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Experimental Olympia Oyster Restoration at Penrose Point State Park

Stena Troyer
Harbor Wildwatch

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[1] Harbor WildWatch [2] PLU Pacific Lutheran University [3] W University of Washington Tacoma, School of Interdisciplinary Arts & Sciences

Troyer S [1], Behrens M [2], Becker B [3], Matheson-Margullis H [3], Davidson M [2], Benson A [3], Cross-Schroeder H [2], Marvin F [3], Buxel S [1]

Future Olympia oyster restoration at Penrose Point State Park will need to consider spatial variability in substrate stability and the risk of predation to juvenile oysters. If the main source of mortality is indeed predation, then a change in methodology should be adopted. Any restoration project needs to be monitored for success and impacts for a duration that is ecologically meaningful. Ongoing monitoring of this project will determine the continued survivorship of outplanted Olympia oysters and their potential impact on the surrounding community.

INTRODUCTION

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. In Puget Sound, the Washington State restoration plan recommends restoration of beds, specifically for "the re-establishment of self-sustaining, large-scale, dense native oyster assemblages able to function as source populations" and not for commercial harvest (Blake & Bradbury 2012). The goal of this study was to determine the feasibility of a large-scale Olympia oyster restoration at Penrose Point State Park.

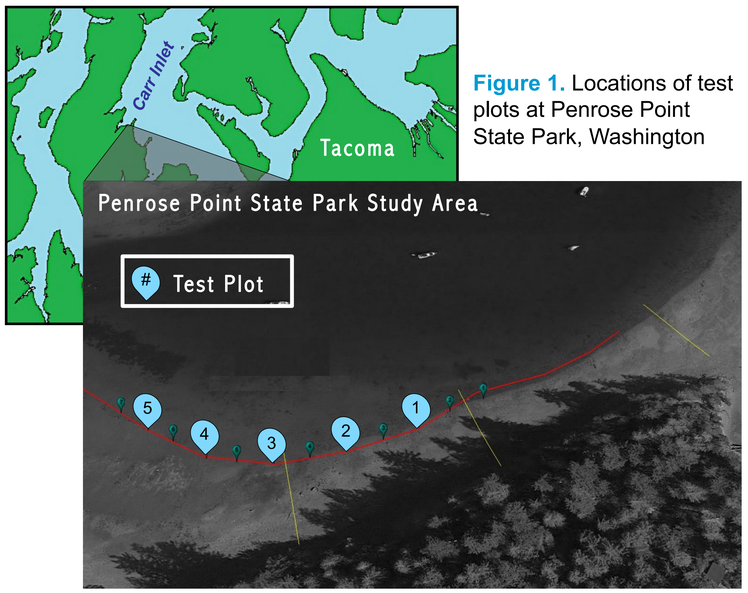

Figure 1. Locations of test plots at Penrose Point State Park, Washington

METHODS

In September 2020, we established 5 restoration test plots (10x10ft of ~1 cubic yard of evenly spread Pacific oyster shell hash) at Penrose Point SP at approximately the 0 ft. MLLW tidal height (figure 1). The plots were seeded with approximately 1200 juvenile oysters (~ 25 mm in size) on the surface of the shell hash on each test plot (figure 2).

In October 2020, January, April and June 2021, we surveyed the test plots for oyster density, size, shell hash cover and shell material spread. These surveys consisted of estimating percent cover of shell hash, counting and measuring live Olympia oysters within ten randomly placed 1/4m^2 quadrats, and measuring shell transported beyond the test plots.

Figure 2. Measuring outplanted Olympia oysters (circled in yellow) in one of five experimental test plots.

