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Mussels as Samplers of Regional Microplastic Contamination Trends

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Background

- Discarded plastics enter ocean habitats and degrade into small particles (Canesi *et al.*, 2012).
- Filter-feeding organisms can ingest these particles, although the impacts of this are poorly known, with only 11 published studies to date (Wright *et al.*, 2013).
- Mussels (*Mytilus* sp.) ingest microplastics, and location—at regional as well as local scales—may impact the degree of contamination (Lyon, 2014).

Research questions

- Is there evidence of spatial variation in ingestion rates of microplastics?
- Does ingestion rate correlate with size (length) of mussel?
- Is there a relationship between relative tidal height and plastic ingestion rate?
 - Analyses pending

Methods

- Mussels were collected from eight locations (one Outer Coast and seven southern Puget Sound) and processed within 24 hours of collection.
- 30 mussels collected per site, 10 from each of three relative tidal heights.
- Digestion of heart and gut in NaClO ($n = 5$ mussels per size class).
- Resulting fluid was centrifuged and the pellet pipetted onto a microscope slide.
- Number and type of plastic particles per sample determined using fluorescence microscopy.

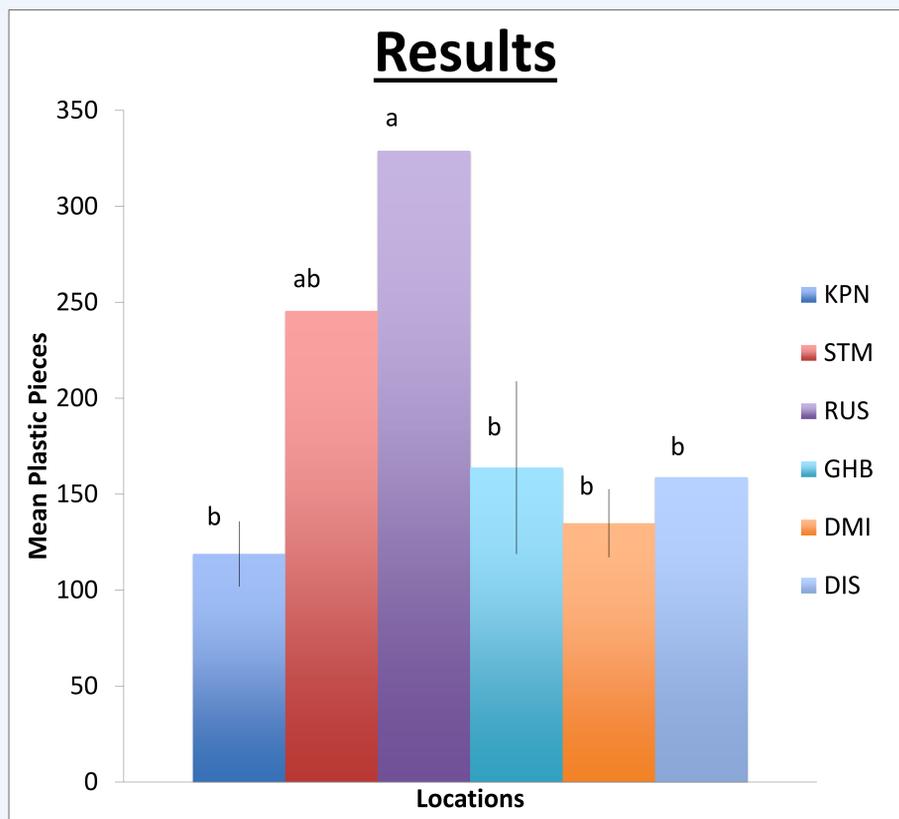


Figure 1. Mussel plastic ingestion rates between locations. Results indicate differences in plastic ingestion amounts between similarly sized groups of mussels from different sites ($p = 0.009$). Standard deviation bars included for multi-sample data sets.

