

## Northwest Territories Water Monitoring Inventory – Introduction

The NWT Water Monitoring Inventory includes information on current water monitoring programs led by Aboriginal, federal and territorial governments, communities, industry, and others.

### What is the NWT Water Stewardship Strategy?

*Northern Voices, Northern Waters: NWT Water Stewardship Strategy* (the Water Strategy) was released in 2010 by the Government of the Northwest Territories (GNWT) and Aboriginal Affairs and Northern Development Canada (AANDC). In 2011, the *NWT Water Stewardship: A Plan for Action 2011-2015* (the Action Plan) was developed to outline the steps needed to implement the Water Strategy and achieve its vision and goals.

### What is the Action Plan?

The Action Plan outlines keys to success and associated action items, divided into four components as represented in the drum diagram below.



### Where does the NWT Water Monitoring Inventory fit in?

Under the Know and Plan and Work Together components, three keys to success suggested the need for the development of a Water Monitoring Inventory that would gather information on NWT monitoring and research programs related to water and sediment quality and water quantity. The focus of this inventory is on monitoring programs.

The keys to success from which the Water Monitoring Inventory stems from are outlined below:

- **Key to Success 1.2D** – Share monitoring and research program findings with water partners and the public.  
*Action Item 1* – Identify existing monitoring and research reporting mechanisms of all water partners.
- **Key to Success 2.1A** – Undertake a review of existing aquatic monitoring programs, practices and research activities in the NWT, and identify and prioritize gaps  
*Action Item 1* – Identify existing monitoring programs and research activities in the NWT and compile into a report.
- **Key to Success 2.1F** – Review existing water quality and quantity monitoring information (surface and groundwater), and identify capacity requirements to fill the gaps.  
*Action Item 1* – Complete literature review of existing monitoring programs and activities.

### How can NWT Water Monitoring Inventory information be used?

Water quality and quantity monitoring are an essential part of determining if aquatic ecosystems are healthy. Through monitoring, information is collected to learn more about the current condition of specific waterbodies, to determine if changes have occurred in these waterbodies, and to help understand any causes for the changes.

Providing greater access to water monitoring program information is an important step towards informing residents and increasing their knowledge about water stewardship, one of the goals of the NWT Water Stewardship Strategy. This will also lead to better informed decision-making abilities at all levels.

The Water Monitoring Inventory lists all existing NWT monitoring program information in one location, to help water partners and residents find information about the state of the water resources in their region in addition to increasing their understanding of water monitoring programs being undertaken throughout the NWT.

### What information is in the NWT Water Monitoring Inventory?

Each monitoring program entry includes information on:

- **Organization** – lead organization is listed first, followed by partner organizations
- **Monitoring Program** – name of the monitoring program
- **Description** – brief description of the monitoring program
- **Parameters Monitored (by Valued Components)** – the focus is on water and sediment quality and water quantity however other parameters such as fish or invertebrates are listed if applicable (note: specific water and sediment quality parameters are listed in detail at the end of the water and sediment quality section)
- **Location of Monitoring** – geographic location including name or waterbody or nearest community and geographic coordinates
- **Region** – NWT-wide, Inuvialuit, Gwich'in, Sahtu, Dehcho, Tłı̄chô, North Slave, South Slave, or Alberta (northern Alberta only if close to the territorial boundary)
- **Date Program Began** – year the monitoring program began
- **Reporting Mechanism** – how reporting of results is undertaken
- **Reports and Articles** – relevant publications (limited amount listed)
- **Website and Contact** – a website and/or email address is provided to more readily access monitoring information and reports
- **Traditional/Local Knowledge** – a check mark means the monitoring programs are based on or include traditional and/or local knowledge
- **Posted on Discovery Portal** – a check mark means reports or relevant documents on the monitoring programs are posted on the NWT Discovery Portal

Monitoring programs are grouped under the following broad organizational headings:

- Federal Government
- Government of the Northwest Territories
- Aboriginal Governments
- Resource Management Boards
- Communities
- Industry
- Academia (highlights other resources/programs/websites where academic research projects can be found but does not detail specific academic research)

### Where can I find information about water-related research in the NWT?

As water-related research is ever evolving and often of short duration, individual research is not captured in the inventory; however, some historic government monitoring and research is included in the inventory. To find more information about water-related research contact:

Aurora Research Institute – <http://data.nwtresearch.com>

NWT Cumulative Impact Monitoring Program – [www.aandc.gc.ca/eng/1100100027498](http://www.aandc.gc.ca/eng/1100100027498)

NWT Discovery Portal – [www.nwtDiscoveryportal.enr.gov.nt.ca](http://www.nwtDiscoveryportal.enr.gov.nt.ca)

NWT Water Stewardship website – [www.nwtwaterstewardship.ca](http://www.nwtwaterstewardship.ca)

### How can I provide comments and updates?

AANDC and the GNWT encourage any water partners or interested individuals to provide comments or updates on the water inventory by emailing [nwtwaterstrategy@gov.nt.ca](mailto:nwtwaterstrategy@gov.nt.ca) or calling (867) 920-6339 or (867) 669-2845.

# Northwest Territories Water Monitoring Inventory

Version 1 (November 2013)

ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?	
<b>Water and Sediment Quality</b>												
<b>Ongoing Monitoring</b>												
<b>Federal Government</b>												
Environment Canada	Northern Water Quality Monitoring Network	<p>*The Water Quality Monitoring and Surveillance Division of Environment Canada conducts water quality sampling at 8 locations in the NWT. Water samples are collected 3 to 6 times per year depending on the location, as part of the Northern Water Quality Monitoring Network.</p> <p>*This monitoring program contributes to the collection of baseline data and reference conditions for northern rivers to help determine spatial and temporal trends, determine compliance with established guidelines, detect emerging issues, and measure response to remedial measures and regulatory decisions.</p>	<p><b>Water quality</b>  <b>Lockhart River at Artillery Lake (3 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients  <b>Liard River at Fort Liard (6 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics  <b>Liard River near the mouth (6 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics  <b>Great Bear River at Great Bear Lake (3 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics  <b>Peel River at Fort McPherson (4 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics  <b>Mackenzie River at Strong Point (6 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics  <b>Mackenzie River at Norman Wells (6 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics  <b>Mackenzie River at Arctic Red River (6 times/yr)</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics</p>	<p><b>Lockhart River at Artillery Lake</b> (62.8889, -108.4658)  <b>Liard River at Fort Liard</b> (60.2414, -123.4753)  <b>Liard River near the mouth</b> (61.7425, -121.2278)  <b>Great Bear River at Great Bear Lake</b> (65.1283, -123.5508)  <b>Peel River at Fort McPherson</b> (67.2589, -134.8886)  <b>Mackenzie River at Strong Point</b> (61.8164, -120.7917)  <b>Mackenzie River at Norman Wells</b> (65.2739, -126.8442)  <b>Mackenzie River at Arctic Red River</b> (67.4558, -133.7531)</p> <p>All sites are co-located with Water Survey of Canada sites.</p>	NWT-wide		<p>Lockhart River at Artillery Lake (1969)                  Liard River at Fort Liard (1960)                  Liard River near the mouth (1960)                  Great Bear River at Great Bear Lake (1969)                  Peel River at Fort McPherson (1960)                  Mackenzie River at Strong Point (1992)                  Mackenzie River at Norman Wells (1960)                  Mackenzie River at Arctic Red River (1960)</p>	<p>*Data is stored in a national database (ACBIS) and is available upon request.</p> <p>*Reports have been published.</p>	<p>*Pippy, K.A. et al. (2010). <i>Water Quality Monitoring and Surveillance Activities Associated with the Mackenzie Gas Project in the Mackenzie Valley</i>. Environment Canada. Water Quality Monitoring and Surveillance Division.</p>	Email: enviroinfo@ec.gc.ca <a href="http://www.ec.gc.ca/eaudouce-freshwater/">http://www.ec.gc.ca/eaudouce-freshwater/</a>		
Environment Canada Alberta Environment	NWT-Alberta Inter-Jurisdictional Rivers Program	<p>*Environment Canada has partnered with Alberta Environment to monitor the water quality of rivers flowing from Alberta to the NWT in the Mackenzie River Basin. The Hay River is sampled 6 times per year at the NWT/Alberta boundary and the Slave River is sampled 8 times per year near Fort Fitzgerald, just south of Alberta boundary.</p>	<p><b>Water quality</b>  <b>Slave River at Fort Fitzgerald, Alberta</b> - physical parameters, major ions, total and dissolved metals, bacteriological, nutrients, PAHs, ammonia (since summer 2011), organochlorines (1 time/yr)  <b>Hay River near the NWT/Alberta border</b> - physical parameters, major ions, total and dissolved metals, bacteriological, nutrients, ammonia (since summer 2011), PAHs (1 time/yr), organochlorines (1 time/yr)</p>	<p><b>Slave River at Fort Fitzgerald, Alberta</b> (59.8575, -111.5987)  <b>Hay River near the NWT/Alberta Border</b> (60.0036, -116.9719)</p>	South Slave, Dehcho, Alberta		<p>*Data is stored in a national database (ACBIS) and is available upon request.</p> <p>*Reports have been published.</p>	<p>*Government of the Northwest Territories (1984). <i>Hay River Basin Overview</i>. Department of Renewable Resources and Environment Canada Inland Waters Directorate.</p>	Email: enviroinfo@ec.gc.ca <a href="http://www.ec.gc.ca/eaudouce-freshwater/">http://www.ec.gc.ca/eaudouce-freshwater/</a>			
Environment Canada Alberta Environment	Oil Sands Water Quality Monitoring	<p>*A component of the joint Oil Sands Monitoring program takes place in the Slave, Athabasca and Peace River watersheds at 12 locations in the NWT and Northern Alberta, as a partnership between Environment Canada and Alberta Environment. The overall program is much broader in scope, with extensive sampling around the oil sands development. The NWT and northern Alberta component began in 2010 with 4 locations, expanded to 9 locations in 2012 and then again to 12 locations in 2013. Water quality is sampled 2 to 10 times per year depending on the location and conditions.</p> <p>*The monitoring program also uses passive sampling technologies such as semi permeable membrane devices and polar organic chemical integrative samplers to monitor hydrophilic contaminants.</p> <p>*Automated real-time monitoring platforms were installed in 2012 at two locations at the Slave at Fitzgerald and Athabasca at 27th baseline sites.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, bacteriological, organics, total and dissolved metals (mercury since 2011), phenol (since 2011), petroleum hydrocarbons (since 2011), BTEX (since 2011), ammonia (since 2011)  <b>Passive water quality sampling at the Slave at Fitzgerald, Athabasca at 27th baseline, and Peace and Peace Point sites for</b> - PAHs (polycyclic aromatic hydrocarbons), dioxins, furans, pesticides  <b>Automated sampling at the Slave at Fitzgerald and Athabasca at 27th baseline sites</b></p>	<p><b>Slave River at Fort Fitzgerald, Alberta</b> (59.8575, -111.5987) (just south of the NWT/Alberta border)  <b>Athabasca at 27th baseline, Alberta</b> (58.1743, -111.3664)  <b>Peace River at Peace Point, Alberta</b> (59.1219, -112.4522)  <b>Birch River below Alice Creek, Alberta</b> (58.3154, -113.0685)  <b>Slave River above the Mouth, NWT</b> (61.3213, -113.6106)  <b>Slave River at the Mouth, NWT</b> (61.2604, -113.4586)  <b>Riviere des Rochers below Little Rapids, Alberta</b> (58.9219, -111.1852)  <b>Richardson River at the Mouth, Alberta</b> (58.3604, -111.2407)  <b>Quatre Fourches on Southern Lake Mamawi Channel, Alberta</b> (58.6316, -111.3343)</p>	South Slave, Alberta		<p>*Data from water samples is stored in a national database (ACBIS) and is available upon request.</p>	N/A	Email: enviroinfo@ec.gc.ca <a href="http://www.ec.gc.ca/eaudouce-freshwater/">http://www.ec.gc.ca/eaudouce-freshwater/</a> <a href="http://www.ec.gc.ca/default.asp?lang=En&amp;nav=D87FA775-1&amp;news=DC1E489F-7A47-4241-96D3-2E37344833B6">http://www.ec.gc.ca/default.asp?lang=En&amp;nav=D87FA775-1&amp;news=DC1E489F-7A47-4241-96D3-2E37344833B6</a>			
