



# Are Paralytic Shellfish Toxin (PST) Levels Higher at Annette Island Beaches With More Human Influence?



Avienda Cook<sup>1,2</sup>, A. Miller<sup>1,2</sup>, Taylor Stumpf<sup>3</sup>, Ellen Chenoweth<sup>2</sup>  
 1. Metlakatla High School, 2. University of Alaska Southeast, 3. Fish and Wildlife Community Metlakatla District

## Introduction

Paralytic shellfish poisoning is a serious and potentially fatal illness that people can get from consuming wild shellfish (Gessner and Middaugh 1995). It has been historically common in Southeast Alaska to eat shellfish, but this has been declining in recent years due to toxin concerns (Harley et al. 2020). We decided to compare the shellfish toxin levels from beaches facing Ketchikan to those facing away from Ketchikan to determine if high anthropogenic influence affects PST levels. In this study, the beaches facing Ketchikan have more foot and boat traffic, and the beaches facing away have minimal foot and boat traffic. Since shellfish are a traditional subsistence resource, it's important and interesting to analyze locational trends in PST levels.

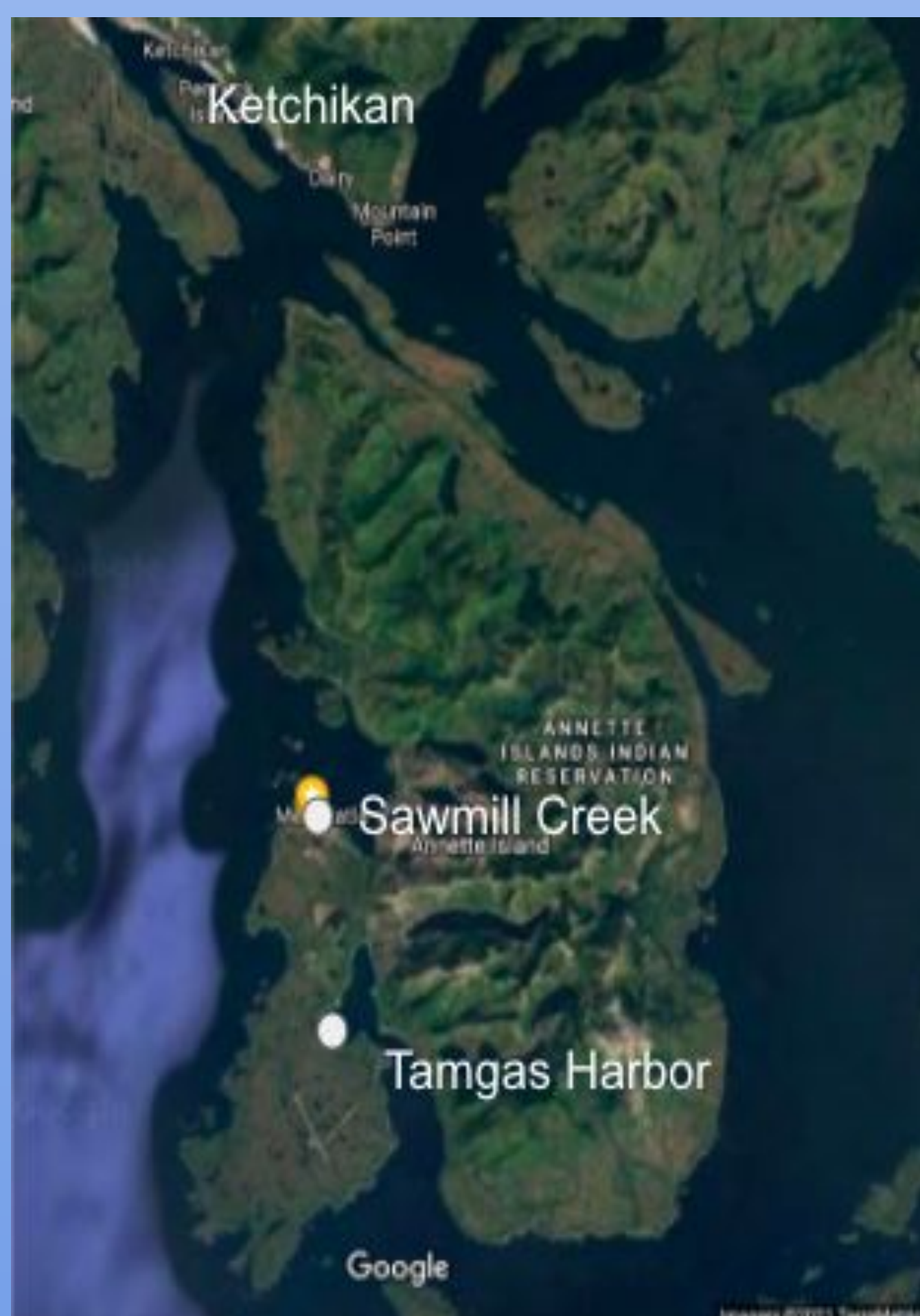
## Hypothesis

If human traffic increases shellfish PST levels, then clams gathered from beaches facing Ketchikan (high boat and foot traffic) will have higher PST levels than shellfish gathered from beaches facing away from Ketchikan (low human traffic).

