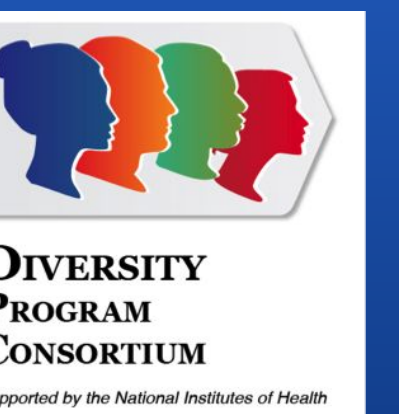


Which Gustavus community beach has blue mussels with the highest saxitoxin levels?



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Hypothesis

We hypothesize that Bartlett Cove will have lower biotoxin levels than Gustavus Beach. This would be due to the higher freshwater input at Bartlett Cove from the glaciers in Glacier Bay.

Background

Understanding harmful algal blooms in Alaska is essential not only to protect the health of marine ecosystems but to protect mammals that feed on shellfish species. We have been researching saxitoxin levels at Gustavus Beach (58°23'21"N 135°43'47"W) and Bartlett Cove (58°27'17"N 135°43'47"W); research has not been conducted on biotoxin levels in both of these areas. This provides baseline data for Gustavus Beach and Bartlett Cove, as well as additional data points for examining the whole of Southeast Alaska. Research has not been done in the Gustavus area on the levels of biotoxins. Lower freshwater levels increase the probability of higher *Alexandrium catenella* levels (Tobin et al., 2019). Glaciers also cause the turbidity in Bartlett Cove to be higher than Gustavus Beach, which would decrease the amount of sunlight penetrating the water. Higher levels of sunlight are also linked to higher *Alexandrium catenella* levels (Sommaruga, Kandolf, 2015).

Sampling Key

- Bartlett Cove Plankton Sampling
- Bartlett Cove Shellfish Sampling
- Bartlett Cove Shellfish Range
- Gustavus Beach Plankton Sampling
- Gustavus Beach Shellfish Sampling
- Gustavus Beach Shellfish Range

Methods

- Plankton tows:** We alternated which site we sampled every week. We started our sampling on January 29 and ended on March 28. Our sampling had three steps: visual observations, environmental analysis (using our refractometer and anemometer to measure salinity, temperature, etc.), and plankton collection.
- Plankton analysis:** The plankton were observed within hours of collection or preserved with Lugol's solution. To observe the samples, we prepared a gridded slide and examined it using an optical microscope, recording every notable observation, such as any noticeable plankton.
- Shellfish sampling:** We studied at the beaches near each plankton collection site. We sampled twice at each location. While collecting mussels, we would head to areas where they were frequent and attempt to collect as many as possible.
- Shellfish Analysis:** We shucked the shellfish we collected. We strained the internal organs of the shellfish before packaging them to be delivered to STAERL (part of SEATOR) for analysis using a receptor binding assay.

References: Sommaruga, R., & Kandolf, G. (2014, February 17). Negative consequences of glacial turbidity for the survival of freshwater planktonic heterotrophic flagellates. Retrieved from <https://bit.ly/2VkoADq>

Tobin, E. D., Wallace, C. L., Crumpton, C., Johnson, G., & Eckert, G. L. (2019, August 30). Environmental drivers of paralytic shellfish toxin producing *Alexandrium catenella* blooms in a fjord system of northern Southeast Alaska. Retrieved from <https://bit.ly/2V2R40l>

The low-risk level for PSP is 80 µg/100g!



