Assessing impacts of shellfish aquaculture on eelgrass (*Zostera marina*) populations in Eastern Long Island Sound.

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98th Annual Meeting of the
National Shellfisheries Association
March 27, 2006

Zostera marina in Long Island Sound

Historical Abundance

Pre-1930 common

~1931 99% died

Ecological Function

foraging

refuge

nursery

Image from Tiner, R., H. Bergquist, T. Halavik, and A. MacLachlan. 2003. Eelgrass Survey for Eastern Long Island Sound, Connecticut and New York. U.S. Fish and Wildlife Service, National Wetlands Inventory Program, Northeast Region, Hadley, MA. National Wetlands Inventory report. 14 pp. plus Appendices.

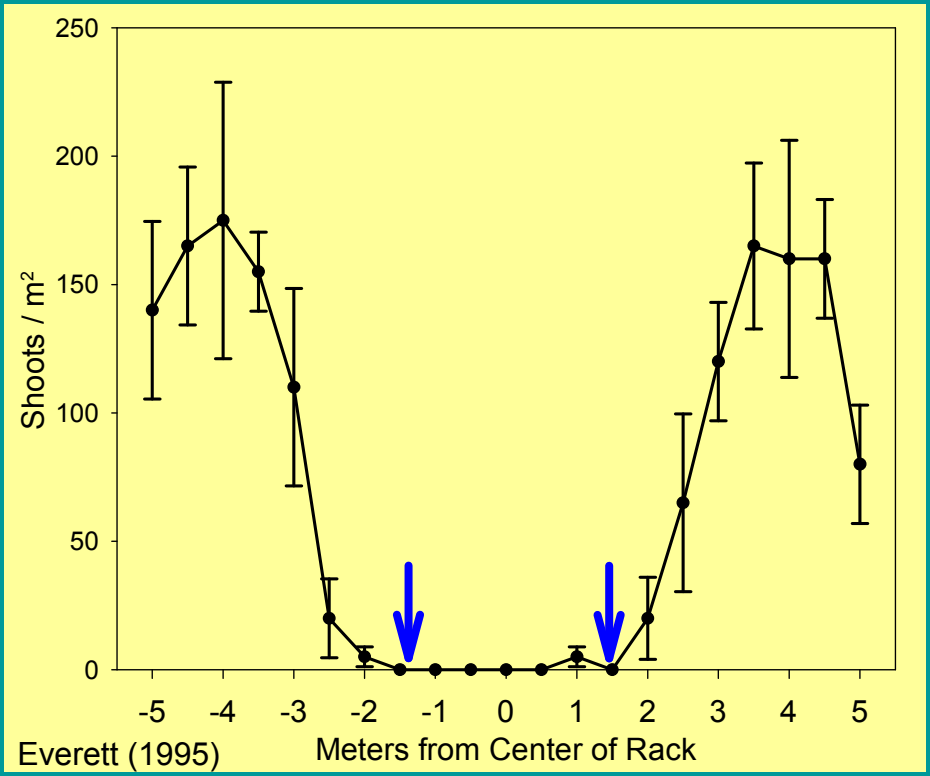
Typical Gear Deployment Techniques

Aquaculture in Connecticut

bottom cage with oysters (lid removed)

photo courtesy of Tessa Getchis

Conflicting Evidence



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Pregnall (1993) Thesis, Bard College. Regrowth and recruitment of eelgrass (Zostera marina) and recovery of benthic community structure in areas disturbed by commercial oyster(…).

