

## Introduction

Shellfish have been an important food source to many Alaska Native people through many generations in Kasaan. Shellfish connects us to the past and also gives us something delicious to enjoy. Sadly, they also can contract a harmful poison called **saxitoxin** (Knaack et al., 2016). Saxitoxin comes from an algae called Alexandrium, which stays dormant in the winter months when it is very cold, then multiply during the warmer months of the year. When there is a large amount of algae multiplying in one area, it is called an **algal bloom**.

Shellfish ingest Alexandrium through filter feeding, which leads to toxins being retained in the shellfish tissues. This is called bioaccumulation. Because shellfish bioaccumulate PSTs, it is important to test and record the results in order to keep our tradition alive and our people safe (Wekell et al., 2004). Year round shellfish in Kasaan Bay are being tested and monitored for harmful algae blooms. For our project we will be testing shellfish from the Whale House Beach and George's Beach.

## Hypothesis

Due to the close proximity and similar environment, we predict that the PST levels in George's Beach will be similar or identical to Whale House Beach.

## Methods

On March 12th, 27th and April 10th, about five butter clams, half a gallon bag of blue mussels, cockles were collected (Fig. 1). The butter clams were collected opportunistically<sup>1</sup> and the blue mussels were collected haphazardly<sup>2</sup> (if greater than six centimeters at their widest point.) Species were collected from both the Whale House Beach, where the Organized Village of Kasaan does routine testing, and George's Beach about 500 ft away. After harvesting, shellfish were rinsed in the ocean and stored in open bags. Whole shellfish were then packaged in a styrofoam box with an ice pack and proper paperwork and send to the Sitka Tribe of Alaska Environmental Research Lab in Sitka. We contacted the lab the same day samples were sent. Results were returned within a week or two. There, samples were tested for saxitoxin using a Receptor Binding Assay.



Fig. 1. A freshly harvested cockle from George's beach.

