Engineering With Nature: Increasing Habitat Value and Invertebrate Secondary Production on Great Lakes Coastal Structures

ERDC
Engineer Research and Development Center

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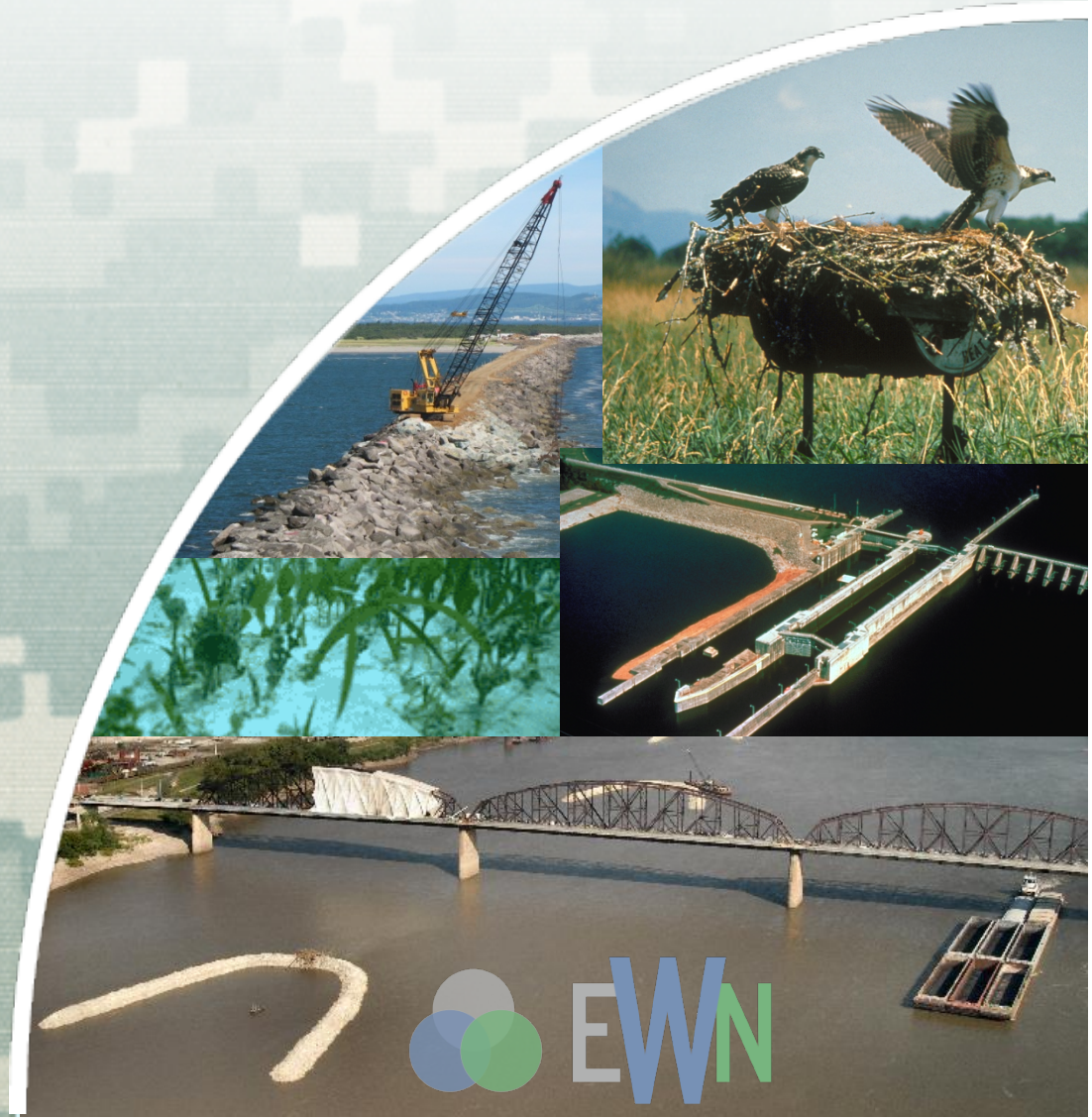

US Army Corps of Engineers
BUILDING STRONG®

The Team

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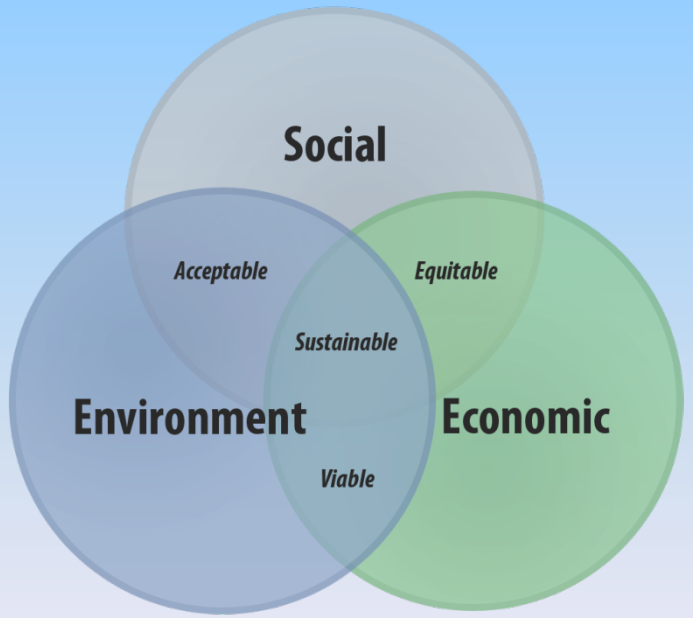
- Tony Friona (ERDC-EL)

Engineering With Nature is…

…the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.

