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Analyzing Trends of Dissolved Oxygen and Abundance of Crab Zoea in Possession Sound

Thunder Lambright
Ocean Research College Academy at EvCC

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Everett Community College

Introduction

Crabbing is a multibillion-dollar industry that greatly contributes to the economies of many coastal regions including the Puget Sound region. The health of crab populations depends on many environmental factors that are intertwined and connected. One of the most talked-about issues facing shellfish such as crabs is rising ocean temperatures. Higher temperatures can lead to lower dissolved oxygen levels which can suffocate marine creatures. Crabs are especially vulnerable to this threat and more data is needed to accurately predict and prevent such events. With the increase in ocean temperatures over the years, hypoxia has become increasingly more common. For this reason, knowledge of how low dissolved oxygen levels affect crabs at all life stages is critical for management strategies.

Study Site

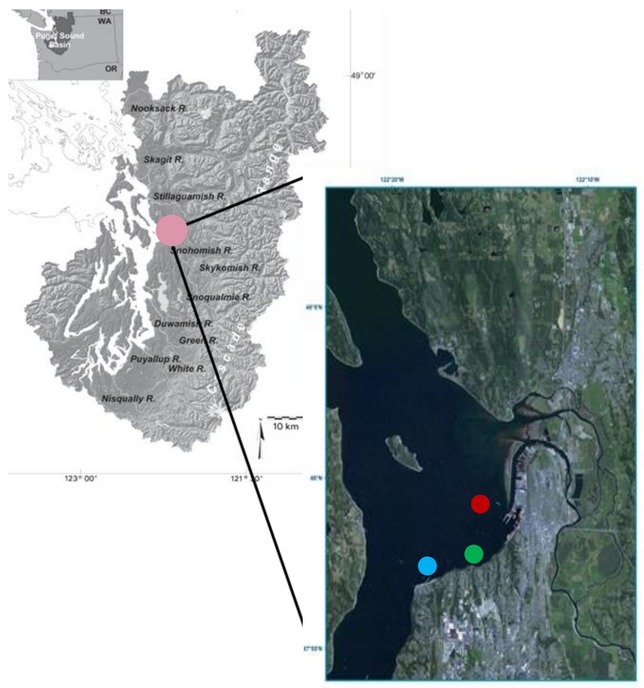

Fig. 1 Map showing Puget Sound (bottom) with Possession Sound marked by an orange circle. The close up of the Snohomish River Estuary system in Possession Sound (top) shows the three study sites: Buoy, Howarth Park, and MBT.

