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Olympia Oyster Restoration

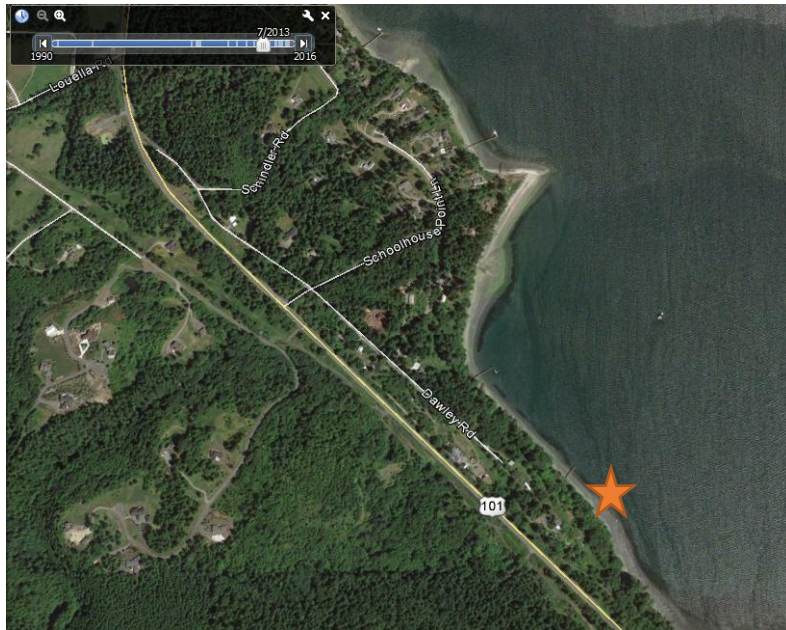
Introduction

The Clallam County Marine Resources Committee (Clallam MRC), Jamestown S'Klallam Tribe (JST) and Puget Sound Restoration Fund are working together to restore Olympia oysters in Clallam County with a focus on Sequim Bay. The effort is part of a larger goal underway to restore 100 acres of Olympia oyster habitat in the Puget Sound area by 2020.

In 2012 one acre of JST tidelands in Sequim Bay near Blyn was dedicated to Olympia oysters. Grow-out bags with approximately 6,200 Olympia oyster seed were planted on the tidelands and the following year seeded cultch bags with approximately 500,000 oysters were spread onto the tidelands. In 2014 seeded cultch bags with approximately 250,000 seed were spread on to an additional half acre of tidelands making the total restoration site 1.5 acres.

The successful restoration effort on Jamestown's tidelands prompted Clallam MRC and their partners to search for other potential restoration sites in Sequim Bay. Several potential sites in Sequim and Dungeness Bay were investigated. Site assessments were conducted at Dungeness Farm and Washington Harbor and test plots were established at Pitship Point and Cline Spit. The test plots at both locations revealed that these sites were not suitable for Olympia oyster restoration because of exposure to wave and wind action. In addition, the Dungeness Farm site was deemed too exposed and sites in Washington Harbor were either too close to eelgrass beds or the landowners were not interested in allowing Clallam MRC access to their tidelands.

The newly restored Dawley Road property was another potential site and in September 2017 Clallam MRC submitted a Special Use Permit to the US Fish and Wildlife Service asking for permission to establish two test plots at their Dawley Road property in Sequim Bay (Figure 1). In September 2018 Clallam MRC received the Special Use Permit. Installation of test plots at the Dawley Road site is planned to take place October 5, 2018.



Google Earth picture of the shoreline around the Dawley Road site taken at low tide in July, 2013. The USFWS property is identified with a red star



Figure 1. Location and tidelands at the Dawley Road property

In May 2018 the JST proposed using a parcel of tidelands that they lease from WA Department of Natural Resources at the head of Sequim Bay. The site is approximately 700 ft. east of the current restoration site and covers an area of $\frac{1}{2}$ - $\frac{3}{4}$ acre or acres. At the May 2018 meeting the Clallam MRC agreed to pursue this site as the new restoration site.

On July 19th more than 100 bags of Olympia oyster seed were moved from the area they have overwintered to the new restoration site at the head of Sequim Bay (Figure 2). The work was done by three JST employees and Clallam MRC staff. On August 13th a crew of volunteers and tribal biologists spread the more than 100 bags of Olympia oyster seed at the new restoration site. The work was done by three JST employees and two Clallam MRC members.



