



## Emerging Contaminants Under the Microscope: Exploring Microplastics in the North Saskatchewan River

Jeremiah Bryksa, Patric McGlashan, Northern Alberta Institute of Technology

Microscopic plastic particles, called microplastics, are an emerging environmental contaminant that has become an increasing concern for governments, industry, and society. Although there is growing demand to understand the prevalence and impact of these ubiquitous particles in the environment, accurate measurement of microplastics comes with unique challenges, particularly in freshwater systems with high suspended solids and organic matter where quantification is akin to looking for a needle in a haystack. Through a Plastics Research in Action (PRIA) initiative, a 10-year, \$10 million applied research collaboration between Heartland Polymers and the Northern Alberta Institute of Technology (NAIT), we have developed robust methodologies for sampling and measuring microplastics in freshwater that have been deployed on the North Saskatchewan River (NSR) over the past 5 years, representing the most extensive examination of microplastics in Alberta's environment to date.

Advancing this research program required the adaptation of ASTM D8332 to develop a high-throughput sampling approach to facilitate the sampling of 1,500 litres of river water, along with subsequent validation of these novel methodologies. Furthermore, extensive processing protocols have been developed within the laboratory, and in collaboration with Dow Canada, a targeted analytical approach for 8 polymer types (PP, PE, PET, PVC, PS/ABS, PA, PMMA, and PC) was employed using state of the art microspectroscopy instrumentation. In-line with strict quality control protocols, the research team is among the first to develop and employ a robust, high-throughput method to successfully generate reliable microplastic data for freshwater rivers. This achievement has garnered international recognition, with several partnerships in development to progress the standardization of microplastics measurement.

Here, we will present microplastic data collected from 12 sites along the NSR within the Edmonton Municipal region. Our analysis reveals the polymer types present and their variations as the river flows through the city. By employing robust and reliable methodologies, we demonstrate the consistency of results from duplicate samples and highlight subtle differences between mid-river and shoreline locations. This snapshot represents only a fraction of our comprehensive dataset, which will be made available to both the public and scientific community upon the study's completion later in 2025.

### Jeremiah Bryksa

Jeremiah Bryksa, Applied Chemist, has 14 years of academic and industrial laboratory experience, performing analytical chemistry in various sectors within Alberta including oil and gas and environmental monitoring. Within NAIT, Jeremiah studies an emerging contaminant – microplastics. His team has adapted and applied laboratory and field techniques to the North Saskatchewan River to gather data to measure microplastic concentrations within the Edmonton municipal region. Jeremiah aims to contribute to the growing scientific understanding of microplastics in the environment and improve measurement precision and accuracy through the dissemination of methodology to the scientific community. He was also awarded the TELUS World of Science Fellowship in 2023 and continues to communicate science to the public through this organization with hopes of inspiring prospective scientists within Alberta.

### Patric McGlashan

Patric McGlashan, Microplastic Technologist, has 5 years of experience in analytical chemistry with a focus on microplastic quantification in freshwater systems. Patric's work is highlighted in development and validation of prototype sampling units in field trial, developing methodologies for microplastic extraction, polymer analysis via vibrational microspectroscopy, and training highly qualified personnel (HQP) on microplastics applied research.