

# Seeding of Oyster Larvae on Riprap in St. Leonard Creek

*Victoria Agboola & Caroline Troy*

*Mentors: Tom Ihde, Richard Lacouture, Amber DeMarr*

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## Outline

- I. Introduction
- II. Objective
- III. Methods
- IV. Statistical analysis
- V. Results
- VI. Discussion
- VII. Conclusion

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## Background



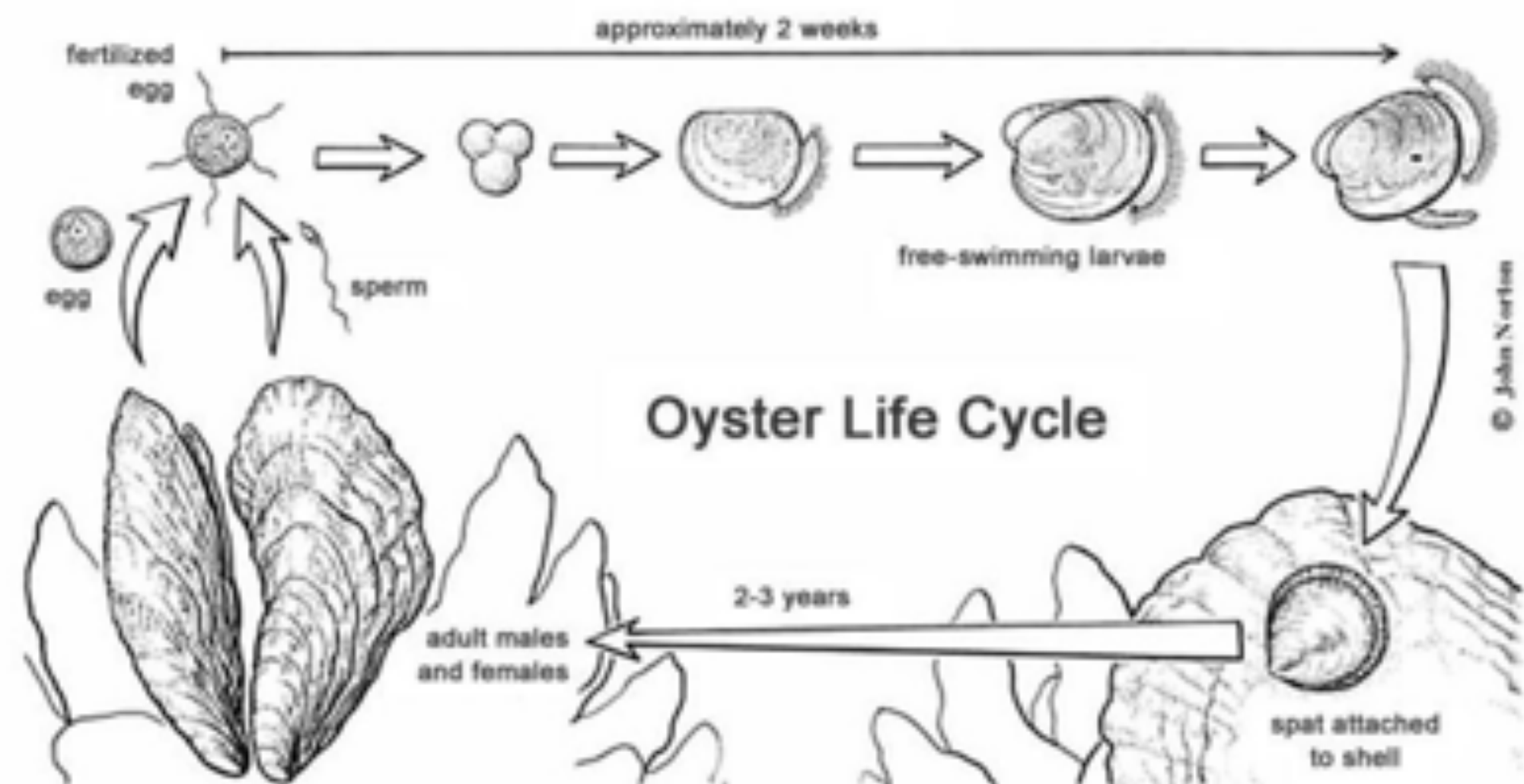
Eastern Oysters ([www.chesapeakebay.net](http://www.chesapeakebay.net))