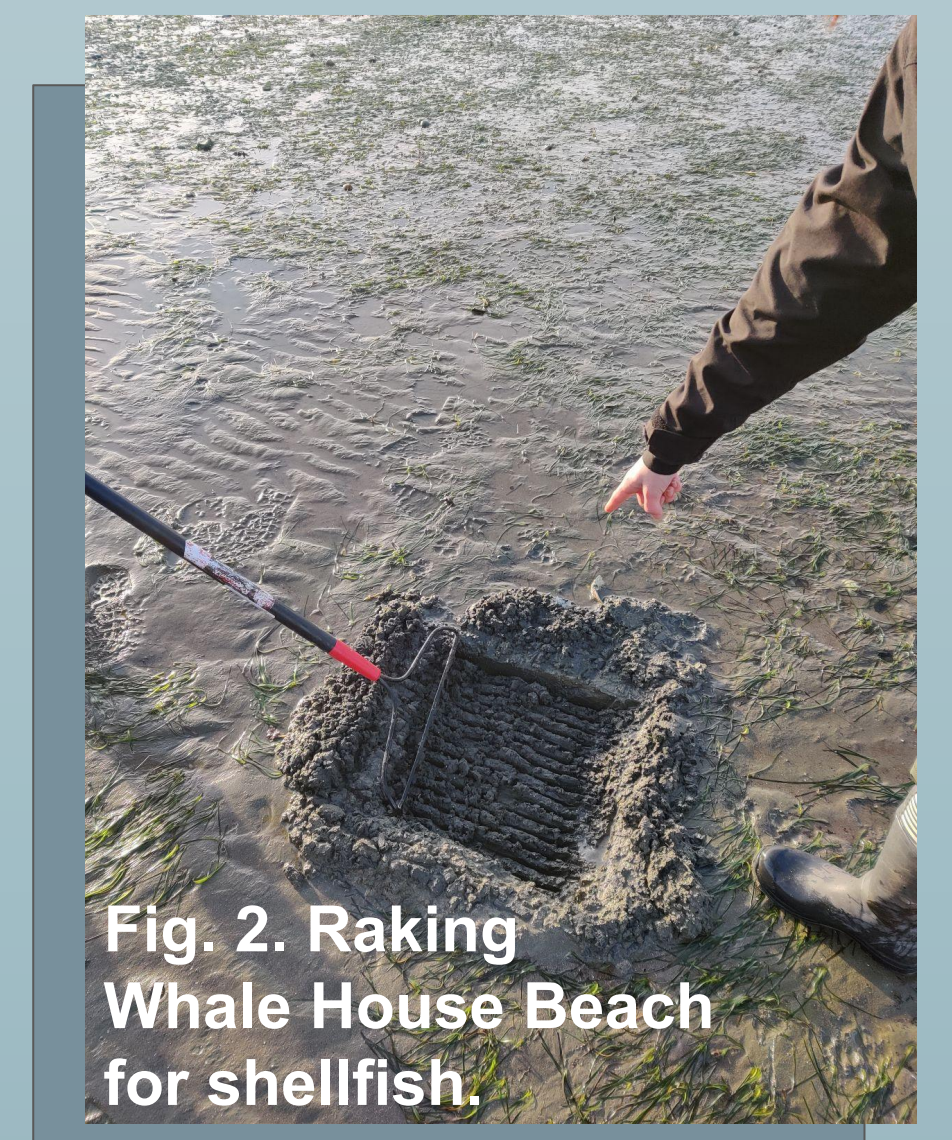


Fig. 2. Raking Whale House Beach for shellfish.

