

# Water Quality Sampling Program for the Sturgeon River Watershed



## The Program

Tetra Tech was retained by the North Saskatchewan Watershed Alliance to implement a two-year water quality sampling program for the Sturgeon River Watershed (SRW).

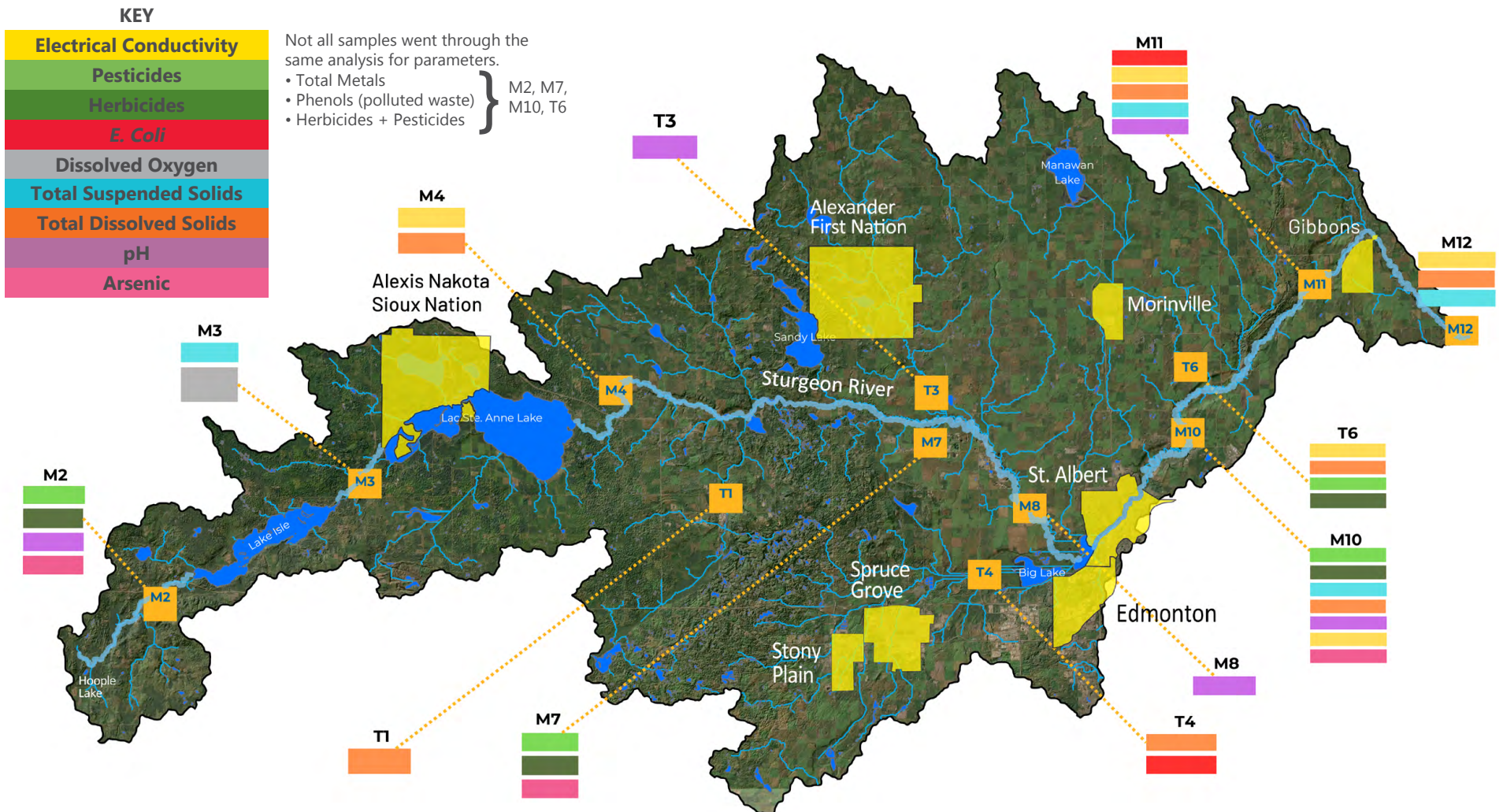
## Overview of Results

Various parameters were observed to exceed the [Environmental Quality Guidelines for Alberta Surface Waters](#), including but not limited to: pH, electrical conductivity (EC), chloride, sulphate, ammonia as nitrogen, total arsenic, total chromium, total cobalt, dissolved iron, total manganese, *Escherichia coli*, as well as herbicides and pesticides.

