

# Presentation to Lake Erie Allegany Partnership

## 18 March 2015

### USACE Green Breakwaters / Engineering With Nature Pilot Projects on Lake Erie

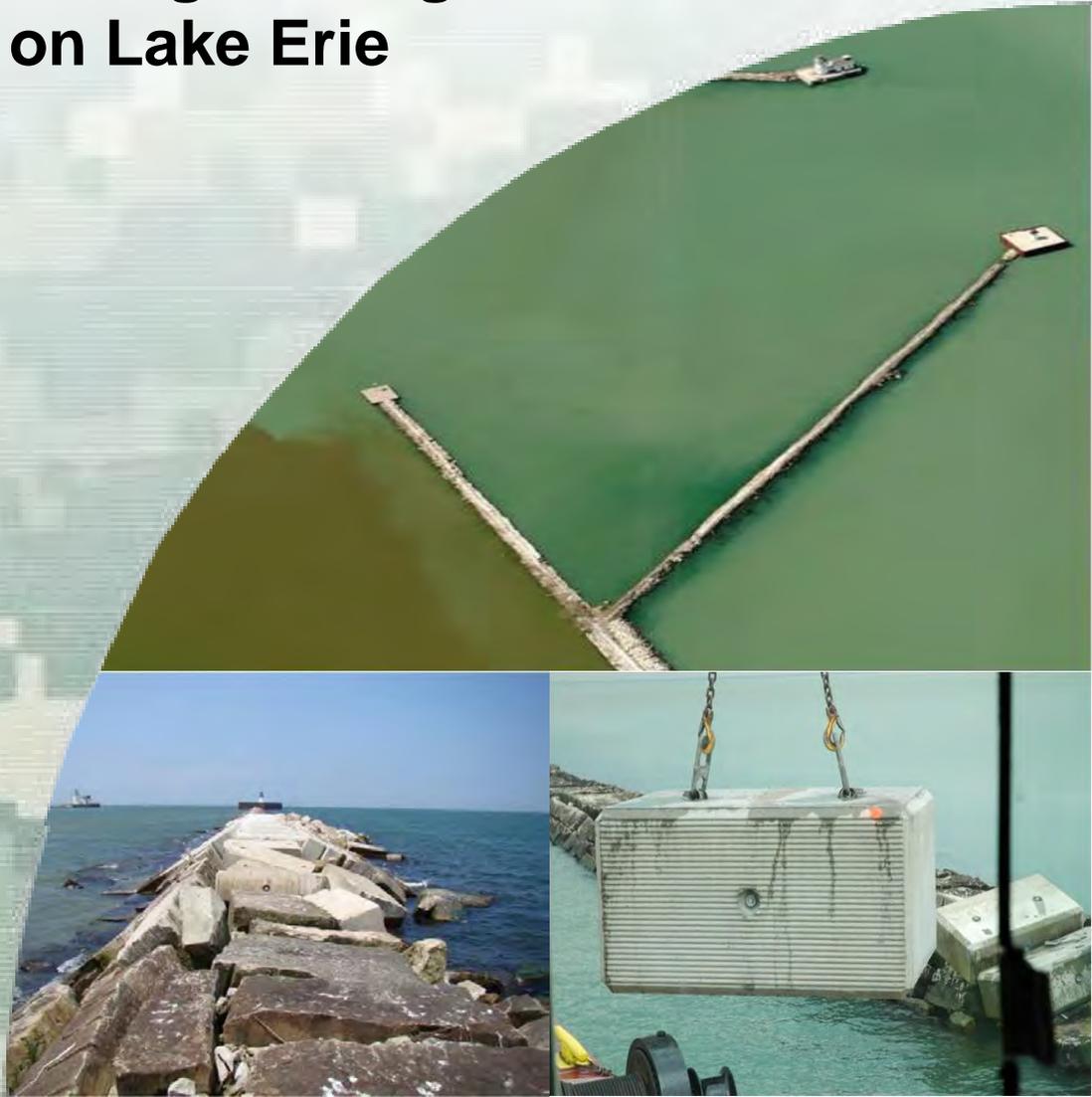
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Navigation Structure Repair Program Manager

Buffalo District



US Army Corps of Engineers  
**BUILDING STRONG**



# Outline

- Engineering With Nature
- GLRI Green Breakwaters Projects
  - ▶ Cleveland Harbor Pilot Project
  - ▶ Ashtabula Harbor Pilot Project