Environment Canada Aboriginal Affairs and Northern Development Canada (AANDC) - Water Resources Natural Resources Canada Wilfrid Laurier University AANDC - Cumulative Impact Monitoring Program	Changing Hydrology in the Taiga Shield: Geochemical and Resource Management Implications	<p>*The objectives of the program are to describe and understand the consequences of recent changes in winter streamflow and geochemical regimes in the North Slave Taiga Shield, and implications to water quality and resulting impacts on the environment. In the Baker Creek watershed, an analysis of lake-bottom sediment cores, a model framework for predicting streamflow, a report on icing locations due to increased winter streamflow, year round water quality sampling, stream flow measurements at gauge sites along Baker Creek and its tributaries, and soil water storage measurements, are undertaken. Sampling should demonstrate how different landscapes respond to either snowmelt or rainfall runoff events. Baker Creek flows through the Giant mine site.</p> <p>*This monitoring will provide outreach opportunities by hosting local elementary and high school students at one or more of the sentinel monitoring sites to participate and observe in the field monitoring and research occurring at the sites.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, stable isotopes, total metals, groundwater chemistry  <b>Water quantity</b> - stream flow  <b>Permafrost</b> - soil moisture storage, frost table measurements                  Other parameters include those related to hydrology, vegetation, permafrost conditions (ground temperature, ice content and soil properties), snow conditions, surficial geology and location and spatial extent of icings</p>	<p><b>Baker Creek watershed</b> (62.5120, -114.3672) - detailed studies on hydrology, surface and groundwater quality, ground temperatures, and extent of icings  <b>Yellowknife River</b> (62.5200, -114.3120) - vegetation monitoring, air and ground temperatures, surface water quality (see AANDC water quality network program Yellowknife region)  <b>Ingraham trail and Highway 3</b> - ground temperatures, ground ice, soil properties, surficial geology</p>	North Slave	2008	<p>*Reporting is completed through the NWT Cumulative Impact Monitoring Program and Aurora Research Institute.</p> <p>*Geological Survey of Canada open files/ scientific journal articles are published.</p> <p>*The principal investigator intends to report regularly on research progress with the Lands and Environment Coordinator of the Yellowknife's Dene First Nation, the North Slave Métis Alliance and local AANDC water managers to ensure the transfer of knowledge for the benefit of northerners. This can range from annual progress reports to community meetings, as resources permit.</p>	<p>*See NWT Discovery Portal for project reports as per the requirements of the NWT Cumulative Impact Monitoring Program funding.</p> <p>*Spence, C., Kokej, S.V., and S.A. Kokej (2012). <i>Changing streamflow in the North Slave: Results, implications and next steps</i>. Report to the Giant Mine Remediation Team and the Cumulative Impact Monitoring Program. 8 pages.</p> <p>*Spence, C., S.V. Kokej and E. Ehsanzadeh (2011). <i>Precipitation trends contribute to streamflow regime shifts in northern Canada</i>. Cold Region Hydrology in a Changing Climate - Proceedings of a symposium held during IUGG 2011 at Melbourne, Australia, June, 2011, IAHS Publ. No. 346, 3-8.</p>	Email: cimp@aandc-aadnc.gc.ca <a href="http://nwt.discoveryportal.enr.gov.nt.ca">http://nwt.discoveryportal.enr.gov.nt.ca</a>	✓	✓	
Environment Canada Fisheries and Oceans Canada AANDC - Cumulative Impact Monitoring Program	Canadian Aquatic Biomonitoring Network (CABIN)	<p>*Water quality is analyzed at each site and basic hydrometric measurements such as velocity and stream slope are recorded. Standardized benthic invertebrates collection methods are used for assessing aquatic ecosystem health. There are over 100 NWT sites sampled by various organizations. Sites are generally sampled 1 or 2 times per year and not on an ongoing basis. The number of new sites added varies yearly.</p> <p>*CABIN applies the Reference Condition Approach for site assessment which compares benthic communities from test sites (sites that have potentially been impaired) to reference sites (sites with little human disturbances), and an assessment is made based on the similarity or divergence.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (no mercury)  <b>Water quantity</b> - velocity, discharge, slope of the stream  <b>Benthic invertebrates</b></p>	<p>A map with site locations and information is posted on the Canadian Aquatic Biomonitoring Network website (<a href="http://cabin.cciw.ca/cabin/main/cabin_current_activities.asp?lang=en-ca">http://cabin.cciw.ca/cabin/main/cabin_current_activities.asp?lang=en-ca</a>).</p> <p>Numerous sites are located in Nahanni National Park Reserve, the Mackenzie Delta and the proposed Mackenzie Gas Pipeline corridor.</p>	NWT-wide	2005	<p>*Data and information are stored in the Canadian Aquatic Biomonitoring Network database available online (special training is required to gain access to the database).</p>	<p>*Scrimgeour, Garry (2010). <i>Evaluating the impacts of mining on the ecological integrity of streams in the South Nahanni Watershed</i>. Presented at the National CABIN Science Forum, November 17-18, 2010, Vancouver, BC.  <a href="http://www.ec.gc.ca/Publications/4C111093-DCE4-4D87-B7FA-DB3E46435D9E%5CNationalCABINScienceForumProceedings2010.pdf">http://www.ec.gc.ca/Publications/4C111093-DCE4-4D87-B7FA-DB3E46435D9E%5CNationalCABINScienceForumProceedings2010.pdf</a></p>	<a href="http://www.ec.gc.ca/rcba-cabin/">http://www.ec.gc.ca/rcba-cabin/</a> (link to database/login to view a map of current CABIN sites)			
Environment Canada Parks Canada	Wood Buffalo National Park Water Monitoring Program	<p>*Beginning in 1988 Parks Canada entered into an agreement with Environment Canada to collect water quantity and quality data in Wood Buffalo National Park. This joint, ongoing water quality monitoring program is considered central to overall efforts to monitor the park's ecological integrity. Wood Buffalo National Park straddles the NWT and Alberta border.</p> <p>*Water quality samples are taken at 3 river locations on the Alberta side of Wood Buffalo National Park 2 to 9 times per year. Note, these 3 locations also coincide with the new Oil Sands Monitoring Program described above.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, bacteriological, organics, total and dissolved metals (mercury since 2011), phenol (since 2011), petroleum hydrocarbons (since 2011), BTEX (since 2011), ammonia (since 2011)</p>	<p><b>Athabasca at 27th baseline, Alberta</b> (58.1743, -111.3664)  <b>Peace River at Peace Point, Alberta</b> (59.1219, -112.4522)  <b>Birch River below Alice Creek, Alberta</b> (58.3154, -113.0685)</p>	South Slave, Alberta		<p>*Data is stored in a national database (ACBIS) and is available upon request.</p> <p>*Many reports have been published over the years.</p>	<p>*Glozier, N.E., Donald, D.B., Crosley, R.W. and Halliwell, D. (2009). <i>Wood Buffalo National Park Water Quality: Status and Trends from 1989-2006 in Three Major Rivers; Athabasca, Peace and Slave</i>. Prairie and Northern Office, Environment Canada.</p>	Email: enviroinfo@ec.gc.ca <a href="http://www.ec.gc.ca/eaudouce-freshwater/">http://www.ec.gc.ca/eaudouce-freshwater/</a> <a href="http://www.pc.gc.ca/eng/pn-nt/woodbuffalo/index.aspx">http://www.pc.gc.ca/eng/pn-nt/woodbuffalo/index.aspx</a>			

