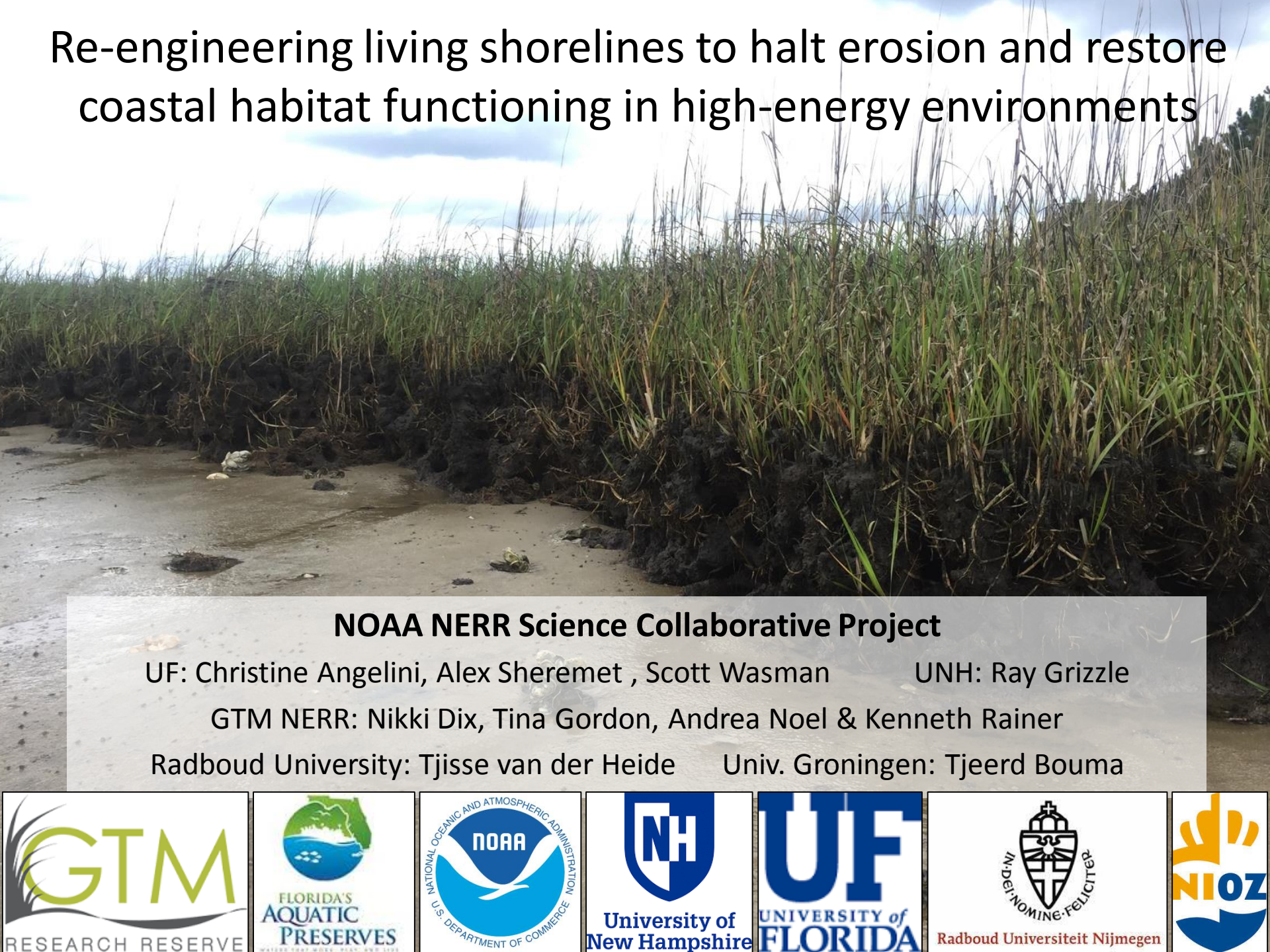


Re-engineering living shorelines to halt erosion and restore coastal habitat functioning in high-energy environments



