Prospects and Uncertainties for Tidal Marshes in New Hampshire

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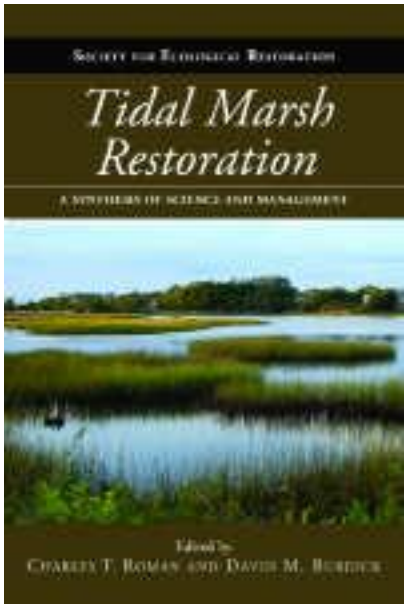


NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

U.S. FISH & WILDLIFE SERVICE DEPARTMENT OF THE INTERIOR

NEW HAMPSHIRE COASTAL PROGRAM

GREAT BAY NATIONAL ESTUARINE RESEARCH RESERVE

NH

Climate Change and *other* Human Stressors - the biggest threats to NH tidal marshes

Our Climate **Continues** to Change:

Global:

- Surface temperatures +0.74° C
- Arctic temperatures 2X

Snow and Ice:

- Snow cover decreasing
- Glaciers shrinking
- Arctic sea-ice decreasing
- Ice shelf losses

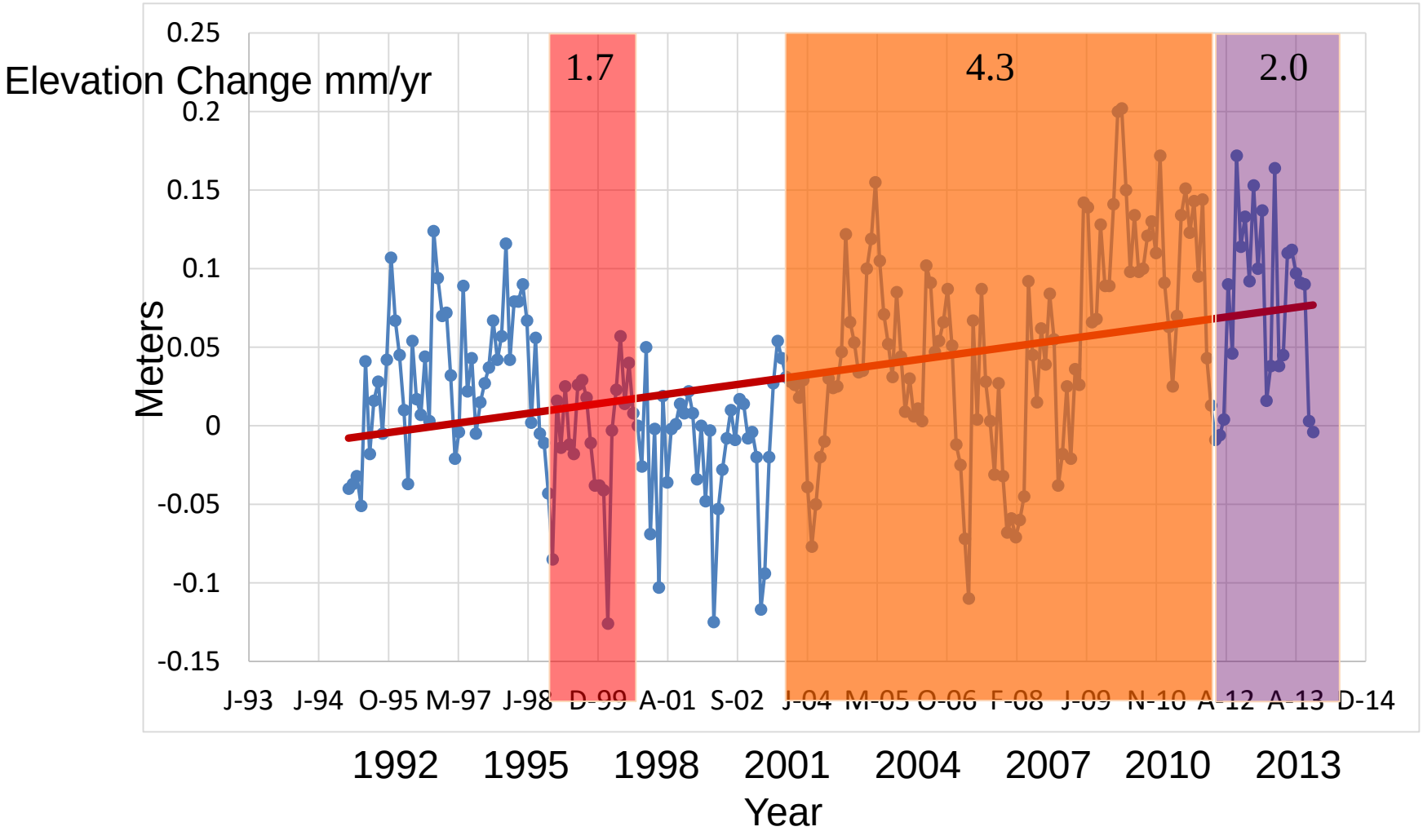
Thermal expansion of the oceans:

- SLR has increased from 1.7 to 3.26 mm/yr*

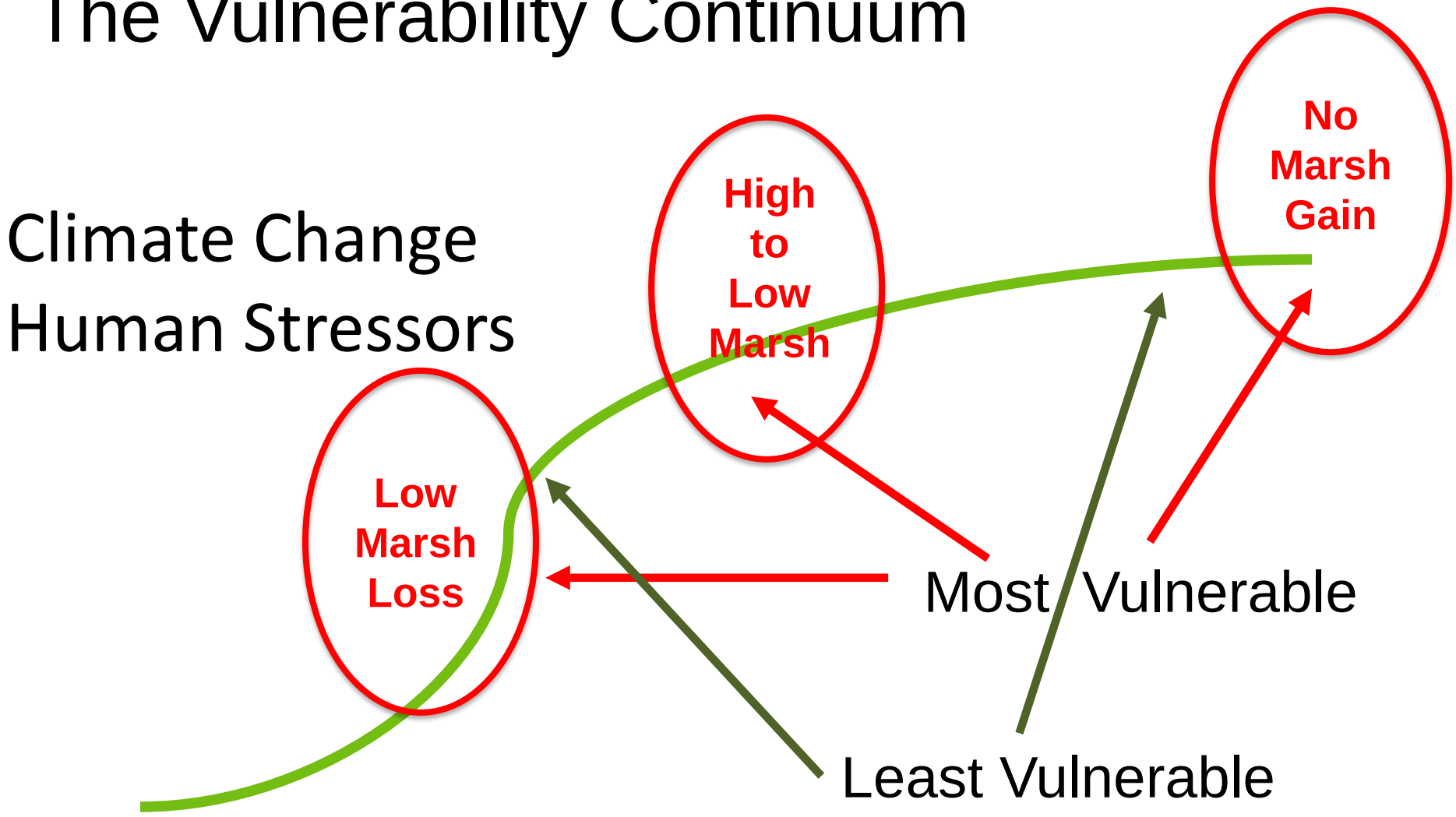
Climate Change Impacts to Wetlands

- Increased sea level and storm activity
  - Seaward edges will retreat
- Temperature increases
  - Range expansions
  - Loss of forb pannes
  - Increased decomposition rates