RESULTS

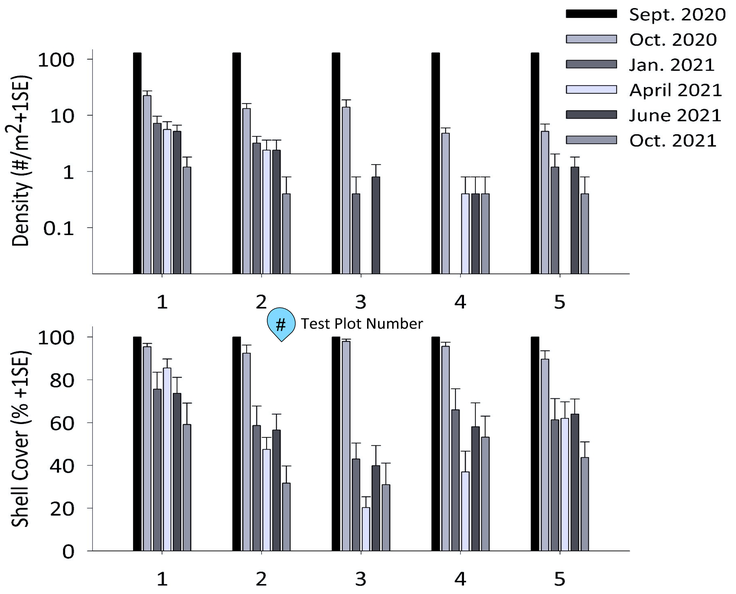

Figure 3. Density (top) of juvenile oysters and shell hash cover (bottom) on experimental test plots from September 2020 through June 2021.

< OYSTER DENSITY: Olympia oyster density declined dramatically within the first month after outplaning and continued to decline over the first 6 months (figure 3) likely due to predation by red rock crabs and/or raccoons based on observations of shell damage.

After 6 months, survivorship began to stabilize and ranged from 0-6%. Much of the variation in the density after January 2021 is likely due to random sampling of the quadrats as test plots 1-3 had densities equal to zero but later increased.

> OYSTER SIZE: Olympia oyster size varied over time (figure 4). The initial decline was likely driven by selective mortality of larger individuals by predation.

After January 2021 , the average size of the remaining individuals increased from January through October 2021 due to growth.

Figure 4. Change in size of outplanted juvenile Olympia oysters across time from October 2020-21.

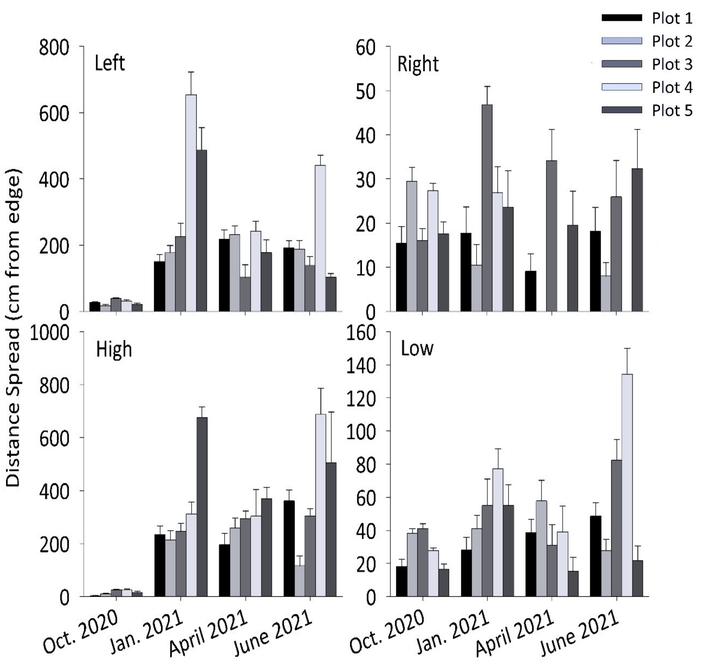

Figure 5. Average movement of shell hash from the test plots from October 2020 - June 2021.

< SHELL MOVEMENT: Stability of shell hash varied over time and among plots (figure 5) where the shell hash remained stable for the first month and then the percent cover of shell hash declined after 4 months across all plots (mean cover – 40-70%) and then stabilized.

Variation of shell transport is likely driven by changes in orientation of the shoreline and surrounding substrate (figure 1).

The decline in shell cover within the plots was primarily associated with both transport of the shell due to waves/currents in test plots 1-3 and sinking of shell and transport in test plots 4 and 5.

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