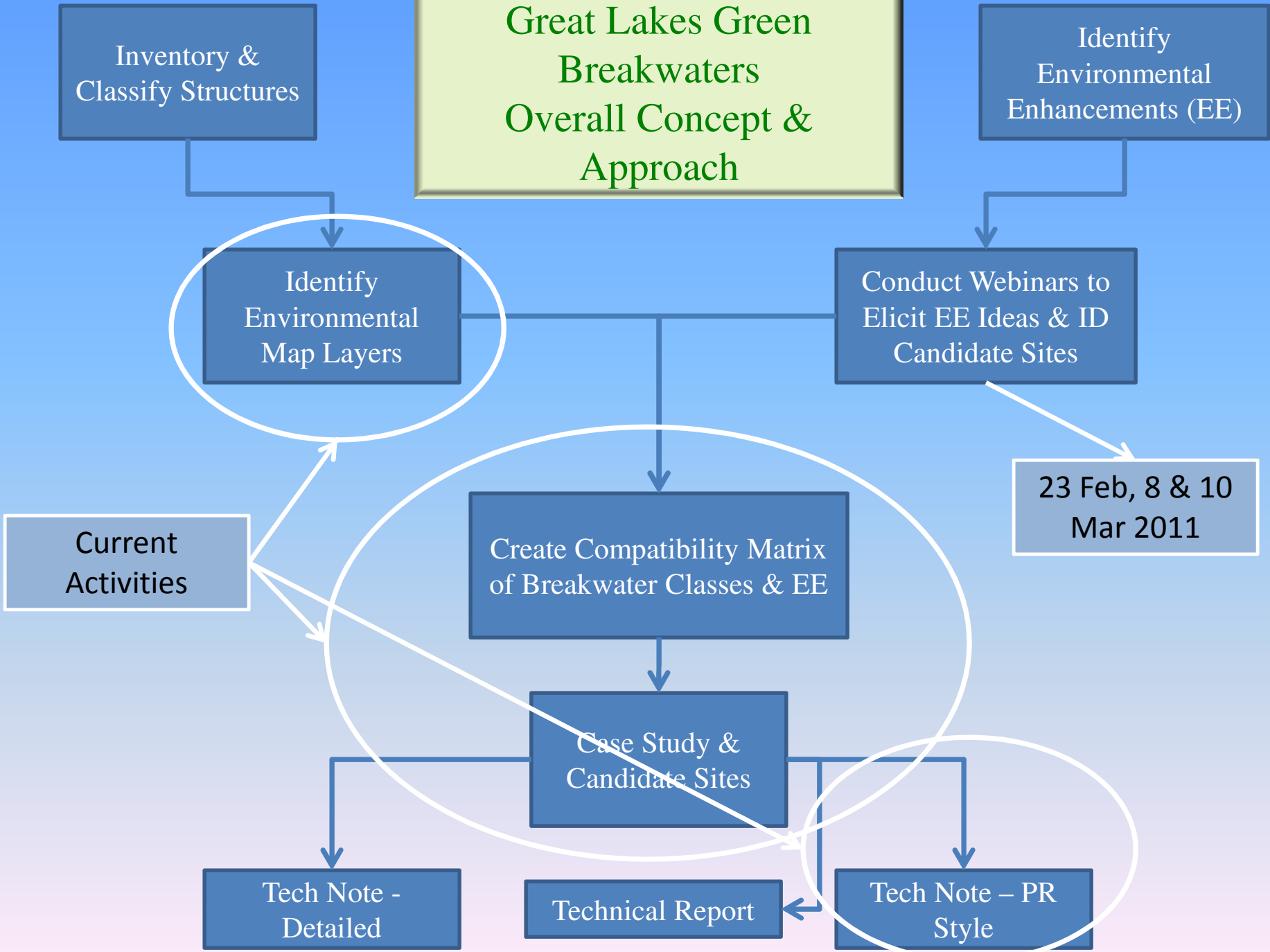


# GLRI Breakwater Ecosystem Improvement Study

- 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

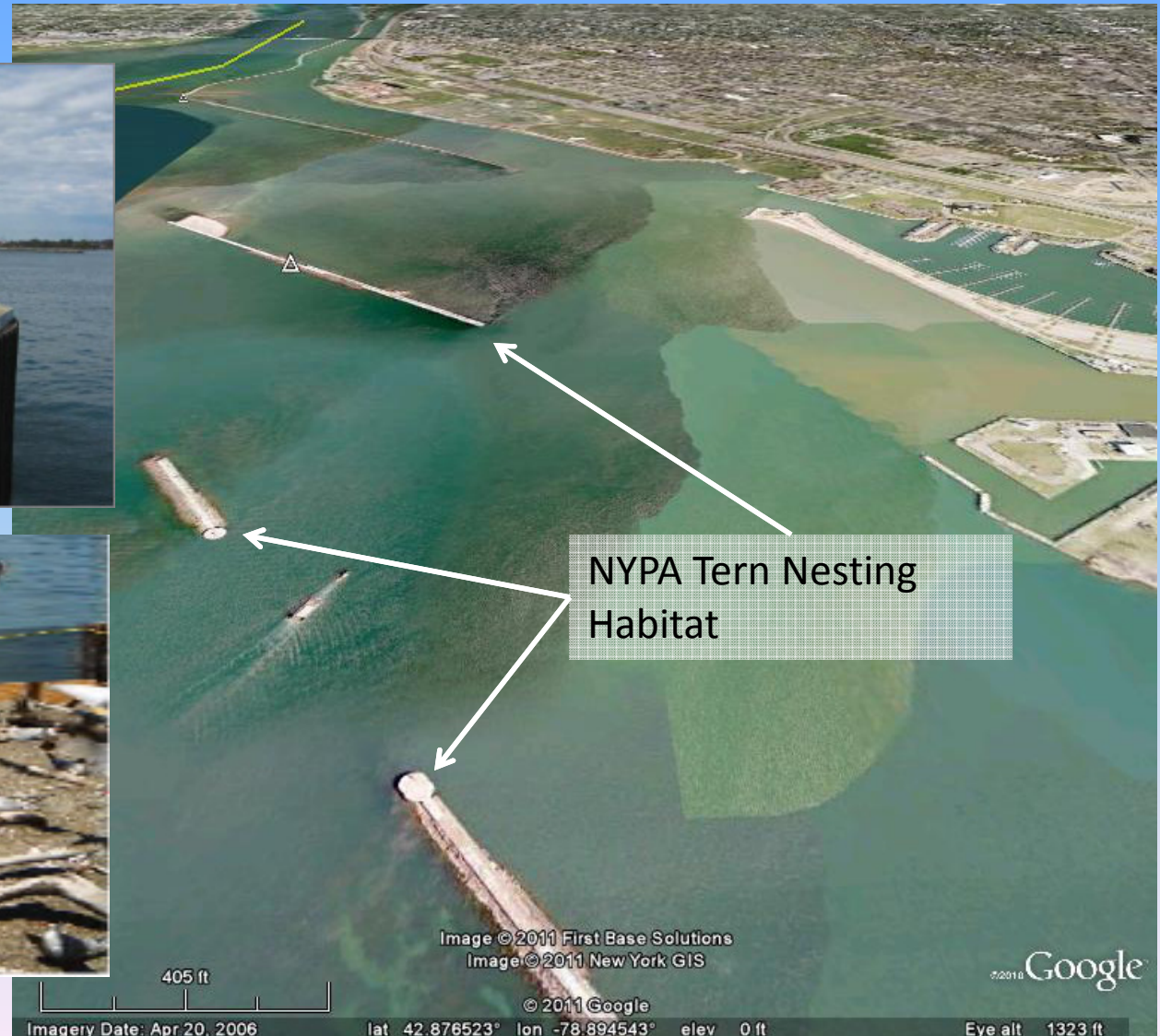


# Great Lakes Green Breakwaters Overall Concept & Approach



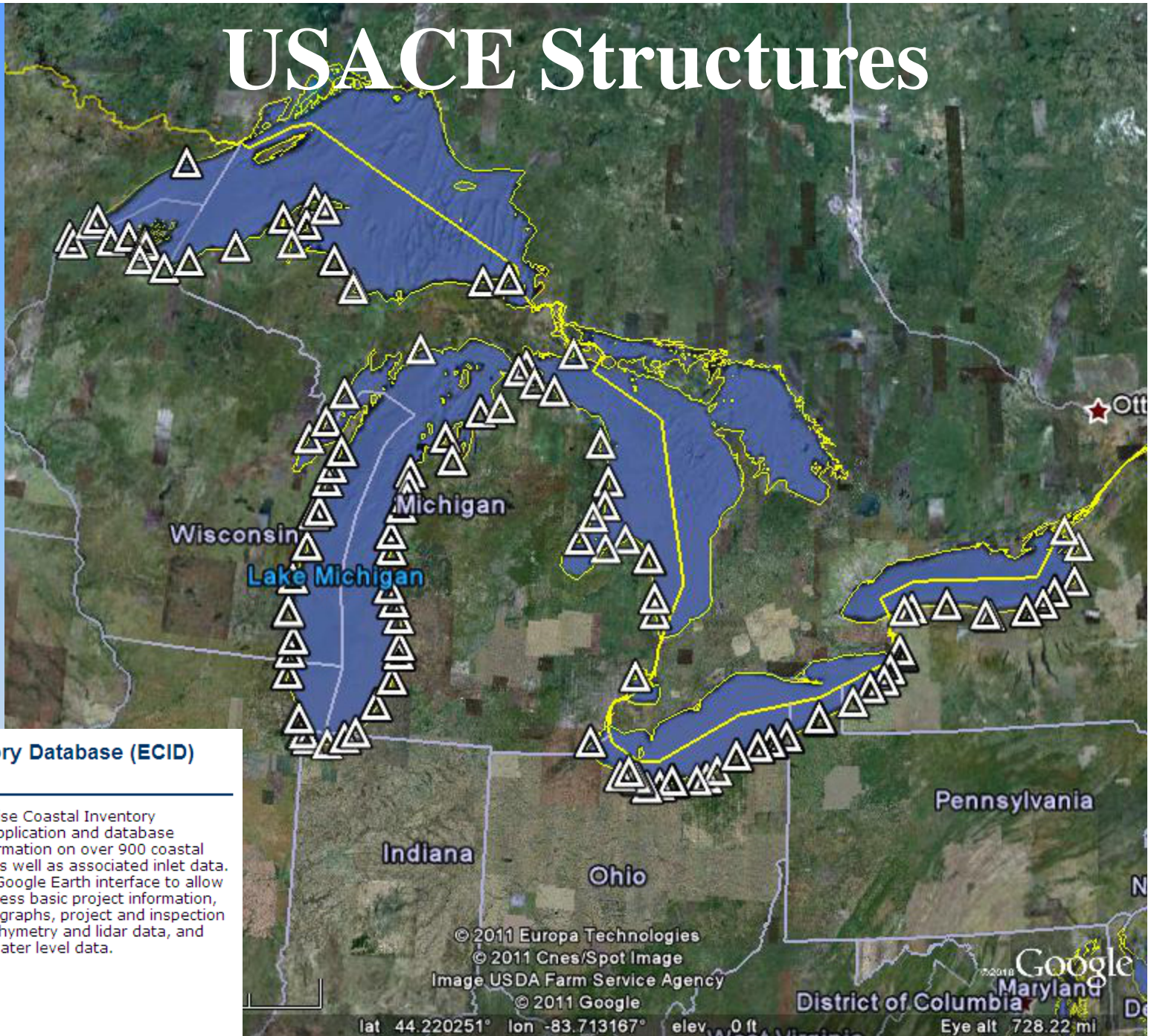
# Tern Nesting Habitat

## New York Power Authority – Buffalo, NY



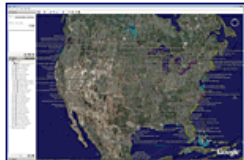
See <http://niagara.nypa.gov/EcologicalStandingCommittee/EcoStanddefault.htm>

# USACE Structures



## Enterprise Coastal Inventory Database (ECID)

Active Project



Enterprise Coastal  
Inventory (ECI)  
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The Enterprise Coastal Inventory Database application and database houses information on over 900 coastal structures as well as associated inlet data. ECI 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.

# Areas of Concern in the Great Lakes - St. Lawrence River Basin



## Legend

- Canada
- U.S.A.
- Delisted AOC
- Connecting Channels

# 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**

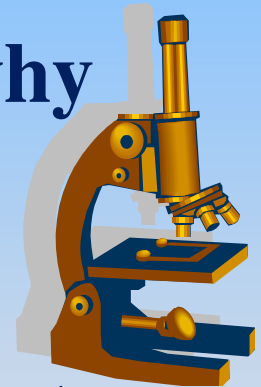


\*Initial Target Group: US Federal Agencies (USACE, USEPA, etc.)