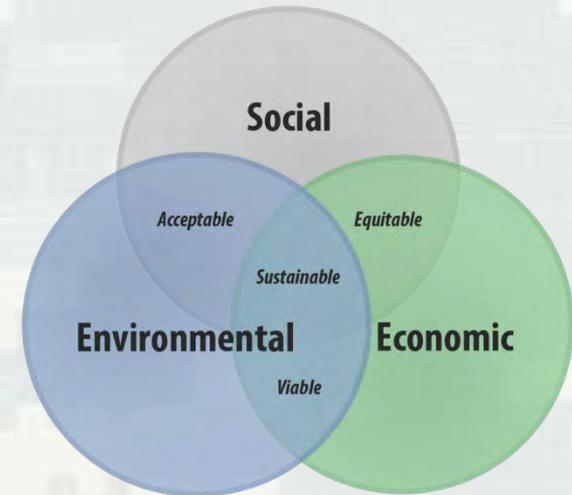


# Engineering With Nature...

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

## Key Elements:

- 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



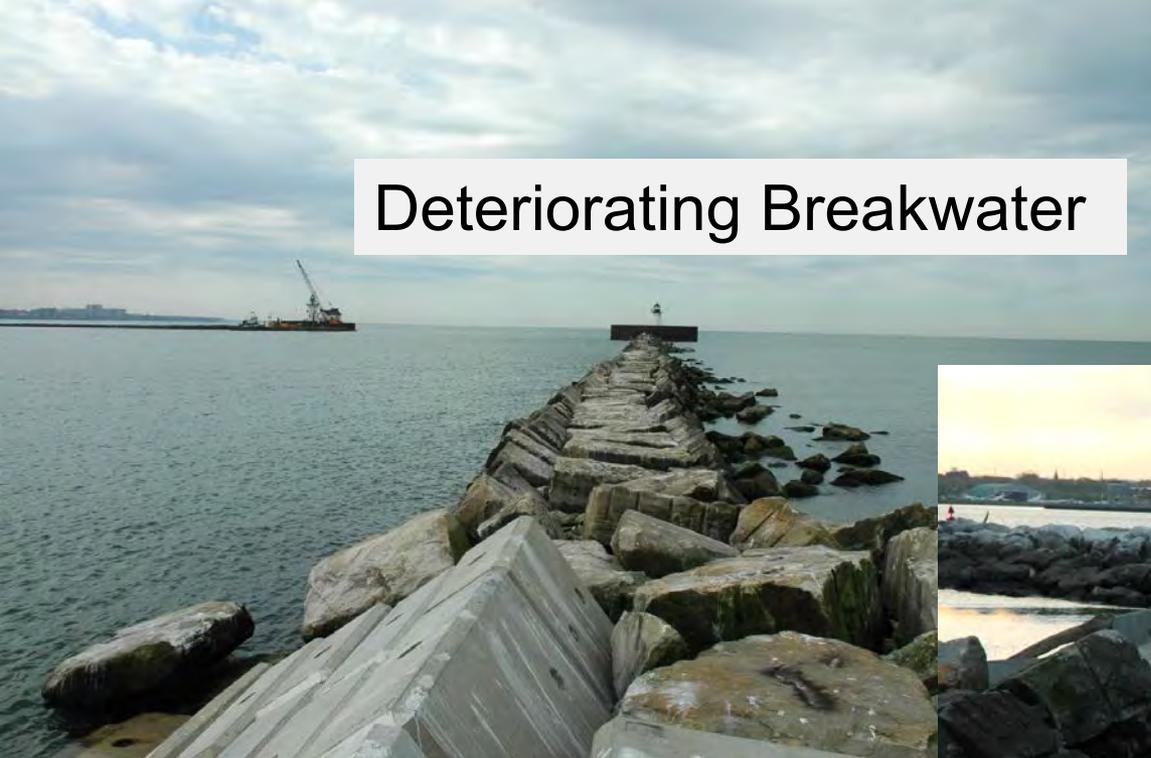
# GLRI Green Breakwaters

- EPA funded pilot projects demonstrating the potential to economically incorporate aquatic habitat features into the O&M repairs of Federal Navigation Structures, and to provide nesting habitat for targeted bird species on top of existing breakwater structures.
- EPA funding covered the differential cost of including the habitat features into the existing O&M repair projects
- Cleveland Harbor – Aquatic habitat only
- Ashtabula harbor – Aquatic habitat, common tern nesting area, low growing vegetation habitat





