Thin-layer sediment placement (TLP)

TESTING A STRATEGY TO ENHANCE COASTAL MARSH RESILIENCE

Funded by NERRS Science Collaborative
Project Background

- Marshes likely to drown with sea-level rise (SLR);
- TLP with dredge seems like one viable adaptation strategy;
- Most studies have been in southeast US and focused on lowest marsh;
- Therefore, we need better understanding of effects of TLP on diverse plant communities across geographies and elevations.
Project Goal

Determine conditions where sediment addition is an effective strategy to enhance marsh resilience
MARSH RESTORATION EXPERIMENT
AT 8 DIVERSE NERR SITES
Experimental design

- 4 factors
  - Elevation (high and low; all sites)
  - Sediment thickness (7 cm and 14 cm; all sites)
  - Biochar (3 sites)
  - Sediment type (quarry vs dredge; 3 sites)
A completed set of addition plots, plus untreated controls, CBVA

10 of these sets at each of the participating reserves.
Sediment addition

- Sediment added early spring 2018
- Quarried sand with 10% local marsh mud
- Biochar/dredge
Monitoring

- Vegetation - cover, composition, canopy height
- Crab burrow density
- Plot elevation
- At end of experiment - porewater chemistry, soils, accretion
- Three years of monitoring
Issues with retaining sediment in frames...

Raccoons digging
Deer stepping
Crabs burrowing
...and hurricanes

...but still seeing some veg regrowth.

Narragansett Bay RI
Waquoit Bay MA
Chesapeake Bay VA
North Carolina
Elkhorn Slough CA
Elevation Increase

Narragansett

North Carolina

Chesapeake Bay VA

Elkhorn Slough
Narragansett is crabby

Narragansett Bay

Chesapeake Bay VA

Elkhorn Slough

Mean change in burrows plot\(^{-1}\)

LOW
HIGH

C 7 14 B C 7 14 B C 7 14 BC 7 14 B C 7 14 D C 7 14 D

LOW
HIGH
Companion Outputs

• Outputs
  • Consensus statement
  • Monitoring guidelines
  • Permitting guidelines
  • Greenhouse experiments

• Outreach
  • Poster on greenhouse work
  • Talk at RAE session
ADVISORY COMMITTEE

Jo Ann Muramoto, Massachusetts Bays National Estuary Program

Caitlin Chaffee, Rhode Island Coastal Resources Management Council

Cathy Wigand, US EPA Atlantic Ecology Division

Jim Turek, NOAA Restoration Center (Northeast Region)

Rob Tunstead, USDA-NRCS (New Jersey)

Nicole Carlozo and Jackie Specht, Maryland Department of Natural Resources

Elizabeth Murray, US Army Corps of Engineers, Wetlands and Coastal Ecology Branch

Christina Toms, San Francisco Bay Regional Water Quality Control Board

Richard Nye, Seal Beach National Wildlife Refuge, US Fish and Wildlife Service
Thank you to the University of Michigan’s NERR Science Collaborative for providing funding...