

Introduction

- Pacific walrus (*Odobenus rosmarus divergens*) are an important subsistence resource for coastal Alaska Native communities.
- Microplastics are present in marine sediments of the Bering and Chukchi seas and in benthic organisms consumed by walrus (Fang et al., 2018).
- Microplastics have been found in gastrointestinal tracts of marine mammals (Sletten 2023), as well as blubber and fat (Merrill et al., 2023).

Objective and Hypotheses

Determine the concentration of microplastics (MP) in walrus tissues and investigate potential trends with sex and age:

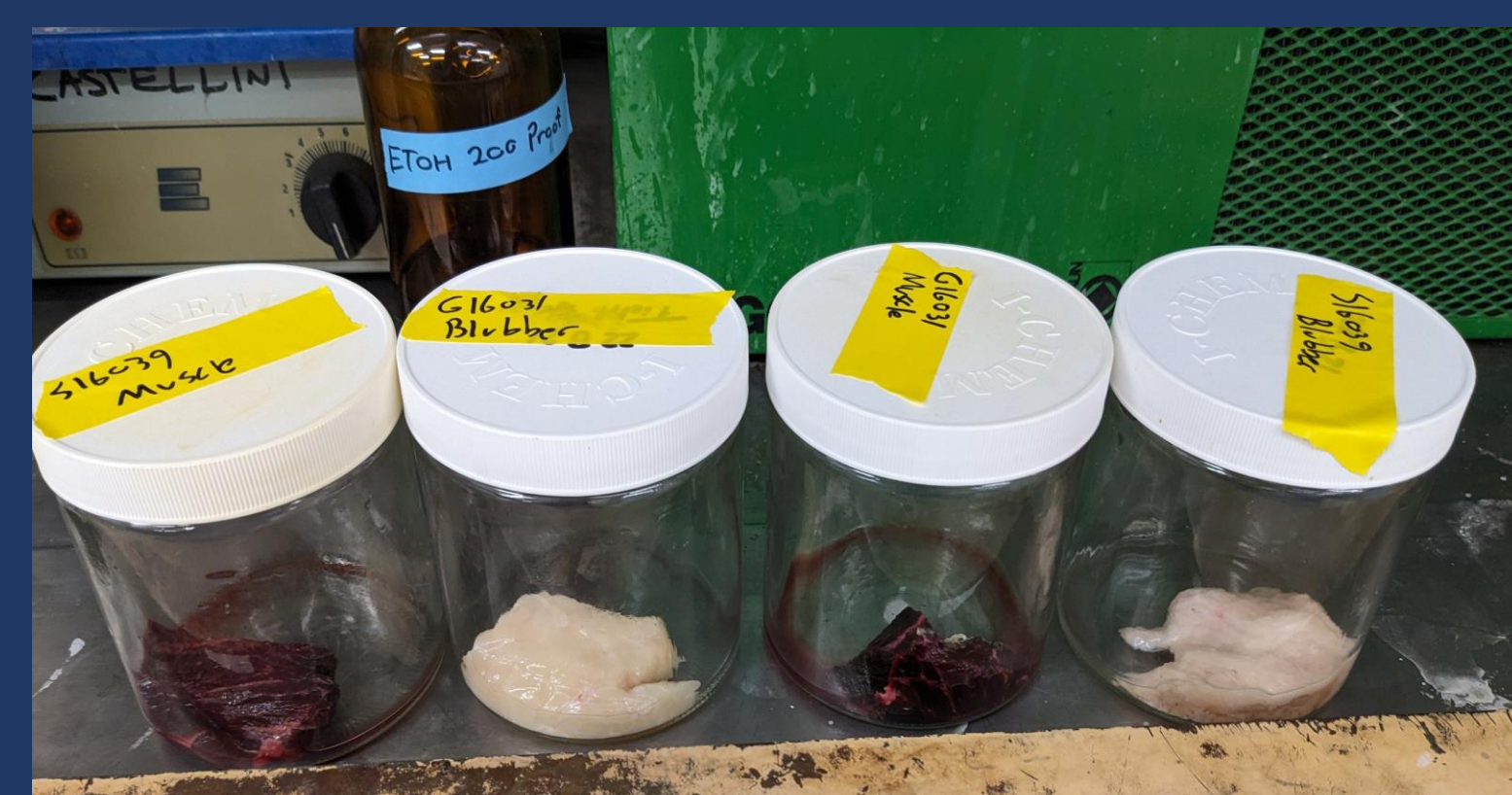


Photo by Anthony Fischbach, USGS

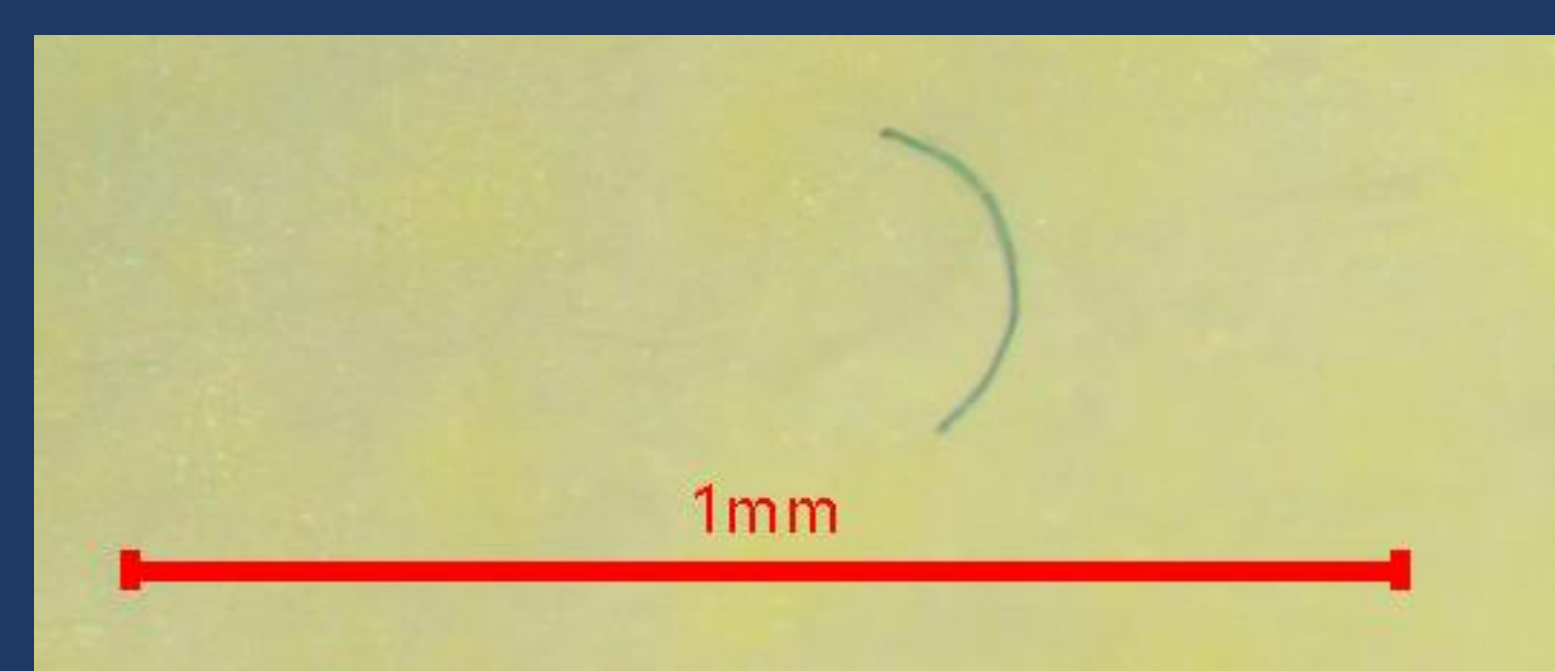
- Hypothesis 1:** MP concentration is higher in walrus muscle than blubber.
- Hypothesis 2:** MP concentration is higher in store-bought meats than walrus muscle.
- Hypothesis 3:** MP concentration increases with age.
- Hypothesis 4:** MP concentration is higher in male walrus tissue than female.

Methods

- Muscle and blubber sampled from 20 walrus harvested in 2016 near Savoonga and Gambell.
- Tissue dissolved in KOH solution and incubated over 72 hours.
- Blubber samples were further treated with ethanol (Merrill et al., 2023).
- 12 commercial meat products (beef, chicken, pork) also processed for comparison.
- Tissues vacuum filtered onto 0.7 μm glass filters and examined under microscope.