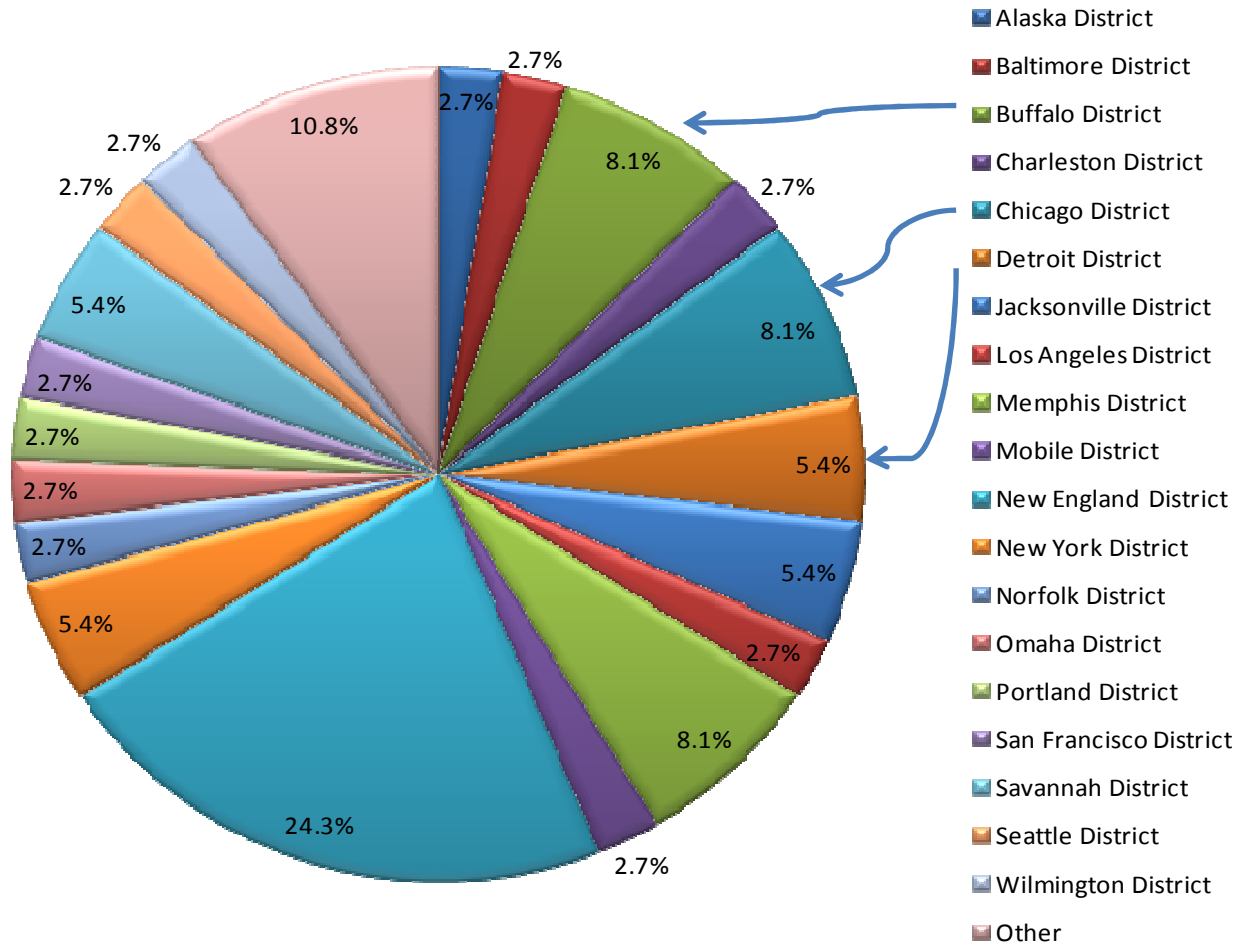
# Information Needs

- **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?