Key Ingredients:

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners



Deteriorating Breakwater

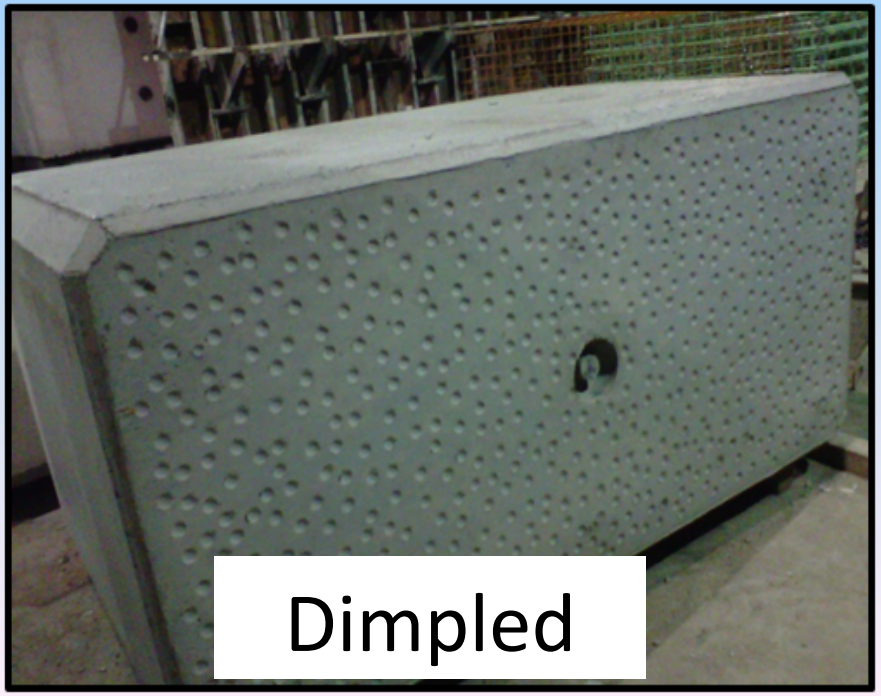
Short Repair Section w/ Block

8’ x 4’ x 4’ Repair Toe Block

Are there ways to improve biological value of blocks?