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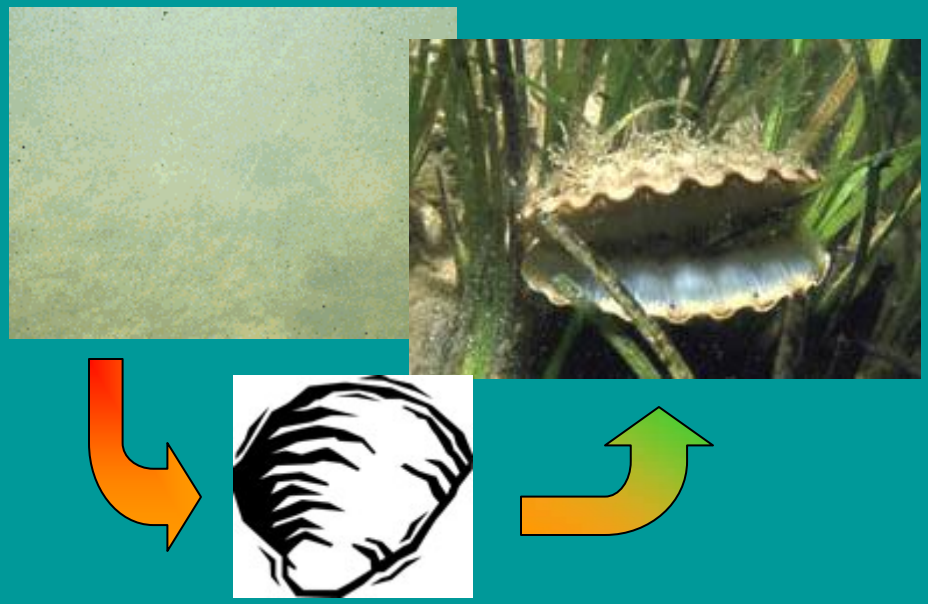

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Peterson and Heck (2001) Mar. Ecol. Prog. Ser. 213: 143-155. Positive interactions between suspension-feeding bivalves and seagrass – a facultative mechanism.