# 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/sinuuous 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)

<http://www.mvr.usace.army.mil/EMP/default.htm>

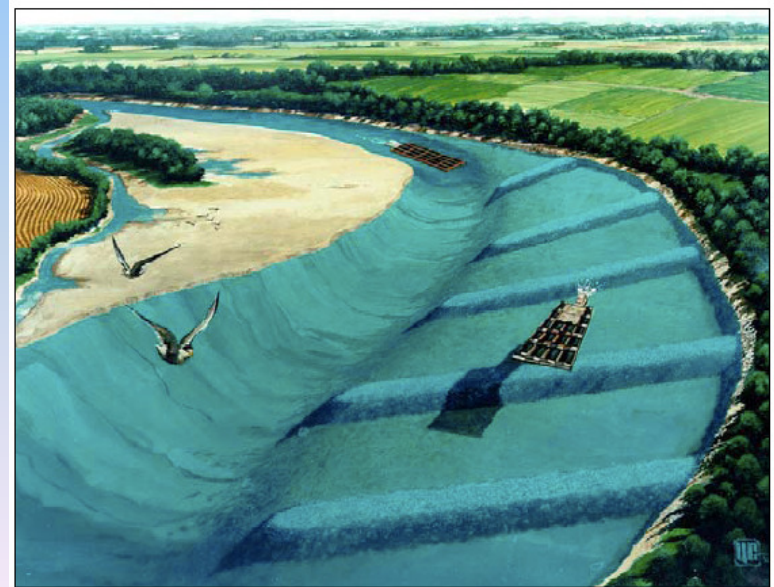