NOAA NERR Science Collaborative Project

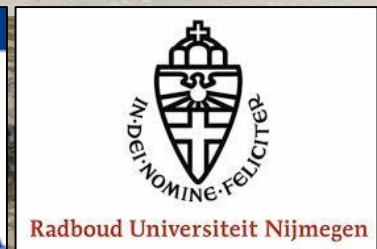
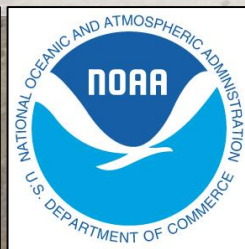
UF: Christine Angelini, Alex Sheremet , Scott Wasman

UNH: Ray Grizzle

GTM NERR: Nikki Dix, Tina Gordon, Andrea Noel & Kenneth Rainer

Radboud University: Tjisse van der Heide

Univ. Groningen: Tjeerd Bouma



What are the biggest problems you face?

\$36.7 billion industry & 167K new powerboats per year



Lots of boat traffic



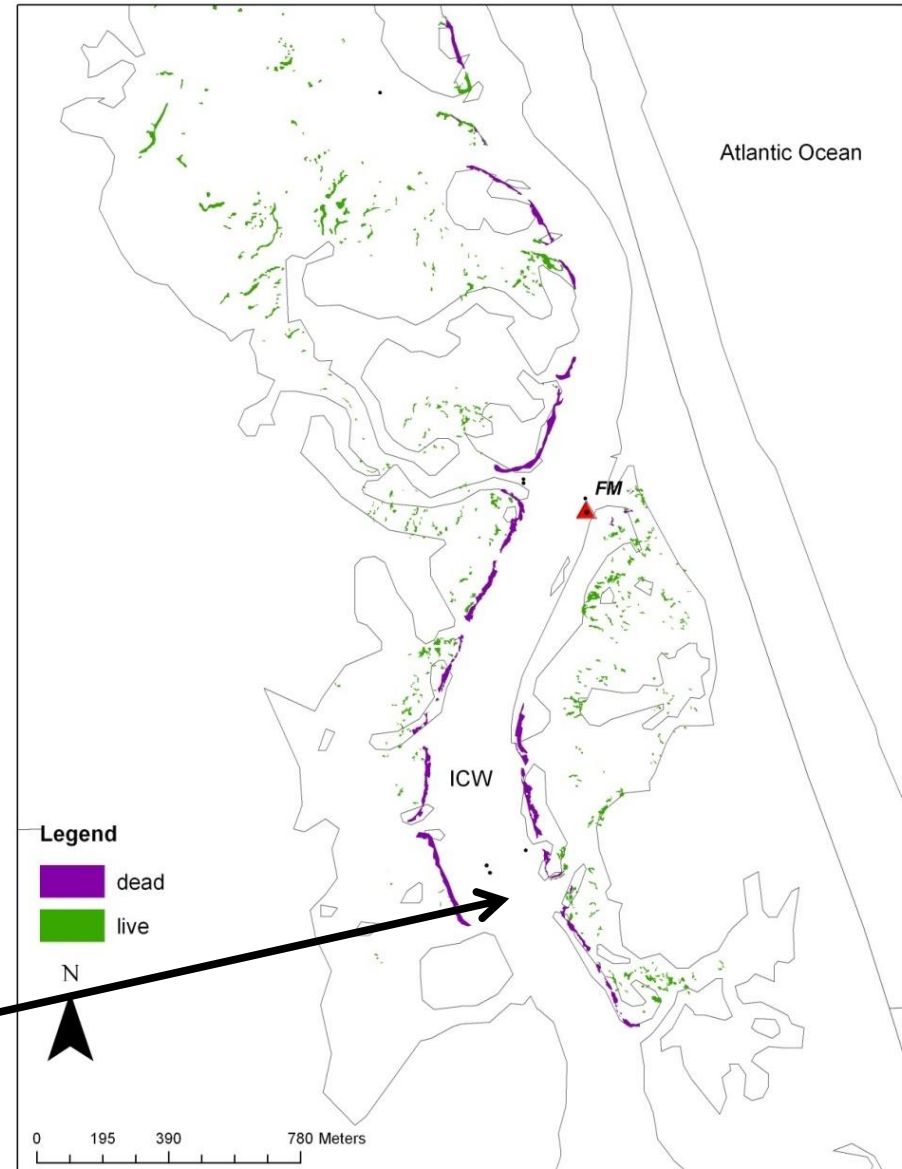
Lots of boat wakes



Boat wakes drive loss of oyster reefs



Distribution of dead reefs along ICW and live reefs in interior marshes indicate high energy is causing oyster loss



