# South McQuesten River / Et’o Nyäk Tagé cumulative impacts study

Project summary

Yukon


South McQuesten River in the winter at the long-term monitoring station.

# What is this project about?

The Government of Yukon's Water Resources Branch conducted an information review on the South McQuesten River/Et'o Nyäk Tagé watershed, located north of Mayo, Yukon in the Traditional Territory of the Na-Cho Nyäk Dun people.

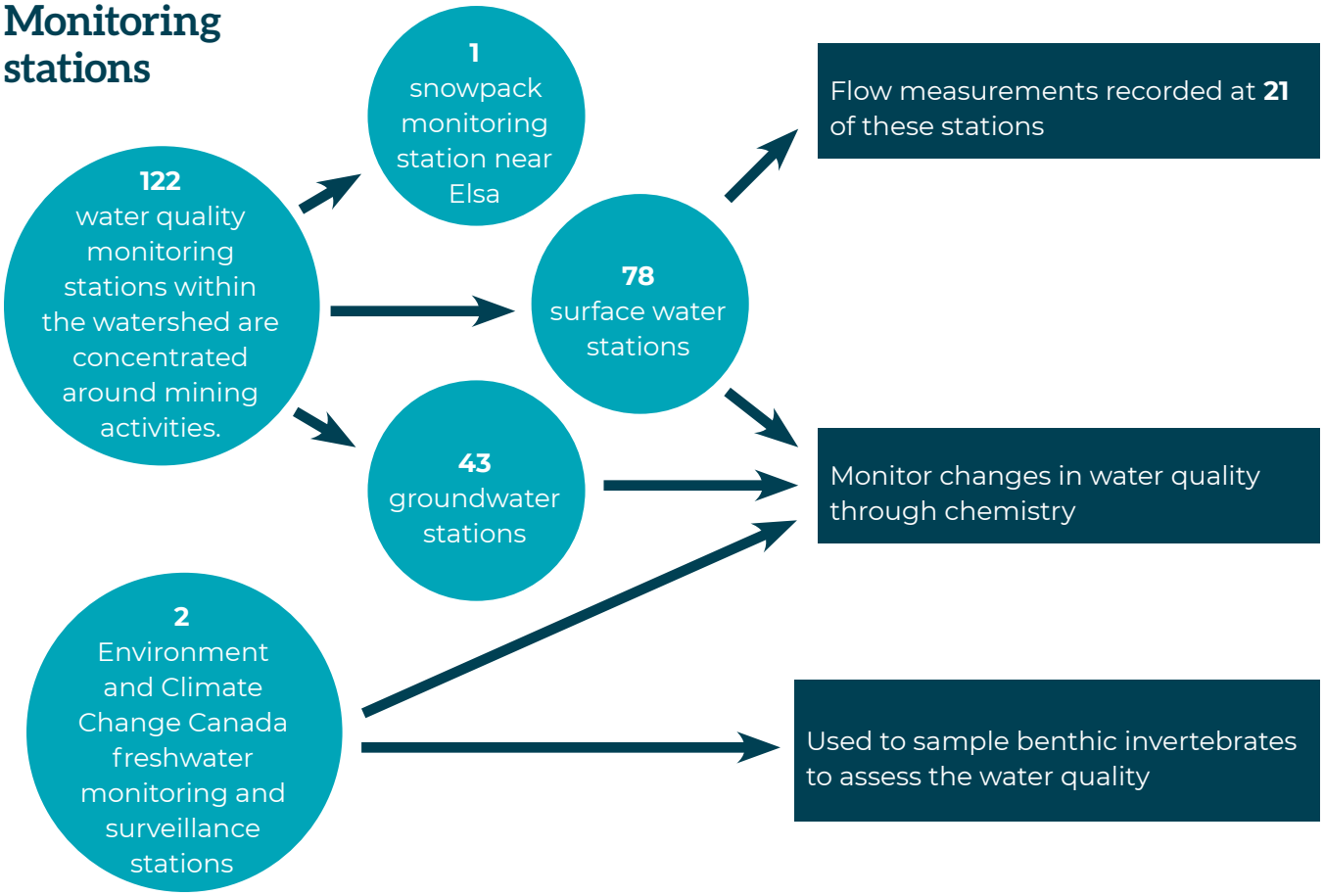
The purpose of this review was to:

- review potential historical impacts on water quality;
- review monitoring data along the river from historical monitoring stations and determine how water quality has changed over 10 years between 2009 to 2018 (also referred to as **trends**);
- develop water quality objectives for this river to inform future water management; and
- initiate monitoring of Cache Creek.

