Alexandrium Catenella Cyst Identification within Elliot Bay

Gary Livingston, Zoe Manuel, Julie Masura (Mentor)

Introduction

The Puget Sound is a diverse and essential marine habitat within the Pacific Northwest. The sound's health and marine ecosystem is a major part of the regional economy and culture. However, surges of saxitoxin, which can cause paralytic shellfish poisoning (PSP), have been impacting Washington State's economy as well as the health of its inhabitants. *Alexandrium catenella* is a dinoflagellate native to the Puget Sound and can be responsible for the bioaccumulation of saxitoxin within regional shellfish. In the winter months, it lies dormant within sediments in the form of cysts before blooming under warmer conditions in the spring/summer. In effort to better monitor the situation and gain further understanding of which areas are most severely affected, the University of Washington, Tacoma partnered with the Washington State Department of Ecology's Puget Sound Ecosystem Monitoring Program to analyze sediment samples from Elliot Bay near Seattle, WA. In this study, sediment samples collected from around Elliot Bay were processed and analyzed under microscope for the presence of *Alexandrium* cysts. Consistent multi-year monitoring of sediment cysts aids scientists in better understanding the conditions that allow *A. catenella* to bloom in mass, while also allowing for earlier and more accurate predictions of PSP outbreaks throughout the Puget Sound.

Methods

- Sediment was collected from 38 locations in Elliot Bay by the Washington State Department of Ecology's Puget Sound Monitoring Program

- Samples were processed using a modified procedure of Yamaguchi et al. (1995)
  - Samples were sonicated to remove the mucus layer surrounding cysts
  - Samples were rinsed through sieves to remove debris
  - Formalin was used to preserve the samples
  - Methanol was used to etch samples in preparation for staining
  - Primulin was used to stain any cysts within samples
  - Samples were rinsed and analyzed under an epifluorescent microscope

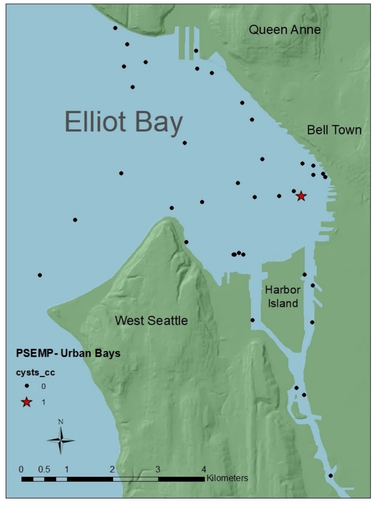

Figure 1: Map of Elliot Bay. Station locations are shown as black dots. Red star represents positive cyst identification.

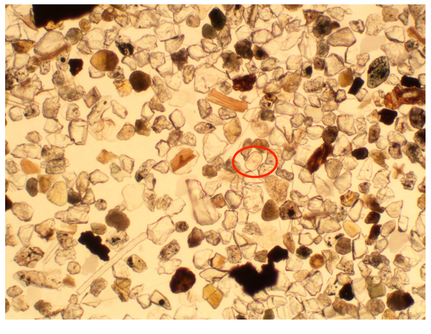

Figure 2: *A. catenella* cyst magnified at 100x. Cyst is shown under normal lighting conditions and encircled in red.

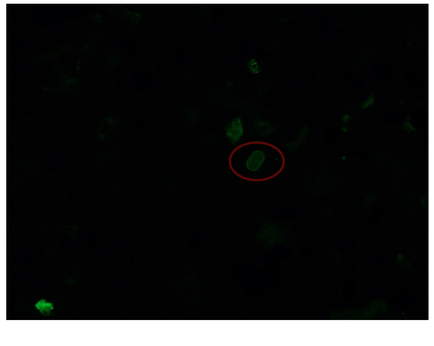

Figure 3: *A. catenella* cyst magnified at 100x, encircled in red. Under fluorescent light, the stained cyst can be seen easier with greater contrast.

Results and Discussion

After analysis of all 38 sediment samples, only one *A. catenella* cyst was discovered . When accounting for the dilution of subsamples, that is equivalent to 2.5 cysts/cc. Sediment samples taken from Elliot Bay in 2019 yielded an average of 14 cyst/cc per sampling station. Sampling is traditionally done in the winter, when *A. catenella* lies dormant in sediment in the form of cysts. However, for this research, samples were collected in spring. When water conditions are warmer, *A. catenella* has bloomed and can be found within the water column. This is the likely explanation for the significantly lower quantity of cysts found in the sediment in 2021.

Sources

Sources available using QR code. For more information: gliving@uw.edu, zobedoza@uw.edu

Acknowledgements

This study was conducted in 2021 in collaboration with WSDOE's Puget Sound Monitoring Program

- **Thank you to the Dept of Ecology for sample collection, Ethan Hoang for assisting with analysis, and Caitlyn McFarland for poster design**