2025 Analysis of *Alexandrium* Cysts in Bed Sediments of Elliot Bay in Puget Sound, WA

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INTRODUCTION

Paralytic shellfish toxin (PST), caused by saxitoxin-producing *Alexandrium catenella*, is a serious environmental and public health concern in marine waters of the Pacific Northwest. While toxin levels in shellfish tissue are routinely monitored, there is comparatively limited data on the abundance and distribution of *A. catenella* cysts in sediments.

Studies in other regions have shown that high cyst densities can precede widespread shellfish mortality events and economic losses. This gap in sediment-based monitoring leaves management agencies reactive rather than proactive, responding only after toxins are detected in harvested shellfish.

This research is unique in that it focuses on the dormant cyst stage within Elliott Bay sediments, providing predictive insight into bloom risk before vegetative cells enter the water column.

Fig. 1. Clockwise from top, life cycle of *Alexandrium catenella*, resting cyst, vegetative cells in chain, fluorescing cyst as seen under microscope

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METHODS

FIELD SAMPLING

> The samples were collected by King County Monitoring Team using a Van Veen by scooping 2-4cm depth of sediment. The samples are then put in zip locks and then labelled and preserved in 4˚C. Once at the lab, the samples were inventoried by our team and kept cold and dark until the samples were processed. Each sample represents sediment from differing locations and stations around the Elliot Bay.

LABORATORY PREPARATION

> Processed according to the modified Yamaguchi et al. (1995) method.

>**Dilution:** 5mL sediment to 1:5 filtered seawater (FSW).

>**Sonication:** 10mL sediment + 45mL FSW at 50% for 1 minute to remove mucous outer membrane.

>**Sieving:** 90µm and 20µm sieves using FSW.

>**Preservation:** 14 mL FSW+ 0.75mL formalin.

>**Etching:** 10 mL methanol to prepare for staining.

>**Staining:** 2 mL Primulin to make cysts visible under the microscope.

Significance

- The purpose of this study is to determine the abundance and distribution of *Alexandrium catenella* cysts in Elliott Bay and assess the potential risk of PST events, should water temperatures exceed 14°C.
- By quantifying cyst abundance and distribution, the study reveals which areas of Elliott Bay are most vulnerable to toxic blooms, allowing environmental managers to prioritize monitoring and mitigation efforts.

RESULTS

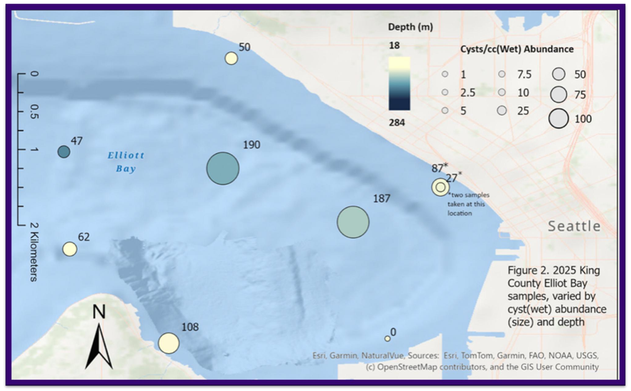


Figure 2: 2025 King County Elliot Bay Samples Varied by Cyst (**wet**) Abundance and Depth

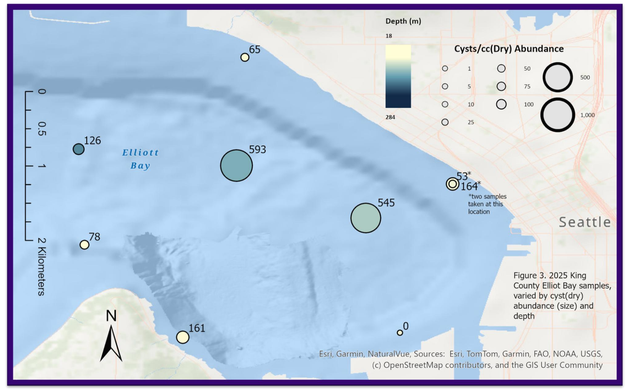
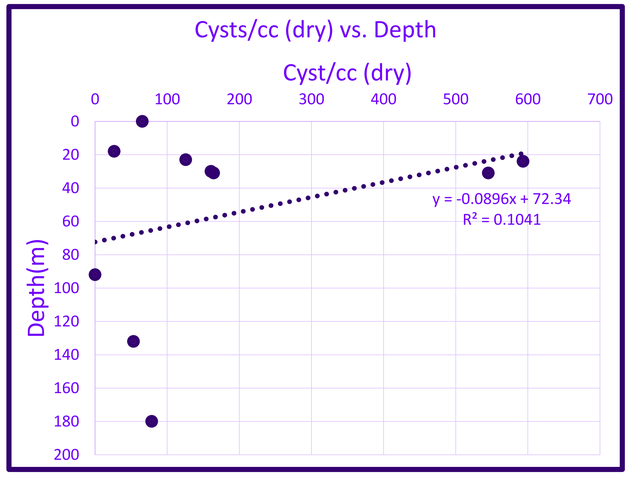
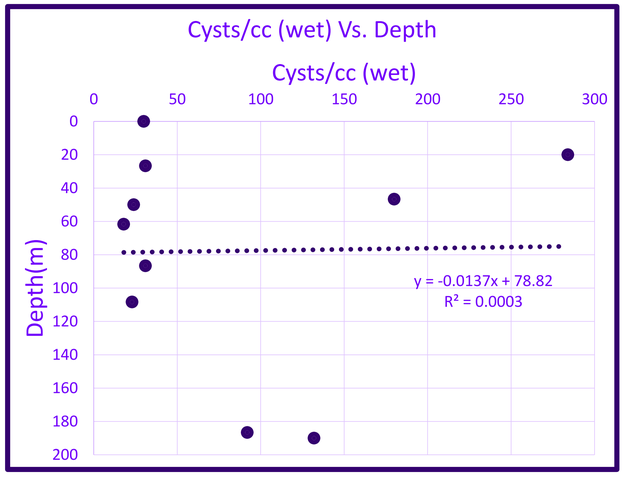


Figure 3: 2025 King County Elliot Bay Samples Varied by Cyst (**dry**) Abundance and Depth





Figures 4 and 5: Linear regressions of **Depth** and their **relative Cyst counts** while dry and wet respectively for 2025 Elliott Bay Samples

Conclusion

> The R^2 value in both figures 4 and 5 indicate that there is **little to no correlation between Cyst counts and depth** statistically for either dry or wet samples analyzed.

> Despite that, there is a pattern demonstrated by the plots above that **the deeper the station samples in the Elliot Bay, the higher the cyst counts** as shown in figure 2.

> **Samples collected near the shore have lower cyst counts as they are in shallower waters when compared to the high counts of Cyst in deeper areas in the Elliott Bay.**

REFERENCES