Coastal Resilience Pilot Project:

Oyster Castle® Reef, Salt Marsh Health, and Sea Level Rise

DR. JEN KARBERG
DIRECTOR OF RESEARCH AND PARTNERSHIPS
NANTUCKET CONSERVATION FOUNDATION

JKARBERG@NANTUCKETCONSERVATION.ORG

Nantucket Conservation Foundation

LIVING SHORELINES SUPPORT RESILIENT COMMUNITIES

Living shorelines use plants or other natural elements—sometimes in combination with harder shoreline structures—to stabilize estuarine coasts, bays, and tributaries.

One square mile of salt marsh stores the carbon equivalent of **76,000 gal of gas** annually.

Marshes trap sediments from tidal waters, allowing them to **grow in elevation** as sea level rises.

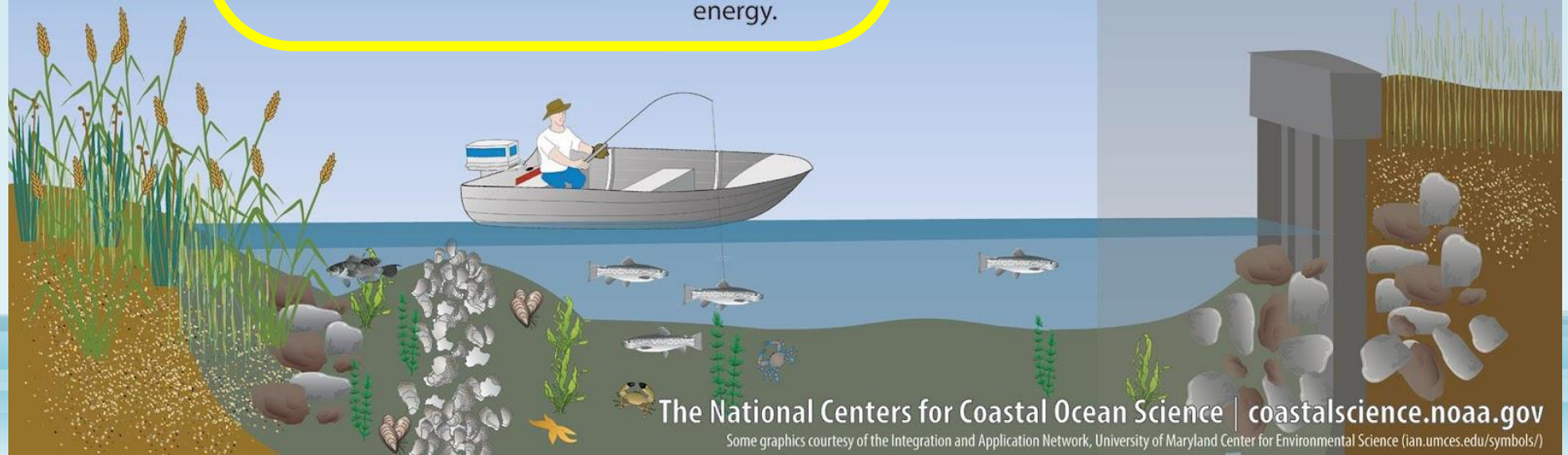
Living shorelines improve **water quality**, provide fisheries **habitat**, increase **biodiversity**, and promote **recreation**.

Marshes and oyster reefs act as natural **barriers** to waves. **15 ft** of marsh can **absorb 50%** of incoming wave energy.

Living shorelines are **more resilient** against storms than bulkheads.

33% of shorelines in the U.S. will be **hardened** by **2100**, decreasing fisheries habitat and biodiversity.

Hard shoreline structures like **bulkheads** prevent natural marsh migration and may create seaward **erosion**.