- The Chesapeake Bay's oyster population is less than 1% of what it originally was. (UMCES)
- Oysters are important to the Chesapeake region both ecologically and economically
- While there are restoration efforts, more work needs to be done.



Chesapeake Bay (<https://svs.gsfc.nasa.gov>)

## Oyster Life Cycle



Riprap Site



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## Objective

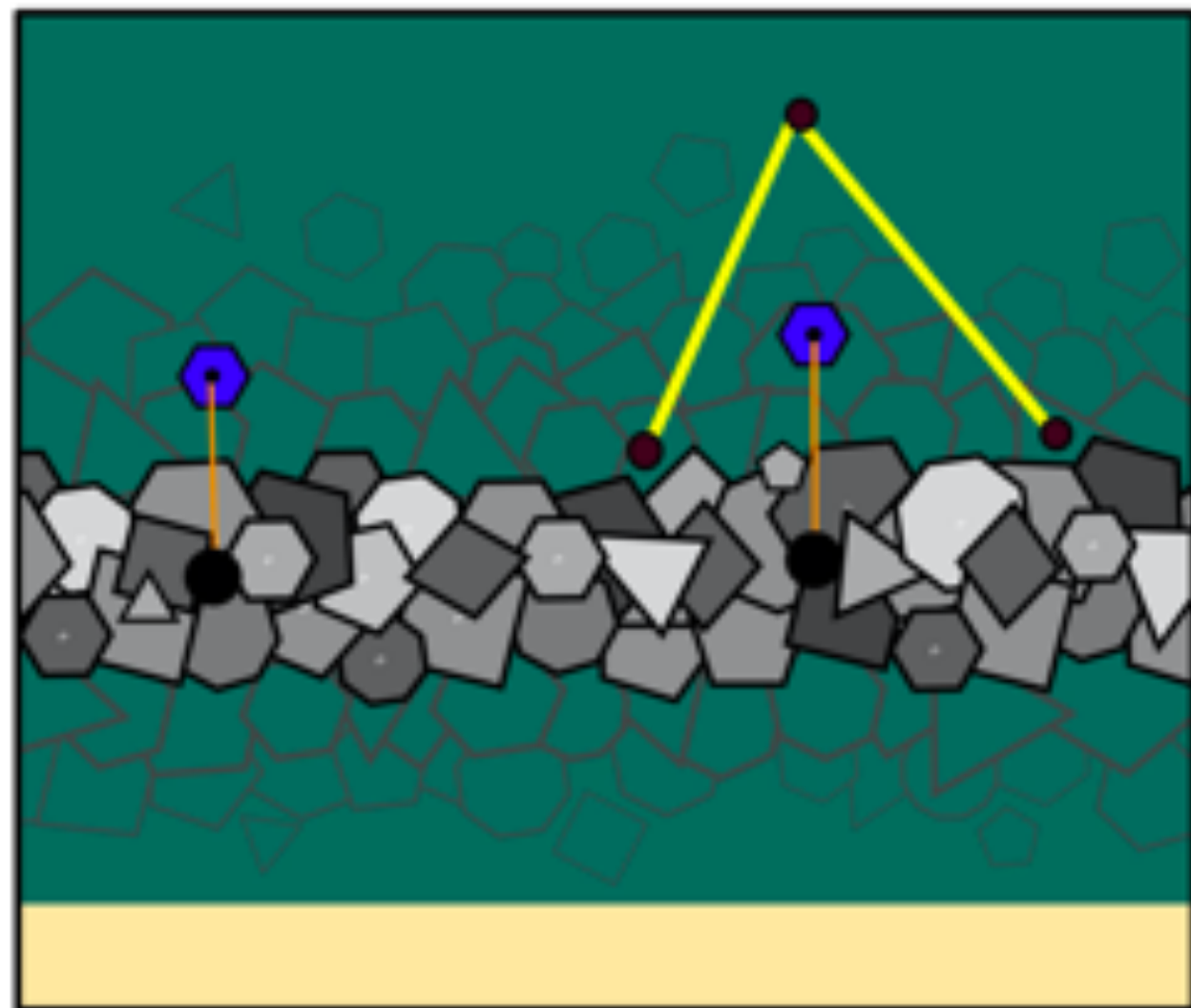
- Find if the method of setting oysters on riprap is possible
- Potentially find a new way for the public to be involved in oyster restoration and a way to make positive use of hundreds of miles of riprap in the bay