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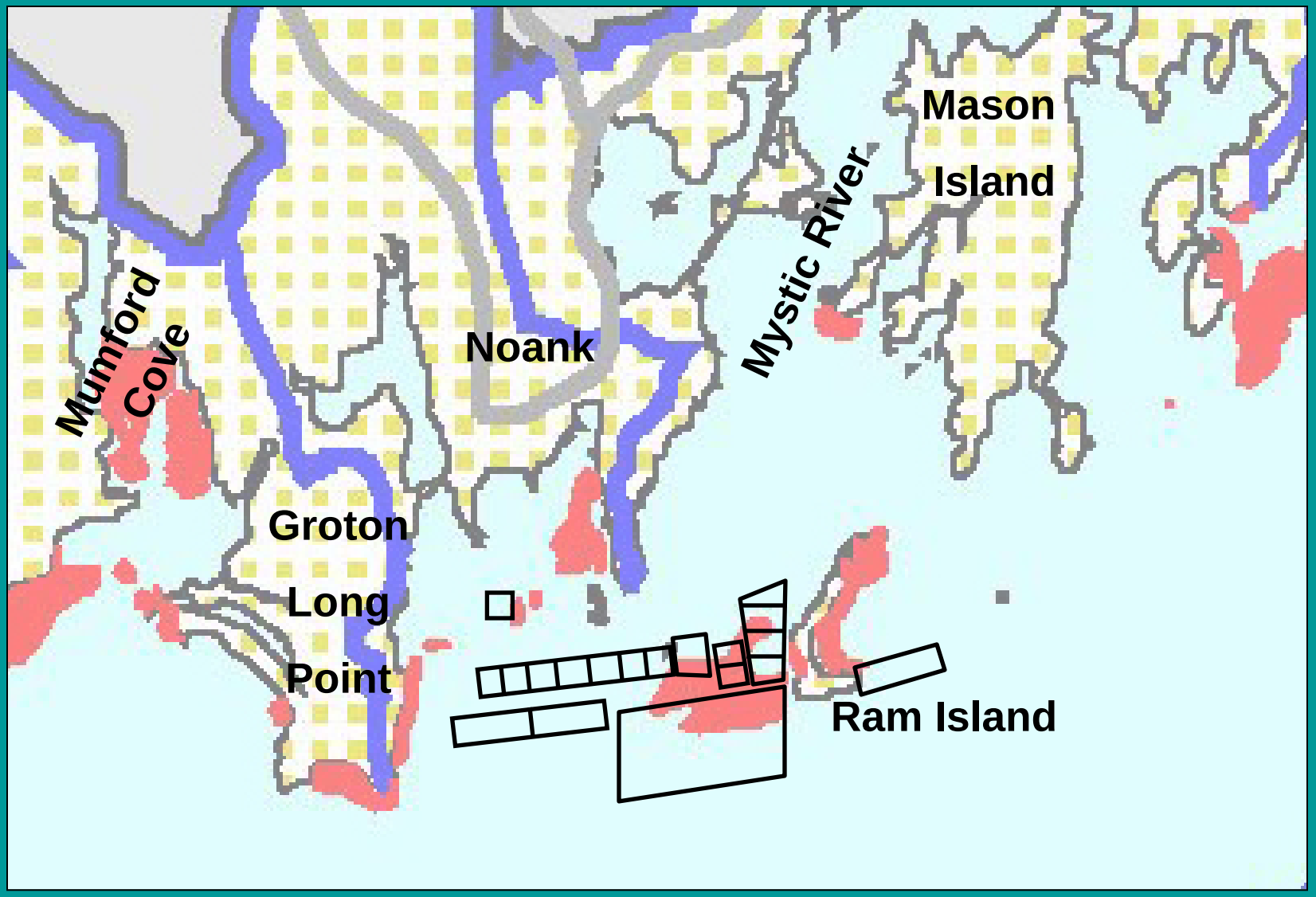
