

How to create a sustainable, precautionary, integrated regulatory space for the discharge of PFAS from wastewater treatment plants?





Plastic Waste Beauty Products Clouder Microflakes Microflakes Microflakes

https://www.silverson.com/us/resource-library/application-reports/assay-of-pharmaceutical-products

https://www.culligan.com/support/water-information/whatare-pfas-pfoa-and-pfos

https://sitn.hms.harvard.edu/flash/2019/microplastics-crisis/

What are contaminants of emerging concern?

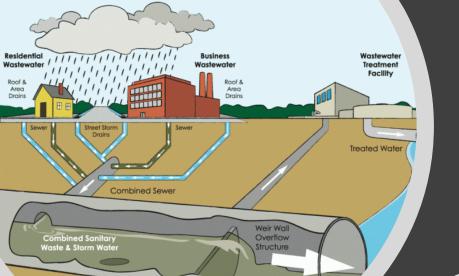
 Compounds that can be detected in sources and may pose a risk to the health of the environment or to human health BUT are not currently monitored in WWTP effluent, which leaves us with a lack of clarity on the amounts being discharged.

Personal Care Products (PCP) – including cosmetics, soaps, shampoos, detergents, cleaners, etc.

Plastics – E.g., Microfibers – come from washers and dryers

- currently there is no technology to remove these compounds from effluents

PharmaPer and polyfluoroalkyl substances (PFAS) including PFOS and PFOA - compounds that are used as fire retardant, Teflon, rainwear, etc.



low to Wastewater

The Wastewater Challenge

WWTP receive sewage from multiple sources that needs to be treated, designed to remove nutrients, not designed to remove CECs

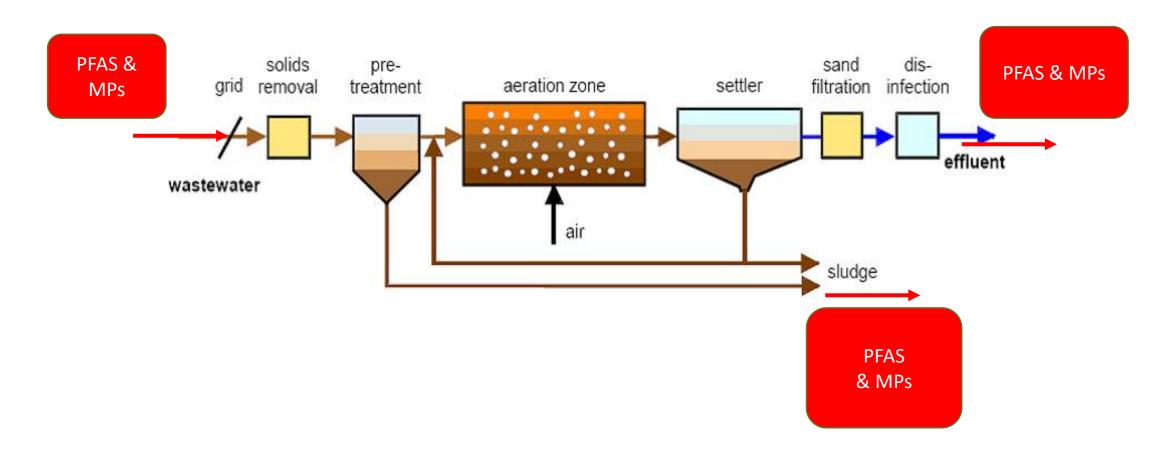
Example:

- Over 1.5 billion litres of wastewater is collected, treated and released into Lake Ontario every day
- With that volume, a compound released at only pg/L can actually contribute to releasing grams/year



https://en.wikipedia.org/wiki/Effluent#/media/File:Discharge_pipe.jpg

Sources: https://www.teachengineering.org/activities/view/uok-2216-wastewater-treatment-plant-model-water-quality; and Zanina Ilieva.



The Regulatory Problem: A WWTP is a land-based source of pollution, and can be characterized as a both a conveyer, a producer, and a source of CECs – i.e., PFAS/MPs.

