Dear Dr. Shumway,

Thank you very much for obtaining these valuable comments from the reviewers as well as providing us the opportunity to address these. We feel that we have addressed the comments and as such have greatly improved the quality of the manuscript. For your convenience and the convenience of reviewers we have provided below the specific revision suggested by each reviewer following their comments (in italics). Revised text is denoted with bold formatting.

We hope that you will find the manuscript acceptable for publication in JSR, and please let me know if you have any questions or concerns.

Sincerely,

Jake Heare

**Reviewer 1 (Also original reviewer of first submission)**

*I have seen this ms before in submission to another journal (JEMBE) and I am writing the review of this version (submitted to JSR) as a revision of my earlier review. Most of the suggested changes have been made but see comments re line 281 and Figure 1.*

*General comments:*

*These remain as for the earlier submission:*

*“This is a brief report presented in a very limited context. It looks like a MS thesis or similar that has been edited from a longer report style document. It needs a broader ecological context to be high priority for JEMBE (J. of Experimental Marine Biology and ECOLOGY). What is reported appears to have been carefully planned, implemented, analyzed and reported.”*

*If we consider the JSR to have a narrower or “different but focused” context to JEMBE then this is acceptable. But I believe the authors could do better, it still reads like a student thesis.*

*Line by suggestions and comments.*

(Note we have not included the 10 comments that Reviewer 1 indicated we revised to satisfaction in our earlier submission)

*JSR – line 76. Adaptive structure ahs now become adaptive divergence. Is this term attributed to Camara and Vadopalas (2009)? I don’t think so given the sentence structure in the JEMBE submission. Either way it still needs defining in this text and context – so add the definition please.*

We have added a definition of adaptive divergence to help clarify the idea of population structure in Puget Sound.

Lines 63-66

**Despite several studies on Olympia oyster ecology and life history traits in Puget Sound, WA, information on population structure is limited and nothing is known about adaptive divergence (defined as the branching out of new and differing fitness related phenotypes from a common ancestor) of populations within Puget Sound (Camara and Vadopalas, 2009).**

*JEMBE - Line 281, ….reproduce in year 1 as females. Earlier (line 68) you stated that they first reproduce as males, so do they reproduce twice in year 1? If so then add a few words just to make this clear, otherwise you leave the sense of contradiction.*

*JSR – This has NOT been addressed. On line 69 of this version first reproduction as males is stated. REVISION NEEDED*

Thank you for pointing out the apparent contradiction. The sentence in the introduction was rewritten to help clarify. Yes they do reproduce twice in year 1. The new sentence is as follows:

Lines 50-52.

***Ostrea lurida* are rhythmical consecutive hermaphrodites (Coe, 1932b), spawning first as males followed by multiple oscillations between male and female within a spawning season.**

*On the figures:*

*JEMBE These need serious revision for publication. They are rainbow colors, they need to be presented in black, white and grey scale.*

*JSR. Figure 1 is simply the original color image set in B&W/gray scale. It is not very good, in fact it is unacceptable for a leading journal. A B&W line figure would be much better.*

Figure 1 has been entirely redesigned to create a better looking black and white map for publication.

**Reviewer 2**

***General Comments:***

*This manuscript covers an important topic in native oyster restoration, and uses a technique that has been established for prior shellfish studies. The authors appear to have expended a great deal of time and effort to obtain adequate sample sizes for the reciprocal transplant studies. The material is appropriate to JSR.*

*I especially liked some parts of the research design. Hardly anyone appreciates the Old Masters, yet these authors used a paper published nearly 80 years ago (Hopkins, 1937) to develop testable population reproduction parameters. While I remain critical of some ways the research was done (below), I think parts of the study were masterful, and all efforts must be made to put this manuscript into publishable form.*

*Unfortunately, this article has some serious issues that must be addressed before I can recommend publication. These include (not necessarily in order of importance), writing style*

*lack of salinity (and other) data, and presentation of the mortality data. I believe these can be addressed, but they will take enough revision that the manuscript should be resubmitted and reviewed as a new manuscript.*

*I have indicated some specific issues I had with the writing style below in the specific comments, but this paper needs considerable effort, ideally from some of the co-authors with a different approaches to writing, to improve clarity and flow. I cannot recommend publication as the paper is currently written even if there were no other issues.*

