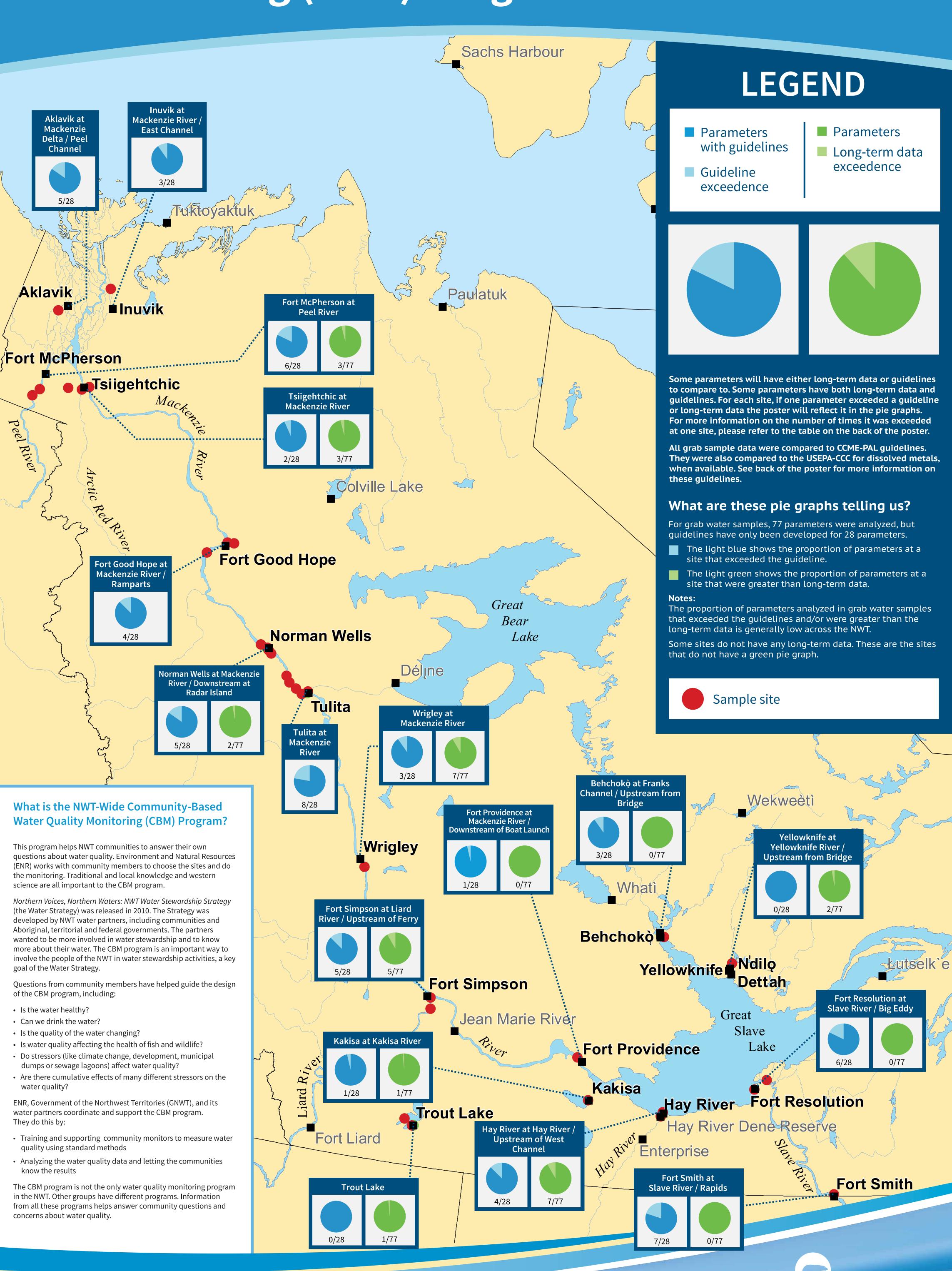
NWT-Wide Community-Based Water Quality Monitoring (CBM) Program – 2013 Results



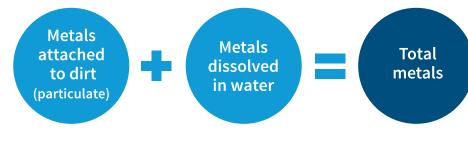
Territories Environment and Natural Resources

How is the data analyzed?

Comparing data to guidelines:

Once water quality data is collected, it is analyzed to see what it means. One way to analyze the data is to compare it to guidelines that have been developed for specific parameters.