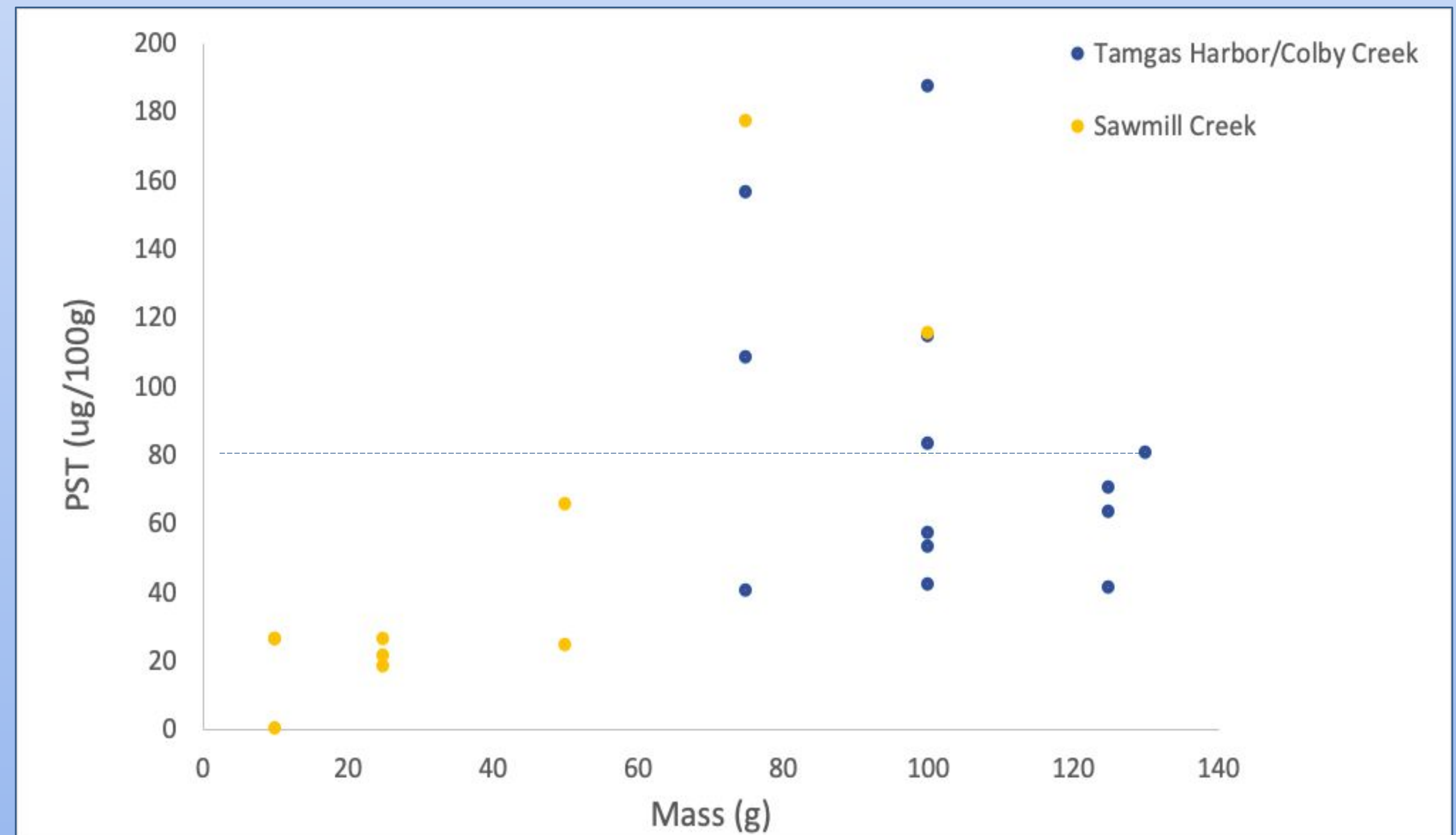


## Methods

- Test beach samples were gathered on February 9th from Sawmill Creek in front of the Fish and Wildlife Department.
- Control beach samples were gathered on the same day from Tamgas Harbor on the back side of the island.
- We specifically gathered butter clams from each beach. We got ten from the test beach, and 13 from the control.
- The clams were washed, weighed, and then sent off to the Sitka Tribal Environmental Research Lab to get tested for any PST that the shellfish might contain.
- The Sitka research lab used a receptor binding assay to analyze variance in shellfish PSTs.



## Results



- 38% of Tamgas Harbor's shellfish were above the FDA threshold (80  $\mu\text{g}/100\text{g}$ ) and 20% of the shellfish at Sawmill Creek were above the threshold.
- The average PST level for Tamgas was 84  $\mu\text{g}/100\text{g}$ , and 40  $\mu\text{g}/100\text{g}$  for Sawmill Creek.
- Between the two sites, Tamgas Harbor had the highest average level of PSTs.
- Clams between 80 and 100 grams had the highest PST levels.
- Tamgas Harbor had the most individual clams above the PST threshold level.

## Discussion

The data that was collected did not support the hypothesis. We believe that it was refuted because the size of clams collected from the test beach was smaller on average than the size collected from the control