

# Oyster Aquaculture Larval Subsidy Drives Emerging Wild Oyster Populations in Maine, USA

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# Motivation

1. Maine has a long history of wild oysters, yet only relict populations remained until recently.
2. Today, wild oysters are harvested from the intertidal zone in estuaries with numerous oyster farms. Many point to larval subsidy from farms as the source of these new populations.
3. The links between wild oysters and farms, and the interactions between wild shellfish fisheries and aquaculture, are still poorly understood.

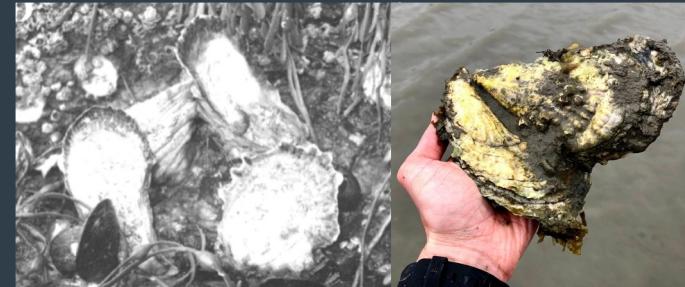
Damariscotta River Estuary shell middens.  
(Larsen, 2016; Maine.gov)



Oyster cages on the Damariscotta.  
(Glidden Point)



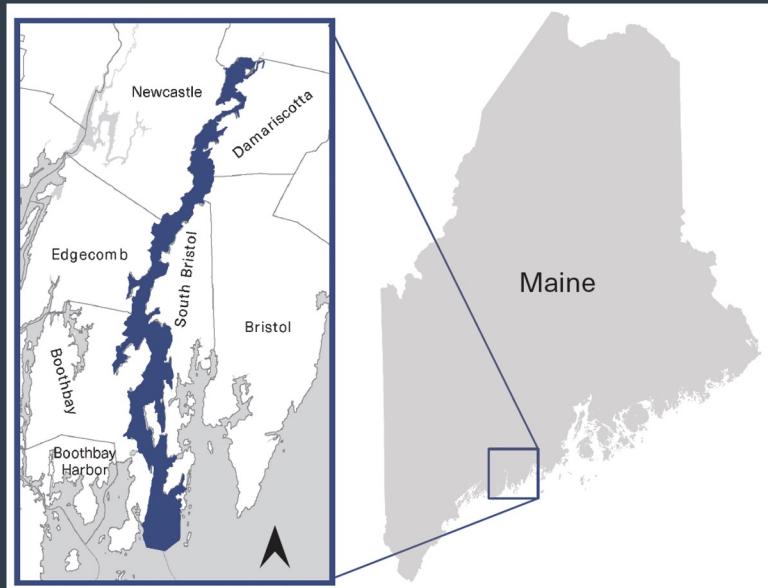
Wild oysters in the Damariscotta.  
(left: Capone et. al 2008, right: current study)



# Documented local knowledge observations of the Damariscotta as an ‘Oyster River’

“...in the past 30 years oysters and oyster farming has taken off in Damariscotta...And it's solid full of natural oysters because of the overflow from the farms. They obviously spit out seed...So, it's become an oyster river, much more than clamping.”

- Shellfish harvester who works the neighboring estuary



Risley, 2022; Risley et al., 2024

# Guiding Question

Are wild oyster populations the result of larval spillover from diploid (reproductive) oysters raised on farms?