Eastern oysters set on riprap (<https://oceanservice.noaa.gov/>)

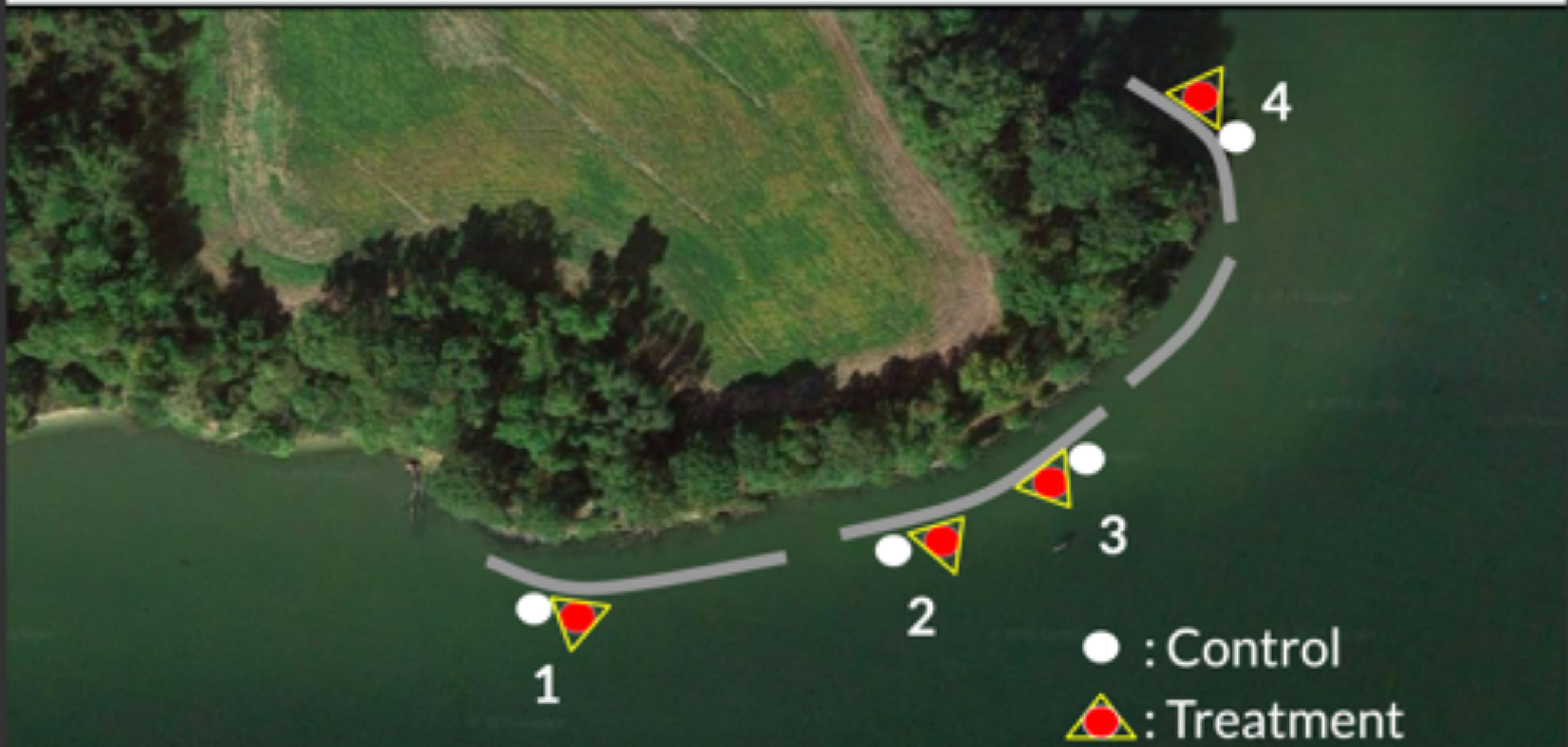
## Experiment Design

- Four sites along riprap
  - Treatment and control rock at each site (7 m apart)
- Treatment contained by curtain containment and exposed to oyster larvae
  - Curtain then removed and oysters monitored overtime for survival and growth



Overhead view of riprap site

## Experiment Layout





# Hypothesis

*There will be a greater number of seeded oysters on the treatment rocks than the control rocks.*

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## Methods: Preparation

1. Eight granite rocks were selected
2. Installed eye hook for attaching weight to at site
3. Two 10 x 10 cm quadrats were trace and drilled on each rock
4. Rocks seasoned in bay water to give them the necessary biofilm for larvae attachment