*Salinity data for the study sites are required if the authors wish to draw any conclusions about environmental impacts, because salinity affects the distribution of this species and possibly, therefore, fitness and survival. In the specific comments below for M&M, I discuss thus further. The following paper reviews some of the ways salinity affects distribution:*

 *Baker, P., Richmond, N., and Terwilliger, N.B. 2000. Re-establishment of a native oyster, Ostrea conchaphila, following a natural local extinction. 221-231. In Pederson J. (ed.). Marine Bioinvasions, 1999. MIT Sea Grant, Cambridge, MA.*

*For the purpose of this study, I am mainly concerned that there could have been low-salinity events or trends that affected survival, growth, or reproduction at some sites and not others. Existing data sets with a resolution of at least weekly may be sufficient, if they can be found. Data collected by WA DNR, WA DFW, commercial shellfish operations, or reserve managers for the study period may be adequate.*

Thanks to the reviewers suggestion we have included data on salinity, chlorophyll a, and dissolved oxygen from the Washington Department of Ecology at areas relatively near our experimental sites. Interestingly there was no overt phenomena except that between the Northern and Southern site there was a ten fold difference in chlorophyll content which we had not previously noticed. We believe that this has improved the manuscript significantly as it covers more environmental data than we had originally planned. That said, the data was only collected monthly from areas between 2 and 20 km from our experimental sites and thus does not accurately reflect environmental factors in the immediate area of our samples on a time scale that could correlate with our findings. The website containing this information as well as lat/long of our sites and WDoE collection sites and distance between the two has been included in the manuscript to express why we were not reliant on these data sets. You can see this new material in

Lines 114-116.

**In August 2013, 480 juvenile oysters (5-10 mm) from each population were placed at Fidalgo (N 48.478252, W 122.574845), Oyster (N 47.131465, W 123.021450), Dabob (N 47.850948, W 122.805694), and Clam Bays (as control site)(N 47.572894, W 122.547425) (Figure 1).**

Lines 121-127.

**In late autumn 2013, trays at Northern (N 48.496358, W 122.600862), Southern(N 47.138692, W 123.017387), and Central sites (N 47.573685, W 122.545323) were subsequently suspended from floating structures to reduce exposure to extreme temperatures during tidal exchanges and oysters were removed from mesh bags. Trays remained anchored to the substrate submerged in a perched lagoon in the Hood Canal site (N 47.850948, W 122.805694) as no suitable floating structure was available and oysters were removed from mesh bags.**

Lines 135-140.

**In addition, monthly salinity, chlorophyll a, and dissolved oxygen content was viewed for each site from the Washington Department of Ecology website (**[**https://fortress.wa.gov/ecy/eap/marinewq/**](https://fortress.wa.gov/ecy/eap/marinewq/)**) for buoys at the Northern site (N 48.5133, W 122.5933, approx. 1.97 km from site), Central site (N 47.6217, W 122.5017, approx. 6.25 km from site), Hood Canal site (N 47.6670, W 122.8200, approx. 20.55 km from site), and Southern site (N 47.1650, W 122.9633, approx. 5.04 km from site).**

Lines 210-211.

**Monthly environmental data from the Department of Ecology showed no unusual phenomena outside of the average environmental parameters for *O. lurida*.**

Lines 292-295.

**Due to the distance between the sites and their associated environmental data from the Washington Department of Ecology as well as the monthly resolution of the data, we are unable to comment on fine scale changes within the environment that may have affected our oysters but to what degree is unknown.**

Lines 319-321.

**From the WDoE environmental data, there was a clear 10 fold difference in chlorophyll a content between the Northern and Southern sites with the Southern site having the highest primary productivity of all sites.**

Lines 340-341.

**This also seems somewhat correlated to the differences in chlorophyll a content seen between the Northern and Southern sites though to what extent is unknown.**

  *Salinity is an obvious environmental parameter, and the most easily measured after temperature, but obviously there could be others as well, such as chlorophyll, which were not measured either. Chlorophyll, for example, would be less likely to affect total survival, but would very strongly affect growth and reproductive status.*

Please see the above comments on data collected by the Department of Ecology.

