

Aquaculture ~~and~~ as Conservation in the MidAtlantic

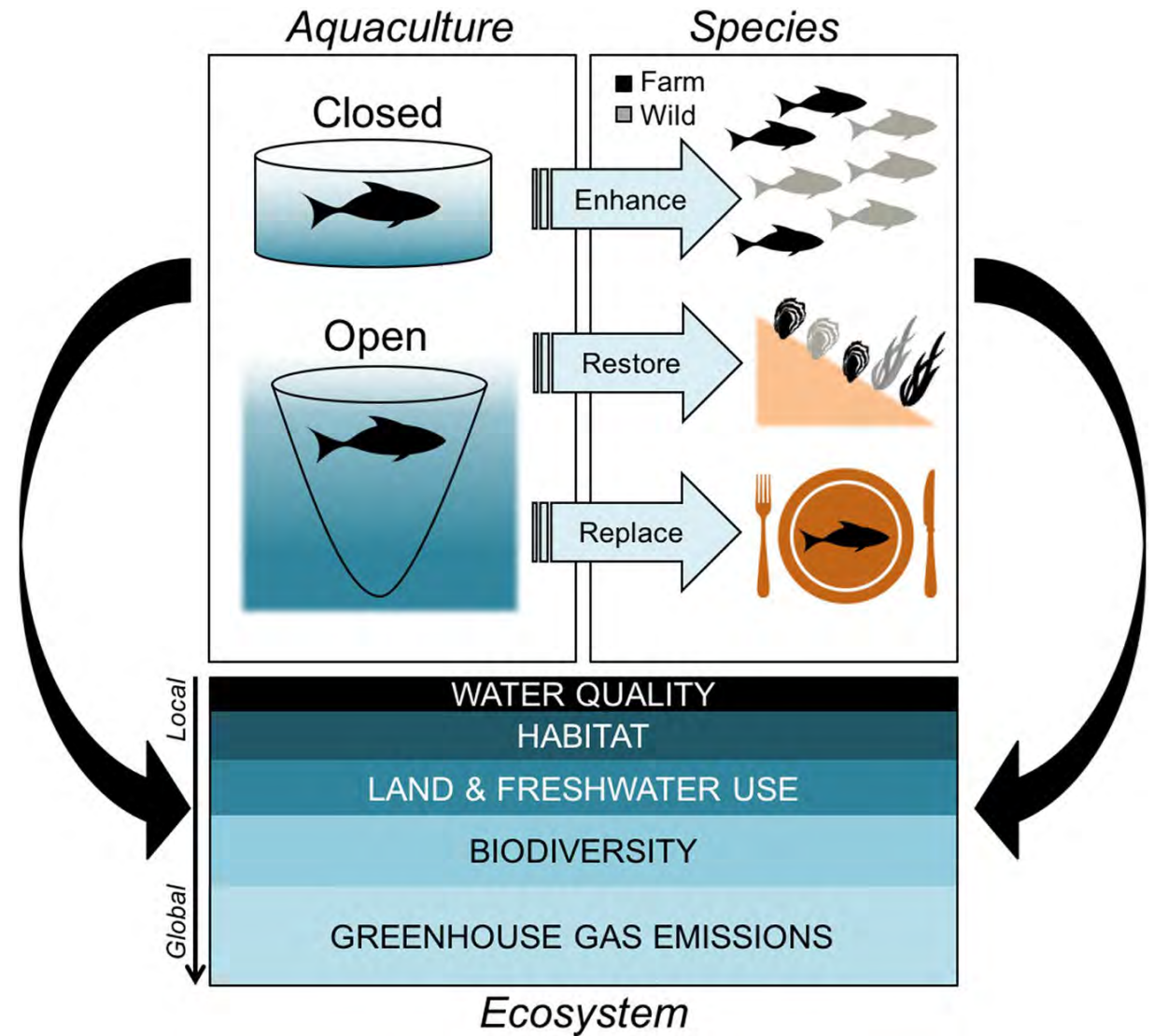
Daphne Munroe



New paradigm of 'Conservation Aquaculture'



Conservation Aquaculture:
the use of human cultivation of an aquatic organism for the planned management and protection of a natural resource



