Building a Habitat Suitability Index for Olympia Oyster Restoration

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Dohrn, Charlotte, "Building a Habitat Suitability Index for Olympia Oyster Restoration" (2020). Salish Sea Ecosystem Conference. 16.
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Building a Habitat Suitability Index for Olympia Oyster Restoration

Charlotte Dohrn, University of Washington School of Marine and Environmental Affairs

INTRODUCTION

Olympia oysters – the west coast’s only native oyster species – are scarce throughout their range. An estimated 4% of oyster “beds” remain in the southern Salish Sea compared to historic populations. Restoration efforts are underway coastwide.

- Location within bays and estuaries is an important factor in restoration project outcomes.
- Restoration practitioners are interested in new tools to support identifying potential restoration sites.
- Habitat suitability index (HSI) models have been widely applied for oyster restoration and resource management.
- This study presents a preliminary spatial HSI model for Olympia oyster restoration in the southern Salish Sea.

DEFINING HABITAT SUITABILITY

Habitat requirements for Olympia oyster survival, reproduction, and population persistence were identified from a thorough literature review. Tidal elevation, mean spring/summer temperature, mean winter salinity, and maximum current velocity were selected as “threshold” habitat variables to include in the index, and HSI scores were assigned based on the literature. Risk of low salinity events and residence time were included in the HSI as additional “exclusion” habitat variables (i.e., score of 0 or 1). Table 1 shows the suitability ranges for the threshold habitat variables included in this study, recastified by four possible HSI score values, as shown in the key. The methodology applied to synthesize literature and translate suitable ranges to HSI scores was adapted from Lewis et al. (2019).

Table 1. Suitability ranges and HSI scores for four threshold habitat variables. The ranges below were defined using the “Framework to Identify Suitable Bivalve Habitat in Estuaries.” (Lewis et al., 2019).

<table>
<thead>
<tr>
<th>Habitat Variables</th>
<th>Suitability Ranges</th>
<th>HSI Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tidal elevation</td>
<td>Mean spring/summer temperature (°C)</td>
<td>Very Cold</td>
</tr>
<tr>
<td></td>
<td>Mean winter salinity (psu or ppt)</td>
<td>Very Cold</td>
</tr>
<tr>
<td></td>
<td>Maximum current velocity (m/s)</td>
<td>Very Cold</td>
</tr>
</tbody>
</table>

HSI RESULTS – LIBERTY BAY

Figure 1 shows the results of applying the HSI to Liberty Bay, Washington. In this study, reclassified by four possible HSI score values, as shown in the key. The methodology applied to synthesize literature and translate suitable ranges to HSI scores was adapted from Lewis et al. (2019).

ACKNOWLEDGMENTS & REFERENCES

- Funding for this work was provided to Charlotte Dohrn through a Department of the Interior Northwest Climate Adaptation Science Center graduate fellowship.
- Many thanks to Jodie Toft, Brian Allen, and the Puget Sound Restoration Fund Team for their invaluable collaboration and support throughout this project. Thanks also to my advisor, Terrie Klinger, for her thoughtful feedback and mentoring, and Sunny Jardine and other SMEA faculty for their guidance.

DISCUSSION

- This study presents an initial effort to develop and apply an HSI model to identify suitable habitat for Olympia oyster restoration in the southern Salish Sea.
- Results suggest that the HSI may identify suitable habitat in some areas (e.g., Liberty Bay and Dyes Inlet); however, analysis is needed to understand where the model may overpredict suitability and/or fail to identify suitable habitat for restoration.
- Potential applications of this work include using the model to preliminarily identify potential restoration sites, exploring potential climate change impacts to suitable habitat, comparing HSI scores with restoration outcomes, and others.
- Further research could focus on assessing the accuracy of environmental layers used to define the index and determining the best data sources, examining relationships between habitat variables and restoration outcomes using statistical methods, and gathering and analyzing data on restoration project outcomes.

REFERENCES

- Suquamish Tribe Fisheries Department. (2019). 2018 Suquamish Tribe Fisheries Department Restoration Overview, 1

COMMENTS, QUESTIONS, SUGGESTIONS, COLLABORATION?

I would love to hear from you! cdohrn@uw.edu

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