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ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
Environment Canada Parks Canada	Nahanni National Park Reserve Water Monitoring Program	<ul style="list-style-type: none"> <li>Beginning in 1988 Parks Canada entered into an agreement with Environment Canada to collect water quality and quantity data throughout Nahanni National Park Reserve. This joint, on-going water quality monitoring program is considered central to overall efforts to monitor the park's ecological integrity.</li> <li>Water quality samples are taken at 9 rivers and creeks throughout Nahanni National Park Reserve 3 times per year.</li> </ul>	<b>Water quality</b> - total and dissolved metals (no mercury), major ions, physical parameters, nutrients, organics, cyanide	<ul style="list-style-type: none"> <li>Flat River at the mouth (61.5297, -125.4106)</li> <li>Flat River at park boundary (61.4278, -126.6299)</li> <li>South Nahanni River at Virginia Falls (61.6361, -125.7969)</li> <li>South Nahanni River near Nahanni Butte (61.0991, -123.5899)</li> <li>Prairie Creek at the mouth (61.2844, -124.4456)</li> <li>Prairie Creek at old park boundary (61.3485, -124.4153)</li> <li>Prairie Creek at new park boundary (61.5219, -124.7126)</li> <li>Prairie Creek above Cadillac Mine (61.5583, -124.8125)</li> <li>Prairie Creek below Cadillac Mine (61.5561, -124.8108)</li> </ul>	Dehcho	<ul style="list-style-type: none"> <li>Flat River at the mouth (1972)</li> <li>Flat River at park boundary (1988)</li> <li>South Nahanni River at Virginia Falls (1996)</li> <li>South Nahanni River near Nahanni Butte (1988)</li> <li>Prairie Creek at the mouth (1988)</li> <li>Prairie Creek at old park boundary (2001)</li> <li>Prairie Creek at new park boundary (2010)</li> <li>Prairie Creek above Cadillac Mine (2003)</li> <li>Prairie Creek below Cadillac Mine (2003)</li> </ul>	<ul style="list-style-type: none"> <li>Data is stored in a national database (ACBIS) and is available upon request.</li> <li>Many reports have been published over the years.</li> </ul>	<ul style="list-style-type: none"> <li>Spence, C. (1998). <i>An overview of river conditions for South Nahanni River Basin, NWT</i>. Environment Canada. Atmospheric Environment Branch.</li> <li>Parker, B.R. et al. (2009). <i>Water quality analysis for Nahanni National Park Reserve, NWT</i>. Environment Canada. Water Quality Monitoring and Surveillance Division.</li> <li>Parker, B.R., Levesque, L.M., Gue, A., Perry, L., Dessouki, T., Halliwell, D. and Haggarty, D.R. (2010). <i>Nahanni National Park Water Quality Status and Trends</i>. Environment Canada.</li> <li>Nahanni National Park Reserve (2009). <i>State of the Park Report</i>. Parks Canada. <a href="http://publications.gc.ca/collections/collection_2010/pc/R64-368-2009-eng.pdf">http://publications.gc.ca/collections/collection_2010/pc/R64-368-2009-eng.pdf</a></li> </ul>	<ul style="list-style-type: none"> <li>Email: <a href="mailto:enviroinfo@ec.gc.ca">enviroinfo@ec.gc.ca</a></li> <li><a href="http://www.ec.gc.ca/eaoudouce-freshwater/">http://www.ec.gc.ca/eaoudouce-freshwater/</a></li> <li><a href="http://www.pc.gc.ca/eng/pn-nt/nahanni/index.aspx">http://www.pc.gc.ca/eng/pn-nt/nahanni/index.aspx</a></li> </ul>		
Parks Canada	Tuktuk Nogat National Park Water Quality Monitoring Program	<ul style="list-style-type: none"> <li>Tuktuk Nogat National park is one of Canada's high arctic parks located in the Inuvialuit Settlement Region. Water quality monitoring occurs yearly at 2 sites along the Hornaday River. Monitoring was undertaken in partnership with Environment Canada at 4 sites along the Hornaday River until 2010. Parks Canada took over sole monitoring in 2011.</li> </ul>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (no mercury), organics	<ul style="list-style-type: none"> <li>Hornaday River at Little Hornaday River (68.3310, -121.9633)</li> <li>Hornaday River at unnamed tributary (68.7540, -122.4022)</li> </ul>	Inuvialuit	<ul style="list-style-type: none"> <li>1998</li> <li>Monitoring occurred in conjunction with Environment Canada at the Hornaday river near the mouth from 2000 to 2010 and at the west park boundary from 1998 to 2010.</li> </ul>	<ul style="list-style-type: none"> <li>Data are stored in a national database (ACBIS) and are available upon request.</li> <li>Reports have been published over the years.</li> </ul>	<ul style="list-style-type: none"> <li>Halliwell, D. et al. (2002). <i>Protecting the aquatic quality of Tuktuk Nogat National Park and Lower Hornaday River</i>. Environment Canada, Canadian Heritage, Fisheries &amp; Ocean Canada. Meteorological Service of Canada and Parks Canada.</li> <li>Tuktuk Nogat National Park (2011). <i>State of the Park Report</i>. Parks Canada <a href="http://www.pc.gc.ca/eng/pn-nt/tuktuknogait/index.aspx">http://www.pc.gc.ca/eng/pn-nt/tuktuknogait/index.aspx</a></li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.pc.gc.ca/eng/pn-nt/tuktuknogait/index.aspx">http://www.pc.gc.ca/eng/pn-nt/tuktuknogait/index.aspx</a></li> </ul>		
Parks Canada	Aulavik National Park Water Quality Monitoring Program	<ul style="list-style-type: none"> <li>Aulavik National park is one of Canada's high arctic parks, located in the Inuvialuit Settlement Region on Banks Island. Water quality monitoring occurs yearly at 1 site along the Thomsen River. Monitoring was undertaken in partnership with Environment Canada until 2010. Parks Canada took over sole monitoring in 2011.</li> </ul>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (no mercury), organics	Thomsen River near Green Cabin (73.2270, -119.5418)	Inuvialuit	2000	<ul style="list-style-type: none"> <li>Data are stored in a national database (ACBIS) and are available upon request.</li> <li>Reports have been published over the years.</li> </ul>	<ul style="list-style-type: none"> <li>Aulavik National Park (2010). <i>State of the Park Report</i>. Parks Canada. <a href="http://www.pc.gc.ca/eng/pn-nt/aulavik/index.aspx">http://www.pc.gc.ca/eng/pn-nt/aulavik/index.aspx</a></li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.pc.gc.ca/eng/pn-nt/aulavik/index.aspx">http://www.pc.gc.ca/eng/pn-nt/aulavik/index.aspx</a></li> </ul>		
