Catch Success of Blue Crab Bait: Synthetic Bait vs. Atlantic Menhaden

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History of Maryland Crabbing Industry

• Highest-valued commercial fishery in the Bay

• Largest supplier of crabs
Introduction

Forage fish populations are declining due to increased demand as food, bait, etc.
OrganoBait

- Uses synthetic attractants that mimic those given off by decaying fish.
Objective

- Determine the catch success of synthetic OrganoBait versus bait fish (Atlantic Menhaden).

- Determine whether the synthetic bait acts as a suitable replacement for traditional forage fish.
Method

- Day 1: Pots are set in two locations on the Patuxent River. One location is baited with Menhaden, the other with synthetic bait.
Method (cont’d)

• Day 2: Pots are pulled. Quantity, size, and sex of crabs are recorded. Pots are rebaited and set in opposite locations.

• Day 3: Pots are pulled. Quantity, size, and sex of crabs are recorded.

• Additionally recorded abiotic factors at each location, such as salinity, temperature, & dissolved oxygen content.
Menhaden caught significantly more crabs than OrganoBait
2 factor ANOVA test (site and bait type as main effects)
No significant effect of Bait Type or Site on Female Crab Size
2 factor ANOVA (site and bait type as main effects)

Average Female Crab Size vs. Bait Type

Average Female Crab Size vs. Site

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3</td>
<td>5.285581</td>
<td>1.76186</td>
<td>2.4693</td>
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<tr>
<td>Error</td>
<td>22</td>
<td>15.696966</td>
<td>0.71350</td>
<td></td>
</tr>
<tr>
<td>C. Total</td>
<td>25</td>
<td>20.982546</td>
<td></td>
<td><strong>Prob &gt; F</strong></td>
</tr>
</tbody>
</table>
Bait Type and Site Both Significantly Influenced Male Crab Size
2 factor ANOVA (site and bait type as main effects)

Average Male Crab Size vs. Bait Type

Average Male Crab Size vs. Site

Source | DF | Sum of Squares | Mean Square | F Ratio |
-------|----|----------------|-------------|---------|
Model  | 3  | 8.251932      | 2.75064     | 17.9709 |
Error  | 32 | 4.897955      | 0.15306     | Prob > F |
C. Total | 35 | 13.149887     | <.0001*     |

Source | Nparm | DF | Sum of Squares | F Ratio | Prob > F |
-------|-------|----|----------------|---------|----------|
Bait Type | 1     | 1  | 7.2083251      | 47.0944 | <.0001*  |
Bait Type*Site | 1     | 1  | 0.0105870      | 0.0692  | 0.7942   |
Site     | 1     | 1  | 0.7394043      | 4.8308  | 0.0353*  |

Bait Type and Site Both Significantly Influenced Male Crab Size
2 factor ANOVA (site and bait type as main effects)
Discussion

• Menhaden catches significantly higher numbers of crabs than OrganoBait

• Menhaden catches significantly larger male crabs than OrganoBait

• Future Research
Economic Influence

• OrganoBait is projected to sell commercially for less than current Menhaden prices, as well as several other bait types.

• Trade-off
References

- http://kepleybiosystems.com/organobait/

- A Synthetic Crustacean Bait To Stem Forage Fish Depletion (July 2016), A. Dellingera, J. Plotkina, B. Duncana, L. Robertson, T. Brady, C. Kepley

- http://www.cbf.org/about-the-bay/more-than-just-the-bay/chesapeake-wildlife/menhaden/

- http://www.chesapeakebay.net/issues/blue_crabs
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- All other PEARL staff
Questions