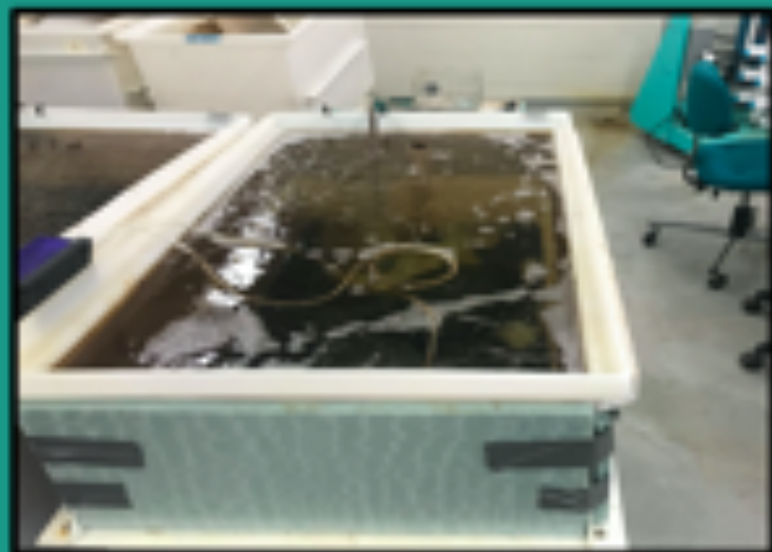
*Preparing the Rocks*



Drilling Rocks



Drilled Rocks



Tank for rock seasoning



Stenciling Quadrats



10x10 cm Quadrat

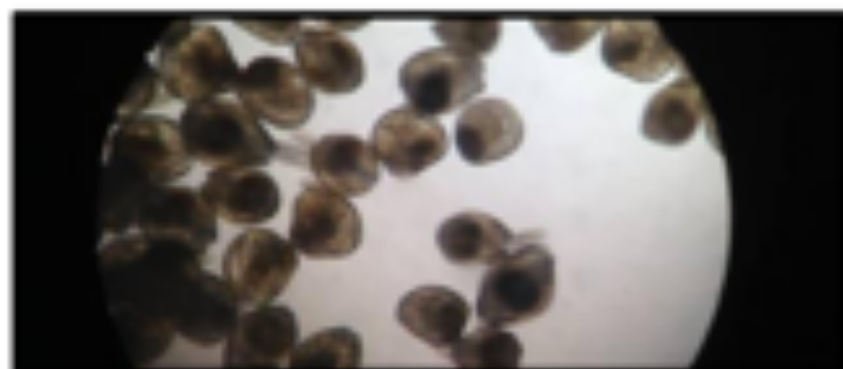
## Curtain Set-Up



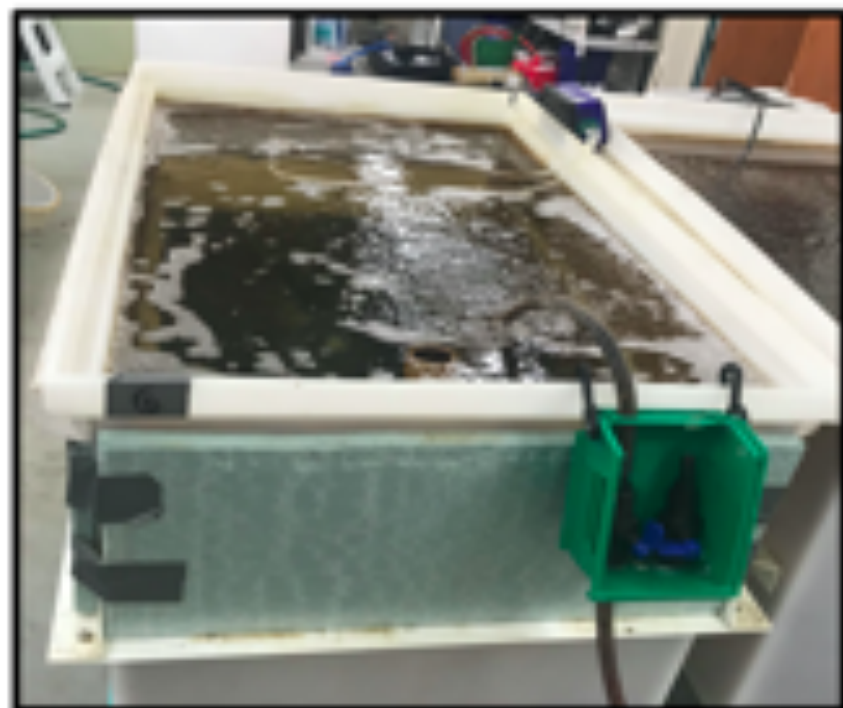
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## Methods: Experiment Set-Up

1. Curtains were set up at riprap site
2. Oyster larvae were examined and counted under microscope
3. Set up 100 L tank with a conditioned and unconditioned rock for testing oyster viability
4. 360,000 larvae released in each curtain area



Oyster Larvae under microscope (<http://ccesuffolk.org>)