# Deteriorating Breakwater



## Short Repair Section w/ Block



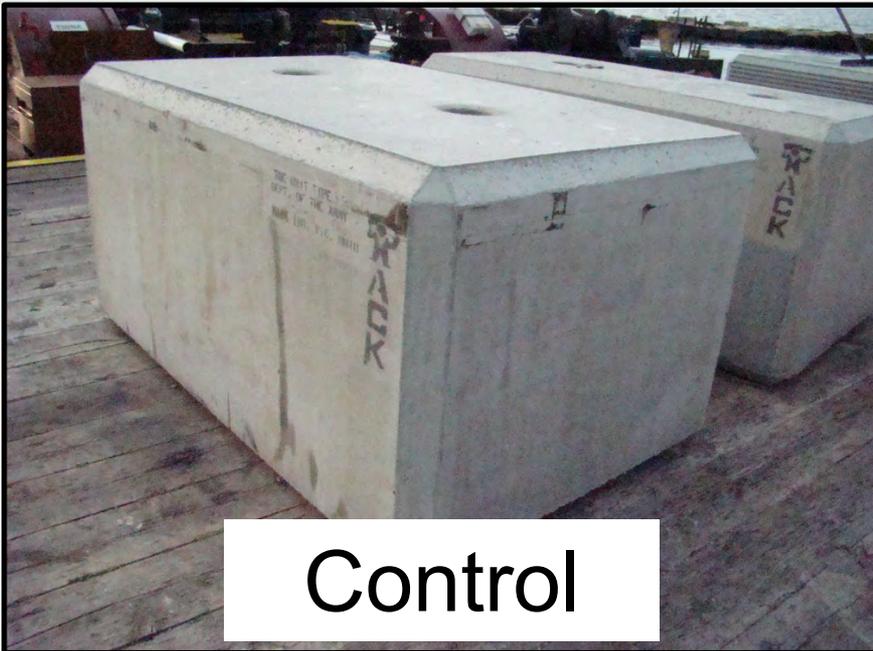
## 8' x 4' x 4' Repair Toe Block



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# Are there ways to improve biological value of blocks?