Muscle and blubber samples in glass jars

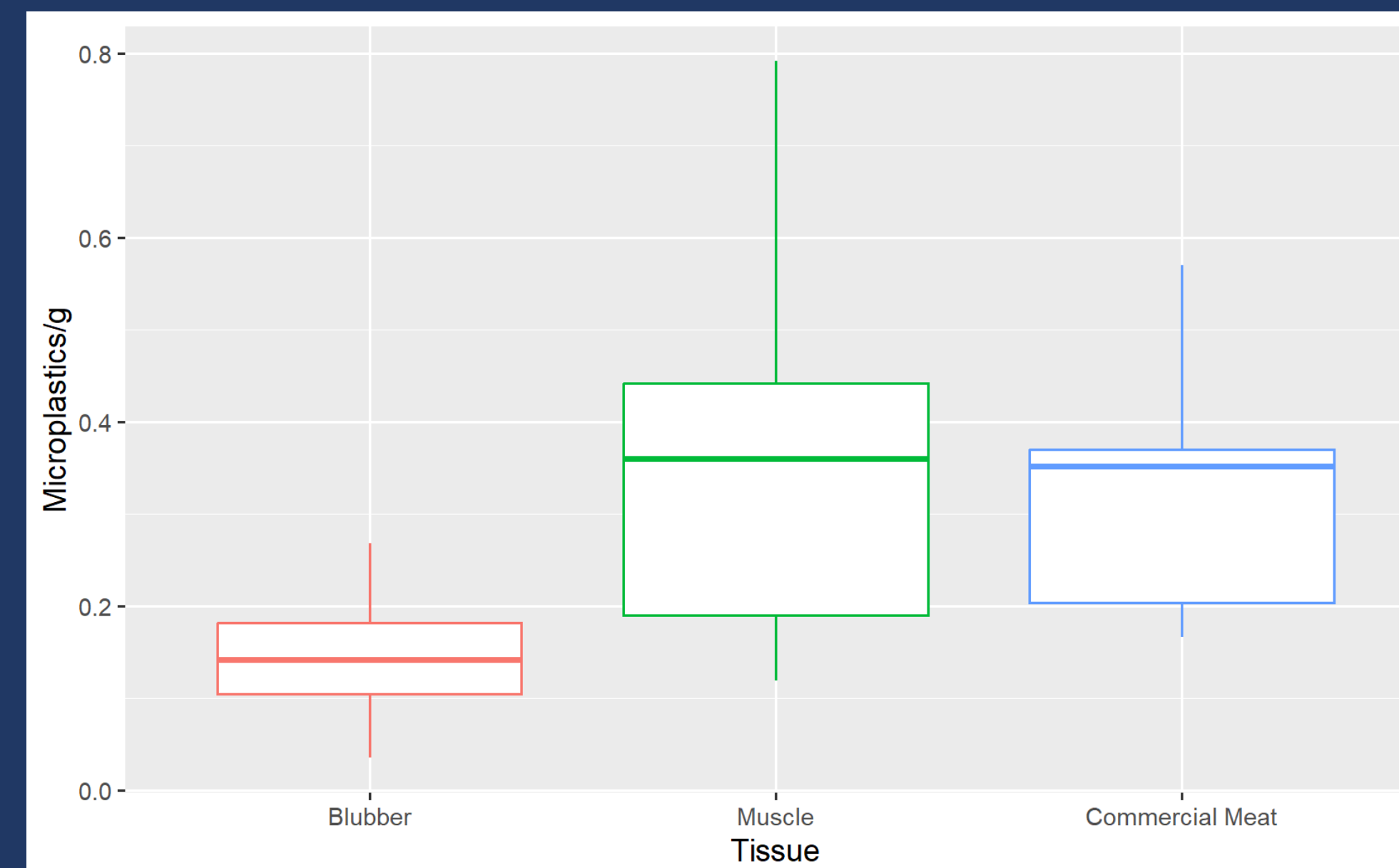


Blue fiber found in blubber.

