Great Lakes EWN Demonstration Projects

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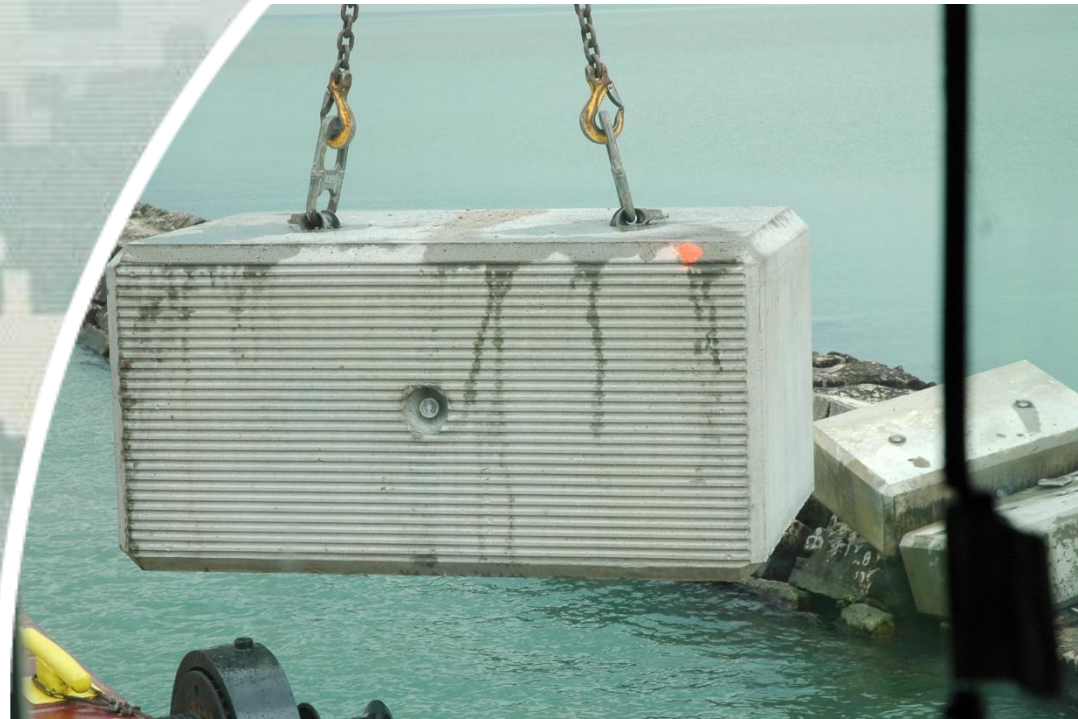
FRM/EWN Workshop
10-11 June 2014
Vicksburg, MS