AANDC - Water Resources	Water Quality Network Monitoring Program - Yellowknife Region	<ul style="list-style-type: none"> <li>Monthly water quality sampling occurs at 3 sites in the Yellowknife and Behchoko areas - Yellowknife River, Cameron River and Marian River - as part of the water quality network program as a matter of local community interest.</li> </ul>	<b>Water quality</b> - total and dissolved metals (including mercury), major ions, nutrients, physical parameters	<ul style="list-style-type: none"> <li>Yellowknife River (62.5200, -114.3200)</li> <li>Cameron River (62.4943, -113.5489)</li> <li>Marian River (62.7873, -115.9498)</li> </ul>	North Slave, Wek'èezhii	<ul style="list-style-type: none"> <li>Yellowknife River (1987)</li> <li>Cameron River (1983)</li> <li>Marian River (1997)</li> </ul>	<ul style="list-style-type: none"> <li>Reports are underway. Periodic data release is provided on request.</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Email: <a href="mailto:NorthwestTerritoriesWaters@aandc.gc.ca">NorthwestTerritoriesWaters@aandc.gc.ca</a></li> <li><a href="http://www.aandc-aandc.gc.ca/eng/1100100022936">http://www.aandc-aandc.gc.ca/eng/1100100022936</a></li> </ul>		
AANDC - Water Resources	Water Quality Network Monitoring Program - Upper Coppermine and Upper Lockhart basins	<ul style="list-style-type: none"> <li>Water quality sampling occurs at 8 sites downstream of the diamond mine developments on Lac de Gras and Snap Lake in the Upper Coppermine and Upper Lockhart basins 2 to 4 times per year as part of the water quality network program. Sampling began in the 1990s to establish baseline information and to address concerns regarding potential future cumulative effects of northern diamond mining in the region.</li> </ul>	<b>Water quality</b> - total and dissolved metals (including mercury), major ions, nutrients, physical parameters	<ul style="list-style-type: none"> <li><b>Upper Coppermine River basin</b> <ul style="list-style-type: none"> <li>Point Lake (65.3572, -113.7265)</li> <li>Rocknest Lake (65.6352, -114.3502)</li> <li>Desteffany Lake outflow (64.6151, -111.9536)</li> <li>Darring Lake (64.8618, -111.5968)</li> <li>Lac de Gras (64.5778, -111.1521)</li> </ul> </li> <li><b>Upper Lockhart River basin</b> <ul style="list-style-type: none"> <li>McKay Lake outflow (64.1537, -110.1350)</li> <li>Lake of the Enemy (63.8090, -110.3388)</li> <li>King Lake (63.7917, -110.7067)</li> </ul> </li> </ul>	North Slave, Wek'èezhii	<ul style="list-style-type: none"> <li>Upper Coppermine River sites (1999/2000)</li> <li>Upper Lockhart River sites (1993, 1994, 1999, 2006 to present)</li> </ul>	<ul style="list-style-type: none"> <li>Reports are underway. Periodic data release is provided on request.</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Email: <a href="mailto:NorthwestTerritoriesWaters@aandc.gc.ca">NorthwestTerritoriesWaters@aandc.gc.ca</a></li> <li><a href="http://www.aandc-aandc.gc.ca/eng/1100100022936">http://www.aandc-aandc.gc.ca/eng/1100100022936</a></li> </ul>		
AANDC - Water Resources	Transboundary Rivers Monitoring Program - Slave River	<ul style="list-style-type: none"> <li>The transboundary water quality sampling sites were established to characterize the water quality in the major transboundary rivers flowing into the NWT. The transboundary rivers monitored are the Slave, Hay, Liard and Peel Rivers.</li> <li>For the Slave River, surface water, centrifugate water and suspended sediment are sampled at Fort Smith near the NWT/Alberta border. Sampling (including fish sampling) occurred yearly between 1990 and 1995 to develop baseline information, with follow up sampling at 5 year intervals. Follow up sampling occurred between 2000 and 2007 (not including fish), and sampling continues on the Slave River as part of the Slave River Delta partnership and to inform transboundary negotiations with Alberta, with the most recent sampling taking place in 2011, 2012 and 2013.</li> </ul>	<ul style="list-style-type: none"> <li><b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), organics including polycyclic aromatic hydrocarbons (alkylated and parent compounds), chlorophenols, PCBs and pesticides</li> <li><b>Sediment quality</b> - physical parameters, major ions, nutrients, total metals (including mercury), organics including phenols, polycyclic aromatic hydrocarbons (alkylated and parent compounds), chlorophenols, dioxins, furans, PCBs, herbicides and pesticides</li> </ul>	Slave River at Fort Smith (60.0234, -111.8906)	South Slave	1990	<ul style="list-style-type: none"> <li>Reports and community presentations</li> <li>Slave River Reports were released in 1998 and 2012.</li> </ul>	<ul style="list-style-type: none"> <li>Sanderson, J., Lafontaine, C. and Robertson, K. (1998). <i>Slave River Environmental Quality Monitoring Program - Summary Report</i>. Aboriginal Affairs and Northern Development Canada (formerly Indian and Northern Affairs Canada), Yellowknife, NT.</li> <li>Sanderson, J., Czarniecki, A. and Faria, D. (2012). <i>Water and Suspended Sediment Quality of the Transboundary Reach of the Slave River, Northwest Territories</i>. Aboriginal Affairs and Northern Development Canada, Yellowknife, NT.</li> </ul>	<ul style="list-style-type: none"> <li>Email: <a href="mailto:NorthwestTerritoriesWaters@aandc.gc.ca">NorthwestTerritoriesWaters@aandc.gc.ca</a></li> <li><a href="http://www.aandc-aandc.gc.ca/eng/1100100022936">http://www.aandc-aandc.gc.ca/eng/1100100022936</a></li> <li><a href="http://nwt.discoveryportal.enr.gov.nt.ca">http://nwt.discoveryportal.enr.gov.nt.ca</a></li> </ul>	✓	✓
