

Microplastics in Salish Sea marine food webs

From seabirds to filter feeders

Conservation Ecology Lab
University of Puget Sound



General objectives

- Use focal species at multiple trophic levels as biological indicators of plastic distribution and concentrations in marine ecosystems.
- Use bio-indicators to monitor trends in marine and freshwater plastics over time.
- Use food web approach to develop models of distribution and relative abundance in marine ecosystems.
- Assess impacts of plastic exposure on marine wildlife (i.e., tissue-level accumulation of contaminants, physiological impacts, etc.).



Seabirds as bio-indicators of marine plastic pollution

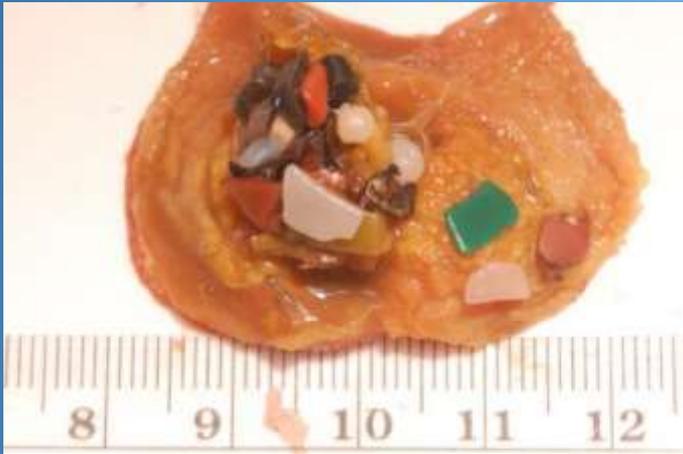


Northern Fulmar



Sooty Shearwater

Plastic in the diet



NOFU

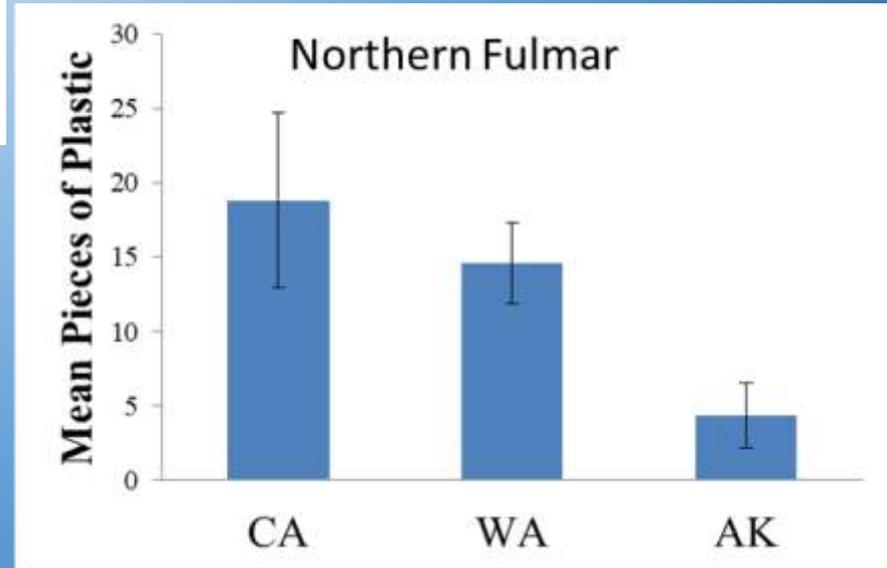
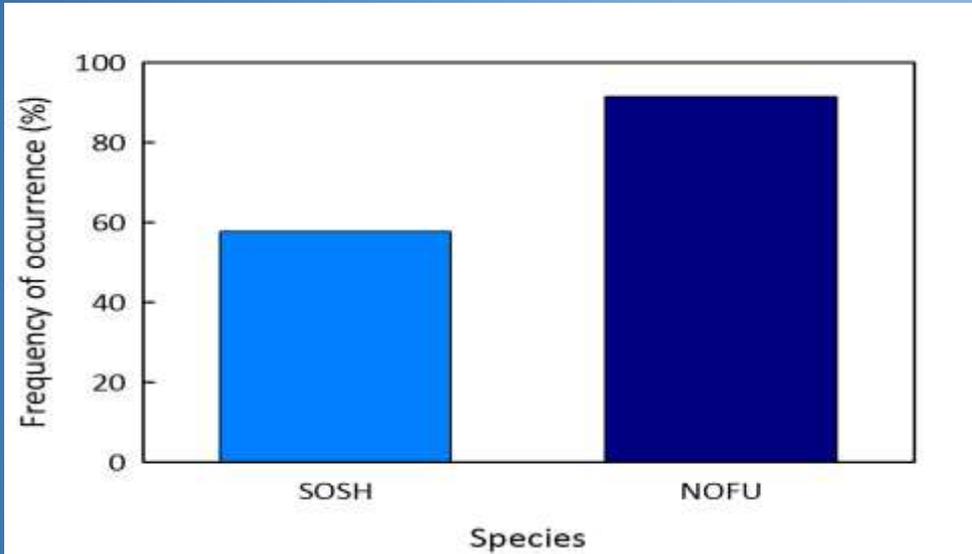