1990-2013
Monthly MSL vs. Time at Portland, Maine



The Vulnerability Continuum



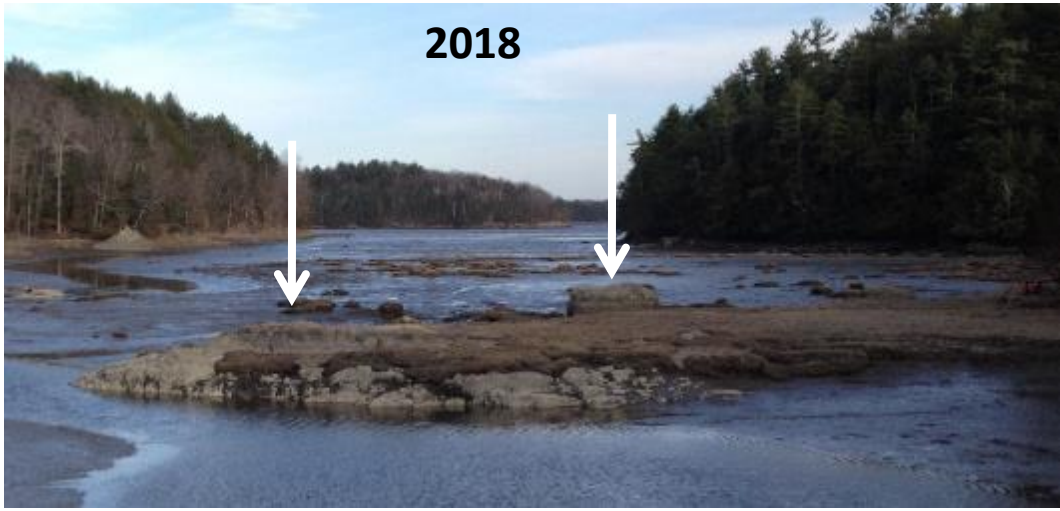
High Marsh Replacement or Collapse

Low Marsh Collapse – Crommet Creek

NERRS Sci Coll Project

w/8 reserves across US

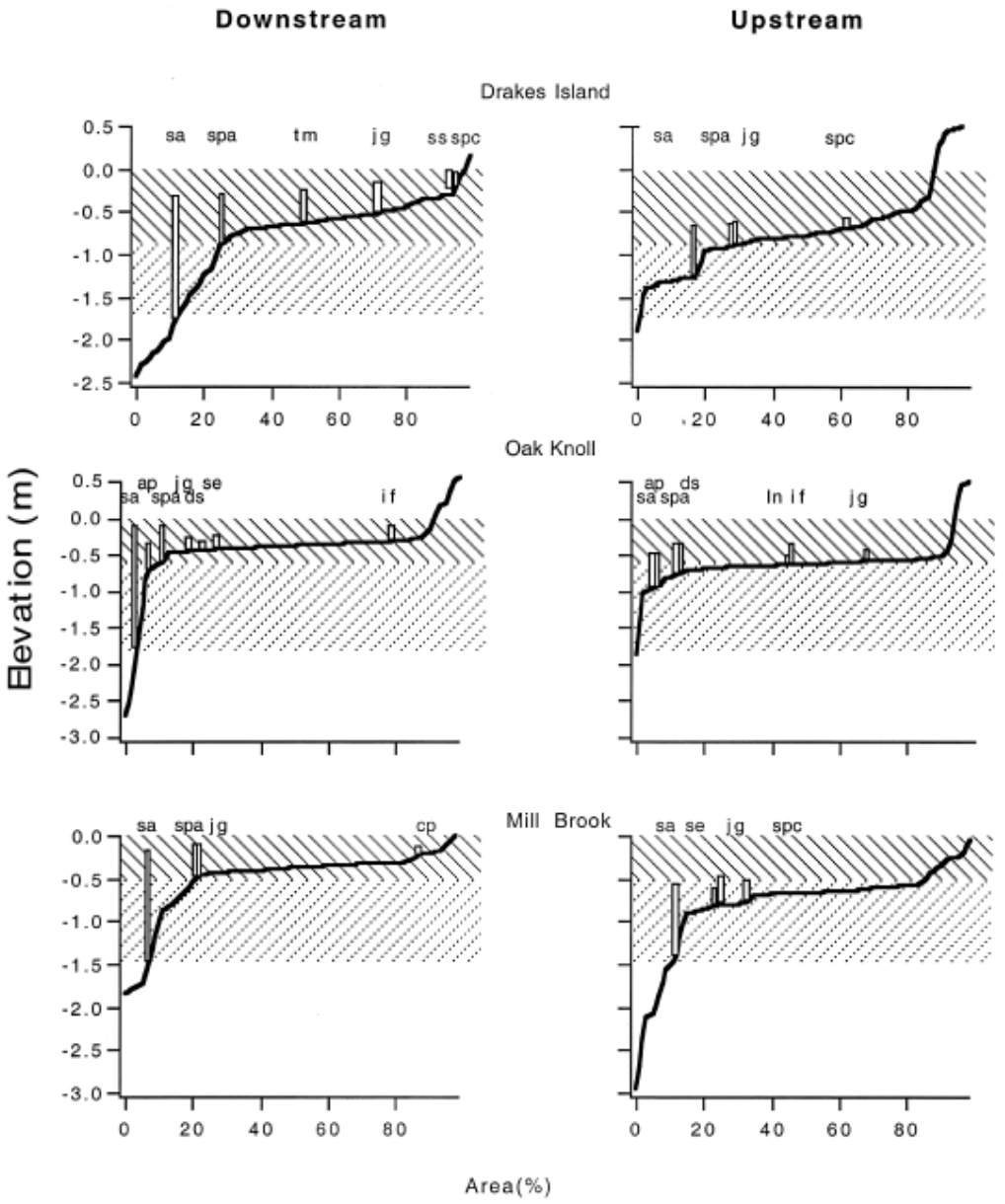
Can in-situ plants survive/thrive under 7 and 14 cm sediments?