Figure 5.7. Bendway Weirs

# River Training Structures

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

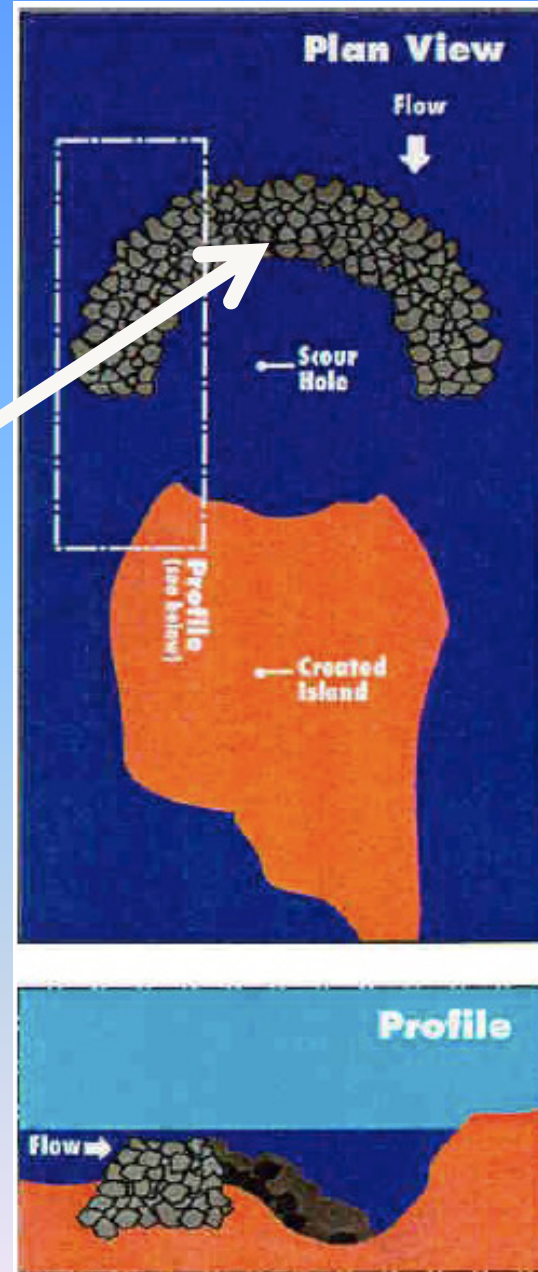
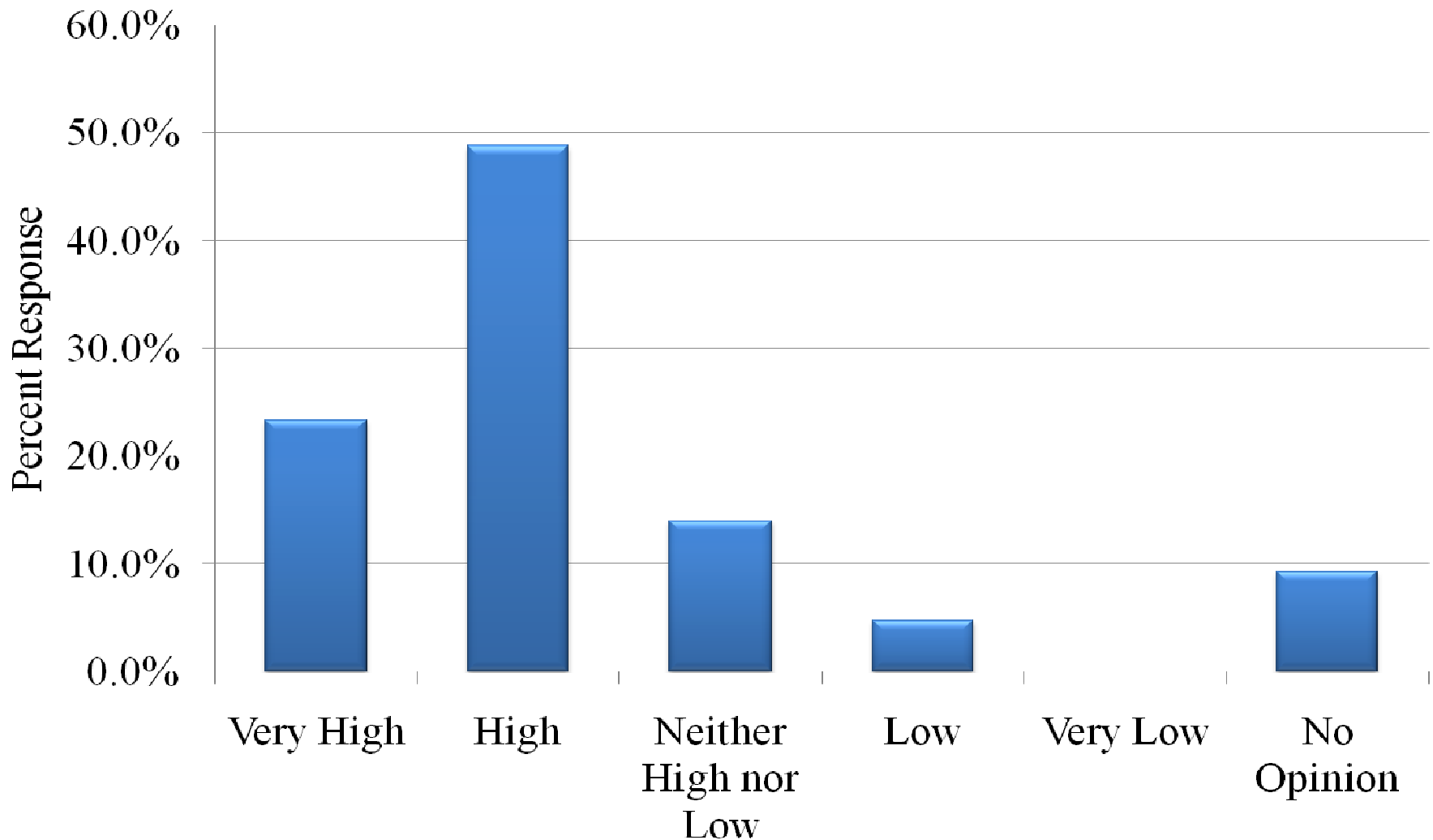