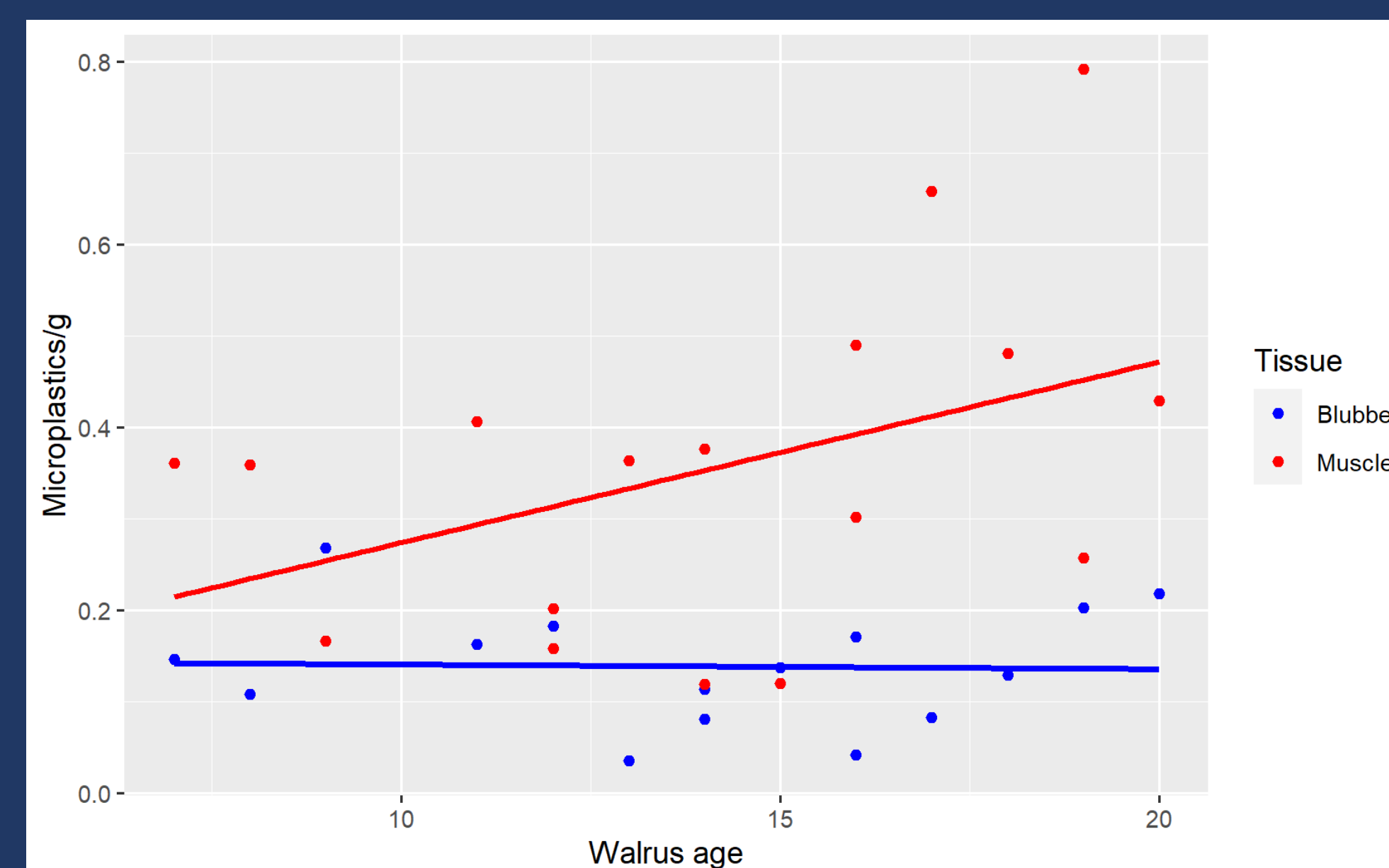


Clear fiber found in muscle.