Ecosystem Services

Filtration & Water Quality

Habitat Provisioning

Wave Dampening & Shoreline Protection

Offshore Aquaculture

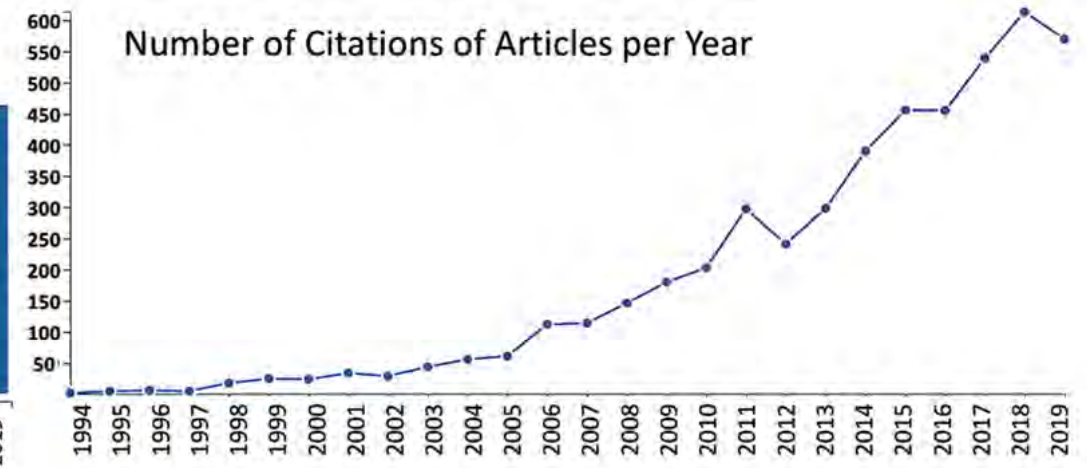
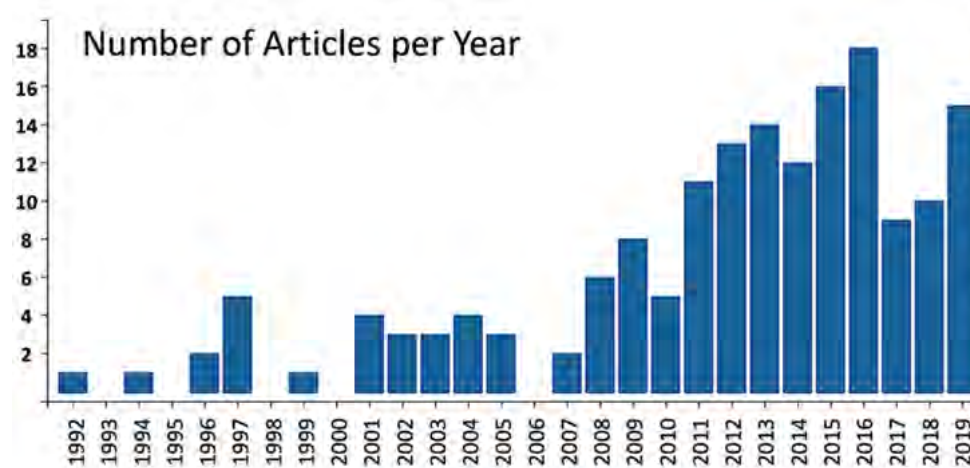
Wildlife & Endangered Species Interactions



Filtration & Water Quality



- Oyster filtration is highly variable
 - influenced by hydrodynamics, oyster size, temperature, salinity, and seston quantity and quality