And accelerate salt marsh erosion

1m lateral marsh erosion per year



Unstable, escarped marsh edges



Widespread wake-induced loss of oysters & marsh

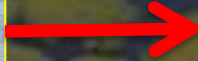
Intracoastal Waterway (ICW):
3,000 mile
‘artery for commerce’



Much of the ICW transects estuaries



How can we maintain the edges of our estuaries in the face of increasing traffic?



What is Needed:

A. Long-term, cost-effective method for:

- 1) Dissipating waves and boat wakes
- 2) Increasing oyster reef habitat
- 3) Reducing, or even halting, salt marsh erosion

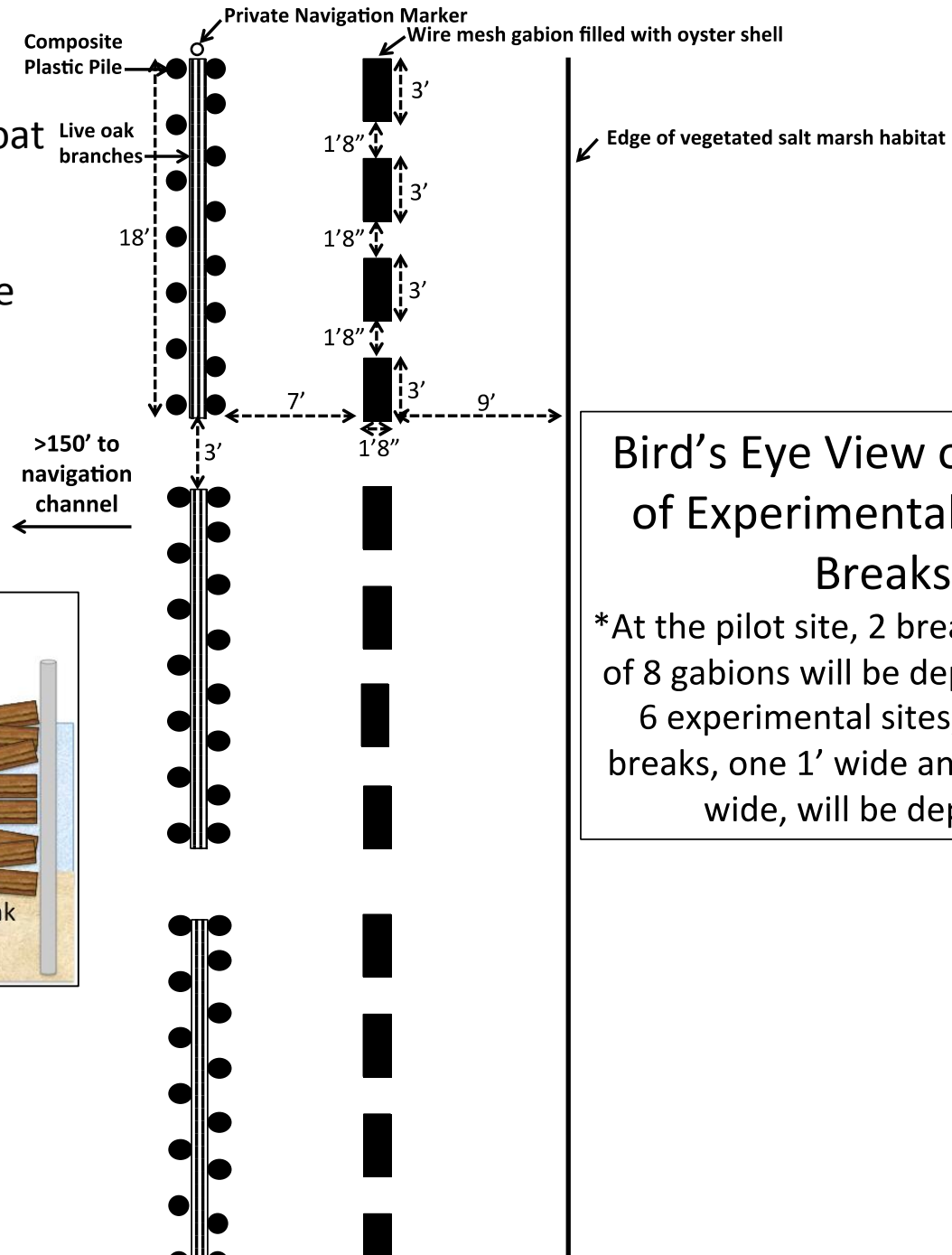
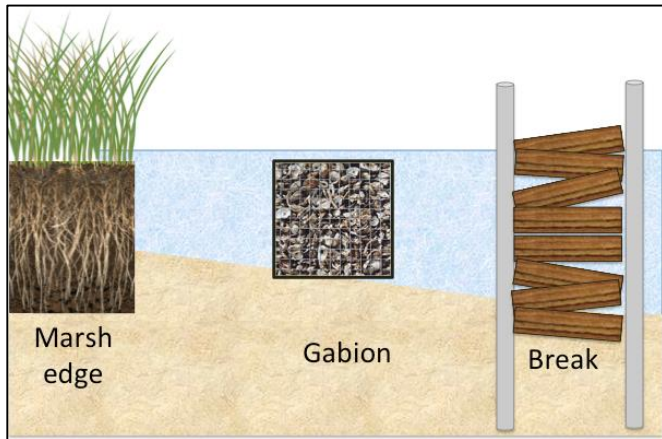
B. Training materials to disseminate methods