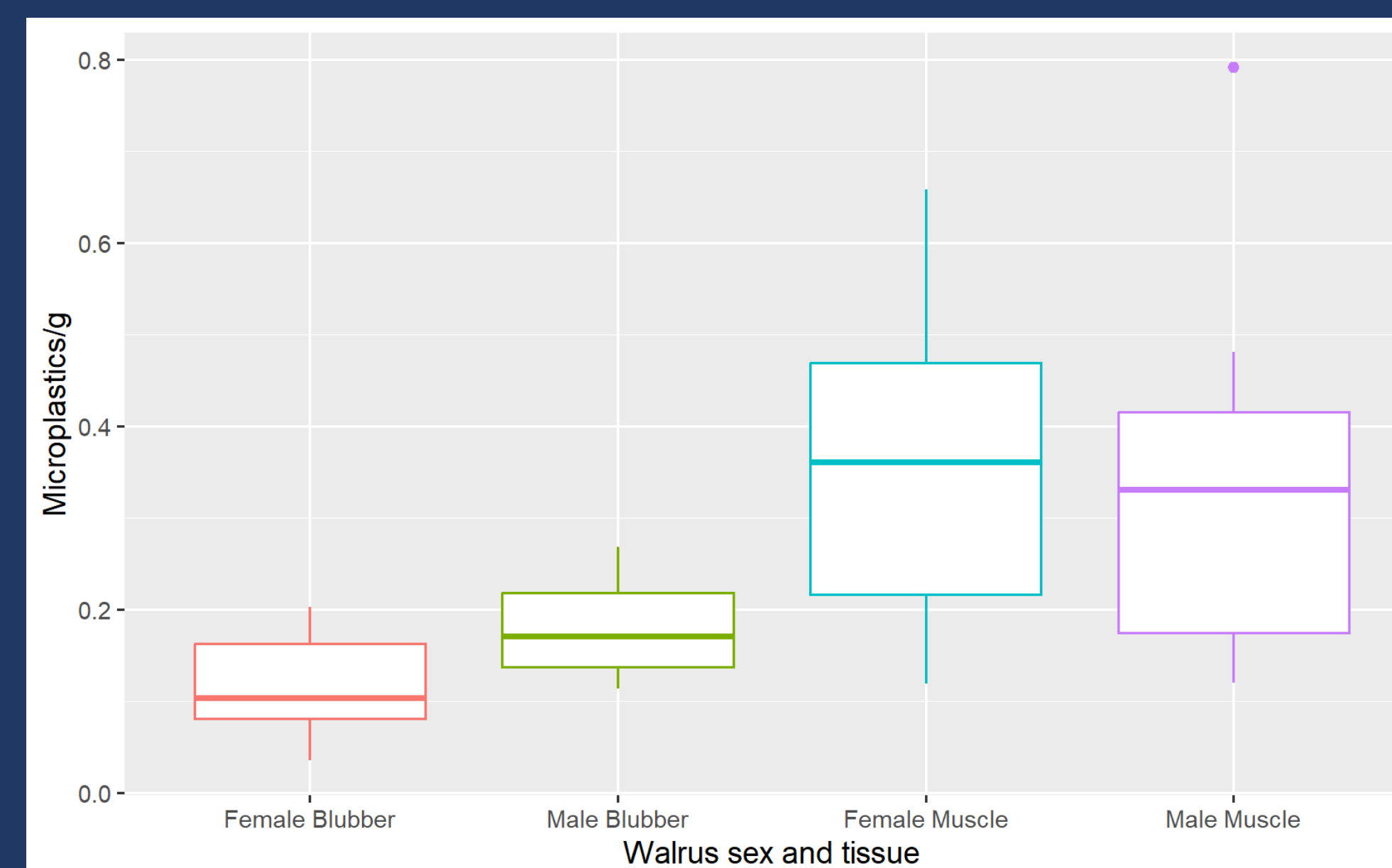
Results



Comparisons of tissue tested. Walrus muscle had significantly greater MP concentration than blubber ($p = 0.0001$); no significant difference between walrus muscle and commercial meats ($p = 0.728$). Bold lines in the boxes represent medians, whiskers represent minimum/maximum values.



Microplastic concentration vs age of walrus sampled. MP concentration increased with age in muscle ($R^2 = 0.177$, $p = 0.0923$), but not blubber ($R^2 = 0.0009$, $p = 0.9137$)



Microplastic concentration by sex and tissue type. Male blubber had significantly greater MP concentration than female blubber ($p = 0.022$).

References

- Fang, Chao, et al. "Microplastic contamination in benthic organisms from the Arctic and sub-arctic regions." *Chemosphere*, vol. 209, 2018, pp. 298–306, <https://doi.org/10.1016/j.chemosphere.2018.06.101>.
- Merrill, Greg B., et al. "Microplastics in marine mammal blubber, melon, & other tissues: Evidence of translocation." *Environmental Pollution*, vol. 335, 2023, p. 122252, <https://doi.org/10.1016/j.envpol.2023.122252>.
- Sletten, Alexandria. *Microplastics in Spotted Seal Stomachs from the Bering and Chukchi seas in 2012 and 2020*. MS Thesis, University of Alaska Fairbanks, 2023.

- Total of 177 microplastics isolated from all walrus tissues.
- 18/20 blubber samples and 20/20 muscle samples contained microplastics.
- 12/12 store bought meat samples contained microplastics.
- Fibers are predominant microplastic type (169 of 177; 95.5%).
- Majority of microplastics are clear in color (71 of 177; 40.11%), followed by blue (56 of 177; 31.64%), black (43 of 177; 24.29%), and red (7 of 177, 3.95%).

Conclusions and Future Directions

- Hypothesis 1: MP concentration is higher in walrus muscle than blubber.** ✓
- Hypothesis 2: MP concentration is higher in store-bought meats than walrus muscle.** ✗
- Hypothesis 3: MP concentration increases with age.** ■
- Hypothesis 4: MP concentration is higher in male walrus tissue than female.** ■

- Examine microplastics through spectroscopy to determine polymer types and potential origins.
- Continue to expand sample sizes across locations and harvest years.
- Where possible, include samples from calves to investigate microplastic presence at earliest stages of life history.
- Work with communities to identify particular tissues of importance or concern for Alaska Native subsistence.

- While microplastics are present in walrus tissues, it has not been determined how they affect walrus health.**

Acknowledgements

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