R/LME/N–3 - Alleviating Regulatory Impediments To Native Shellfish Aquaculture

Progress Report: January 2014 – January 2015

A significant impediment to sustainable aquaculture is the lack of proper information to predict the impacts of culturing native shellfish species for restoration and commercial production. As a result, expansion and growth of domestic aquaculture is constrained and may be halted by management directives that restrict distribution of hatchery derived native shellfish until the potential interactions are better understood. The overall goals of this project are to increase our knowledge of local adaptation in Olympia oysters to address concerns that interbreeding between potentially maladapted cultured and wild stocks could negatively impact wild populations. Over the current reporting period we successfully completed research objective 1, to evaluate fitness components and performance of seed from different origins in a reciprocal transplant experiment. This research effort culminated in the preprint published in December 2014 [Heare JE, Blake B, Davis JP, Vadopalas B, Roberts SB. (2015) Evidence of *Ostrea lurida* (Carpenter 1864) population structure in Puget Sound, WA. PeerJ PrePrints 3:e1106 https://dx.doi.org/10.7287/peerj.preprints.704]. The paper is currently out for peer-review.

In summary, *Ostrea lurida* from Dabob Bay had higher survival at all sites but lower reproductive activity and growth (Figure 1 and 2). Oysters from

Oyster Bay demonstrated greater reproductive activity at all sites with moderate growth and survival (Figure 1). 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.

