

JCMRC Olympia Oyster Project QA / QC Plan

July 2007 – June 2009

Introduction

The Olympia oyster, *Ostreola conchaphila*, is the only oyster native to the Pacific Coast of North America. It was once common in Puget Sound but since the arrival of European settlers, pollution, over-harvesting and habitat loss have taken their toll on native oyster populations. Though greatly reduced in density, viable populations of *O. conchaphila* still exist in Puget Sound waters. It is the purpose of this project to:

- Task 1 - Continue research on the population located in southwest Discovery Bay. A characterization of the reproductive health, including larval settlement monitoring will be completed. A survey of this oyster population by location (GPS mapping), estimated numbers, size distribution and age will be completed.
- Task 2 - Identify three additional eastern Jefferson County native oyster population locations. Locations will be identified and characterized through geographic location (GPS). Population density and size distribution will be estimated.

Task 1 - Sampling and Monitoring Plan for Discovery Bay Site

Reproductive Cycles

The gametogenic cycle in native oysters is determined primarily by water temperature. Olympia oysters must be in temperatures ranging from 55 – 61 degrees F for spawning and brooding to occur. In order to correlate water temperature to spawning behavior, continuously recording thermographs have been installed within the existing oyster beds in the sub-tidal pond and the drainage lagoon. Temperature data is periodically downloaded and archived at Taylor Shellfish Laboratory in Quilcene, WA. The data will be analyzed by Dr. Joth Davis (JCMRC member and advisor to this project).

Olympia oysters will be sampled at approximately weekly intervals beginning in mid- April and continuing through June or when the majority of sampled oysters are determined to have spawned. Forty oysters will be collected during each sampling event, twenty each from the lagoon area and the sub-tidal pond. The oysters will be transported to Taylor Research Lab in Quilcene, WA. At the lab each oyster will be weighed and measured. Cross-sections of gonadal tissue will be removed from each oyster and a sub sample sent off-site for histological processing. Histological slides will be returned to Taylor Research Lab and analyzed for gametogenenic development. Samples for gametogenesis will be processed using standard histological techniques.

Salinity will be measured during each sampling event.

Age Structure (size / growth rate / survival)

The population age structure examination commenced in July 2007. For this measurement, 200 live oysters were selected along a transect line located from the sub-tidal pond through the berm breach to the lagoon drainage channel. The oysters were transported to the Taylor Shellfish Laboratory in Quilcene, WA where they were measured for height and width (1mm) using vernier calipers. Easily removable epifauna (limpets, mussels, small barnacles) was scraped off the oysters. Heavily set barnacles were left in place as removal may have damaged the oyster shell. The oysters were then cleaned, dried, and sanded with 220 grit sandpaper. The shells were then wiped with 75% Ethanol. Plastic FLOY® Fish tags were attached to each individual oyster with epoxy glue. The oysters were kept in a cooler or in water baths when not being worked on. The oysters were returned to the research site during the next low tide and placed into plastic oyster trays. The trays were securely anchored to the substrate. The tagged oysters will be held on shell trays through the next growing season. Measurements will be repeated at the end of the 2008 field season to determine a growth rate per age class. Growth increments will be scored and changes in size/age categories will enable the calculation of growth and survivorship and possibly recruitment parameters for this population.

Larval Settlement:

Sampling for the assessment of larval recruitment was standardized with other regional researchers (Brian Allen – PSRF and Allan Trimble – UW). Samplers have been constructed according to a design provided by B. Allen (see photo).



Nine samplers will be installed during the first reproductive sampling event in mid-April. The samplers will be installed at three locations: the sub-tidal pond near the old tide gate; at approximately the 4.4'MLLW line of the lagoon; and at approximately the 1.5'MLLW line of the lagoon. The sampler replicates will be installed one meter apart. The cultch shell strings will remain in place until larval brooding is observed during reproductive stage monitoring. At such time, the cultch strings will be removed and placed in an isolated "grow out" tank at Taylor Shellfish Laboratory, Quilcene, WA for 2-3 weeks and then examined for evidence of larval recruitment. Cultch shell strings will be set and collected on a weekly basis through July (or for one month after the majority of oysters have spawned).

Population Assessment (size, density and geographic distribution)

This portion of the study will be conducted by Puget Sound Restoration Fund staff. To assess the population for size, density, and geographic distribution in the lagoon drainage and sub-tidal pond, PSRF staff will employ a protocol in development. This procedure borrows from the WDFW standardized - random approach for sample density (see Campbell 1996).