Ice deposition may help – Crommet Creek this March

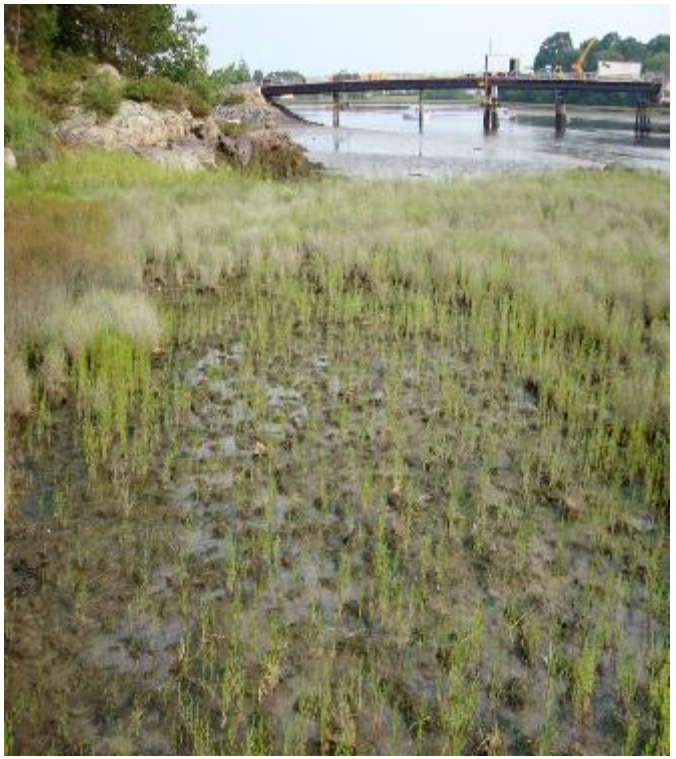
Tidal Restrictions lead to Subsidence

Our marshes appear to subside with lower tide levels and grow with higher tide levels



Boumans et al. 2002

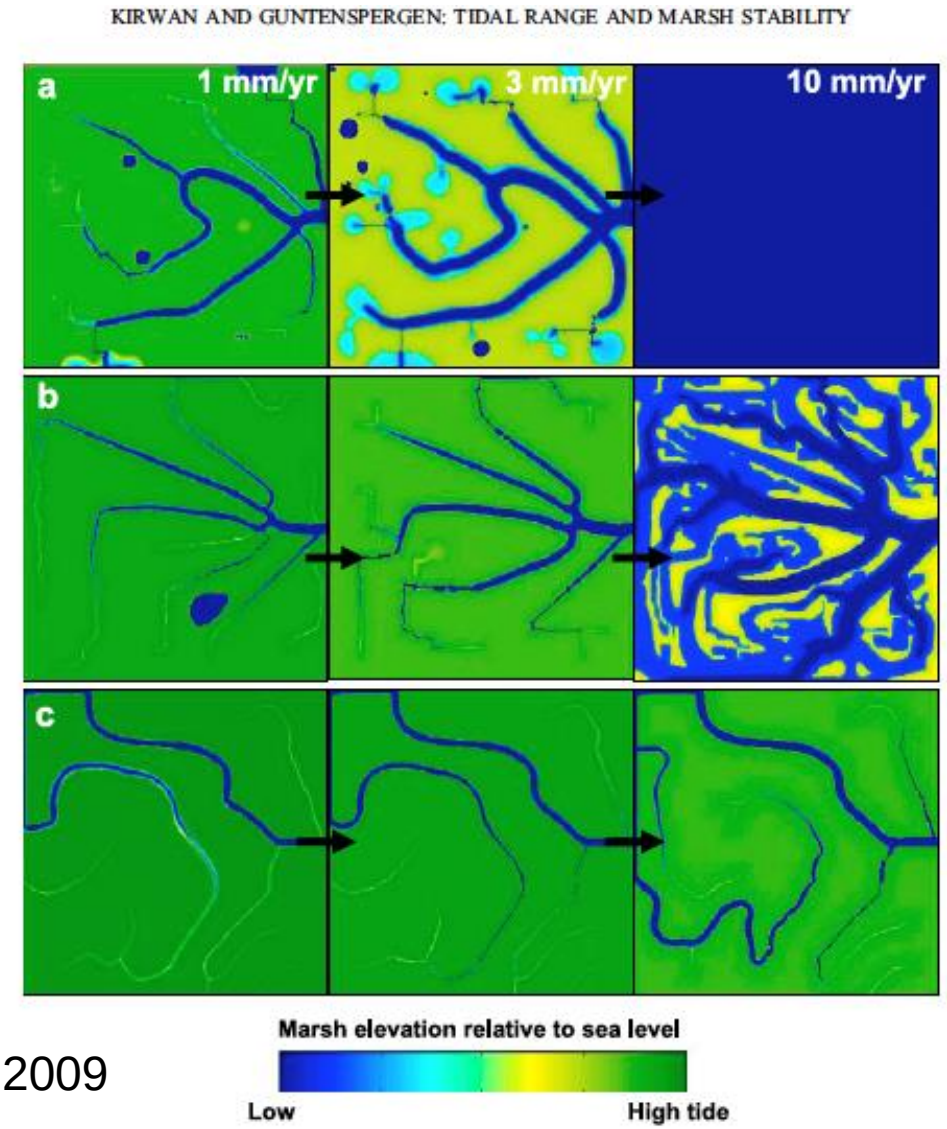
Last Chance for Restricted Marshes



- Sea Level Rise is accelerating
- 30% of our marshes have been lost to filling
- Remaining marshes:
  - 10% restricted
  - Most have reduced sediment supply
  - Reduced resilience
- In 50 years we will flood them out

