Brief Project Summary--

Hatchery produced offspring from 3 populations in diverse habitats reciprocally transplanted in each of the bays and a 4th novel bay at Manchester. Animals monitored for growth, development, reproductive fitness/success, and mortality to determine any phenotypic differences between each population at each site. Samples collected from all populations at sites which have undergone major mortality events. These samples will be sequenced using Rad-Seq technologies to determine any genetic differences as each site.

Hatchery and Outplanting--

Puget Sound Restoration Fund collected broodstock from known oyster populations within Fidalgo, Dabob, and Oyster bays. These bays lie on a North-South axis and were selected based on the diverse environmental factors affecting each bay as well as their importance to restoration and commercial shellfish efforts. Broodstock were spawned in early to mid June 2013 and offspring were grown out under common garden hatchery conditions until mid August. Animals were out planted in standard growout trays in each of the three bays as well as Manchester.

October/November Site Checks--

The sites were visited in October to assure that animals were surviving and that no confounding factors were at work. It was determined original tray placement was not optimal in three bays and the decision was made to move samples. From late October until mid November samples were moved from their original intertidal surface placement to hanging off floating docks in Fidalgo, Oyster, and Manchester Bays.

1st Sampling--

The first sampling event occurred in mid to late December when it was discovered that a major mortality event had occurred at Dabob bay which could possibly be linked to a severe drop in temperatures during early December. At that time we decided to samples all populations at all sites in an effort to get representative samples should another major mortality event occur at any of the other sites. 32 animals per population per site were sampled at Fidalgo, Manchester, and Oyster Bays. At Dabob we attempted to sample 64 animals per population to ensure large enough sample size for sequencing. We also counted mortalities at each site and took size and weight measurements on live samples from each site for intra- and inter- population and site comparisons.

Dabob 2nd Sampling--

Dabob was sampled again at the end of January during a monitoring visit to get accurate live counts from remaining animals. Upon visiting the site we found that another 50% of the remaining animals in each population had died. 40 oysters were collected from each population and processed for later sequencing. We also did full live counts, mortality counts, size and weight measurements to compare to december samples as well as between populations.

February Site Monitoring--

In light of the continued mortalities at Dabob we revisited Manchester, Oyster, and Fidalgo Bays. No samples were taken due to the high survival rate at each site. Images were taken of all trays to measure growth using image analysis software. We collected the few mortalities for further analysis from each site. Also Oyster Bay lost 1 set of 3 trays due to an equipment failure. The trays may be recoverable but we won’t know until a low tide event during daylight hours.

Results from December/January

Moving Forward--

Reproductive Success/Fitness

To assess reproductive success we have decided to use two direct approaches with the possibility of an indirect measure. First we are testing whether a sedation method can allow use to collect larvae from brooding females during the latter part of May and early June. We have an experiment on going right now to see if this treatment induces mortality and if we can successfully flush the inside of the bill with sea water. Second we are planning on building larvae traps based on designs created and used by Dr. Bonnie Becker at UW-Tacoma for her larval research. These traps will hang from the bottom of our trays and hopefully collect any offspring produced by population. These larvae will then be used for population assignment tests to determine relative reproductive success of each population. A third indirect method will be to take samples and concurrently process them for molecular biomarkers for development such as vitellogenin and prostaglandin content.

Stress Tolerance and Fitness

Based on a short pilot experiment run in November we are looking at running a month long stress experiment on the three populations within a hatchery setting. These animals will then be processed for RNA to determine differences in response to stress. This will give us stronger phenotypic evidence for differences seen anecdotally between populations as well as any differences seen from sequence data that will be generated in the future.