Figure 2. Elizabeth Tobin, JST shellfish biologist, pulls up some of the oyster bags. Chris Burns, JST senior technician, and volunteers spread the oysters at the new restoration site.

Jamestown Tidelands Restoration Effort Summer 2018

An Olympia oyster population survey was completed at the Jamestown restoration site by five members of JST on September 10th 2018. The purpose of this survey was to estimate the size and survivorship of the Olympia oyster population within the 1.5 acre boundary of the restoration site, determine the perimeter of the oyster bed and identify the size distribution of the Olympia oyster population. The following report was submitted by Elizabeth Tobin to the Clallam MRC.

2018 Olympia Oyster Population Survey Jamestown Tidelands Restoration Site

An Olympia oyster population survey was completed at the Jamestown restoration site by five members of Jamestown's Natural Resources department on September 10th 2018. The purpose of this survey was to estimate the abundance, delineate the population perimeter and identify the size range of the Olympia oysters associated with the 1.5-acre restoration site on Jamestown's Tribal tidelands.

Survey Methods:

The population survey was carried out using a systematic random design to eliminate any bias in the sampling protocol. The Olympia oyster survey was conducted during a 0.1 ft MLLW tide so that the entire oyster bed was exposed to allow for complete sampling. Eight transects, spaced 30 feet apart, were laid out along a 4° compass heading which ran from the southern boundary to the northern boundary of the restoration site (Fig. 1). Along each transect, Olympia oysters were sampled within 0.25 m² quadrat "sample plots". The starting position of the first transect from the Southwest corner and the starting position of the first 0.25 m² sample plot for each transect were randomized using a random number generator. After placement of the first 0.25 m² quadrat, subsequent sample plots were spaced approximately every 30 feet along each transect. A total of 63 sample plots (equal to a total sampled area of 16 m²) were examined for Olympia oysters within the bounds of the restoration site. This sampling protocol allowed for consistent stratified sampling throughout the site. All substrate, down to about 2 inches, was examined within each sampling plot to determine the total number of live and dead Olympia oysters. Shell length (measurement from the hinge to the longest edge of the shell) was measured in every other quadrat divisible by 2. A survey grade GPS unit was used to walk the perimeter of the observed Olympia oyster "bed" (i.e., population area). All field data was compiled and analyzed by Jamestown's Shellfish Biologist, Liz Tobin, and reported to the Clallam MRC.

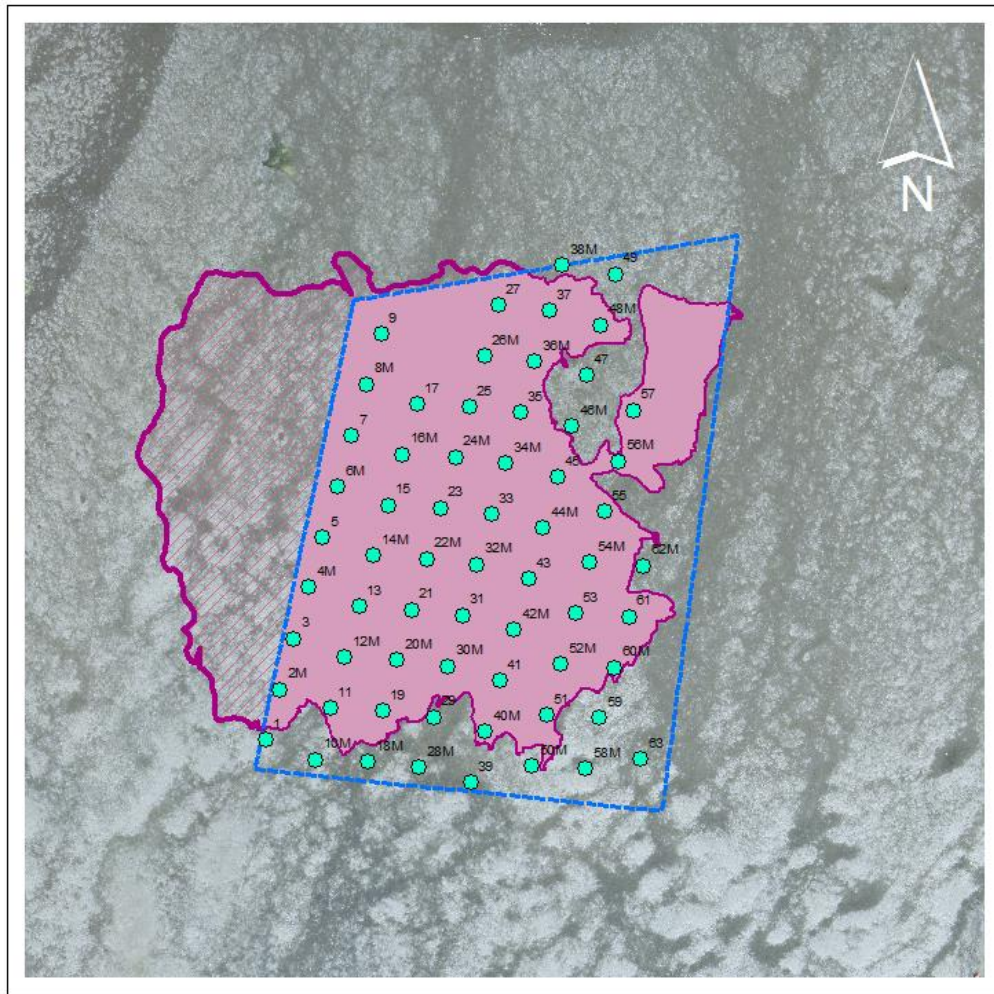
Survey Results:

In 2018, the area of the Olympia oyster bed was observed to cover an area of 1.5 acres. Compared to previous years, the oyster bed appeared to expand west of the restoration site boundary. For consistency with previous population surveys the 2018 survey was only conducted within the bounds of the 1.5-acre restoration site, and therefore, a sizeable proportion (~0.5 acres) of the Olympia oyster bed was not sampled because it fell outside of the restoration site boundary (Fig. 1 & Fig 2). The 2018 Olympia oyster population estimate within the Jamestown restoration site is 19,429 individuals (Table 1). A mean density of 3.7 oysters per m² was calculated for the entire 1.5-acre restoration site and a mean density of 4.7 oysters per m² was calculated within the sampled oyster bed area (~1.05 acres). Olympia oysters exhibit a high-level patchiness, even within the identified oyster bed area, resulting in the low mean density due to the large number "zero" observations (Fig. 3). Assessment of Olympia oyster survivorship indicated that 84% of the counted oysters were viable. The size range of the subsampled live adult oysters was 8 - 58mm. The lower end of the oyster size distribution indicates the presence of new recruitment to the site.

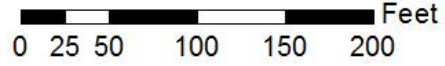
Overall, the 2018 survey results indicate that restoration efforts have generally been successful at the Jamestown site as Olympia oysters appear to be surviving, growing, reproducing and expanding their

Maps and report prepared by:
JST Shellfish Biologist, Liz Tobin
9/26/2018

population area. However, Jamestown biologists have determined that a lack of suitable substrate within the restoration site is, in part, accounting for low oyster densities within the site. Efforts to enhance shell substrate for Olympia oyster settlement will be necessary to ensure long-term population stability and oyster reef-building at this site.



2018 Blyn Olympia Oyster Restoration Site Survey



- Sample Plots
- ▭ Restoration Site Boundary (1.5 acres)
- ▭ Olympia Oyster Bed w/in Restoration Site (1.05 acres)
- ▭ Olympia Oyster Bed (1.5 acres)

Figure 1: 2018 Jamestown Olympia oyster population survey. The magenta boundary is the perimeter of the Olympia oyster bed (i.e., population area) in the vicinity of the restoration site. The shaded pink shows the portion of the oyster bed area that falls within the restoration site boundary where the population survey took place.

