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Do we have to change our name now?

A commercial hatchery perspective on soft shell clam production

Mike Congrove - Oyster Seed Holdings, Inc

Economic and Environmental feasibility of soft-shell clam aquaculture in Virginia

- Seitz et al.

Why?

- Alternative production species for mesohaline hatcheries
- Diversify mesohaline oyster farms by option of a second species

Economic and Environmental feasibility of soft-shell clam aquaculture in Virginia

- Seitz et al.

OSH Role

- Nurse seed from Maine from 1 to 12mm for two seasons for subsequent planting and monitoring by VIMS
- Spawn Mya in year two

What did we learn?

- They aren't oysters
- Prefer less cleaning in nursery phase
- Clam raceways are may be more appropriate for nursery culture
- Summer time nursery temps a problem
- Temperamental spawners- spring spawn easier?
  - Spring spawn however, exposes to temperature sensitivity

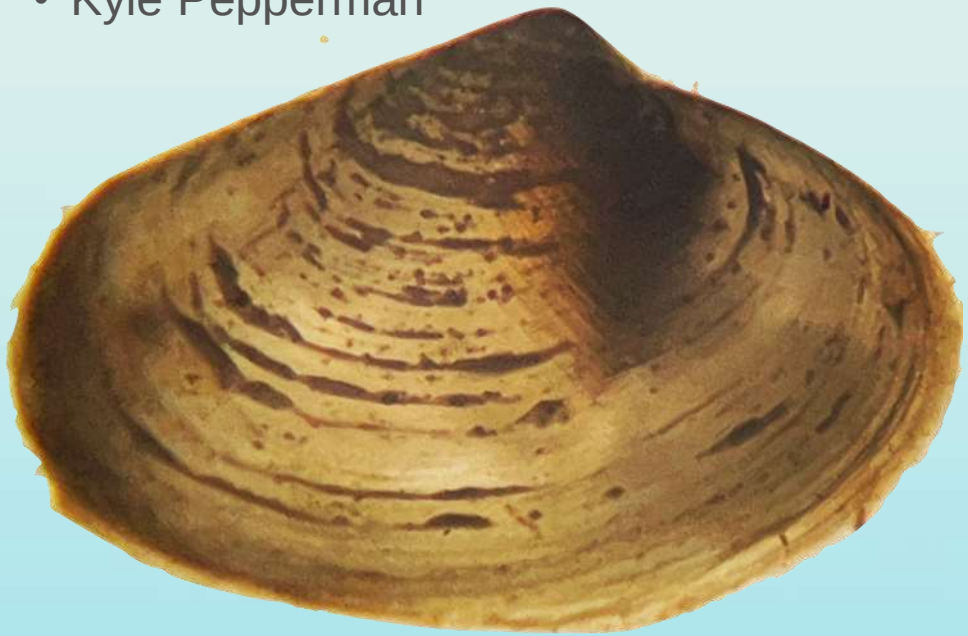
Thank You!

- Sam Glover
- Stan Allen

- Kasey Bond
- Gretchen Davis
- Alex Blanchet
- Casey Attallah
- Scott Dinning
- Emily Allen

- Natalia Schoenberg
- Rochelle Sietz
- Andrew Scheld
- Rom Lipcius
- Jay Clark

- Brian Beal
- Kyle Pepperman



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VIMS ESL Aquaculture Staff

Reba Smith
Hatchery

Darian Kelley
Nursery

Edward Smith
Grow out

John Lewis
Grow out

Bay Scallops

	DNA Sampling	Restoration and Broodstock	ESL Grow out Experiment	Provided to Local Growers
FL	105	39,492	-	-
NC	105	17,660	-	-
ESL	105	39,146	-	32,339
NY1	105	41,364	163,710	50,415
NY2	105	-		-
Nyoo	65	696	-	-
Totals	590	138,358	163,710	82,754
Overall 2023 seed scallop production				385,412