SOSH



Patterns of plastic ingestion

Sooty Shearwaters vs. Northern Fulmars



Physiological consequences

Amanda Johnson '17

- Common Murre
- PBDE concentrations in liver vs. feather
- Temporal trends



Plastic ingestion by forage fish



FRED BAVENDAM/ MINDEN PICTURES/National Geographic Creative



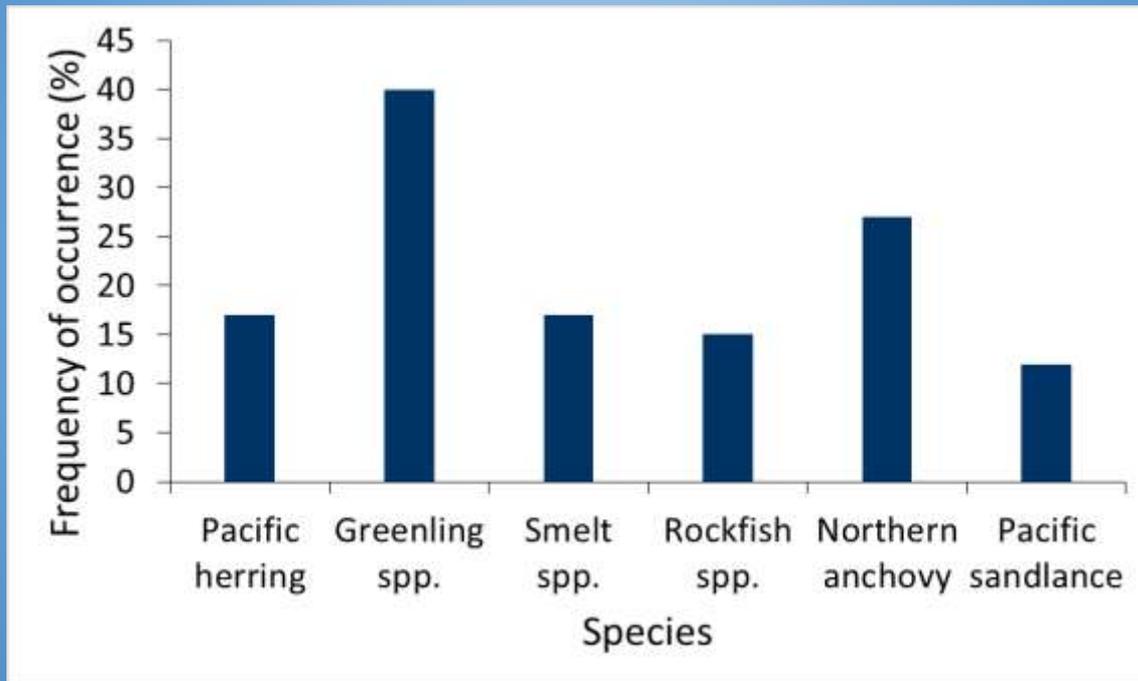
Mayne Island Conservancy Society

Plastic ingestion by forage fish

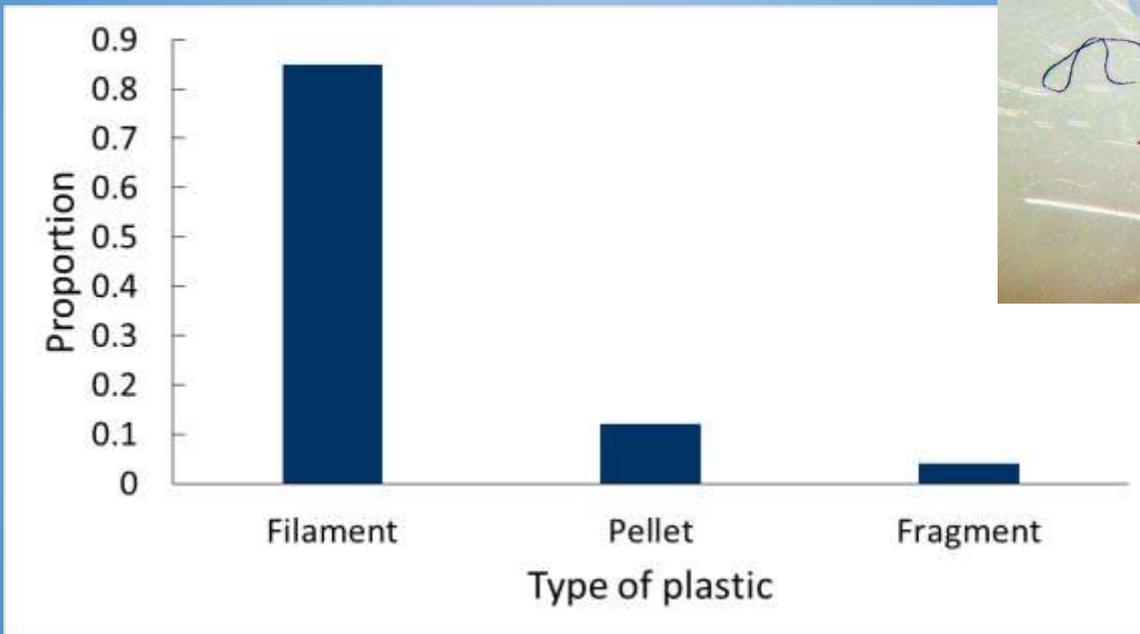
Bonnie Wirth '14, Tovah Siegel '15, Amanda Johnson '17



