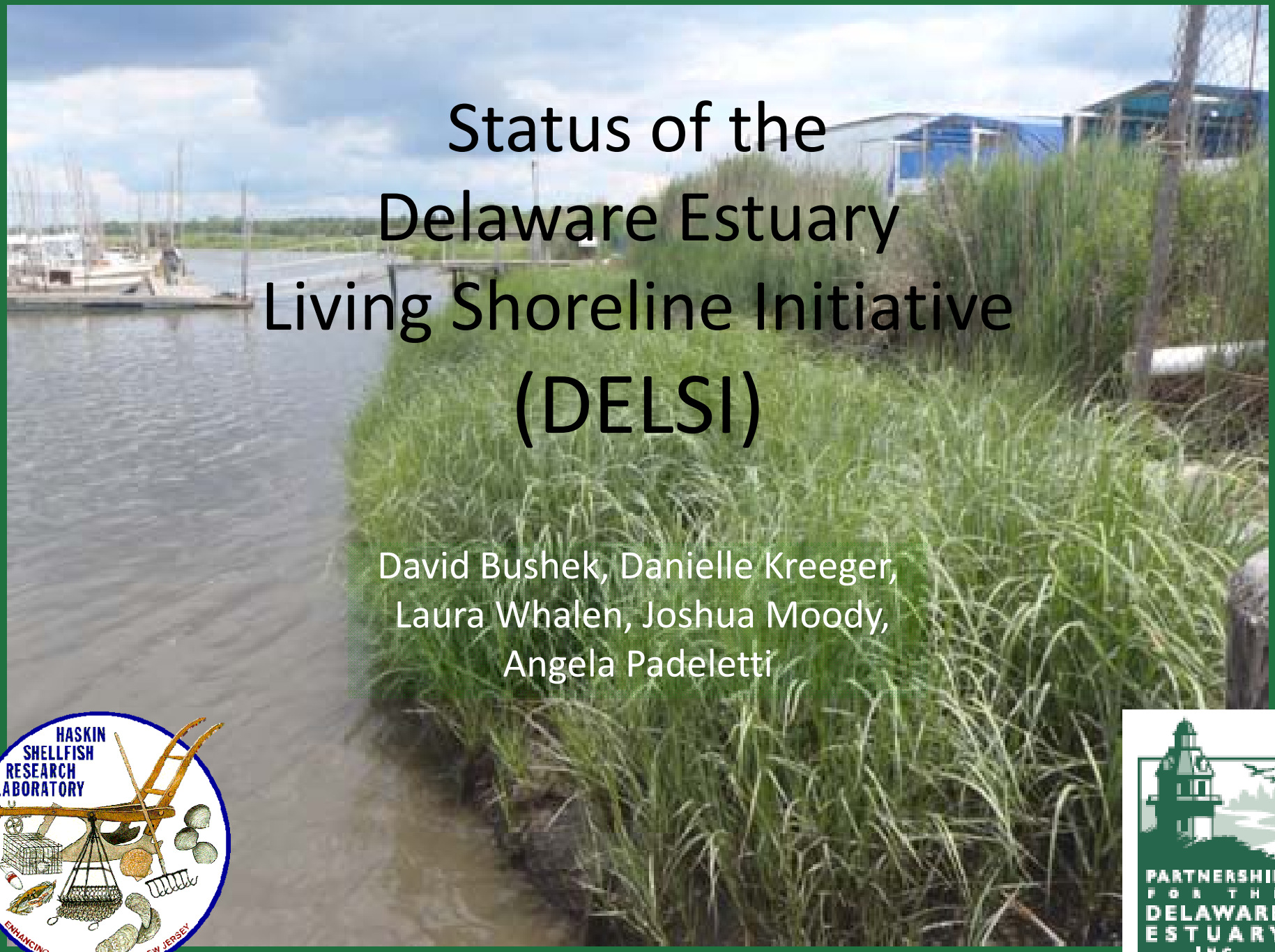

Status of the Delaware Estuary Living Shoreline Initiative (DELSI)

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ENHANCING THE FISHERIES OF NEW JERSEY

PARTNERSHIP FOR THE DELAWARE ESTUARY INC.