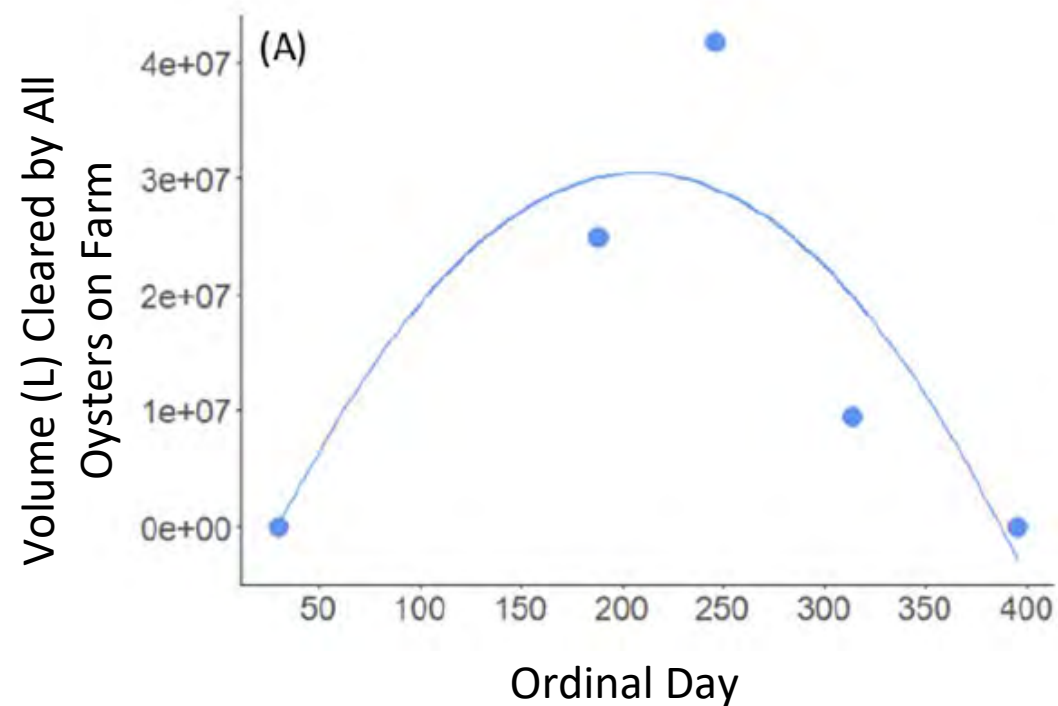


A Web of Science search of all articles containing the following terms: (shellfish or oyster) and (aquaculture) and (nutrient or nitrogen) and (TMDL or management or eutrophication or BMP) returned a total of 166 articles published between 1900 and 2019. The bar plot on the left shows the number of those articles published each year, and the figure on the right shows the number of times those 166 articles were cited each year.

Year-Round Farm-Scale Filtration at Oyster Farms



Janine Barr



- Quantifying Farm-Scale Ecosystem Services Provided by Eastern Oyster Aquaculture in the Northeast