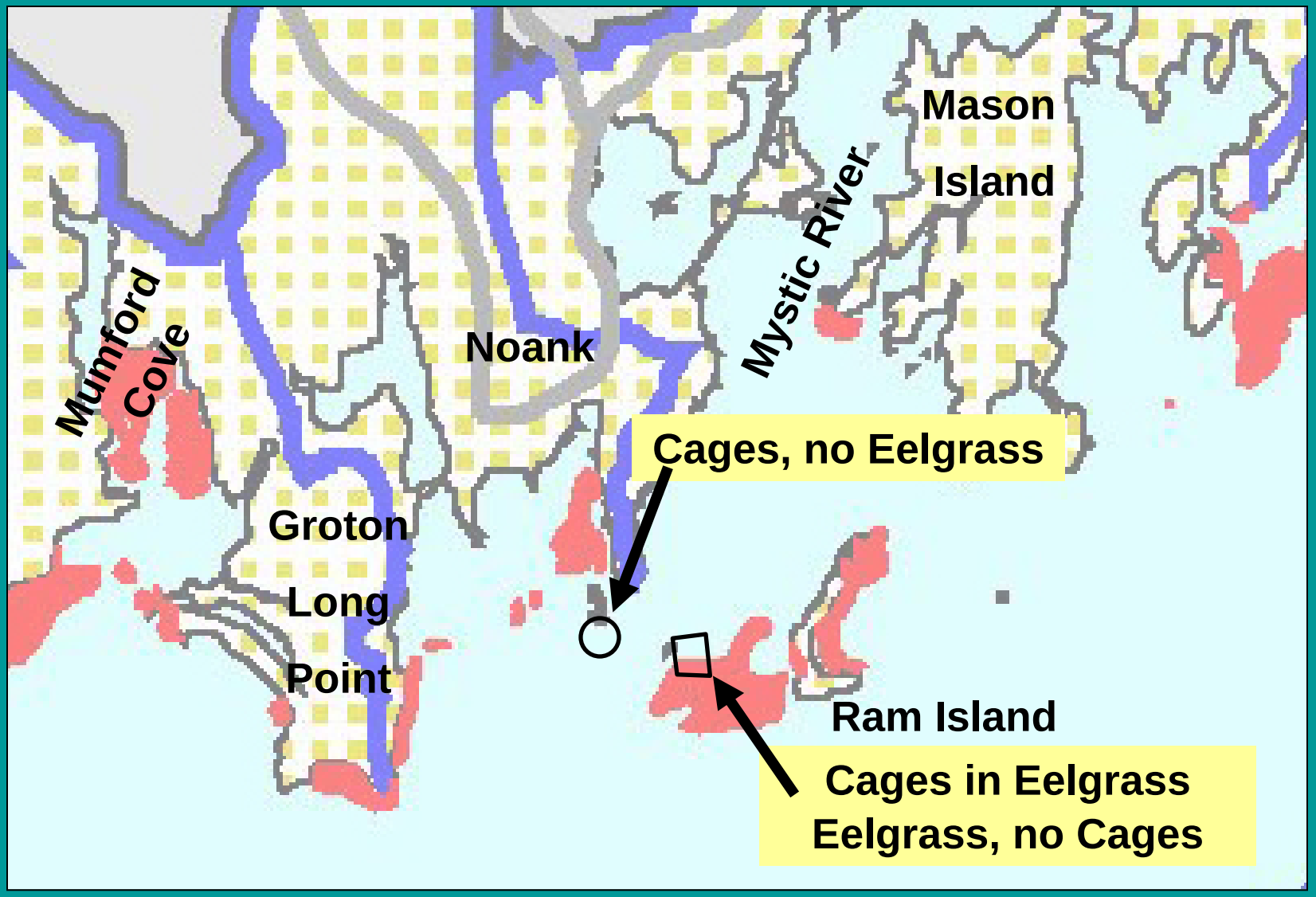
Competition For Space
Aquaculture vs. Eelgrass

