Juvenile Bay Scallop (Argopecten irradians irradians) Habitat Preferences

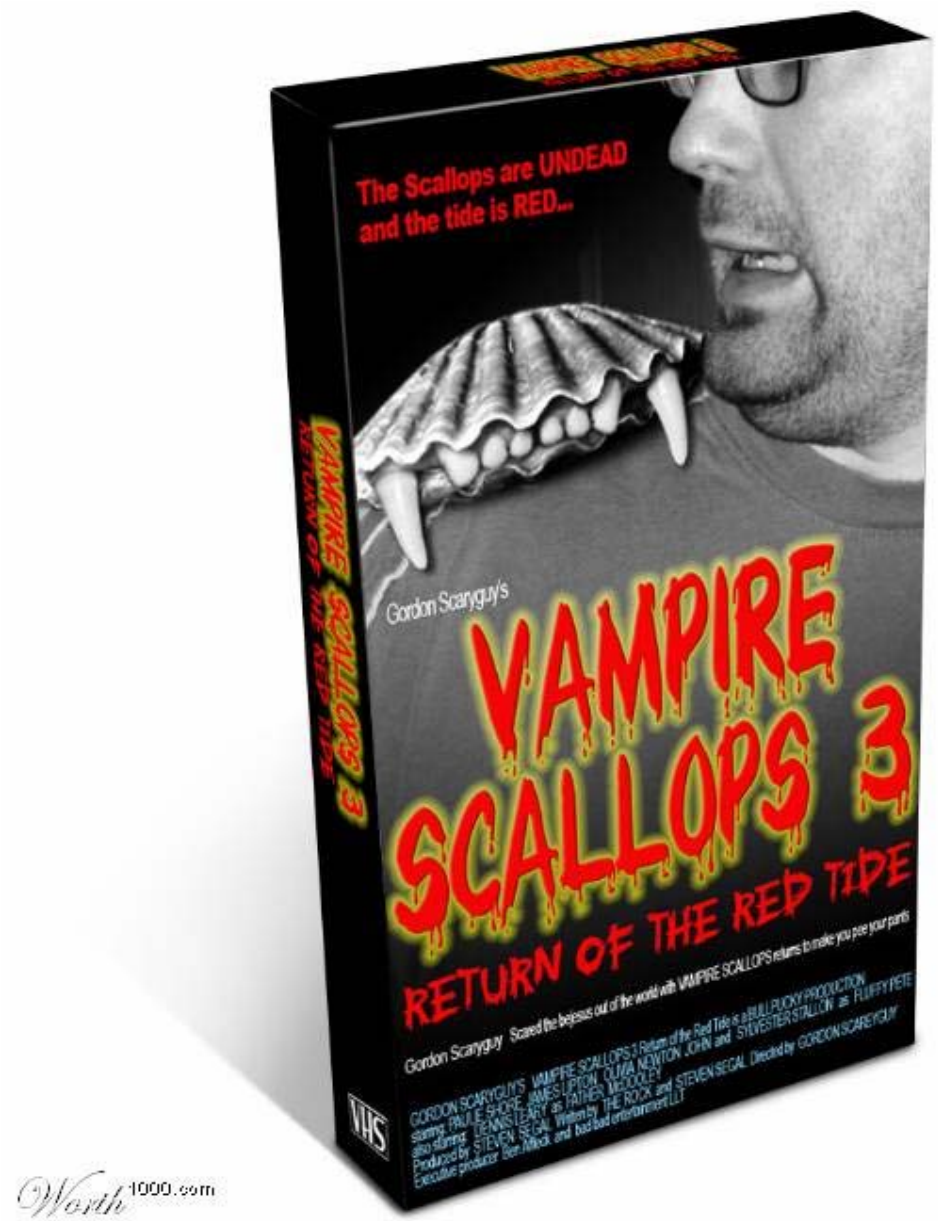
Marnita Chintala, Elizabeth Hinchey, Timothy Gleason, and Walter Berry

National Health and Environmental Effects Research Laboratory

Atlantic Ecology Division

Narragansett, RI

April 12, 2005




EPA Research Goal:
Develop Methods for Predicting Biological Effects of Habitat Alteration
How do populations of fish, shellfish, and aquatic dependent wildlife respond to habitat alteration?