Guidelines tell us how much of a chemical or substance can be in the water before it might cause harm to fish and other living things. The Canadian Council Of Ministers of the Environment (CCME) made the Canadian Water Quality Guidelines for the Protection of Aquatic Life (PAL). These guidelines cover all of Canada but are not specific for northern waters. The guidelines don't always account for the natural condition of northern rivers. Northern rivers can have higher levels of dirt, mud and silt in the water. Since metals attach to dirt, northern rivers can have naturally high concentrations of some metals. This is why we want to create new guidelines for specific sites across the NWT.



Metals dissolved in water are more of a concern than metals attached to dirt (particulate). This is because dissolved metals are more easily absorbed by fish and other animals. There are no Canadian guidelines for dissolved metals concentrations in water. There are only Canadian guidelines for the total amount of metals in water.

Dissolved metal data for 2013 were compared to dissolved metal guidelines developed by the United States Environmental Protection Agency (USEPA). These guidelines are called Criterion Continuous Concentration (CCC). They tell us the amount of dissolved metal that fish and other animals can be exposed to during long periods of time without

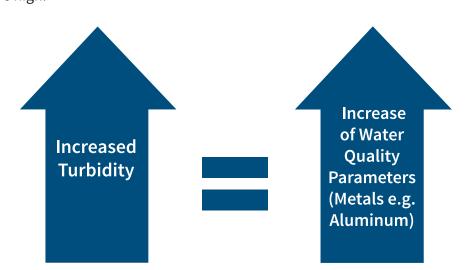
No guidelines are available for dissolved oil and gas related chemicals (hydrocarbons) in water. Scientists have found that dissolved hydrocarbons above 400 ng/L can affect fish health. Dissolved hydrocarbons have been measured in northern rivers at around 15 ng/L.

Comparing current data to long-term data:

Another way to figure out what the results mean is to compare current data to long-term water quality data for the same lake or river. CBM results are compared to results from similar rivers or lakes where metals in the water have been measured for a long time. This shows whether the metal concentrations have been changing over time, or if they are naturally high. A river or lake is likely naturally high in metals if long-term monitoring shows metal concentrations are often or always above the guidelines. In this situation, it is more important to look at whether metal concentrations have been increasing over time as this could be a cause for concern. If the levels have stayed the same, it would mean things haven't changed and this is less of a concern.

Accounting for natural variation:

Turbidity tells us how cloudy the water is. Turbidity values can change quite a bit from season to season and across different locations. Turbidity can have a large degree of natural variation. Heavy rains and runoff events can cause turbidity to increase. Turbidity can often be related to other water quality parameters. For example, metals like aluminum, copper and zinc can attach to dirt and can increase in concentration when turbidity levels are high.



Equipment we use and what we test for (parameters)

The CBM program uses several pieces of equipment to measure water quality during the ice-free season:



YSI Sondes: measure temperature, pH, turbidity, dissolved oxygen, conductivity and chlorophyll-a every two hours for as long as the sondes are in the water.



PMDs (Polyethylene Membrane Devices): pick up dissolved oil and gas related chemicals (hydrocarbons). They are passive samplers that stay in the water for one month. They are changed up to four times per field season. The University of Alberta does the analysis.

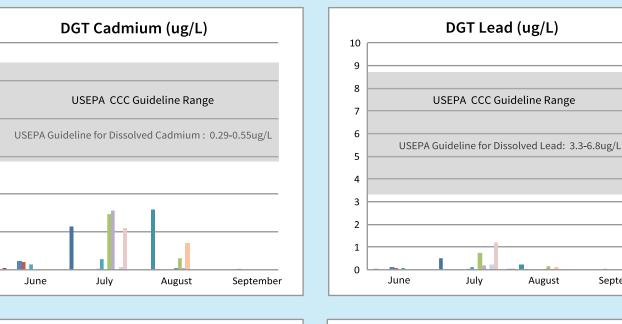


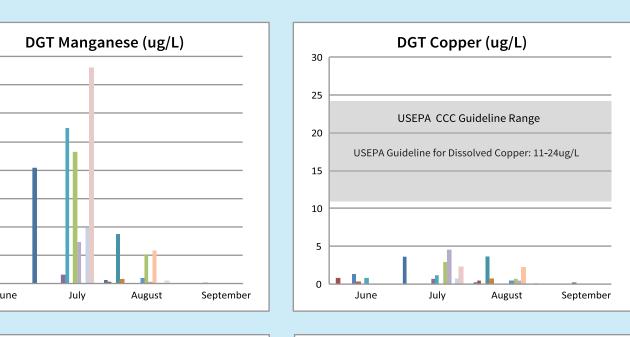
Diffusion Gradients in Thin-Films passive samplers (DGTs): act like sponges to pick up the toxic part of dissolved metals in the water. DGTs stay in the water for 3 to 4 days. DGTs measure the concentrations of dissolved metals in the water over longer periods of time than a grab sample. Trent University does the analysis.

