

2023 Analysis of Harmful Algae in Bed Sediments of the Salish Sea in the Puget Sound



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Introduction

Alexandrium catenella is a toxic dinoflagellate that has two life stages, a dormant cyst form in bed sediments or a vegetative swimming stage. *A. catenella* produces a paralytic shellfish toxin (PST) which can bioaccumulate in shellfish and when ingested by mammals, could potentially cause paralytic shellfish poisoning (PSP) (Greengrove et al. 2012). The purpose of this project is the continuation of monitoring of *A. catenella* populations and to report findings to stakeholders and policy makers to determine if increased monitoring is needed in locations where cysts are found.



Figure 1. Lifecycle of *Alexandrium catenella*, with microscope images.

Methods

- > 50 stations were sampled by Washington State Ecology's Marine Sediment Monitoring Group using a van Veen sediment scooper, transferred cold and in the dark to UWT for processing.
- > Diluted 5 mL of sediment to 1:5 with filtered sea water (FSW).
- > Sonicated to remove mucous layer surrounding cysts, easier to etch and stain.
- > Sieved through 90 μm and 20 μm sieves with FSW.
- > Preserved using formalin.
- > Etched using methanol, ensures stain will stick.
- > Stained with Primulin and rinsed with FSW.
- > Examined under epifluorescence microscope.

