INTRODUCTION

Blueback Herring (Alosa aestivalis) and Alewife (A. pseudoharengus), collectively termed river herring, are two anadromous fish that return from coastal oceans to freshwater streams to spawn. In recent decades, river herring populations have declined drastically. In 1988, GMU researchers began monitoring river herring spawning populations in two Potomac River tributaries, Pohick Creek (PC) and Accotink Creek (AC). In 2013, data collection began on a third tributary, Cameron Run (CR), as a part of a different study. Each creek experiences different amounts of human activity, from high to low urbanization (CR, PC, and AC, respectively). Additionally, CR and PC receive treated wastewater discharge, known as effluent, while AC does not receive any. Both effluent and urbanization can reduce available oxygen and plant life, changing fish communities and food webs.  

The objective is to gain a better understanding of river herring populations and if they are impacted by different water quality parameters. To this purpose, we aimed to answer the following research questions:

1. Which of the three creeks supports larger and more productive spawning populations of river herring?

2. Are there correlations between water quality parameters and river herring spawning populations?

STUDY LOCATION

Cameron Run is the closest creek to Washington D.C. and has high human impact. Accotink and Pohick are further from Washington D.C., but Pohick, like Cameron Run, receives treated wastewater discharge.

METHODOLOGY

For 10 weeks beginning in mid-March each year, weekly plankton tows collected ichthyoplankton (Fig. 5), while block nets (set for 24-hours) captured adult river herring to be identified, counted, measured, and then released. Unidentifiable adult specimens, as well as ichthyoplankton samples, were preserved in 70% ethanol then sorted, counted, and identified in the lab. Water quality parameters were also collected including temperature, conductivity, dissolved oxygen, and pH at each creek using a YSI data sonde.

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RESULTS

<table>
<thead>
<tr>
<th>Water Quality Parameter</th>
<th>CR</th>
<th>PC</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>10.1</td>
<td>10.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Conductivity (µS/cm)</td>
<td>650</td>
<td>700</td>
<td>600</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/L)</td>
<td>6.0</td>
<td>6.5</td>
<td>7.0</td>
</tr>
<tr>
<td>pH</td>
<td>8.5</td>
<td>8.0</td>
<td>7.5</td>
</tr>
</tbody>
</table>

DISCUSSION

While the results of the ANOVAs were not significant, the results when graphed demonstrated that Pohick Creek had the highest spawning productivity in 2019 (Fig. 4) as result of Pohick having the highest abundance of larval river herring collected. Additionally, Pohick Creek had the highest spawning population size in 2019 (Fig. 5) as result of Pohick having the highest abundance of adult river herring recorded of the three creeks.

CONCLUSIONS

1. Pohick Creek likely supports a larger and more productive spawning population of river herring, specifically Blueback Herring, due to increased water temperature from effluent.

2. There are correlations between water quality parameters and river herring spawning populations. There was a positive relationship between larval river herring and adult Blueback Herring with water temperature, and a negative relationship between larval river herring and pH.

* Despite being managed together, Alewife and Blueback Herring have different relationships with water quality parameters.

REFERENCES:


ACKNOWLEDGMENTS