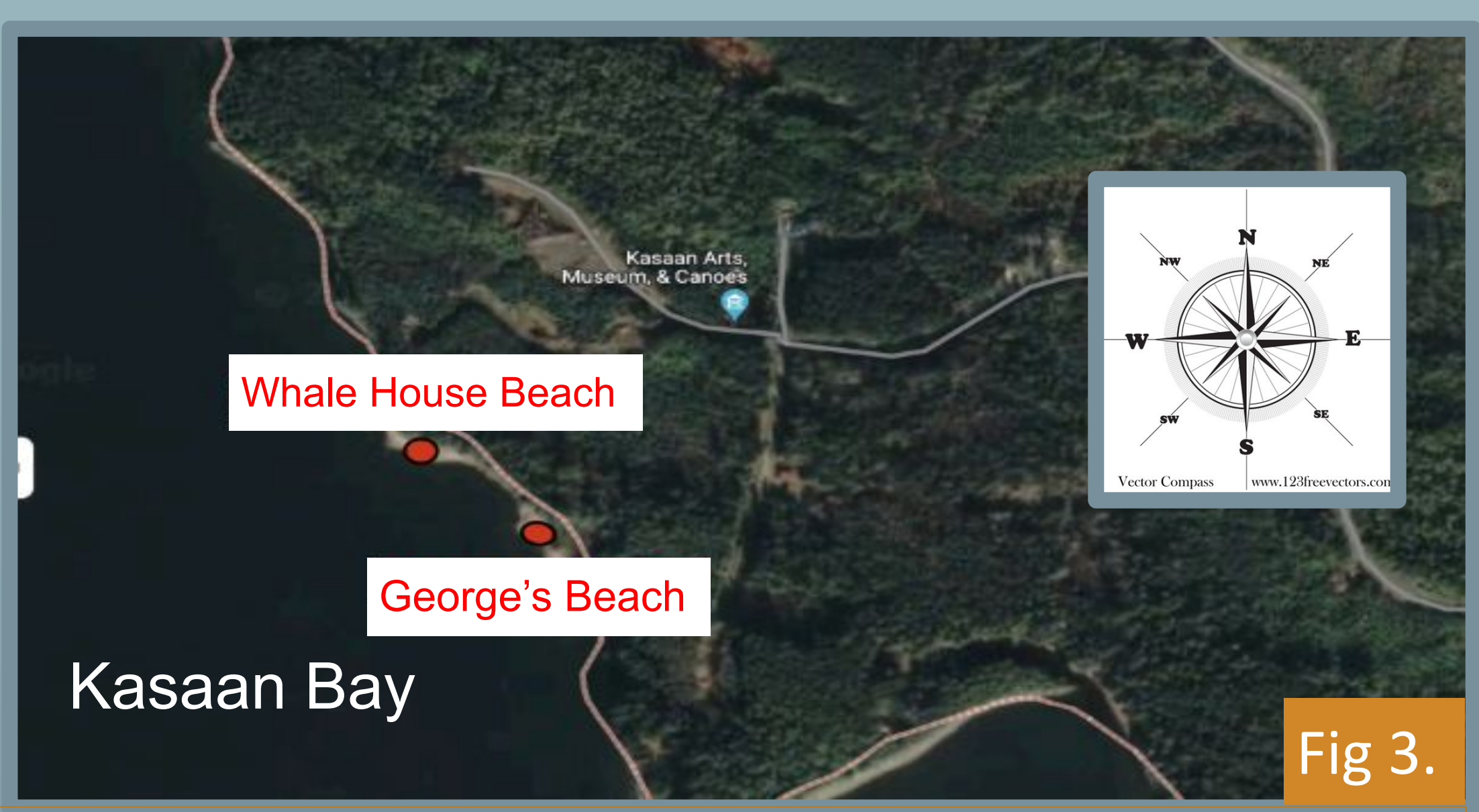


Fig 3.

