2017 Analysis of *Alexandrium* Cysts in Bed Sediments of Bellingham Bay in Puget Sound, WA

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INTRODUCTION

Alexandrium catenella, a toxic dinoflagellate, produces saxitoxin that can bioaccumulate in shellfish with the potential to cause paralytic shellfish poisoning (PSP) when consumed by mammals. Monitoring resting cyst forms (fig. 1) will determine what areas have a higher number of *A. catenella* cysts, and therefore the chance of a toxic bloom. The purpose of this study was to monitor the concentrations of *A. catenella* cysts in sediments in Bellingham Bay to alert of future human and ecosystem health risks.

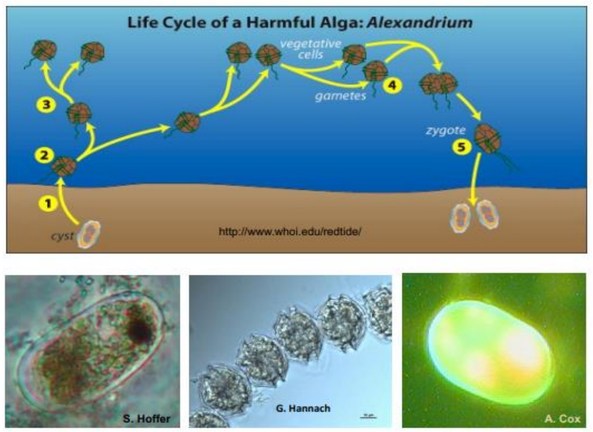

Fig. 1. Clockwise from top, life cycle of *Alexandrium catenella*, resting cyst, vegetative cells in chain, fluorescing cyst.

QUICK FACTS

> *Alexandrium catenella's* life cycle has both a dormant and vegetative stage . The transition is triggered by a increase in competition, and/or a lack of sunlight and nutrients.

> Bellingham Bay is a known seedbed for high cyst concentrations.

> The effects of Paralytic Shellfish Toxins (PST) affect mammals by causing paralysis due to blocking sodium channels.

METHODS

FIELD SAMPLING

> Washington State Department of Ecology's Marine Sediment Monitoring Team provided 30 sediment samples from Bellingham Bay in 2017. A 0.1 m^2 stainless steel van Veen grab sampler was used to recover sediment of depths ranging from 1 to 30 meters.

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.

DISCUSSION

> Median grain size increased (more energy) the cyst count decreased (figs. 4&5)

> Samples collected in June. Warmer temperatures and more nutrient abundance can cause excystment into vegetative cell stage.

> Minimum cyst count sampled at shallow depth(5m) while the maximum cyst count sampled at deep depth showing a correlation between the type of environment and the amount of dormant cysts.

RESULTS

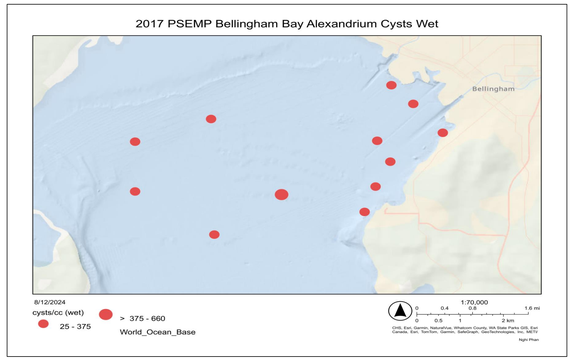

Fig. 2. 2017 cysts distribution in wet sediment sampled from around Bellingham Bay.

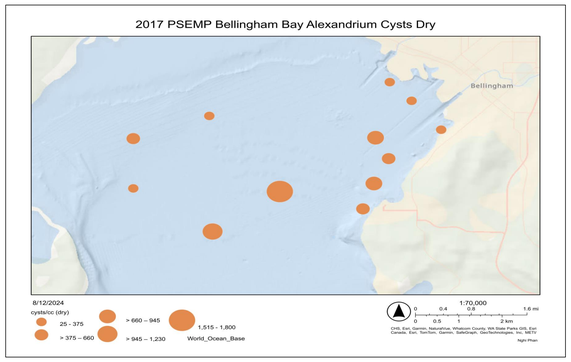

Fig. 3. 2017 cysts distribution in dry sediment sampled from around Bellingham Bay.