# What is monitored and where?

Water quality is monitored by various governments and organizations throughout the watershed to detect potential impacts associated with anthropogenic activities and climate change. A map showing all the monitoring stations is in the full report, available from open.yukon.ca/information/publications/plans-and-reports-water.

## Monitoring stations



## How is the river doing?

Multiple activities occur in the South McQuesten River watershed, including recreational and subsistence fishing, hunting, trapping, recreation, quartz mining and placer mining. Some of these activities, in addition to climate change, can contribute to impacting water quality. Mining can be a source of metals and suspended particles. Access roads adjacent or crossing a river can be a source of hydrocarbons and total suspended solids. Wildfires may result in an increase of nitrogen, organic carbon and total suspended solids to surface water. Generally speaking, the quality of the water changes over the seasons, over the years, and changes as the water flows through the watershed.

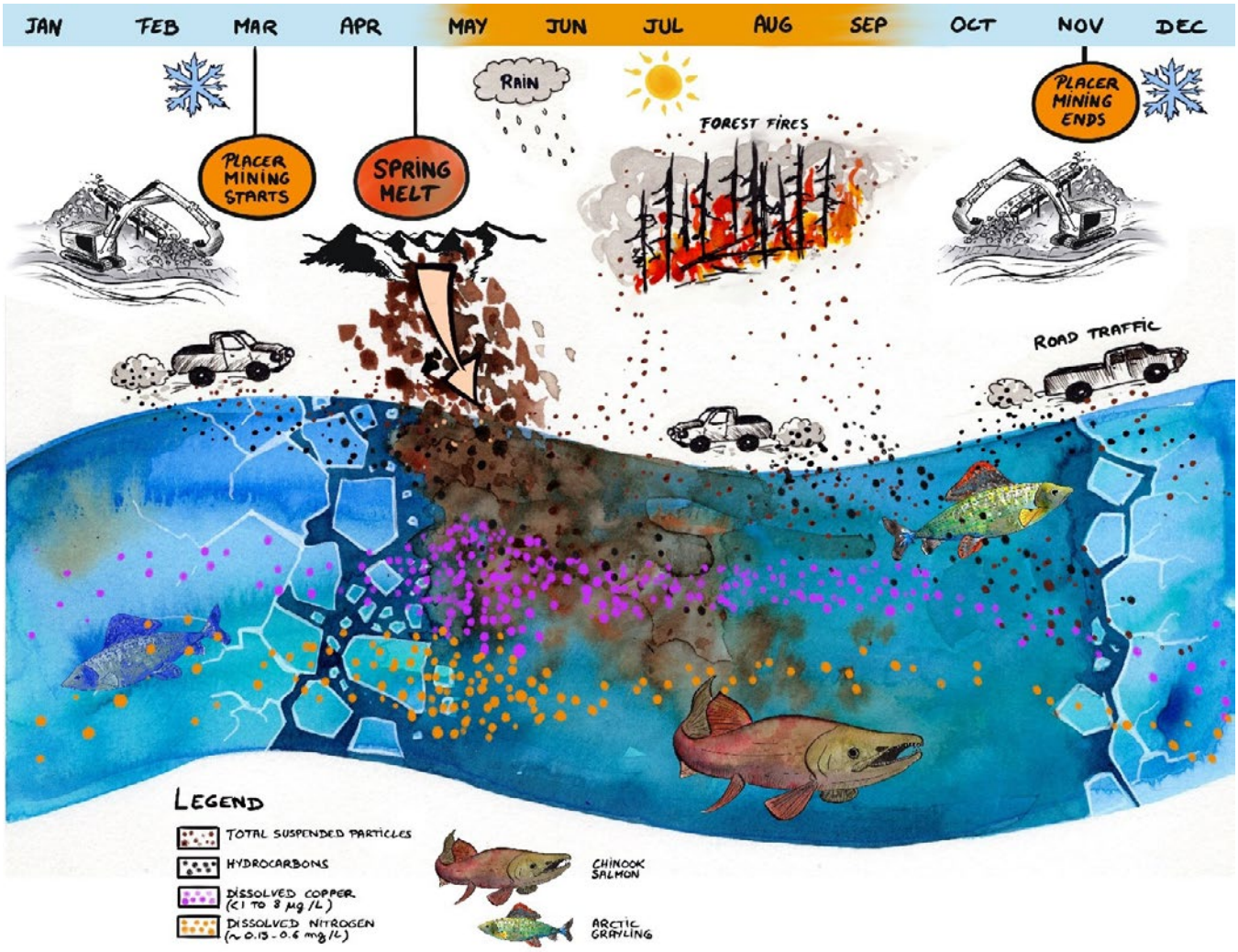



**Illustration 1:** Human impacts on the South McQuesten River throughout the year.

# Is the South McQuesten River a healthy river?

We used the Water Quality Index (WQI) and an evaluation of aquatic insects that live on the bottom of the river or in the sediments  to understand the health of the river. The WQI indicates the South McQuesten River has “marginal” water quality, which may be influenced by naturally elevated minerals in the area. Interpretation of the number and type of aquatic insects suggest the South McQuesten River has good water quality. A variety of species are present that are sensitive to extended exposure to poor water quality conditions. Also, the benthic community structure is not dominated by populations with high tolerance to poor water quality conditions.

The WQI indicates the river has **marginal** water quality. Marginal means the water quality is not great. The water regularly has elevated concentrations of some minerals.

Sampling of benthic invertebrates suggests the river has **good** water quality.

Water chemistry along the South McQuesten River reflects the influence from the tributaries and the environment as the river progresses downstream. An increase in aluminum, copper and zinc occurs downstream of Cache Creek, the most upstream tributary, where these parameters were the highest. Cadmium, copper and zinc concentrations decrease as the river progresses downstream due to dilution. Lead concentration was the highest downstream of Christal Creek and Flat Creek, then decrease as the river flows downstream. Arsenic increases as the river flows downstream, likely from contributions of Haldane and Haggart creeks.