*There is an alternate solution to the problem of no salinity data, and that is to forget about environmental explanations and simply present the mortality, growth, and reproductive data in relation to geographic distance. They still represent the same evidence of population structure, just without an explanation, which I find weak and unconvincing when based solely on temperature. It is not as satisfactory, but it would still be a valid study.*

Please see above comments about data collected from te Department of Ecology.

*The mortality data were poorly and/or confusingly presented at several points throughout Results and Discussion, which made me question the primary findings. Further comments are given below in the section for Results and Discussion.*

Mortality data has been reorganized and updated with mortality via predators to discuss differences between populations. Also population and site names have now been differentiated to eliminate confusion.

**Abstract**

*The abstract is constructed of mostly short, choppy sentences that don’t really convey the idea, as I understand it. I would suggest making the second sentence the first sentence, and adding a few terms; e.g. “Species traits that hold (carry?) adaptive advantage... may differ among reproductively discrete locales.” Then, combine the first and third sentence, e.g. “Knowledge and consideration of these traits should, therefore, be integrated into conservation efforts that include long-term persistence of species.”*

 *You need to use the common name of Ostrea lurida in the abstract, or at least*

*mention that it is an oyster.*

Abstract has been changed to read as follows:

Lines 21-31.

**Species traits that carry adaptive advantage such as reproductive timing and stress resilience may differ among reproductively discrete locales. Knowledge and consideration of these traits should, therefore, be integrated into conservation efforts that include long-term persistence of species. To test for adaptive differences between Olympia oyster, *Ostrea lurida*, populations a reciprocal transplant experiment was carried out monitoring survival, growth, and reproduction using three established populations of *O. lurida* within Puget Sound, Washington. Performance differed for each population. *O. lurida* from Dabob Bay had higher survival at all sites but lower reproductive activity and growth. Oysters from Oyster Bay demonstrated greater proportion of brooding females at a majority of sites with moderate growth and survival. Together these data suggest the existence of *O. lurida* population structure within Puget Sound and provide information on how broodstock should be selected for restoration purposes.**

**Introduction**

*Line 51. Unclear – why is this of concern? Is it because habitat degradation, etc. are degrading oysters, or because oysters are of value in combating habitat degradation, etc.? Obviously, both are at least partially true, but you need to expand this to more than one sentence, since this provides half of the rationale for your research.*

*The following citations may be of value in this:*

 *Coen, L.D., Brumbaugh, R.D., Bushek, D., Grizzle, R., Luckenbach, M.W., Posey, M.H., Powers, S.P., & Tolley, S.G. 2007. Ecosystem services related to oyster restoration. Mar. Ecol. Prog. Ser. 341:303-307.*

 *Luckenbach, M.W., Mann, R., & Wesson, J.A. (eds.) 1995. Oyster Reef Habitat Restoration: A synopsis and Synthesis of Approaches. Virginia Inst. Mar. Sci. Gloucester Point, VA.*

 *Newell, R.I.E., Fisher, T.R., Holyoke, R.R., & Cornwell, J.C. 2005. Influence of eastern oysters on nitrogen and phosphorus regeneration in Chesapeake Bay, USA. 93-120 in R.F. Dame and S. Olenin (eds.) The Comparative Role of Suspension-Feeders in Ecosystems. NATO Science Series IV: Earth and Environmental Series 47. Springer, New York.*

 *Ramsay, J. 2012. Ecosystem services provided by Olympia oyster (Ostrea lurida) habitat and Pacific oyster (Crassostrea gigas) habitat; Dungeness crab (Metacarcinus magister) production in Willapa Bay, WA. M.S. Thesis, Oregon State Univ., Corvallis, OR. 54 pp.*

 *zu Ermgassen, P.S.E., Gray, M.W., Langdon, C.J., Spalding, M.D., and Brumbaugh, R.D. 2013. Quantifying the historic contribution of Olympia oysters to filtration in Pacific Coast (USA) estuaries and the implications for restoration objectives. Aquat. Ecol. 47:149-161.*

We added material and references from Coen et al. (2007) and zu Ermgassen et al. (2013) to improve the explanation of why restoration is important and the ecosystem services oyster species provide.

Original Line 51.

Restoration of native oysters is of increasing concern due to ongoing habitat degradation, loss of ecosystem services, and global climate change (Anderson, 1995; Lotze et al., 2011).