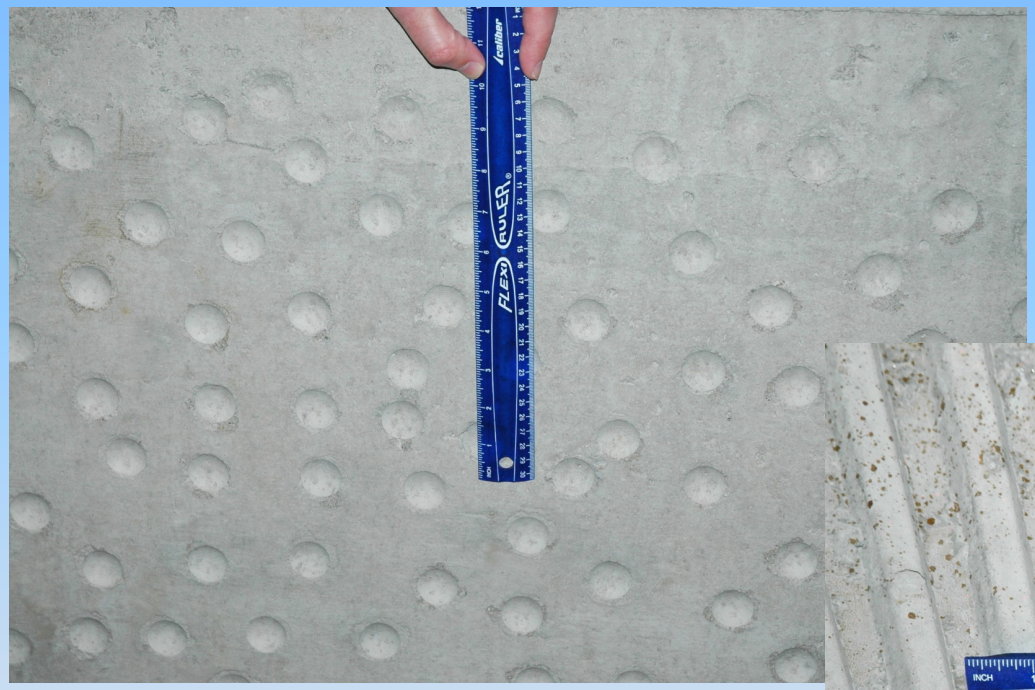
Control

Grooved

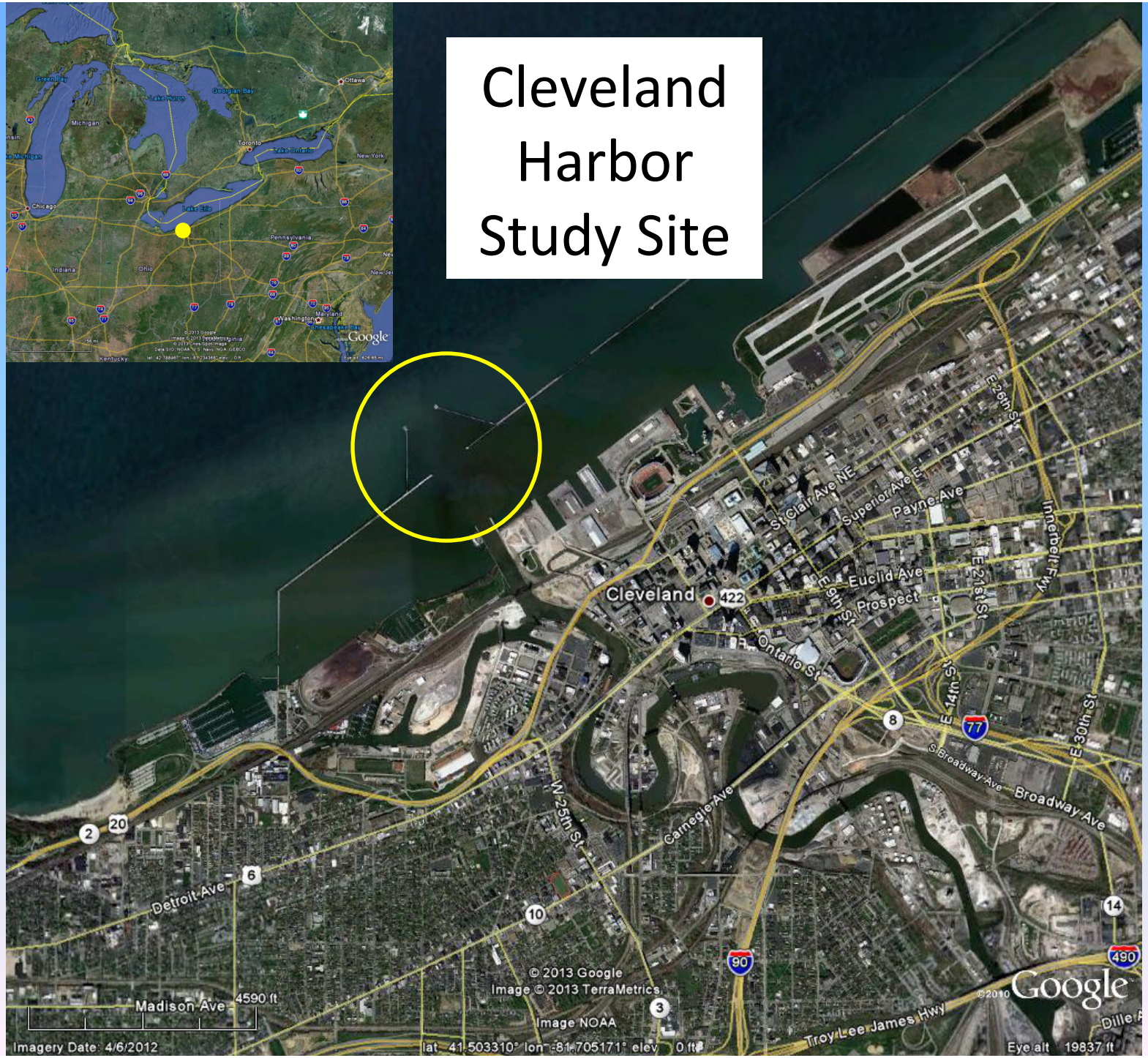

Dimpled

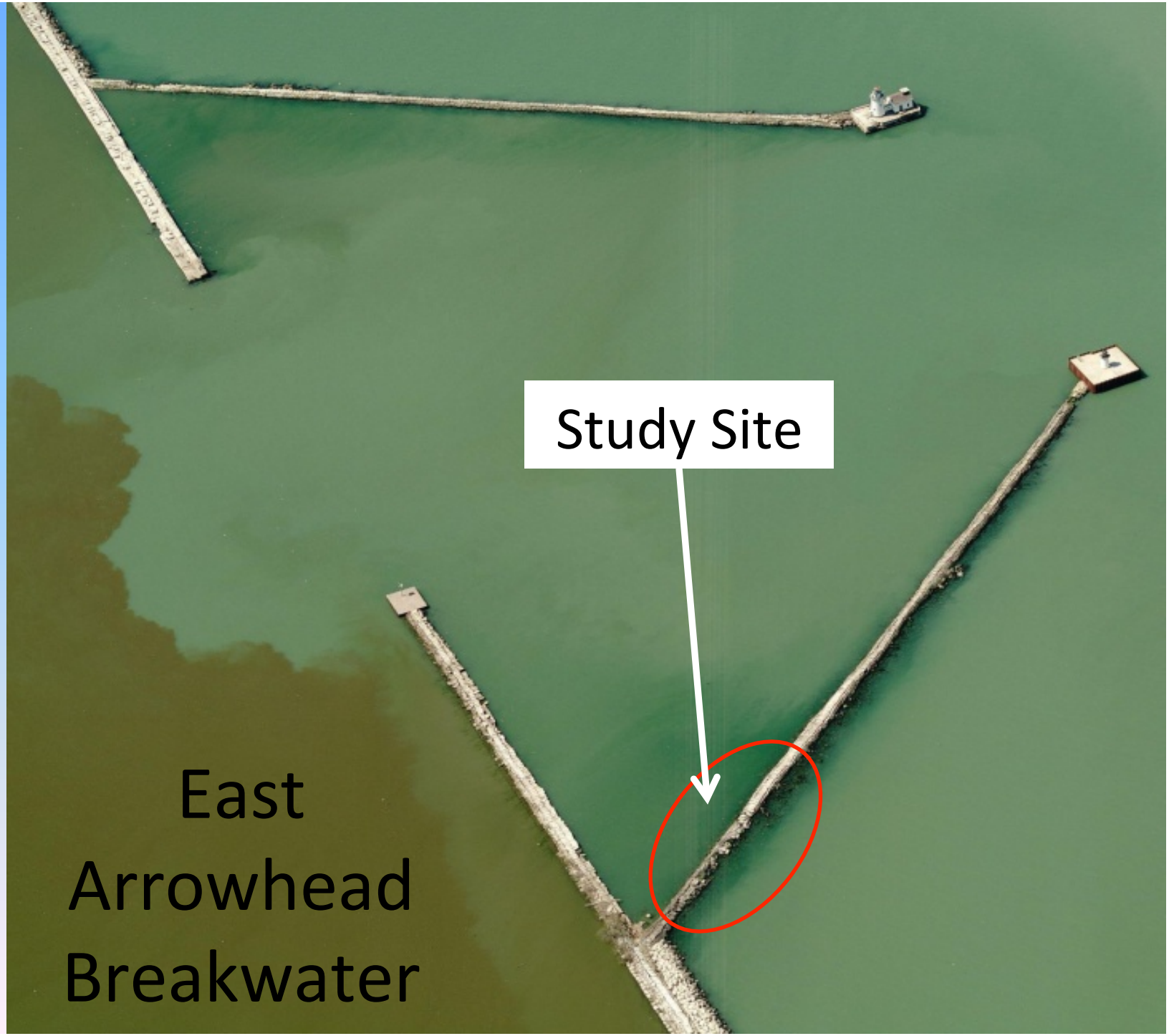
Grooved Shelf

Texture Scale



Cleveland Harbor Study Site

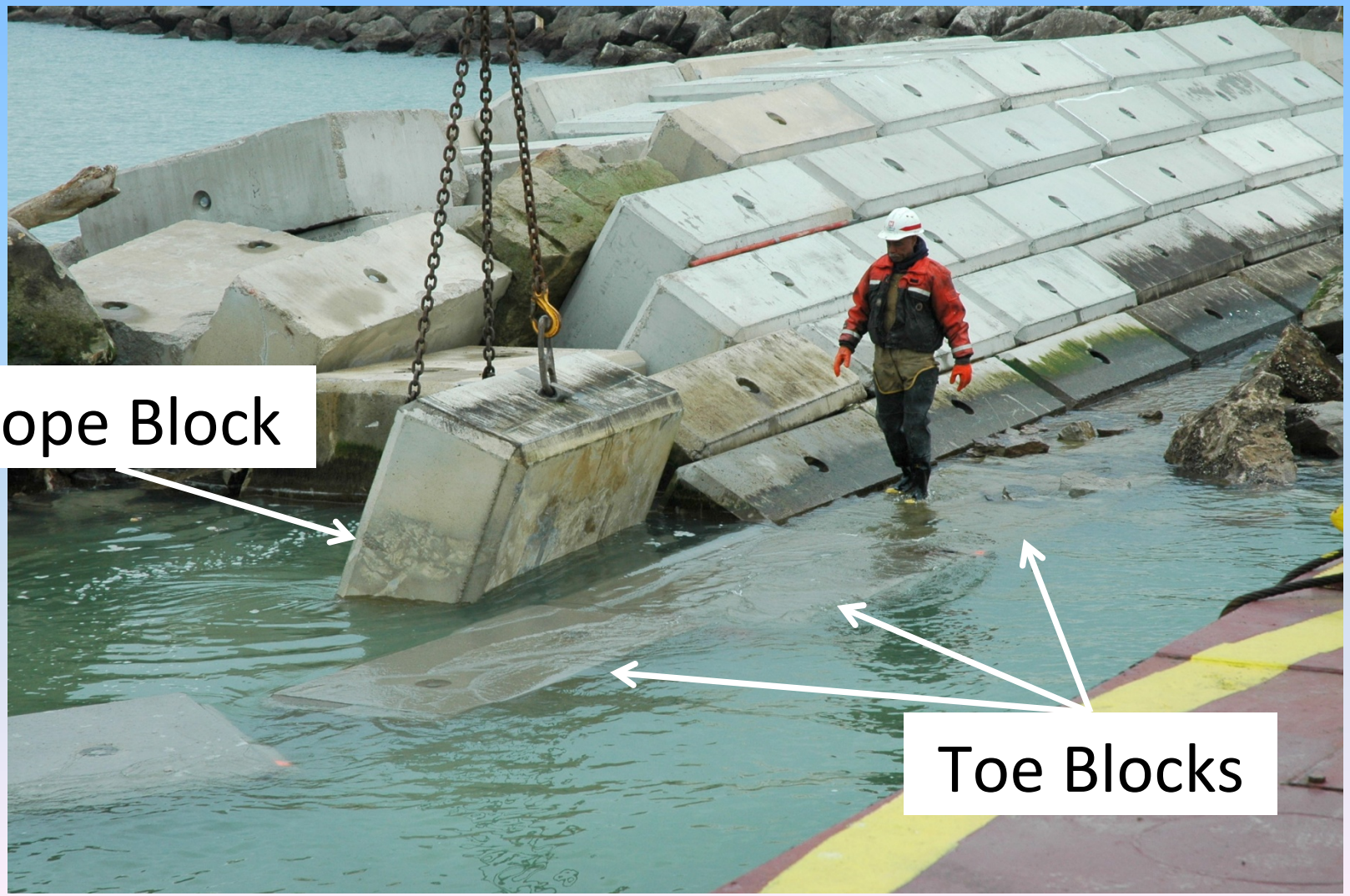



Study Site
East
Arrowhead
Breakwater

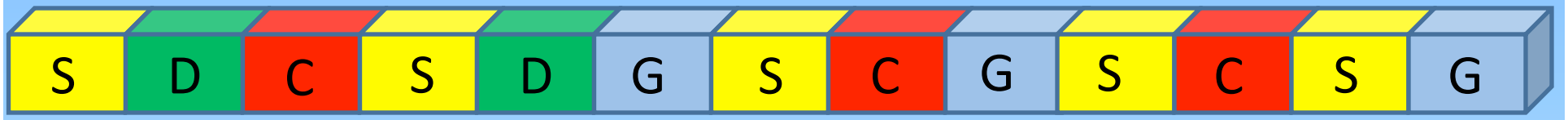
Project Schedule

- April/May 2012 – 13 toe blocks installed
- October 2012 – sampling
- April/May 2013 – 3 2012 blocks reset – Hurricane Sandy repairs – no new toe blocks
- June 2013 – sampling
- October 2013 – sampling
- 2014 - data analysis & reporting