Results

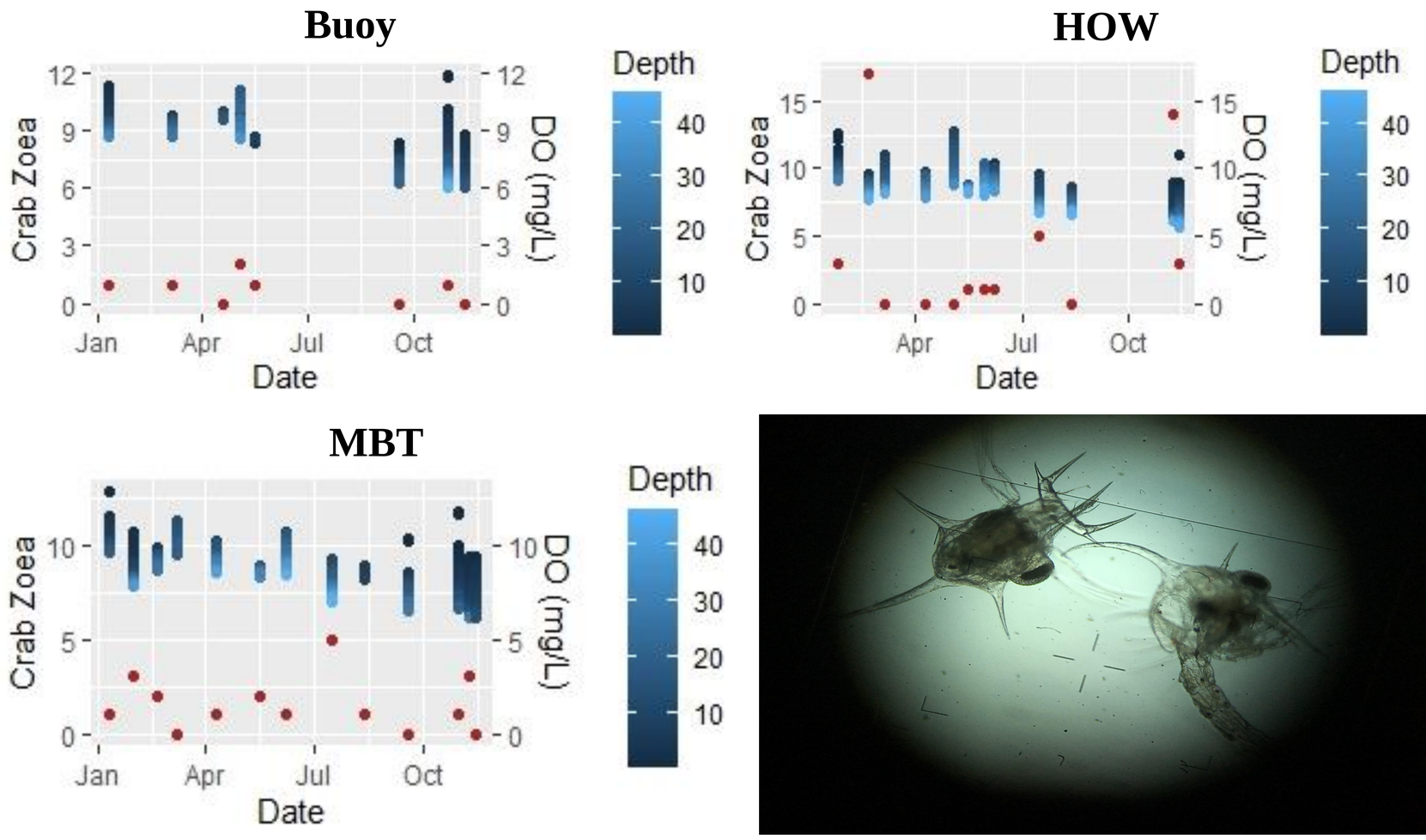

Fig. 2 Scatter plots showing crab zoea counts and dissolved oxygen levels for each cast at each site in 2019. Crab zoea represented by dark red dots, dissolved oxygen shown in blue in relation to depth

Fig. 3 Image of Crab zoea under microscope collected at MBT in 2019. (Photo courtesy of ORCA)

Methods

Fig. 4 Plankton net during horizontal tow. (Photo Courtesy of ORCA)

Fig. 5 ExoSound Device used to collect dissolved oxygen data. (Photo courtesy of ORCA)

Dissolved oxygen data was monitored with YSI and EXO sensors while crab zoea were collected on vertical and horizontal net tows then counted by my colleagues and I at ORCA.

ORCA

The Ocean Research College Academy is a dual enrollment program where high school juniors and seniors experience innovative, interdisciplinary and student-centered learning. A longitudinal study of the local estuary forms the backbone of the first-year experience, and leads students to conduct independent research in their second year of the program. ORCA has received grants for a research lab, research vessel, and summer research funded by the National Science Foundation.

Next Steps

Further Research will continue the analysis of dissolved oxygen and crab zoea trends in during 2015-2017 as well as 2020. Statistical analysis will examine the strength of the correlation between dissolved oxygen values and crab zoea. Early results show evidence for a delayed correlation between dissolved oxygen and crab zoea. More data across a larger timeframe must be collected to highlight seasonal trends in crab zoea numbers before drawing a final conclusion. As this research progresses, other chemical factors such as pH and temperature will also be included alongside dissolved oxygen

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