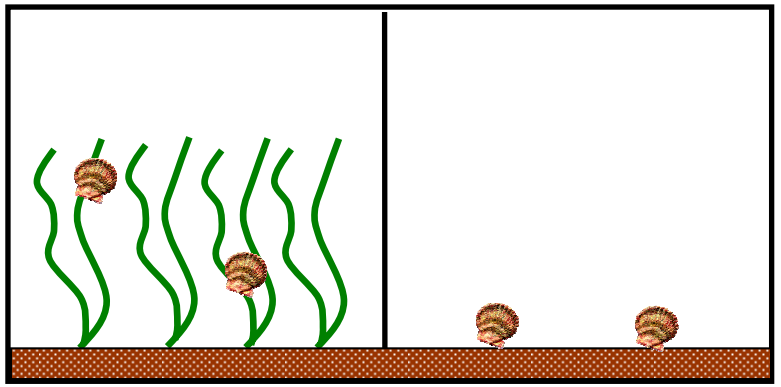
Why examine how changes in habitat affect populations of bay scallops?

- Bay scallops are a high priority species
- Estuarine wetlands are priority ecosystems
- Scallop dependence on submerged aquatic vegetation (SAV) is well demonstrated
- In order to model scallop habitat relationships, we must be able to assign "values" to habitat types

Laboratory experiments

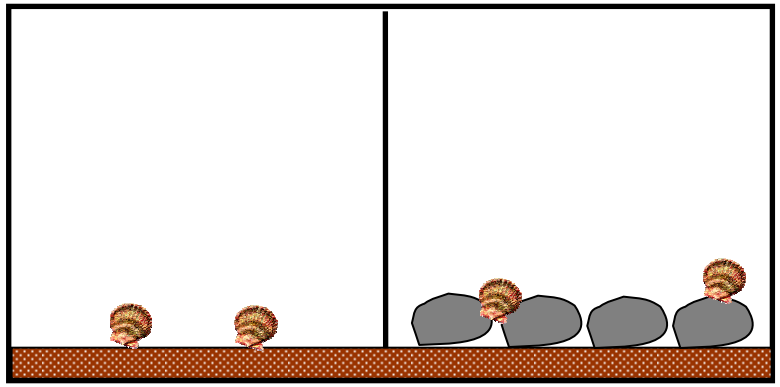
Which habitats do scallops prefer?

- eelgrass
- cobble
- macroalgae
- bare sand



Paired habitats:

- eelgrass + sand
- cobble + sand
- macroalgae + sand

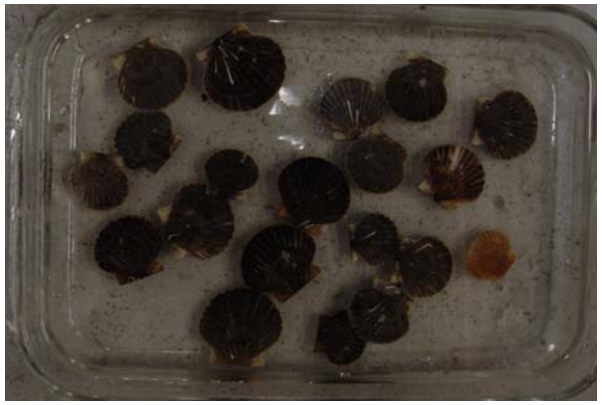


Methods

Experiment Series 1:

- 5 experiments
- Scallop sizes ranged from 6 to 16 mm

Experiment Series 2:



- 3 experiments
- Scallop sizes ranged from 28 to 50 mm

Methods

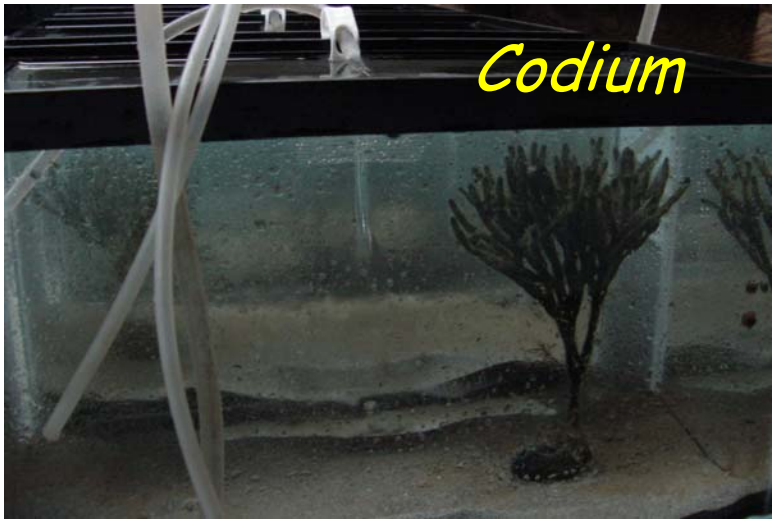
Experiment Series 1:

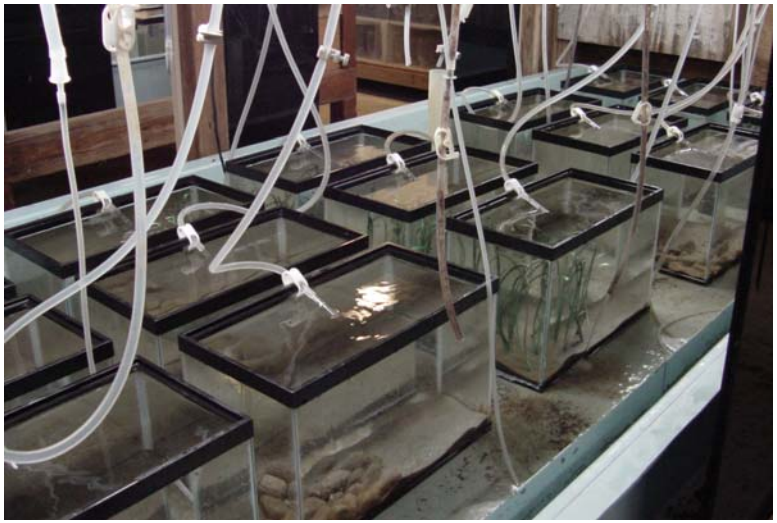
- 5 replicate 5 gal tanks; 10 scallops per tank
- Treatments were sand + eelgrass, sand + *Codium*, and sand + cobble
- Scallops placed between habitats

Experiment Series 2:

- 2 replicate 40 gal tanks; 20 scallops per tank
- Treatments were sand + eelgrass, sand + *Codium*, and sand + cobble
- Scallops placed between habitats