Placing Slope Block Behind Toe Blocks

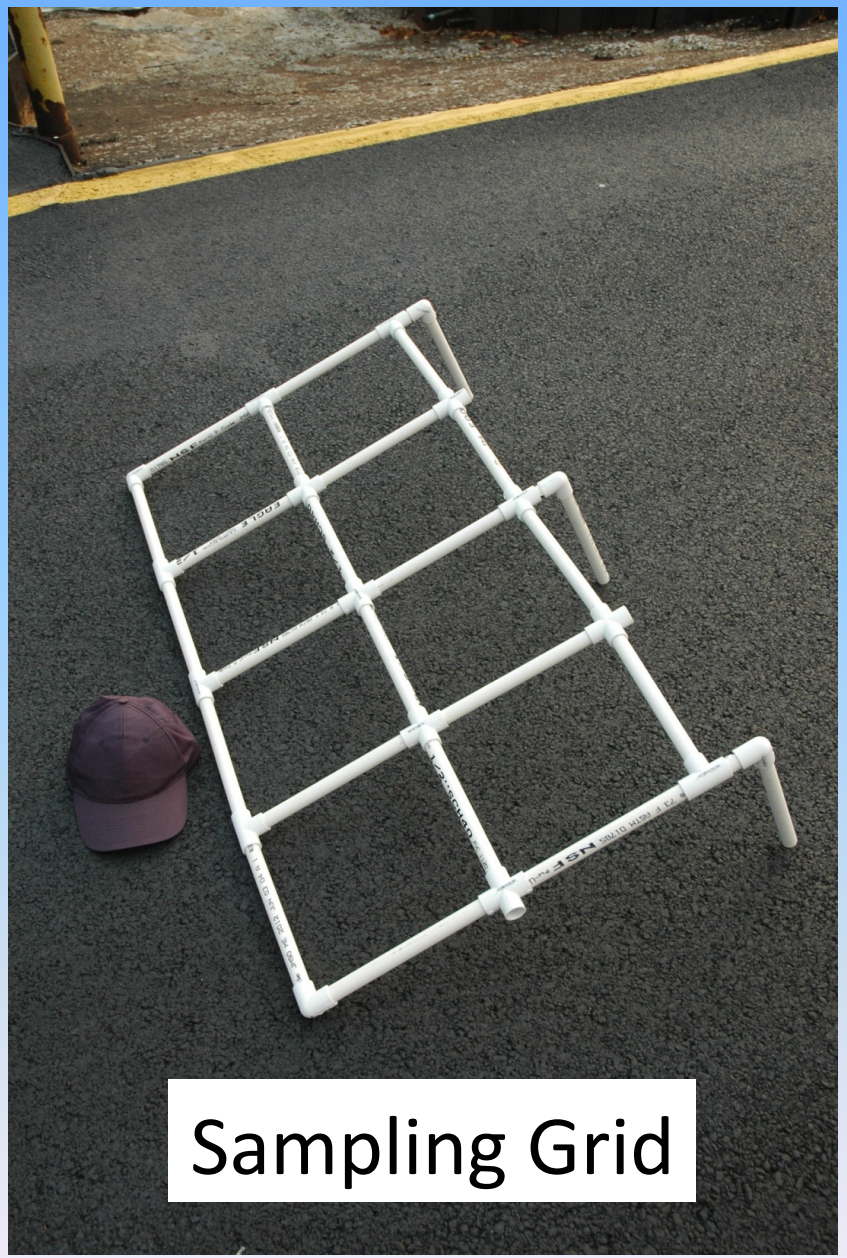


Toe Block Layout



S – Shelf (5)
D – Dimple (2)
C – Control (3)
G – Groove (3)

- Only partial installation of total plan (13/34)
- 2013 work delayed due to necessary Hurricane Sandy repairs

