Varying Quantities of Microplastics at Different Beach Sites in Petersburg, Alaska

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Introduction

The presence of plastic in the marine environment is almost unavoidable in the many forms that it takes. Plastic can have detrimental effects on marine life, specifically when they enter the food web either in a larger form or as microplastics. Microplastics are defined as minute pieces of plastic that are roughly 0.06-0.5mm in diameter (Andrady et al. 2011). It has been shown that microplastics in a marine environment will be filtered into the circulatory system by bivalves, which poses a concern to those who may want to harvest and eat shellfish (Browne et al. 2008). While the full effects of microplastics in biological systems is not completely known, they have been shown to carry POP's (Persistent Organic Pollutants), which have significantly harmful impacts on human endocrine, cardiovascular, and reproductive health (O.M.L. Alharbi et al. 2018). The proximity and frequency of human interaction in an environment may be correlated with the amount of microplastic found at individual locations, which is relevant in determining the varying potentially harmful effects of the plastics on humans and the environment.

Methods

- A three minute phytoplankton tow was taken with freshly rinsed bottles and net at Sandy Beach, which is located near a landfill and has frequent foot traffic, South Harbor, which has frequent boat and foot traffic, and Scow Bay, which has less frequent human interaction.
- The samples were transferred into labeled glass jars to mitigate plastic contamination.
- The three samples were filtered using the filtration system at Petersburg Indian Association.
- The filters were examined under the dissecting and compound microscope to identify if microplastics are absent (no microplastics identified), present (minimal microplastics identified), or prolific (microplastics present throughout the sample).
- Identification procedures included examination for biological structures (cells), characteristic color and shape, and using a hot needle to differentiate between plastic and rock.
- Sampling occurred twice a week from March 23rd to April 6th.

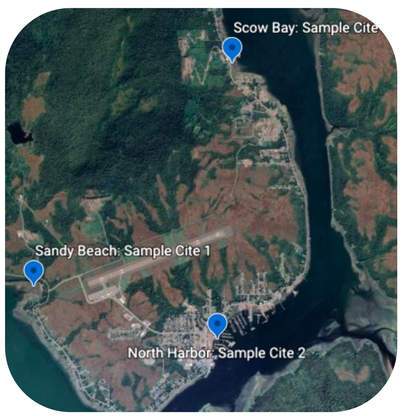
Hypothesis

We predict that there will be fewer microplastics identified at locations with less frequent human interaction.

Results

	03/23	03/25	03/29	03/31	04/05	04/06
Sandy Beach (high traffic, near landfill)						
South Harbor (high traffic)						
Scow Bay (low traffic)						

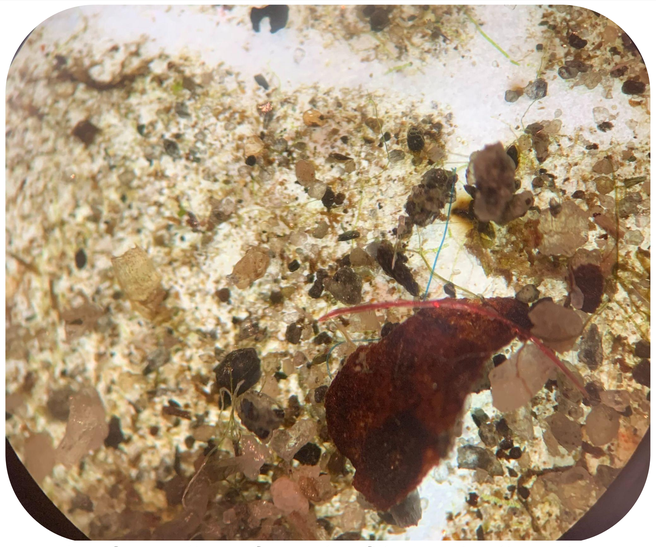
Absent	Present	Prolific	No sample due to weather



Sample sites in Petersburg, AK

Collecting samples at Sandy Beach.

- There were no microplastics identified at Scow Bay.
- Both the South Harbor and Sandy Beach had varied between absent, present, and prolific quantities of microplastics.
- Plastics identified at Sandy Beach are hypothesized to be fiberglass.
- The main type of microplastics identified at South Harbor were microfibers.



Example of a portion of a water filter under the microscope with microplastics present

Discussion

Based off of the data collected from the three Petersburg locations, our hypothesis was supported. There were noticeably more microplastics at Sandy Beach, which has high frequency of foot traffic and close proximity to human pollutants, and at the South Harbor, which also experiences large amounts of human interaction. The results of this study could be further explored to correlate microplastic presence with different factors such as tide, weather conditions, recent polluting events, and other human caused events. Data from this study can could also be used to hypothesize the presence of microplastics in organisms such as shellfish or other filter feeders. In addition, exploring some of the harmful effects of microplastics in their ability to harbor POPs may be correlated to the frequency of human interactions and pollutants affecting a certain site.

References:

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