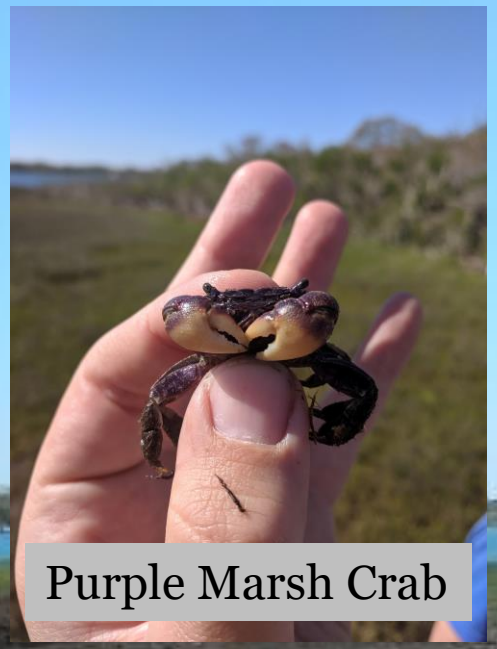
The National Centers for Coastal Ocean Science | coastalscience.noaa.gov

Some graphics courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/symbols/)

Nantucket Conservation Foundation

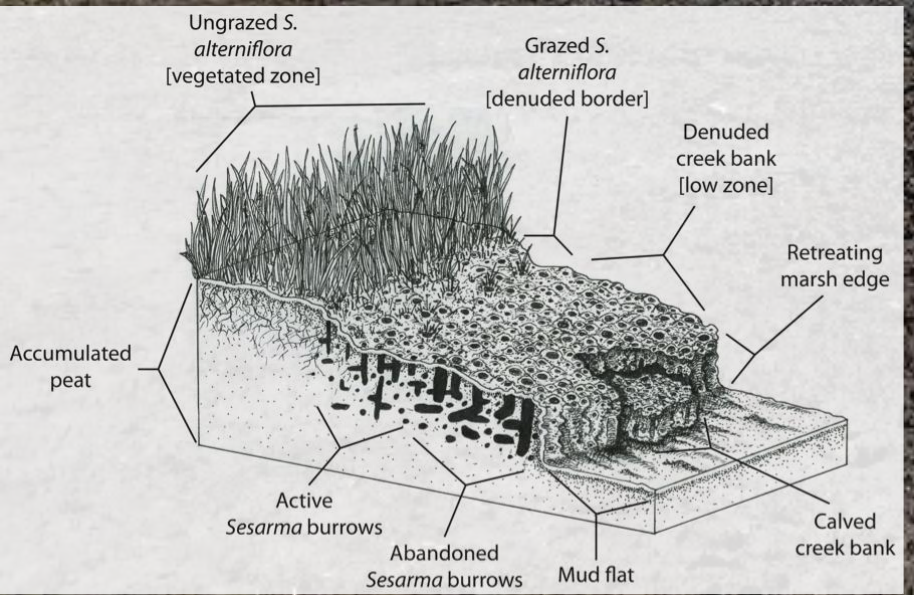

Medouie Creek Oyster Project
Site Overview
Area of Detail
Medouie Creek Wetland Complex
Oyster Reef
Proposed Site
Reference
Monitoring Site
Polpis Harbor
Nantucket
Conservation
Foundation

Salt marsh Dieback and Erosion



Purple Marsh Crab

- 2019: Crab removal research
- 2020: Con't crab removal, +Spartina outplanting
- 2021 – 2026/7 : continue crab removal research as the marsh stabilizes.