The primary responsibility for coordinating sampling and monitoring activities at the Discovery Bay research site rests with Port Townsend Marine Science Center (PTMSC) staff with guidance and expertise from Washington Department of Wildlife biologist (Brady Blake), the Puget Sound Restoration Fund staff and MRC member, Dr. Joth Davis.

Task 2 - Identification of additional native oyster populations

These surveys will be organized and conducted by the JCMRC Shellfish subcommittee chairman with assistance from Mr. Brady Blake (WDFW) using the survey and record keeping protocols established in 2005 (see following); A corps of trained volunteers will assist in the field.

Field Survey Protocol

1. Arrive at the survey site a minimum of one hour prior to low tide
 - a. Olympia oysters are generally found at tide heights below -1.0'.
 - b. Look at the overall site to develop a survey strategy (i.e. homogenous substrate vs. varied; presence of microhabitats, etc.).
 - c. Note any freshwater sources such as seeps, springs, or streams
 - d. Take GPS coordinate reading and note on field sheet.
 - e. Fill out site, weather, tide, and personnel data on field sheet.
 - f. Take photos of the beach and document on field sheet.
 - i. Show the beach zones from lowest intertidal to upland
 - ii. Show the "length" of the beach (extent of habitat along shoreline).
 - iii. Photograph any microhabitats where Olympia oysters are present.
2. Start at the lowest intertidal section of the beach. This should be below the pacific oyster "belt" if present.
 - a. Note substrate type on field sheet (silt, sand, muck, etc.)
 - b. Examine any microhabitats in this zone (pilings, boulders, patches of shells).
 - c. Olympia oysters, if present, can be attached to any permanent hard substrate in the zone.
 - d. Pay attention to any low, wet spots behind shoals, shell a/o sand bars.
 - e. Look on the underside of shells and cobbles.
 - i. *Note: Olympia oysters seem to prefer to set on Pacific oyster shell; acorn barnacle clusters; rocks.*
 - f. Look on the side of boulders that are protected from wave action, such as undercuts and crevices.
 - g. If Olympia oysters are found
 - i. Measure the height of the tide and slope of beach (see separate instructions) and note on field sheet.
 - ii. Take GPS coordinates
 - iii. Photograph
 - iv. If identification is in question, take a sample for Brady Blake (WDFW) to confirm. Include a label with site information.

- h. Note any predators common to Olympia oysters (sea stars, moon snails, Japanese drills, large crabs – Dungeness; red rock)
 - i. Estimate size distribution by measuring a minimum of 100 randomly selected oysters using vernier calipers.
 - j. Estimate population size by “random haphazard” quadrat sampling (use PSRF protocol – contact Brian Allen)
3. After surveying the entire length of the site in the lower intertidal zone, walk the middle tide zone back to the start point (the Pacific oyster “belt”).
 - a. Examine any low areas where water has remained (behind shoals, etc.)
 - b. Follow the survey procedure outlined in #2.
4. Examine any lagoons or “backwater” areas in the upper intertidal.
 - a. Olympia oysters may be found in areas higher on the beach (+2.0’) that retain water on minus tides.
 - b. Follow the survey procedure outlined in #2.

For each survey, compile a folder containing the following:

- Completed survey form
- Photographs
- Maps
- Correspondence
- Any other pertinent misc. information

QA/QC

Data collection and compilation

The Project Coordinator will organize data collection with protocol oversight by Dr. Joth Davis. The Project Coordinator will ensure that any volunteers associated with the project are following established data collection protocols. The Project Coordinator will compile data on EXCEL spreadsheets and forward to Dr. Davis for analysis. We will ensure that the data is accurate by strictly adhering to the collection protocols.

Data storage

The data will be stored electronically on compact disk (CD) and / or on “Flash” drive back-up. The data will also be kept on the Project Coordinator’s computer hard drive. Electronic and hard copies of the data will be kept on file at the Port Townsend Marine Science Center (Executive Director’s office).

Data analysis

The data will be analyzed by Dr. Joth Davis.

Data use

Data will be included in a final report and made available to Washington Department of Fish and Wildlife (WDFW), Puget Sound Restoration Fund (PSRF), Marine Resource Committees, and other organizations conducting

restoration projects. The purpose of collecting the data is for research and education.

Personnel Qualifications

- Project Coordinator: Karen Lull has a BS Environmental Science and Ecology with extensive experience in field and laboratory procedures.
- Oversight: Joth Davis has a Ph.D. in Fisheries Sciences with a focus on molluscan ecology/ physiology and aquaculture. He has extensive experience with data and statistical analysis.