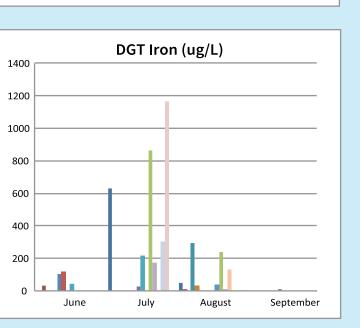
These different methods complement one another. They provide useful information about water quality conditions at different places in the NWT.

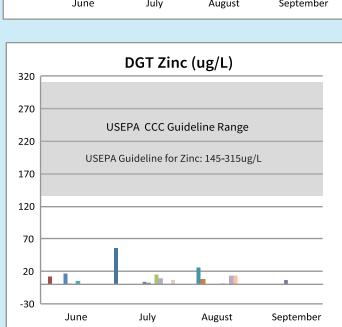
DGT results summary

CCME guidelines are for total metals, so they cannot be compared to the dissolved metal results from DGTs. But the United States has guidelines for certain dissolved metals (cadmium, copper, lead, nickel, and zinc). This is called the USEPA-CCC. In 2013, DGTs were deployed at 26 sites. The toxic part of dissolved metals was below the USEPA-CCC guidelines for dissolved metals at most sites. In 2013, only one sample for cadmium in the Mackenzie River at Norman Wells was slightly higher than the USEPA-CCC guideline. In 2012, dissolved copper, zinc and cadmium were sometimes measured at levels higher than the USEPA-CCC at a few locations. This is likely because of more rain in 2012 than 2013, and lower flows in 2013. There are no long-term data sets for these parameters. So, it is important to continue monitoring to build a long-term data set to account for natural variation.









Legend (DGT graphs)

Fort Good Hope at Mackenzie River / Ramparts

Fort Simpson at Liard River / Upstream of Ferry

Aklavik at Mackenzie River / Peel Channel

Behchoko at Franks Channel / Upstream

from Bridge

Great Slave Lake

West Channel

Fort McPherson at Peel River

Fort Providence at Mackenzie River /

Downstream of Boat Launch

Fort Resolution at Resolution Bay /

Fort Smith at Slave River / Rapids

Hay River at Hay River / Upstream of

Norman Wells at Mackenzie River /

Downstream at Radar Island

Tsiigehtchic at Mackenzie River

Yellowknife at Yellowknife River /

DGT Nickel (ug/L)

USEPA CCC Guideline Range

USEPA Guideline for Dissolved Nickel: 64-139ug/L

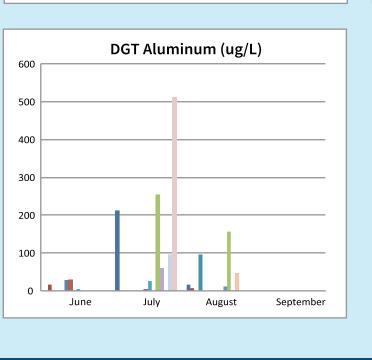
Trout Lake at Trout Lake

Tulita at Great Bear River

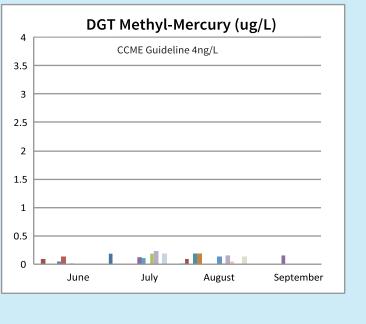
Wrigley at Mackenzie River

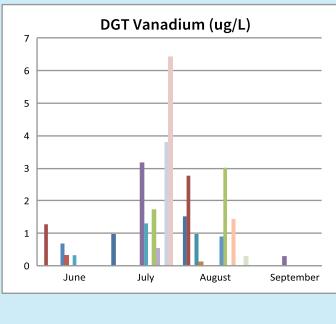
Upstream from Bridge

Inuvik at Mackenzie River / East Channel

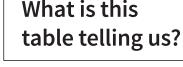


DGT Cobalt (ug/L)