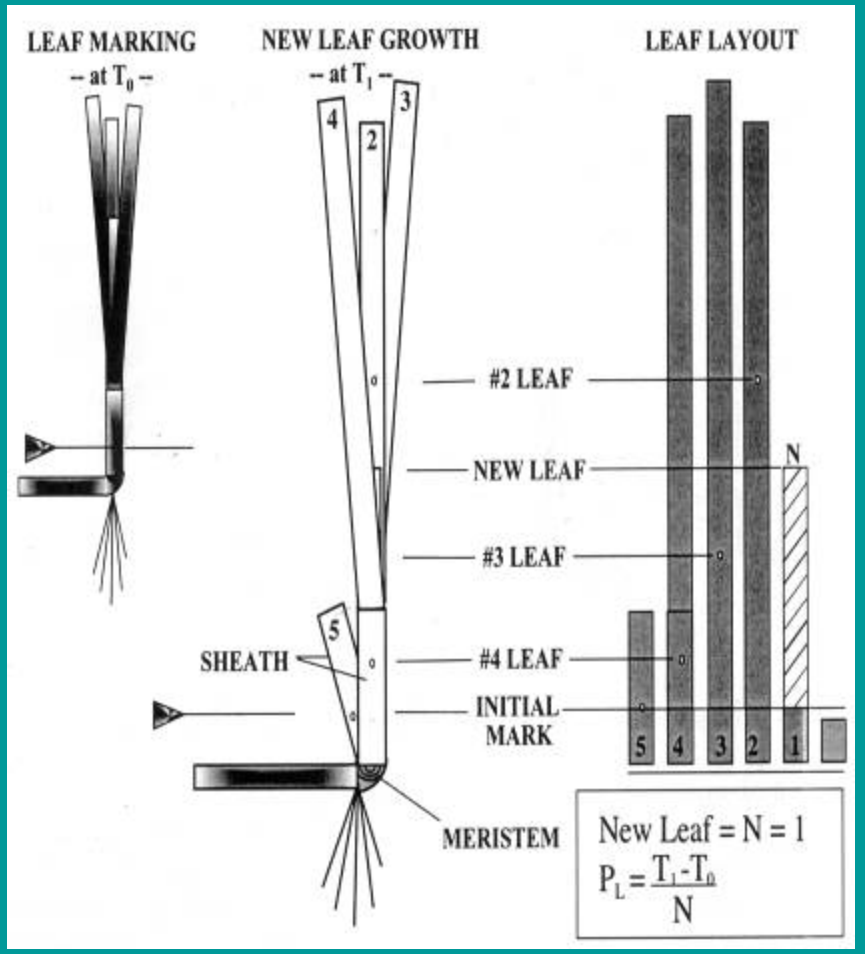


Experimental Set-Up



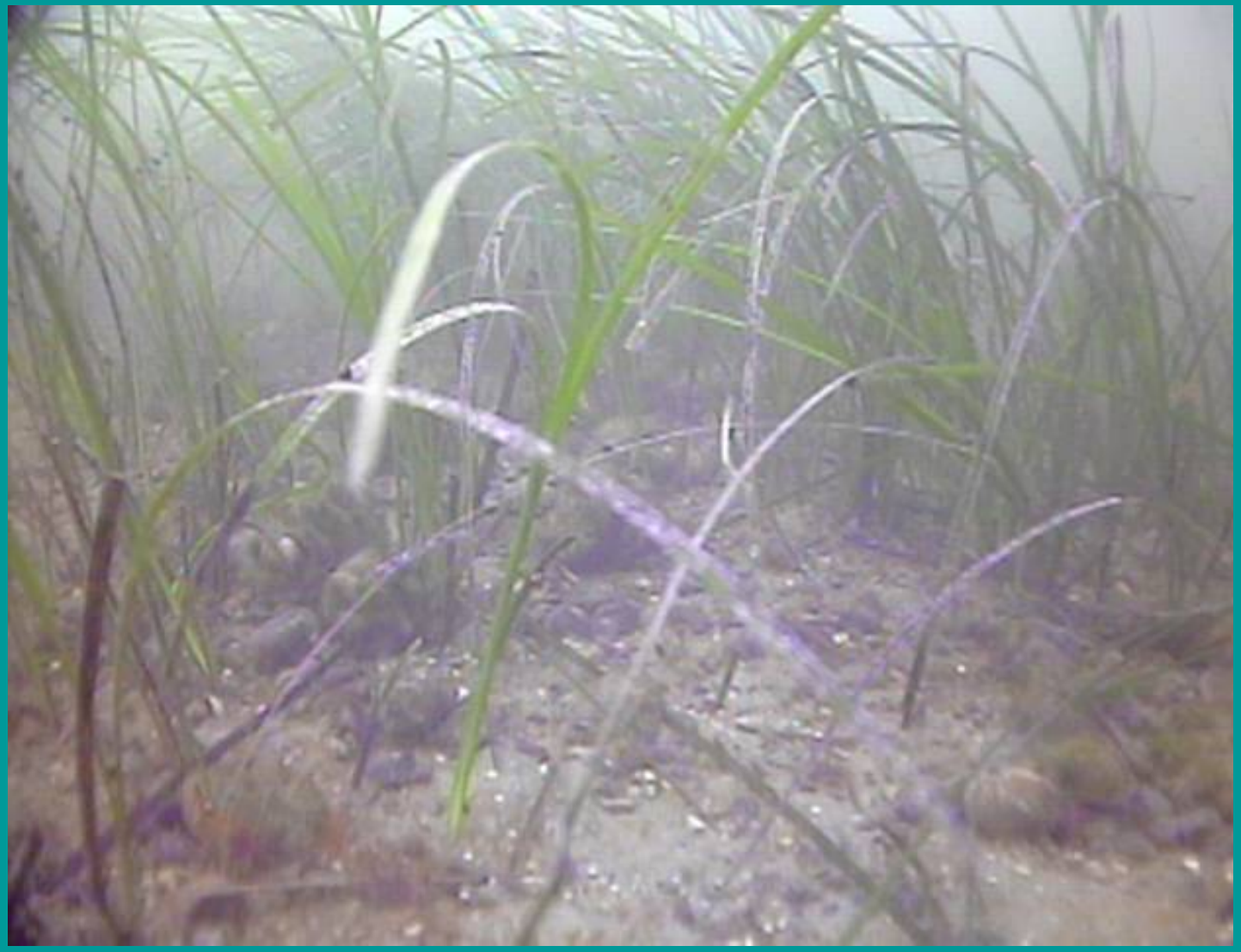
Direct Effects on Eelgrass Biomass and Growth

- dry weight biomass
- short shoot density
- canopy height
- sheath length
- plastochrone interval
- new leaf area



Short and Coles, eds. (2001) *Global Seagrass Research Methods*. Elsevier. 473p.