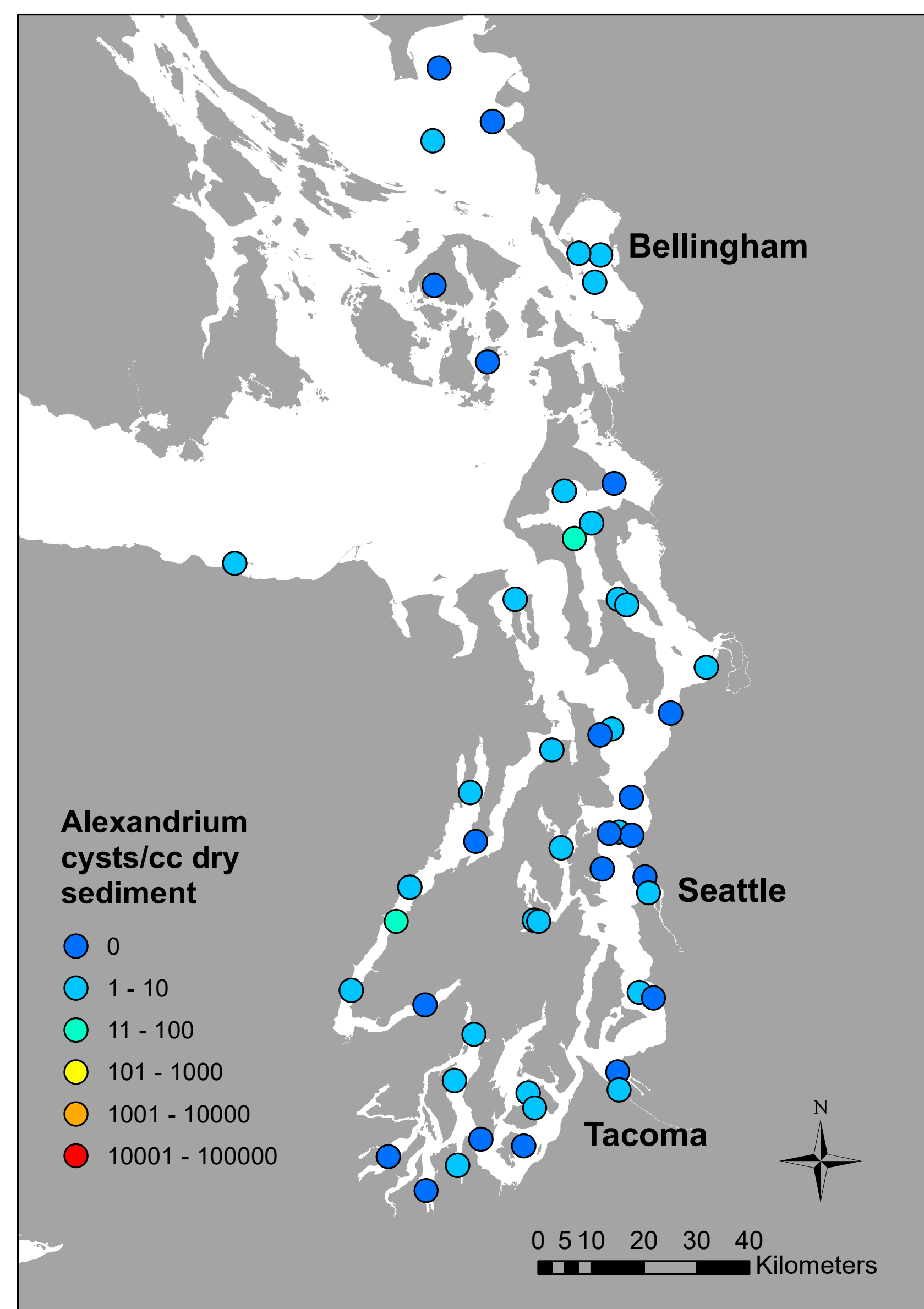
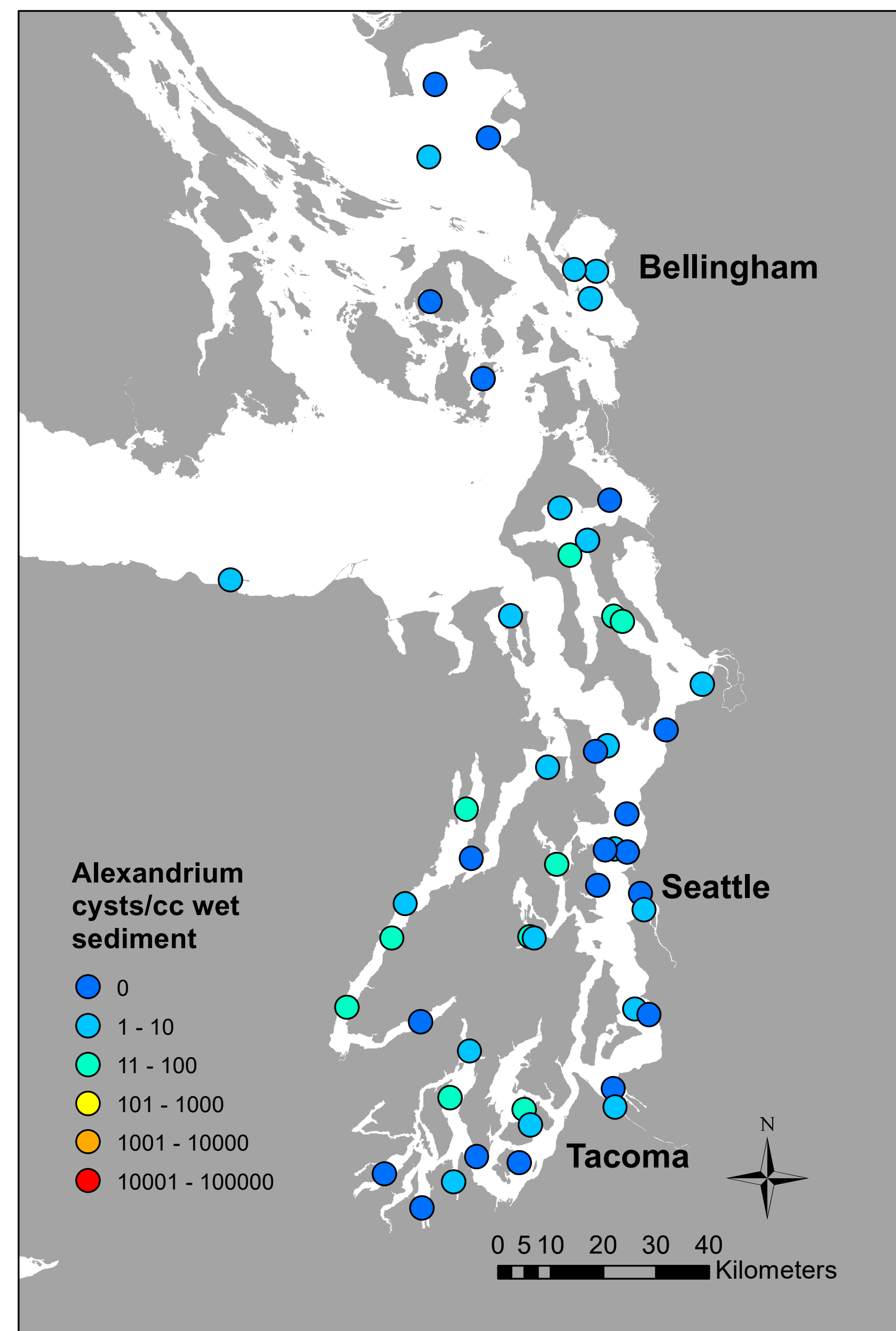


Figure 2 (Top): Cysts/cc(wet) of all 50 stations. Cysts/cc(wet) describes the spatial distribution of cysts with water fraction. Figure 3 (Bottom): Cysts/cc(dry) of sampled stations. Describes cysts in solids, with no water fraction.