Control



Grooved



Dimpled

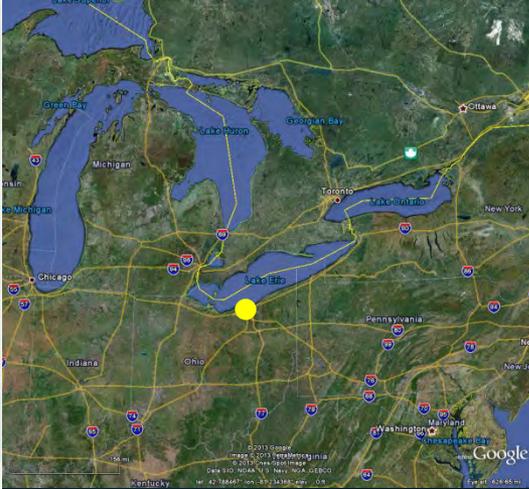


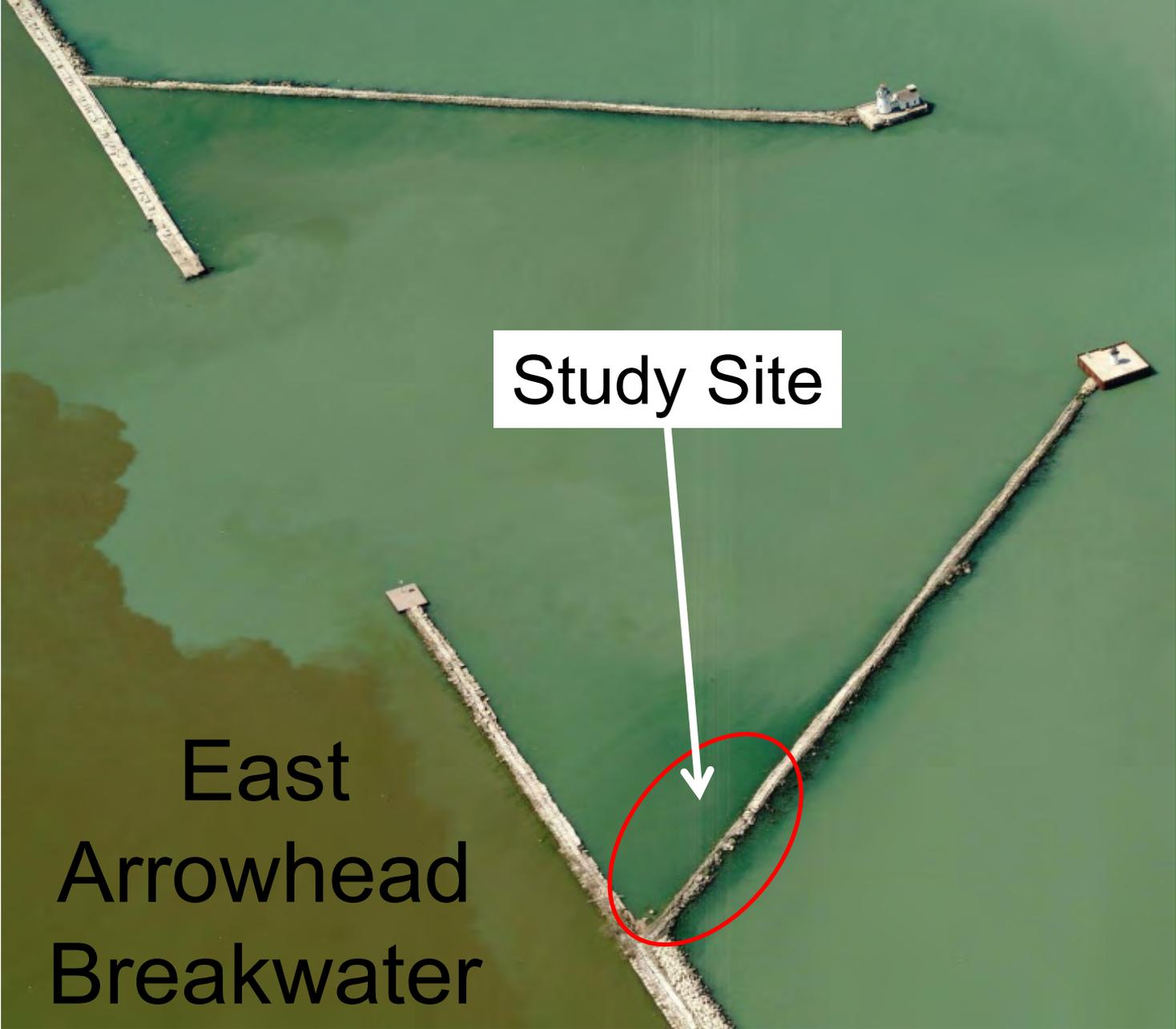
Grooved Shelf

# Texture Scale



# Cleveland Harbor Study Site





East  
Arrowhead  
Breakwater

Study Site



# Cleveland Project Schedule

- April/May 2012 – 13 toe blocks installed
- October 2012 – sampling
- April/May 2013 – 3 of the 2012 blocks reset – Hurricane Sandy repairs – no new toe blocks
- June 2013 – sampling
- October 2013 – sampling
- April/May 2014 – remaining 21 blocks set
- 2014/15 - data analysis & reporting



# Toe Block Layout



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

- A total of 34 blocks were set
- 2013 work was delayed due to necessary Hurricane Sandy repairs