Erosion in the mouth of the Maurice River. Note the loss of meander around Fowlers Island and Basket Flats

Erosion and accretion are natural processes that create dynamic habitats.

- Erosion = accretion = stability
- Erosion < accretion = marsh growth
- Erosion > accretion = marsh loss

Challenge:

In the face of sea level rise, how do we balance shoreline erosion and accretion to protect marsh habitats?

Common solutions:

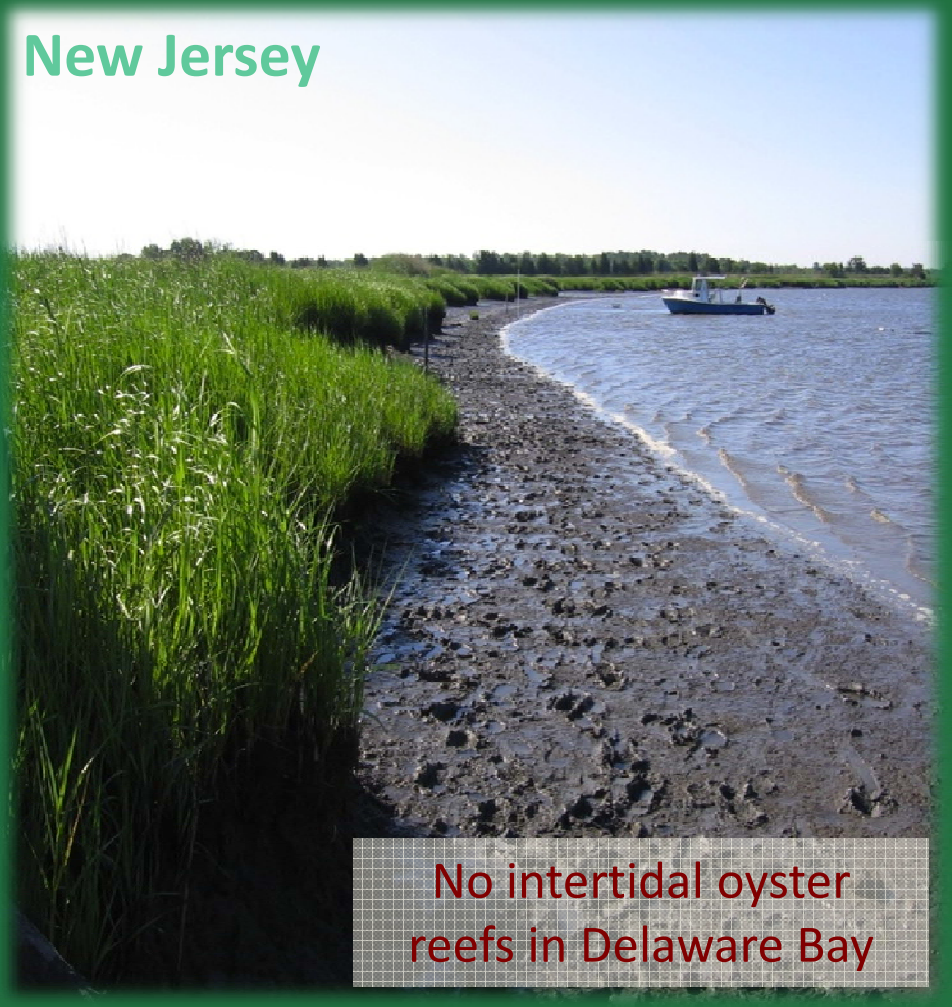
- Bulkheads
- Riprap
- Revetments

Problem:

- Hard structures change ecological structure and function.

We can do better.

Shellfish as Natural Erosion Control



- Fringing oyster reefs absorb wave energy and trap sediments.
- Oyster reefs also create habitat, filter water, and recycle nutrients.