Lines 34-44.

**Restoration of native oysters is of increasing importance because of their significant contribution of ecosystem services and the large scale reduction in resident population size caused by ongoing habitat degradation and global climate change (Anderson, 1995; Lotze et al., 2011). The native east coast oyster, *Crassostrea virginica*, has been shown to make large contributions in way of ecosystem of services such as phytoplankton control, refuge creation, and benthic-pelagic coupling (Coen et al., 2007). While *C. virginica* has a greater influence on water quality than the native west coast oyster, *Ostrea lurida*, it is suspected *O. lurida* creates significant habitat value akin to that of the native European oyster, *Ostrea edulis* (zu Ermagassen et al., 2013). In an attempt to restore lost ecosystem services due to population decline, resource managers and restoration groups focus on placing viable animals into habitats to supplement dwindling populations and encourage persistence. Success of these efforts is highly dependent on the fitness of the transplanted individuals (McKay et al., 2005).**

*Line 55. It should be obvious to most people that fitness means reproductive fitness, but it won’t hurt to add “reproductive.”*

We changed the line to include both survival and reproductive fitness, so that both types of fitness would be equally represented.

Original Line 55.

Success of these efforts is highly dependent on the fitness of the transplanted individuals(McKay et al., 2005).

Updated Line 43-44.

**Success of these efforts is highly dependent on the survival and reproductive fitness of the transplanted individuals (McKay et al., 2005).**

*Line 57. I am unfamiliar with “geographic morphology.” Is this geography or geomorphology (the shape of the land) or something biological?*

We have updated the term to geomorphology for clarity.

New Lines 59-60.

**Palumbi (1997) demonstrated that geomorphology affected sea urchin population structure….**

*Line 58. This sentence is misleading, because it suggests that there is a change in fitness within Crassostrea virginica along latitude. Instead, as I understand the paper by Burford et al., there is a change (cline) in specific traits in order to maintain constant fitness with latitude.*

We have changed the sentence to read:

Line 60-61.

**...population structure and Burford et al. (2014) recently demonstrated a fitness related trait cline in the eastern oyster, *Crassostrea virginica*, along the Atlantic coast.**

*Line 59-60. Make this statement more positive. Population structure will not hinder restoration and may actually aid it, if we understand it.*

We have changed to affect because it could be both positive or negative interactions.

Original Line 59-61.

Findings such as these indicate that many similar species have unknown population structures that could hinder restoration efforts**.**

Updated Line 59-62.

**Palumbi (1997) demonstrated that geomorphology affected sea urchin population structure and Burford et al. (2014) recently demonstrated a fitness related trait cline in the eastern oyster, *Crassostrea virginica*, along the Atlantic coast. Findings such as these indicate that many similar species have unknown population structures that could affect restoration efforts.**

*Line 62-63. Combine 1st two sentences.*

We have moved sentenced and updated to improve transition as suggested:

Original Line 62-63.

One species that has received considerable attention with respect to restoration is the Olympia oyster, *Ostrea lurida* Carpenter, 1864. The Olympia oyster is the only native oyster to the west coast of North America.

Line 45-46.

**Olympia oysters, *Ostrea lurida* Carpenter, 1864, are the only oysters native to the west coast of North America; they have received considerable attention with respect to restoration.**

*Line 64-65. A better citation for biogeography is:*

*Polson, M.P. & Zacherl, D.C. 2009. Geographic distribution and intertidal population status for the Olympia oyster, Ostrea lurida Carpenter 1864, from Alaska to Baja. J. Shellfish Res. 28: 69-77.*

Added suggested citation:

Line 46-48.

**Olympia oysters exist in a variety of habitats within its range from Baja California, Mexico to British Columbia, Canada (Hopkins, 1937; Polson & Zacherl, 2009).**

*Line 68. aka protandrous hermaphrodites*

The general definition of protandrous hermaphroditism is a single event within a lifetime when a male animal switches to being a female. *Ostrea lurida* on the other hand change from male to female, then back to male, then back to female each spawning season. Coe (1932) showed that they do this frequently throughout a season and lifetime, spawning equally as male or female. We have changed the phrasing to explain this oscillation between genders.

Original Line 68: *Ostrea lurida* are rhythmical consecutive hermaphrodites (Coe, 1932b), spawning first as males followed by cycling between male and female within a season.