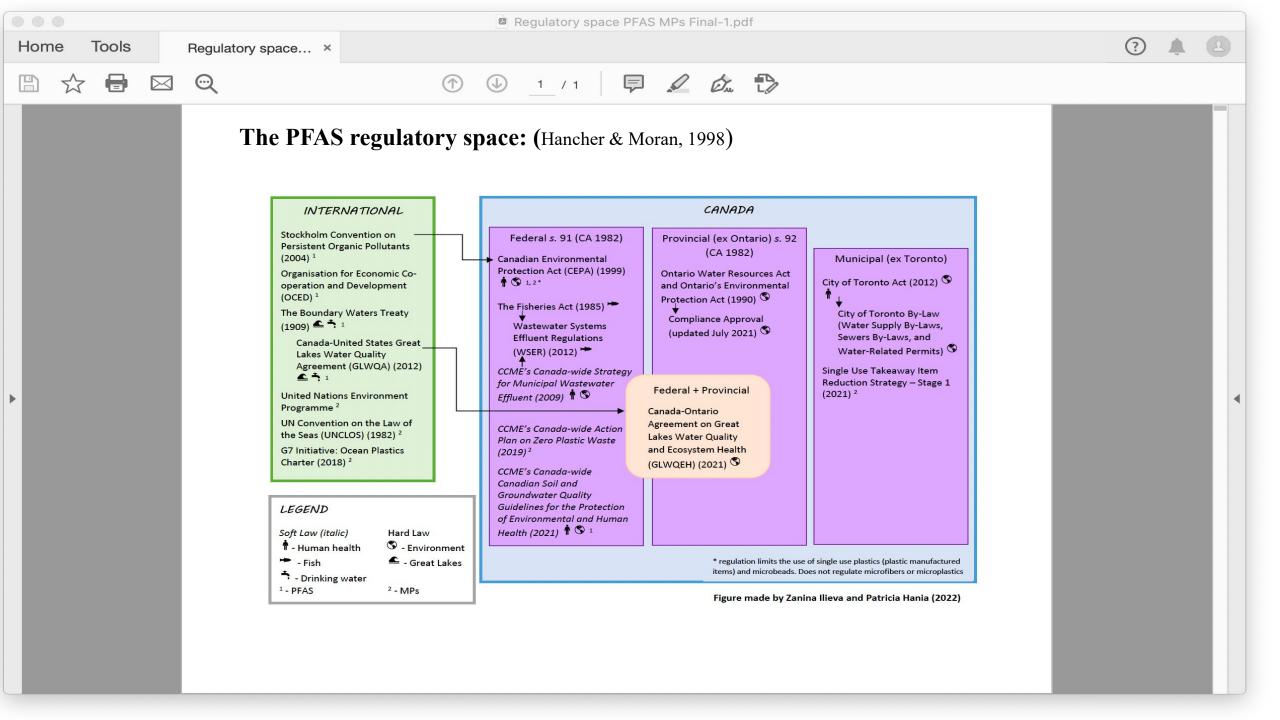
What does the science tell us? Human & Ecological Health Effects: In Water - Mobility, Repel and Dissolve, Persistent, Bioaccumulate

• PFAS – "The Forever Chemical"