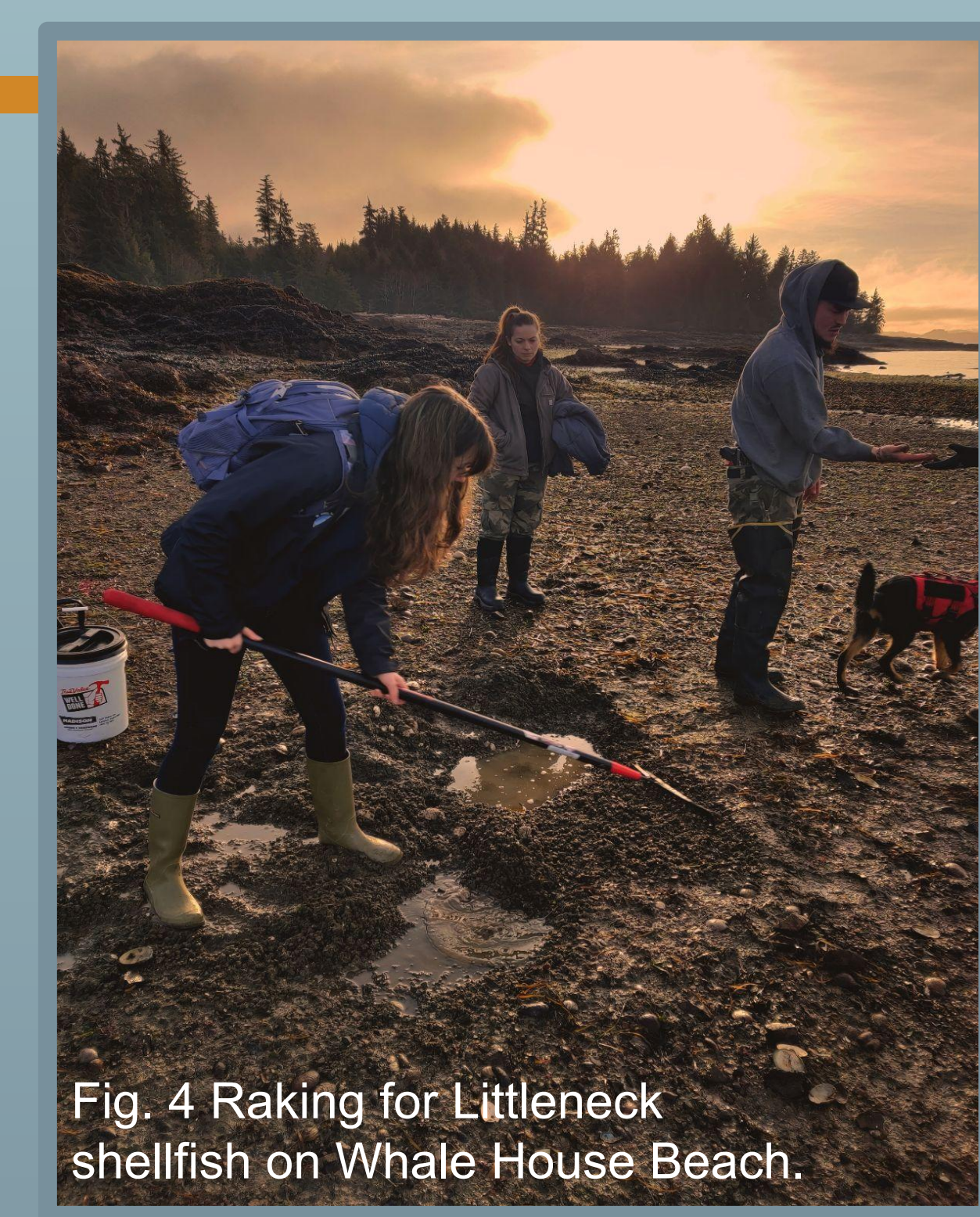


Fig. 4 Raking for Littleneck shellfish on Whale House Beach.

