Taking Inventory of Alexandrium catenella Cysts in Quartermaster Harbor

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Abstract

Alexandrium catenella is responsible for paralytic shellfish poisoning in Puget Sound. Ingestion of shellfish containing saxitoxins can cause symptoms ranging from nausea to death. Harmful algal blooms (HABs) lead to closure of shellfish harvesting, impacting local economies. A 2008 survey mapped the concentrations of *A. catenella* cysts throughout Quartermaster Harbor. This study sampled the same sites in 2010 to determine if cysts migrate over the years. Subsamples were processed and analyzed using epi-fluorescent microscopy. Comparing the abundance and distribution of cysts over time can create a better understanding of the mechanisms driving *Alexandrium*, leading to improved prediction and management of HABs.

Discussion

Since the 1980's, Harmful Algal Blooms (HABS) have expanded globally, increasing in range, size, and duration (Gonzalo, et al, 2011). Of particular concern are blooms that contain dinoflagellates that produce saxitoxins, which bioaccumulate in mollusks and are responsible for Paralytic Shellfish Poisoning (PSP) (Kvitek, 1991) (McClean, 1993). HABs have a negative impact on local economies, resulting in loss of resources, and closure of fisheries and beaches. In addition, ecological impacts from HABs include depletion of oxygen in ocean waters, displacement of other species, and alteration of habitat (Anderson, 2006).

The exact mechanisms that trigger HABs are not known, but theories include a combination of environmental factors, including tidal action, changing weather patterns, and shifts in nutrient availability from anthropogenic inputs (Anderson, 2006).

Our study focuses on Quartermaster Harbor, a shallow, poor circulating harbor that lies between Vashon and Maury Islands. Vegetative cells of *Alexandrium catenella* may be pushed in to the harbor through tidal action, where they are eventually deposited as resting cysts on the sediment floor.

By inventorying the number of resting cysts over time, and correlating that number with environmental data collected along with the cysts, patterns may emerge that increase the effectiveness of prediction and management of HABs.

Harmful Algal Bloom (HAB) in Puget Sound

Methods

Collection

Grab: Surface layer of sediments is collected with van Veen sampler.

Storage: Samples are kept on ice and in the dark to inhibit growth.

TOC: Sediments are dried and weighed, then organics are burned off leaving only mineral fraction. Difference in weight is the Total Organic Carbon present.

Deploying the Van Veen.

Mineral fraction of sediment samples after burning.

Counting

Sonication: Breaks apart colloids and aggregates.

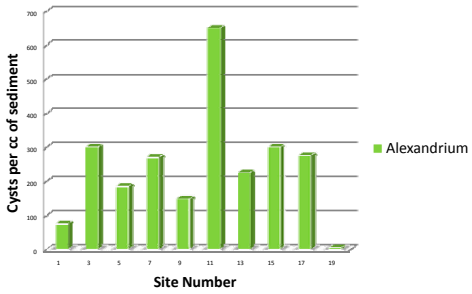
Sieve: Selects particles in the size range (between 90µm and 20 µm) of Alexandrium cysts.

Fix: Kills cells, stopping growth

Count: Cells are counted using an epi-fluorescent microscope and a raft slide.

Results

Alexandrium Cysts



Although the number of cells per mL was lower than previous studies, preliminary results indicate that Quartermaster Harbor is an active seed bed for HABs.

Total Organic Carbon

Although there seems to be no apparent correlation between TOC and the number of *A. catenella* cysts, future research may find correlation between other environmental factors.

Future studies will include comparison between number of cysts and environmental conditions, to understand the dynamics of HABs.

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