Typical Appearance of Eelgrass Area

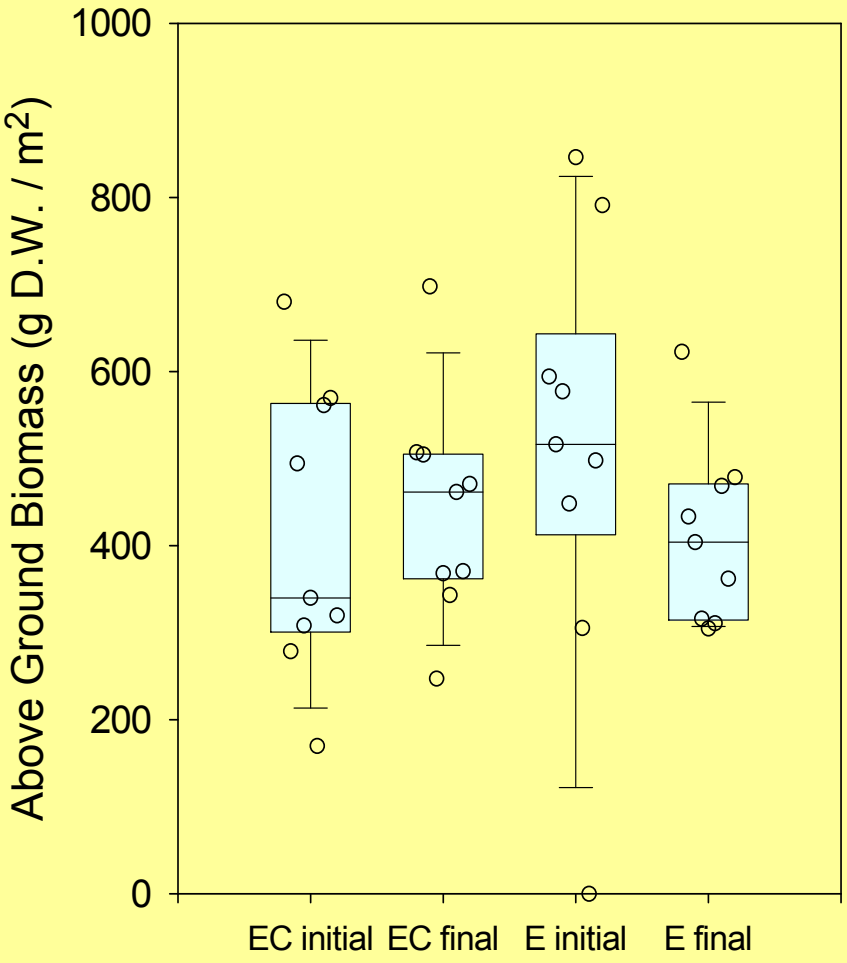


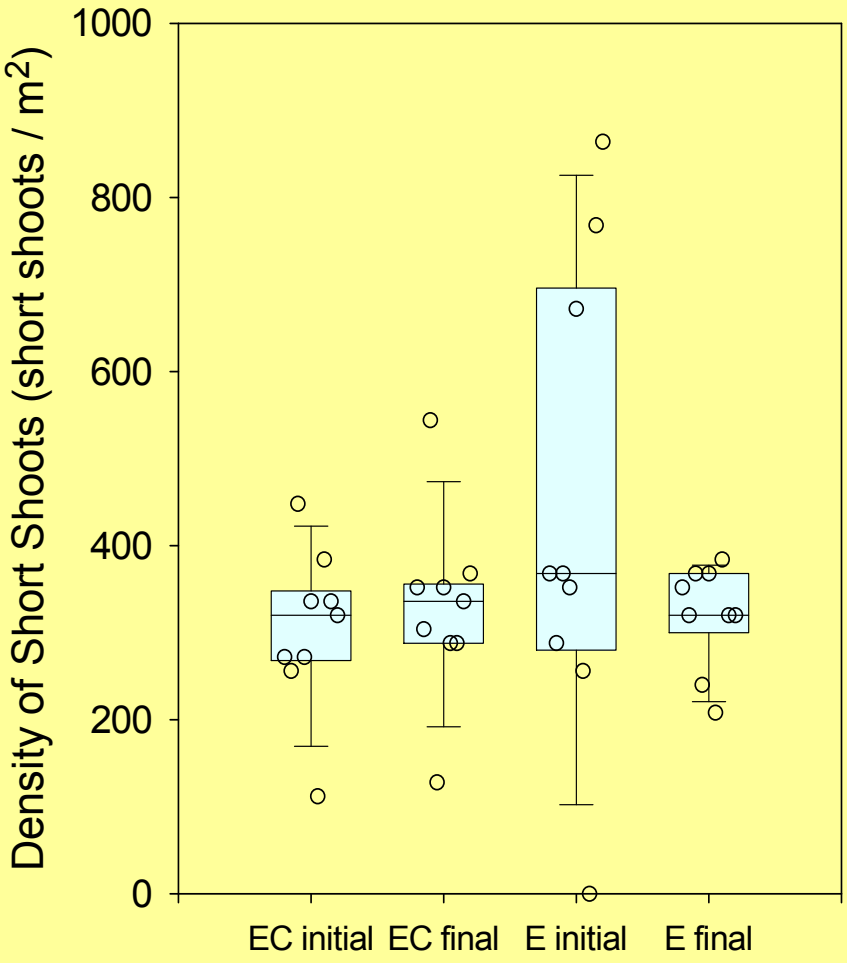
Lots of algae on the cages!