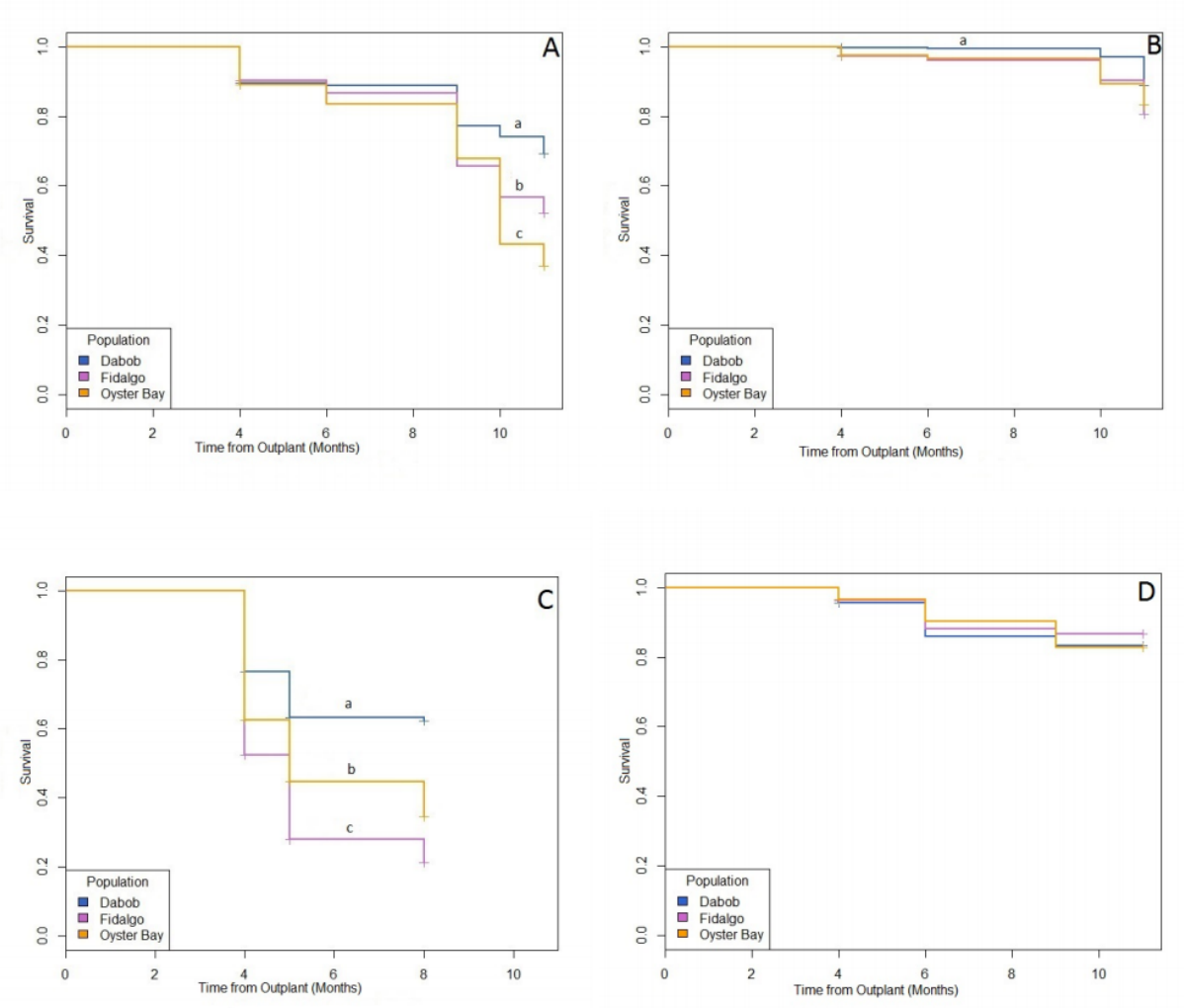
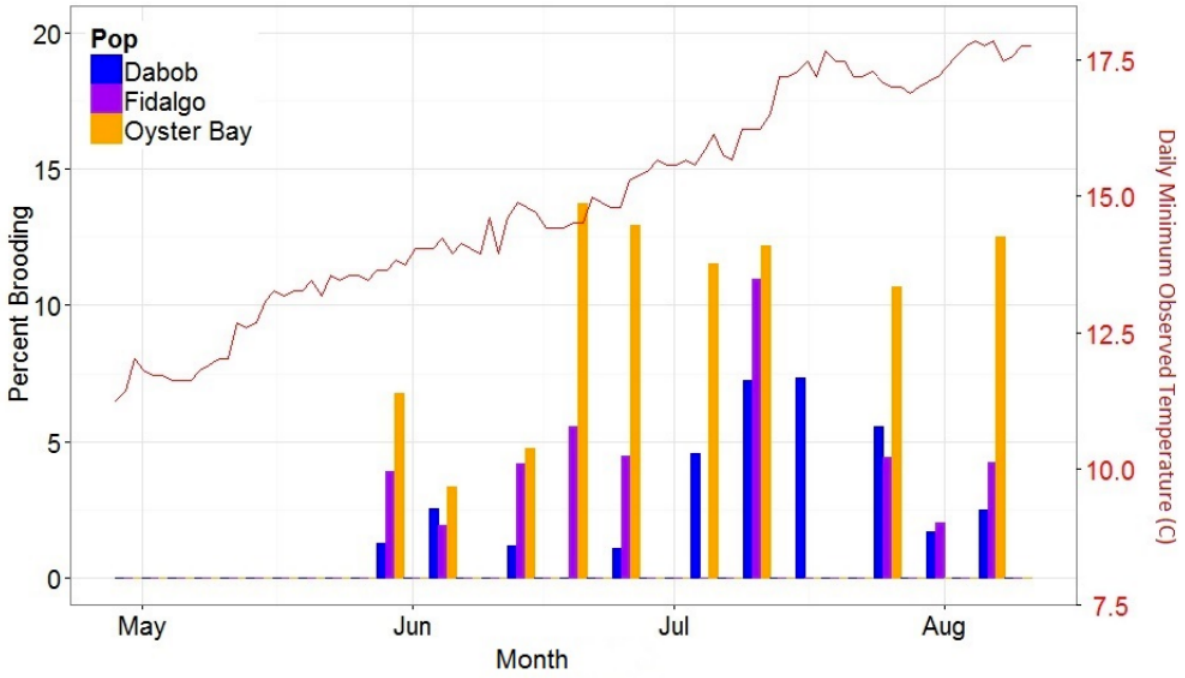


Figure 1 Proportion Survival for Three Oyster Populations. (Dabob = Blue, Fidalgo = purple, Oyster Bay = orange) at four locations; Oyster Bay (A), Manchester (B) Dabob (C), and Fidalgo (D). Lowercase letters (a,b,c) are

significant differences.



