Environmental Sources, Bioaccumulation, and Biomagnification of Perfluoroalkyl Substances in the Food Web of Ringed Seals in Lake Melville, Northern Labrador, Canada

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Introduction: Perfluoroalkyl substances (PFASs)

- Synthetic organofluorine compounds
- Oil and water-repelling alkyl chain and hydrophilic functional group
- Used in stain-resistant clothing, grease-proofing food packaging, aircraft hydraulic fluids, fire-fighting, etc.
- Highly persistent
- PFOS is a major PFAS that bioaccumulates in food webs

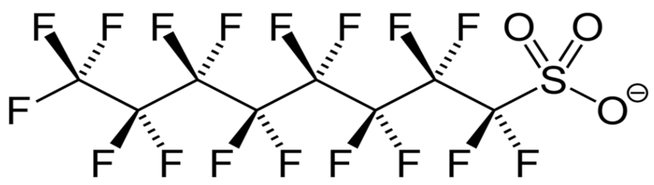


Figure 1: PFOS

Ringed Seal (*Phoca hipsida*)

- Top predator in the Lake Melville ecosystem
- Widely distributed across the Arctic
- Traditional food item for indigenous people

Objectives

- To identify and compare sources (terrestrial, atmospheric, or oceanic) of PFASs to ringed seal food web of Lake Melville, northern Labrador
- To investigate bioaccumulation and biomagnification of PFASs to the Lake Melville seal food web
- **Rationale**: Wildlife are an important source of food and cultural practice to the Indigenous community

Figure 3: Lake Melville, Northern Labrador

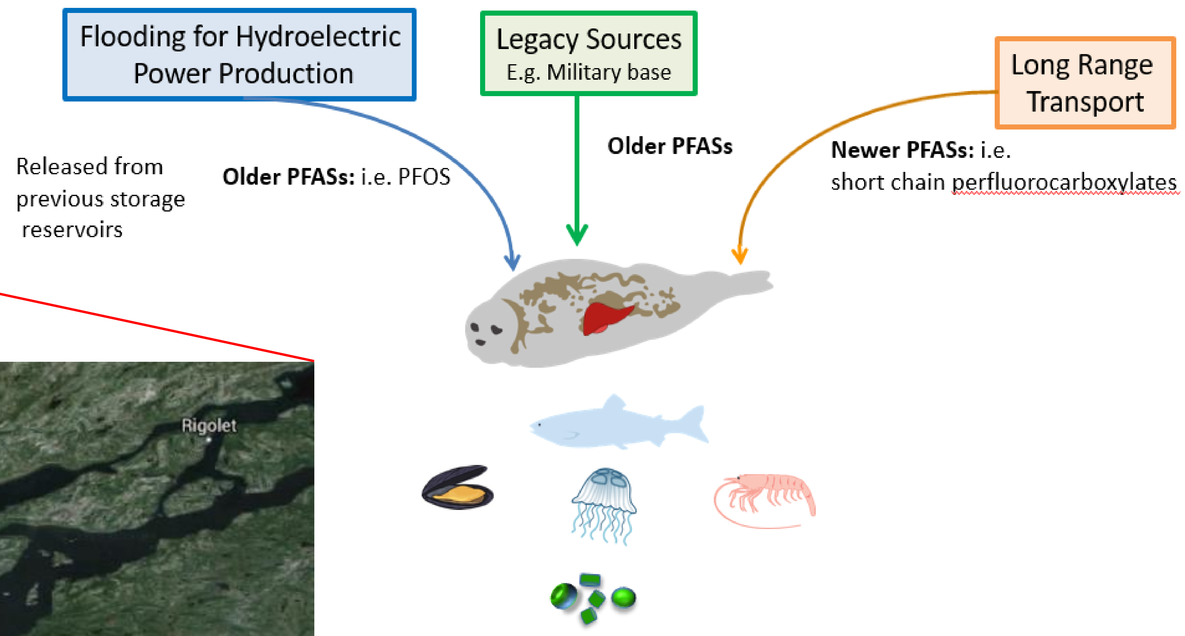
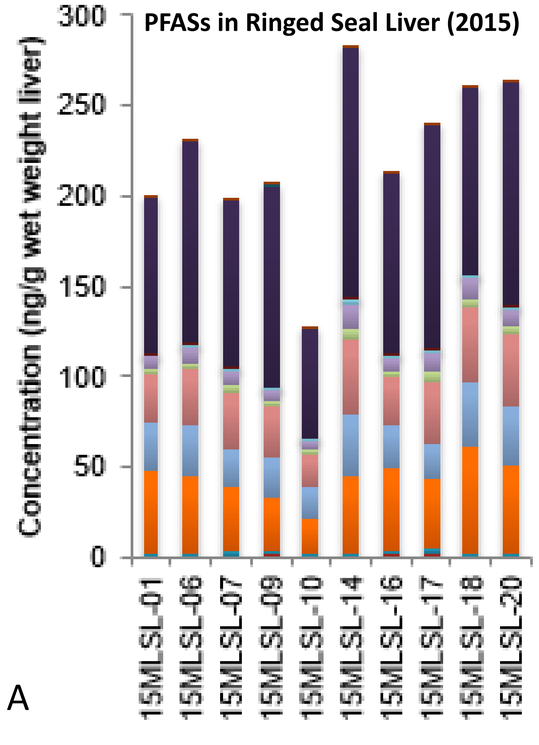