Figure 5.10. Blunt Nosed Chevron

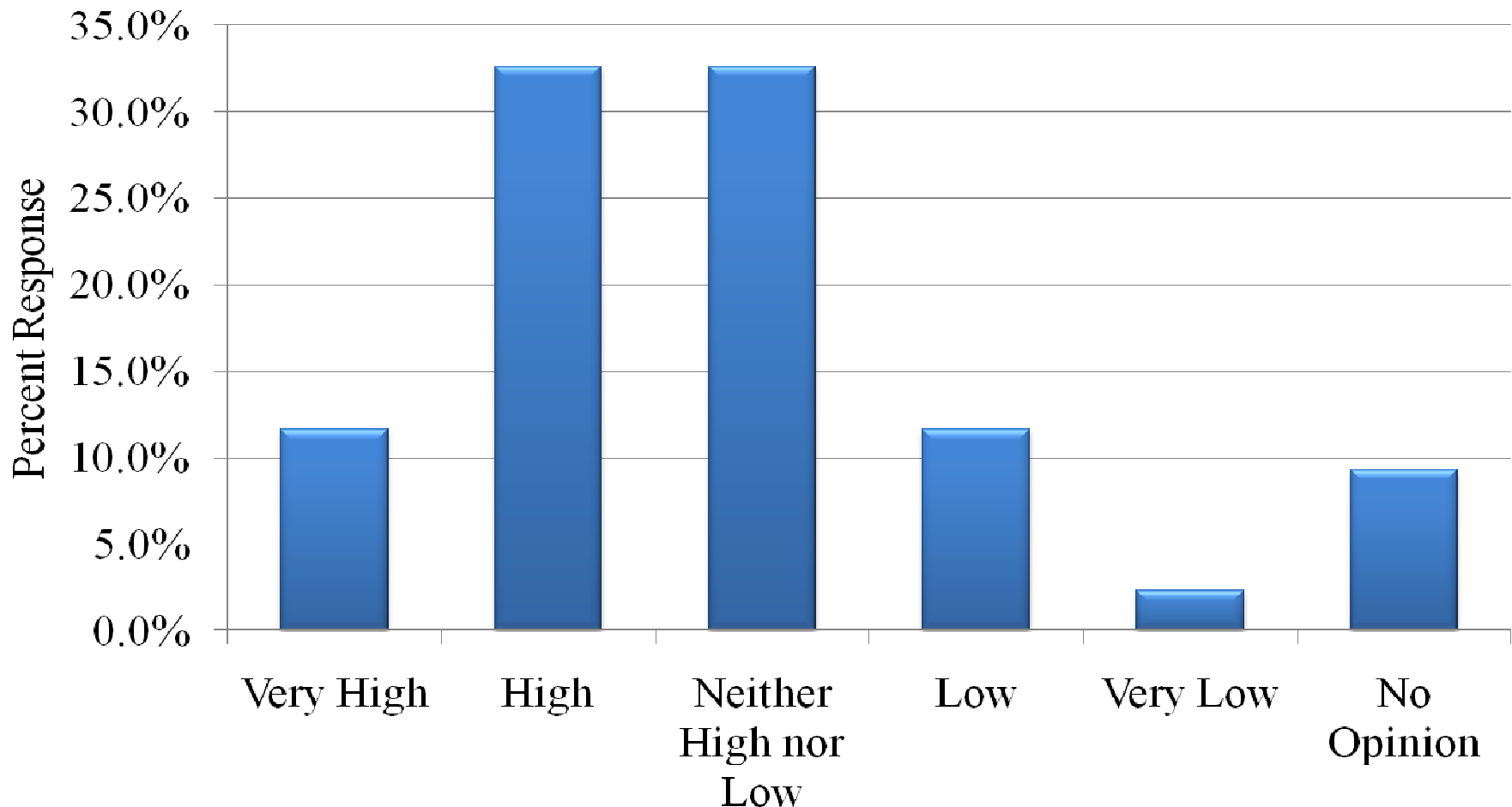
# Views on Impediments

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



# Views on Impediments

**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 EENI?**



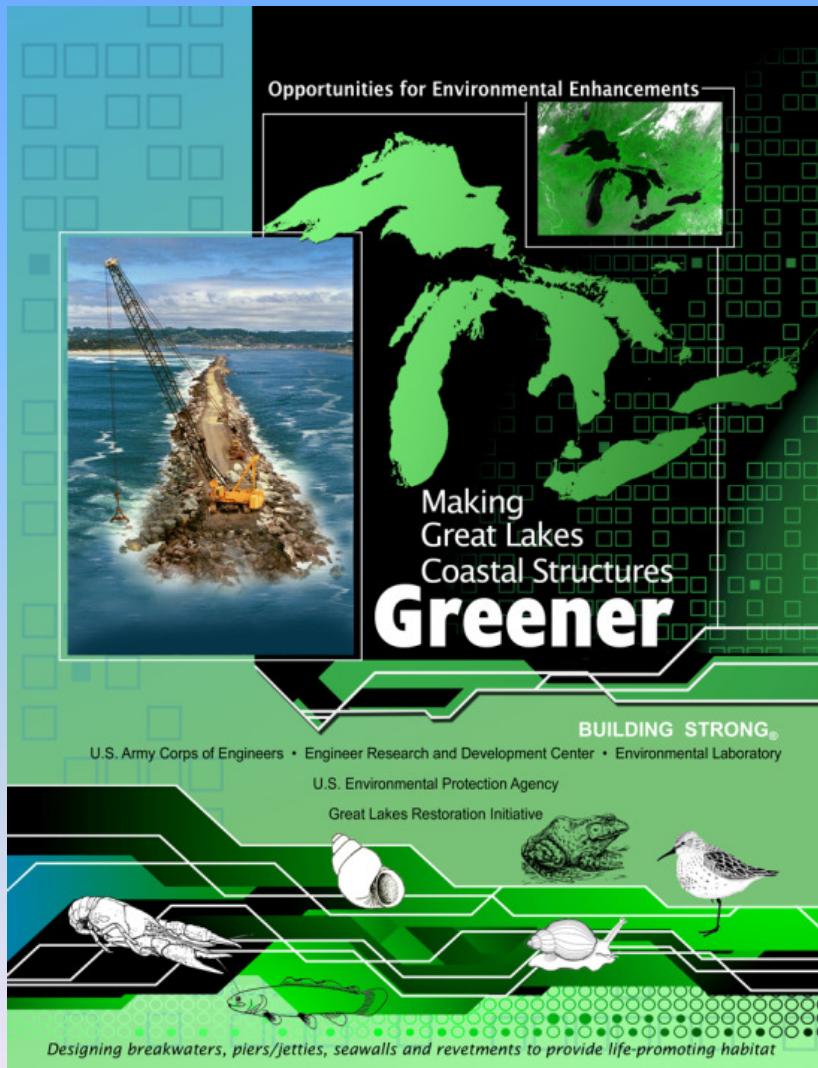
