Olympia oysters, *Ostrea lurida*, in Puget Sound, Washington are known to initiate reproduction at a specific temperature threshold. Bays along a latitudinal gradient within the Sound exhibit temporal variation in attaining this temperature. This gradient of habitat types has been shown in recent studies (Savolainen, 2007) to induce the phenomena of local adaptation within semi sessile and sessile native organisms. Since O. lurida is native to the west coast, it is hypothesized that populations along a latitudinal gradient have become locally adapted to their environment. This adaptation would have important ramifications for conservation and restoration projects within the Puget Sound. To test these differences we set up a reciprocal transplant experiment among three populations from Fidalgo (Northern), Dabob (Central), and Oyster (Southern) bays along a latitudinal axis as well as a fourth bay (Manchester NOAA facility) as a control repository. We monitored growth, survival, and fecundity from August 2013 to August 2014. We observed only minor growth and survival differences among populations. Throughout the spawning season, Southern oyster population produced significantly more brooding oysters at two of the three sites compared to the other two populations. Oyster populations native to these diverse bays may have genetically diverged their spawn timing to conform to environmental conditions within each bay, or the Southern population may simply have greater fitness. Through our ongoing research, we intend to determine whether Olympia oyster populations exhibit local adaptation within Puget Sound.