Habitat Provisioning

Received: 11 December 2020 | Revised: 7 April 2021 | Accepted: 10 May 2021

DOI: 10.1111/raq.12584

REVIEW

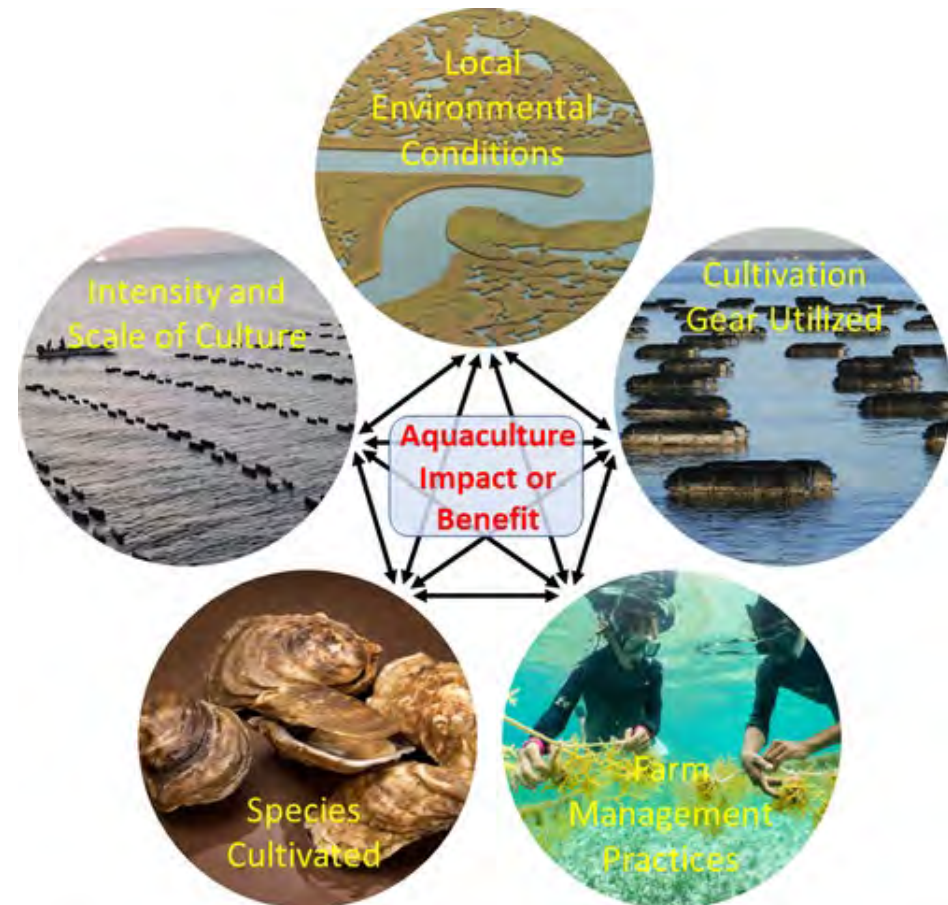
REVIEWS IN Aquaculture

Habitat value of bivalve shellfish and seaweed aquaculture for fish and invertebrates: Pathways, synthesis and next steps

Seth J. Theuerkauf¹ | Luke T. Barrett² | Heidi K. Alleway³ | Barry A. Costa-Pierce⁴ | Adam St. Gelais⁴ | Robert C. Jones¹



The direction (negative, neutral or positive) and magnitude of the impact of aquaculture on ecosystems is dependent on multiple interacting drivers.





**NOAA
FISHERIES**

- Northeast Fisheries Science Center

Documenting Fish Interactions with Oyster Aquaculture Cages

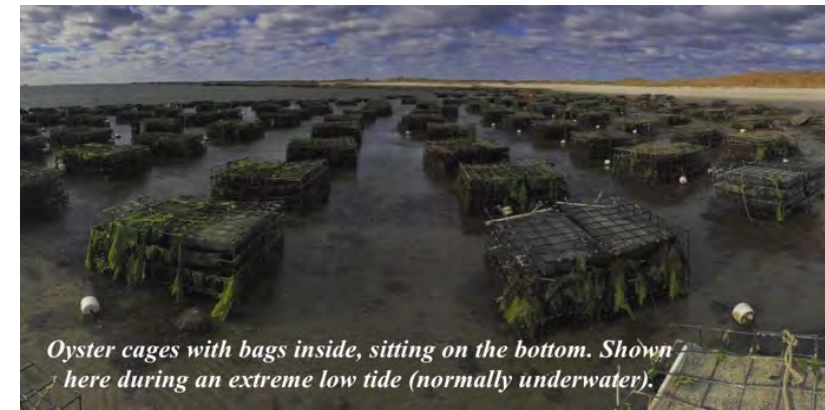
Julie M. Rose, Paul Clark, Renee Mercaldo-Allen, Gillian Phillips,

The screenshot shows the NOAA Fisheries website interface. At the top left is the NOAA Fisheries logo. To its right is a search bar labeled "Search NOAA Fisheries". Below the logo and search bar is a dark blue navigation bar with white text links: "Find a Species", "Fishing & Seafood", "Protecting Marine Life", "Environment", "Regions", "Resources", "Services", and "About Us". The main content area has a sub-header "AQUACULTURE" in blue. Below it is the project title "Milford Lab's GoPro Aquaculture Project" in large black font, followed by the subtitle "Understanding interactions between shellfish aquaculture gear and the environment" and the location "New England/Mid-Atlantic". On the left side of the page, there is a vertical stack of social media icons (Facebook, Twitter, LinkedIn, YouTube, and a plus sign for more). A red arrow points to the plus sign icon. To the right of the social media icons is a "Table of Contents" section with a vertical bar next to the "Overview" item, which is highlighted. The "Overview" section contains the "Project Goal" text: "To determine if oyster cages used in shellfish aquaculture provide habitat similar to that of naturally occurring rock reef environments and if cage densities associated with shellfish farming attract fish differently than single cages in low relief areas." Below the goal is the "Project Description" section. At the bottom right of the page, there is a blue circular icon with a white upward-pointing arrow.