AANDC - Water Resources	Transboundary Rivers Monitoring Program - Hay River	<ul style="list-style-type: none"> <li>The transboundary water quality sampling sites were established to characterize the water quality in the major transboundary rivers flowing into the NWT. The transboundary rivers monitored are the Slave, Hay, Liard and Peel Rivers.</li> <li>For the Hay River, surface water, centrifugate water and suspended sediment are sampled near the NWT/Alberta Border. Sampling occurred in 2004, 2005, 2011, 2012 and 2013 (2 times each year). The site is co-located with Environment Canada's long term water quality monitoring site (est. 1988), where surface water samples are collected 6 times per year.</li> </ul>	<ul style="list-style-type: none"> <li><b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), organics including polycyclic aromatic hydrocarbons (alkylated and parent compounds), PCBs and pesticides</li> <li><b>Sediment quality</b> - physical parameters, major ions, nutrients, total (including mercury), organics including polycyclic aromatic hydrocarbons (alkylated and parent compounds), PCBs, herbicides and pesticides</li> </ul>	Hay River at NWT/Alberta Border (60.0429, -116.8235)	Dehcho	2004	<ul style="list-style-type: none"> <li>Reports and community presentations</li> <li>Hay River data analysis is underway.</li> </ul>		<ul style="list-style-type: none"> <li>Email: <a href="mailto:NorthwestTerritoriesWaters@aandc.gc.ca">NorthwestTerritoriesWaters@aandc.gc.ca</a></li> <li><a href="http://www.aandc-aandc.gc.ca/eng/1100100022936">http://www.aandc-aandc.gc.ca/eng/1100100022936</a></li> </ul>	✓	
AANDC - Water Resources	Transboundary Rivers Monitoring Program - Liard River	<ul style="list-style-type: none"> <li>The transboundary water quality sampling sites were established to characterize the water quality in the major transboundary rivers flowing into the NWT. The transboundary rivers monitored are the Slave, Hay, Liard and Peel Rivers.</li> <li>For the Liard River, surface water, centrifugate water and suspended sediment are sampled above the Kotanelee River near the NWT/British Columbia border. The Liard River was initially sampled between 1991 and 1994, up to 4 times per year to develop baseline information. Fish were also sampled at the Liard River for contaminants between 1992 and 1994. Follow up sampling occurred in 2001, 2002, 2007 and 2013 (approximate 5 year sampling interval).</li> </ul>	<ul style="list-style-type: none"> <li><b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), organics including polycyclic aromatic hydrocarbons (alkylated and parent compounds), PCBs and pesticides</li> <li><b>Sediment quality</b> - physical parameters, major ions, nutrients, total (including mercury), organics including polycyclic aromatic hydrocarbons (alkylated and parent compounds), PCBs, herbicides and pesticides</li> </ul>	Liard River above Kotanelee River (60.1485, -123.7349)	Dehcho	1991	<ul style="list-style-type: none"> <li>Reports and community presentations</li> <li>The Liard River report was released in 1998.</li> </ul>	<ul style="list-style-type: none"> <li>Taylor, B.R., Sanderson, J. and Lafontaine, C. (1998). <i>Liard River Environmental Quality Monitoring Program - Summary Report</i>. Aboriginal Affairs and Northern Development Canada (formerly Indian and Northern Affairs Canada), Yellowknife, NT.</li> </ul>	<ul style="list-style-type: none"> <li>Email: <a href="mailto:NorthwestTerritoriesWaters@aandc.gc.ca">NorthwestTerritoriesWaters@aandc.gc.ca</a></li> <li><a href="http://www.aandc-aandc.gc.ca/eng/1100100022936">http://www.aandc-aandc.gc.ca/eng/1100100022936</a></li> </ul>	✓	
AANDC - Water Resources	Transboundary Rivers Monitoring Program - Peel River	<ul style="list-style-type: none"> <li>The transboundary water quality sampling sites were established to characterize the water quality in the major transboundary rivers flowing into the NWT. The transboundary rivers monitored are the Slave, Hay, Liard and Peel Rivers.</li> <li>For the Peel River, surface water, centrifugate water and suspended sediment are sampled above Fort McPherson near the NWT/Yukon border. The Peel River was initially sampled between 2002 and 2007, to develop baseline information, with follow up sampling at 5 year intervals. Sampling has since occurred 2 times in 2012. The site is co-located with Environment Canada's water quality monitoring site (est. 1960) where surface water samples are collected 4 times per year.</li> </ul>	<ul style="list-style-type: none"> <li><b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), organics including polycyclic aromatic hydrocarbons (alkylated and parent compounds), PCBs and pesticides</li> <li><b>Sediment quality</b> - physical parameters, major ions, nutrients, total (including mercury), organics including polycyclic aromatic hydrocarbons (alkylated and parent compounds), PCBs, herbicides and pesticides</li> </ul>	Peel River above Fort McPherson (67.3225, -134.8629)	Gwich'in	2002	<ul style="list-style-type: none"> <li>Reports and community presentations</li> <li>The Peel River Report was released in 2002 summarizing basic water quality data; further data analysis is underway.</li> </ul>	<ul style="list-style-type: none"> <li>Czarniecki, A. and Beavers, R. (2002). <i>Peel River Basin Water Quality Report</i>. Aboriginal Affairs and Northern Development Canada (formerly Indian and Northern Affairs Canada), Yellowknife, NT.</li> </ul>	<ul style="list-style-type: none"> <li>Email: <a href="mailto:NorthwestTerritoriesWaters@aandc.gc.ca">NorthwestTerritoriesWaters@aandc.gc.ca</a></li> <li><a href="http://www.aandc-aandc.gc.ca/eng/1100100022936">http://www.aandc-aandc.gc.ca/eng/1100100022936</a></li> </ul>	✓	✓