Sampling Grid

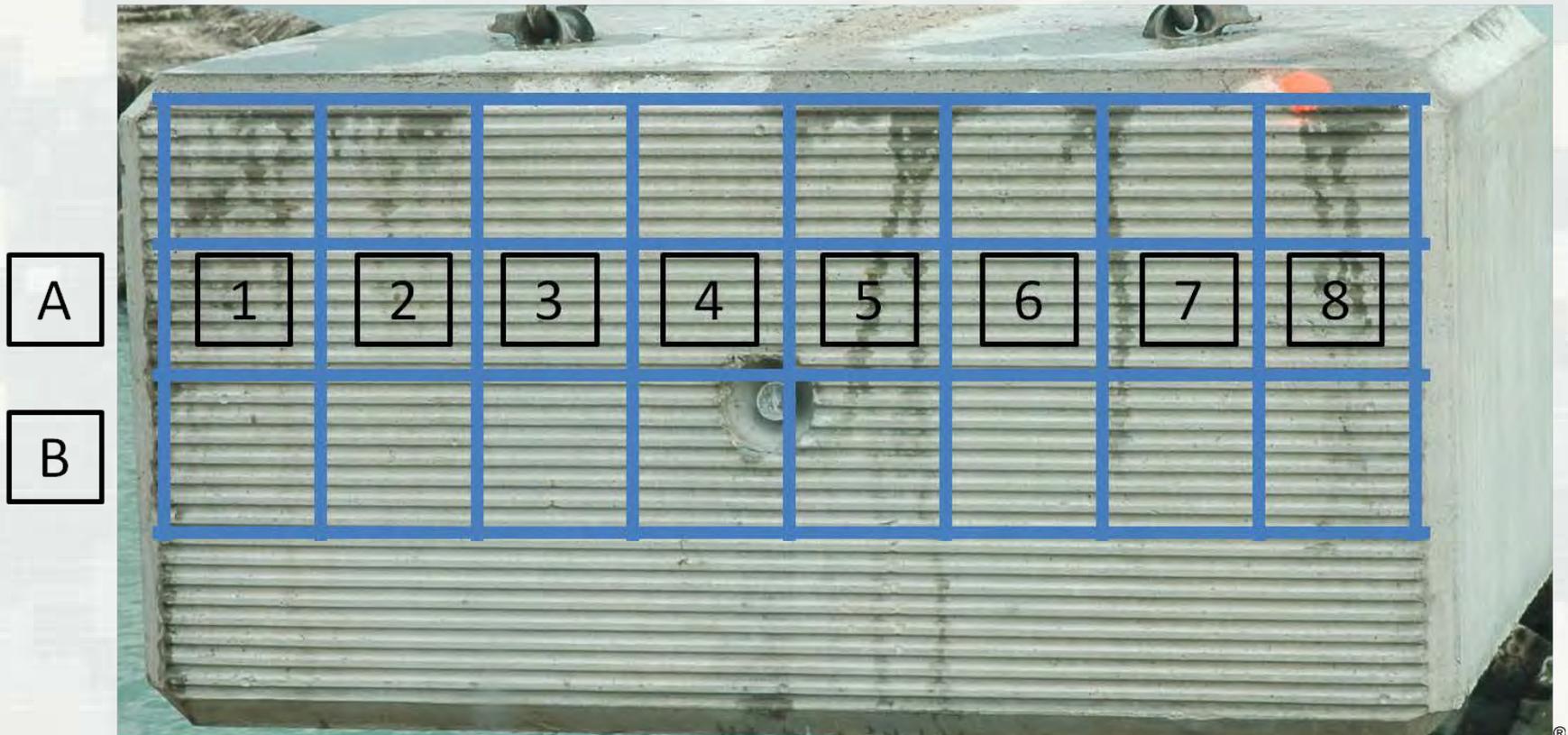


Sample Collector



# Sampling Grid

- Top row was not submerged





Sample Collection



Post-sampled Area

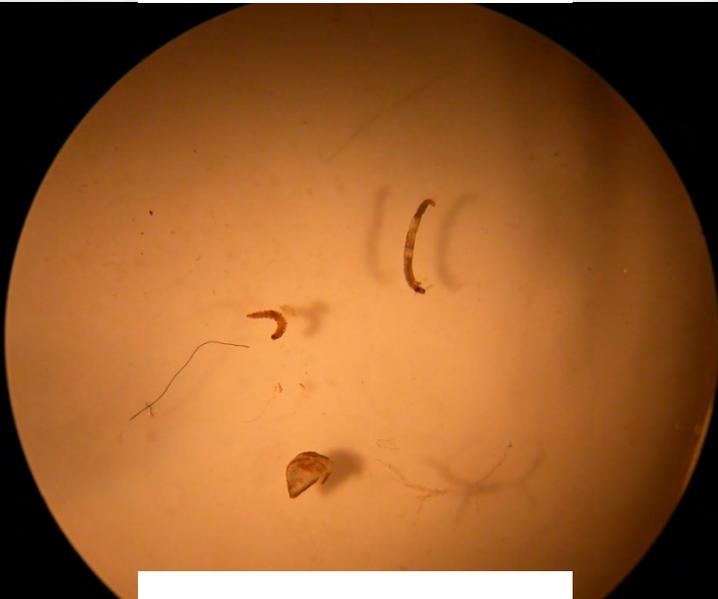