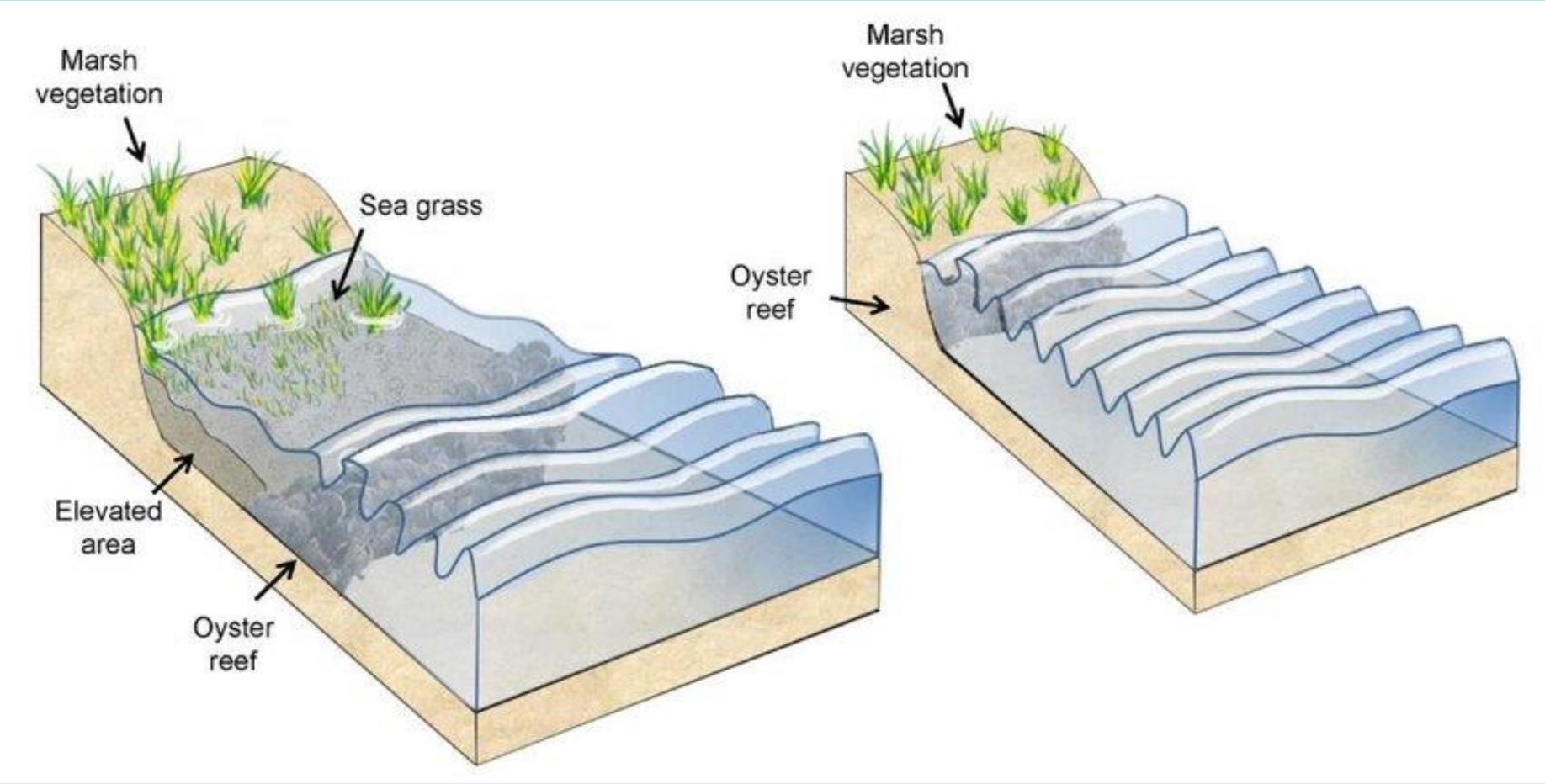


60 years Nantucket Conservation Foundation

Salt Marsh Dieback Research

- Crab Control + Spartina alterniflora planting = high success……
- But, it's still a 5 year process

Nantucket Conservation Foundation



Intertidal Oyster Reef

- Wave reduction (height and force)
- Erosion reduction
- Sediment accumulation
- **Marsh migration sea-ward?**


Medouie Creek Oyster Project
Site Overview
Area of Detail
Medouie Creek Wetland Complex
Oyster Reef
Proposed Site
Reference
Monitoring Site
Polpis Harbor
Nantucket
Conservation
Foundation