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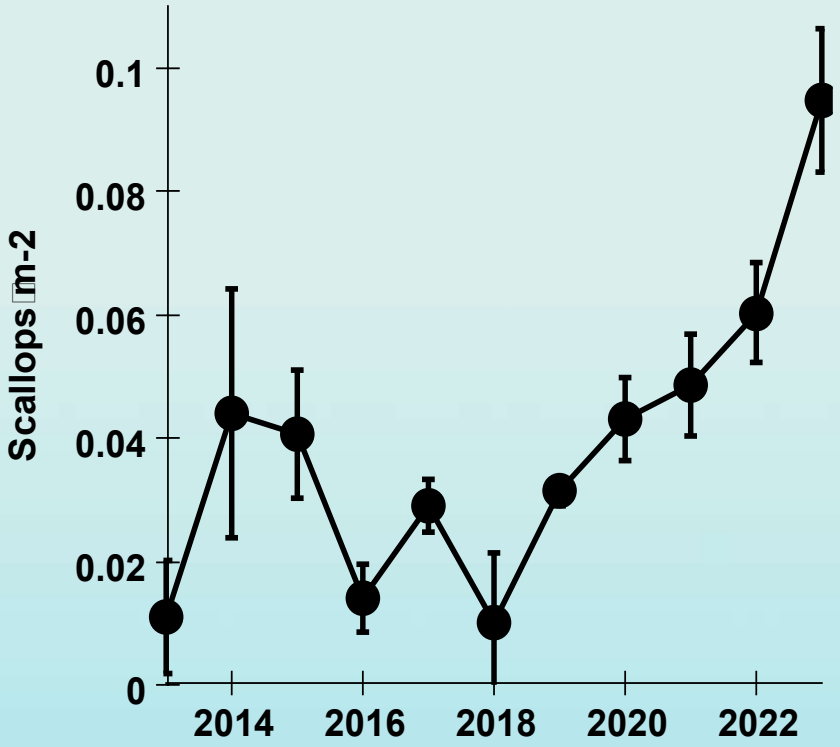
Virginia Institute of Marine Science
Eastern Shore Laboratory
Wachapreague, VA

Bay Scallops

Wild stock restoration



Aquaculture

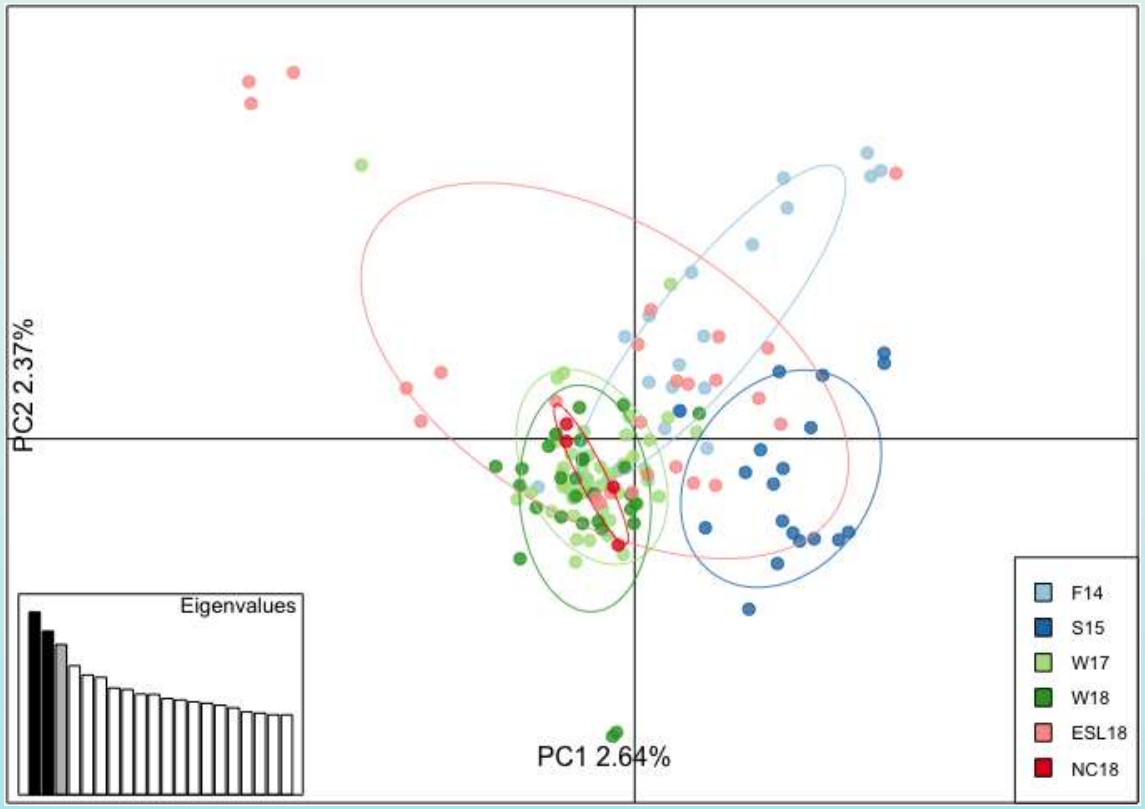
Growout techniques:
Lantern nets, oyster cages, co-culture with clams under nets

