

Water-Proofing Alberta's Urban Communities: Countering the Effects of Climate Change, Urbanization and Water Scarcity through a Comprehensive One-Water Source Protection Plan

Calgary is located within a 'closed' watershed, where the amount of water available for urban growth and development is finite, yet rapidly continues. Climate change predictions forecast increasing drought, heat, storms, and flooding, which when coupled with increased urbanization, will erode water quality. These disparate, yet interactive complex issues require a comprehensive data-driven 'One-Water' management approach. Many new and emerging surveillance tools have been developed which have proven to be valuable in addressing urban pollution problems. The data generated can be used to help mitigate risks, identify emerging concerns, and help guide infrastructure planning or pollution control strategies.

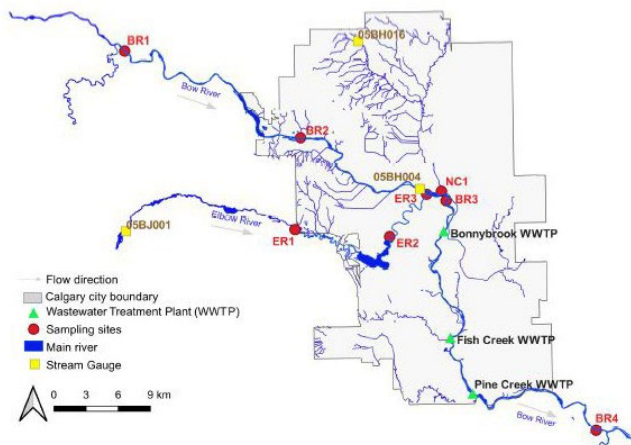


Figure A3.1. Sampling locations for micropollutant study carried out between 2018 – 2022.



RECIPIENT:
City of Calgary



PARTNERS:
University of
Alberta



TOTAL BUDGET:
\$1,290,000



AI FUNDING:
\$540,000



PROJECT DATES:
APR 2023 – APR
2026

APPLICATION

Climate change will exacerbate urban pollution issues. To effectively deal with the impacts of urban pollution, innovative policies aimed at preventing urban pollution are needed. The increased likelihood of drought, heat and flooding, will intensify contaminant loading in urban water environments, increasing the negative human and environmental health impacts. These water issues are rooted in the common problem of urban pollution and necessitate a data-driven 'One-Water' approach to source water protection for preventing urban pollution.

PROJECT GOALS

The holistic "One-Water" framework for source water protection aims to:

1. Ensure reliable, secure, clean drinking, recreation and irrigation water in urban centers.
2. Promote public confidence in a healthy, livable city.
3. Protect human and ecosystem health through reducing exposures to pollutants.
4. Promote 'greening' initiatives to sustain ecosystem services and native biodiversity.
5. Promote conservation efficiency around the use and reuse of natural and alternative water resources.
6. Create resiliency to climate and economic challenges in the face of water scarcity.
7. Provide long-term sustainability and economic prosperity in the face of future uncertainty.
8. Provide water managers with science-based decision-making tools for developing strategies to deal with emerging or impending water problems.

BENEFITS TO ALBERTA

Developing a one-water source protection strategy requires a comprehensive data-driven surveillance program that focuses on: a) identifying anthropogenic pollutants and their levels in urban water sources (and upstream); b) characterizing sources of pollution occurring within the urban watershed and aimed at mitigating these risks (e.g., cross connections, infrastructure failures, etc.); c) identify early warning indicators of emerging threats, focusing on individual level threats (i.e., cyanobacterial toxin levels, microplastic bioaccumulation), and where possible, using predictive modeling approaches for enhanced threat detection; and d) mobilizing knowledge into innovative policy management strategies aimed at preventing pollution and ensuring sustainability, reliability and resiliency of urban water supplies under the pressures of a changing climate, urbanization and water scarcity.



9 Publications



**10 Students
Trained**



**5 Policies/Practices
Informed**



2 Project Jobs

CURRENT STATUS

NOVEMBER 2025

Two field seasons have been completed for monitoring key surface water sites in the watershed and reservoirs for fecal bacteria, microbial source tracking markers, pathogens, nutrients, cyanobacterial toxins, taste-and-odor issues, emerging substances of concern, chemical tracers of fecal pollution, microplastics and invasive species in urban water sources in Calgary. In addition to the surface water samples, 2 seasons of storm water sampling during both base flow and event-based sampling have been completed. Efforts have begun to integrate, compare and visualize the large volume of data generated as a first step in developing One-Water strategies aimed at preventing urban water pollution.