Methods

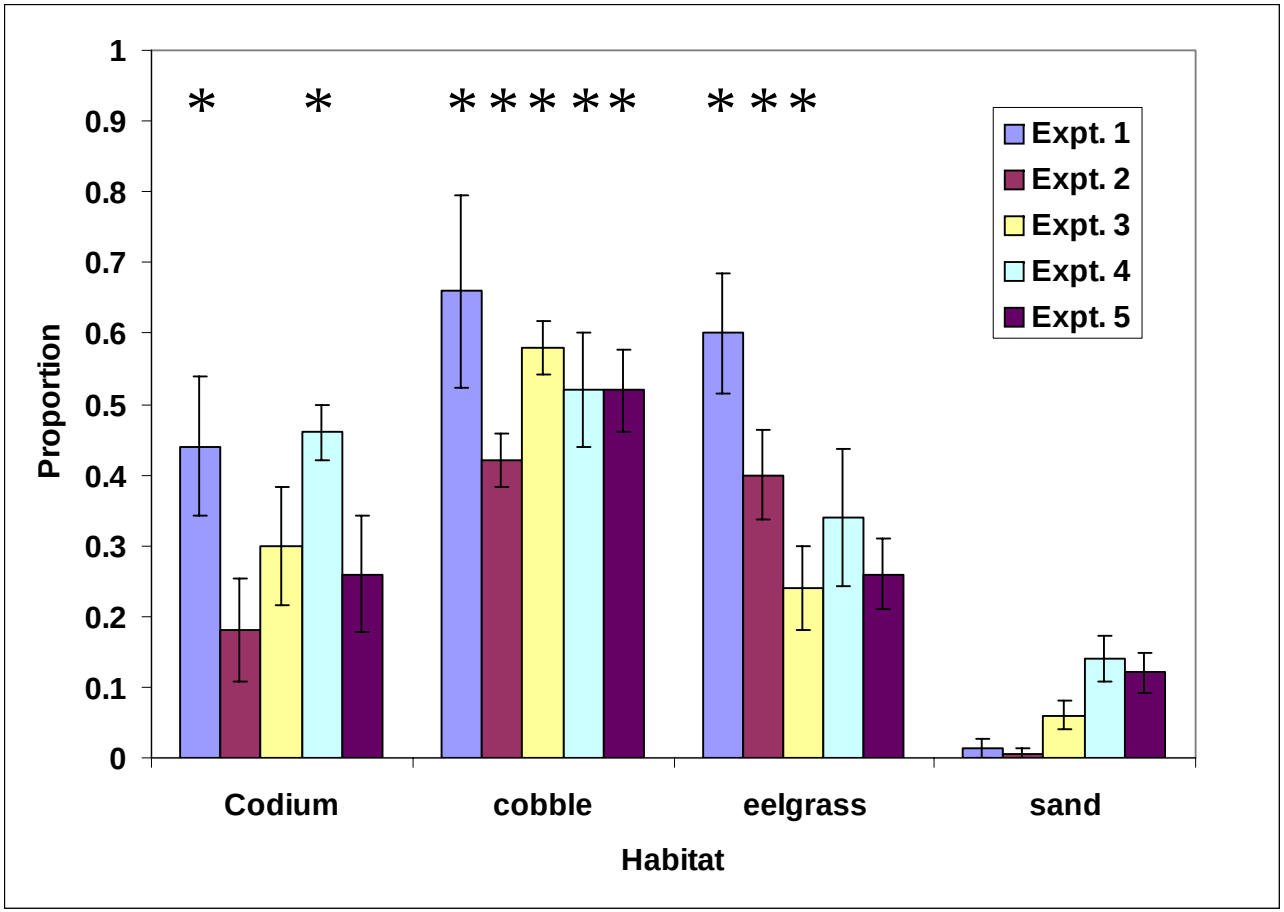




Methods

Scallops Within Habitats

Experiment Series 1: Scallops < 15 mm shell length



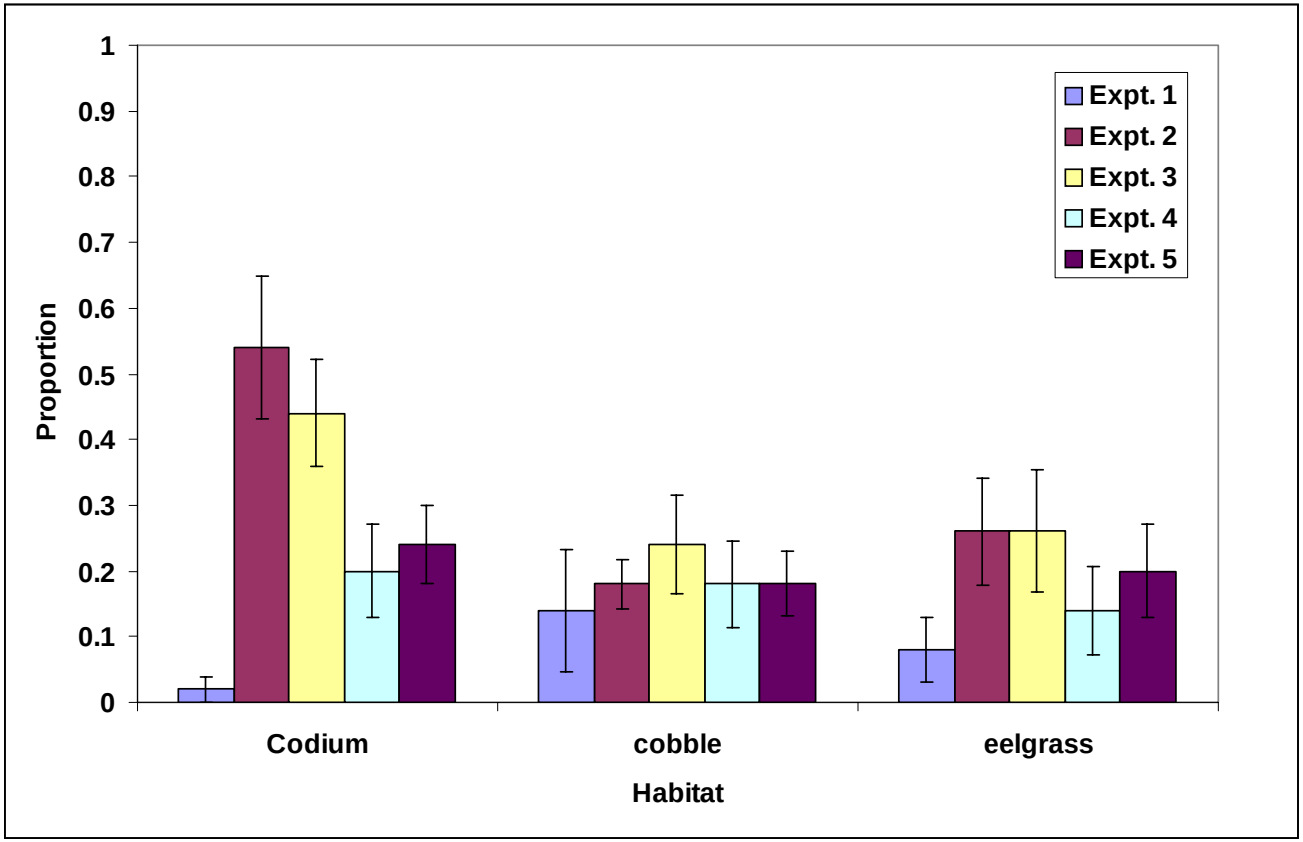
- Significant Experiment effect ($p = 0.003$)
- Significant Treatment effect ($p = 0.0001$)
- cobble separated from eelgrass and *Codium*
- Significant differences between cobble and sand, eelgrass and sand, and *Codium* and sand (*)