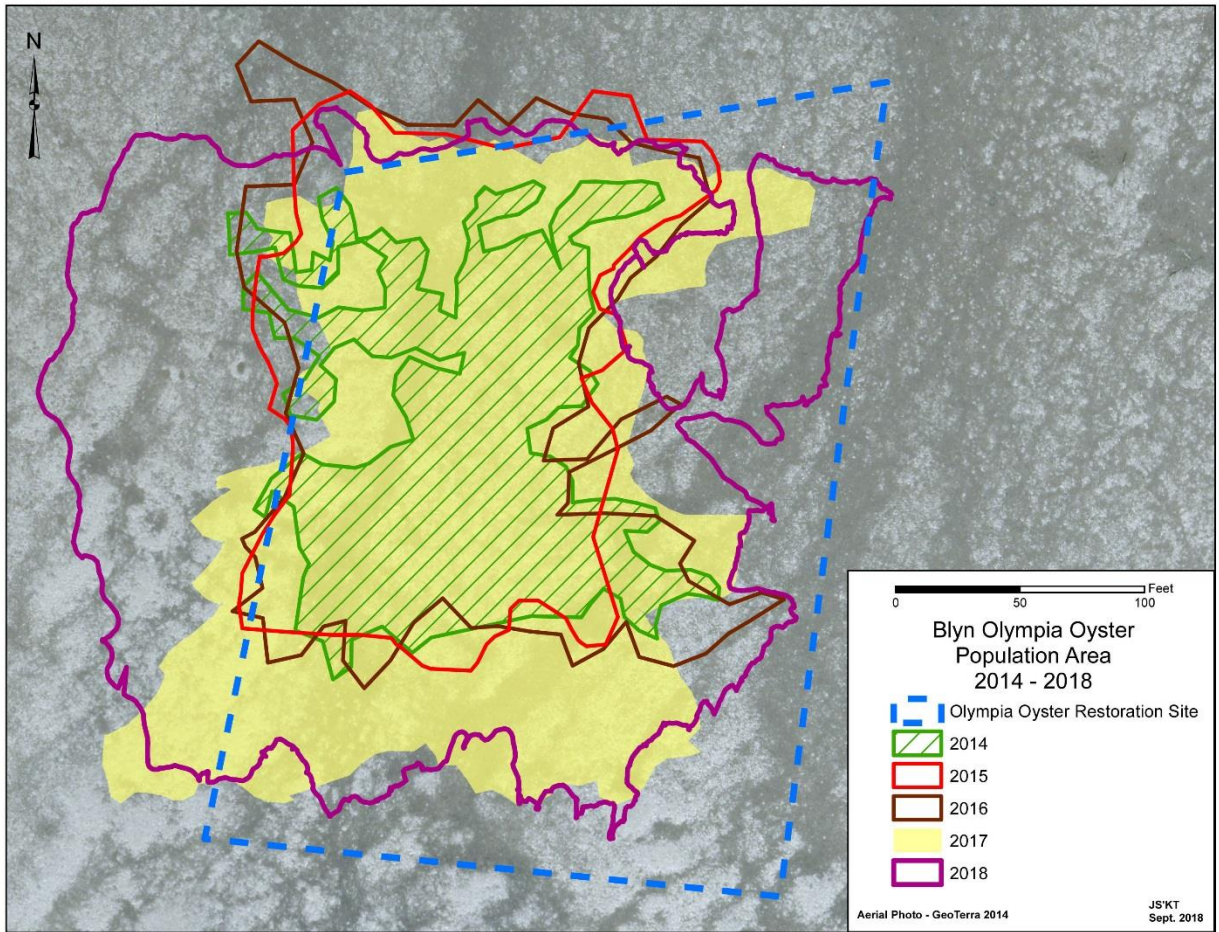
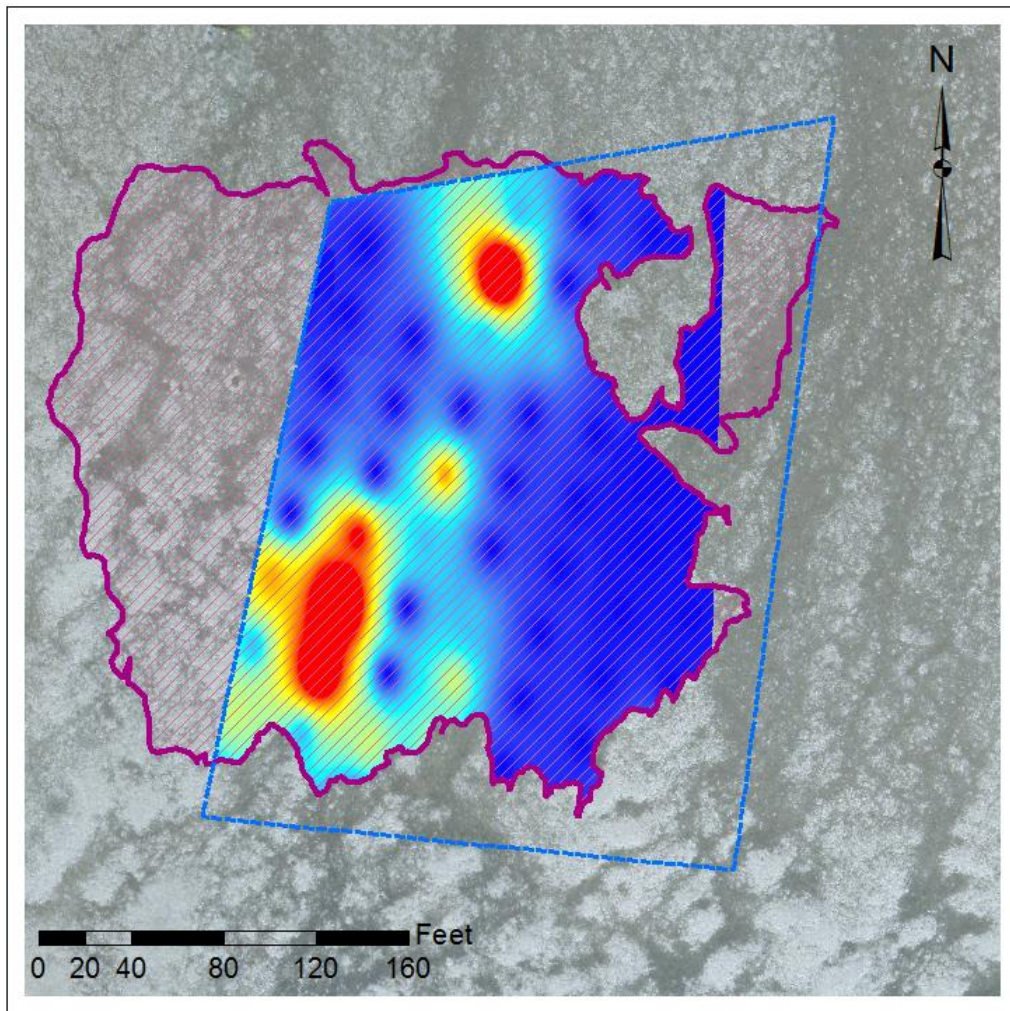