Genetics

Reba Smith, photo

Bay Scallops

Genetic strategies for ecological restoration and aquaculture



Jan McDowell
VIMS Associate Professor

Leslie Youtsey
VIMS Ph.D. Student

Commercial bay scallop farm MD-VA Chincoteague Bay

Lee Beachamp (Co-Owner), Matt Holloway (Co-Owner), Claire Rush (Marketing Manager), and Bryan Dickey (Farm Manager)

Harvested 85,000 scallops this year

Setting up a hatchery

Baywater SEAFOOD

Climate change

Species ranges are changing

"Lost" species

"New" natives

Atrina rigida
Pen shells
Aductor muscle
Black pearls

"new" native
to the ESVA?

Offshore aquaculture

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Eastern Shore Laboratory
Wachapreague, VA

Cultured eelgrass?

Regulatory scope needed to allow bottom leaseholders to grow seagrass and and sell seed

Restoration projects, Living shorelines

Precedence from *Spartina alterniflora* saltmarsh cordgrass commercial culture

Macroalgae

Scott Lindell, WHO

Sugar Kelp trials
Wachapreague Inlet
Winter 2022-2023
Winter 2023-2024

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Eastern Shore Laboratory
Wachapreague, VA

New faculty at VIMS ESL

Stacy Kruger-Hadfield
Macroalgae expert

Tracey Saxby, Integration and Application Network (ian.umces.edu/media-library).

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CO-CULTURE & ALTERNATIVE SPECIES

SK NOAA
VA CZM NOAA
VAC
Private Donors

NOAA FISHERIES

Virginia Coastal Zone MANAGEMENT PROGRAM

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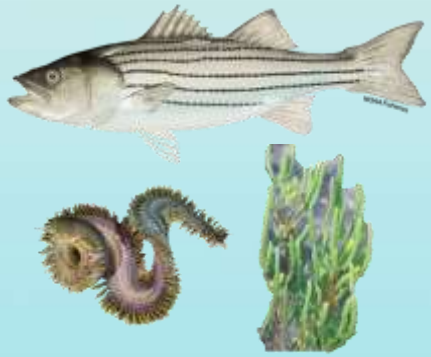
Multi-species Aquaculture Research in New Jersey

Michael P. Acquafredda, PhD (he/him)
Aquaculture Specialist,
Haskin Shellfish Research Laboratory,
Rutgers University
Michael.Acquafredda@rutgers.edu

RUTGERS
New Jersey Agricultural Experiment Station
HASKIN SHELLFISH RESEARCH LABORATORY