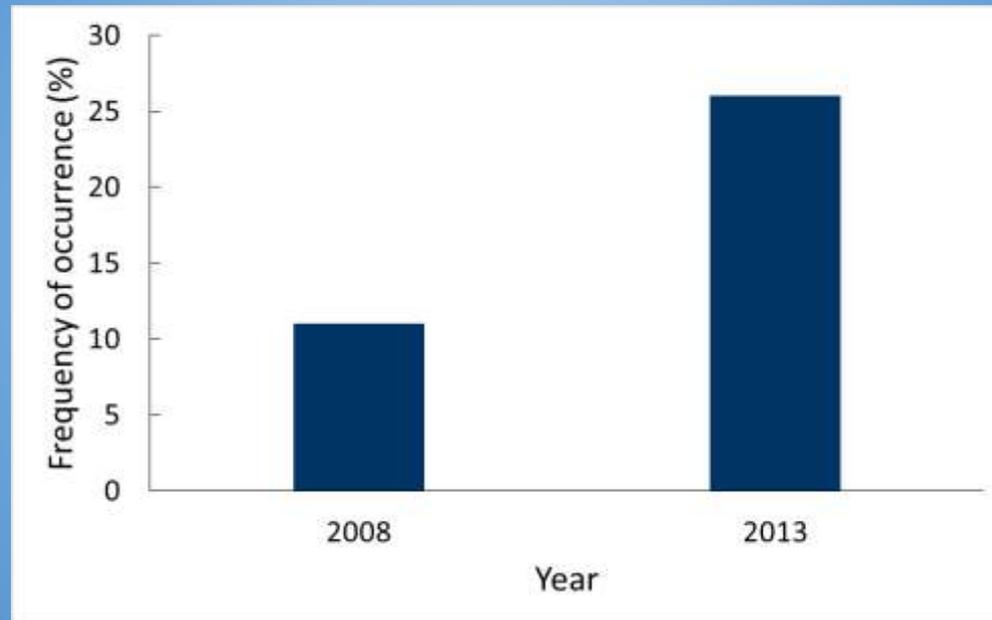
Frequency of plastic ingestion by forage fish



Types of micro-plastic ingested

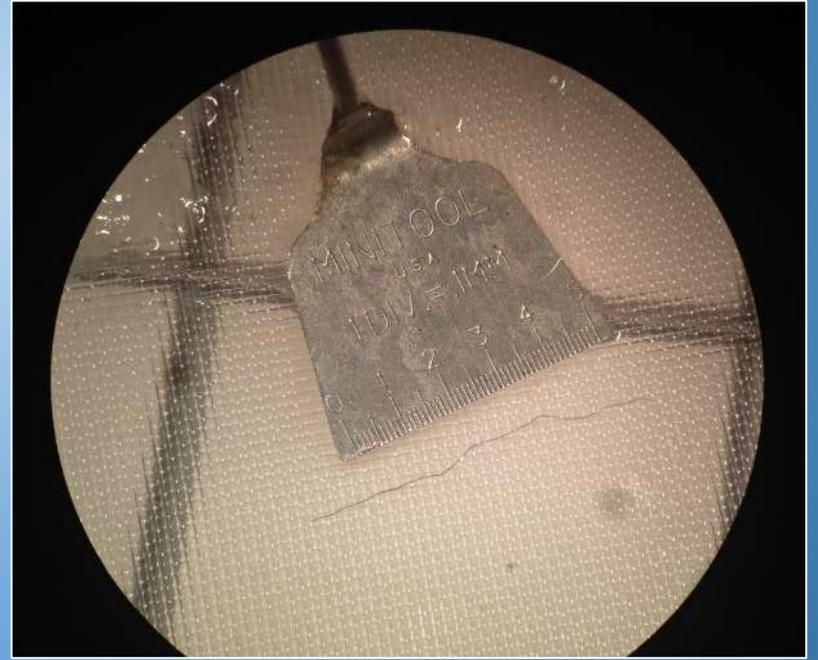
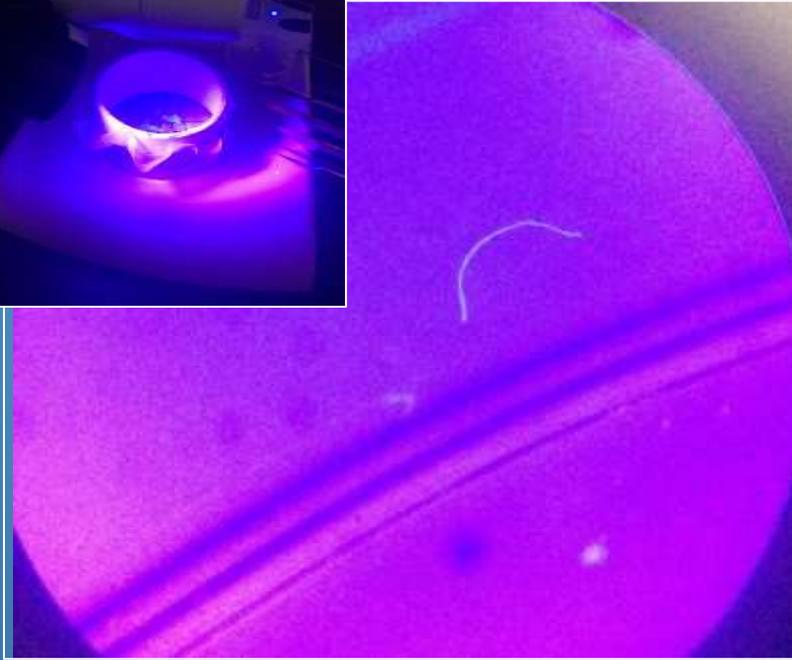


