Ways To Reduce Bivalve Poisoning in The Salish Sea

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Intro to the Salish Sea 101

Thesis Question:

What are the effective strategies of preventing bivalve poisoning from harmful algal blooms?

Background Information

General Information

Bivalves, which includes clams, oysters, and mussels have the potential to harbor poisons through consuming algae in harmful algal blooms (Nishitani 3). Not all algal Blooms are harmful, but those that are contain toxins, which when consumed by a bivalve make them poisonous.

Alexandrium is a large contributor to bivalve poisoning in the Salish Sea. It produces saxitoxin which, once consumed by a bivalve, becomes stored in their bodies (Hatch). When a bivalve housing saxitoxin is ingested by a human it can cause paralytic shellfish poisoning (PSP). The saxitoxin will interrupt sodium channels and prevents nerves from firing (Hatch) which can cause loss of control of body parts and difficulty breathing. Warning signs include a tingling sensation in the lips and tongue which can progress into your toes and fingers. (Nishitani 3).

These blooms are a naturally occurring phenomenon but are becoming more frequent and have a larger window when they can bloom throughout the year (Hatch). Blooms occur in warmer weather and bivalves consume algae more quickly in warmer weather as well. This leads to seasonal patterns of blooms and bivalve contamination (Nishitani 3).

Methods:

To understand which strategies different groups of people used to prevent bivalve poisonings, we interviewed two people who have worked with bivalves, Marco Hatch, a Lummi Nation member, Professor at WWU, and an expert in butter clams, and "Beach Master" Louie Bloom who has no formal training but has devoted his life to beach work (Bloom). Due to limitations in time and availability, we will also be using outside sources in our comparison.

Past Strategies

There has been evolution in the way we test the water/bivalves for HAB, or harmful algal blooms. Louie Bloom shares with us that, “the way counties or dept. of health, tested shellfish for toxins in the 1960's or later was to grind up mussels, oysters, clams, etc..., and inject mice or rats, and see if they die.” Our technology that we use to test the water for HAB have evolved. According to Marco Hatch, NOAA 10 years ago did an “ESP environmental sample process, which is like an R210 that has a hose that goes out and processes water and environmental DNA, specific to each toxin producing species of plankton or even the actual toxin.”

Venn Diagram of Strategies

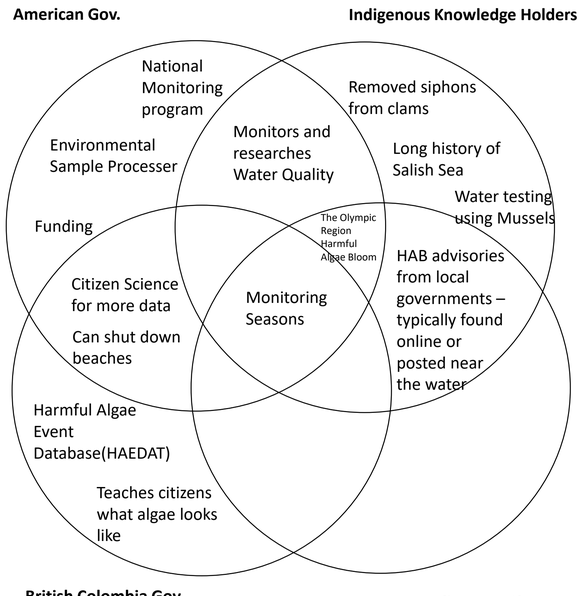

Table 1. A Venn Diagram with four groups, American Gov., Indigenous Knowledge Holders, British Colombia Gov., and Non-Indigenous Clammers, in most of the groups there are strategies.

Butter Clam Diagram

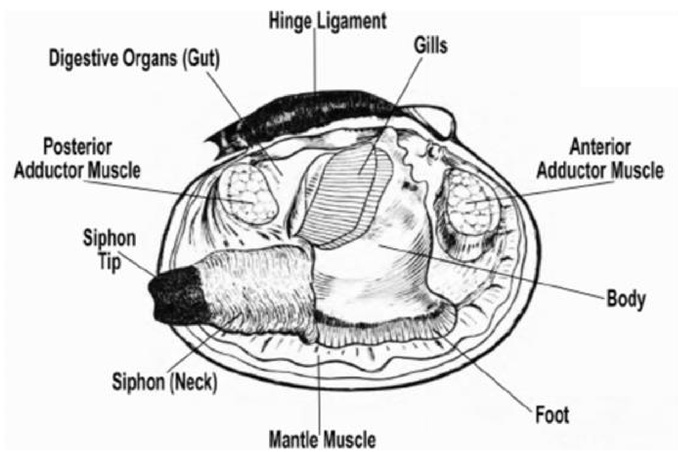

Figure 2. A diagram of a butter clam with each part labeled (Quayle and Bourne, 16).

Discussion

The simplest way to prevent getting poisoned, is to not eat bivalves. However, that is an extremely impractical choice, and the next best thing is to monitor the world around you.

Being able to study the world around you is based on available resources. Many clammers only have local advisories and knowledge of the seasons (Bloom). Indigenous knowledge holders use this as well, with the added benefit of experience on the Salish Sea and have learned generations ago that you can snip off the siphon of a clam to remove most of the toxins (Hatch). Sea otters were also known to use this strategy (Hatch). Both of these groups are in America and Canada, but the countries have different ways of figuring out if the water is dangerous and put out different advisories.

Today, the Lummi Natural Resources Department has been active in monitoring waters for biotoxins using mussels (LUMMI). Mussels are especially quick in consuming algae which makes them effective gauges for monitoring water quality (LUMMI). Blended mussel samples are taken to the to the Washington State Department of Health or the Northwest Indian College for examination; the results are used to inform when signs are posted for shellfish harvest closures (LUMMI).

British Colombia has not focused their funding or research on harmful algal blooms, which means reduced ability to tell the people. America has research buoys in the water which can give constant updates of what specific toxins are there, and work with tribal and local governments, as well as colleges to collect data together, and call it The Olympic Region Harmful Algae Bloom (ORHAB).

Interpretations:

The most of effective strategies of preventing bivalve poisoning is to get as much up to date and specific information as possible and working with your community to do so. The American government and tribal communities (which there is sizeable overlap between), are currently in the lead for doing the most, but because of the limited ability to interview people in the time we had, we don’t know the exact impact that each group has on reducing the harm to people, so many people who are in these communities could have different findings.

Our study has not specifically resolved any issue, but those who look at it can learn more about how to keep themselves safe.

Acknowledgements

Much of the information used in this presentation has been gathered from tribal data sources or native individuals such as Marco Hatch. They have been at the forefront of research into algal blooms in the modern day but have also known about ways to minimize poisonings far before that. Their contributions make up a critical part of scientific knowledge on the subject. We are thankful for all that they have shared with us.

Work Cited

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