Marsh Responses to three SLR rates under three Tidal Ranges

Tidal restrictions put our high tidal range marshes at risk
e.g. Philbricks Pond



Matt Kirwan and Glen Guntenspergen, 2009

Philbrick's Pond

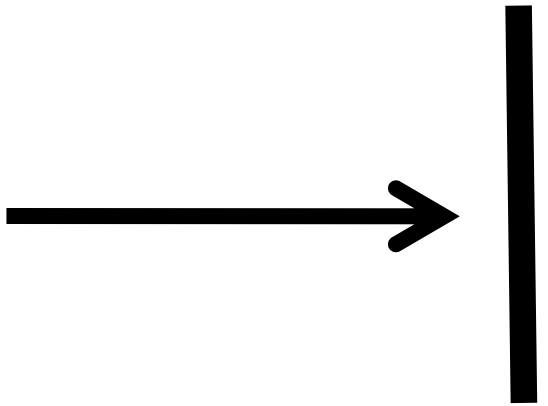
Waffle and Syrup pattern

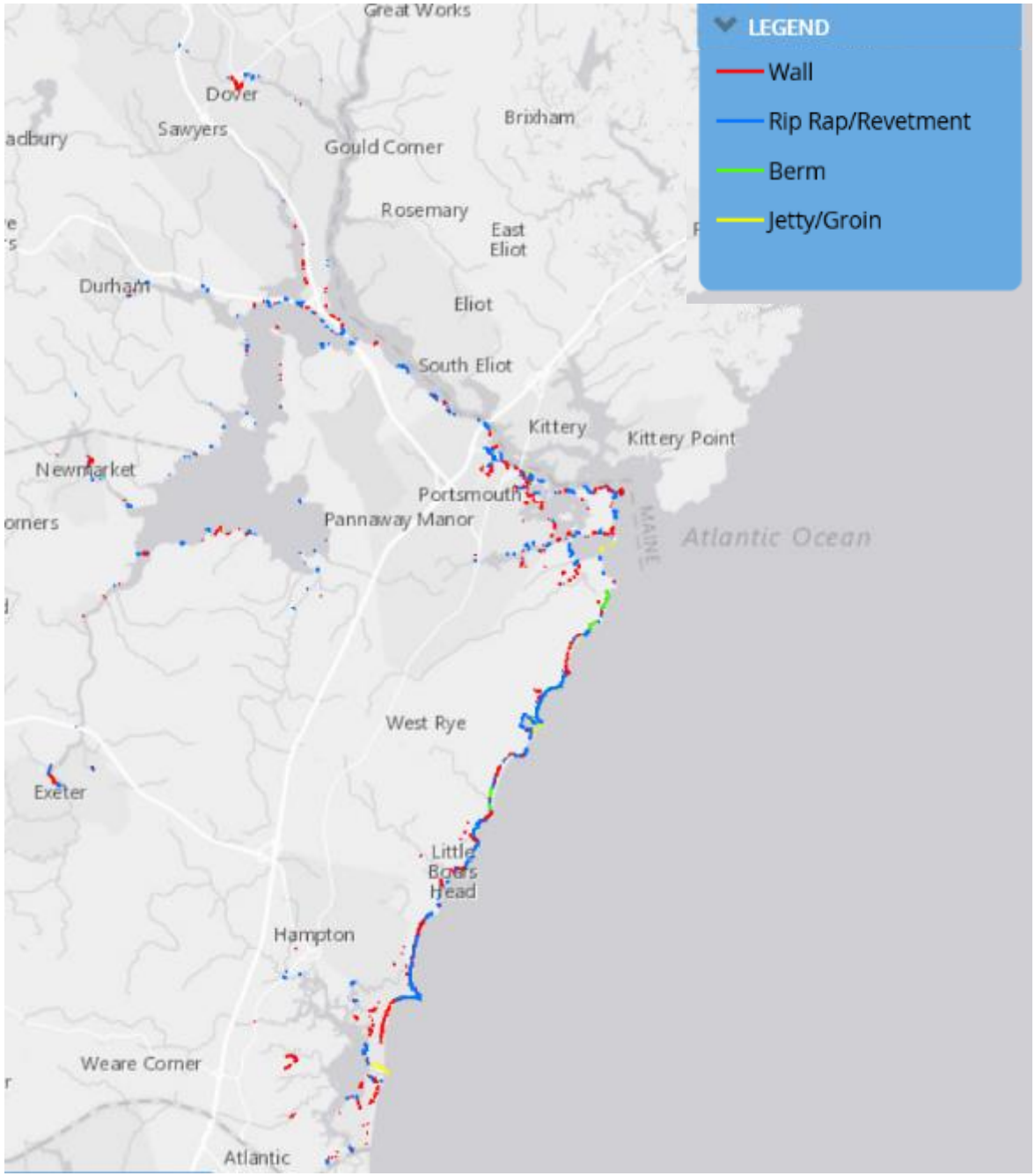
Effective tidal range is only 6 inches!