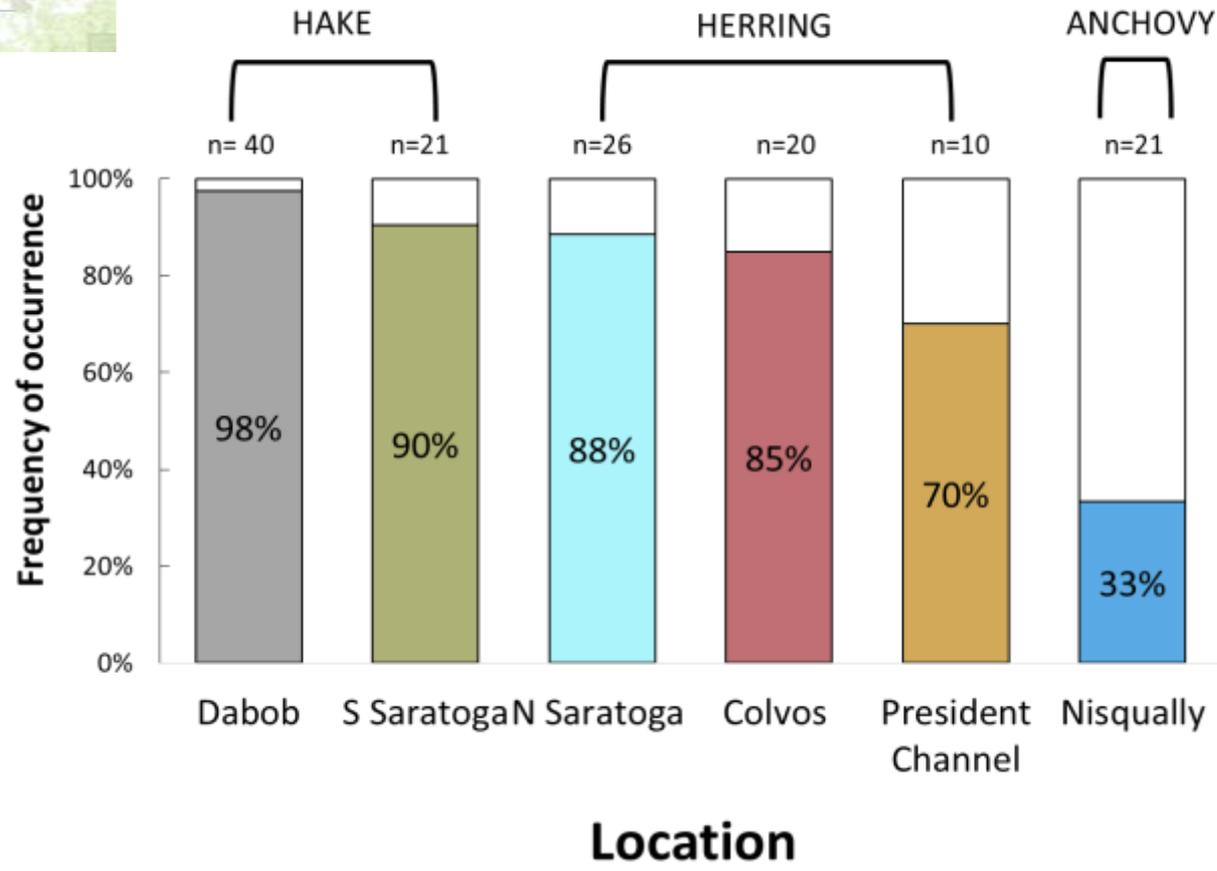
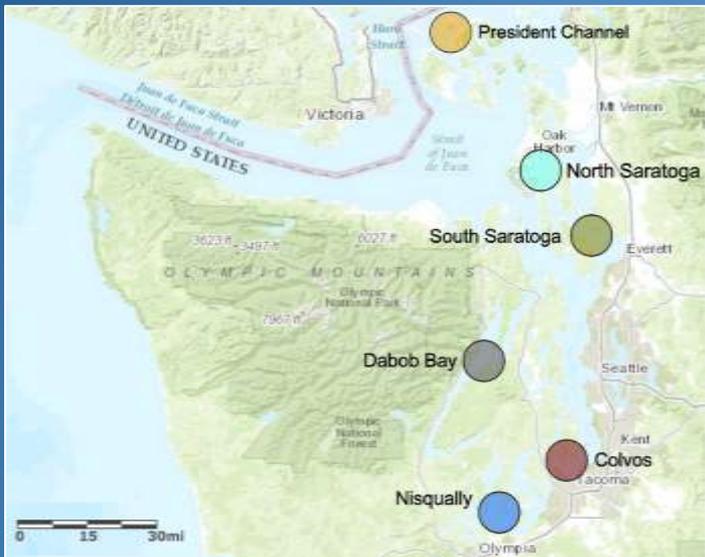
Temporal comparison: 2008-2013



Microplastics in forage fish

Robyn Thomas '18





What about benthic foragers?