Wild oysters in Damariscotta River Estuary

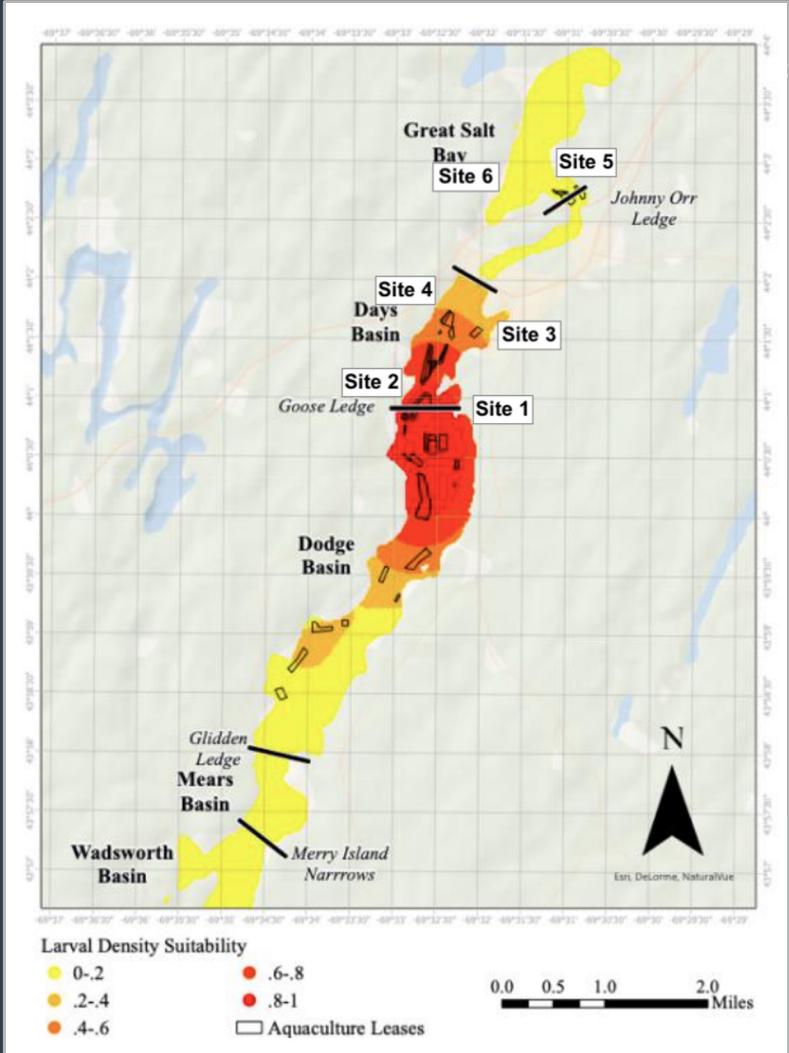
# Multiple methods used to investigate links among wild & farmed populations

- 1. Wild Oyster Settlement Study**  
To quantify larval supply from farms
- 2. Intertidal Adult Oyster Surveys**  
To map adult wild oyster populations