THE SALT MARSH SQUEEZE

From Kirsten Howard, NHCP

Marsh migration
+
Shoreline stabilization
=
salt marsh squeeze





SHORELINE TODAY

12% total armored

70% Atlantic Coast

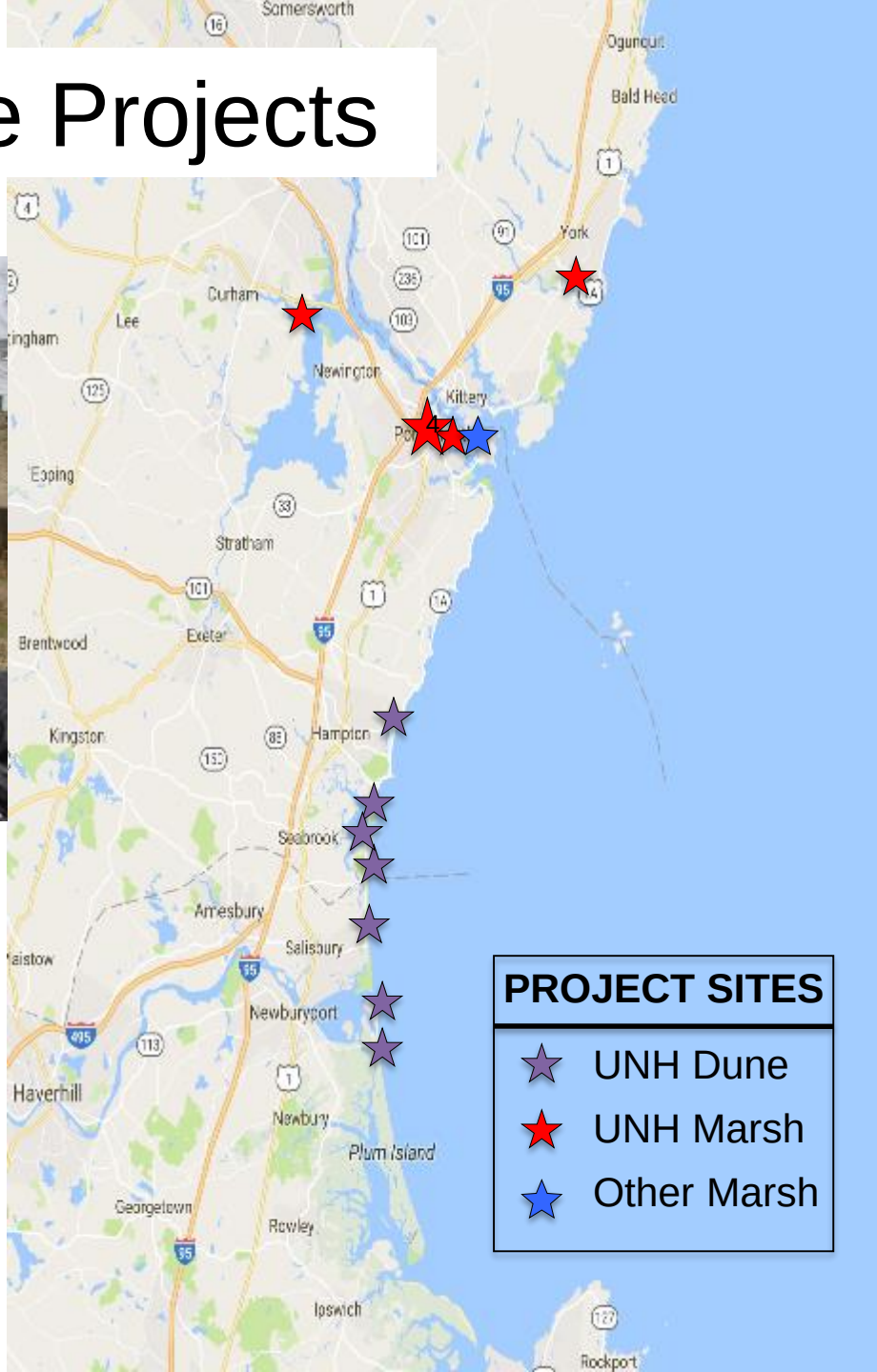
5% Great Bay

Blondin & Howard 2014

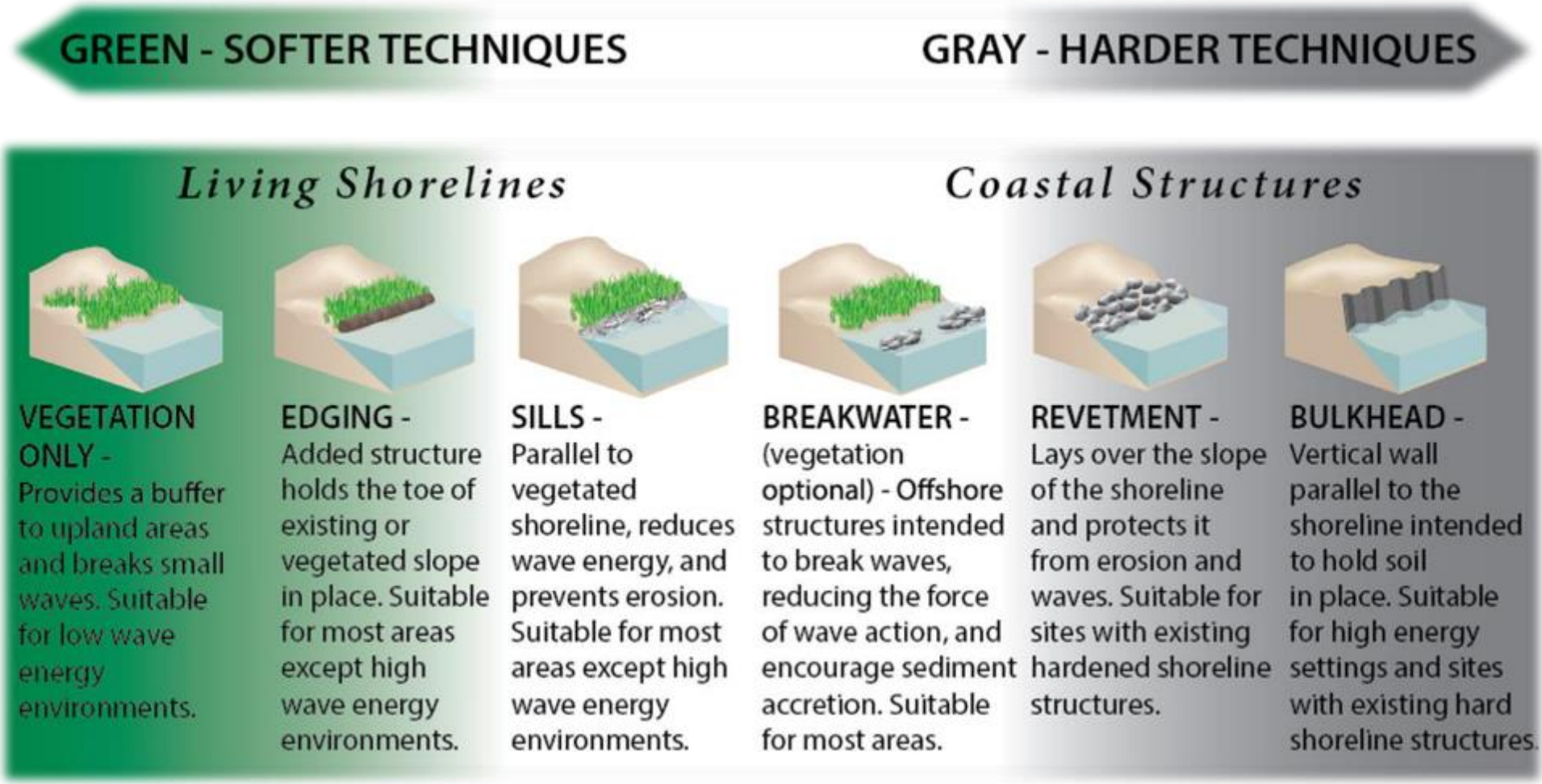