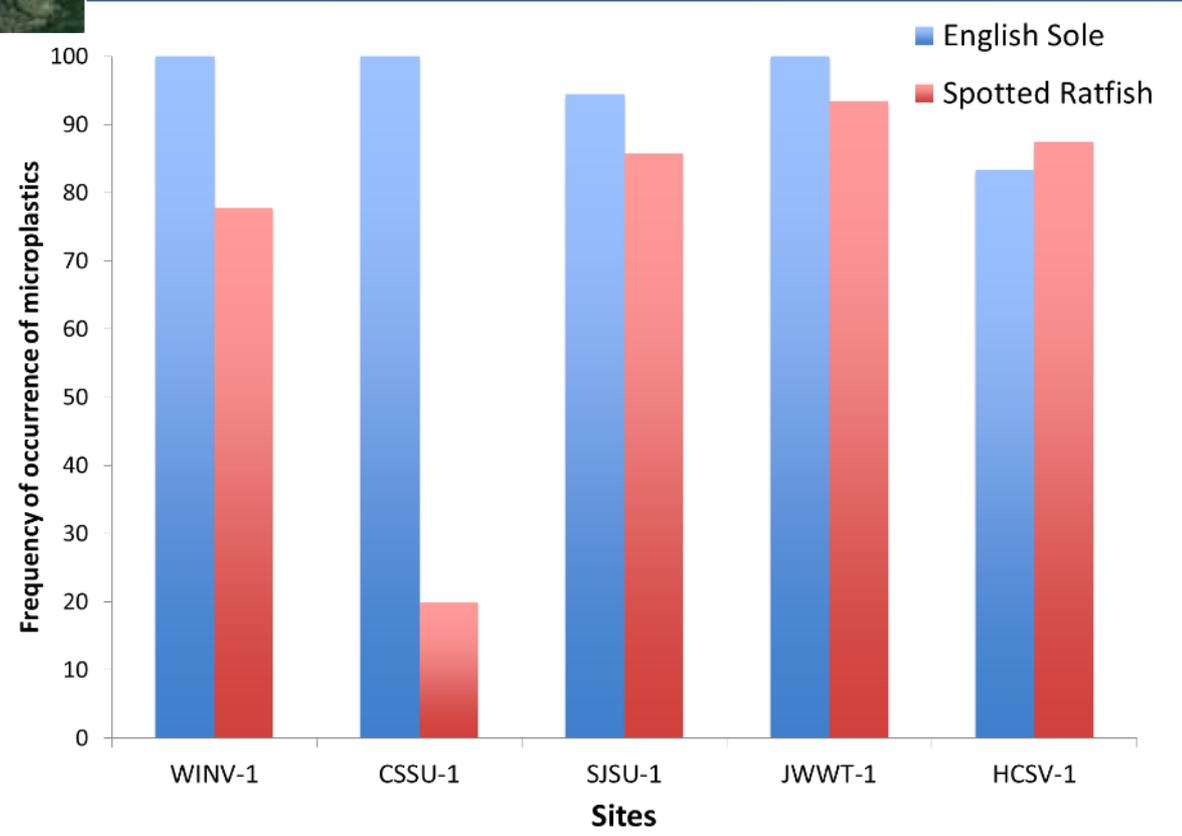


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Plastic ingestion by benthic fish