Figure 2: Ringed seal food web and PFASs sources

Research Site: Lake Melville

- Semi-enclosed estuarine fjord
- Inputs of both fresh and marine waters
- Home to Indigenous communities in Rigolet
- Reservoir creation for hydropower development

Preliminary Results



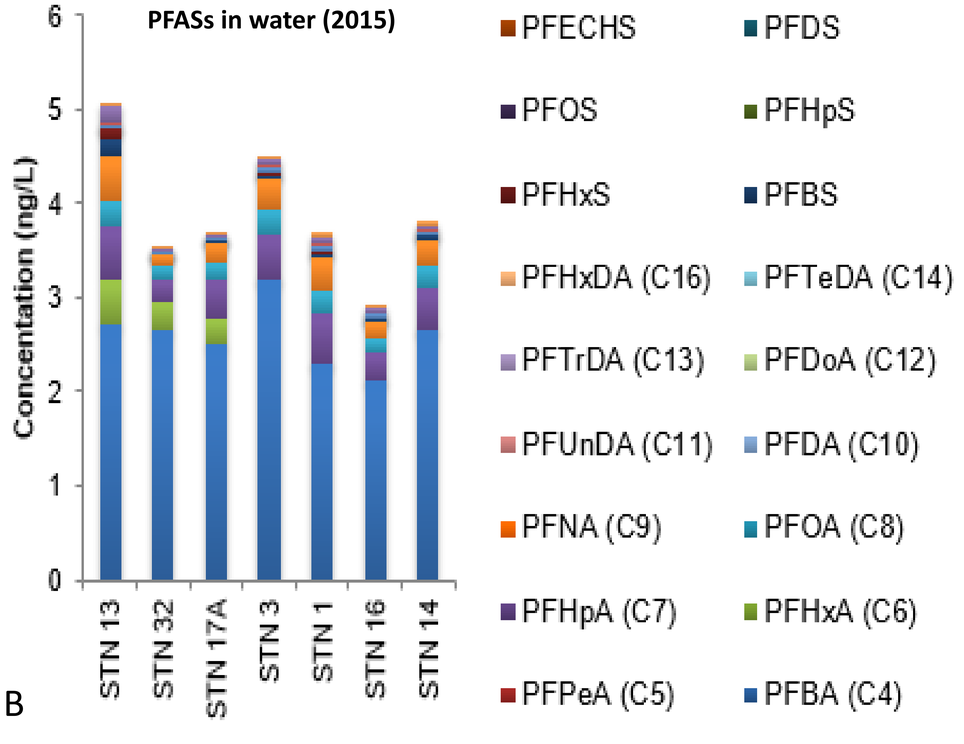


Figure 4: Distribution of PFASs in seal liver and water samples
A. PFOS being abundant in ringed seal liver samples
B. Short-chain PFAS being abundant in Lake Melville water

Future Work

- Analysis of ratios of PFASs across a terrestrial-marine gradient to predict sources
- Look for presence of short-chain PFASs to indicate atmospheric sources
- Use bioaccumulation factor (BAF) to assess PFASs bioaccumulation
- Use stable isotope analysis to reconstruct the food web and assess PFASs biomagnification

Significance

- The first study investigating PFASs in a whole food web in Labrador's ecosystem
- Understanding the sources and transport of PFASs to the ringed seal food web
- Understanding whether the level of PFASs in ringed seals and other biota will impose health concerns to indigenous people who consume them on a regular basis

Acknowledgement

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