C. Outreach materials to inform the public about the:

- 1) coastal habitat economic & ecological value
- 2) management efforts to protect & maintain estuaries
- 3) actions individuals can take to support these efforts

Gabion-breaks positioned to:

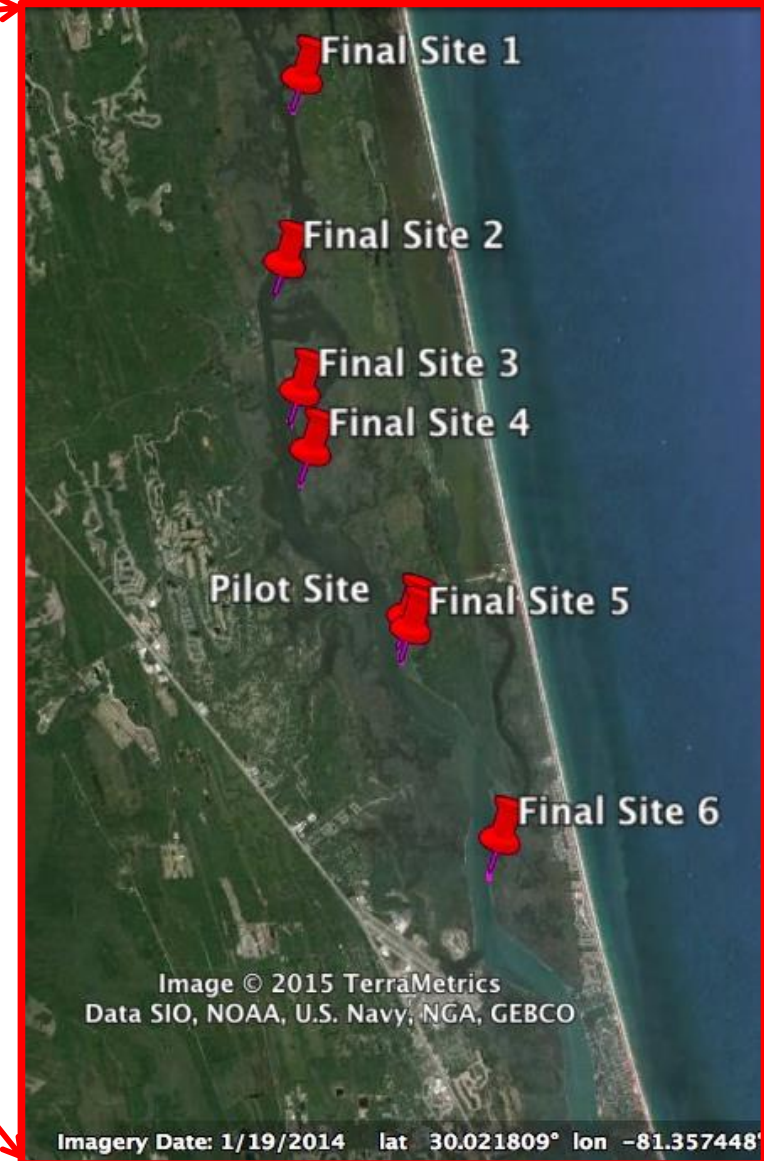
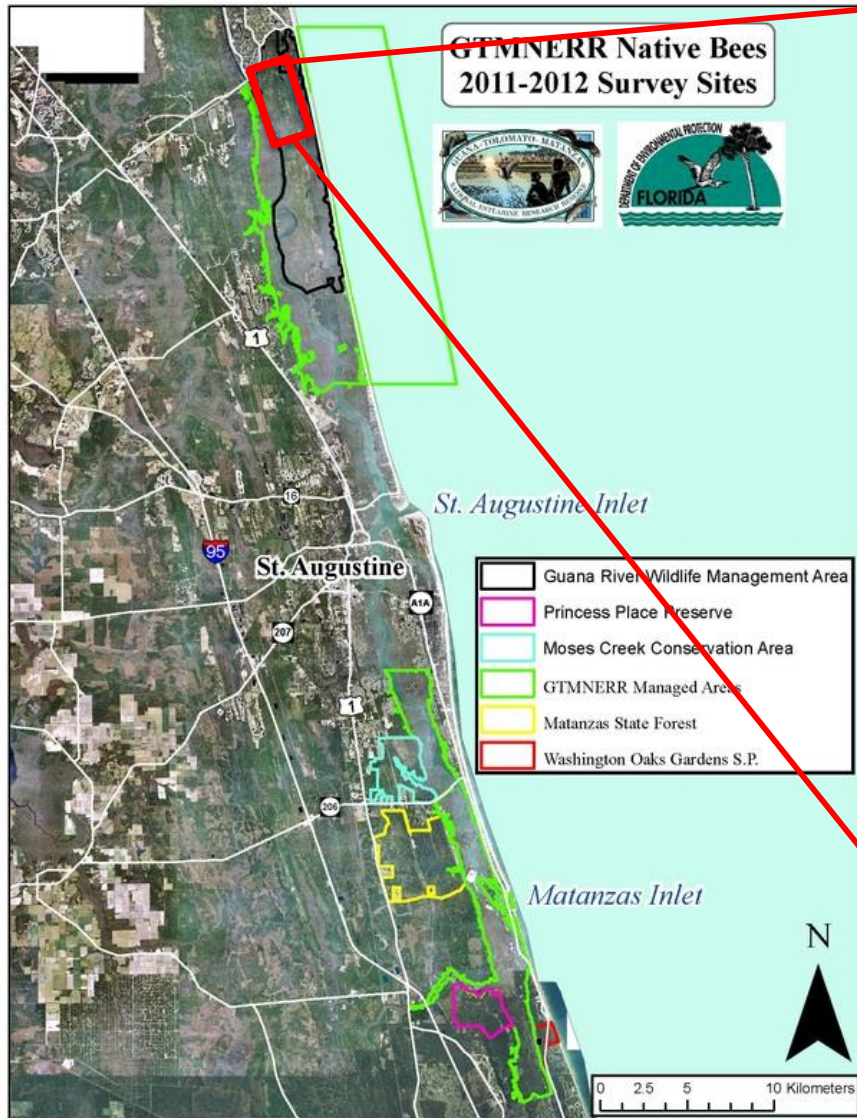
- Minimize obstruction of boat traffic
- Minimize effects on wildlife
- Maximize wake dissipation
- Facilitate oyster growth



