

Undergraduate Research Symposium May 19, 2017 Mary Gates Hall

Online Proceedings

POSTER SESSION 1

Balcony, Easel 107

11:00 AM to 1:00 PM

Possession Sound Phosphorus Concentration in Relation to Salinity

Emily Martin, Junior, Environmental Science, Everett Community College

Connor Cheney

Taya Shoemaker, Freshman, Biology, Everett Community College

Mentor: Robin Araniva, Everett Community College

Mentor: Ardi Kveven, Ocean Research College Academy, Everett Community College

Mentor: Katherine Dye, Everett Community College

Located in the Whidbey Basin, Possession Sound is a body of water within the Puget Sound that is directly influenced by the Snohomish River. Water runoff from rain events takes phosphorus from the soil and eroded rocks, and introduces it into the Snohomish River, which eventually travels into Possession Sound. Additionally, irrigation, agriculture, construction and other human influences on the environment affect the chemistry of the water. Students of the Ocean Research College Academy (ORCA), a Running Start program through Everett Community College, have been collecting water chemistry and nutrient data in Possession Sound for the past ten years. Our research group compiled data from previous years to study the relationship between phosphorus concentration and salinity. Salinity levels were determined by EXO Sonde or YSI 650 and water samples were captured with a Niskin bottle, which were sent to the University of Washington Marine Chemistry Laboratory for nutrient analysis. The data were collected at three different research stations. Two sites are located near the mouth of the Snohomish River and the Port of Everett, while the third is further south and not as directly impacted by the freshwater from the Snohomish River, however there is some freshwater impact due to storm drains near the data collection site. It was hypothesized that, higher phosphate levels would be found in lower salinity water nearest the Snohomish River. Over several years, we expected to see different patterns in phosphorus levels based on Snohomish River discharge. Data and findings from this research project will aid in our understanding on our Spring Quarter research project, which will focus on plankton con-

centrations in the Possession Sound.

POSTER SESSION 2

Commons West, Easel 7

1:00 PM to 2:30 PM

Ocean Acidification and pH Changes in the Eelgrass Beds of Padilla Bay

Jacqueline Dodd, Sophomore, Mathematics, Seattle Central College

Kaetlen Slocum, Sophomore, Environmental Science, Biology, Seattle Central College

Mary Amstrup, Sophomore, Environmental Science, North Seattle College

Mentor: Ann Murkowski, Biology, North Seattle College

Mentor: Marina Halverson, Biology, Seattle Central College

Increasing atmospheric CO₂ has led to increased uptake of CO₂ by oceans causing ocean acidification. Ocean acidification is the long-term reduction of pH that can have negative effects on marine organisms, especially young calcifying organisms. In Puget Sound, ocean acidification has already caused large-scale oyster larval mortality, negatively affecting a significant contributor to the Pacific Northwest economy. The native eelgrass in Puget Sound, *Zostera marina*, may be a local mitigation strategy for ocean acidification. Marine plants take up CO₂ through photosynthesis to create biomass increasing the pH of the water. In this study, water samples were collected from several depths within the water column above eelgrass beds and surrounding mudflats in Padilla Bay. Water samples were analyzed for pH, total alkalinity, dissolved oxygen, dissolved inorganic carbon, and chlorophyll A. Eelgrass shoots and density were measured for leaf area index and the Padilla Bay National Estuary Research Reserve weather stations were used to calculate solar irradiance to estimate the photosynthetic activity of the eelgrass beds. Results suggest that eelgrass beds, in addition to providing critical habitat, may also help locally mitigate ocean acidification beyond the area of the eelgrass beds. Future research analyzing the input and output of carbon in eelgrass beds will be critical to developing large-scale carbon and pH models in marine environments.

POSTER SESSION 2

Commons West, Easel 34

1:00 PM to 2:30 PM

The Effect of Temperature on Dissolved Oxygen

Annika Goranson, Sophomore, Environmental Science, Actuarial Science, Everett Community College

Lucas Franz, Freshman, Biology, Everett Community College

Kyle Ness, Freshman, Music Performance, Music Education, Everett Community College

Phillip Stiles, Freshman, Oceanography, Everett Community College

Mentor: Katherine Dye, Everett Community College

The Ocean Research College Academy (ORCA), a running start program in partnership with Everett Community College has been conducting research in the Possession Sound since 2004. Those carrying out this investigation added to ORCA's longitudinal data set in 2016 and 2017. Possession Sound is part of the north Whidbey Basin of the Puget Sound and is bordered by Snohomish County to the east and Whidbey Island to the west. Dissolved oxygen (DO) is an important factor in the survival of many aquatic species, and the loss of these species due to a lack of dissolved oxygen can disrupt the lives of other predatory animals and negatively affect marine industries. As DO levels fall below 4 mg/L, waters become hypoxic which can be fatal to marine life. This study investigates the effect of temperature on DO levels in the Possession Sound from a single site location (referred to as Deep) during 2015 and 2016. Water samples were collected from a depth of about 20 meters by deploying a Niskin sampling bottle. Then DO and temperature were measured with a YSI-85 handheld instrument. Results show that DO levels are lower in waters with warmer temperature. For instance, a DO level of 7.7 mg/L was observed at 11oC, while a DO level of 4.78 mg/L was surveyed at 12.16oC. These results are attributed to water molecules being less dense in colder water, allowing for more volume to be occupied by dissolved oxygen. This suggests that warmer temperatures in Possession Sound may not be suitable for sustaining diverse and healthy marine life. Since this research only investigated dissolved oxygen at 20 meters deep, it would be of interest to investigate DO levels of surface waters in order to probe the effect of photosynthesis on DO in the future.

Larval Fish Population Comparison between Eelgrass Beds and Open Water

Jordan Lindgren, Sophomore, Pre-Med, Biotechnology, Everett Community College

Joe Sisneros, Sophomore, Environmental Science, Geology, Oceanography, Everett Community College

Mentor: Ardi Kveven, Ocean Research College Academy, Everett Community College

Mentor: Robin Araniva, Everett Community College

Ichthyoplankton are a very important aspect of aquatic ecosystems. Larval fish populations can be a determining factor of the overall health of the ecosystem. Rockfish, for example, are known for their long lifespans and low survival rate past the larval stage. For this study, specific locations in Possession Sound were sampled for the presence of larval fish, with a specific interest in the potential presence of larval rockfish. Eelgrass beds are ideal spawning locations due to their sheltering and food source benefits. Therefore, a 500 μ m plankton net was horizontally towed over eelgrass beds located at southern Whidbey Island and the Mount Baker Terminal (MBT), as well as nearby offshore sites with a minimum depth of 20 meters. It was hypothesized that larval fish populations would be higher at the eelgrass bed sites compared to the offshore sites, due to eelgrass being a favorable habitat for the larval fish. Data collection occurred between the months of February 2017 and April 2017. Preliminary results support the hypothesis with a total of 24 individual larval fish being found in eelgrass beds, and only 12 being found in open water tows. The overarching goal of this study is to help determine whether or not the eelgrass beds in Possession Sound are current homes to larval rockfish. Due to their endangered status it is important to know where larval rockfish thrive in order to know how to protect them in the future.

POSTER SESSION 3

Balcony, Easel 88

2:30 PM to 4:00 PM