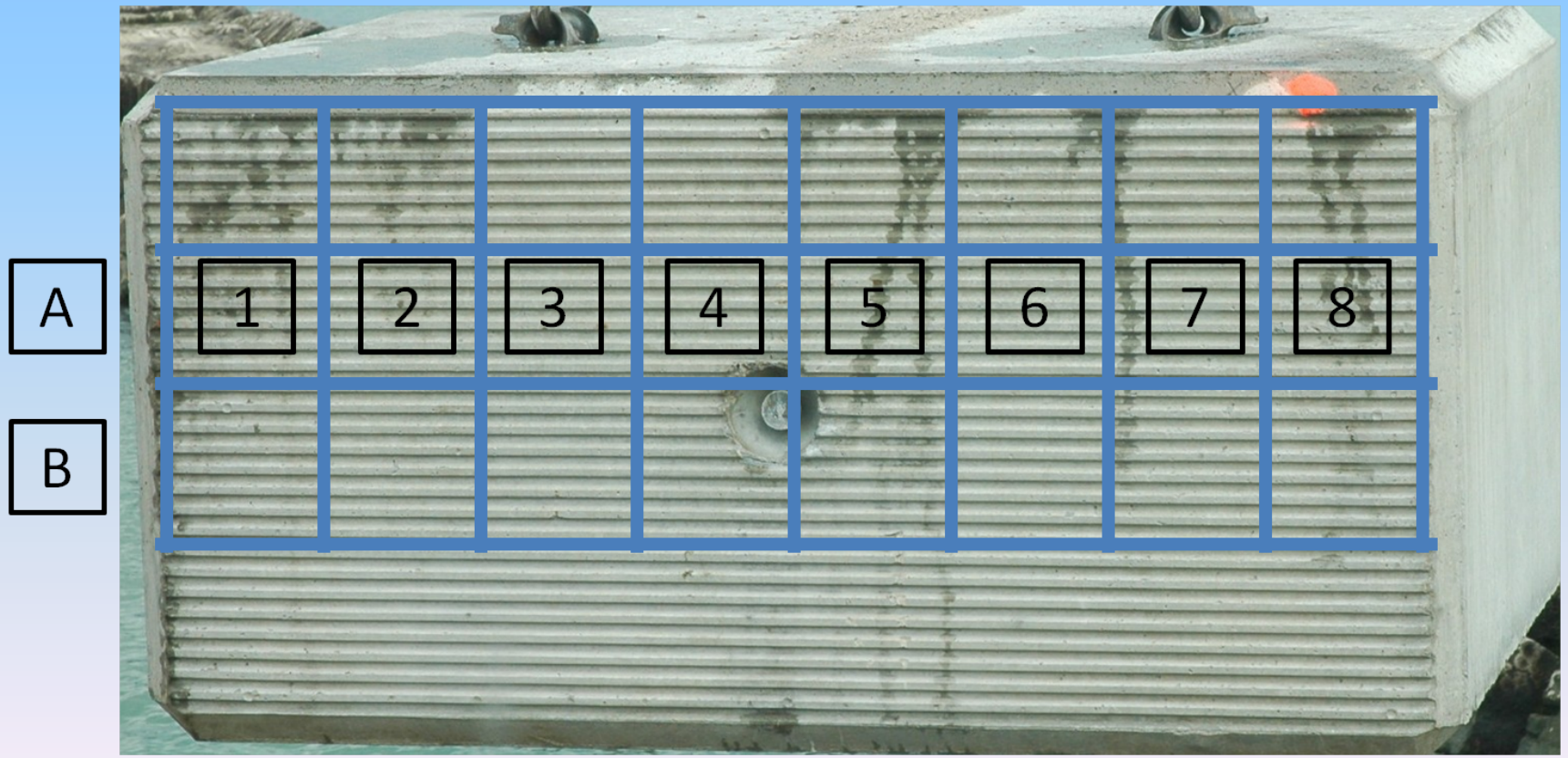


Sampling Grid

Sample Collector

Sampling Grid

- Top row was not submerged



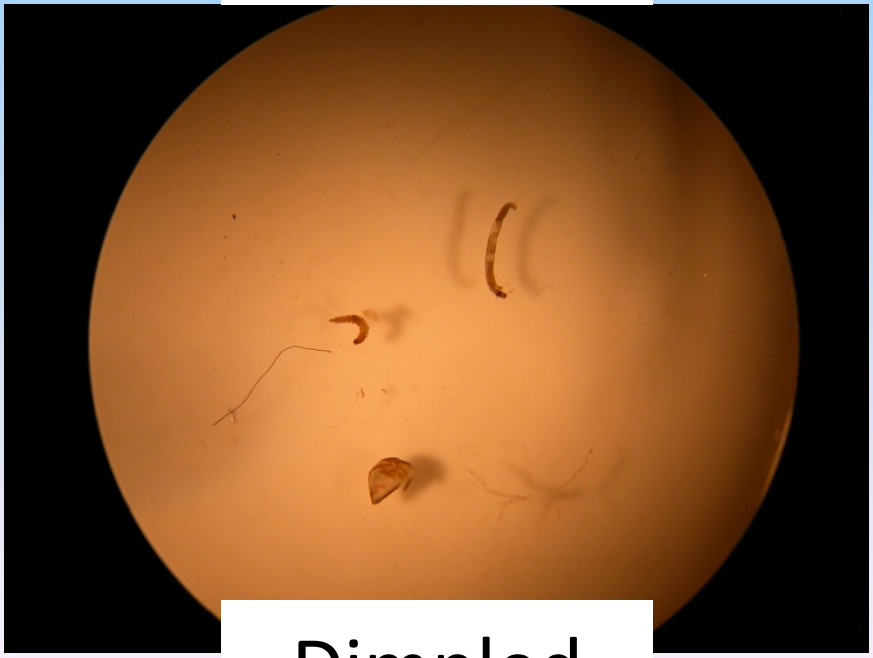
Sample Collection

Post-sampled Area

Representative Samples

Control

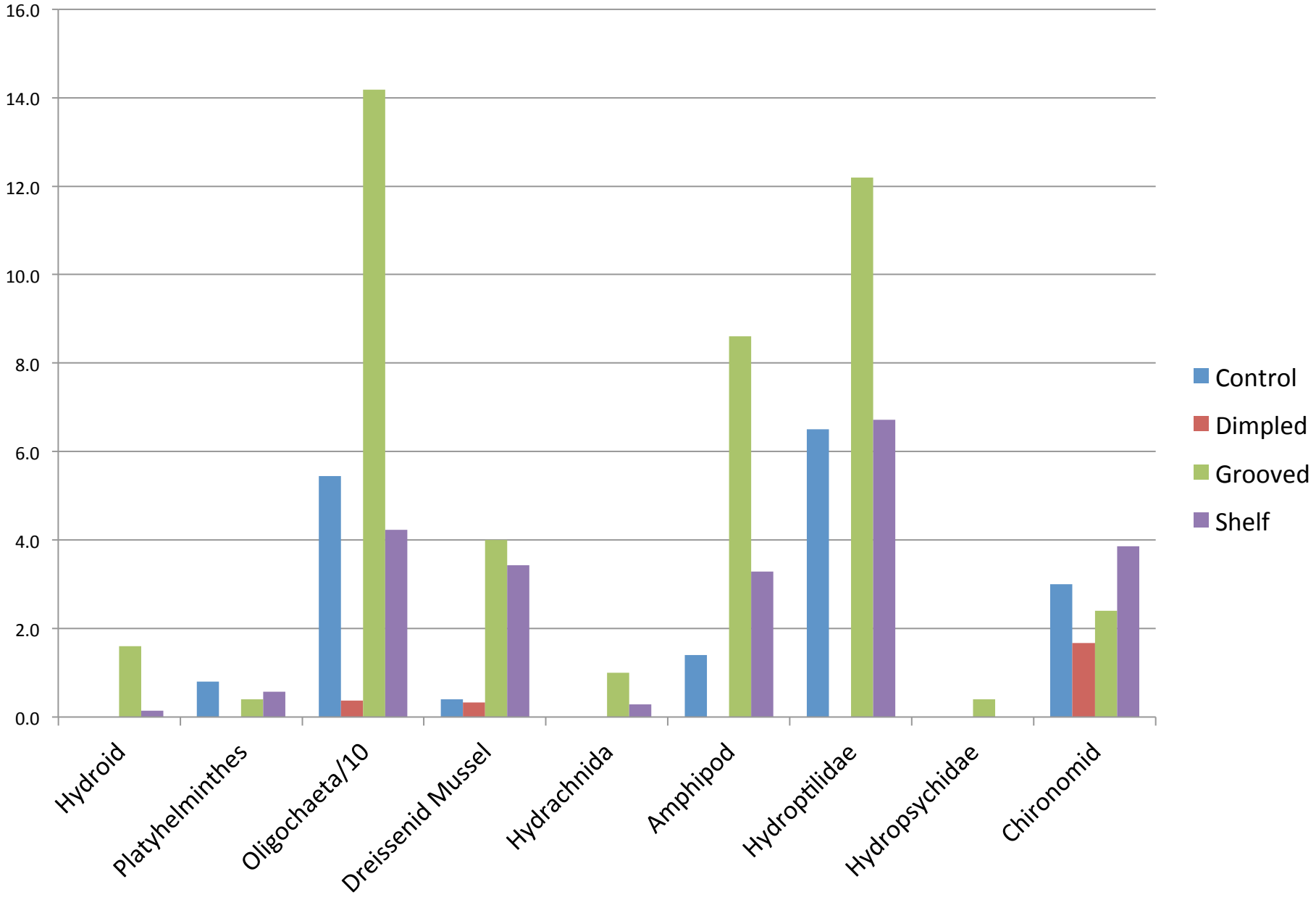
Grooved



Dimpled

Grooved Shelf

Preliminary Results – Abundance – October 2012