# Representative Samples



Control



Grooved

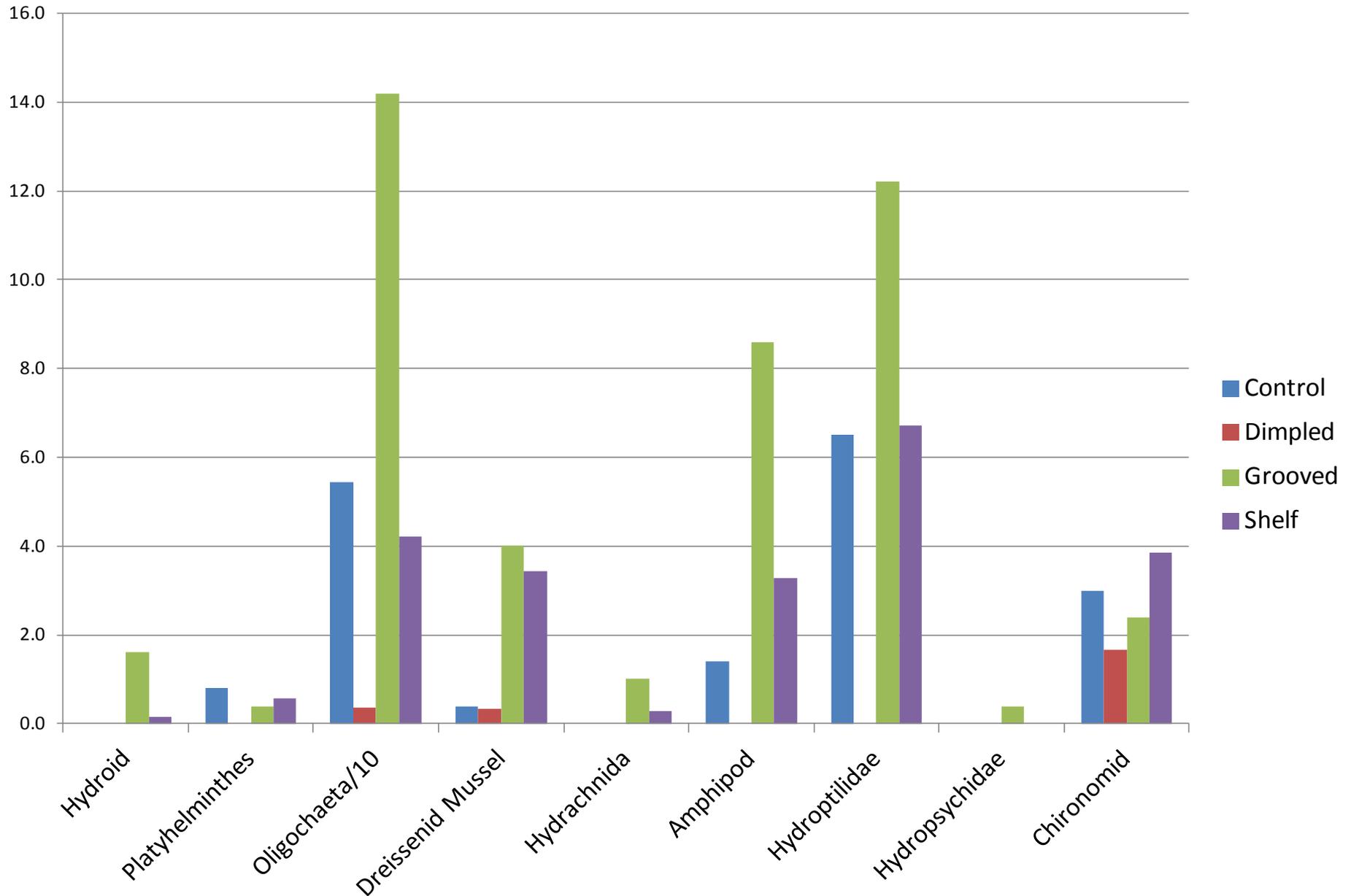


Dimpled



Grooved Shelf

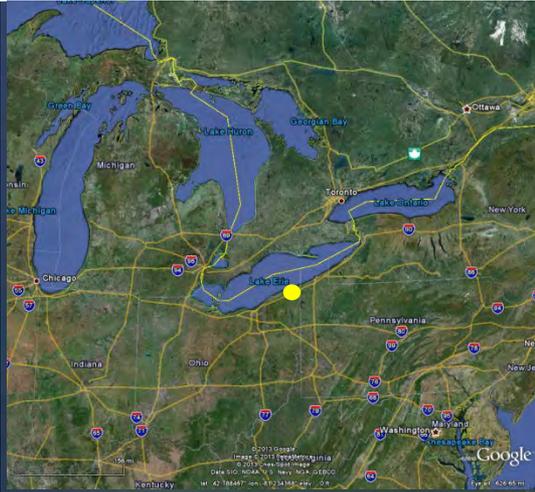
# Preliminary Results – Abundance – October 2012