Scallops Within Habitats:

Scallops at 6 h

Scallops In Flow Area

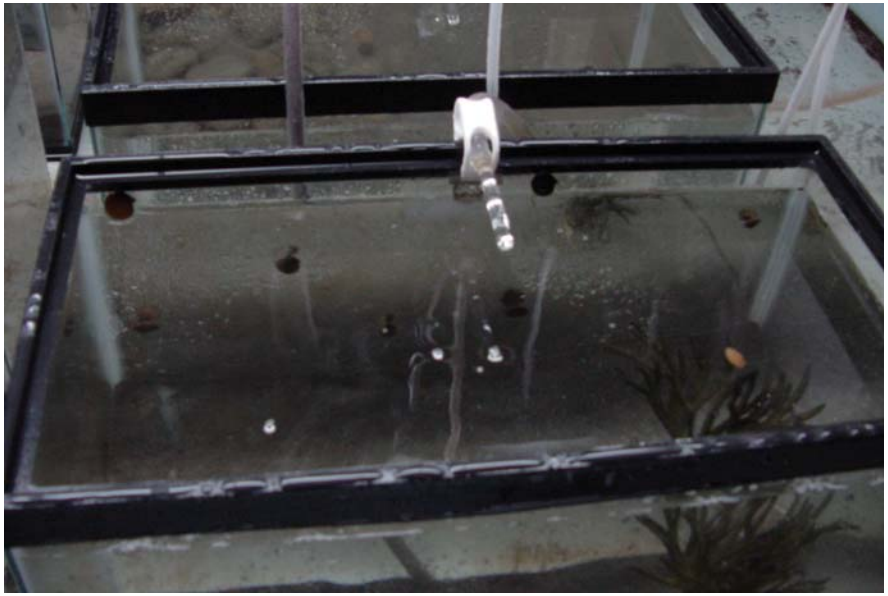
Experiment Series 1: Scallops < 15 mm shell length



- Significant Experiment effect ($p = 0.0005$)
- Significant Treatment effect ($p = 0.05$)
- *Codium* separated from cobble and eelgrass

