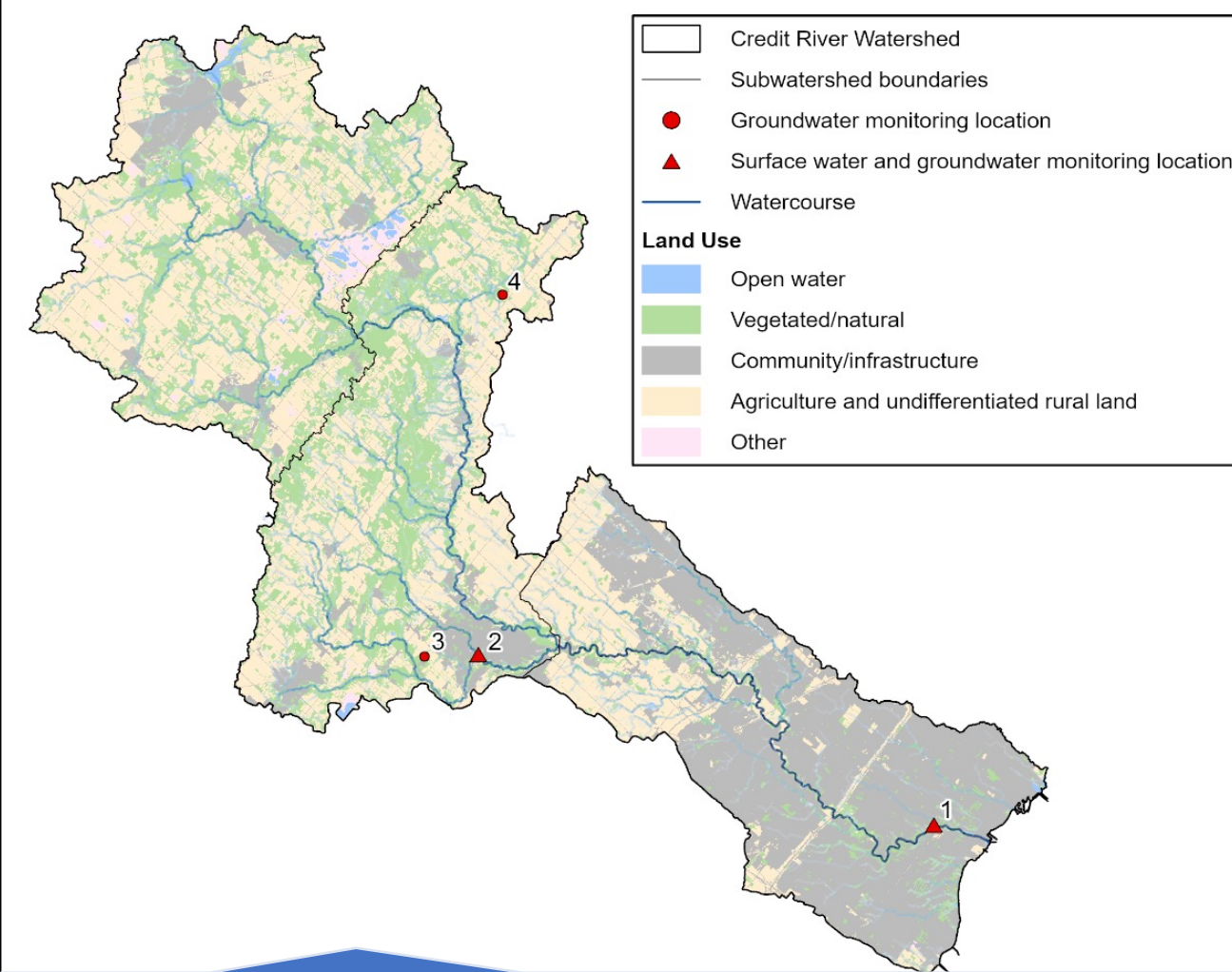


Assessing Trends in Chloride Concentrations in the Groundwater and Surface Water of a Rapidly Urbanizing Watershed in Southern Ontario