Results

- > The highest *A. catenella* cyst counts came from stations Hood Canal - Central (HCB003) and Central Basin - North (40037) with 8 total, 40 cysts/cc wet, and 12 cysts/cc dry.
- > Average cyst counts over all stations was 2 cysts, 8 cysts/cc wet and 3 cysts/cc dry.
- > Graphs were made comparing cysts counts to total organic content (TOC) and median grain size, there was no correlation between cyst/cc(wet) or cyst/cc(dry) with either factor.

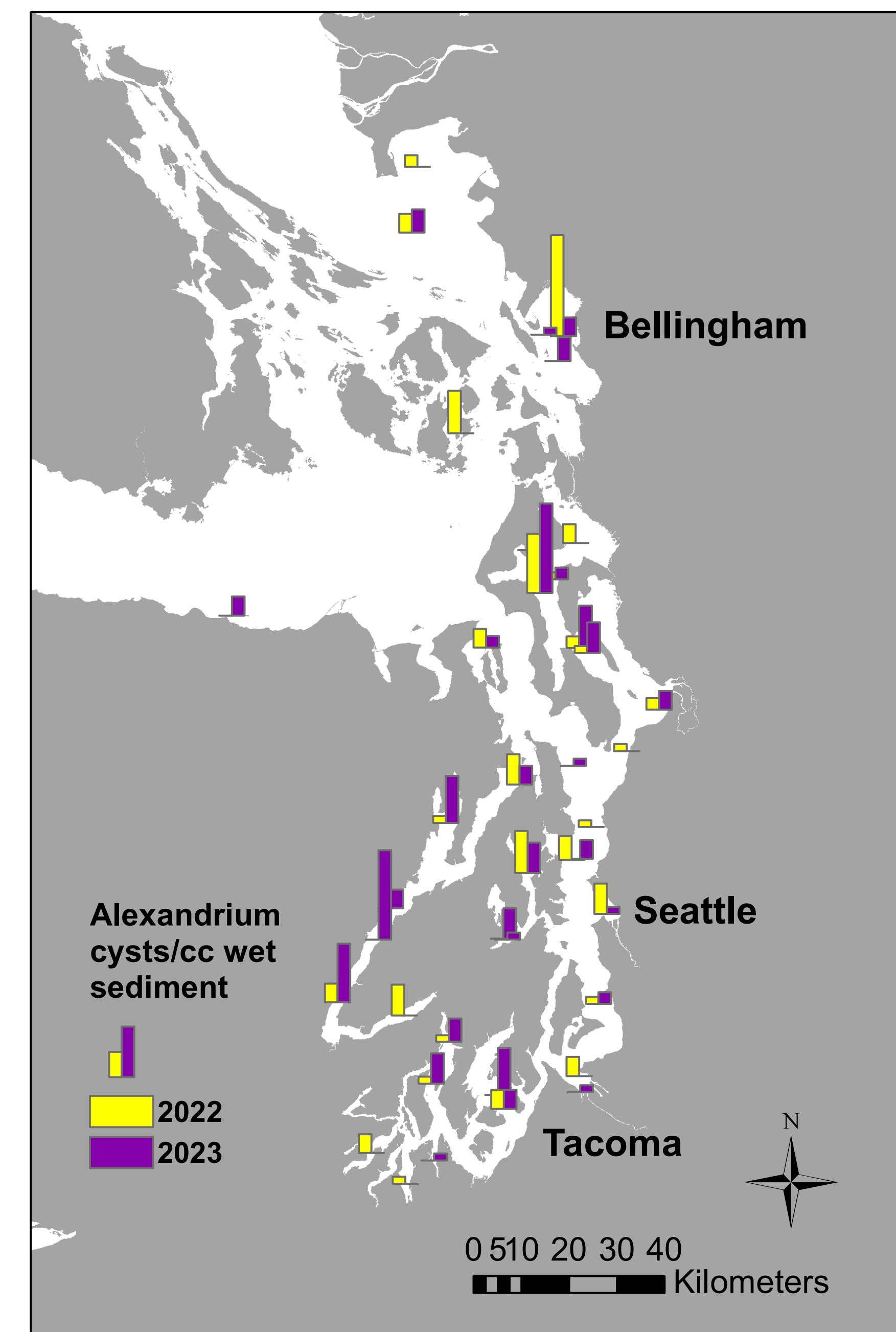


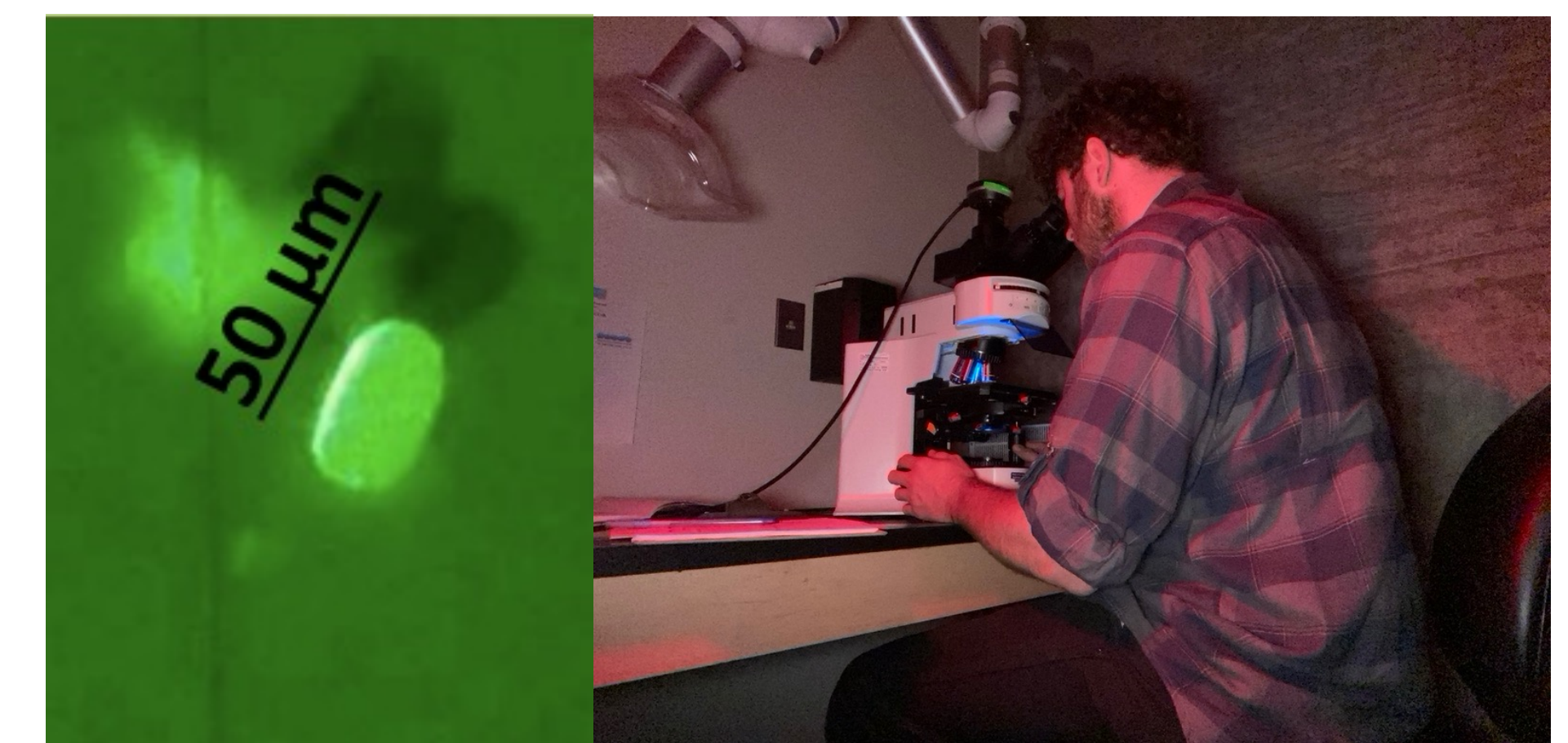
Figure 4: Comparison of 2023 cysts/cc(wet) counts to 2022 counts.



Right: Sieving of sediment samples. Left: Sonicator setup used for sediment samples.

Discussion

- > When compared to previous years, we can see a trend of increased cyst counts in the Hood Canal region and South Puget Sound.
- > A decrease in Bellingham Bay and the North Puget Sound is observed, Bellingham Bay is a typical seedbed/hotspot for cysts.
- > Factors that may have altered *A. catenella* cyst count include the collection of samples during the Spring/Summer season, warmer weather and more resources may cause cysts to germinate.



Left: *Alexandrium catenella* (photo by C. McFarland). Right: Use of epifluorescence microscope.

Conclusion

- > All findings will be reported to stakeholders and policy makers to determine if increased or additional monitoring is needed.
- > Monitoring should be continued throughout the Puget Sound to keep an understanding of the *A. catenella* cyst population and ensure public health.

References

Sources available with QR code.

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