beach. There's a salmon hatchery out at Tamgas that could have an influence on the PST levels. We think there may be nitrogen input from sewage, salmon remains, and fish food that fertilizes harmful algal blooms, making them more likely to occur at this beach.

Acknowledgements: We would like to thank Ian Hudson for introducing us to this program and encouraging us to do it. Megan Wright for being in our meetings helping us whenever we needed it. Thank you to the Sitka Environmental Research Lab for processing our samples and to Kari Lanphier for consulting on our project and providing support. Metlakatla Department of Fish and Wildlife for us with what we needed for clam digging. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: [www.alaska.edu/titleIXcompliance/nondiscriminationsupplying](http://www.alaska.edu/titleIXcompliance/nondiscriminationsupplying).

### References:

Bradford D. Gessner, John P. Middaugh, Paralytic Shellfish Poisoning in Alaska: A 20-Year Retrospective Analysis, *American Journal of Epidemiology*, Volume 141, Issue 8, 15 April 1995, Pages 766–770.  
 Harley, J. R., Lanphier, K., Kennedy, E. G., Leighfield, T. A., Bidlack, A., Gribble, M. O., & Whitehead, C. (2020). The Southeast Alaska Tribal Ocean Research (SEATOR) Partnership: Addressing Data Gaps in Harmful Algal Bloom Monitoring and Shellfish Safety in Southeast Alaska. In *Toxins* (Vol. 12).