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
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?
Plastic ingestion by benthic fish

Patrick Wallin ‘18
Plastic ingestion frequency

Forage vs. benthic fish species

![Bar graph showing frequency of occurrence for different fish species.](image)
Mussels as bio-indicators of micro-plastic abundance

Nick Lyon ’16, Olivia Mitchell ’16, Eliza Munger ‘17
Microplastic ingestion by mussels

Mean # plastic particles

- 0
- 1-5
- 6-10
- 11-15
- 16-20
- 20 +
Effect of size on plastic ingestion

![Graph showing plastic ingestion data for Destruction Island and Key Peninsula. The graph includes linear regression lines with equations and R² values: y = 38.9x + 37.8 (R² = 0.81) for Destruction Island and y = 39.4x - 6.7 (R² = 0.77) for Key Peninsula.](image)
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!