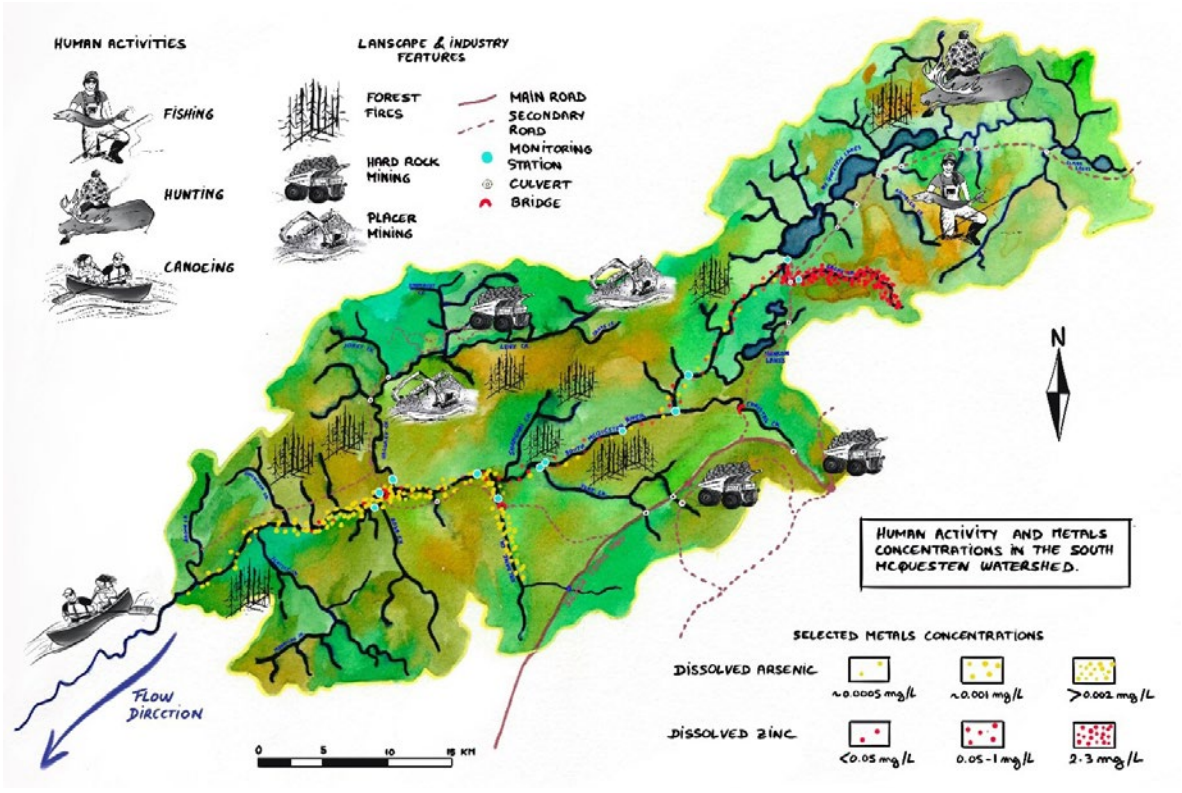



**Illustration 2:** Human activities and metals concentration in the South McQuesten watershed.

# How is the river changing over time?

Environment and Climate Change Canada completed an evaluation of the trends of the water quality data over the last 10 years. The data came from the long-term monitoring station located in the South McQuesten river, upsteam of Haggart Creek tributary. The analysis found some parameters increased in concentration (including turbidity, nitrogen and copper), while a decrease occurred for other parameters (including arsenic and pH).

Changes observed in the water chemistry of the watershed is likely a result of multiple factors:

- climate change;
- development in the watershed; and
- an increase in surface runoff from:
    - burned and/or cleared vegetation,
    - roads, and
    - during spring melt.