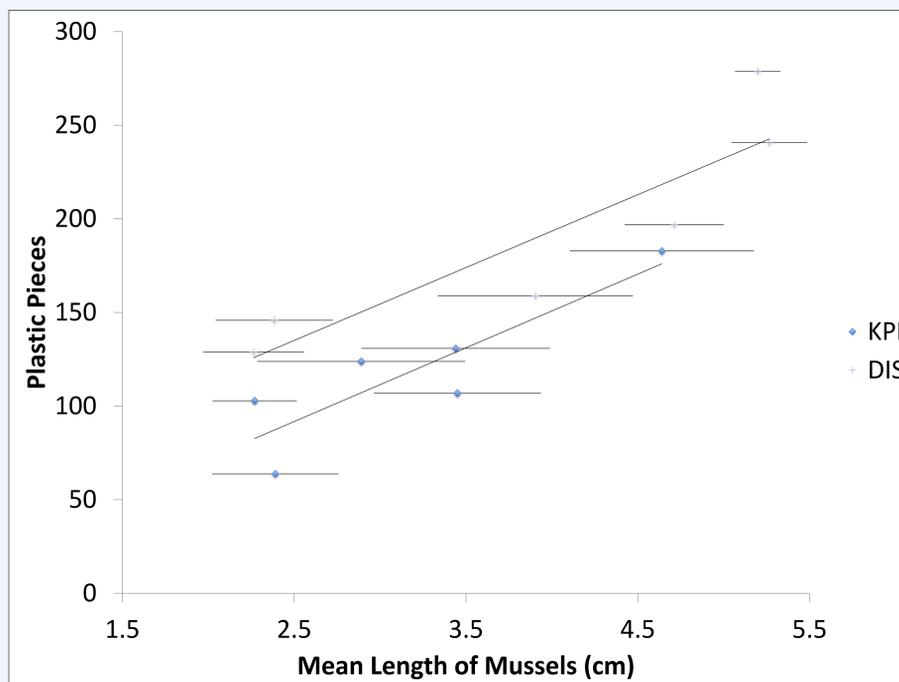


Figure 2. Mussel plastic ingestion quantities by mean length of mussels. Results support a correlation between increasing plastic contamination and increasing length (KPN, $p = 0.02$; DIS, $p = 0.01$). Standard deviation bars included for mussel length due to grouping of mussels prior to processing.

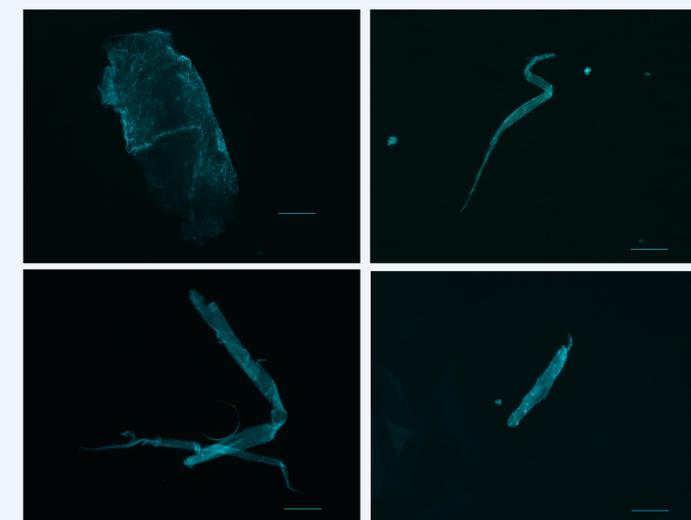


Figure 3. Microplastic particles ingested by *Mytilus* mussels. Scale bars are 100 μ m.

Discussion

- All mussels surveyed showed measurable levels of microplastic contamination.
- Plastic contamination varied significantly between sites.
- At sites where length was a significant factor in degree of contamination, increasing length was related to increasing contamination.
- Filaments increased with increasing length, but neither location nor tidal height were significant.

Future Research

- Quantify plastic contamination within mussels from broader geographic range.
- Characterize the plastic found in mussels.
- Assess physiological and population-level effects of plastic ingestion in marine food webs.

Acknowledgements

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