Figure 2. Olympia oyster beds boundaries from population surveys completed from 2014 - 2018 are compared.

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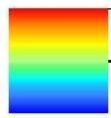
Table 1: Oyster density data, population area and population size estimate for the Jamestown Olympia oyster restoration site from 2014 – 2018. The 2018 population estimate includes 95% confidence intervals.

Survey Year	Mean Restoration Site Density (# m ⁻²)	Population Area (acres)	Mean Population Area Density (# m ⁻²)	Population Estimate	Notes
2014	--	0.42	28	46,800	Survey only within oyster bed area; 39 subsamples
2015	18	0.64	24	46,620	Unseeded cultch added; Survey throughout 1.5 acre restoration site
2016	15	0.74	19	55,770	Survey throughout 1.5 acre restoration site: 51 subsamples
2017	5	1.05	8	33,978 (±15,783)	Restoration site shifted southward, Survey throughout 1.5 acre restoration site: 78 subsamples
2018	4	1.5	5	19,429 (±10,431)	Survey throughout 1.5 acre restoration site: 63 subsamples



Olympia Oyster Density

Value



High : 32

Low : 0



Restoration Site
Boundary (1.5 acres)



Olympia Oyster Bed
(1.5 acres)

Figure 3: 2018 Olympia oyster density ($\#/m^2$) at the Jamestown restoration site in Sequim Bay. Data are interpolated in ArcGIS 10.5.1 using inverse distance weighting. The analysis was masked by the Olympia oyster population boundary within the restoration site. Red designates the high density Olympia oyster patches within the surveyed population area. Blue designates areas within the restoration site with no Olympia oysters.