US Army Corps of Engineers
BUILDING STRONG®

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

Great Lakes RESTORATION


Study Site
Cleveland East Arrowhead Breakwater – Lake Erie

Cleveland & Ashtabula, OH

Texture Scale

Sample Collection

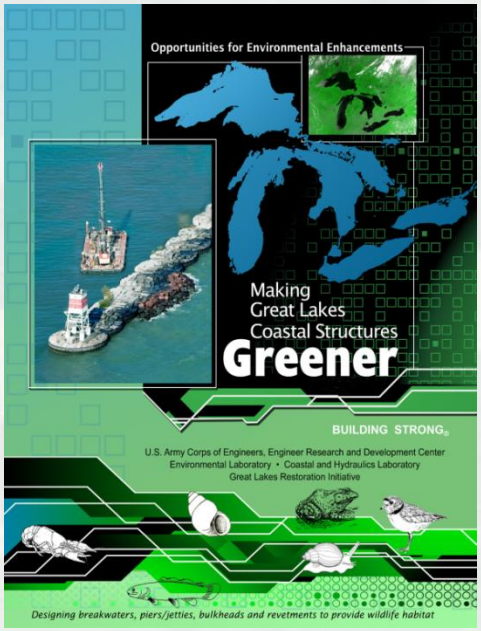
Post-sampled Area

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

PIANC WwN Certification



Brochures

Trade Publications

Ashtabula Harbor Breakwater Project Approach

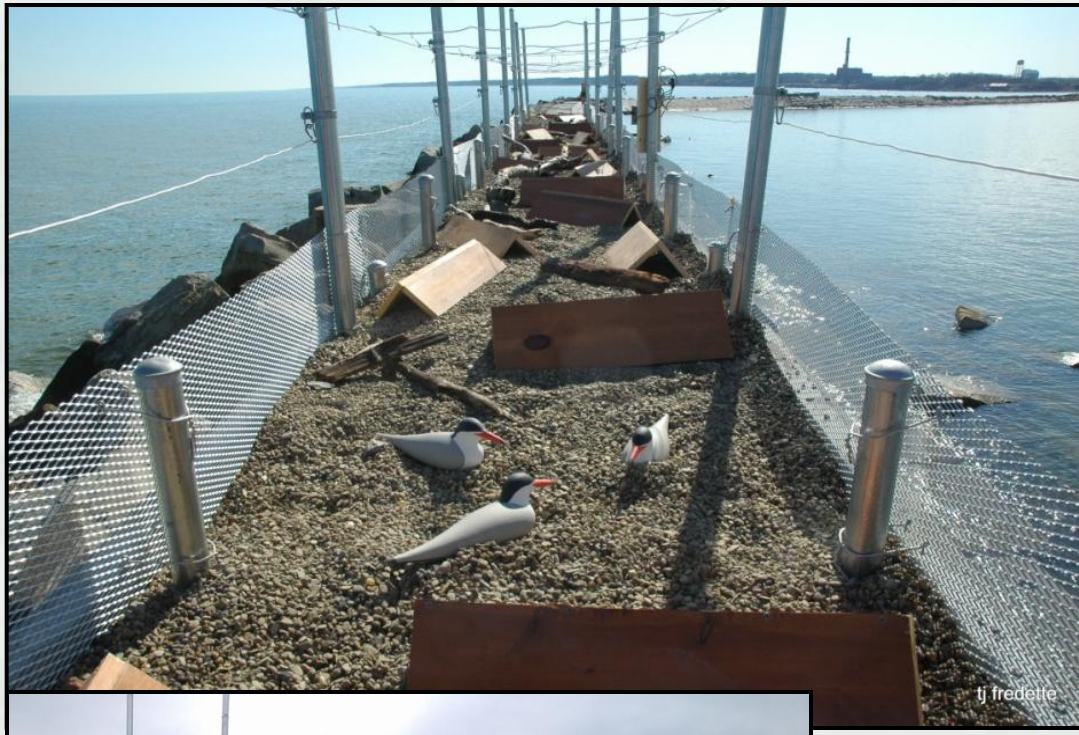
- Beyond indirect and unplanned habitat creation
- Modify design of breakwater to create bird habitat during routine maintenance
- Provide features creating habitat opportunities for the common tern
- Examines creation of tern habitat using modified toe blocks
  - Nesting pea gravel
  - Predator/competitor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

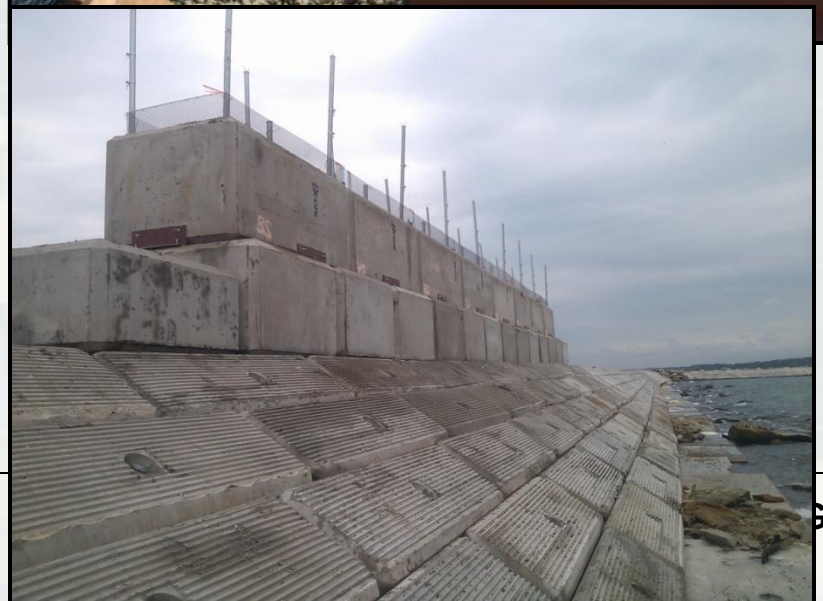

Ashtabula Harbor - Lake Erie
Study Site
© 2013 Google
1999 ft
Image © 2013 TerraMetrics
Imagery Date: 4/5/2012
lat 41.912231° lon -80.792287° elev 0 ft
Eye alt 8642 ft
Google