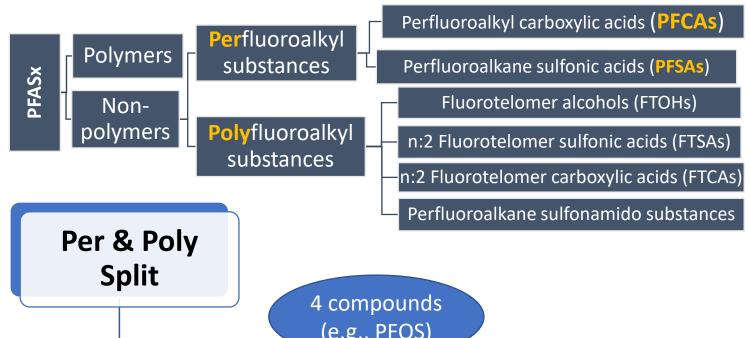
- Human exposure through food consumption, drinking water, indoor dust adsorption and workplace activities.
- PFAS are known to be persistent in the human body where the chemical substance is easily absorbed into the gastrointestinal tract and can transfer into "the central nervous system."
- The Canadian Biomonitoring Program (5th Report 2016-2017) documented the presence of **nine different types of PFAS in the blood, urine and breast milk of 2500 Canadians** ranged in the age of three to 70, and living in 10 provinces.
- PFAS research on fish, amphibians and wild birds remains inconclusive yet, points to widespread PFAS exposure through a range of environmental pathways, air, water and land. The majority of the research has been conducted on fish.
- Research on top predator fish in water bodies across Canada observed higher concentrations of PFAS in fish within the watershed near large cities, especially in southern Ontario, identifying large urban centers as major sources of PFAS into the receiving environment

Human & Ecological Health Effects: In Water, Mobility, Persistent, Bioaccumulate

- Microplastics MPs "Shedding" MPs --- from plastic products and synthetic clothing.
- **Human Impact Research** uncertain, research is pointing to health impacts relating to metabolic disturbances, neurotoxicity, and increased cancer risk in humans.
- Affecting human fertility (i.e., in both males and females).
- Recent first-time research has proved the existence of microplastics in human placentas.
- Research on tap water, beer (12 brands water drawn from the Great Lakes) and sea salt revealed the presence of microplastics.
- Fish & Biota Impact Research microfibres are ingested by organisms and can lead to digestive obstructions that affect take-up of nutrients, 'mechanical' harm, and where the fibres can carry toxic substances where this microlitter adsorbs onto substances and then moves along the transport pathway adding additional pollutants to the fibre's chemical composition.
- Even though the majority of the research in freshwater has been conducted on fish, where fish are known to ingest MPs, the research is pointing to potential impacts to humans that consume the fish and the need for further research on MP exposure across the food chain and ecosystem



Regulatory Gap: PFAS



9 compounds (e.g., PFOA)

Per & Poly Split

4 compounds (e.g., PFOS)

PFSAs

CEPA -

Schedule #1
List of Toxic
Substance

#129 – PFOA #130 – PFAS #131 – PFCAs + PFOA #132 PFAS + PFOS

Key Messages

Three Integrated Actions directed at Three Levels –

1. Federal –

- 1. to update WSER regulation to classify PFAS as a deleterious substance under s.5 of the regulation, and supported by s.34(1) of the Fisheries Act. WSER, Supra note 18. Fisheries, Supra note 48 s. 34(2)(a)(b)(c).
- 2. This first action can be achieved by elevating the CEC discharge problem as a policy priority to be examined through an ad-hoc participatory governance committee arrangement

2. Provincial

- 1. "Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health (GLWQEH, 2021)" integrate the contaminants of concern (PFAS) identified in GLWQEH, 2021, and adopt PFAS WWTP effluent parameters to be developed through an Advisory Panel under the Fisheries Act or the CCME, as many of these state actors are participating through the GLWQEH process.
- 2. PFAS effluent parameters can then be incorporated into an environmental compliance approval certificate.

Key Messages

Three Integrated Actions directed at Three Levels –

3. Municipal

- 1. City of Toronto Act, the identification of PFAS as a toxic substance under CEPA and a WWTP taken into account under the "environmental well-being of the City" and "the health, safety and well-being of persons" provisions of the legislation.
- 2. At the municipal scale, an integrative policy response can also be pursued by establishing an agreement with the federal government, especially for those WWTPs owned by a municipality.
 - 1. In Ontario, municipal governments can enter agreements under *s*.3.1 of the Ontario Municipal Act where the "The Province acknowledges that a municipality has the authority to enter into agreements with the Crown in right of Canada with respect to matters within the municipality's jurisdiction." Municipal Act, 2001, S.O. 2001, Chapter 25.