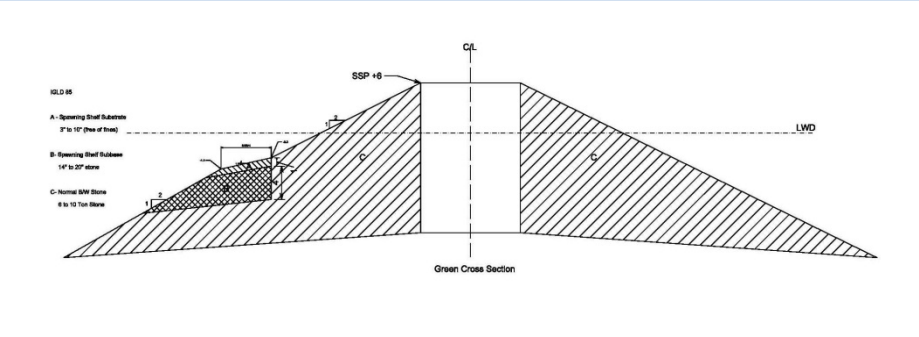


Preliminary Implications

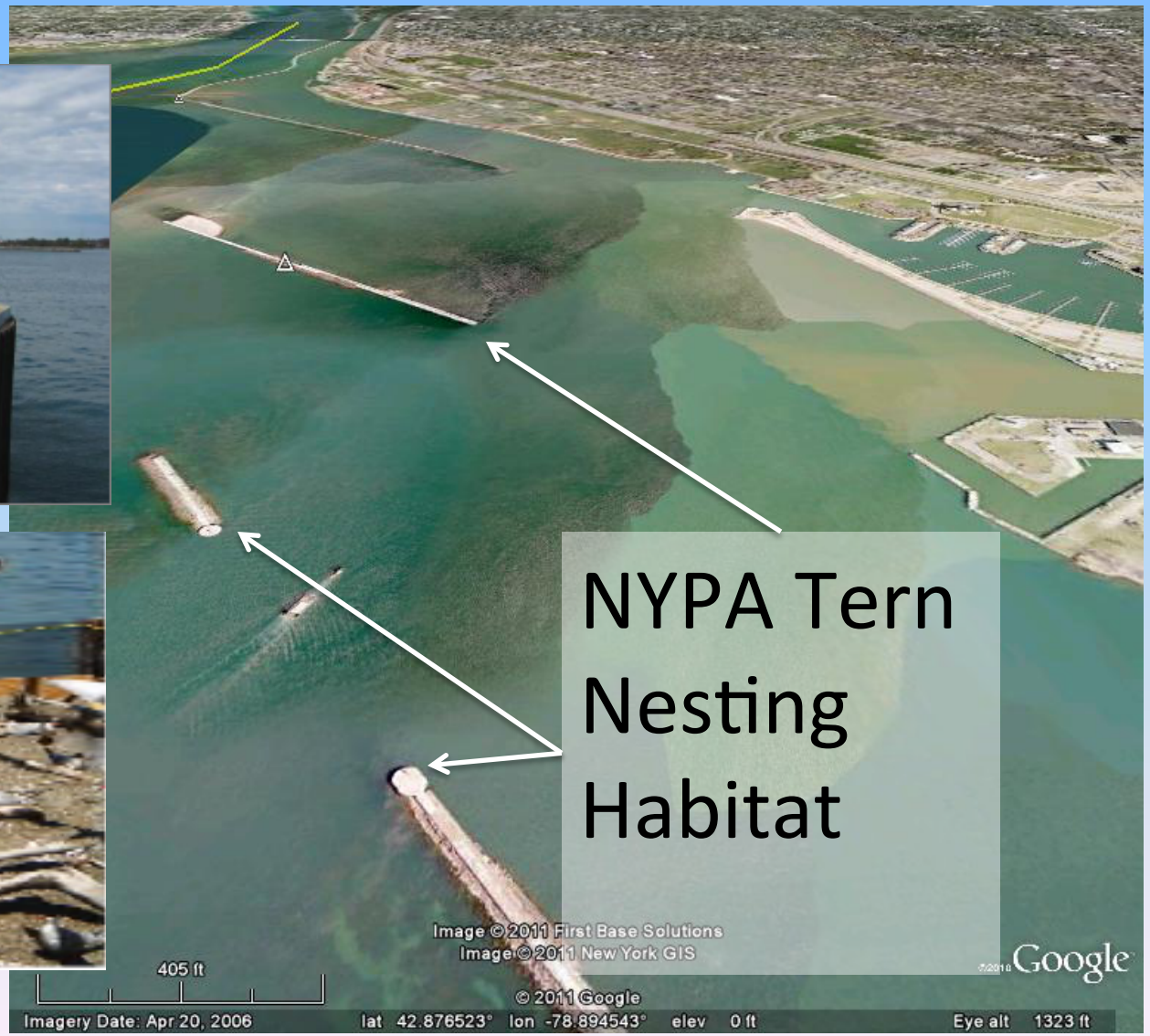
- Initial colonization greater for most groups on grooved blocks
  - Invertebrate Secondary Production Increase
- Potential to provide juvenile fish refuge

Other options for other infrastructure

