Seeding of Oyster Larvae on Riprap in St. Leonard Creek

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Outline

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

- 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.
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
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
Hypothesis

There will be a greater number of seeded oysters on the treatment rocks than the control rocks.
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 traced and drilled on each rock
4. Rocks seasoned in bay water to give them the necessary biofilm for larvae attachment
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 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
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
Analysis: Test of Hypothesis

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

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<thead>
<tr>
<th>Site</th>
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<th>Treatment Average</th>
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<tbody>
<tr>
<td>Site 1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Site 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Site 3</td>
<td>0</td>
<td>4</td>
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<tr>
<td>Site 4</td>
<td>0</td>
<td>1.5</td>
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\[
t = \frac{\bar{d}}{s_\bar{d}} = 2.2958
\]
\[
v = n - 1 = 3
\]
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\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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- *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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Estimation of Set

- Surface area of lower triangle CED calculated to find minimal estimate of area oysters could attach to
  - SA Average: 22,030 cm²
- 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
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
Acknowledgments

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  - Amber DeMarr
- Jon Farrington
- Kyle Wood
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