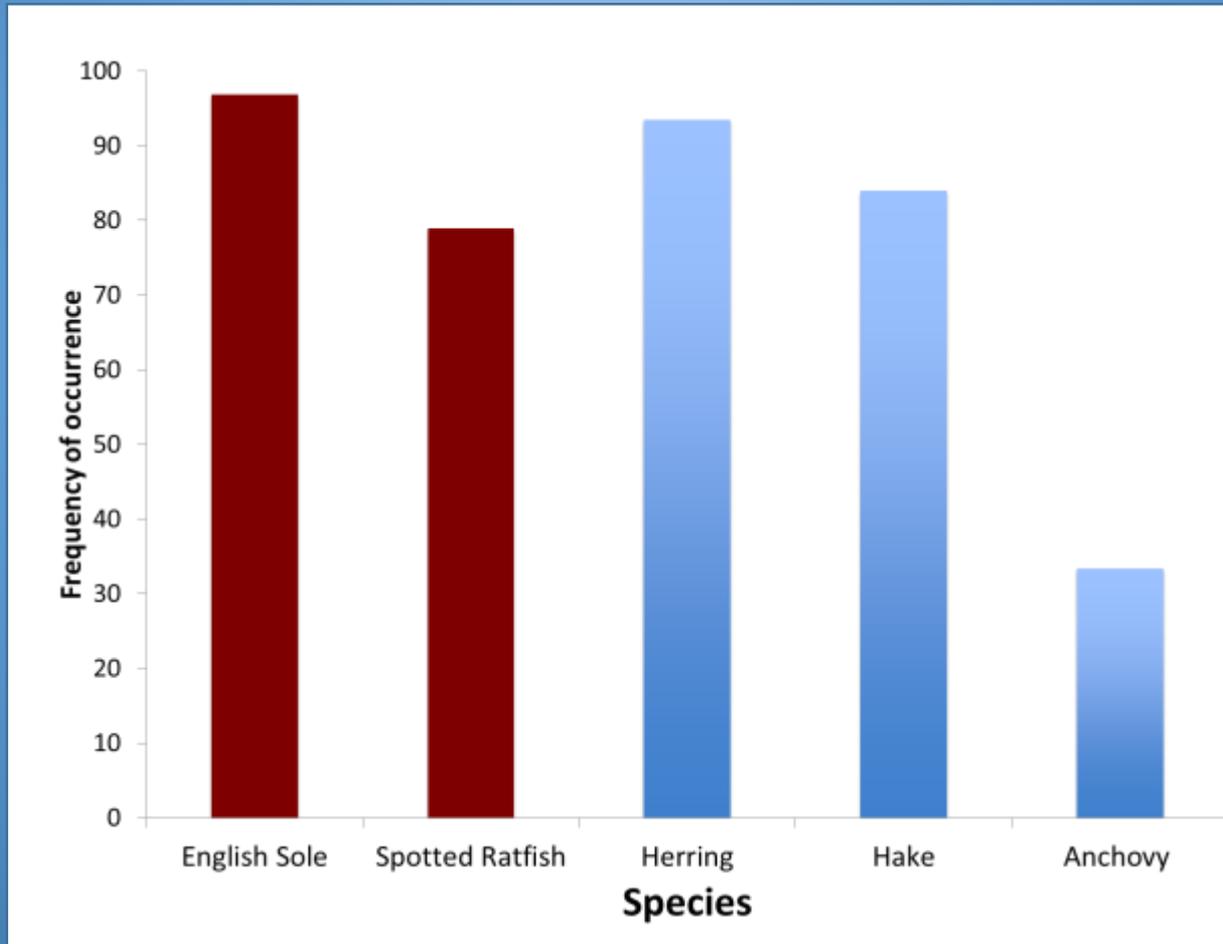
Patrick Wallin '18





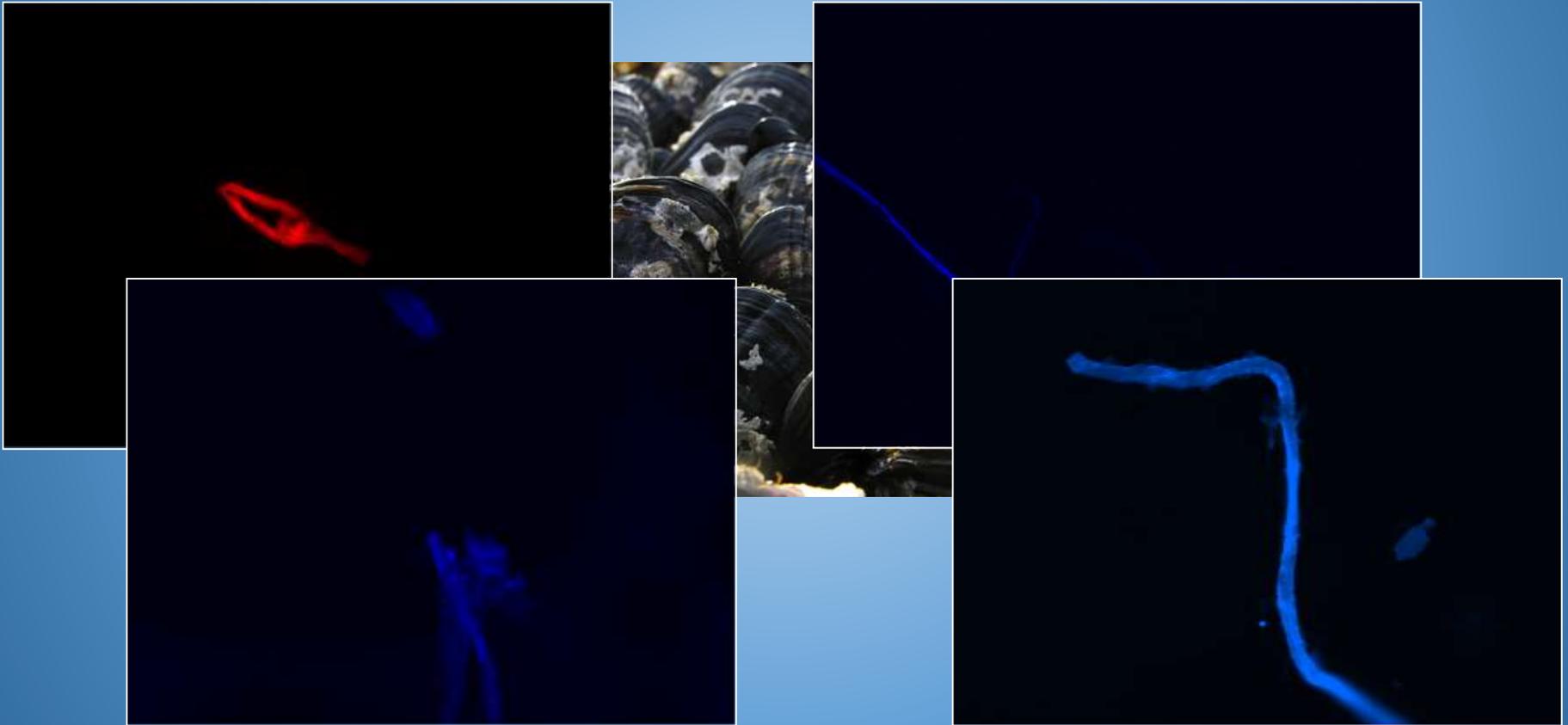
Plastic ingestion frequency

Forage vs. benthic fish species