Grab sample table

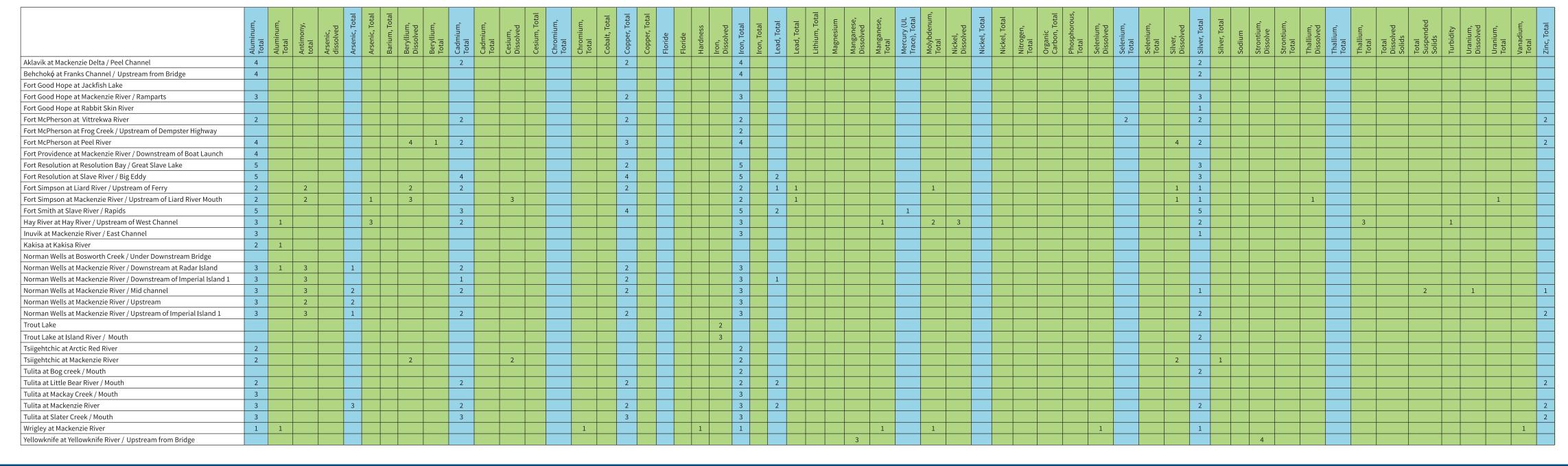


The blue columns show the number of times a certain parameter exceeded the guideline.

The green columns show the number of times a certain parameter exceeded any existing long-term data.

in the box, then there was no exceedence.

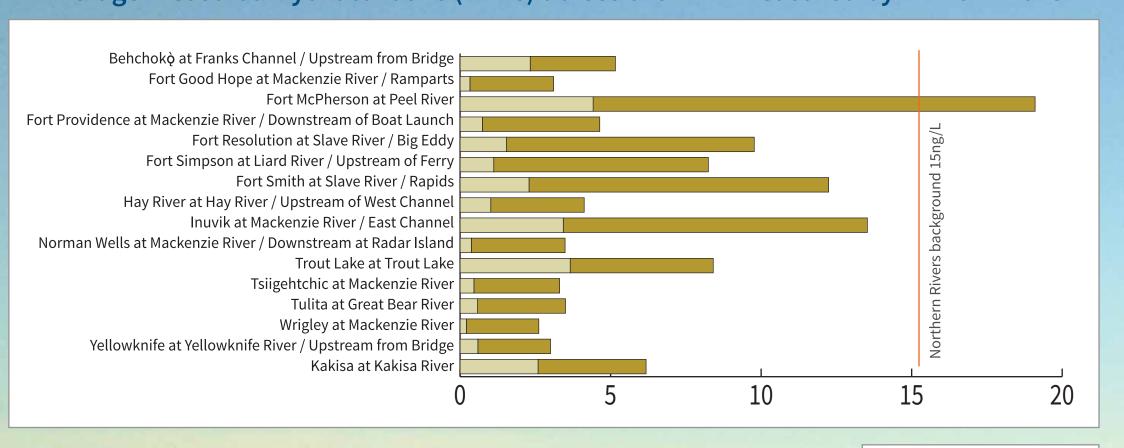
Example: Total aluminum exceeded the guideline four times at Behchokó at Franks Channel/ Upstream from bridge site.