Local Living Shoreline Projects

Coastal Habitat Restoration Team:
Burdick, Moore, Grizzle, Eberhardt, Ashcraft, Ballestero and Technicians and Students

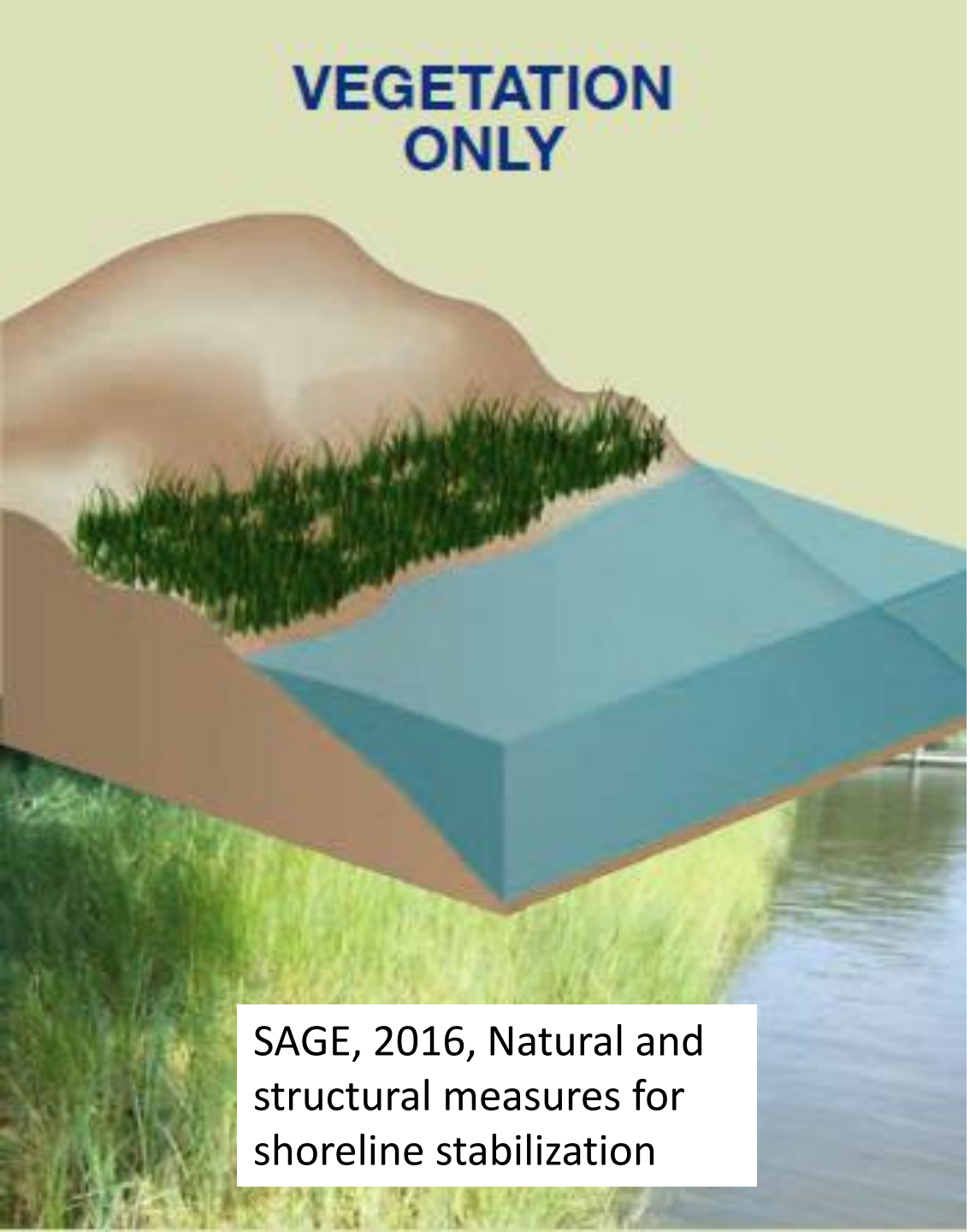
University of New Hampshire
COASTAL HABITAT RESTORATION
CHaRT