Prior Restoration Site Conditions

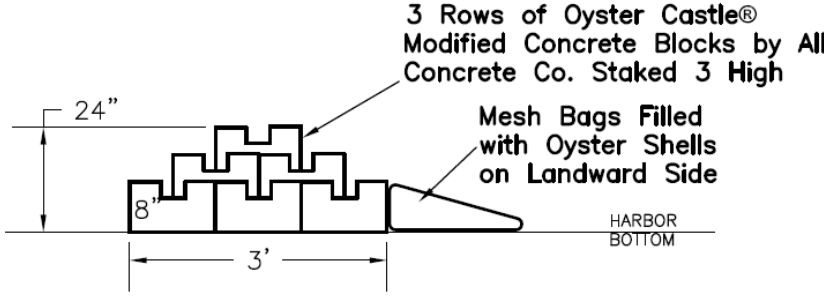
Water Depth

- Mean 2.89ft
- Water drops below 0.8ft for 30min ever 3-4 months.

Salinity: 19-35ppt over 15 years.

No submerged aquatic veg

Spat Collectors: no oyster spat in 2020



CROSS–SECTION VIEW OF TYPICAL OYSTER CASTLE REEF
Scale: 1"=2'

Nantucket Conservation Foundation

Prior Restoration Site Conditions

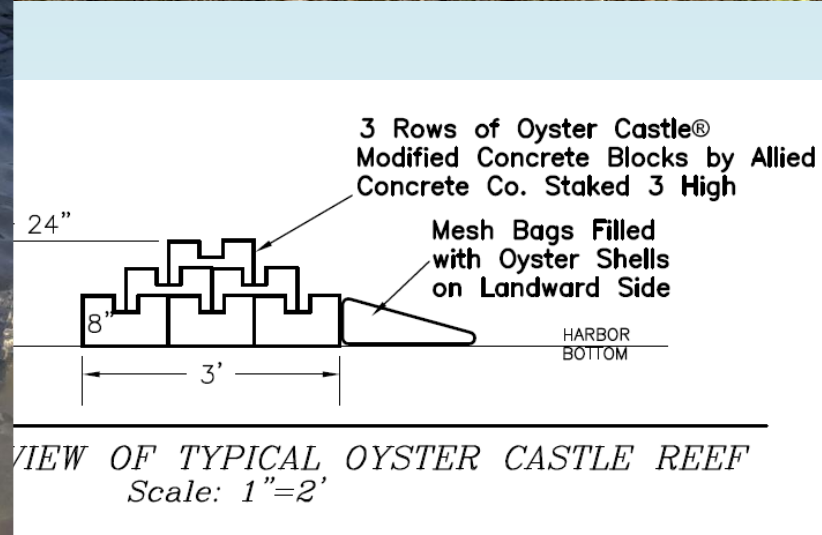
Water Depth

- Mean 2.89ft
- Water drops below 0.8ft for 30min ever 3-4 months.

Salinity: 19-35ppt over 15 years.

No submerged aquatic veg

Spat Collectors: no oyster spat in 2020



VIEW OF TYPICAL OYSTER CASTLE REEF
Scale: 1"=2'