PMD results summary

No guidelines are available for dissolved oil and gas related chemicals (hydrocarbons) in water. Dissolved hydrocarbons have been measured in northern rivers at around 15 ng/L. Scientists have found that dissolved hydrocarbons above 400 ng/L can affect fish health. In 2013, 30 sites were sampled for dissolved hydrocarbons. Just as in 2012, the results were well below the levels that would affect fish health. Some samples from along the Mackenzie River, Peel River and Slater Creek were slightly higher than the background concentration for northern rivers of 15 ng/L. Total dissolved hydrocarbon concentrations from Bosworth Creek (near Norman Wells) were higher than the background level as well, but still below concentrations that would affect fish health.

Average Dissolved Hydrocarbons (PAHs) across the NWT Measured by PMDs in 2013



Sonde data summary

Norman Wells) were higher than the background level as well, but still belo Average Dissolved Hydrocarbons (PAHs				2013	Turbidity (overall NWT range: 0.25-968 NTU; average: 87.3 NTU)	Great Bear River at Tulita July 6 – Aug 18	Average range 1 to 2 NTU	Slave River at Fort Smith July 12	968 N
Behchokò at Franks Channel / Upstream from Bridge Fort Good Hope at Mackenzie River / Ramparts Fort McPherson at Peel River rt Providence at Mackenzie River / Downstream of Boat Launch Fort Resolution at Slave River / Big Eddy			.5ng/L		Dissolved Oxygen (overall NWT range: 7.9-13.6 mg/L; average: 9.77 mg/L)	Trout Lake Aug 19	7.9 mg/L	Tulita at Great Bear River July 6- Aug 18	12 m
Fort Simpson at Liard River / Upstream of Ferry Fort Smith at Slave River / Rapids Hay River at Hay River / Upstream of West Channel Inuvik at Mackenzie River / East Channel Vorman Wells at Mackenzie River / Downstream at Radar Island Trout Lake at Trout Lake Tsiigehtchic at Mackenzie River Tulita at Great Bear River Wrigley at Mackenzie River			ern Rivers background 1		Max Temperature (July/August) (overall NWT range: 0.97-24.76 °C; average: 16.53 °C)	Great Bear River at Tulita Aug 12	16°C	Hay River at Mouth and at Town July 1	24.7
Yellowknife at Yellowknife River / Upstream from Bridge Kakisa at Kakisa River	5	10	North	20	pH (overall NWT range: 6.59-8.88; average: 8.19)	Slave River at Fort Resolution July 19	7.60	Kakisa River Aug 30	8.79
	Manda		Total Parent F Total Alkylate	PAHs (ng/L) ed PAHs (ng/L)	material will entreach at a			ik san sahid kha	

Involved communities

Organizations involved in the CBM program use monitoring results for different levels of decision making. Communities can access data to use it for local decision making and other monitoring and research activities.

Many communities and organizations take part in the CBM program. One example is the Dehcho First Nations / Aboriginal Aquatics Resource Ocean Management (AAROM). We recognize the time and effort the following organizations have contributed:

Aklavik – Renewable Resource Council and Hunters & Trappers Committee

Behchokó – Tłjcho Government Dettah and N'dilo – Yellowknives Dene First Nation

Fort Fitzgerald – Smith's Landing First Nation

Fort Good Hope – Yamoga Land Corporation, Community Council, Métis Land Corporation and Renewable Resource Council

Fort Smith - Northwest Territory Métis Nation, Salt River First Nation,

and the Town of Fort Smith

Fort McPherson – Renewable Resource Council

Fort Providence – Dehcho First Nations/AAROM and ENR local office Fort Resolution – Deninu Kue First Nation, Fort Resolution Métis Council and the Hamlet of Fort Resolution

Fort Simpson – Dehcho First Nations/AAROM and Liidlii Kue First Nation

Hay River – Dehcho First Nations/AAROM

Inuvik – Hunters & Trappers Committee Kakisa – Ka'a'gee Tu First Nation

Norman Wells - Renewable Resource Council, Town of Norman Wells and ENR

regional office Trout Lake – Dehcho First Nations/AAROM and Sambaa K'e First Nation Tsiigehtchic – Gwichya Gwich'in Council and Renewable Resource Council

Tulita – Fort Norman Métis Lands and Financial Corporation and ENR regional office Wrigley – Dehcho First Nations/AAROM and Pehdzeh Ki First Nation

Where to find more information For more information on the CBM program and other NWT Water Stewardship Strategy initiatives, visit: www.nwtwaterstewardship.ca

ENR values good communication and engagement. We welcome your feedback! Email: nwtwaterstrategy@gov.nt.ca