# 1. Wild Oyster Settlement Study

Delago, 2021

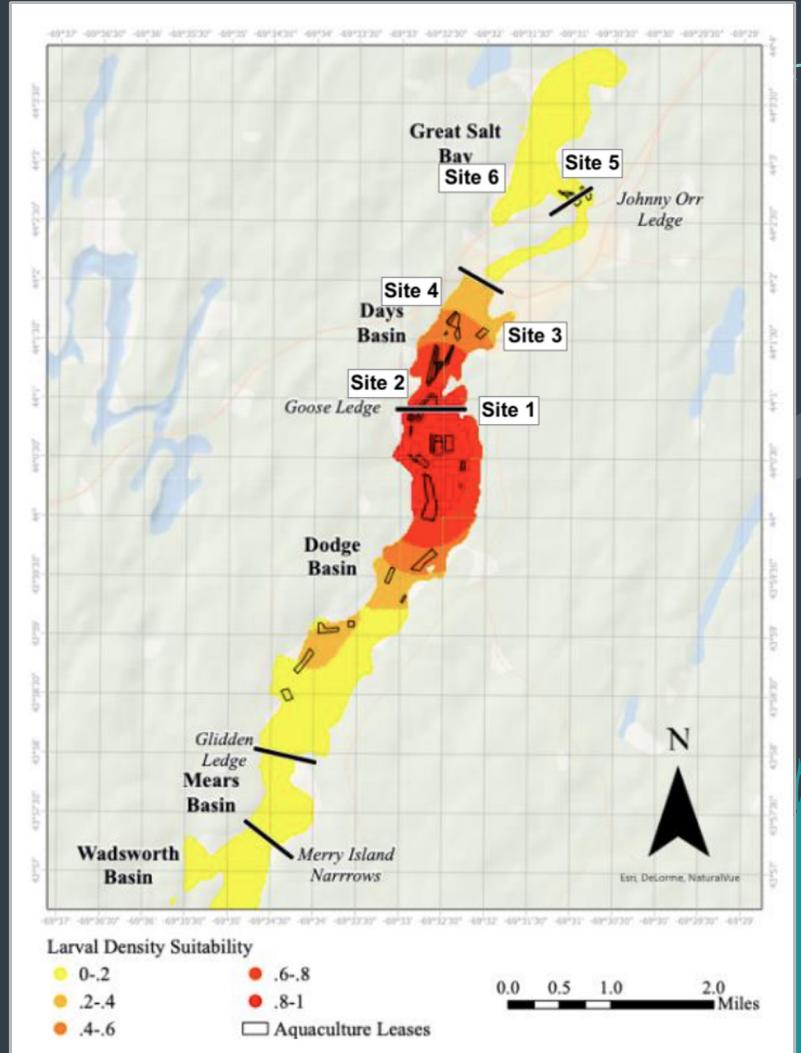


# 1. Wild Oyster Settlement Study



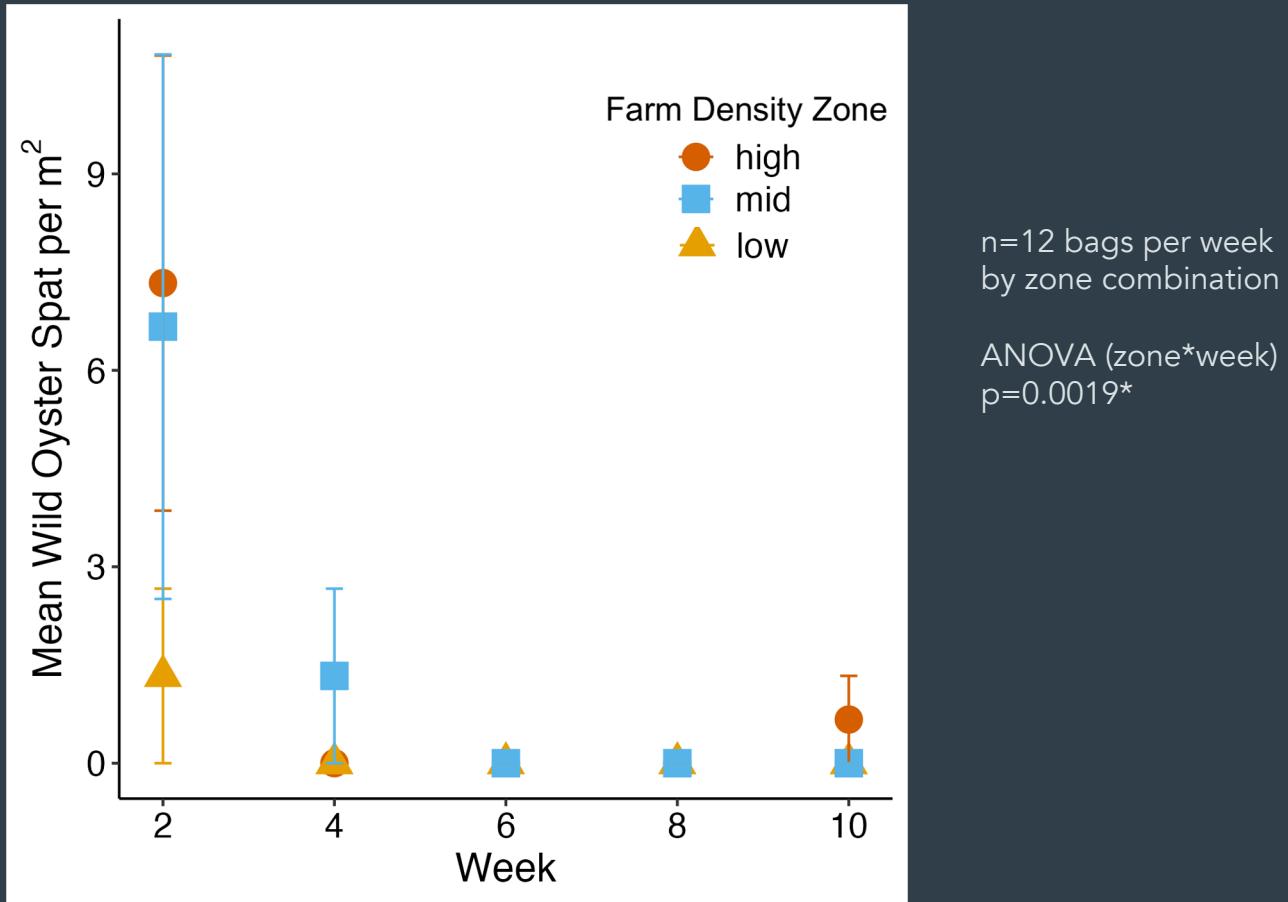
## Study Design

- June-September 2023: 10-weeks
- 6 total sites
  - 2 per farm density zone
- 6 replicate bags per study site
- Bags replaced every 2-weeks
- Held in flowing seawater 1-2 weeks