## Results

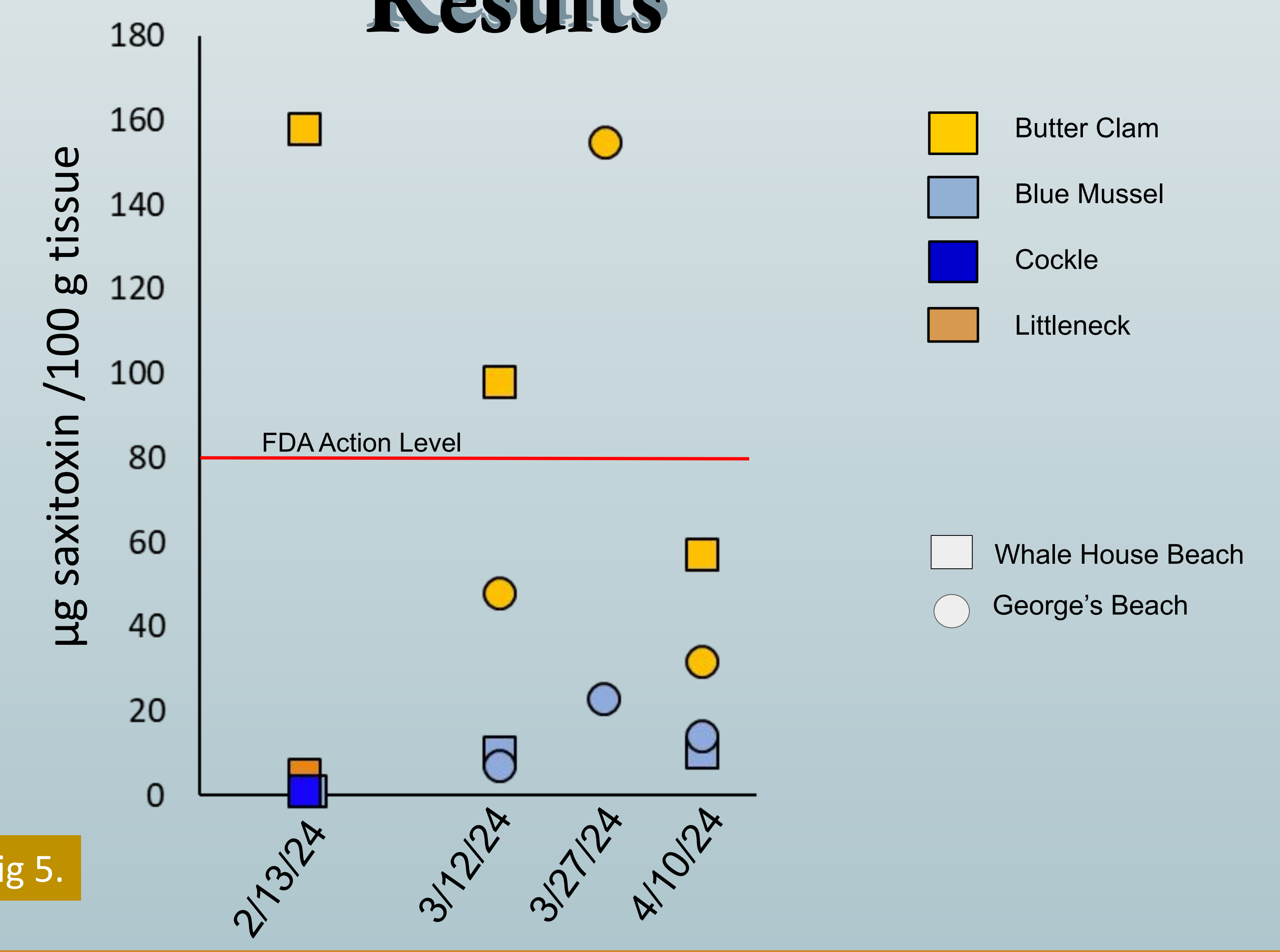


Fig 5.

- Butter clams were the only species that were above the FDA action level 80 µg/100 g (Fig 5)
- Butter clams also had much higher level of saxitoxin, about twice as much as the other species.
- Overall, Whale House Beach had **MORE** saxitoxin than George's Beach for butter clams and blue mussels, except for one instance where George's Beach had more saxitoxin in the blue mussel species on April 10th.

## Discussion

Overall, our data does **NOT** support our hypothesis because the PST levels (the toxins that can cause paralytic shellfish poisoning if consumed) were higher on Whale House Beach than on George's Beach. There are many explanations as to why this was observed, one of which could be that the amount of phytoplankton cysts in the sediment. Although the saxitoxin levels were higher on Whale House Beach than on George's Beach, this may not always be the case. Even though both beaches tested below the regulatory limit on April 10th, we would need to repeat this experiment and receive the same results at least three times before an advisory warning against harvesting would be removed. Toxin levels are continually changing and the data recorded will not be permanent so continued monitoring is needed to provide up-to-date advice for harvesters. It is also very important to remember that butter clams can retain toxins up to two years and become more concentrated. It is always best if you are harvesting shellfish, to send your samples to the Sitka Tribe of Alaska Environmental Research Lab to be tested for PSTs before consuming.

Because our knowledge is limited to only these two beaches, future research could include sampling more beaches during more seasons, so that we can find out what is in our local waters on a microscopic level, which would overall improve our society and culture, since people will always be harvesting from different beaches.

**References:**  
Wekell, J. C., Hurst, J., & Lefebvre, K. A. (2004). The Origin of the Regulatory Limits for Psp and Asp Toxins in Shellfish. *Journal of Shellfish Research*, 23(3), 927-930  
Knaack JS, Porter KA, Jacob JT, Sullivan K, Forester M, Wang RY, Trainer VL, Morton S, Eckert G, McGahee E, Thomas J, McLaughlin J, Johnson RC. Case diagnosis and characterization of suspected paralytic shellfish poisoning in Alaska. *Harmful Algae*. 2016 Jul;57(Pt B):45-50. doi: 10.1016/j.hal.2016.03.006. Epub 2016 Aug 30. PMID: 28918891.

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