Ranges of Options



Guidance for Considering Use of Living Shorelines, NOAA 2015

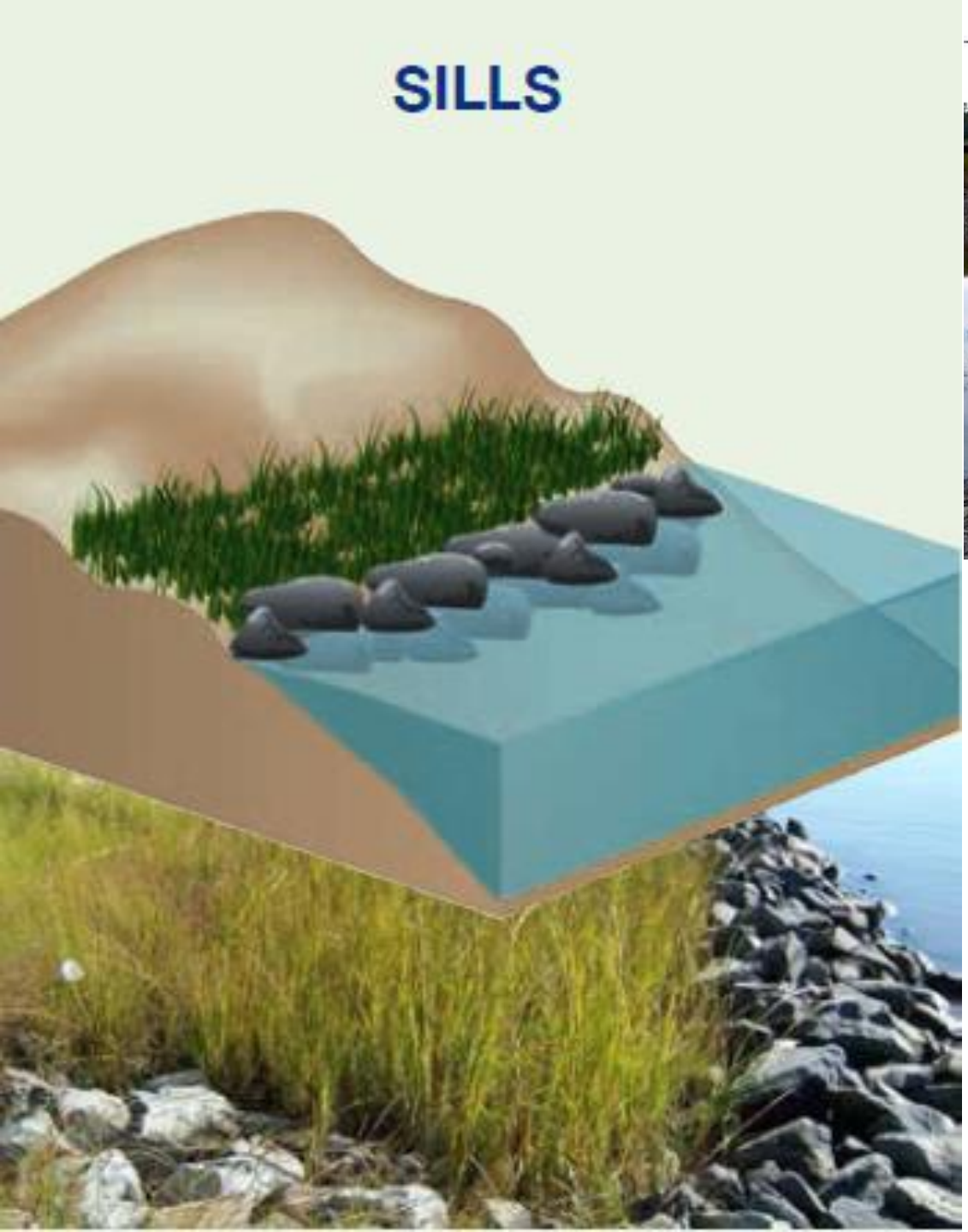


SAGE, 2016, Natural and structural measures for shoreline stabilization

Mill Pond Way berm removal, North Mill Pond, Portsmouth, NH

SAGE, 2016, Natural and structural measures for shoreline stabilization

Brewster Street Mitigation on North Mill Pond (Stantec)



Marsh built in South Mill Pond 2001, Portsmouth, in front of seawall and behind sill constructed from existing rocks on site.

SAGE, 2016, Natural and structural measures for shoreline stabilization

North Mill Pond at Brewster St. Mitigation 2016

Pre-existing

Fill to Designs Grades

Add a few boulders to break up ice

Plant With Plugs

Final Product

Challenges of northern shoreline projects ‘Lessons Learned’

- Low light
- Short growing season
- Large tidal range
- Ice

Thank You!

With contributions and help in NH from many students of marsh ecology, and:

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Paul Stacey
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