Line 50-52: ***Ostrea lurida* are rhythmical consecutive hermaphrodites (Coe, 1932b),spawning first as males followed by oscillation between male and female within a spawning season.**

*Like 71-72. When are spawning/settlement peaks? These data exist in some of the earlier literature.*

We added a brief summary of the peak spawning/settlement period as found by Hopkins in 1932-33.

Original Line 71-73.

Hopkins (1937) observed in south Puget Sound that a maximum of 10-15% of *O. lurida* are brooding at any given time during a spawning season (1932). Peak larval settlement, roughly correlated with peak spawning, occurs twice annually within south Puget Sound (Hopkins, 1937).

Updated Line 54-55.

**Peak larval settlement, roughly correlated with peak spawning, occurs twice annually within south Puget Sound (Hopkins, 1937) with the earlier of the two events typically occurring in the latter half of May.**

*Line 75. Awkward transition - you just said this in the prior paragraph.*

Moved paragraph and changed transition as suggested.

Original Line 73 - 77.

Even with the body of information presented by previous research on *O. lurida*, little is known about stock structure.

Despite several studies on Olympia oyster ecology and life history traits in Puget Sound, WA, information on stock structure is limited and nothing is known about adaptive divergence of populations within Puget Sound (Camara and Vadopalas, 2009).

Update Line 61-66.

**Findings such as these indicate that many similar species have unknown population structures that could affect restoration efforts.**

**Despite several studies on Olympia oyster ecology and life history traits in Puget Sound, WA, information on population structure is limited and nothing is known about adaptive divergence of populations within Puget Sound (Camara and Vadopalas, 2009).**

**Materials and Methods**

*General: For an experiment of this complexity, a few introductory sentences laying out the research design would be useful.*

The reciprocal transplant experiment design is now explained in a new subsection as suggested:

Lines 82 - 88.

***Reciprocal Transplant Experiment***

**As previously stated, reciprocal transplant experiments have been shown to be an effective way to measure stock structure in areas of interest. For our project we chose three geographically separated, reproductively discrete groups (which we will refer to as populations for simplicity) of *O. lurida* within Puget Sound. These animals were then brought to a hatchery, spawned, and the offspring from each population was outplanted back into the bays we chose. This way allows us to see how differing natural environments with resident oyster populations affect both local and non local populations over time.**

*Line 92-93. Tell us about these locations. Do they differ in temperature regime, salinity, and circulation patterns? For example, Dabob and Oyster bays are along or at the end of long fiords, but Fidalgo Bay opens directly to the highly mixed Salish Sea. Dabob and Oyster bays have large upland catchment basins but Fidalgo Bay does not. Oyster Bay is almost 1.5 degrees of latitude south of Dabob Bay, etc.*

Sites describe in a new subsection as suggested:

Lines 90-102.

***Bays of Origin***

**Three bays (ie. Fidalgo Bay, Dabob Bay, and Oyster Bay) within Puget Sound were selected for this experiment based on presence of resident *O. lurida* populations, distance from other bays, and latitudinal position. Fidalgo Bay is the most northern site and as such experiences cooler year round conditions. This bay is also directly fed by the Strait of Juan de Fuca, allowing colder sea water directly from the Pacific to mix with bay waters daily. Dabob Bay is located within Hood Canal, an area of Puget Sound distinctly separated from the rest of the sound. The Bay itself is home to many commercial shellfish farms and well as unique tidal flux that can increase or decrease freshwater input from nearby water ways. Oyster Bay is the southern most site and known for its historically large populations of *O. lurida*. Currently there remains at least one large population within the region. It is also home to the majority of Olympia oyster shellfish aquaculture and harvest. Waters in this bay remain local with little mixing from the rest of the sound and thus remain warmer for the majority of the year. The site also experiences significant effects from effluent waste and logging industries in the area.**

*Line 95-96. Where were oysters spawned (what facility), and using what methods?*

Spawning techniques are now included:

Lines 106-113.