NOAA



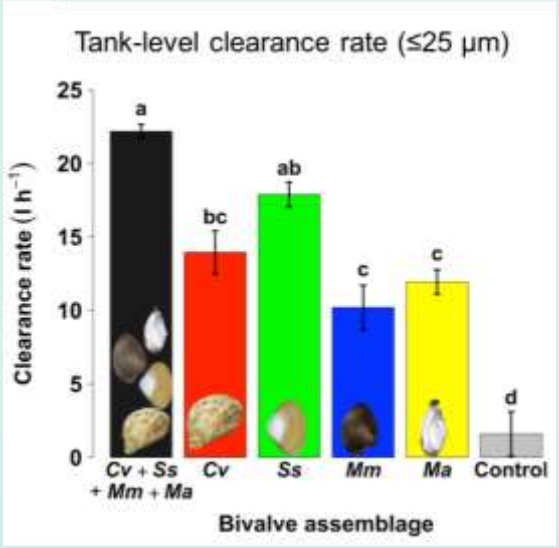
Evaluating the efficacy of bivalve polyculture

M. Acquafredda & D. Munroe

Diverse communities often outperform monocultures.
We tested this hypothesis using Northeast bivalves: oysters, surfclams, hard clams, and softshell clams.

1. Will multi-species groups have greater *particle clearance rates* than monocultures?

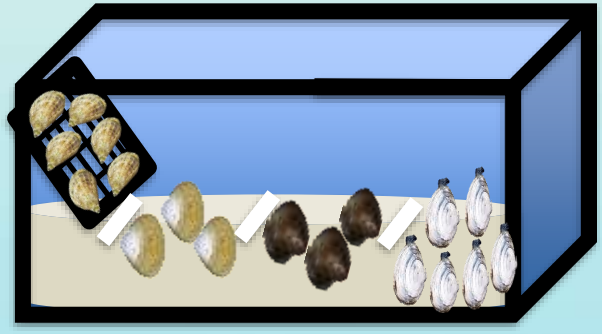
For particles ≤ 25 µm, the 4-species polyculture had significantly greater tank-level clearance compared to most monocultures



This study suggests that these bivalve species could be co-cultured without outcompeting one another.

2. Will multi-species groups have greater *total biomass* than monocultures?

Shellfish biomass (shell size, whole wet weight) was NOT affected by species richness



Future work should replicate this experiment on farms and explore how varying environmental conditions influence interspecific interactions.

Acquafredda, M. P., & Munroe, D. (2020). Effect of species diversity on particle clearance and productivity in farmed bivalves. *Mar Ecol Prog S*, *639*, 107-126. https://www.int-res.com/abstracts/meps/v639/p107-126/

Evaluating the feasibility and sustainability of an integrated multi-trophic recirculating aquaculture system using striped bass, sand worms, and sea beans

