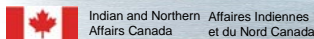


Peel River Watershed Sampling Program: Water and Suspended Sediment (1999-2007) Northwest Territories & Yukon



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In Cooperation With: Government of Yukon and Gwich'in Tribal Council

Transboundary Water Management

The Water Resources Division monitors transboundary rivers entering the Northwest Territories from other jurisdictions.

Water management decisions made in upstream jurisdictions can affect water quality and water quantity in the Northwest Territories. It is important that the waters of the Mackenzie River Basin are managed and protected to preserve the ecological integrity of the Aquatic Ecosystem, and to facilitate reasonable, equitable and sustainable use of this resource for present and future generations.

Transboundary rivers monitored by Water Resources include the Coppermine, Liard, Hay, Slave and Peel rivers.



Transboundary Water Quality Monitoring Sites: Hay, Slave Coppermine, Liard and Peel rivers.

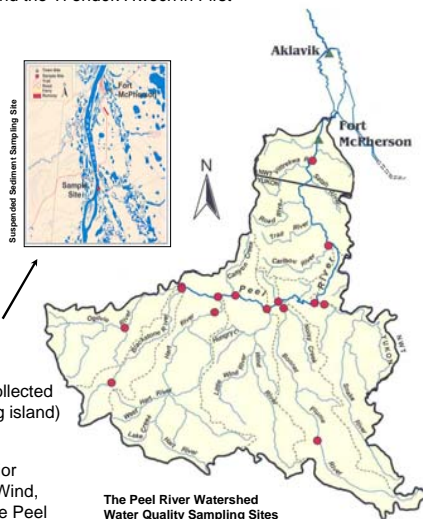
Introduction

The Peel River is a major transboundary river of the Mackenzie River and originates in the Ogilvie Mountains, Yukon. The Peel River flows 430 km to join the Mackenzie River, approximately 65 km south of Aklavik in the NWT. The river supports the subsistence lifestyle of residents within and around the area, including the Tetlit Gwich'in, the Na-cho Nyak Dun and the T'ondëk Hwëch'in First Nations.

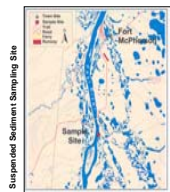
Objectives

This monitoring program was conducted:

- To establish a baseline prior to potential developments,
- To understand water and suspended sediment quality conditions in the Peel River basin,
- To meet the requirements of the Transboundary Water Management Bilateral Agreement between the Yukon and the Northwest Territories, and
- To address community concerns about possible contaminants in water and suspended sediment.



The Peel River Watershed Water Quality Sampling Sites



Suspended Sediment Sampling Site

Where & when were the samples collected?

- Beginning in 2002, water and suspended sediment samples were collected at the *Peel River above Fort McPherson* (between 8 mile and the big island) sampling site during winter, spring, summer and fall.
- Beginning in 1999, seasonal water samples were collected from major tributaries of the Peel River including the Ogilvie, Blackstone, Hart, Wind, Bonnet Plume, Snake, Caribou rivers and several locations along the Peel mainstem.

What was collected?

WATER

(surface & soil-free samples)



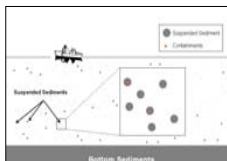
Steven Tetlich of Fort McPherson Logistical Support



Large Volume Extraction – river water passes through centrifuge at a rate of 6.0L/min.

SUSPENDED SEDIMENT

(soil floating in water)



Metals & contaminants can attach to suspended sediment in rivers and be carried long distances from their source.



The suspended sediment is collected in the centrifuge bowl and transferred into sampling jars.

What were we looking for?

Basic Parameters: temperature, pH, nutrients (phosphorous), major ions (calcium, magnesium, sodium).

Metals: arsenic, copper, zinc, lead, mercury, etc.

Hydrocarbons (PAHs): Compounds produced naturally (forest fires, oil/gas resources, coal seeps) and/or by people and industry (automobile exhaust, incomplete burning of coal, oil/gas and wood, fuel/gas spills and charbroiled meat).