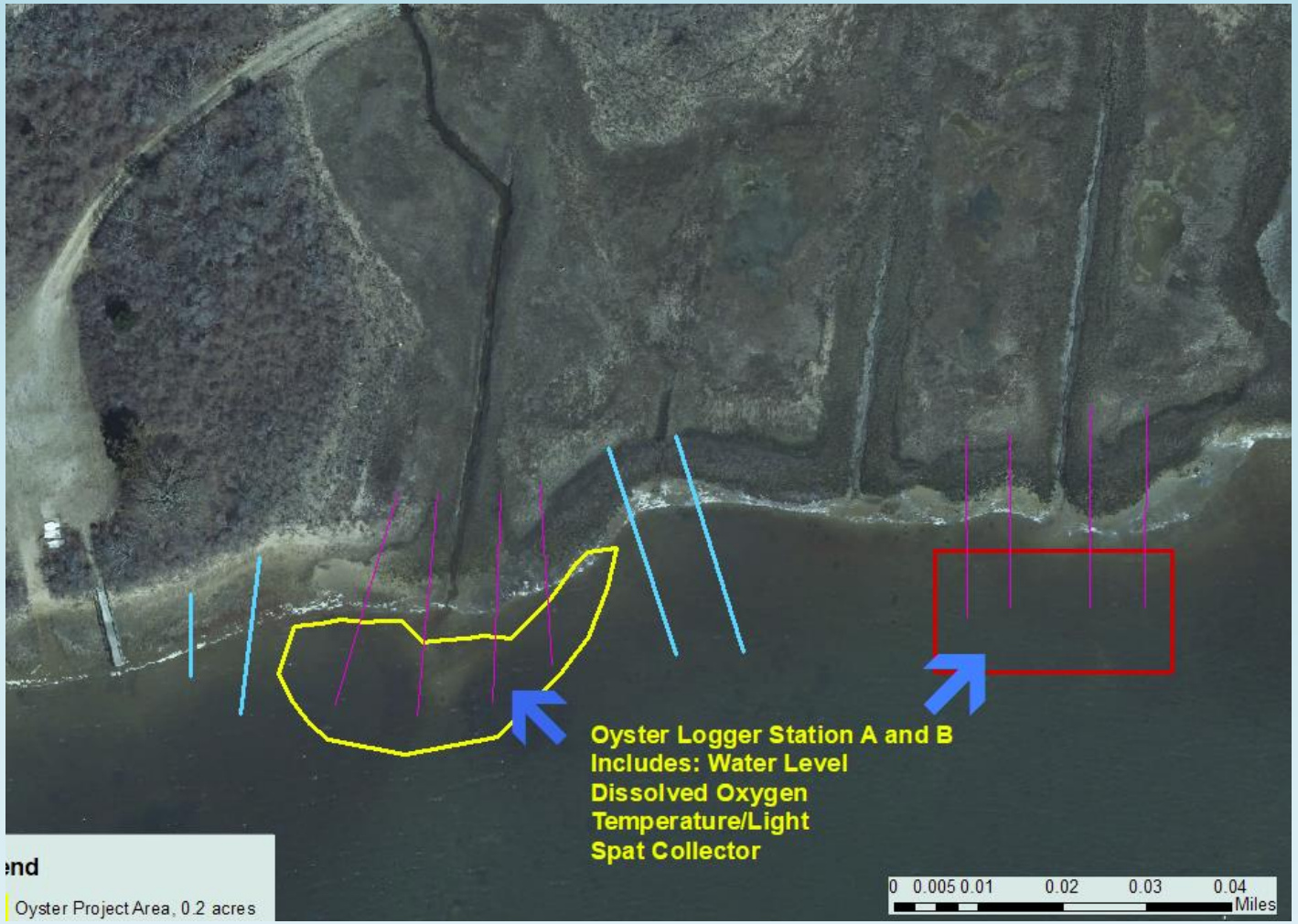
Nantucket Conservation Foundation

Nantucket Conservation Foundation
60 years

Nantucket Conservation Foundation


60 years
Nantucket
Conservation
Foundation

Intensive Environmental Monitoring



Nantucket Conservation Foundation

Status After One Year

Nantucket Conservation Foundation

Crab Removal/Dieback Restoration

Nantucket Conservation Foundation

Thank you

Jen Karberg: jkarberg@nantucketconservation.org

Town of Nantucket, Natural Resources Dept and Shellfish Hatchery
Allied Concrete
MA In Lieu Fee Program
Linda Loring Nature Foundation, Massachusetts Nantucket Audubon, Nantucket Shellfish Association, Maria Mitchell Association, ACKlimate, Nantucket Land Council, and Champoux Landscape