Study site: Rose Cove
Little Egg Harbor Region of Barnegat Bay, NJ

Camera deployments collected continuous footage across tidal cycle during active farm operations from July-September 2018 & 2019

- Sampled habitats included:
- Floating bags
- Off-bottom cages
- Natural marsh edge
-



[J.P. Shinn, D.M. Munroe, J.M. Rose. 2021.](#) A fish's-eye-view: accessible tools to document shellfish farms as marine habitat in New Jersey, USA. *Aquacult Environ Interact*13: 295-300

[Video](#) showing various species of fishes and invertebrates interacting with oyster farm and natural structured habitats

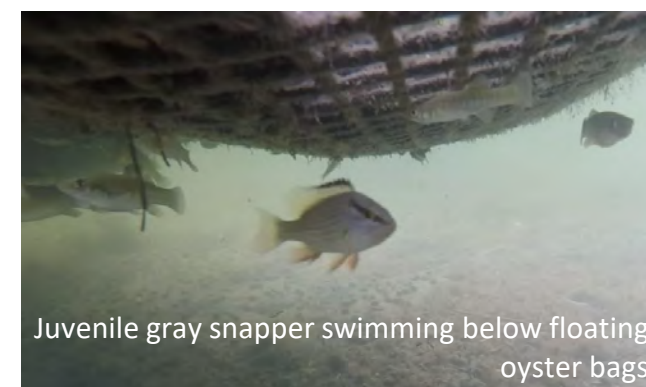
Video observations collected in 2018 & 2019

Common name	Species	Commercial fishery*
Atlantic silverside	<i>Menidia menidia</i>	X
eastern mud sail	<i>Tritia obsoleta</i>	
mummichog	<i>Fundulus heteroclitus</i>	X
feather blenny	<i>Hypsoblennius hentz</i>	
blue crab	<i>Callinectes sapidus</i>	X
hermit crab	<i>Pagarus spp.</i>	
Atlantic needlefish	<i>Strongylura marina</i>	
grass shrimp	<i>Palaemonetes spp.</i>	X
sheepshead	<i>Archosargus probatocephalus</i>	
naked goby	<i>Gobiosoma boscii</i>	
silver perch	<i>Bairdiella chrysoura</i>	
striped bass	<i>Morone saxatilis</i>	X
permit	<i>Trachinotus falcatus</i>	
ctenophore	<i>Mnemiopsis leidyi</i>	
menhaden	<i>Brevoortia tyrannus</i>	X
cunner	<i>Tautoglabrus adspersus</i>	
Atlantic mud crab	<i>Panopeus herbstii</i>	
American eel	<i>Anguilla rostrata</i>	X
summer flounder	<i>Paralichthys dentatus</i>	X
northern kingfish	<i>Menticirrhus saxatilis</i>	
diamond back terrapin	<i>Malaclemys terrapin</i>	
Atlantic croaker	<i>Micropogonias undulatus</i>	X
eastern oyster drill	<i>Urosalpinx cinerea</i>	
inshore lizard fish	<i>Synodus foetens</i>	
mangrove snapper	<i>Lutjanus griseus</i>	
tautog	<i>Tautoga onitis</i>	X
mullet	<i>Mugilidae spp.</i>	
northern pufferfish	<i>Sphoeroides maculatus</i>	X
striped killifish	<i>Fundulus majalis</i>	
skillet fish	<i>Gobiesox strumosus</i>	
spider crab	<i>Libinia emarginata</i>	
spot	<i>Leiostomus xanthurus</i>	X