# Northwest Territories Water Monitoring Inventory

Version 1 (November 2013)

ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
AANDC - Water Resources	Transboundary Rivers Monitoring (NWT/Alberta) - South Slave District Office	Water quality sampling in the Alberta/NWT transboundary region takes place at 8 rivers, 2 times per year (spring and fall). This long-term sampling program was established to begin to characterize the water quality in all transboundary rivers, both large and small.	<b>Water quality</b> <b>Buffalo River at Highway 5 Bridge</b> - physical parameters, major ions, nutrients, total metals, ammonia <b>Hay River at West Channel Bridge</b> - physical parameters, major ions, nutrients, total metals, ammonia <b>Kakisa River at Highway 1 Bridge</b> - physical parameters <b>Little Buffalo River at Highway 5 Bridge</b> - physical parameters <b>Slave River at Fort Smith</b> - physical parameters <b>Tazin River at the Mouth</b> - physical parameters <b>Salt River at Highway 5 Bridge</b> - physical parameters <b>Slave River at the Mouth</b> (61.2730, - 113.5416)	<b>Buffalo River at Highway 5 Bridge</b> (60.7161, -114.9069) <b>Hay River at West Channel Bridge</b> (60.825, -115.7788) <b>Kakisa River at Highway 1 Bridge</b> (60.9858, -117.2453) <b>Little Buffalo River at Highway 5 Bridge</b> (60.0472, - 112.7713) <b>Slave River at Fort Smith</b> (60.0161, - 111.8897) <b>Tazin River at the Mouth</b> (60.4183, - 110.6933) <b>Salt River at Highway 5 Bridge</b> (60.0211, - 112.3508) <b>Slave River at the Mouth</b> (61.2730, - 113.5416)	South Slave	1982	Data has been analyzed as part of the Slave and Hay River monitoring programs.		Email: NorthwestTerritoriesWaters@aandc.gc.ca		
AANDC - Contaminants and Remediation Directorate	Tundra Mine Remediation - Water Quality Monitoring Program and Surveillance Network Program as per Type A water licence MV2009L8-0008	<p>The Contaminants and Remediation Directorate, in conjunction with the Water Resources Division, operates water quality and quantity monitoring stations at contaminated sites. The abandoned Tundra mine site is undergoing remediation and reclamation for arsenic-impacted water in the tailings containment area, tailings solids, hydrocarbon contaminated soil and waste rock, and potentially acid generating waste rock.</p> <p>The Surveillance Network Program (SNP) is required as per the Type A water licence. A water quality monitoring program is also in place to identify all pathways that contaminants may be taking to reach downstream lakes and includes monitoring at the tailings containment area, surface seepage, shallow groundwater, downstream lake sampling, and sediment sampling and toxicity testing at select sites. Many of the sampling locations double as SNP sampling locations. Monitoring occurred weekly throughout the open water season in 2011, 2012 and 2013. A long-term water quality monitoring program to confirm the environmental conditions surrounding the site post-remediation will be implemented in a phased approach over 5-year periods with the first phase beginning after site remediation is complete (i.e., 2014 to 2018). It will meet SNP requirements, which will be extended over the long-term monitoring phase.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total metals, organics, solids, cyanide</p> <p><b>Groundwater quality (shallow wells)</b> - physical parameters, major ions, nutrients, total metals, organics, solids, cyanide</p> <p><b>Sediment quality</b> - sampling has occurred in the past</p>	<b>Tundra minesite</b> (64.0489, -111.1680)	North Slave	2002	Reports are submitted to the Mackenzie Valley Land and Water Board as per water licence conditions.	<p>2011 and 2012 Water Quality Monitoring Program report</p> <p>Annual Surveillance Network Program reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p>http://www.aandc-aandc.gc.ca/eng/1100100026203/1100100026204</p> <p>http://www.mvlwb.ca/mv/registry.aspx</p> <p>Email: ntcad@aandc.gc.ca</p>		
AANDC - Contaminants and Remediation Directorate	Discovery Mine Remediation - Surveillance Network Program	The Contaminants and Remediation Directorate, in conjunction with the Water Resources Division, operates water quality and hydrology stations at contaminated sites. The Surveillance Network Program for the Discovery Mine Remediation project was a requirement of their Type B water licence (MV2003L8-0008) which expired February 2012. Monitoring occurred weekly throughout the open water season until the fall of 2011. The site has been remediated and with the expiry of the water licence there are no regulatory requirements for a water quality monitoring program. However, continued monitoring on site will continue. A Draft Phase II Long-Term Monitoring Plan to continue water quality monitoring at the Borrow Pit and Giauque Lake at a reduced scope and frequency has been developed. The Plan follows the 25 year landfill monitoring protocol of the AANDC Abandoned Military Site Remediation Protocol. Follow up monitoring will take place as follows: year 7 (2013), year 10 (2016), year 15 (2021), and year 25 (2031).	<p><b>Water quality</b> - physical parameters, major ions, nutrients, dissolved metals, hydrocarbons, solids, cyanide</p>	<b>Discovery mine site</b> (63.1833, -113.8833)	North Slave	1998	Internal reports (as no longer a reporting requirement under a water licence)	Internal reports (as no longer a requirement for a water licence)	<p>http://www.aandc-aandc.gc.ca/eng/1100100026203/1100100026204</p> <p>http://www.mvlwb.ca/mv/registry.aspx</p> <p>Email: ntcad@aandc.gc.ca</p>		
AANDC - Contaminants and Remediation Directorate	Colomac Mine Site Remediation - Surveillance Network Program as per Type B water licence W2009L8-003	The Contaminants and Remediation Directorate, in conjunction with the Water Resources Division, operates water quality and hydrology stations at contaminated sites. The Surveillance Network Program (SNP) for the Colomac Mine Remediation project is a requirement of their water licence. The number of SNP stations has been decreased as remediation has taken place. At the completion of the short term monitoring phase (2012-2015), the monitoring data will be assessed and the program will be further adjusted. The Colomac Post-Reclamation Monitoring and Residual Hydrocarbon Monitoring Plan was approved by the Wek'èezhii Land and Water Board. The current Water Licence expires in February 2015.	<p><b>Water quality</b> - physical parameters, major ions, nutrients, dissolved metals, hydrocarbons, solids, cyanide</p>	<b>Colomac mine site</b> (64.4045, -115.1052)	Tłı̄chǔ	2000	Annual reports are submitted to the Wek'èezhii Land and Water Board.	Annual Surveillance Network Program reports are submitted to the Wek'èezhii Land and Water Board.	<p>http://www.aandc-aandc.gc.ca/eng/1100100026203/1100100026204</p> <p>http://www.mvlwb.ca/WLWB/registry.aspx</p> <p>Email: ntcad@aandc.gc.ca</p>	✓	