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

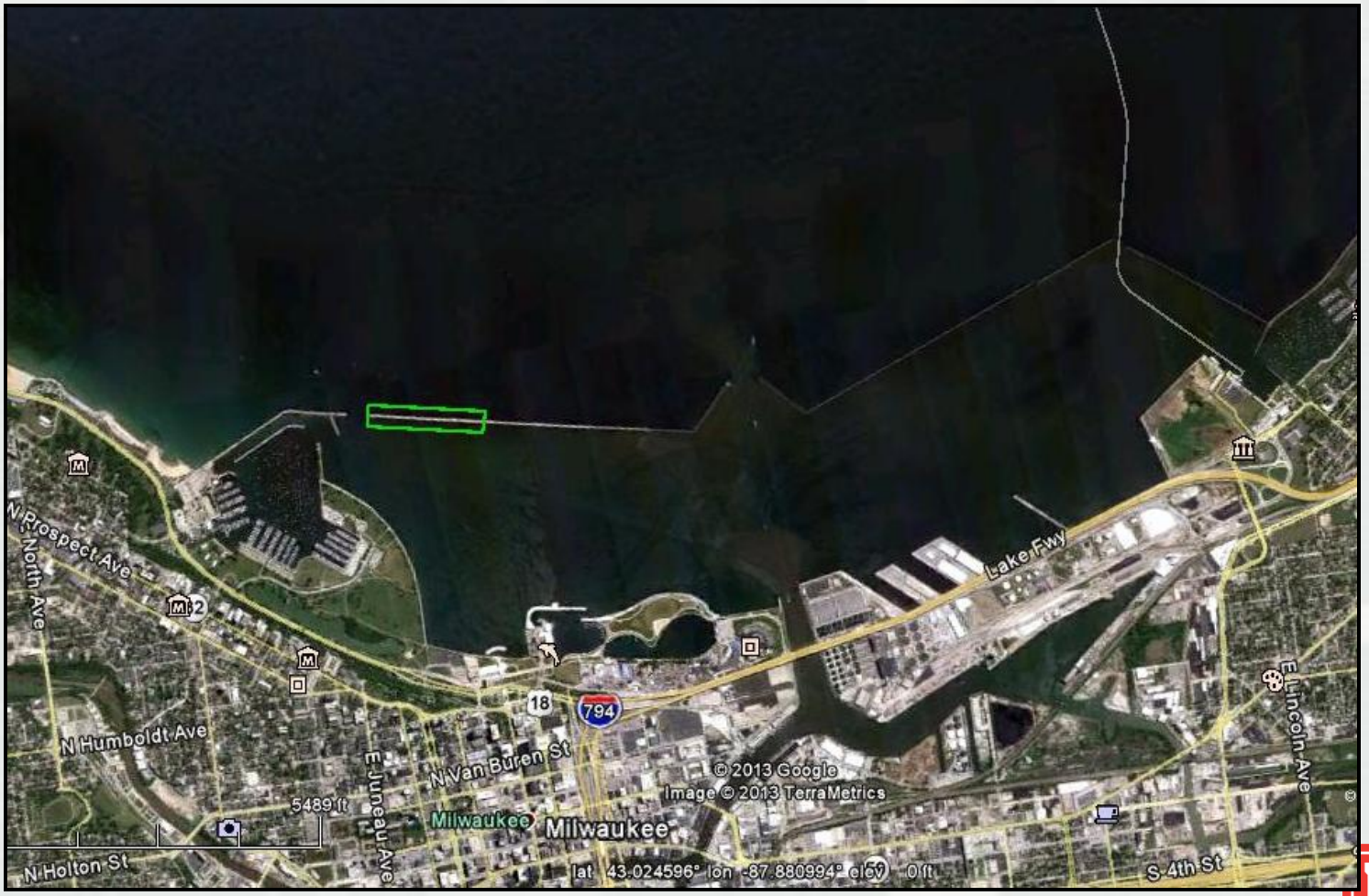




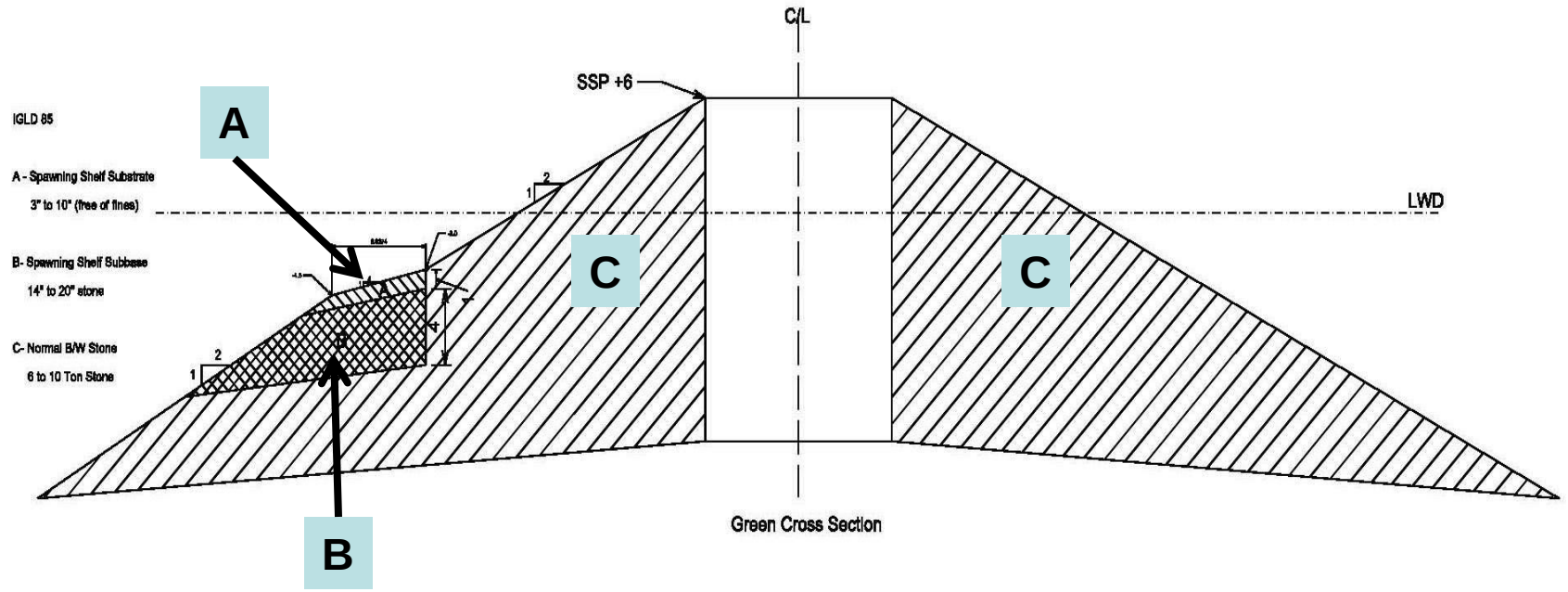
Milwaukee Harbor Project Approach

