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Subject: Progress on Isthmus slough bridge native oyster restoration effort

Background/ abstract:

Currently, native oysters, *Ostrea lurida*, occur naturally in only Coos and Yaquina bays, and as part of re-introduction efforts in Netarts. Upper Coos bay populations appear the most viable of the state where densities and recruitment patterns are compared to those of other estuaries/ areas (Gray, 2010). This population was first detected in 1986, hundreds of years since local extirpation (Baker, 1995) To further encourage this populations rebound ODFW has undertaken selected restoration projects, piggybacking on DSL, ODOT, and other permits within the populations area, requiring mitigation.

This project is the second of its kind, performed similarly to 2008 work at the Glenbrook nickel site. In a similar fashion, pre work surveys were conducted, work was performed, shell was then added back to the site, surveys are planned in the future to determine effectiveness of work. Mitigation efforts such as this are intended to give small populations of native oysters an enhanced starting point after area construction effects prior populations.

Introduction

In cooperation with Oregon Department of Transportation (ODOT), ODFW worked to help mitigate for work performed on the Isthmus slough bridge. The bridge, built in the early 1900's, still had wood supports which were replaced with steel.

Figure 1: Isthmus slough bridge 2010

Native oysters were known to be abundant in the area, and since heavy disturbance of the mudflats was expected with this work, mitigation for native oysters was appropriate.

Random systematic surveys were conducted prior to work to define the pre- mitigation condition. This data will be used later to define the success of the project.

Oysters present at site prior to the work were expected destroyed given the nature of the work.

When work was complete, ten cubic yards of locally grown, whole, Pacific oyster, *Crassostrea gigas*, shell was placed below the bridge to enhance available settlement substratum for native oyster, *Ostrea lurida*.

Pre-work survey:

The expected vicinity of the work was surveyed via semi-systematic sampling. Transect lines of strata were developed at the +3, +2, +1, and 0' MLLW tidal levels via flagging points off at times known tidal levels. Each line was approximately 100 feet in length.

Quadrat sampling occurred at each 10 feet along the transect line systematically, beginning at a random point within the first 10 feet of each transect line. Counts and shell heights were measured at each quadrat. 10 quadrats were examined in each of the 4 transects, totaling to 40.

Survey work was conducted on 2 consecutive nights in November.

Data:

Densities:

Densities were high and concentrated on the level areas at lower tidal elevations. It is likely that this is in part due to increased substrate available resultant of less sloped

Table 1: Density data at Isthmus slough bridge

Transect elevation	Sample size (# of quadrats)	Mean density (oysters/ m^2)	C.I. of Mean
0 MLLW	10	83.6	123.8
1 MLLW	10	205.6	175.2
2 MLLW	10	75.6	55.0
3 MLLW	10	18.8	17.8

Size structure:

Length frequencies trended to smaller oysters in the higher strata, as is casually observed throughout their range. L/F distribution was found to be very significantly lower (P = <0.001) at 0 and +1 MLLW elevations when compared to +3 MLLW elevation using a Mann- Whitney rank sum test. Using the same test, significant differences were detected between l/f data from 0 and +1 MLLW when compared to +2 MLLW (p= 0.014, p= 0.004).

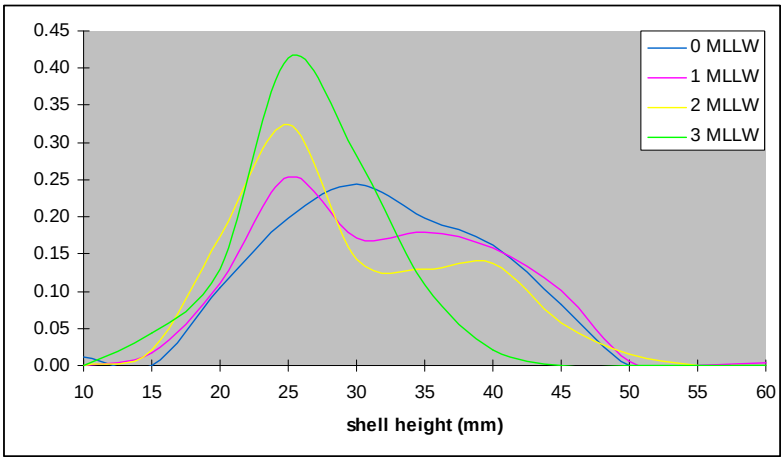

Figure 2: histogram of size frequency bins at tidal strata

Position:

The position of the oysters is an important element to guide future restoration efforts, though is difficult to measure. Casually, it is easy to observe that a few things play important roles in the successful oyster beds, though these things are difficult to measure with small scale efforts such as this. At this location, bed area which was most healthy (accounting for density, and condition) at the most level, lowest area. The area under bridge tended to provide this even grade, when combined with harder bottom that gravel placed under the bridge provided, those areas were found most populated.

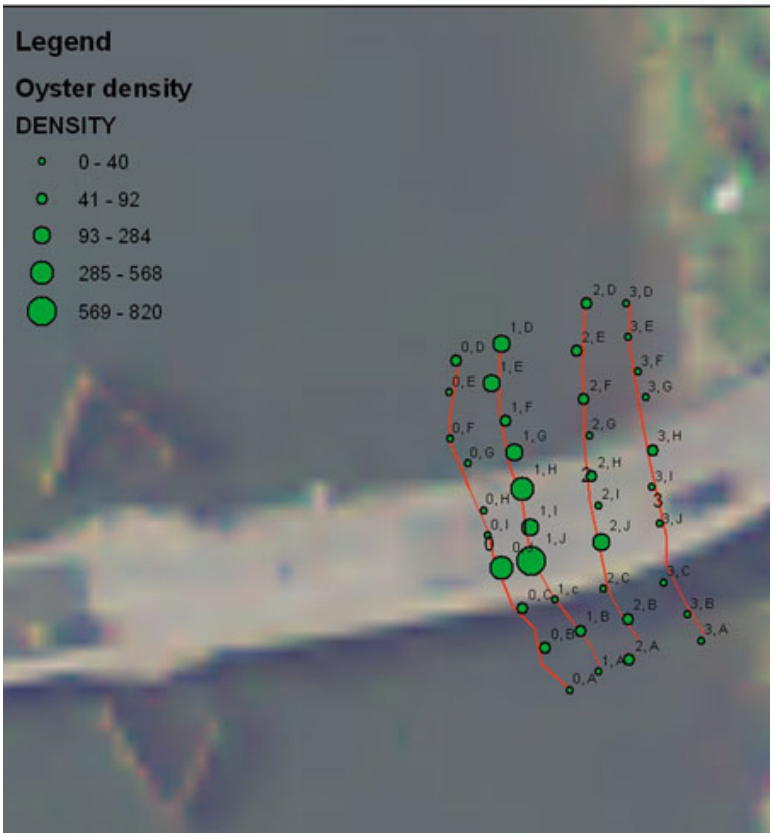

Figure 3: Map of samples with densities

Work/ placement of substrate:

After the work was complete, ten cubic yards of whole Pacific oyster shell was placed at the tidal flat areas roughly between -1 and +2 MLLW. Crafty constructions crews, more familiar with a crane than a boat, made an interesting way of placing the material.

Figure 5: Crane moving shell material

Figure 4: dumping shell

What does it all mean?

It appears, as in the Glenbrook nickel site, oysters tend to be most successful in low gradient areas below +2 MLLW where attachment substrate is available. The target of the placement material was exactly this.

What's next?

Site will be monitored again in a year or two, then into the future as suitable. Information will be added to the growing knowledge of restoration techniques and applied, where appropriate to mitigation opportunities.

Figure 6: Post work view, most new shell below pictured tidal level