

Microplastics from the North Saskatchewan River in the Edmonton Region

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Human use of plastic has increased substantially over the last 70 years; plastics are utilized in all aspects of our daily life, including food and beverage production and packaging, automotive and transportation industry, clothing, construction, and building materials. As a result, there has been a growing concern with the amount of plastic waste found in the environment, specifically small plastic particles. These microscopic plastic particles (microplastics) have been identified in environmental samples taken from all the oceans around the globe, major rivers and lakes, the sedimentary layers on all continents, and even in the biosphere. The government of Canada recognizes this global issue and, in 2019, published Canada's Plastic Science Agenda, which aims to present a national response and highlights the importance of forming collaborations with research institutions and industry partners to increase innovations in this space. In 2019, NAIT entered a 10-year partnership with Interpipeline to create Plastics Research in Action (PRIA) to address plastic waste, environmental monitoring, recyclability, and sustainable practices. One of the main projects under the PRIA portfolio is identifying and monitoring microplastics in water and sediment. This project is in collaboration with Dow Chemical and aims to study microplastics in the North Saskatchewan River (NSR), which flows through the Edmonton municipal region. This study aims to create a robust sampling campaign to understand the microplastic contamination of the NSR along the identified sampling points. Surface water samples and shore sediment samples are being taken biweekly through the spring, summer, and fall months from 2020 to 2023. These matrixes are sampled for microplastic contamination according to the most up-to-date ASTM sampling methodology. In the laboratory, ASTM extraction procedures are employed to isolate and clean up microplastic analyte particles from the surrounding matrix and background noise. Extractable microplastics will be analyzed by the DOW Chemical analytical team on state-of-the-art Quantum Cascade Laser Directed Infrared Spectroscopy (LDIR) to quantitate the particles and characterize individual polymer types. This will generate one of the most robust microplastic Canadian freshwater data sets to date and help our understanding of the quantification and characterization of microplastics in the NSR surface water and sediment.

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Jeremiah Bryksa holds the position of analytical chemist at NAIT with expertise in various chromatography and spectroscopy measurement techniques. Since April 2020, Jeremiah has been working with microplastics, specifically developing, and adapting laboratory techniques to extract and characterize microplastics with strong focus on quality assurance and control.