# Suggestions to Reduce Impediments

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

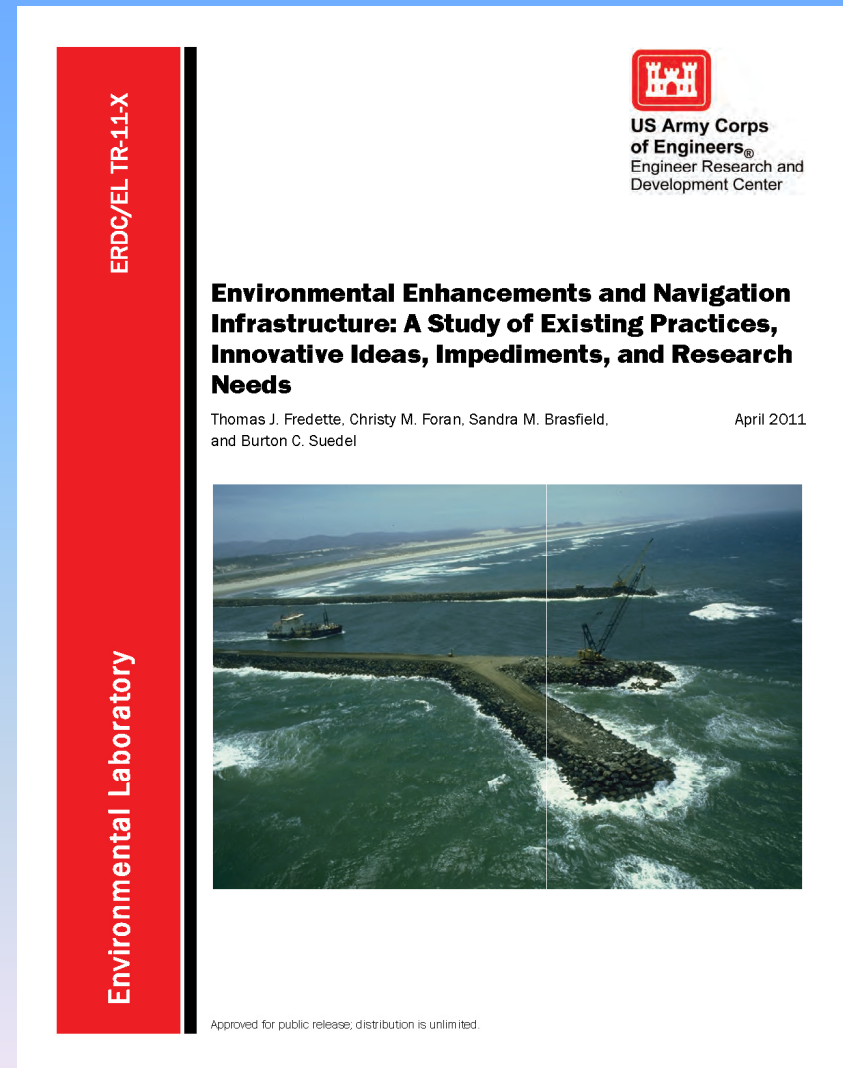




# Draft Brochure and Technical Documents



GLRI



EENI

# 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**