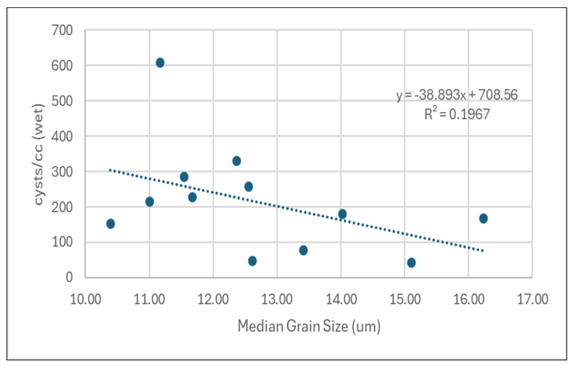

Fig. 4. Linear regression of median grain sizes of 12 samples from 2017 and their cysts counts in wet sediment.

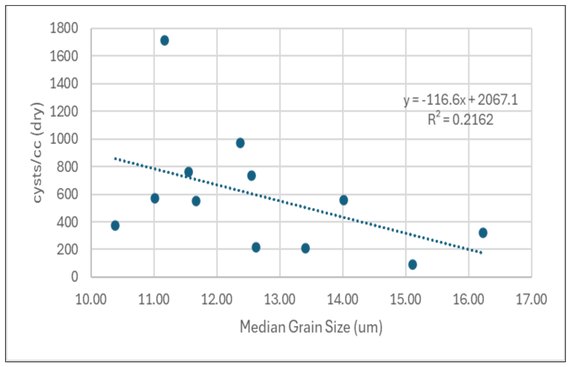

Fig. 5. Linear regression of median grain sizes of 12 samples from 2017 and their cysts counts in dry sediment.

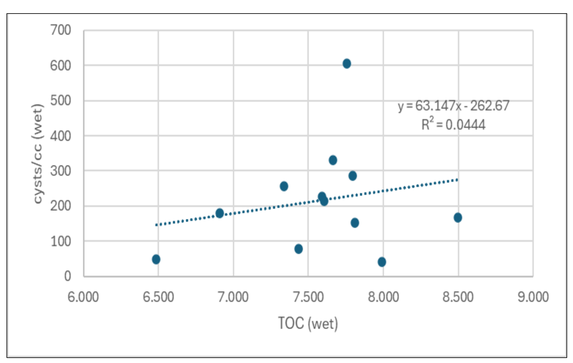

Fig. 6. Linear regression of Total organic carbon of 12 samples from 2017 and their cysts counts from wet sediment.

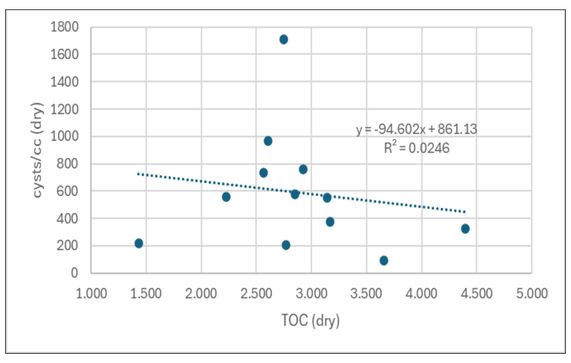

Fig. 7. Linear regression of Total organic carbon of 12 samples from 2017 and their cyst counts from dry sediment.

TABLE 1. Graphs' Correlation Summary

	Median Grain Size (um)	TOC (wet)	TOC (dry)
Cysts/cc (wet)	Slight poor correlation	No correlation	No correlation
Cysts/cc (dry)	Slight poor correlation	No correlation	No correlation

REFERENCES