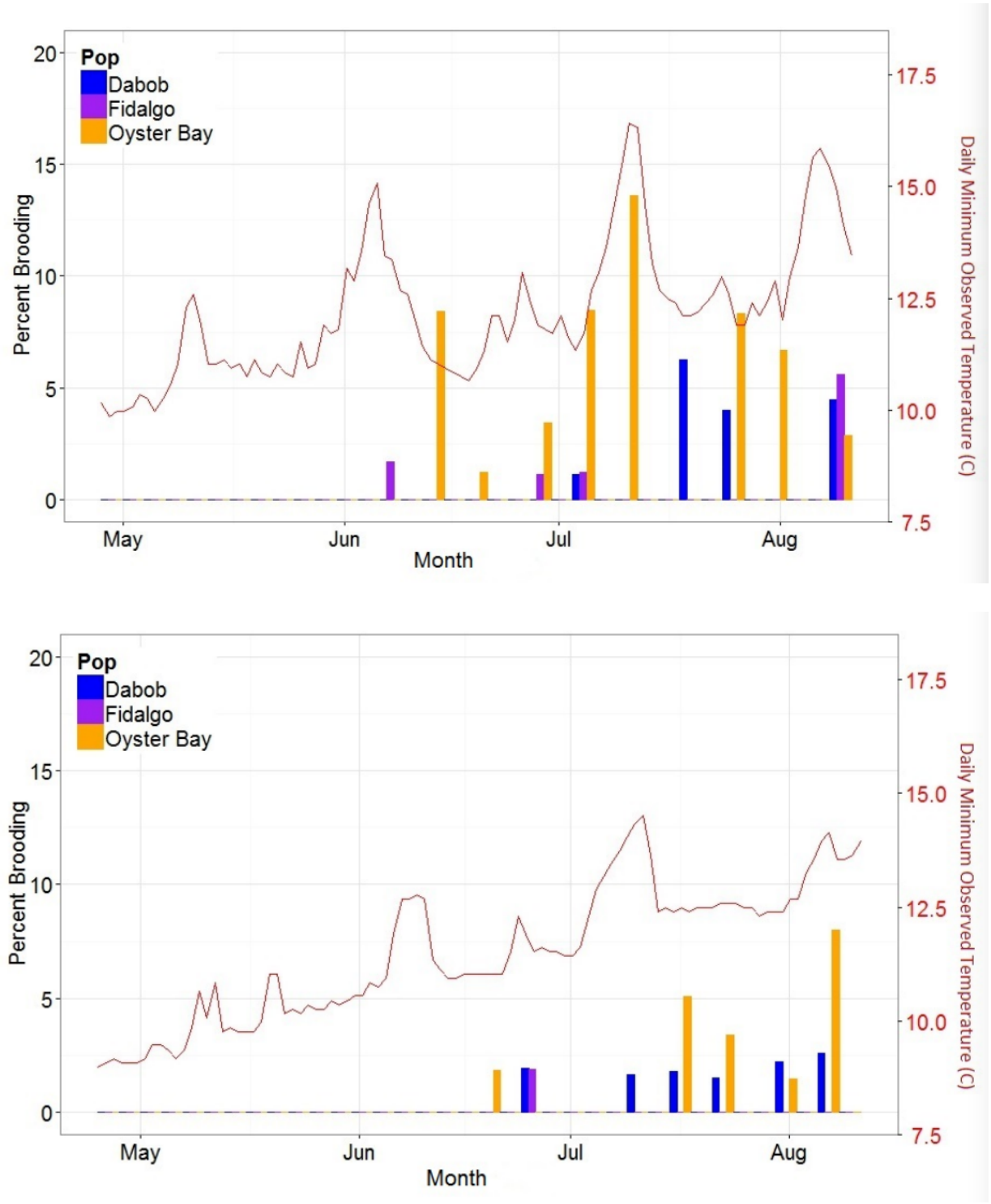


Figure 2 Percent Brooding Females from Each Population at Each Sample Date at Oyster Bay (top), Fidalgo (middle), and Manchester (bottom).

Percent determined by number of brooding females (Br) divided by number of open oysters (T) or %=(Br/T)*100. Blue = Dabob, Purple = Fidalgo, Orange = Oyster Bay.

In conclusion, significant differences in life history traits among *Ostrea lurida* populations within Puget Sound Washington demonstrate adaptations possibly linked with environmental cues such as high survival of the Dabob population may be due to extreme environmental variation at home site, greater proportion of brooding females in the Oyster Bay likely related to temperature trends at home site, and high growth in Fidalgo probably related to shorter growing seasons at home site. Over the next reporting period we will be focusing our efforts on testing some of these hypotheses as well as characterizing genetic and epigenetic structure of oysters in Puget Sound.