*commercial fishery exists in the Mid-Atlantic region

• Commercially important juvenile species use farm gear as habitat

- Observed during farming activity



Wave Dampening & Shoreline Protection



Spencer Marquardt



Dr. Diane Foster

7/2018



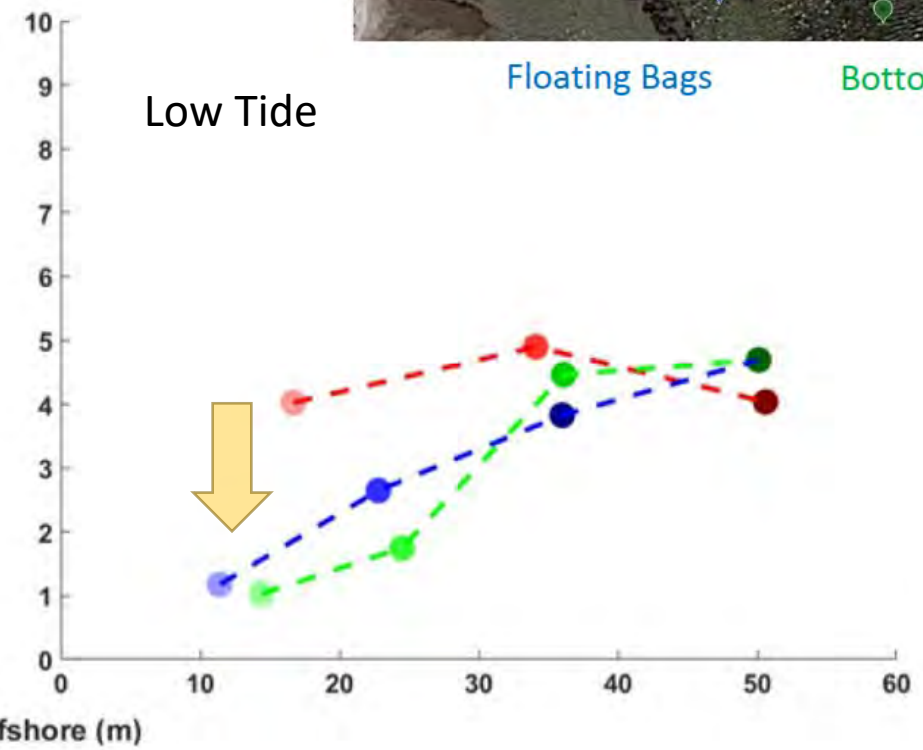
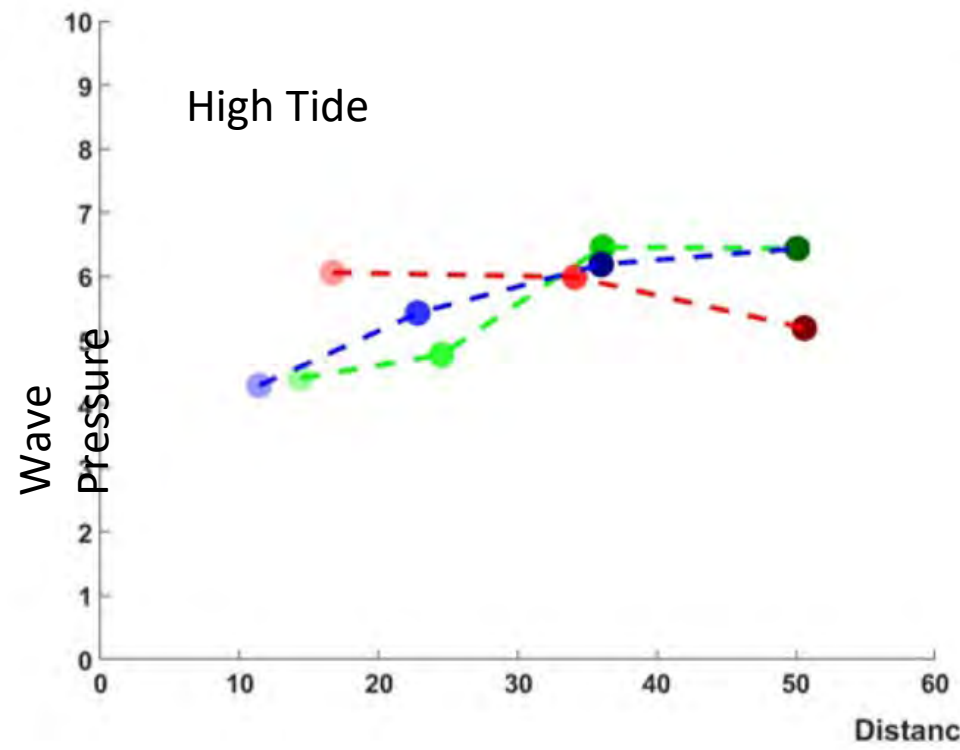
212 ft