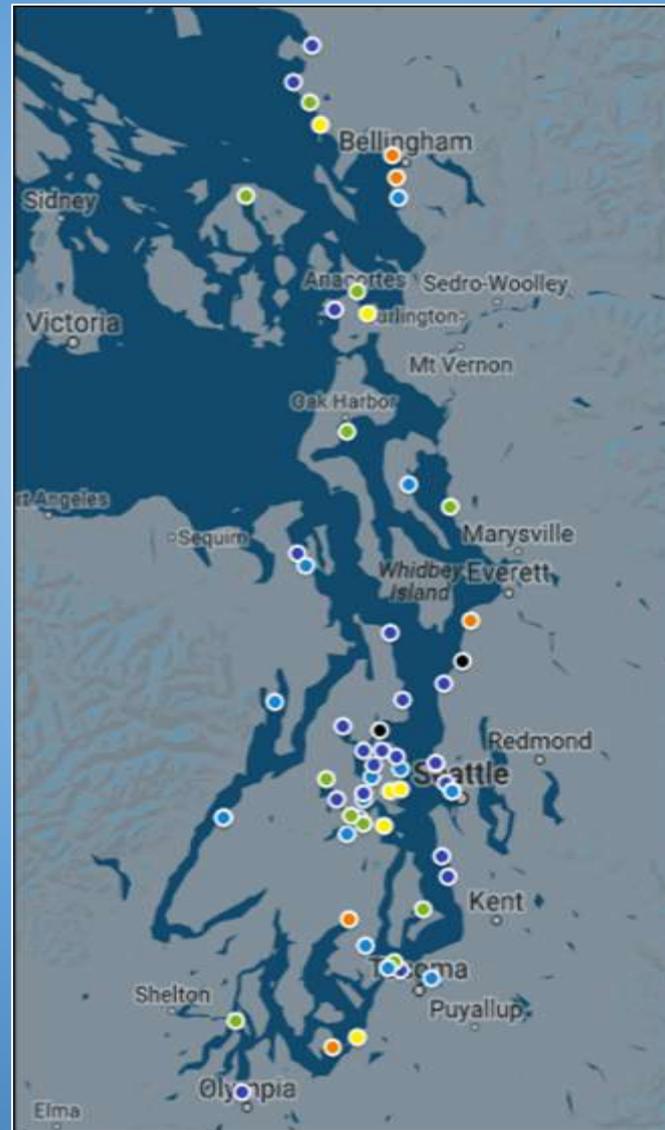


Mussels as bio-indicators of micro-plastic abundance

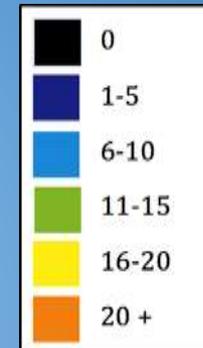
Nick Lyon '16, Olivia Mitchell '16, Eliza Munger '17



