



Dr. Delbert Gatlin
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Dear Dr. Gatlin,

We are pleased to submit the enclosed manuscript, “Effects of winter conditions on Olympia oyster reproduction and larval yield,” for consideration in *Aquaculture*.

Temperature regulates many reproductive processes in marine invertebrates, particularly for those living in temperate regions. As global temperatures rise due to anthropogenic inputs, milder winters are anticipated due to increased sea surface temperature and more frequent marine heat waves. Elevated winter temperature has capacity to alter cultured stocks and wild populations through wide-scale shifts in reproductive timing and capacity, and offspring viability. Yet, we know little about how changes to winter conditions will impact critical reproductive processes in marine species.

Our novel study exposed adult Olympia oysters (*Ostrea lurida*) to two winter temperatures (7°C, 10°C) in the presence of two feeding regimes. We show that changes to winter conditions substantially alters bivalve physiology and gamete development, resulting in more developed sperm, larger oocytes, and larvae that tended to be larger. In the wild, more developed gametes and larger larvae following milder winters could greatly impact recruitment patterns. However, larval production timing and magnitude were unaffected, indicating that *O. lurida* reproduction may be relatively resilient to shifting winter temperatures.

This is the first study to assess reproductive impacts of winter warming in the presence of varying feeding regimes in an *Ostrea* spp, and to do so in a controlled environment in a marine bivalve. Now, the winter environment prior to spawning must be considered when predicting and examining marine invertebrate reproductive cycles.

This study also contributes valuable information pertinent to the commercial and restoration production of *O. lurida* and related flat oysters (*O. angasi*, *O. edulis*, *O. chilensis*), species of economic and ecological importance. Specifically, we show that larval size upon release does not predict larval survival in a hatchery setting, and to optimize larval production the amount of time broodstock are held prior to spawning should be minimized.

This manuscript is not under consideration by another journal, and all authors approve of the manuscript and its submission to *Aquaculture*.

Thank you for your consideration.

Sincerely,
Laura H Spencer & Steven B Roberts
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