M. Acquafredda, C. Spino, J. Rosendale & B. Phelan

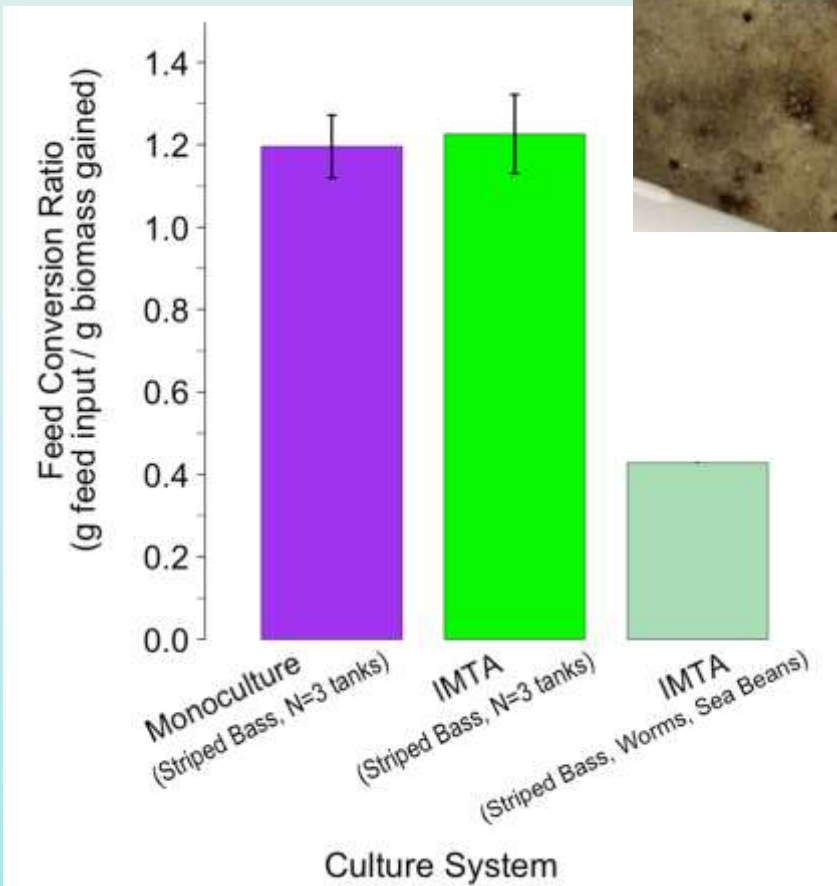
1. The monoculture and IMTA-reared striped bass grew similarly.

2. Worm biomass increased by ~114% and ~50% more worms could have been supported by IMTA

3. ~24.5 kg (~54 lb) of marketable sea beans were produced; more sea beans could have been supported by IMTA

4. IMTA exhibited dissolved waste mitigation (nitrate, phosphate, pH)

5. IMTA system-wide FCR was substantially lower than the monoculture FCR



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CO-CULTURE OF GRAZERS AND OYSTERS

Darien D. Mizuta*[1] & William C. Walton[1]
[1]Virginia Institute of Marine Sciences (VIMS), Virginia - USA
Section: Natural Resources

VIMS | William & Mary
Virginia Institute of Marine Science

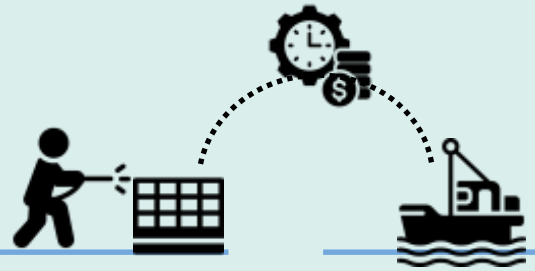
William & Mary
Chartered 1693

VA Aquaculture Conference, Newport News, Nov 10 & 11, 2023

LOW-TECH CO-CULTURE: SEAFOOD PRODUCTION & BIOFOULING CONTROL

OYSTERS

Suspension feeders – phytoplankton mostly



GRAZERS

Omnivorous – eating small animals, algae.

Or algae only.

e.g. urchins, periwinkles

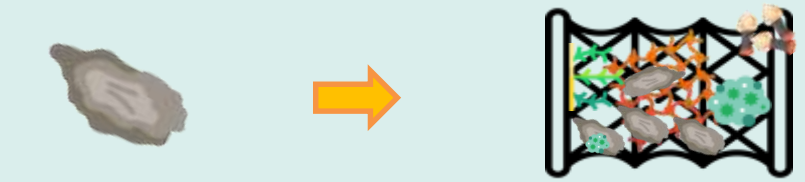
Low-tech solutions = INCLUSIVE!

Nature – based Solution

ATLANTIC PURPLE URCHIN

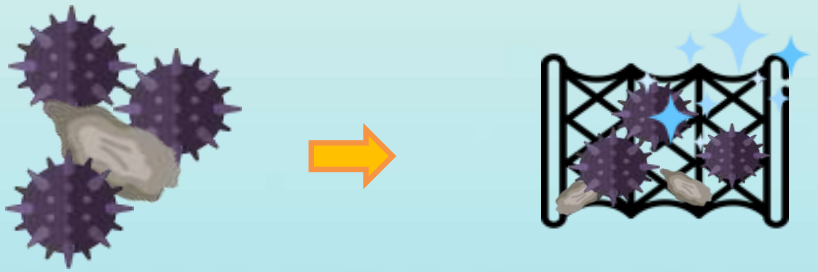
Arbacia punctulata

URCHINS + OYSTERS: HYPOTHESIS



CONTROL (monoculture)

LOW STOCKING DENSITY



HIGH STOCKING DENSITY

Same with periwinkles.