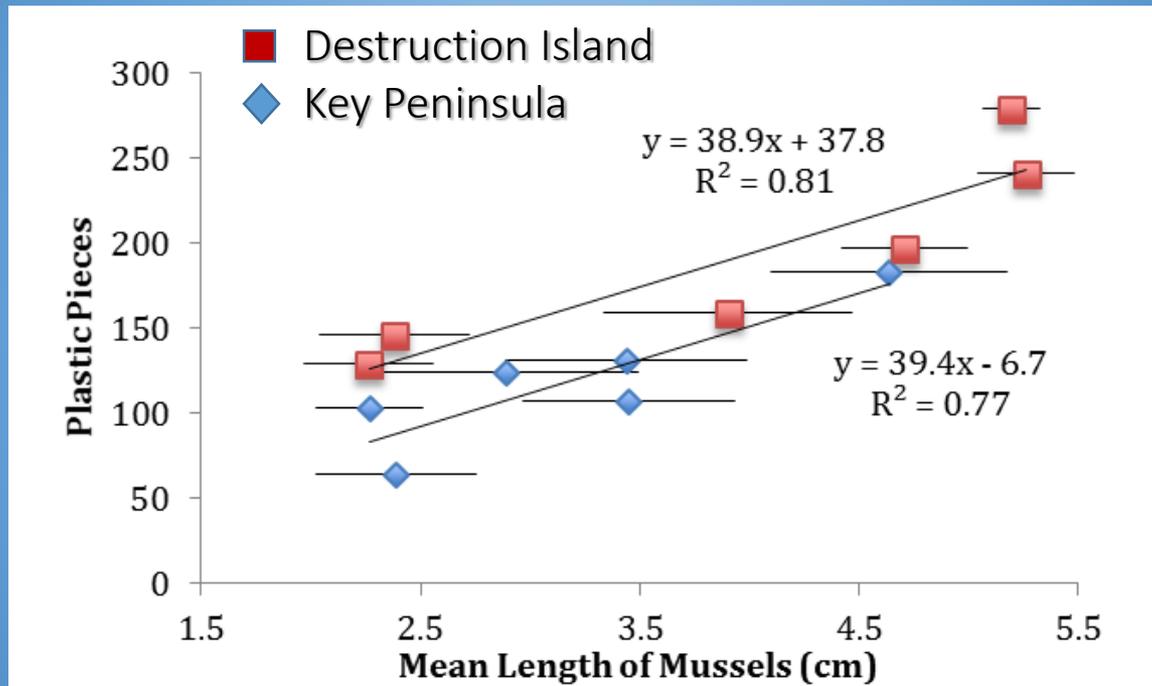
Microplastic ingestion by mussels



Mean # plastic particles

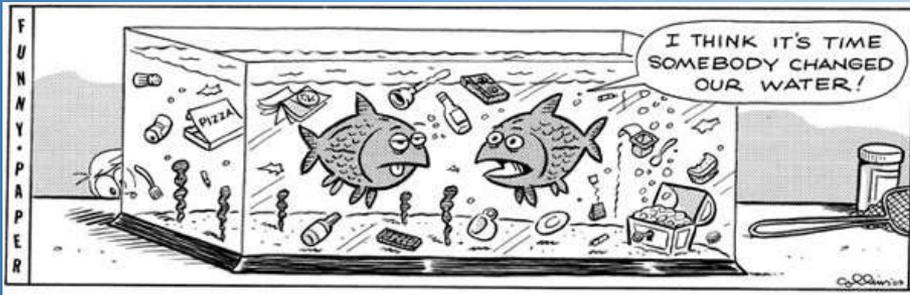
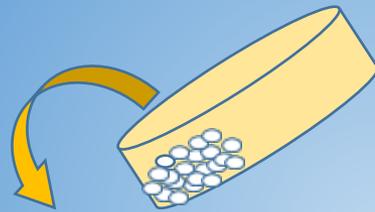


Effect of size on plastic ingestion



Experimental studies: Physiological consequences

Kieran O'Neil '16 and Olivia Mitchell '16



- Effects of PCB-laden plastic ingestion on tissue level concentrations in medaka fish

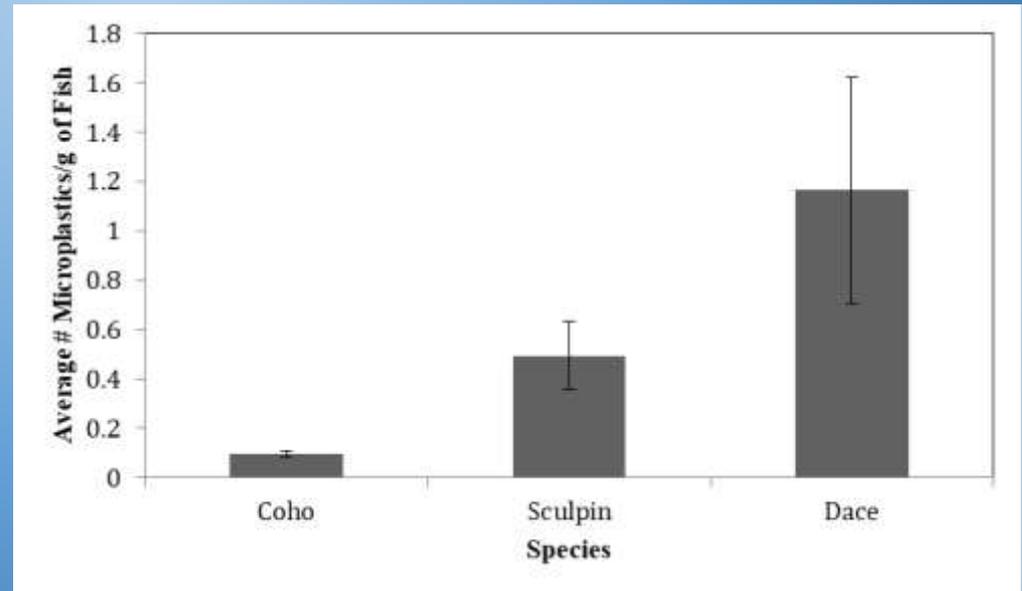
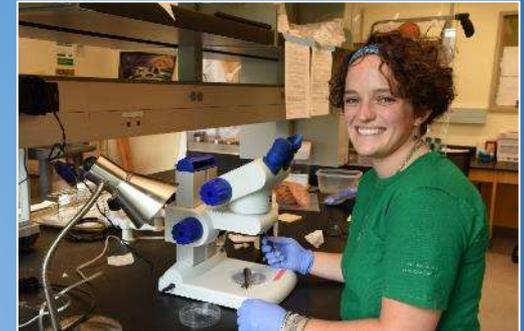


- Effects of plastic ingestion on metabolic rates of mussels

Microplastics in freshwater systems

Carson Lyness '16

- Freshwater systems poorly studied
- Puyallup and Green rivers
- Plastic ingestion by fish
 - Coho salmon
 - Sculpin spp.
 - Dace spp.



Thank you!

