Project Report
PSMFC Subaward 23-084G for the period **May 1st through July 31th 2024**

Project Title: Gene activity and genetic selection in Pacific cod reared under thermal stress

Objective: Predict organismal and population outcomes of Pacific cod exposed to elevated temperature

Summary: Recent heat wave stress in the Gulf of Alaska has resulted in significant declines of Pacific cod, *Gadus macrocephalus*, in that region. The physiological and transcriptional responses of Pacific cod and whether selective mortality is present under thermal stress are unknown. The proposed project will address these questions critical to their survival under climate change by identifying regions of the genome and epigenome that respond to thermal stress. Juvenile Pacific cod will be reared in several temperatures then an integrated genomic approach will identify genes, gene variants, and epigenetic markers that respond to thermal stress and confer resilience. To complement the genomic approaches and further investigate temperature influences on energy resources, we will perform lipid analyses. This work will inform predictions of genetic selection and molecular response of Pacific cod in the Gulf of Alaska under climate change.

Progress and results

During this period sample selection for DNA methylation was evaluated. This included trying new extraction methods and sending off a sub sample for sequencing to validate output. In addition, methods were explored that would allow both RNA and DNA extraction from a single sample. At the end of the reporting period, it was yet to be determined if this would be a viable option. During this period genetic analysis of fish was revisited using novel approaches. Results indicate a mix of genotypes, but predominantly from the Kodiak and Unimak populations. This analysis was carried out on low coverage whole genome sequencing data generated in year 1 of the project.

Challenges

None to report.