2021 South Sound Science Symposium Project Summary

Title: Experimental Olympia Oyster Restoration at Penrose Point State Park

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Project Summary: Native oyster beds are important for the ecosystem services they provide but are threatened globally. Regionally, Olympia oyster (*Ostrea lurida*) restoration has been identified as a priority in the Salish Sea. This study utilized experimental test plots, recruitment monitoring, and long-term monitoring efforts to better understand Olympia oyster restoration efforts. This report focuses on the results of the test plots with a short summary of other efforts.

In September 2020, we established 5 restoration test plots at Penrose Point State Park at approximately the 0 ft MLLW tidal height. The test plots were 10 ft by 10 ft and consisted of ~1 cubic yard of Pacific Oyster shell hash spread to a uniform thickness. We then seeded the plots with approximately 1,200 juvenile oysters (~ 25 mm in size). In October 2020 and January 2021, we surveyed the test plots for Oyster density, size, shell cover and spread. Additionally, the project monitored oyster recruitment fortnightly utilizing shell strings (Becker *et al.* 2020) at seven locations each at Penrose Point and Maple Hollow Park, as a reference site, during summers of 2019-20. To understand potential changes in the surrounding ecological community, we utilized Harbor WildWatch's long-term Beach Monitoring program for both locations. As part of this project, we expanded the Beach Monitoring program to three locations at Penrose Point to understand the spatial extent of community changes.

The test plots showed dramatic changes in the density of juvenile oysters and shell cover since being established (figure). The oyster density declined dramatically within the first month after outplanting and continued to decline over the first 4 months. After 4 months, survivorship ranged from 0-6%. We attribute most mortality to predation by crabs based on their rapid colonization of the plots and observations of damage on small Olympia oyster shells. The stability of the shell hash also varied over time and among plots. The percent cover of shell hash declined after 4 months across all plots (mean cover = 40-70%). The decline in shell cover was primarily associated with sinking of shell in test plots 4 and 5 and transport of the shell due to waves/currents in test plots 1-3. For the past two reproductive seasons, there has been extremely low Olympia oyster recruitment at both Penrose Point and Maple Hollow, with 1-3 recruits per season observed across 210 shells per site observed fortnightly. Although full analyses of community data have not yet been conducted, initial observations indicate a lack of community-level changes, as the

shell spread from test plots has been away from monitoring locations and recruitment of Olympia oysters has been functionally absent.

These findings indicate that any potential Olympia oyster restoration at Penrose Point, and potentially elsewhere, will need to consider spatial variability in substrate stability and the risk of predation to juvenile oysters. The low levels of recruitment will likely require simultaneous addition of shell substrate and oysters for restoration to be successful. Monitoring of this project will continue to determine the continued survivorship of outplanted Olympia oysters and their potential impact on the surrounding community.

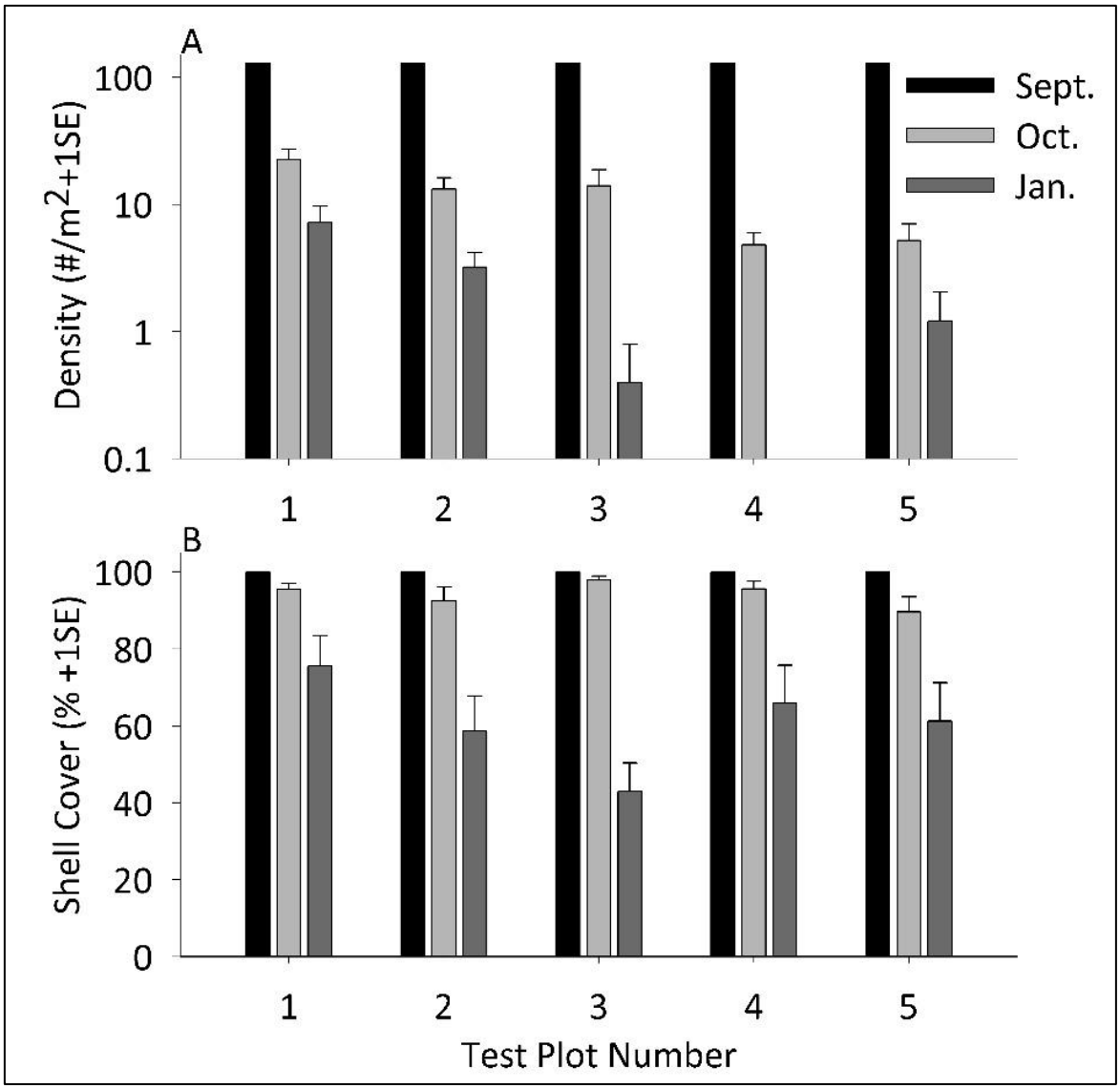

Figure. Density (A) of juvenile oysters and shell hash cover (B) on experimental test plots. Sept. 2020 densities were estimated based on initial outplants of 1,200 oysters per plot and full shell cover during plot establishment.

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Reference:

Becker, B. *et al.* (2020) Spatial and Temporal Distribution of the Early Life History Stages of the Native Olympia Oyster Ostrea lurida (Carpenter, 1864) in a Restoration Site in Northern Puget Sound, WA. Journal of Shellfish Research. 39(1): 43-58.