seawa
South East Alberta Watershed Alliance

YOUR CONNECTION TO THE WATERSHED

Understanding Water Quality in the SEAWA Watershed

March 2023

Water quality refers to the suitability of water for an intended use. Good quality water is safe for **drinking, protection of aquatic life** (fish and other organisms living in water), **agricultural use** (irrigation of crops and livestock watering), or **aesthetics and recreation**.

Water quality is determined by measuring a set of chemical, biological, physical, and radiological characteristics of water, and comparing these with established provincial and federal government guidelines. Guideline values depend on the intended use of the water:

Environmental Quality Guidelines for Alberta Surface Waters 2018

Canadian Drinking Water Quality Guidelines

Canadian Environmental Quality Guidelines

- *Canadian Water Quality Guidelines for the Protection of Aquatic Life*

Examples of water quality characteristics

Chemical: nutrients (phosphorus, nitrogen), heavy metals (cadmium, mercury, lead, arsenic), pesticides, pharmaceuticals, hormone analogs, dissolved oxygen, dissolved metals and salts (sodium, magnesium, calcium, manganese), Biological and Chemical Oxygen Demand (BOD, COD), pH, dissolved organics

Biological: bacteria (fecal coliforms – *E. coli*), parasites (*Cryptosporidium*, *Giardia*), Microcystin Toxins (Blue Green Algae), chlorophyll.

Physical: Temperature, colour, turbidity, electrical conductance, odour

Radiological: uranium (There are uranium deposits in southern AB).

Accelerated nutrient enrichment of lakes and reservoirs (often caused by phosphorous), leads to the condition called **eutrophication**. This condition promotes the growth of blue-green algae (*Cyanobacteria*) that can release toxin into the water.

Alberta Environment and Protected Parks (AEPA) and Alberta Health Services have information on the trophic status of Alberta lakes.

Regular water quality monitoring is key to compliance with guidelines, and the management of health risks to users.

AEPA regularly monitors water levels, and water quality at certain locations in rivers, streams, lakes, and reservoirs throughout the province.

Water levels and flows influence water quality. High flows may increase turbidity (cloudiness) but can also dilute concentrations of contaminants.

Stream levels and discharge are recorded for the South Saskatchewan River (SSR) at Medicine Hat, and Seven Persons, Ross, Bullshead, Gros Ventre, and Boxelder Creeks.

Water quality is monitored at the station upstream of Medicine Hat as part of the Long Term Monitoring Network.

Water quality is influenced by many factors such as climate/hydrology, landscape/topography, geology/bedrock, and land use (human activities).

Water Quality Guideline Examples:

Aquatic Life:

Dissolved oxygen, Early life stages 6 mg/L; Other stages of life 5.5 mg/L.

Drinking Water:

E. coli, none detectable/100 ml

Livestock watering:

MCPA (pesticide), 25 µg/L

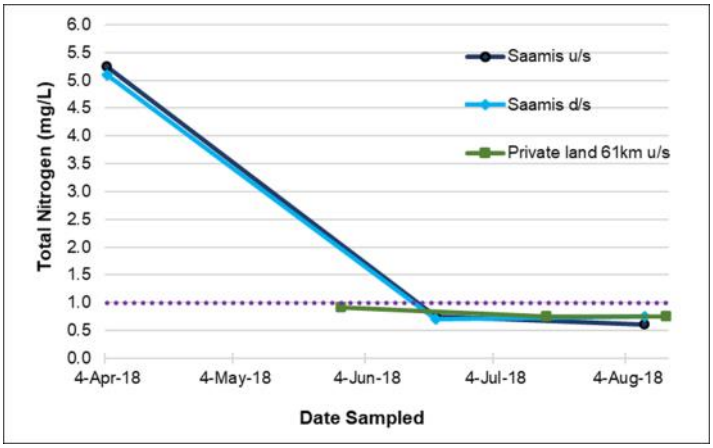
Crop irrigation:

E. coli, 100 (number)/100 ml

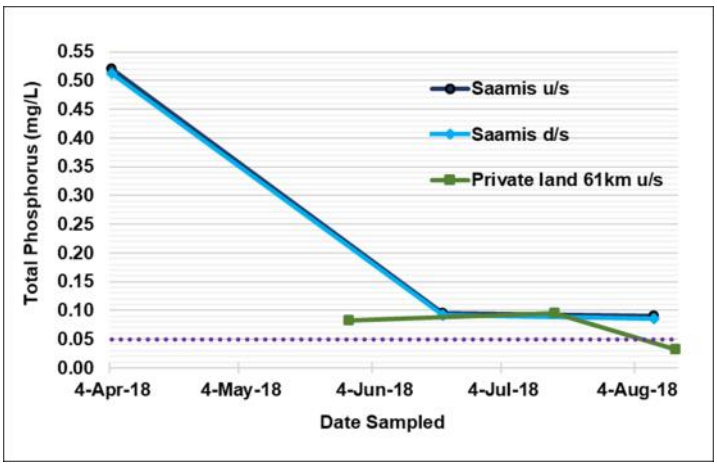
Recreation:

Clarity of water should be sufficient for the user to estimate depths and see subsurface hazards.

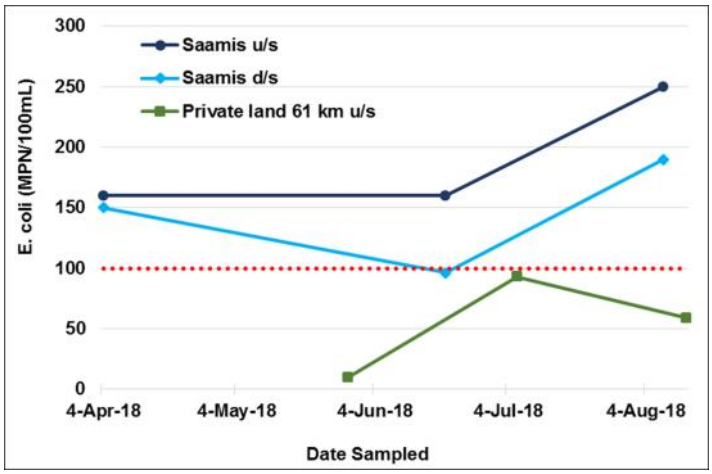
Water Quality information over time is compiled and summarized as graphs (examples below). Summarizing information shows patterns that provide awareness about water quality issues or potential issues, and direction towards management actions. SEAWA tested water quality of the Seven Persons Creek at the Saamis Archeological Site (2 sampling locations), Medicine Hat and at a farmland upstream, in the summer of 2018. Here are key issues:



Water quality can be improved with a reduction of Total Nitrogen below 1.0 mg/L during the growing season.



Water quality can be improved with a reduction of Total Phosphorus below 0.05 mg/L during the growing season.



Bacteria *E. coli* concentrations at the Saamis locations exceed the guideline value of 100 MPN/100ml for safe irrigation of produce that are eaten raw.

Blue-green algae (*Cyanobacteria*). Photo taken at the Bullshead Reservoir following an Alberta Health Services advisory on August 3, 2018. Photo credit: Natasha Rogers

Related information:

Status of Surface Water Quality in the South Saskatchewan Region 2017-2018

Pesticides in watersheds of southern Alberta

Salinization of the South Saskatchewan River Basin

Trace organic compounds in streams of southeastern Alberta

Alberta River Basins

Uranium in Southern Alberta

Blue-green algae Health Advisories

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Canada

Alberta GOVERNMENT

PLAINS MIDSTREAM CANADA