- Fish spawning shelves
- Tern nesting platform (Ashtabula)

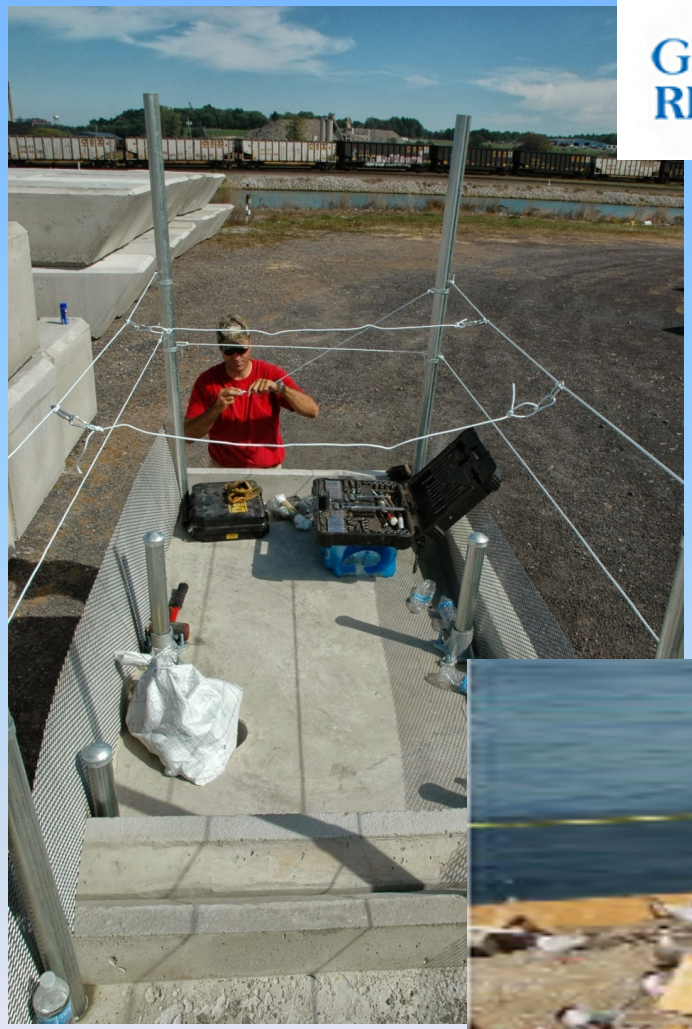


Tern Nesting Habitat
New York Power Authority – Buffalo, NY



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

Ashtabula, OH Tern Nesting



Great Lakes RESTORATION

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Thanks!

Questions?