Pleurosigma Morphotype



Results

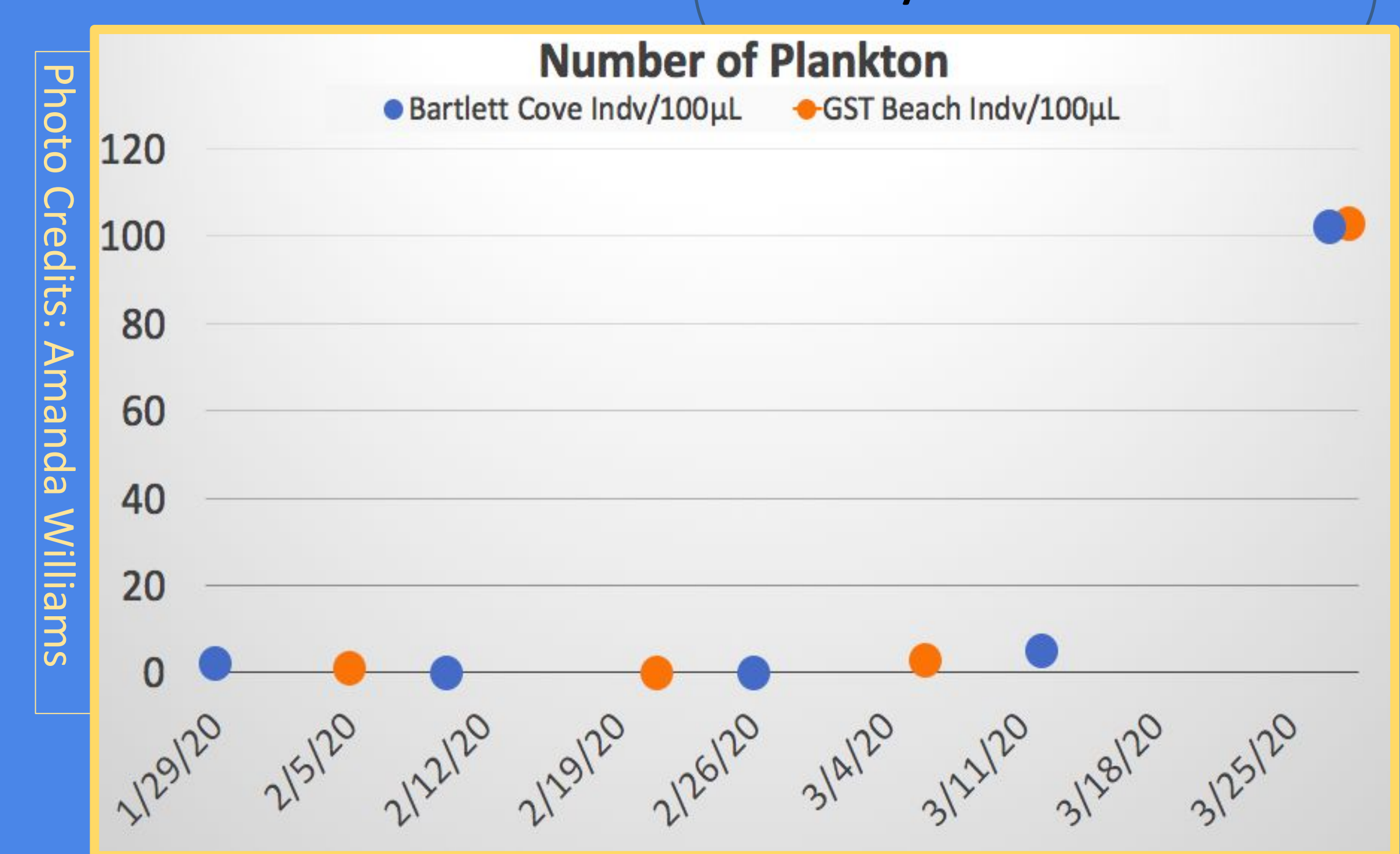
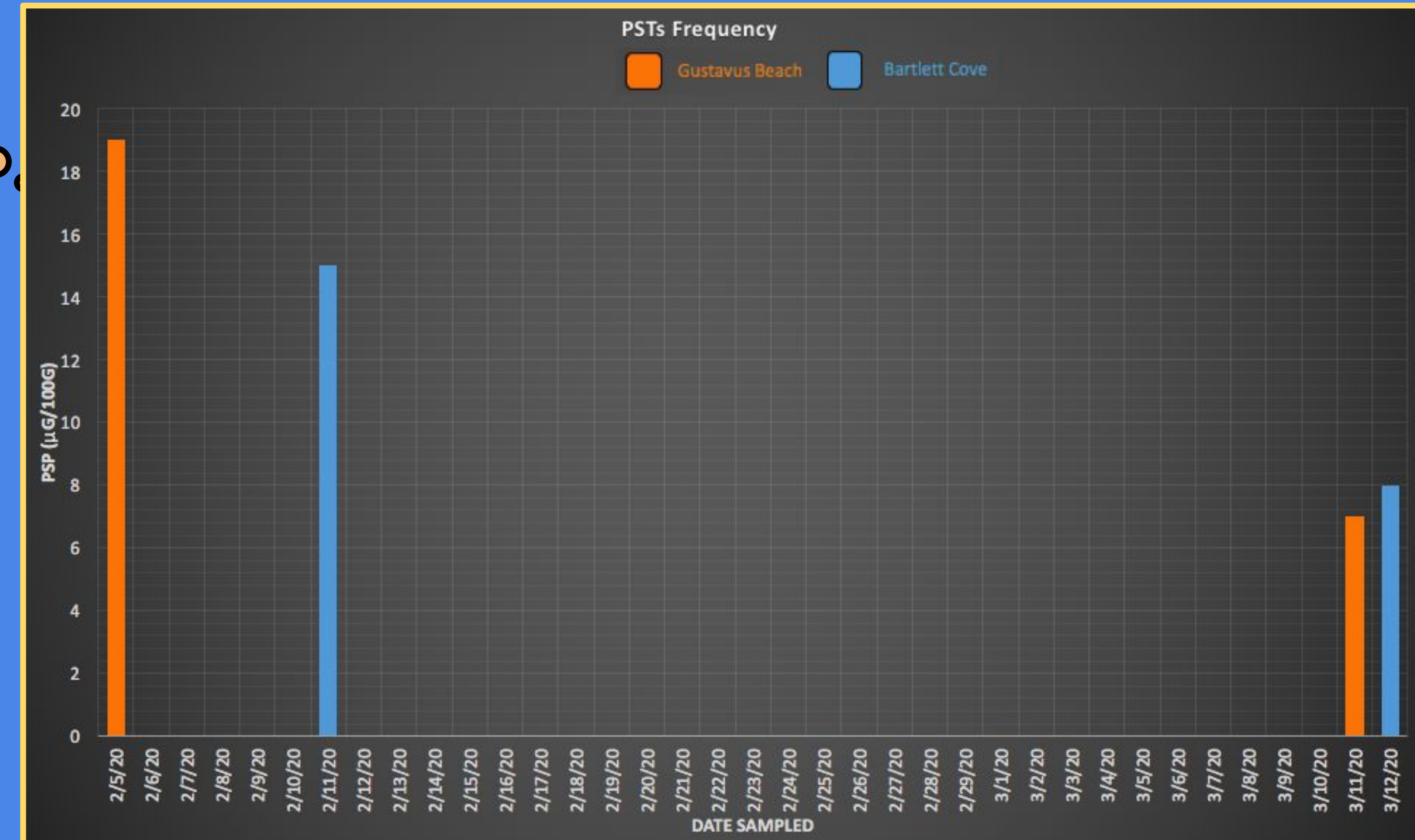
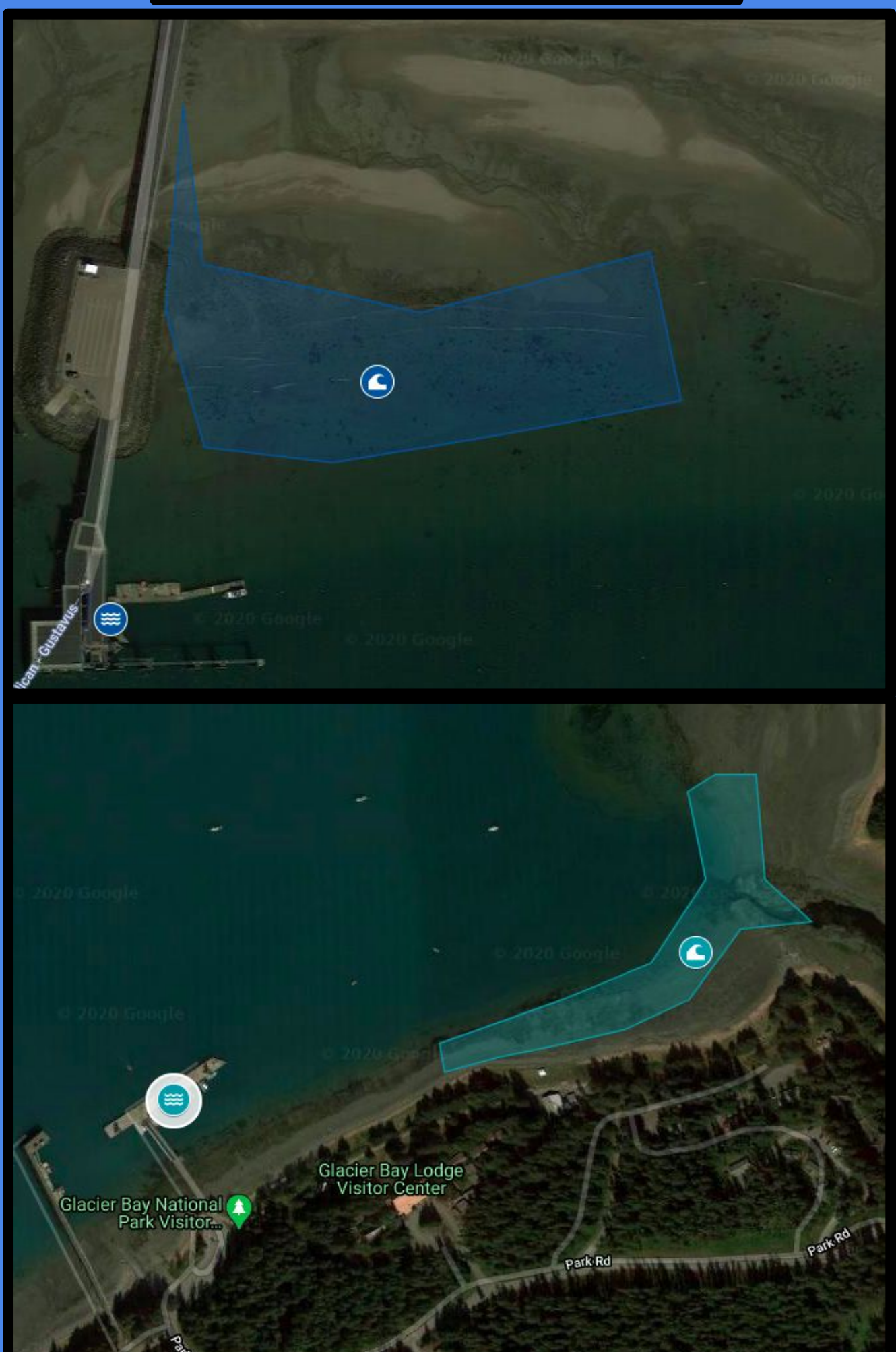


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Discussion

The data we have collected does not support our hypothesis. The amount of plankton found at Gustavus Beach during the sampling was usually slightly higher, the difference is very slight. In the first saxitoxin test Gustavus was a little higher, but the second time Bartlett cove was. These differences are not enough to make any definite conclusions. First of all, we only collected data from January to March, while a comprehensive study would go for an entire year or multiple years. Another potential limitation of this study is that the relatively short distance between the two sites might preclude any actual differences. Finally, the sampling dates are potentially too far apart to get a full picture of the time period we studied. It is still not clear if the freshwater input from Glacier Bay does reduce the levels of saxitoxin in shellfish, and a study with sites further apart would provide better insight.

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Bottom: Gustavus Beach, Top: Bartlett Cove. Created by Coral Williams, using Google My Maps