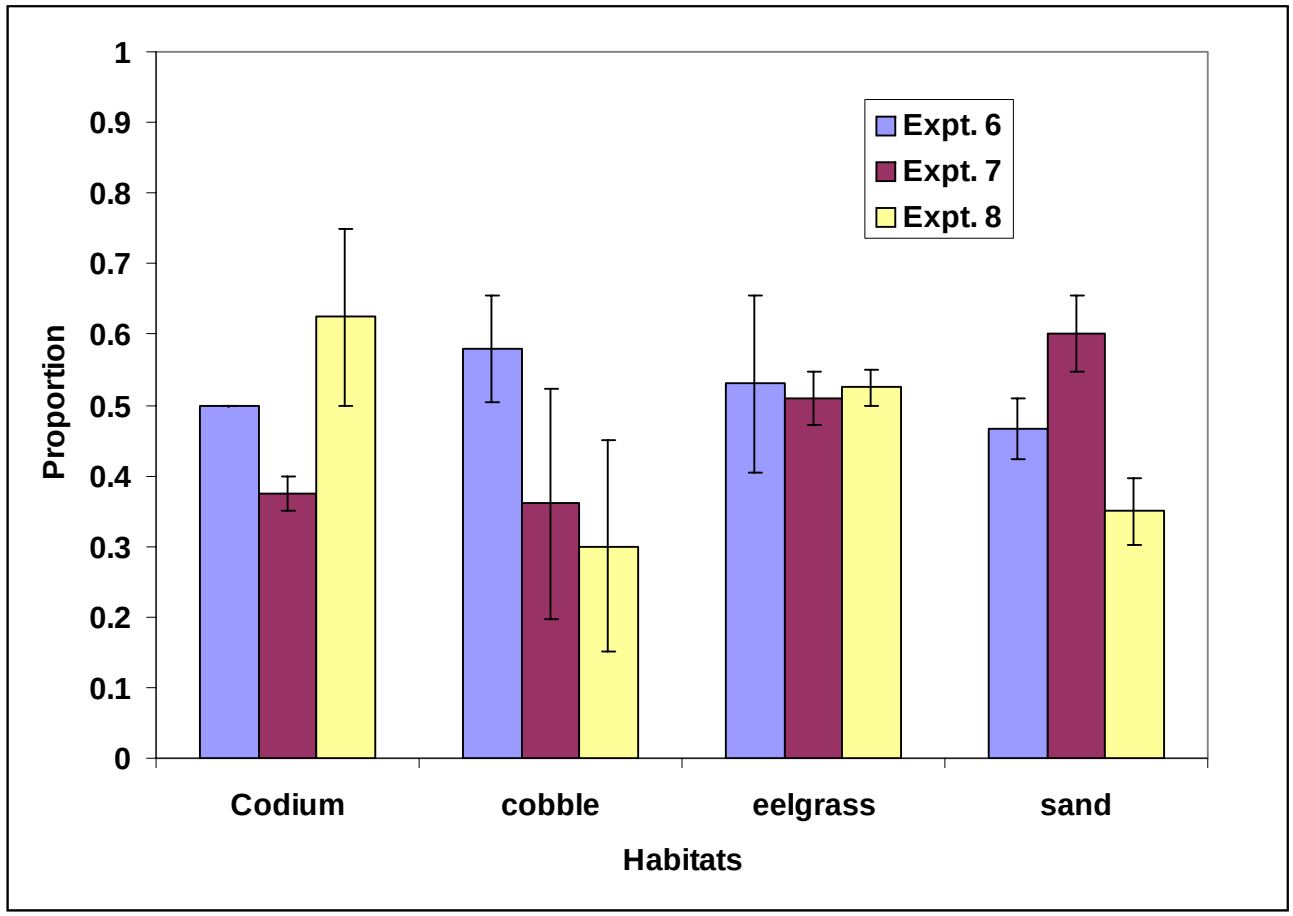
Scallops In Flow Area:

Scallops at 24 h



Scallops Within Habitats

Experiment Series 2: Scallops > 25 mm shell length



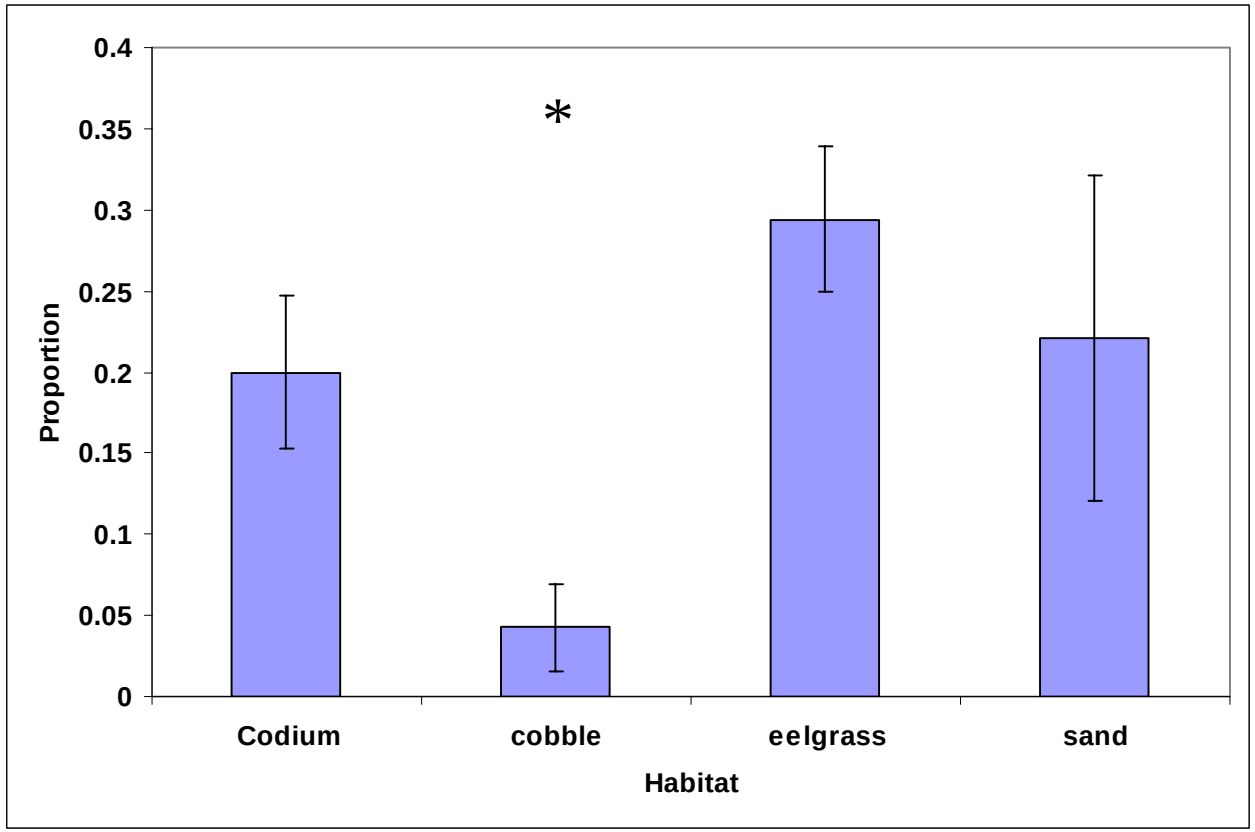
- No significant Experiment effect ($p = 0.41$)
- No significant Treatment effect ($p = 0.43$)
- No significant differences between sand and other habitats

Scallops Within Habitats:

Scallops at 24 h

Scallops Buried in Sand

Experiment Series 2: Scallops > 25 mm shell length



- No significant Experiment effect (p = 0.53)
- Significant Treatment effect (p = 0.025)
- Significant difference between cobble and sand

Scallops Buried in Sand:

Scallops at 24 h

Summary

- Small scallops (< 15 mm) prefer structured habitat over sand.
- Small scallops prefer flow areas 30-40% of the time.
- Larger scallops (> 25 mm) do not prefer structured habitat over sand.
- Larger scallops prefer to bury about 25% of the time.

Future laboratory experiments

- Predation:

  Scallop habitat choice and survival as a function of habitat type (eelgrass, bare sand, cobble, macroalgae)


@Save the Bay


www.savefish.com


www.dive-rite.com


InfoZone at Museum Victoria

Applications of Research

- Use data in three models:
  - Habitat Suitability Index
  - Demographic Population Model
  - Systems Model
- Combine models with habitat mapping techniques

Acknowledgments

U.S. EPA Atlantic Ecology Division
Heather Burnell
Denise Champlin
Bill Miner
Jonathan Serbst
Roger Williams University
Karin Tammi
Carma Gilcrist
Martha's Vineyard
Dave Grunden