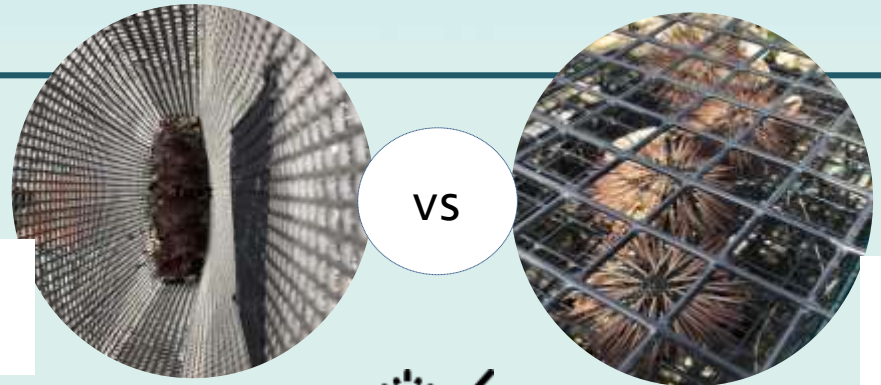
ADVANTAGES


SAME SPACE USE
SAME GEAR/TECHNOLOGY
DIVERSIFICATION
- Area used:
CB inner to CB marine.
- Products.
- Revenue.

EXPERIMENTAL DESIGN (at Eastern Shore)