Bird's Eye View of One Set of Experimental Gabion-Breaks

*At the pilot site, 2 breaks and a total of 8 gabions will be deployed; at the 6 experimental sites, 2 sets of 3 breaks, one 1' wide and a second 2' wide, will be deployed)

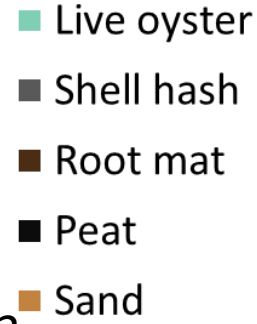
Study Area: Northern GTM NERR



Focus on: high-energy shorelines



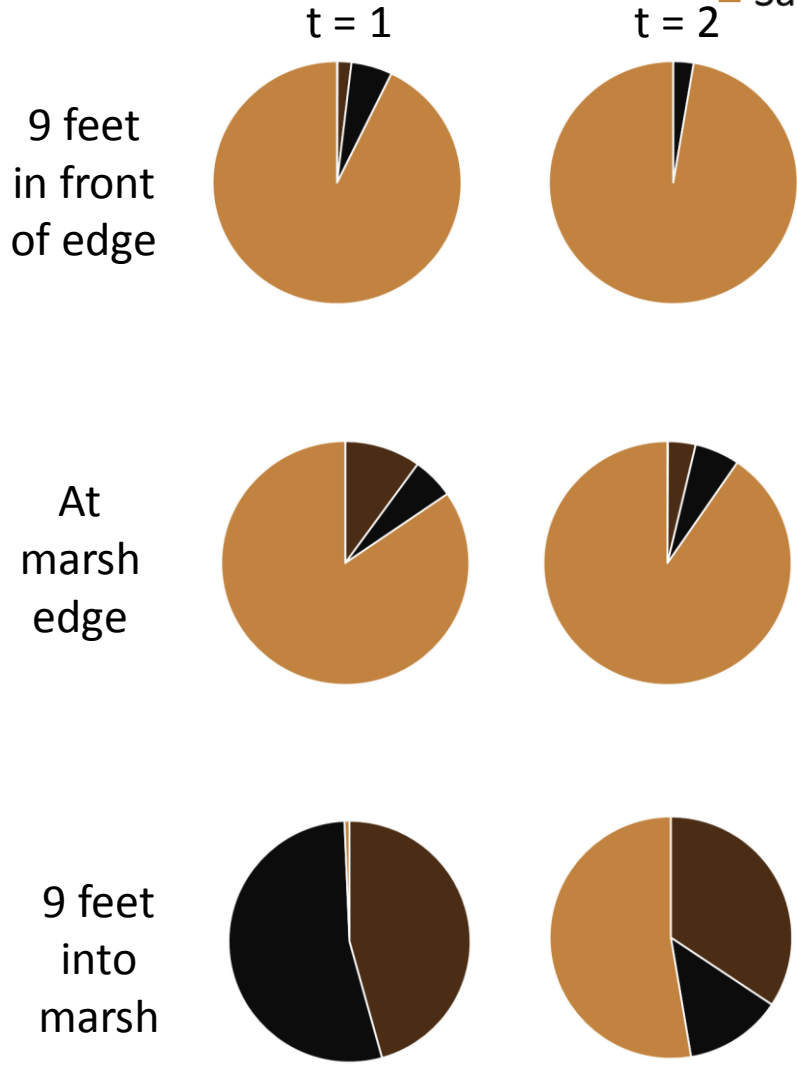
2016 Monitoring



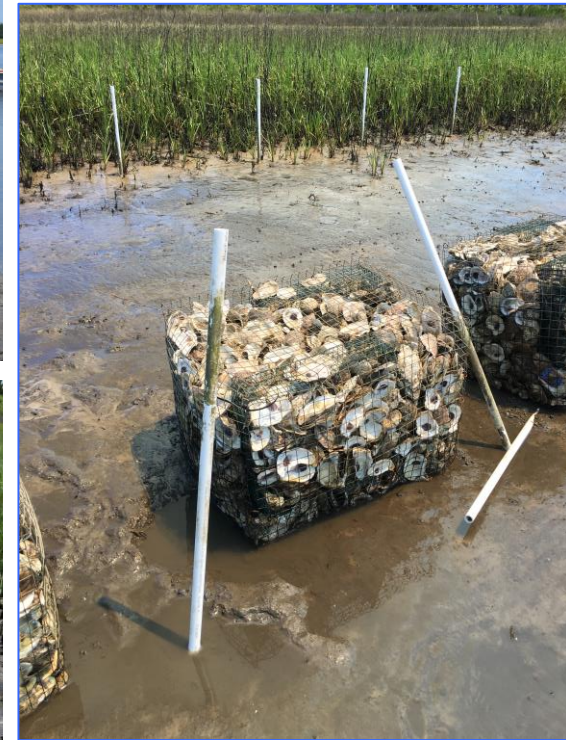
Scour removing fine sediment & peat

- 19cm erosion in 6 months

Plant & invertebrate loss



2016 Pilot field experiment: what works?



2017 break walls: fence posts, branches & PVC-coasted wire

- Hand-installed structures:
- 2.5 hours per wall for 2 people
- \$90 in materials + labor + transportation



Secure after 8 months + Hurricane Matthew.
Little to no shipworm damage in crapemyrtle branches

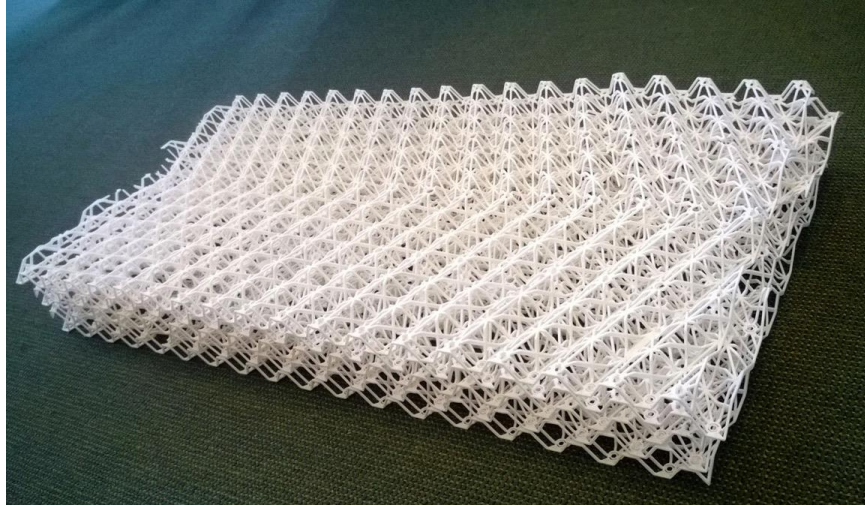
Gabions: New mini-gabion design



3, 6" x 6" x 24" wire cages get linked together
Secured with 1 rebar, 24 pounds each
Each reef costs ~\$15 + labor + transportation

Gabions:

BESE



After 2.5 months



After 6 months



After 18 months



- 4, 1.5" x 18" x 24" linked BESE sheets
- Secured with 1 rebar, 3 pounds each
- Each reef ~\$16 + little labor + transportation

2017 plans

- Install break walls & gabions at 6 sites
- Monitor their effects on boat wakes, sediment accretion (or erosion), oysters, marsh grass, nekton use
 - Preliminary results: rate of erosion

Project Team



Nikki Dix,
GTM NERR, Oyster & Larval ecology



Tina Gordon,
GTM NERR CTP Coordinator



Kenneth Rainer
GTM NERR Education Coordinator



Andrea Noel
GTM NERR & NE FL APs, Coastal rest. ecology



Scott Wasman, UF
Geotech. Engin, Soil mechanics



Christine Angelini, UF
Coastal Resilience, Marine Comm. Ecology



Alex Sheremet, UF
Coastal Hydrodynamics, Physics of Waves/Wakes



Ray Grizzle, UNH
Oyster Restor. Ecology



Tjeerd Bouma, NIOZ,
Coastal Resilience & Biophysical feedbacks



Tjisse vander Heide,
Radbound Univ., Coastal Ecology

Questions?