Ribbed mussels for living shorelines?

Ecological services
- Stabilize sediments
- Water filtration
- Nutrient cycling
- Sediment deposition

Not harvested
- No poaching concerns
- No human health risk

Synergism with grass forms natural marsh levees

Why not incorporate into existing living shoreline tactics?


DELSI Goal:
Develop living shoreline strategies for Delaware Bay
that incorporate local shellfish communities

DELSI Questions:

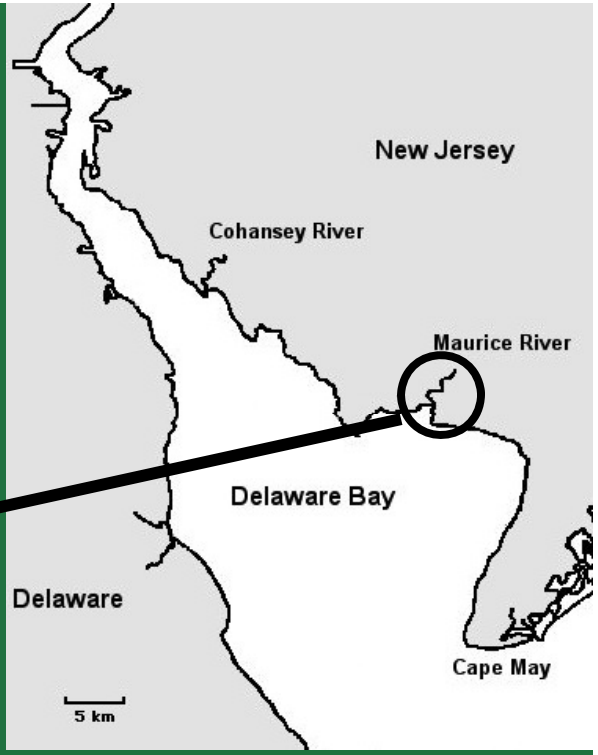
1) Can coir biologs and and mats halt salt marsh erosion?

2) How can we use ribbed mussels to enhance the living shoreline?

Coir is a byproduct of the coconut industry

Husk fibers

Phase I



Test installation methods across a gradient of energy and erosion.

DELSI Deployment

DELSI Site D

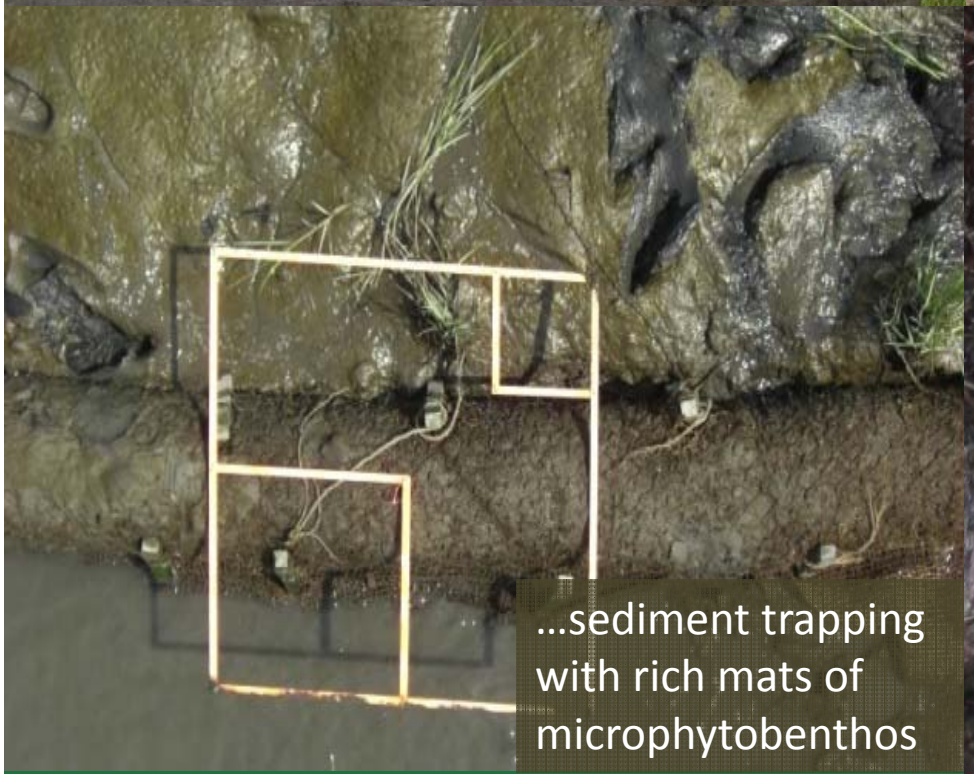
Installed multiple configurations.