Sea surface

HT: 2,10 m



bags in bottom cages

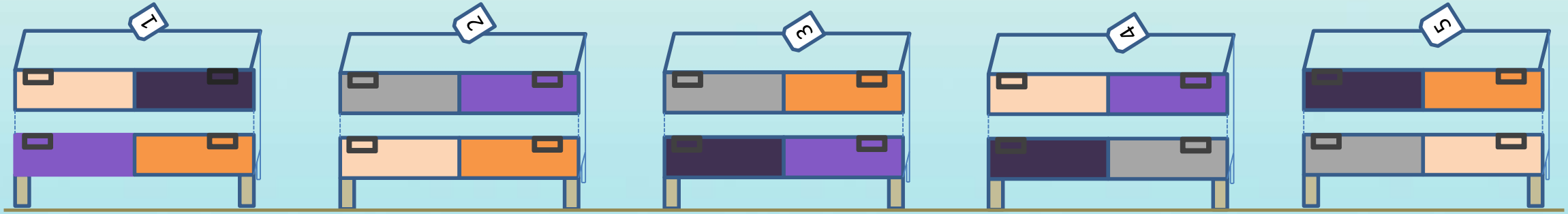
vs

only bottom cages

LT: 0,65 m

Size: juveniles, adults

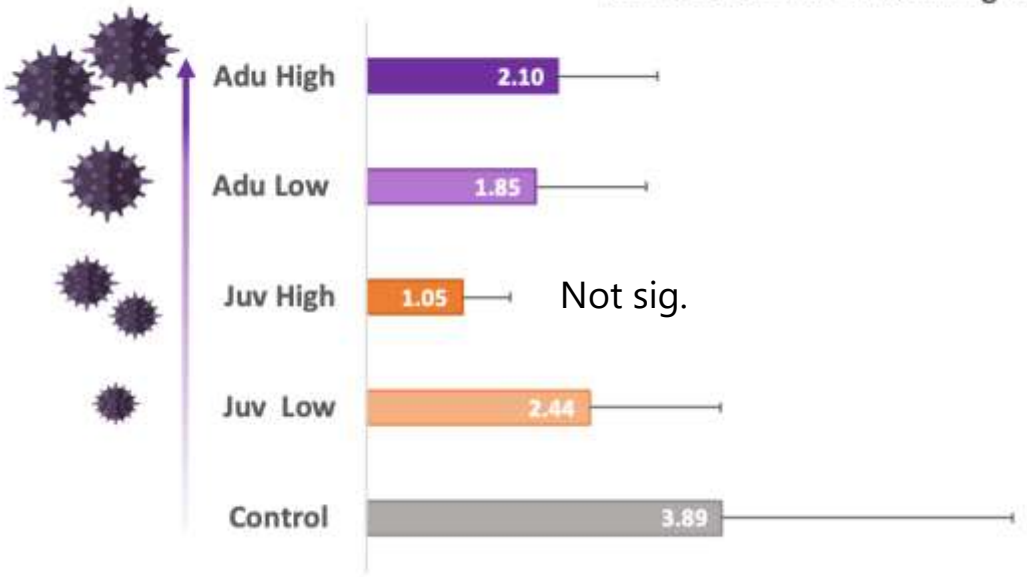
Stocking density: “low”, “high”



Sea bottom

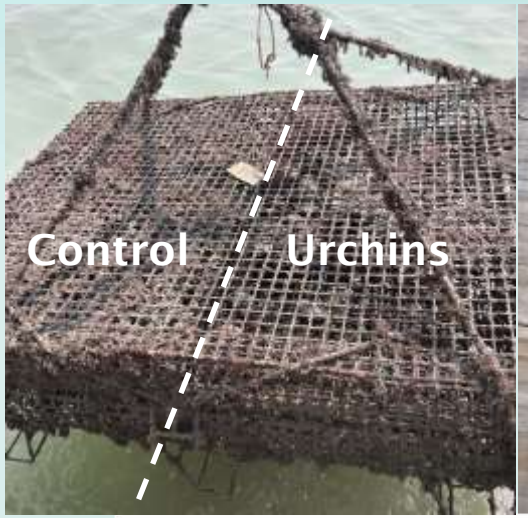
2022

Biofouling (g) from farming bags stocked with different urchin stocking densities



Not sig.

Treatments: urchin size and stock

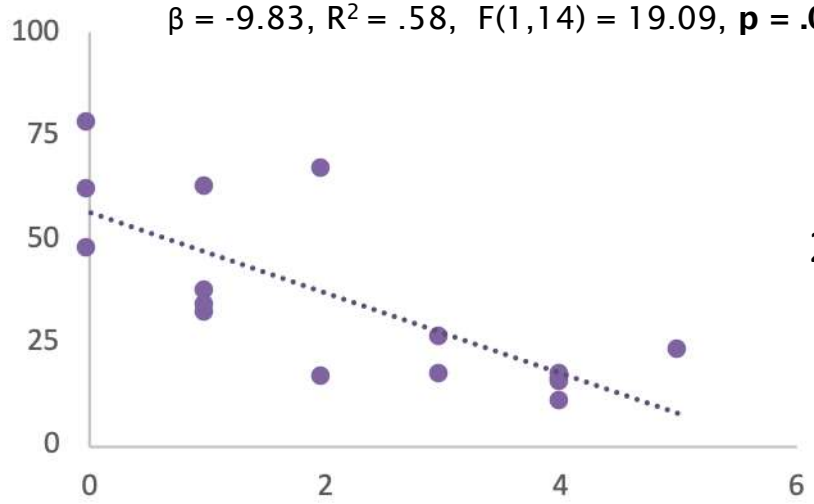


Urchin mortality was high.

2023

Biofouling (g)

β = -9.83, R^2 = .58, F(1,14) = 19.09, **p = .001**



Survival (number of urchins)

PRODUCT FEASIBILITY

ROE (= "uni") with different **color.**

- Sauce?
- Condiment?

