

Examination of Microplastic Content in Steller sea lions (*Eumetopias jubatus*) and Cassin's auklets (*Ptychoramphus aleuticus*)

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Abstract

- This project was to document and compare the microplastic content and quantity in the diets of Steller sea lions and Cassin's auklets. Due to their distinct diet differences
- Cassin's Auklet diet's consist of krill while Stellar Sea Lion diet consists of a variety of fish.; This comparison will allow for a more holistic understanding of microplastic accumulation within the marine food web and where microplastic accumulation might be occurring.



Materials

Materials used were: a fume hood, scale, rotating hot plates, and filtration equipment (aerator, 20 micron glass filters, Erlenmeyer flask, glass jars/beakers), nitrile gloves, and cotton clothing.

Chemicals used with filtration included 20% potassium hydroxide (KOH) and sodium iodide (NaI). Along with this Ultra Pure Water was used to clean all material and used to make above chemicals



Results/Conclusions

-After the filtration process, microplastic fibers were located on the final filters from both Cassin Auklets and Stellar Sea Lion sample collection.

- Both habitats of the Stellar Sea Lion and Cassin Auklets have been impacted by plastic debris that has been previously removed.
- Through the filtration process, triple rinsing of the samples, microplastic fibers were found among the final filters; images were taken and will go through a spectroscopy to determine what type of microplastic impacted the habitats.



Methodology

- To filter microplastics out the methodology is the same for both the Cassin's auklets and Steller sea lion samples.
- Triple rinse all glassware, filtration devices/apparatus, tools (spoons, tweezers, etc) before use
- Weigh samples and add 4x measures weight (g) of KOH (mL) to dissolve organic matter of sample, and place in incubator for ~72 hrs
- Whenever a sample is exposed, the ambient is also exposed.
- Filter KOH onto filter paper and place into 40mL glass centrifuge tubes to be ready for NaI filtration/process
- 15 ml of NaI is added to sample and run through a process of; sonication, incubation and centrifuge, then filtered, totaling three times.
- Filtered NaI is then filtered again for a final time. This is what is examined under the microscope for microplastics



Introduction

This project will focus on identifying the presence of microplastics in Steller sea lions, which has never been previously documented, and comparing the microplastic composition and concentration with Cassin's auklets. Cassin's auklets are seabirds that have overlapping habitat with Steller sea lions, however, they feed on a distinctly different portion of the marine food web. The microplastic samples collected from both species originated in the same foraging location, Guskuu/Forester Island Complex. This will be the first study that not only compares the microplastic content of two species which occupy unique sections of the marine food web, but also that compares microplastic composition and concentration within two species that are foraging in the same area. This is important for several reason. First, marine debris and microplastics quantities in the ocean are predicted to triple in the next 25 years so understanding where plastic is entering the marine ecosystem is important for understanding which species might need additional protection or conservation. Second, plastics take up gastrointestinal space in the body and the additives to the plastic themselves can cause lethargy, endocrine disruptions, anorexia, and other detrimental behaviors, all of which cause harm to the species consumer. Understanding the amount of stress both of these species face, in regards to their microplastic load, is important for maintaining their populations. Third, in Steller sea lions especially, their diet preferences overlaps with human consumption species (including salmon, as an example), therefore, learning of their microplastic concentration also provides insight to human health and consumption.

Recommendations

When researching microplastics, it is important to follow the procedure and keep an eye out for contamination. In this project, there were a few minor challenges that needed to be sorted in order to efficiently and successfully research the samples.

The goal was to find microplastics in the final filters and that goal was accomplished by following the research process given to us.

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