Total station surveys tied installations to local USGS benchmarks.

Established transects to monitor change.

Initial monitoring provided exciting results….

Grass and mussels survived when planted in logs



…sediment trapping with rich mats of microphytobenthos

Juvenile mussels recruited to coir logs…

… sweet success

….went sour after a few months.

Few logs remain at two sites.

Marsh retreat was evident.

Deflated logs = deflated enthusiasm

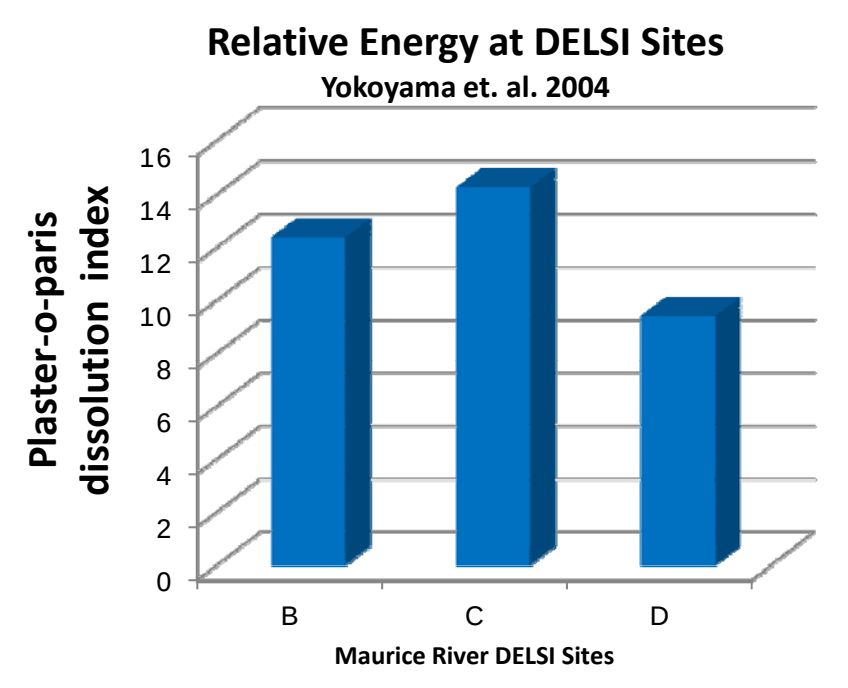
But the third site provided hope

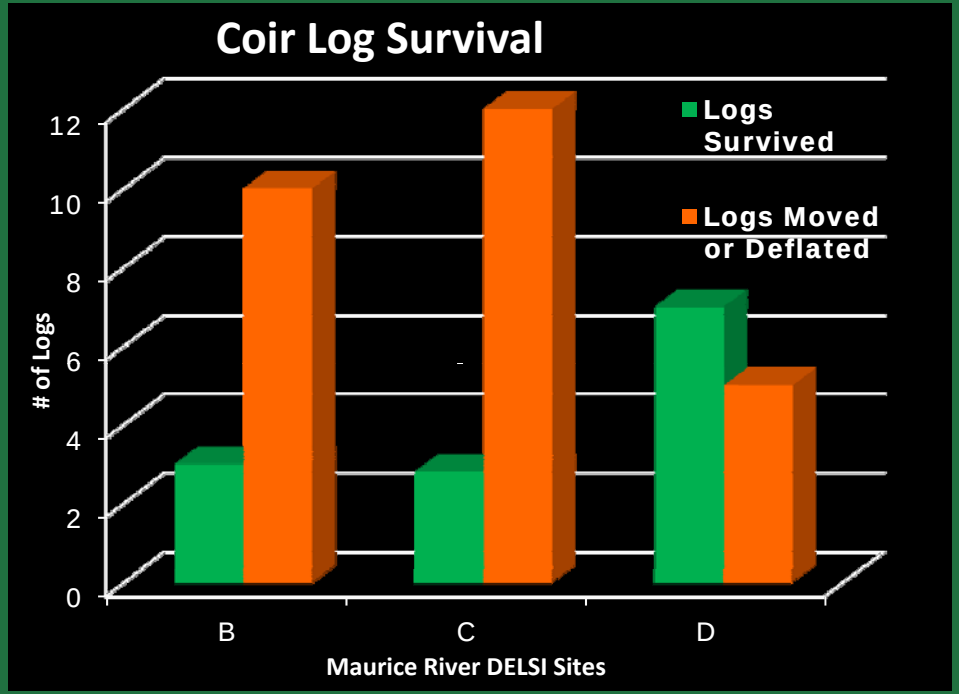
Sediment accumulated behind most logs

Closing off ‘scallops’ worked best

…enthusiasm restored!

Energy and biolog survival





- Logs and mats survived best at low energy site
  - Logs did not work if tucked against marsh
  - Logs survived best when lined with oyster shell bags

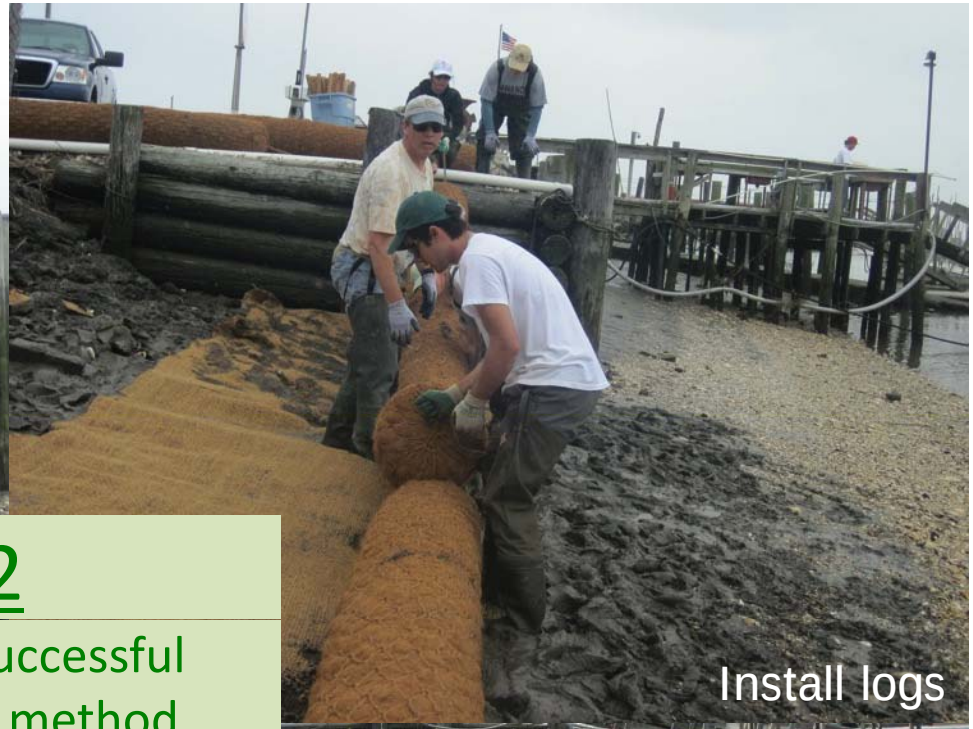
DELSI Phase 1 Conclusions

Coir biolog treatments:

- attenuated waves
- reduced erosion
- trapped sediments
- produced microphytobenthos
- attracted mussels
- amenable to seeding

Optimal configuration:
two rows of logs over mat with shell bags in front


Install mat


Install logs

Phase 2

Replicate successful installation method.
Add grass and mussels.
Quantify faunal use.


Reinforce with shell bags


Let sediment accumulate

Seeding *Spartina*

Salvaged clumps

Nursery plugs




Apply Mussels




Four installations completed July 2010

Monitor:

- Sediments
- Grass
- Fauna

Elevation is key

Motile Fauna

Seines:

deployed at high tide (in pairs)
retrieved at low tide

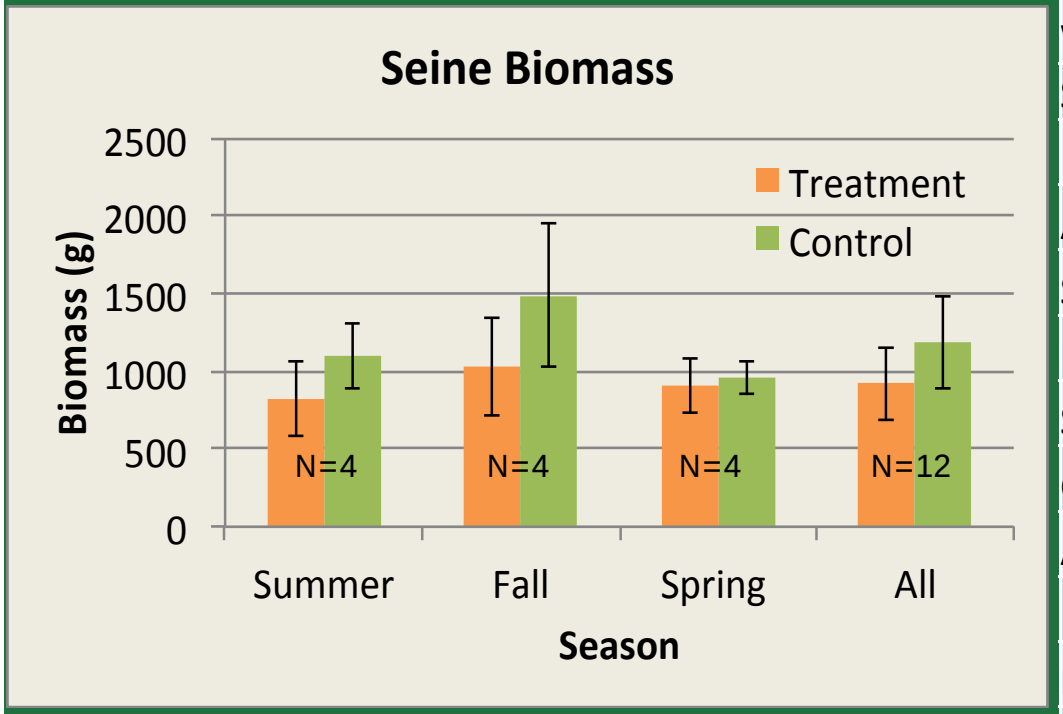
Minnow pots:

deployed at low tide (10 per trt/ctrl)
retrieved at low tide 24 hrs later

Seine Catch Data

Control: 20 species

Treatment: 17 species



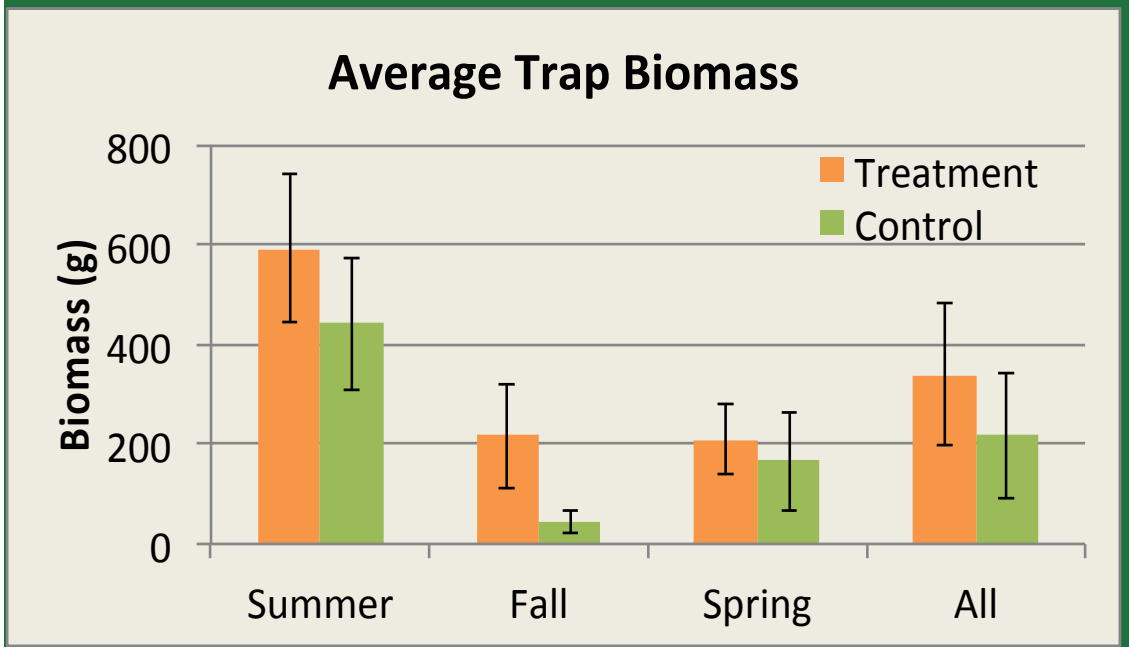
Species	Control	Treatment
Grass Shrimp	1482	2080
Blue Crab	746	577
Bay Anchovy	323	39
Mummichog	235	245
White Perch	93	55
Silverside	51	39
Weakfish	16	15
Striped bass	14	8
Black drum	12	6
Windowpane flounder	12	
Silver Perch	9	26
Hogchoker	5	
American Eel	3	2
Spot	2	1
Unidentified	2	1
Summer Flounder	2	5
Common Carp	2	
Atlantic Menhaden	1	8
Naked Gobi	1	
Diamondback terrapin	1	1
Toadfish		1

Minnow Pot Catch Data

Control: 8 species

Treatment: 9 species

Minnow Pot Species	Control	Treatment
Grass Shrimp	749	771
Mummichog	558	1592
American Eel	29	22
Blue Crab	13	10
Atlantic Menhaden	2	
White Perch	1	10
Spotfin Mojarra	1	2
Striped Bass	1	
Silver Perch		6
Diamondback Terrapin		1
Bay Anchovy		1



DELSI Summary

- Biologs provide a novel tactic for Delaware Bay
- Trap sediments well
- Grass and mussel plantings survive
- Faunal use is similar to natural marsh

Next Steps

- Continue monitoring and assessment
- Develop mussel gardening
- Evaluate site potential throughout Delaware Bay
- Pursue new installations

Practitioner's Guide available


September 2011 (after hurricane)
PARTNERSHIP FOR THE
DELAWARE ESTUARY, INC

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A DuPont Delaware Estuary Initiative

The Nature Conservancy
Protecting nature. Preserving life.™

American Littoral Society
Coastal Conservation

Sea Grant
NJ Sea Grant Consortium

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Department of the Interior

Alternative mussel seeding methods