Google Earth





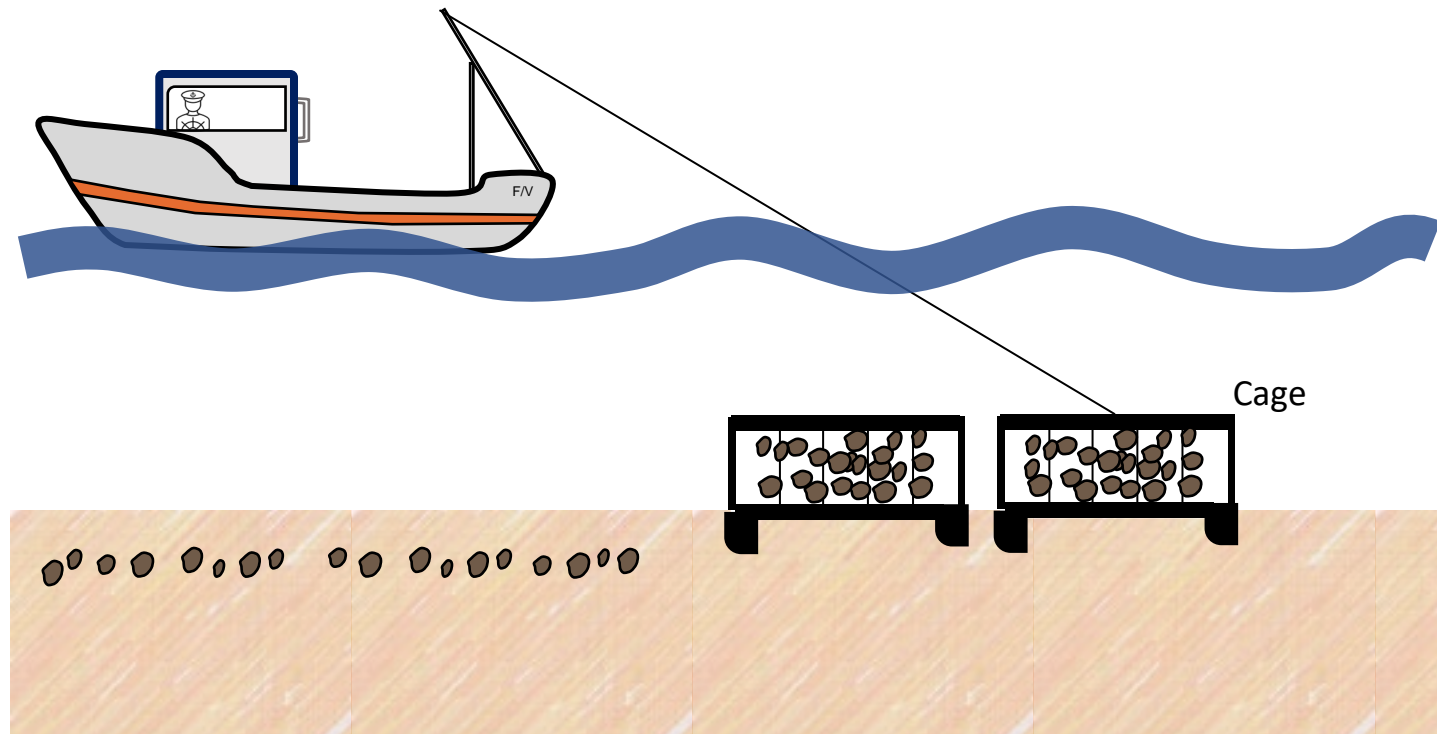
Floating Bags Bottom Cages Control





Offshore Aquaculture

Susceptibility of Atlantic Surfclams Grown in the Coastal Ocean to Multiple Environmental Stressors



Wildlife & Endangered Species Interactions

philly.com The Inquirer DAILY NEWS NEWS SPORTS BUSINESS HEALTH ENTERTAINMENT FOOD OPINION

News — New Jersey

Concerns over red knots, horseshoe crabs, oysters spark debate

Updated: MARCH 23, 2015 — 11:59 PM EDT

REPRINTS



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 [@MunroeLab](https://twitter.com/MunroeLab)

 [MunroeLab](https://www.youtube.com/MunroeLab)