100 L tank for testing oyster viability

## Oyster Release

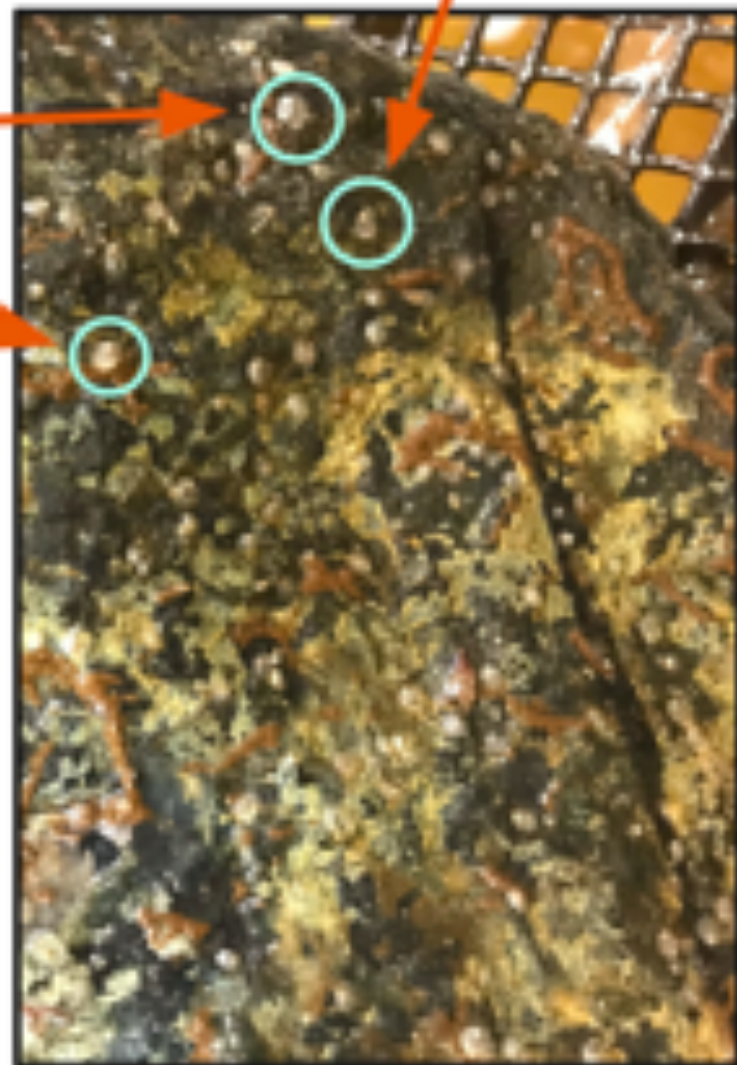
360,000 Oyster Larvae

*Curtains remain up for  
72 hours during larval  
attachment period*



## Tank Results

- Two weeks after larvae release, the tank showed high numbers of oyster spat
- The oysters were viable!



Oyster spat



Oyster spat size



Rocks in tank

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## Results


- 28 days after release we examined the rocks for young oysters
- 3 of the 4 treatment rocks had several small oysters growing in the two quadrats
- All control rocks had no oysters



*Finding oysters in quadrats*







## Analysis: Test of Hypothesis

- To determine if our findings were significant, paired t-test was used


	Control Average	Treatment Average
Site 1	0	5
Site 2	0	0
Site 3	0	4
Site 4	0	1.5

$$t = \bar{d}/s_{\bar{d}} = 2.2958$$

$$v = n - 1 = 3$$

$$\alpha = 0.05$$

$$t_{0.05(1),3} = 2.353$$



## Analysis: Test of Hypothesis

- To determine if our findings were significant, paired t-test was used
- **Null hypothesis:** There is no difference between the control and treatment rocks.
- **Alternative Hypothesis:** There is a difference.
- **Criterion:** Reject null hypothesis if  $t > t_{0.05(1),3}$ 
  - $2.2958 < 2.353$
- **Therefore:** We fail to reject the null hypothesis


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- **Therefore:** We fail to reject the null hypothesis
- *Because we fail to reject the null hypothesis, we cannot claim that our results were statistically significant. However, our critical value was borderline.*