Maruhide Marine Products Santa Barbara, CA

The shell exterior was not so pretty, but look inside this oyster!!!!

Gonad development mainly related to food availability.

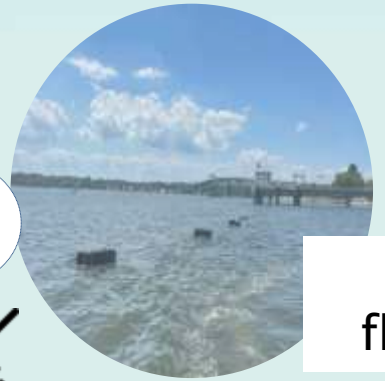
URCHINS FEEDING

URCHINS STARVING

	SUMMER TRIAL 2022		WINTER TRIAL 2022	
Treatments	Urchin Gonad CI	Oyster CI	Urchin Gonad CI	Oyster CI
Start	0.64 ± 0.79	7.23 ± 1.93	3.98 ± 2.69	12.15 ± 2.10
End				
Control	---	7.66 ± 4.02	---	9.53 ± 1.72
Juvenile Low	0.39 ± 0.25	6.95 ± 1.74	0.35 ± n/a	9.31 ± 1.99
Juvenile High	0.79 ± 0.67	6.81 ± 1.28	1.36 ± 0.40	9.07 ± 1.99
Adult Low	0.99 ± 1.06	7.12 ± 1.29	---	8.59 ± 1.75
Adult High	1.01 ± 0.97	7.67 ± 1.00	---	9.59 ± 0.77

PERWINKLES + OYSTERS (at Gloucester Point)

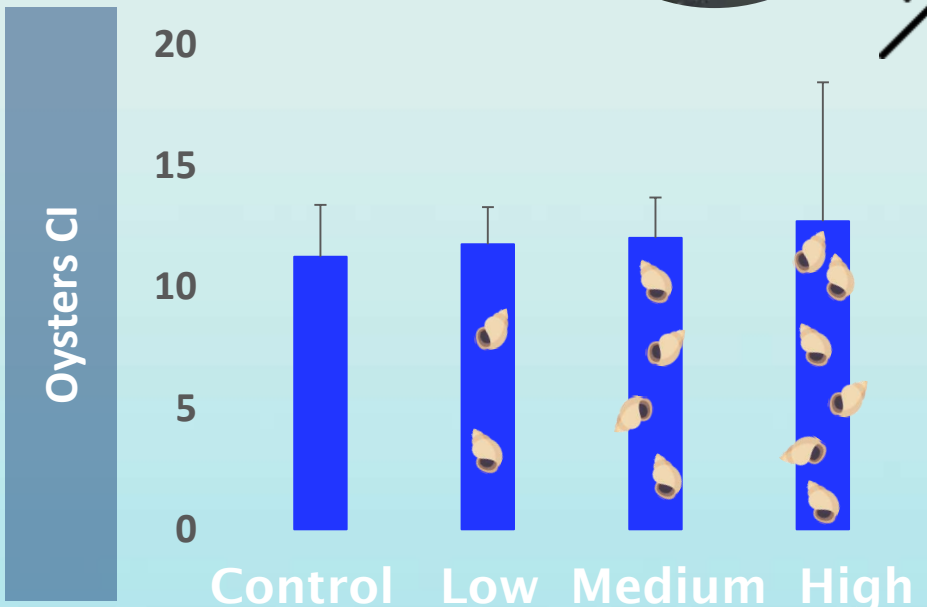
vs



Intertidal racks

Subtidal
floating and bottom cages

Periwinkles surprisingly thrived in subtidal area!



Periwinkles might have an effect in the CI of oysters, depending on farm gear.

Samples of 2023 still to be analyzed.

COMMON PERIWINKLE

Littorina littorea

THANK YOU!

Contact: ddmizuta@vims.edu

Acknowledgement:
This research is funded by the
Atlantic States Marine Fisheries Commission (ASMFC).