**Oysters were held for 5 months in common conditions in Port Gamble, Washington and spawned in June 2013. To ensure genetic diversity, each population from each site was subsequently spawned in 24 groups of 20-25 oysters. This spawning procedure is based on the findings from previous work within the Roberts lab suggesting that this technique maintains genetic diversity. Larvae produced from each population were reared in tanks based on spawning group and settled on microcultch. Post-settlement spat were grown in four replicate screened silos and fed ad libitum until attaining the minimum outplant size (shell length (SL) = 5 mm).**

*Line 97. Cultch (and microcultch) and spat are industry-specific terms, with which many population biologists will be unfamiliar. Define briefly.*

Added definition to microcultch as suggested:

Line 111.

**Larvae produced from each population were reared in tanks based on spawning group and settled on microcultch, i.e. very small pieces of oyster shell.**

*Line 101. Clam Bay is not among the source localities. Why is it used as a grow-out location? If it is some sort of control, like Port Gamble, the rationale needs to be clearly explained.*

Added note that Clam Bay is a control site as suggested:

Line 114-116.

**from each population were placed at Fidalgo (N 48.478252, W 122.574845), Oyster (N 47.131465, W 123.021450), Dabob (N 47.850948, W 122.805694), and Clam Bays (as control site)(N 47.572894, W 122.547425) (Figure 1).**

*Line 109. Salinity strongly affects Ostrea lurida distribution; you need at least some salinity data for the study time period. Some is better than nothing, in case there was an event that could have affected fitness or survival. Such data are probably available near the sites from commercial growers, hatcheries, or WA DNR at Oyster Bay and Dabob Bay; I don’t know about Fidalgo Bay – perhaps from whomever administers the Fidalgo Aquatic Reserve?*

Please see the initial comments about the Department of Ecology data which we used to observe alternative environmental data.

*Lines 108-113. Where were the temperature loggers? In the water, or in the intertidal? Where were they relative to the oysters? Oysters at Dabob Bay were exposed to air throughout the study; are those the temperatures that were recorded?*

We have changed the line to read as follows.

Line 130.

**At each site, two temperature loggers (HOBOlogger, OnSet, USA) were deployed within separate trays chosen at random.**

*Line 144. How did you anesthetize oysters? What is the visual assessment – naked eye or microscopy?*

Anesthetization procedure described:

Lines 182 - 187:

**Specifically, trays were removed from water and exposed to air for 45 minutes then immersed in 0.3M magnesium sulfate (heptahydrate sulfate mineral epsomite (MgSO4·7H2O)) (also known as Epsom salt) dissolved in a 50/50 mix freshwater/sea water for 45 minutes.**

**Results**

*Line 173. Why do you report P as 0 for X2, but as <0.0001 for ANOVA (e.g. lines 195, 225)?*

Changed all P=0 to P<0.0001

**Line 216.**

**...significantly less mortality by the end of the study period at Hood Canal (Χ2=141, df=2, P<0.0001), Southern (Χ2=76.3, df=2, P<0.0001)...**

*Line 175-180. This entire paragraph is confusing. The mortality values you report here are not reflected in Figure 4. In the second sentence you say Fidalgo Bay oysters had 21.2% survival but in the next sentence you say it was at least 80%. Were there strong or sudden mortality events at Dabob and Fidalgo bays, not reflected in the figures?*

Confusing wording was changed with the following to better facilitate understanding of mortality data.

Lines 221-225.

**...drill related mortalities (~48% of Fidalgo population as compared to ~28% of the Dabob population and ~29% of the Oyster Bay population) (GLM, Χ2 =6.2, df=6,P<0.0165). There were significant differences in mortality among populations (Χ2=141, df=2, P<0.0001), with the Fidalgo Bay oysters having the lowest survival (21.2% +/- 2.1SD %) (Figure 4C). Limited mortality was observed at both the Central and Northern site where at least 80% of oysters remained after 11 months (July 2014) (Figures 4B & 4D).**

*Line 231. Overall = across all treatments?*

Changed overall to across populations and sites.

Lines 281-282.

**The average size of brooding females across populations and sites was 27.1 (+/- 4.5SD) mm.**

**Discussion**

*Line 235-242. Earlier in the manuscript you use the term locale for discrete groups of oysters, but here you boldly use the term population, which is a loaded term in molecular genetics. I doubt the localities you studied represent discrete genetic populations, regardless of the results. This does not preclude local selection for specific traits, or some sort of genetic cline, but populations of this size (millions of oysters despite very threatened status) need little genetic exchange to prevent drift.*

We have changed the line to denote that these are geographically separated, reproductively discrete locales which we are referring to as populations for simplicity.

