# **Cleveland East Arrowhead Breakwater Demonstration**



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# The Team

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# Great Lakes 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











Enterprise Coastal Inventory (ECI) Enlarge: 1000x663 (278kb)

Active Project

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.



# **Green 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



# **Top Research Needs**

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



# **Cleveland East Arrowhead Breakwater Demo Project Description**

- Demonstrate potential aquatic habitat improvements
- GL coastal structures during routine maintenance activities
- Simple design modifications to structural elements
- Potential to reduce beneficial use impairments within GL region

# **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

## **Toe Block Fabrication**

#### **Modified breakwater toe blocks**



### **Dimpled block surface**

Habitat shelf with horizontal line texture

# **Toe Block Fabrication**

### **Modified breakwater toe blocks**



Toe block with horizontal line surface Featureless toe block (control)

### **Cleveland Harbor East Arrowhead Repairs**



**April 2012** 

**June 2012** 

### **Toe Block Monitoring and Sampling**





Toe block with horizontal lines Aug 2012 **Sampler Design** 

# **Next Steps**

- Monitoring surveys:
  - Fall 2012, Spring 2013, Fall 2013
- Reporting
- Second demonstration in GL