Background

- Chloride concentrations in the Great Lakes basin have been increasing over the last 30 years as the area has urbanized
- The predominant contributor is the application of road salt (NaCl), especially in urban areas
- Elevated Cl (and Na) concentrations are harmful to freshwater organisms and can impair drinking water quality
- Once chloride enters a body of water, it is very difficult and costly to remove



Land use map of study area, Credit River watershed, including the 4 sampling locations

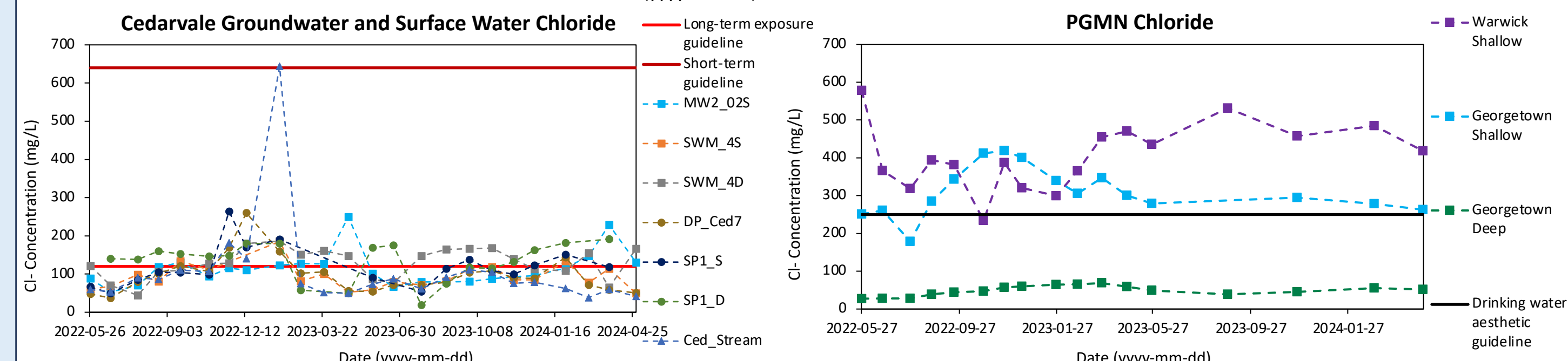
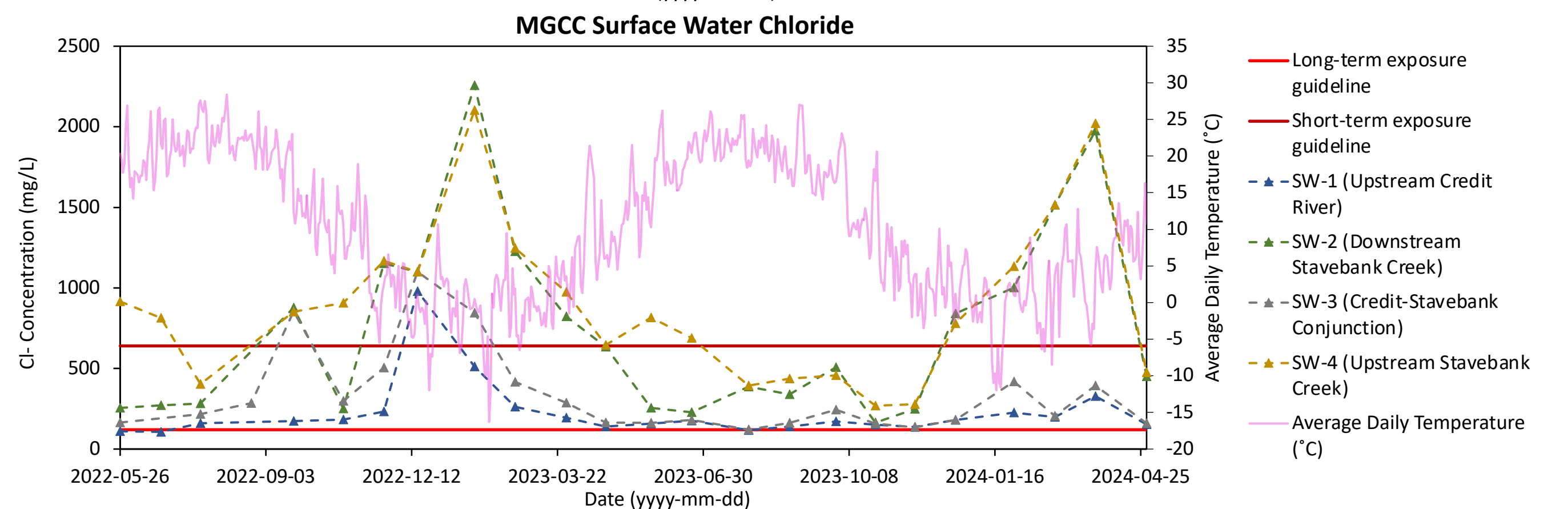
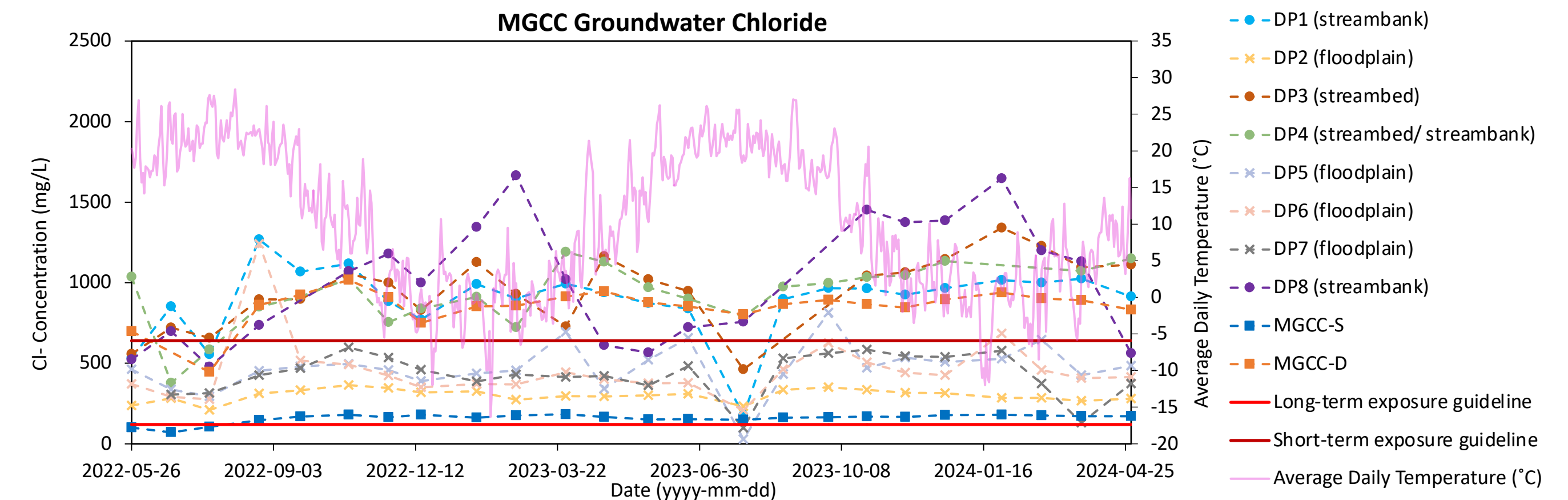
Objectives

- Correlate longer-term chloride concentration data with data collected throughout the study
- Evaluate seasonal effects on chloride trends, including storm events
- Determine how site characteristics influence chloride concentrations (e.g., population density, geology, groundwater – surface water interactions)



Over-applied road salt on a walkway

Results



Field Campaign

- A combination of drive point piezometers, monitoring wells, and surface water bodies are monitored
- Samples are regularly analyzed for major ions, stable isotopes (¹⁸O and ²H), and field parameters such as pH, electrical conductivity, and temperature
- Additional, intermittent analyses including:
 - Tritium-helium (groundwater dating)
 - Artificial sweeteners (source characterization)
 - Rn-222 (tracking groundwater discharge)



Conclusions

- Chloride concentrations are consistently above the long-term aquatic guideline and often surpassing the short-term guideline at the urban (Mississauga) field site
- A combination of parameters seems to be contributing to chloride trends, including urbanization, hydrogeologic conditions, and additional sources of chloride

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