# Preliminary Conclusions

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





# Ashtabula Harbor Study Site



Study Site



# East Breakwater



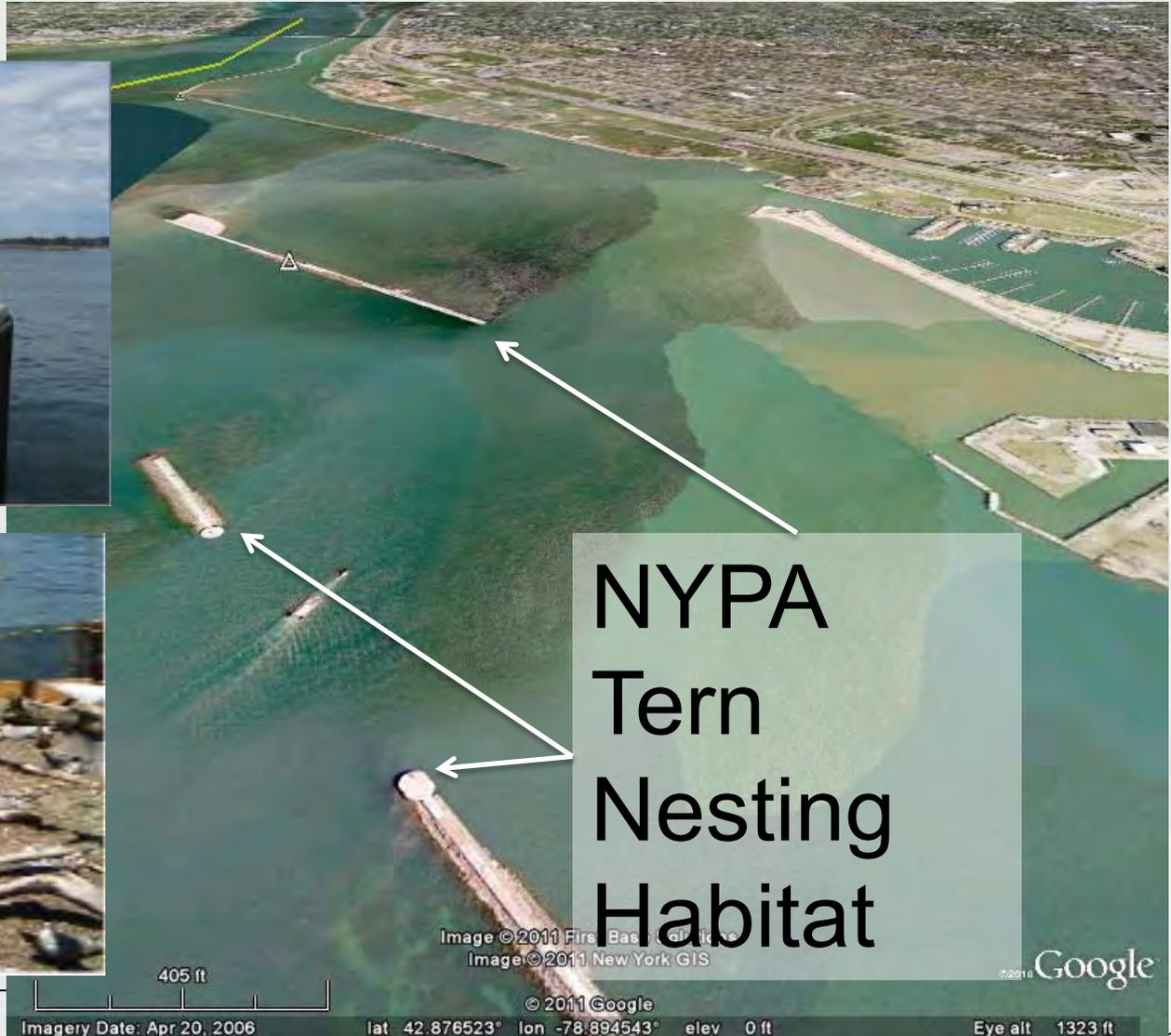
# Ashtabula Project Schedule

- Phase I Construction (2013)
  - Aquatic habitat block installation
  - 250 sq ft of tern nesting habitat
- Phase II Construction (2014)
  - Aquatic and low growth vegetation habitat block installation
  - Additional 250 sq ft of tern nesting habitat
- Phase III Construction (2015 Planned)
  - Complete installation of habitat blocks
- Monitoring
  - Planned monitoring period 2014-2017
  - No terns yet
  - Aquatic and low growth vegetation monitoring starting in 2015
- O&M of Tern Habitat
  - By The Nature Conservancy once USACE study is completed