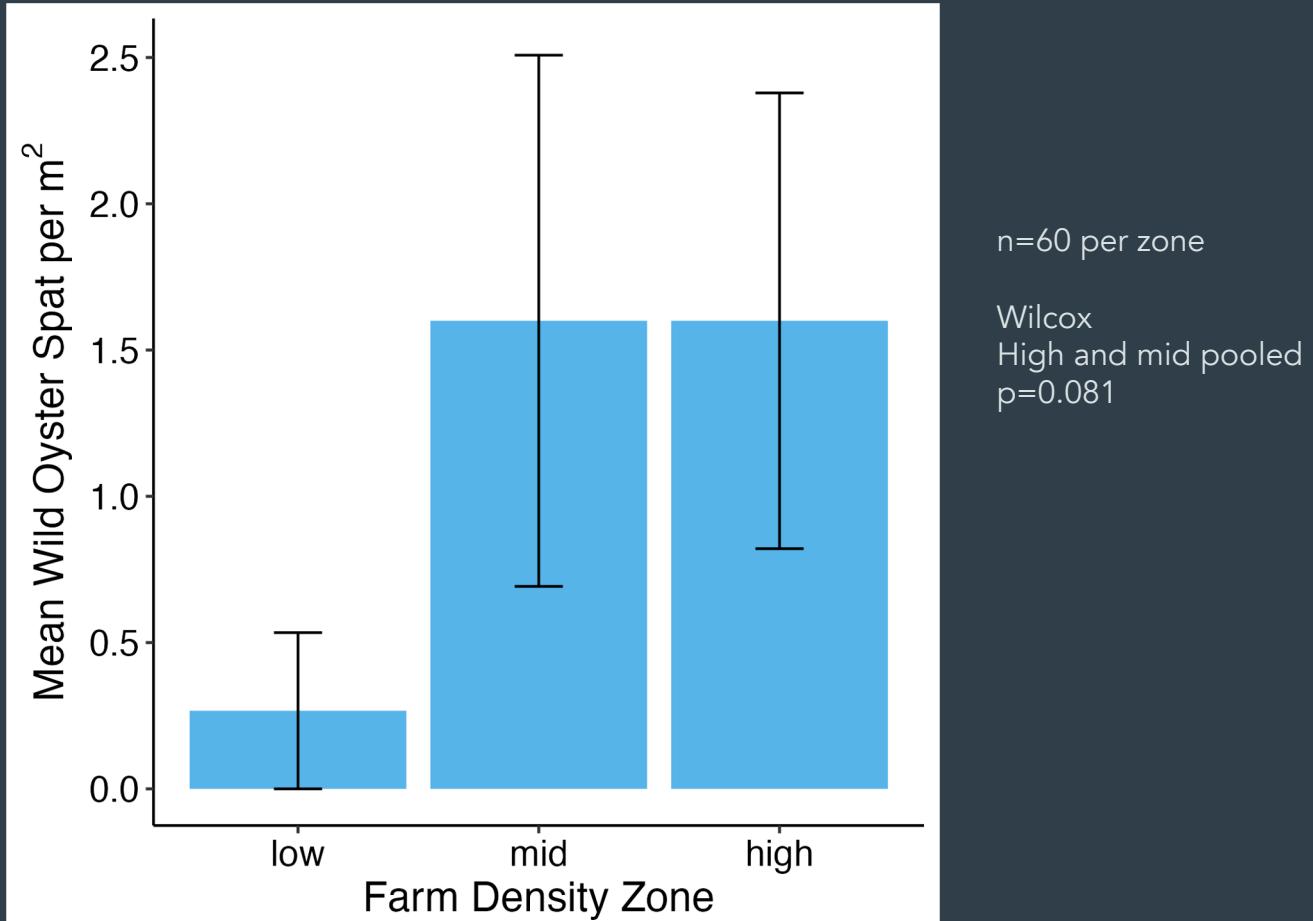


After Atwood & Grizzle, 2020; Delago, 2021

# Settlement Peaks in Early June (Week 2)

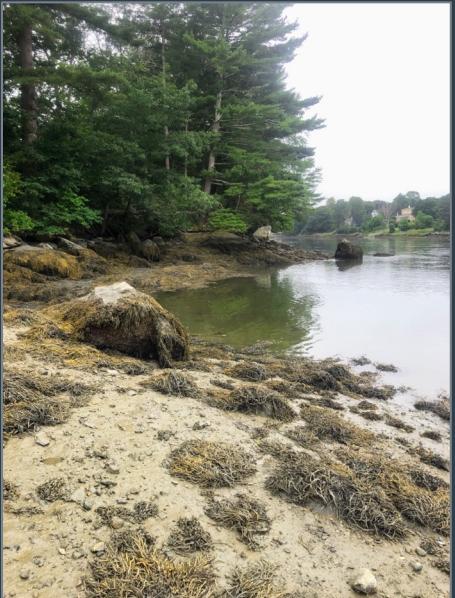


# Higher rates of settlement closer to farms



## 2. Intertidal Adult Surveys

### Study Design



- Surveying intertidal zone of estuary
- 0.25 m<sup>2</sup> quadrat sampled every 10 paces
- Total count, size, and mortality recorded

## Results

### Wild Oyster Adult Statistics

Total Distance	15 mi
Distance Covered	3 mi
Total Oysters	84
Avg Shell Height (mm)	46.3 (+/- 34.6 STDEV)
Median Ht. (mm)	27.1
Range (mm)	14.2-131.1

- Many large oysters attached to rock and beneath *Ascophyllum*. Wild oysters present in 62% of intertidal quadrats *in intertidal zone*



# Documented evidence that oyster farms may be driving the reemergence of wild oyster populations

- Study results indicate:
  - Wild oyster settlement is higher closer to farms.
  - Wild oysters observed in intertidal surveys.