No Significant Difference

initial to final -and- EC to E

nested ANOVA – time nested in treatment





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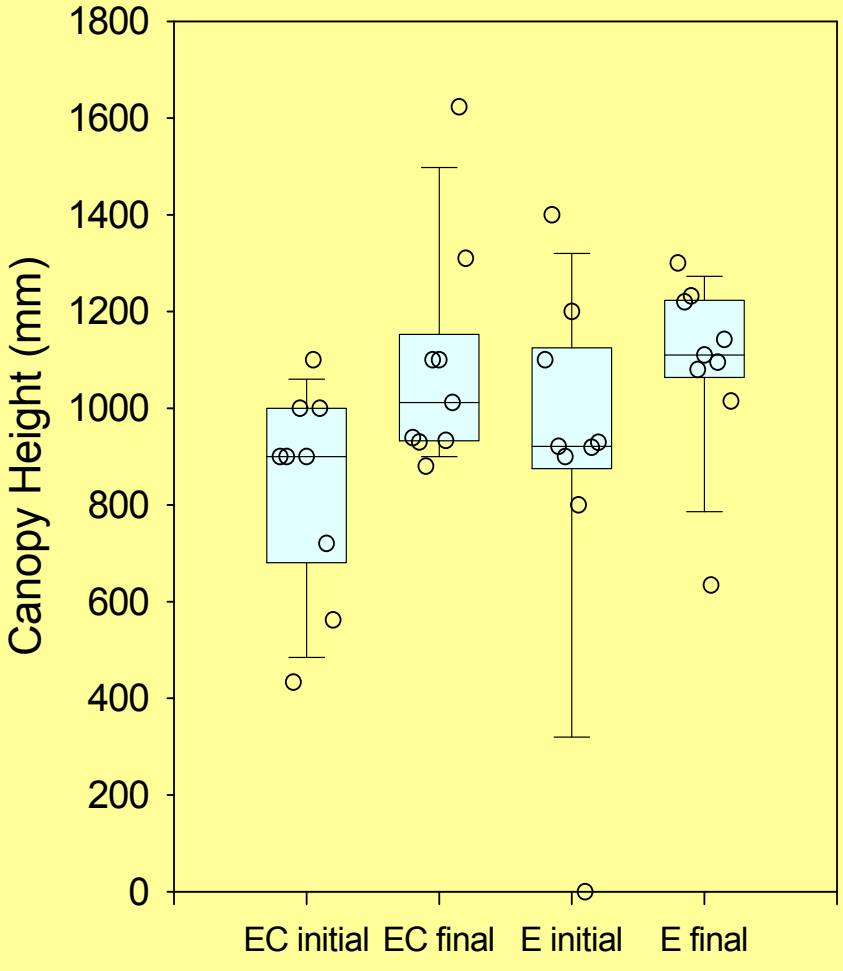
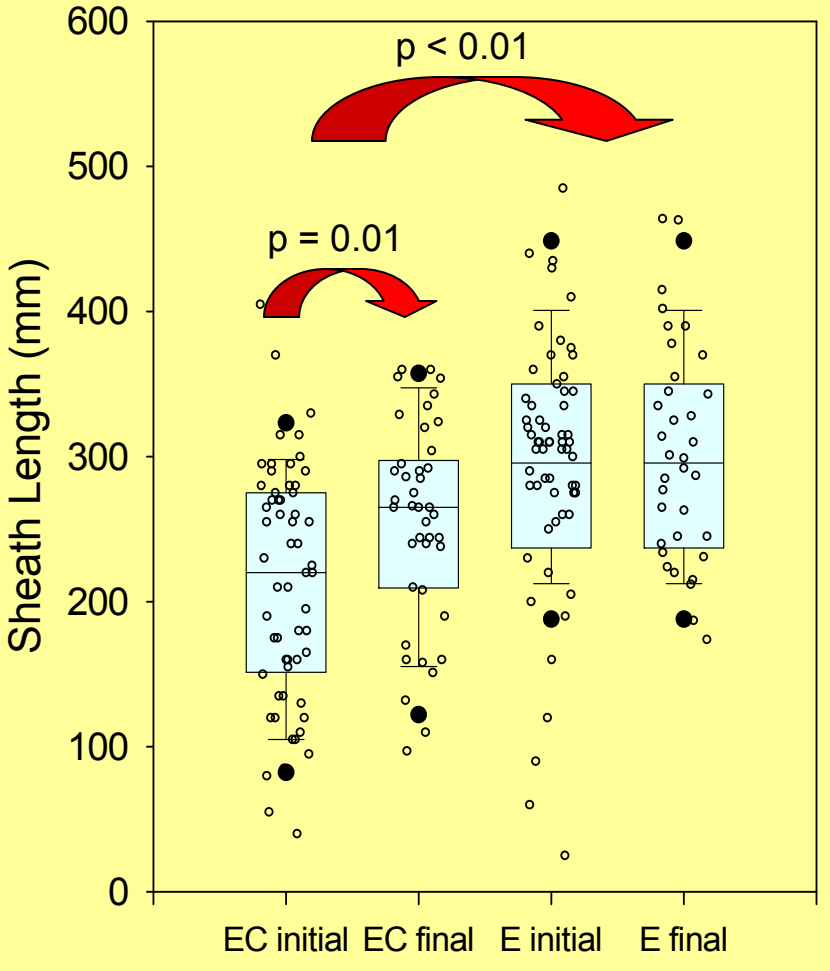