- 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

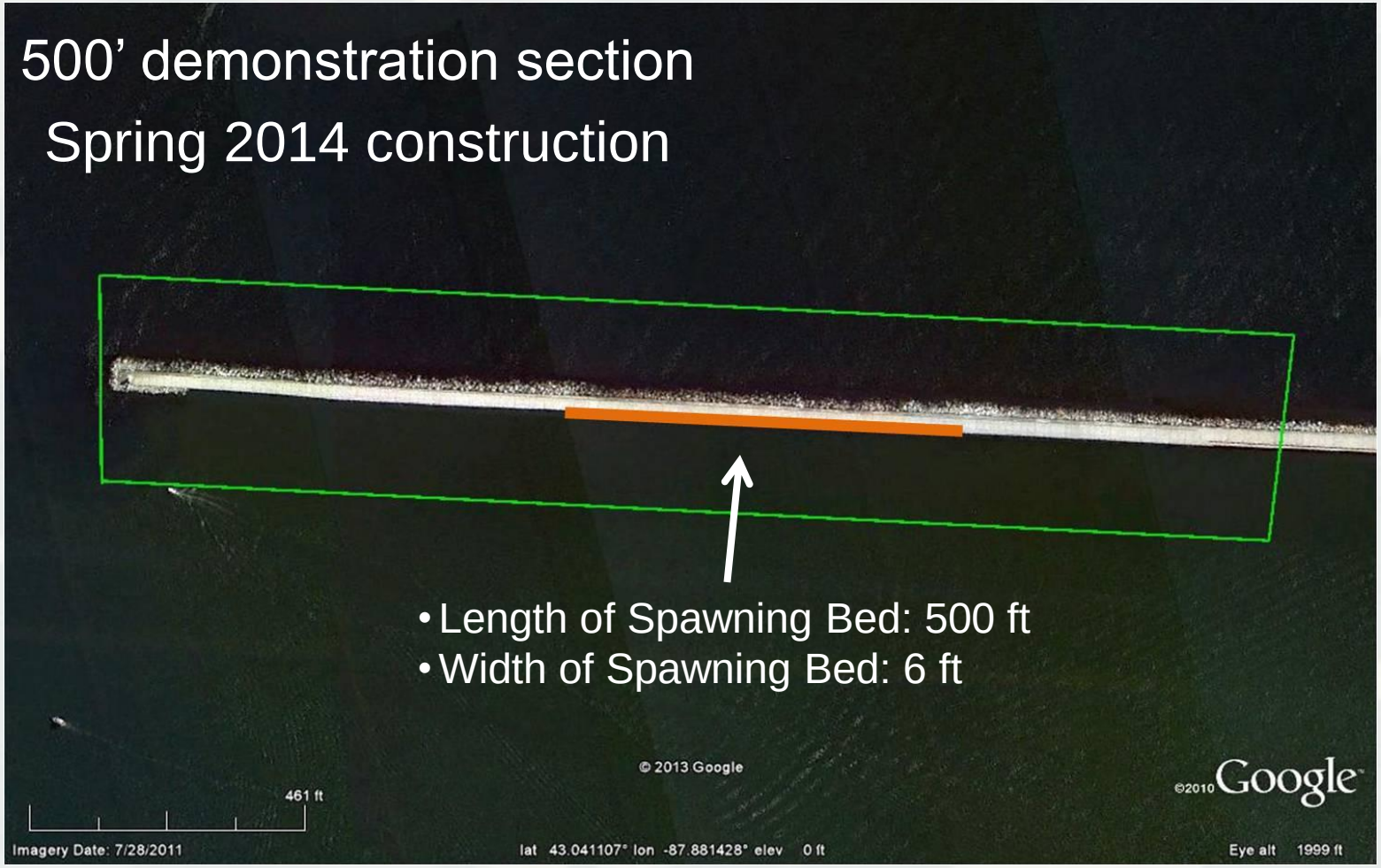


Modified Rubble Mound Breakwater
Fish Spawning Shelf

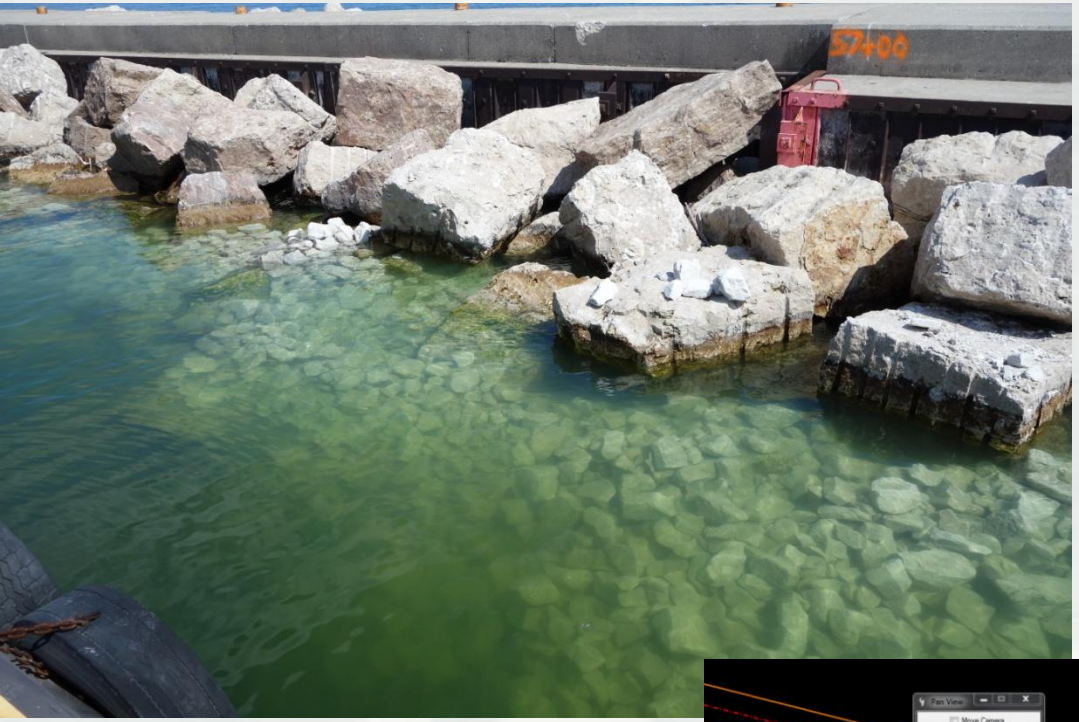