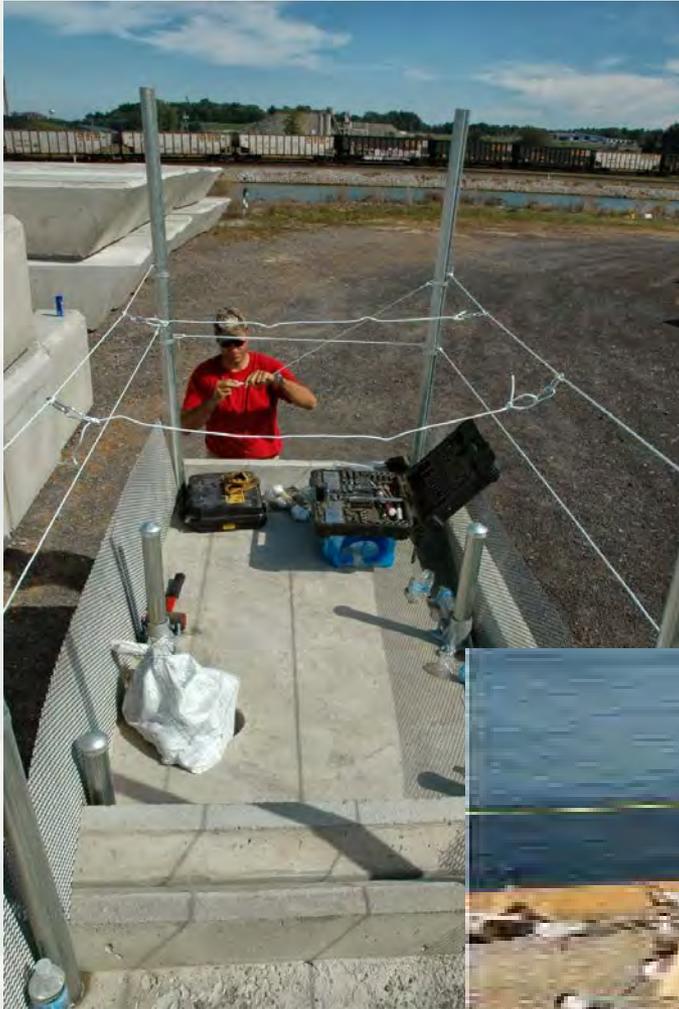
# Tern Nesting Habitat

## New York Power Authority – Buffalo, NY



**NYPA  
Tern  
Nesting  
Habitat**

# Ashtabula, OH Tern Nesting Blocks



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# Phase I Tern Habitat





# Wildlife Management Area

## No Trespassing

Please Do Not Disturb  
For Information Contact:  
U.S. Army Corps of Engineers, Buffalo District  
ATTN: Operations Branch  
1776 Niagara Street Buffalo, NY 14207 (716) 879-4377



US Army Corps  
of Engineers



## Solar powered call box

Grooved texture  
on slope blocks



# Phase II Tern Habitat



Nesting blocks turned to  
provide greater width





Phase I

Phase II





# CERTIFICATE OF RECOGNITION

**PIANC**, the World Association for Waterborne Transport Infrastructure,

hereby grants the company

*US ACE*

the "**Certificate of Recognition**" for the project

(name) *"Cleveland Arrowhead Breakwater"*

(place/country) *United States*

developed following the "**Working with Nature**" philosophy as approved by the jury.

Brussels, *October 8, 2013* (date)

**Louis Van Schel**  
Secretary-General

**Geoffroy Caude**  
President



# The USACE Team

- Tom Fredette (ERDC-EL)
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- Cynthia Banks (ERDC-EL)
- Joan Clarke (ERDC-EL)
- Cheryl Pollock (ERDC-CHL)



# Questions?