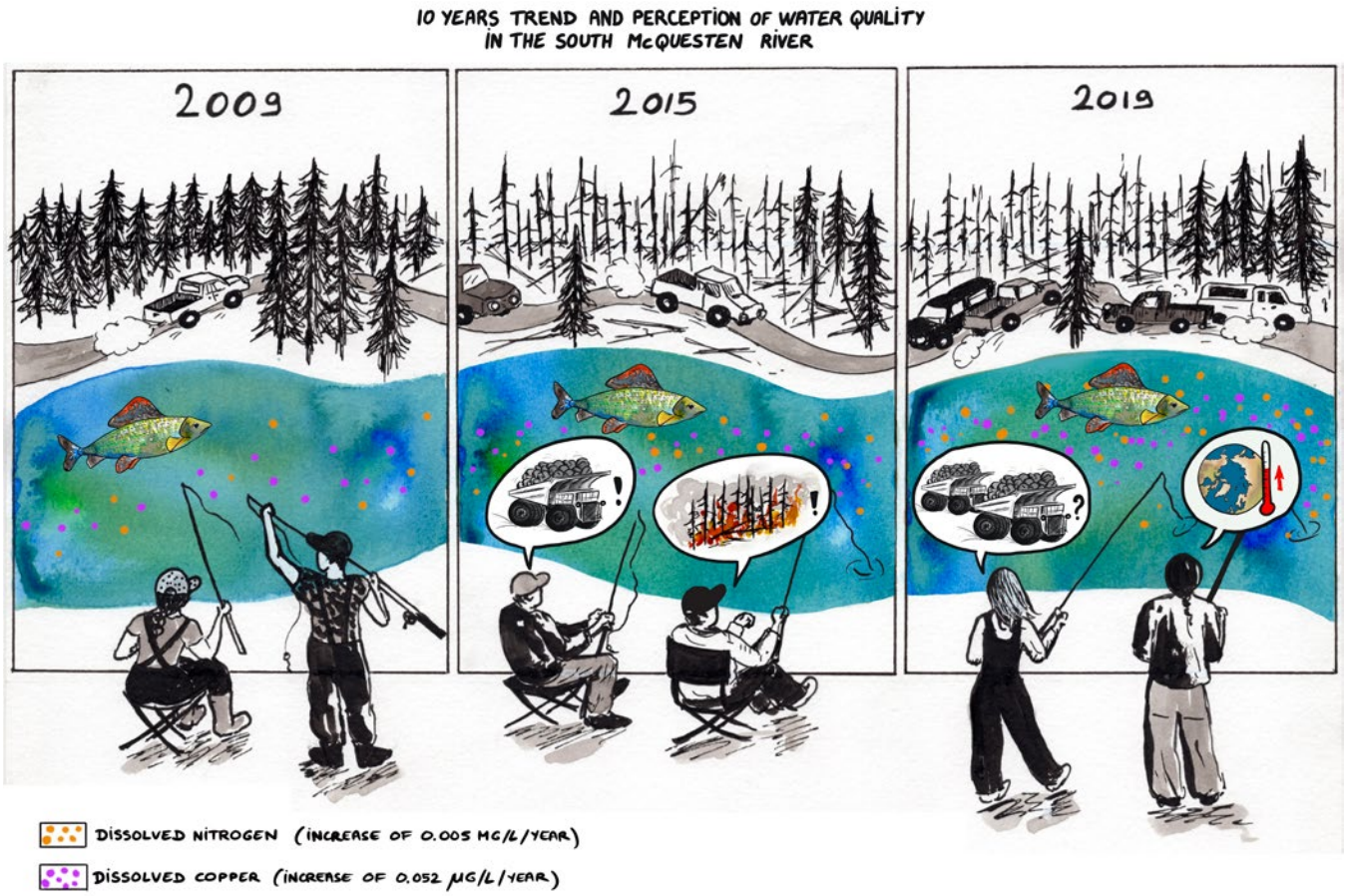



**Illustration 3:** 10 years trend and perception of water quality in the South McQuesten River.


South McQuesten River in the fall at the long-term monitoring location.

## Developing and using water quality objectives to protect the river's future


The Government of Yukon contracted Slater Environmental Consulting and Minnow Environmental to develop water quality objectives for the South McQuesten River. The Government of Yukon engaged with users and caretakers of the river, and found the most appropriate approach to develop these objectives is the "non-degradation" approach. This means we intend to maintain the baseline water quality. Thirteen parameters were selected as contaminants of potential concern (aluminum, arsenic, cadmium, cobalt, copper, iron, lead, fluoride, silver, tin, thallium, vanadium and zinc) and numerical water quality objectives have been developed for each of these parameters. We also developed a method to validate and assess if the objectives are met or not.

## Protecting the South McQuesten River moving forward

The Government of Yukon's Water Resources Branch made 15 recommendations to support adequate and sustainable management of the South McQuesten River. The recommendations include:

- improving monitoring of water quality in the river;
- controlling the anthropogenic release of specific nutrients and metals in the watershed;
- monitoring attainment of the water quality objectives; and
- expanding the trends analysis to other areas and hydrometric parameters.

## For more information

The full, detailed report can be found at: open.yukon.ca/information/publications/plans-and-reports-water

For questions or comments, please contact the Government of Yukon's Water Resources Branch at water.resources@yukon.ca or by phone at 867-667-3171.

## Acknowledgements

A number of partners and collaborators have made this project possible. This includes:

- the Government of Yukon's Department of Environment and Department of Energy Mines and Resources
- Environment and Climate Change Canada
- First Nation of Na-Cho Nyäk Dun
- Slater Environmental Consulting
- Minnow Environmental Inc.