Line 286 - 288.

**Findings from this study provided new information about *Ostrea lurida* life history as well as distinct phenotypes associated with geographically separated, reproductively discrete locales referred to from here on as populations for simplicity.**

*Line 238. This sentence seems overly simplistic. All populations need to survive, and all need to reproduce. Differences might occur in age/size at reproduction, for example, but that is not suggested here.*

We have updated the sentence to reflect the possibility that our findings were affected by age, size at reproduction, or annual variation in other environmental factors as suggested.

Line 288 - 292.

**At the population level, we found some populations favor survival over other traits and some populations favor reproduction suggesting the existence of adaptive structure within Puget Sound, WA though these differences may be due to age or size at reproduction and may change annual variation in environmental factors not observed in this study.**

*Line 247. Temperature may have been correlated with mortality, but you have not experimentally demonstrated cause and effect.*

We have changed the line to reflect the correlation of temperature and predation instead of assuming causation.

Line 301-302.

**Mortality rates were different across sites, with these differences correlated to temperature and predation.**

*Line 275. “...reproductive advantage.” Smaller females can brood exponentially fewer larvae (around a third fewer in a 27 mm oyster compared to a 30 mm oyster), thus putting them at an apparent disadvantage, which is an argument for why oysters (and many other hermaphroditic animals) are protandrous. Explain how reproduction at small size could be a reproductive advantage.*

We have reworded to clarify:

Lines 331-333.

**...because it may provide reproductive advantage by allowing them to reproduce sooner or in harsh environments where growth may be hampered.**

*Line 291, 2nd Sentence. This sentence confused me for a moment until I realized you meant “The population derived from Dabob Bay broodstock exhibited better survival across sites than the other two populations” Earlier, you had stated that survival at Dabob Bay was lower.*

We have clarified the language to reduce confusion.

Lines 349-352.

**Survival differed among populations within 3 out of 4 sites. The population derived from Dabob Bay broodstock exhibited better survival than the other two populations (Figure 4). The observed temperature variability (Figures 2 & 3) at the Hood Canal site in the present study may be indicative of historic temperature trends to which the parent populations were exposed.**

*Line 297-298. Double parentheses are confusing. Find another way to write this sentence.*

Removed extra parentheses.

Lines 355-356.

**...(e.g. bay scallops, *Argopecten irradians*, Brun et al., 2008, and Mediterranean mussels, *Mytilus galloprovincialis*, Dutton and Hofman, 2009)...**

*Line 306-308. I don’t buy the argument that high survival is related to low growth, especially since temperature is the sole stressor you examined. Salinity stress, food availability, ectoparasites, etc. are all alternative explanations.*

We have updated the paragraph to suggest that alternative factors such as salinity stress, food availability, or parasites may have contributed to the differences between populations as suggested.

Line 369-373.

**At all transplant sites, the population derived from Dabob Bay parents exhibited the lowest growth. Salinity stress, parasite and disease load, and food availability may have affected size (Brown and Hartwick, 1988; Andrews, 1984) but because of the separation between sites it seems unlikely that the effects seen in this study are primarily due to these factors. This observation is likely related to the fact the Dabob Bay population also had the highest survival.**

*Line 315. This result is interesting, but you need to clearly separate age of reproduction from size. A glance at the data (Figures 5-11) is inconclusive, but it appears that Oyster Bay oysters are neither the slowest nor the fastest growing. Faster growing oysters reach a larger size and, therefore, a reproductive advantage over smaller females, so if Oyster Bay stock were reproductive earlier independently of size, this is an important bit of evidence.*

We have included growth rate graphs which show the mean size of each population before and after spawning season within each site (Figures 8-10) which suggests that the Oyster Bay population spawned earlier independent of size at two sites which is especially interesting at the Southern Site where the Fidalgo Bay population was roughly the same size yet produce significantly fewer brooding females. The line has been changed to reflect this information.

Line 382-384.

**The Oyster Bay population had a greater proportion of brooding females and reached peak spawning earlier than the other populations (figures 11 – 13), at two sites independent of size which varied between sites (Figures 8 –10, 14).**