A - Spawning Shelf Substrate: 4-8” stone free of fines
B - Spawning Shelf Sub-base: 8-18” stone
C - Normal B/W Stone: 6-10 ton stone

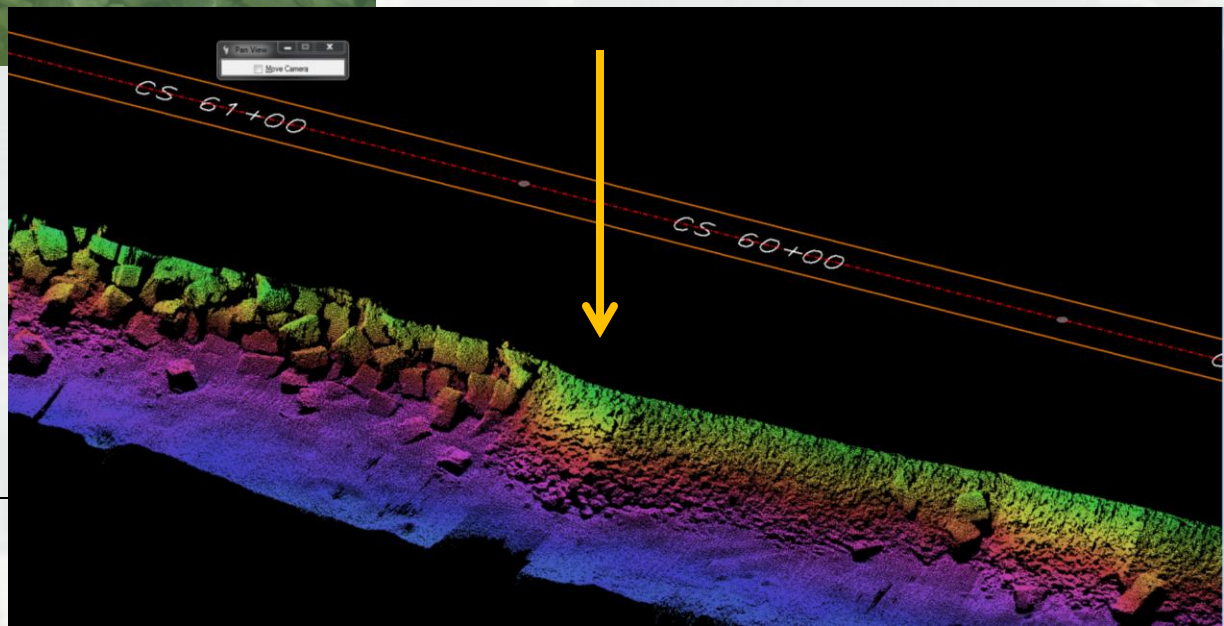
Fish Spawning Bed Location



Post Construction Monitoring



Visual Confirmation



Multi-beam Bathymetry

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