Organochlorines: Compounds that contain chlorine and carbon. These include pesticides such as DDT and lindane as well as PCBs. Organochlorine compounds are NOT natural.



- small quantities of metals are important for all living things; when present, it does not necessarily mean that the water quality is bad
- source of metals can be natural (bedrock erosion) or human-made (mining, and other activities)



How do pesticides (DDT) and contaminants such as PCBs get into our northern environment?



DDT & PCBs last a long time in the environment and can travel long distances from around the world.

LRTP = Long Range Transport of Atmospheric Pollutants

What did we find?

Water Quality	
pH, levels of suspended solids, turbidity, levels of calcium, magnesium & nutrients	All within historical range of data collected at Peel River above Fort McPherson (1980-2000).
Metals: aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, zinc	All metals in surface water (except aluminum (routinely) and lead (on one occasion)) met Health Canada's drinking water quality guidelines. Some metals were found at levels that did not meet the National freshwater aquatic life guidelines – not likely to cause adverse effects. All metals within historical range of water quality at Peel River above Fort McPherson (1980-2000).
Organochlorines (DDT, etc)	None found.
PCBs	None found.
PAHs (hydrocarbons)	Small amounts found in 2004, 2005, 2006 and 2007.

Suspended Sediment Quality	
Metals	Some metals (arsenic, zinc and on occasion, cadmium) were found at levels that did not meet the National Sediment Quality Guidelines for the protection of aquatic life.
Organochlorines (DDT, etc)	2,4-D (dichlorophenoxy) acetic acid was the only organochlorine found and only one occasion in 2004. 2,4-D is a herbicide commonly used to control weeds on lawn and turf (third-most widely used herbicide in NA). Source: most probable source is long-range atmospheric transport and deposition.
PCBs	Extremely low concentrations found on most occasions. Source: long-range transport and deposition.
PAHs (hydrocarbons)	Small amounts found on all sampling occasions. Source: likely natural from upstream petroleum and/or coal formations and/or forest fire inputs.

What do these results mean?

- All metals* in surface water met Health Canada's treated drinking water quality guidelines. * Except (aluminum – routinely and lead – on one occasion). Drinking water quality guidelines are intended to be applied to treated tap water anywhere in Canada. They are not meant to be applied directly to source or surface waters such as the Peel River. The guidelines are meant to protect human health and to provide water that tastes good, smells good and looks good.
- Some levels of metals did not meet the National freshwater aquatic life guidelines. Based on the relationship between total and dissolved metal concentrations at these sites, most metals are attached to suspended solids, making the metals less bio-available to aquatic life. Therefore the metals are unlikely to represent a hazard to the aquatic organisms in the Peel River. Further, it is important to note that the levels of metals generated during this study fall within the historical range of data collected from the Peel River (1980-2000) and therefore are considered normal for this region of the Northwest Territories.
- On occasion, arsenic, cadmium and zinc in the suspended sediment were found at levels that did not meet the National interim freshwater sediment quality guidelines. All other metals met guidelines. As there are no known local (human-made) sources for these metals in the Peel watershed, the sources of the metals are likely due to underlying geology and therefore natural.
- Hydrocarbons found in the water did meet the National freshwater aquatic life guidelines.
- Most PAHs in suspended sediment met the National interim freshwater sediment quality guidelines. Those that did not meet the guidelines (naphthalene, phenanthrene and acenaphthene) are likely associated with natural sources such as upstream petroleum and/or coal formations and/or forest fires.
- The levels of PCBs found in the suspended sediment samples were extremely low. Based on the lab report & the kinds of PCBs found, atmospheric transport is the most likely source of PCBs. According to the World Health Organization & Environment Canada, the levels of PCBs found in the suspended sediment of the Peel River are safe for humans and animals.
- The results from this sampling program indicate that the water quality in the Peel River and its tributaries is very good.

The data collected from this study will be used to develop site-specific transboundary water quality objectives for the bilateral agreement between the Yukon and Northwest Territories. The information can be used to help detect changes in water quality due to future human disturbances or natural phenomena. The data also contributes to the understanding of water and suspended sediment quality in this important northern watershed.