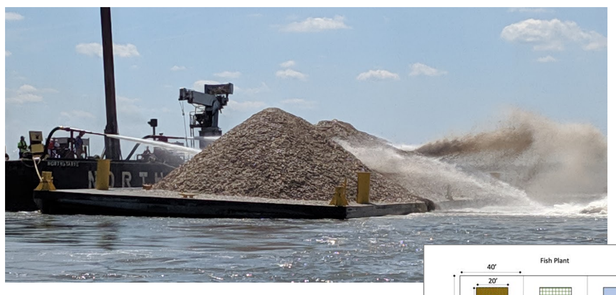
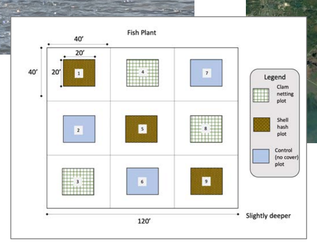
Shell Hash Cover as a Deterrent of Ray Predation on Hard Clam Farms

Daphne Munroe, Jason Morson, Tom Grothues, Dale Parsons

Summary

Environmental change has presented new challenges for hard clam farmers, while a growing demand for limited shellfish leases creates a pressing need to use idle farm leases. The objective of this project was to use farm-scale, collaborative experiments to assess shell hash as a deterrent of ray predation. If successful, this strategy would support methods to use hundreds of idle New Jersey deep-water leases, while reducing labor costs. It will also provide background information about potential increases in natural clam recruitment at sites planted with shell.





Objectives

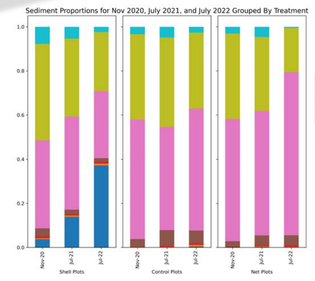
This project tested if shell cover protects farmed clam seed from cownose ray predation. The questions addressed answer were:

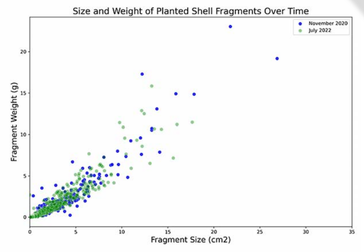
- How does habitat quality of planted shell change over time?
- Does clam seed survival increase when shell is applied to the sediment surface, relative to unprotected and screened clam seed?
- Does clam growth change when planted beneath shell?
- Do cownose or bullnose rays avoid feeding on plots covered with shell?

Methods

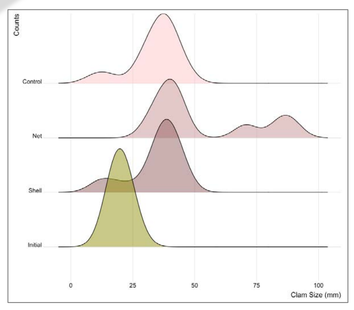
- Experiment was set up at a 5 acre shellfish lease at Cape Horn in Great Bay.
- Three replicate treatments (control, netting and shell hash) were applied randomly to 9 plots.
- Hard clam seed (20mm size, 10 clams/ft^2) was planted at each treatment plot.
- Clams, planted shell and sediments were sampled using cores or hydraulic sampling four times through the duration of the 2 year experiment.
- Lotek hydrophones were placed at the corners of the experiment, and a control area.
  - One bullnose and one cownose ray were surgically tagged and tracked within and around the experiment site using the hydrophone array.

Results

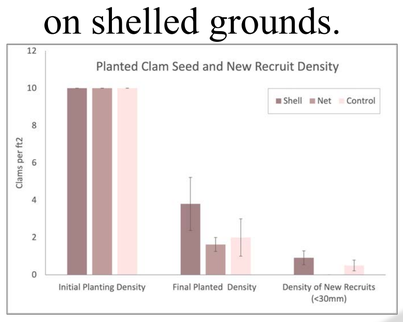




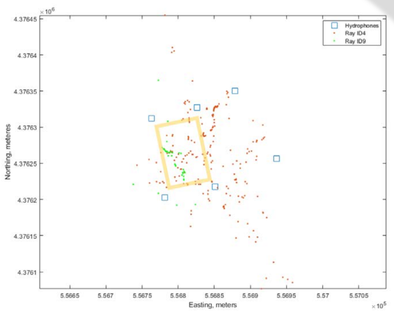
- Sediment grain size increased over time at shell plant plots.
- Shell fragments remained in place and at the same size/weight throughout the experiment.



- Clam survival doubled under shell hash.
- Growth on all treatments was similar.
- Wild recruitment is higher on shelled grounds.



- Ray paths were detected in and beyond experimental plots (sub-meter resolution)
  - Data was insufficient for conclusion about foraging choice.



Funding Provided By:
National Institute of Food and Agriculture, U.S. Department of Agriculture, Northeast Sustainable Agriculture Research and Education program subaward number **ONE20-373**