- Wild oysters in the intertidal zone are now gathered by wild shellfish harvesters.



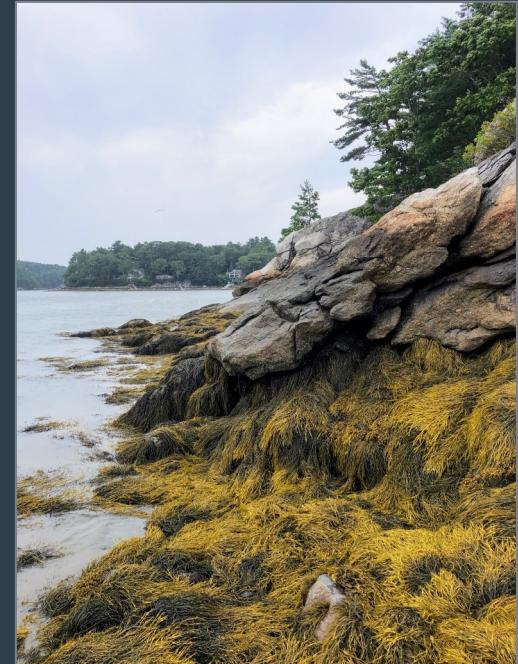
# Research is ongoing and will examine both social and ecological dimensions

## *Spring*

- Focus groups with estuary stakeholders to discuss visions for the future of the Damariscotta.

## *Summer*

- Continued field studies on oyster larval settlement and habitat:
  - Across tidal gradient
  - Rock surface and *Ascophyllum* cover

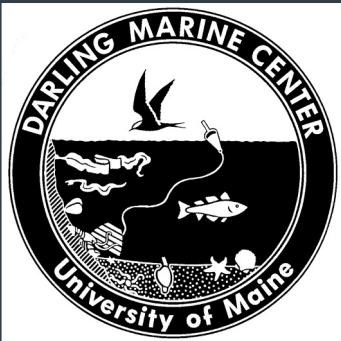


# Thank you!

NOAA Saltonstall-Kennedy Grant  
Damariscotta-Newcastle Joint Shellfish Committee  
Dana Morse, Tom Kiffney, Chris Davis, Ray Grizzle, Robert Atwood, and Emma Polhemus



**NOAA**  
**FISHERIES**



# References

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# Wild Oyster Settlement Gear Study

## Study Design



Ketchum Supply Co.

- Marine cement
- 5 collectors with 24 disks
- Remained at Site 1 for full 10-weeks

## Results



- No observed oyster settlement
- Shell bags preferred
- Strong acorn barnacle recruitment