The Alberta Government states: “Water quality guidelines are science-based numeric concentrations or narrative statements that are recommended to protect various water uses.” These uses include:

- aquatic life
- agriculture (livestock watering and irrigation)
- recreation and aesthetics

## Sturgeon River Monitoring Project: Research Highlights of Parameter Exceedances Against Freshwater Guidelines



## Sturgeon River's Significant Lakes

The Sturgeon River basin has several large lakes along the upper half of the main stem, from upstream to downstream:

- Isle Lake
- Lac Ste Anne
- Matchayaw (Devil's) Lake
- Big Lake

The lakes moderate peak flows in spring and maintain flows during the drier summer and fall period. The large storage capacity of these lakes significantly delays outflows, with a proportion of the flow not reaching the mainstem for about 8-10 years. This is known as lake residence time.

The depth of these recreational lakes creates a temperature gradient that results in periodic turnover and the resuspension of sediments near the lake bottom. This can result in changes in phosphorus and other nutrients in outflows during turnover events. This naturally occurring phenomenon can be best mitigated by minimizing use of nutrients and fertilizers, maintaining or improving riparian areas that naturally intercept and retain nutrient input into lakes, and other proven strategies.



The M2 Station in April and August. Credit: Tetrattech.

## Highlights of Water Quality Parameters

### Dissolved Oxygen (DO)

DO supports all forms of life in water and is formed primarily through photosynthesis by plants. It can also be transferred to water from the air, especially through waves or turbulence. Low dissolved oxygen primarily results from excessive algae growth caused nutrients, especially phosphorus, but is also naturally occurring in some waterbodies.

**SRW:** DO is generally above the minimum PAL guideline threshold, with very occasional outliers in the historical and recent data.

### Electrical Conductivity (EC)

Conductivity is a measure of the ability of ions in water to carry an electric current. Conductivity is a good measure of the total amount of salts in solution (e.g., calcium, magnesium, sodium, bicarbonate, chloride, nitrate, and others). While some of this is naturally present from the surrounding geology, it can also be the product of pollution.

**SRW:** EC increases at the furthest stations downstream (M10-12). This is likely in part because as the SR moves east, its elevation drops and more groundwater enters the system, which tends to be more saline than precipitation and surface runoff.

### Total Dissolved Solids

Small particles in water caused by:

- High flow rates
- Soil erosion
- Urban & Agricultural Runoff
- Septic & wastewater systems
- Decaying plants & vegetation
- Industrial discharge & sewage treatment plants

**SRW:** Occasional field TDS and field turbidity exceedances are likely related to site-specific solute loads and do not appear consistent at any given location.

### Arsenic

This heavy metal gets into water through geological erosion in groundwater or through agricultural or industrial waste runoff. Well water should be tested regularly.

**SRW:** M2 station had August exceedances for both 2021 and 2022. M7 & M10 also had one or more exceedances. It is not clear whether the total arsenic concentrations are the result of local surface inputs (waste runoff) or localized groundwater connections, which can be high in arsenic from soil parent materials.

### Herbicides & Pesticides

Chemical pest deterrents found in water from agricultural, residential or recreational areas.

**SRW:** The M10 station (downstream of St Albert and the Sturgeon Golf and Country Club) indicates that phenoxy-acid herbicides are present in the SRW as a result of local land use activities, which could be cumulative from several sources.

### Total Suspended Solids

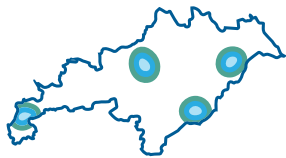
Sources of TSS include pavement (from wear), vehicle exhaust emissions, vehicle parts, building and construction material, road salt, road paint and pedestrian debris, soil material, plant and leaf litter, and atmospheric deposition of particles.

**SRW:** There was an upward trend of most stations in the spring, with many of those same stations showing a downward trend in August. Station M12 showed much higher TSS result in the spring of 2022 (compared to in 2021 or the summer results), which was attributed to variations in stream flow.

## Next Steps



Collect available and known water quality data to complete analysis



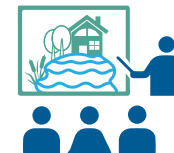
Determine hot-spots and possible spatial patterns of parameters of interest



Provide recommendations for future monitoring efforts



Encourage wise land-use



Educate about land management impacts on water quality

To view this water quality data, go to [DataStream](#).

For more info, go to [nswa.ab.ca](http://nswa.ab.ca) or contact [water@nswa.ab.ca](mailto:water@nswa.ab.ca)