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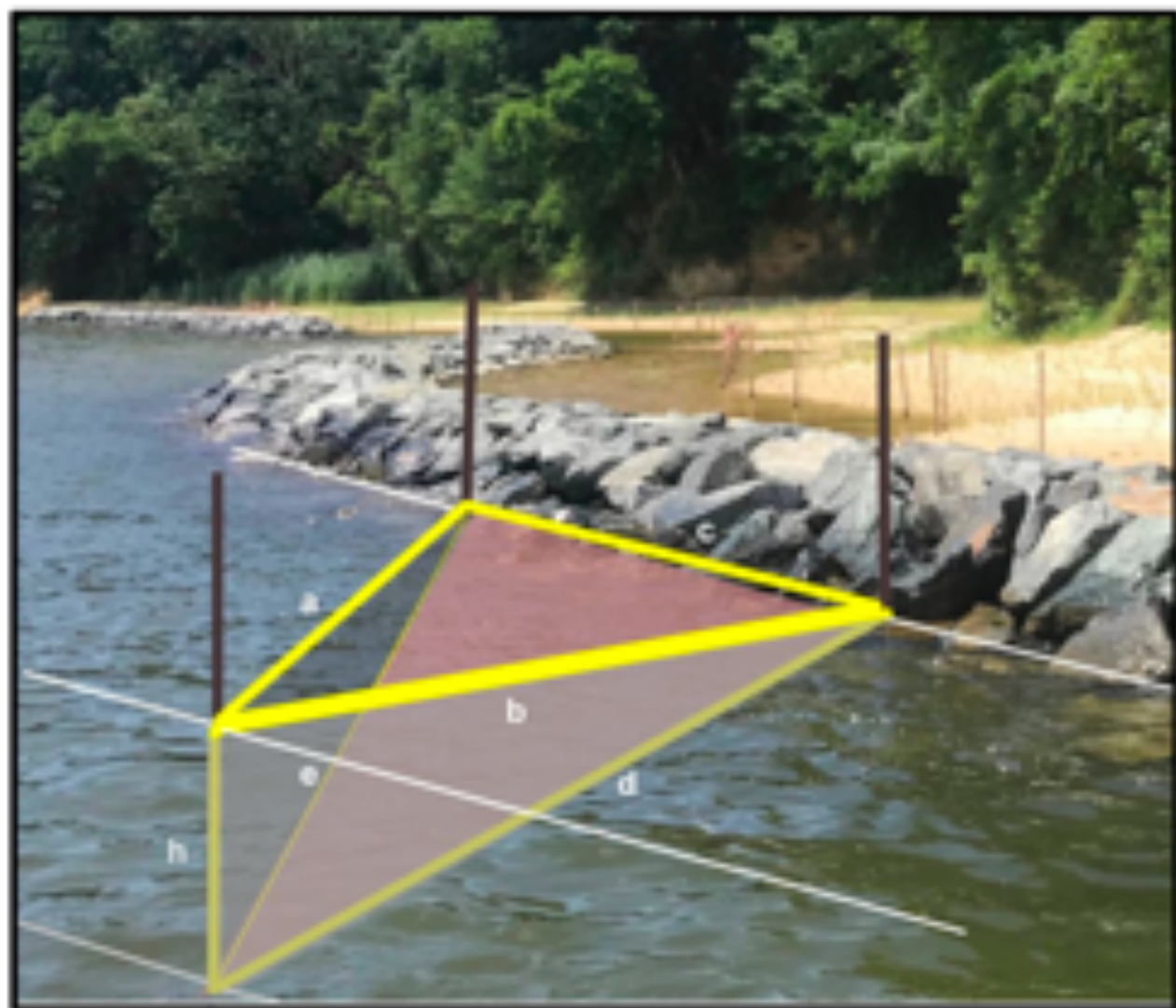
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## Estimation of Set

- Surface area of lower triangle CED calculated to find minimal estimate of area oysters could attach to
  - SA Average: 22,030 cm<sup>2</sup>
- We extrapolated from the number of oysters set in each curtain quadrat to the entire minimal curtain area
  - Average Estimate: 642 Oysters
  - Some treatments were twice that
- Expanded to entire revetment
  - 33,856 Oysters



Surface area of triangle

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## Next Steps

- Number of oysters could be increased
  - We only had 18% of the oyster larvae we planned this year
  - More oysters would increase our chance of statistical significance
- Curtain design
  - Lighter material
  - Layout
- Thicker biofilm
  - Campbell et al.
- Determine what role salinity levels might play in this experiment
  - Low salinity this year
  - Oyster growth may be better in higher salinity areas like Virginia
- Design experiment to collect data points that can tell us the amount of leakage more exactly
  - Control



Treatment curtain set-up

# Acknowledgments



## Thank you to:

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- Jon Farrington
- Kyle Wood
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