Significant Difference

EC initial to EC final -and- EC to E

nested ANOVA – time nested in treatment



Indirect Effects on Eelgrass

- Water Column
  - Dissolved oxygen
  - Chlorophyll (phytoplankton)
  - Turbidity
- Sediment
  - Benthic Microalgae
  - Sediment % Organics

Conclusions from the Pilot Study

- Indirect effects hard to detect.
  - Possibly negated by dilution?
- Growth possibly effected.
  - Sheath length a good indicator.
- Biomass – need many samples.
  - Not a good indicator.

Future Plans

- ✓ Monitor recovery in the cage footprint.
  - sediment % organics and benthic microalgae
- ✓ Verify eelgrass growth results (sheath length) and look for a cause.
  - tissue nutrients (CHN), sediment pore-water nutrients, light extinction coefficients
- ✓ Better characterize the eelgrass density.
  - video monitoring

List of references available – just ask!

Acknowledgements

Tessa Getchis, CT Sea Grant

Jim Markow and the crew at Aeros Cultured Oyster

Robert Britton, volunteer research technician

Jeff Godfrey, Diving Safety Officer, UCONN

Turner Cabaniss, Director of Marine Operations, UCONN

Field Assistance

Alan Banister, Pine Point School
Dave Cohen, UConn
Chris Cooper, JMS
Hélène Hégaret, UConn
Bridget Holohan, UConn
Adam Houk, UConn

Comments and Advice

Jim Kremer, UConn
Alison Branco, UConn
Steve Granger, URI
Lora Harris, URI
Fred Short, UNH
David Carey, CT DA/BA
Mark Johnson, DEP Marine Fisheries

Funding and Support

National Sea Grant College Program, National Marine Aquaculture Initiative
Connecticut Sea Grant
Department of Marine Sciences, University of Connecticut