AANDC - Contaminants and Remediation Directorate	Giant Mine Remediation - Water Quality Monitoring Program as per Type A water licence MV2007L8-0031	Giant Mine is an abandoned gold mine in Yellowknife. In 2007 the Contaminants and Remediation Directorate applied for a Type A water licence (MV2007L8-0031) to undertake remediation and reclamation, including long-term storage and management of 237,000 tonnes of arsenic trioxide dust, covering tailings ponds, and removing buildings. An environmental assessment was completed, and the report of environmental assessment released in June 2013 and is awaiting final approval.	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total metals, solids, cyanide, ammonia, total and dissolved arsenic, hydrocarbons</p> <p>Note: the parameters required for the SNP are the same as in the former water licence</p>	<b>Giant Mine</b> (62.5266, -114.2500)	North Slave	1970	Monitoring data is uploaded from lab results reports into the LodeStar database for Giant. (The data requires validation prior to release to users of the database who have received security clearance for log-on).	Giant Mine Standard Environmental Sampling Procedures Manual	<p>http://www.aandc-aandc.gc.ca/eng/1100100027364</p> <p>http://www.reviewboard.ca/registry/</p> <p>Email: giantmine@aandc.gc.ca</p>		
AANDC - Contaminants and Remediation Directorate	Giant Mine - Environmental Effects Monitoring (EEM) Program	The Metal Mining Effluent Regulations under the Fisheries Act requires all metal mines discharging effluent to undertake effluent monitoring and environmental effects monitoring (EEM) to evaluate the effects of treated mine effluent on fish and fish habitat. While operations at Giant Mine ceased in 2004, it has not been officially designated as having "closed mine status" under the regulations. Therefore, the requirements outlined by the regulations are applicable and an EEM program is required.	<p><b>Water quality</b> - physical parameters, major ions, total and dissolved inorganics including metals, nutrients, radium-226, total cyanide</p> <p><b>Sediment quality</b> - particle size analysis, percent moisture, total organic carbon, total inorganics including metal concentrations</p> <p><b>Fish health</b></p> <p><b>Benthic invertebrates</b></p>	<b>Giant Mine</b> (62.5266, -114.2500)	North Slave	2003	Environmental Effects Monitoring reports are submitted to Environment Canada	See Environmental Effects Monitoring Phase Four Study Design on the Mackenzie Valley Land and Water Board website.	<p>http://www.aandc-aandc.gc.ca/eng/1100100027364</p> <p>http://www.mvlwb.ca/mv/registry.aspx</p> <p>Email: giantmine@aandc.gc.ca</p>		
AANDC - Contaminants and Remediation Directorate	Groundwater Monitoring Program at Giant Mine	The objective of the groundwater monitoring program at Giant Mine is to monitor and characterize groundwater quality. Three types of stations are monitored: shallow groundwater monitoring wells consisting of shallow wells and calcine wells; multipoint (deep) groundwater monitoring wells; and C-Shaft underground zones.	<b>Ground water quality</b> - There are 12 deep groundwater wells collecting dissolved metals	<b>Giant Mine</b> (62.5266, -114.2500)	North Slave	2003	Monitoring data is uploaded from lab results reports into the LodeStar database for Giant, and is validated prior to release to database users with security clearance for log-on.	Giant Mine Standard Environmental Sampling Procedures Manual	<p>http://www.aandc-aandc.gc.ca/eng/1100100027364</p> <p>http://www.reviewboard.ca/registry/</p> <p>Email: giantmine@aandc.gc.ca</p>		
AANDC - Cumulative Impact Monitoring Program Sahtu Renewable Resources Board	Establishing a Watershed Framework for Assessing Cumulative Impacts of Development (Sahtu region)	A cumulative impact monitoring program is being developed to determine effects of oil and gas exploration in the Sahtu region on the aquatic environment, in particular for watersheds draining the eastern foothills of the Mackenzie Mountains. In 2013, a water quality and stream health assessment was designed with input from communities, academics and regulators. In 2013, a modest sampling program was undertaken with community participation coordinated by the Sahtu Renewable Resources Board and the renewable resource councils in Norman Wells and Tulita. Information on the aquatic health of 10 sites in representative streams found in areas impacted and unimpacted by development was collected. Data was collected using Environment Canada's CABIN protocol (see Environment Canada above).	<p><b>Water quality</b> - physical parameters, nutrients, major ions</p> <p><b>Sediment quality</b> - major ions and total metals (to be collected in the future)</p> <p><b>Fish habitat</b> - to be collected in the future</p> <p><b>Benthic invertebrates</b></p> <p>Passive monitoring devices and diffusive gradient in thin-films will also be deployed to test for the presence of hydrocarbons and metals in the water in some of the lower reaches of streams where they enter the Mackenzie River.</p>	Streams draining into the eastern foothills of the Mackenzie Mountains	Sahtu	2013	Reporting is through the Cumulative Impact Monitoring Program.	Reporting is through the Cumulative Impact Monitoring Program.	<p>Email: cimp@aandc-aandc.gc.ca</p> <p>http://nwttdiscoveryportal.enr.gov.nt.ca</p> <p>http://www.ec.gc.ca/rcba-cabin</p>	✓	✓

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Fisheries and Oceans Canada Sahtu Renewable Resources Board Deline Renewable Resource Council AANDC - Cumulative Impact Monitoring Program	Long-term Monitoring of Great Bear Lake Fisheries and the Aquatic Ecosystem	*Monitoring and research related to fish and fish management and the collection of standardized ecosystem level information, such as up to date water quality information to detect changes in water chemistry due to climate change and development, is being undertaken to better address these needs in Great Bear Lake. These sources of information can be combined to examine the relationships between fish abundance and various environmental drivers. Water quality parameters will be recorded for each sampling event/location and more frequent water quality information (together with zooplankton) will be collected annually near Deline by local monitors.	<b>Water quality</b> - physical parameters, nutrients, total dissolved solids  <b>Fish health</b>  <b>Zooplankton</b>  <b>Benthic invertebrates</b>	Five arms of Great Bear Lake	Sahtu	2012	*Reporting is through the Cumulative Impact Monitoring Program.  *Plain language reports on results were prepared (January 2013).  *A community workshop in collaboration with other researchers is planned for the fall of 2013 in Deline.	*See NWT Discovery Portal for related reports and workshop abstracts.	Email: cimp@aandc-aadnc.gc.ca  http://nwt.discoveryportal.enr.gov.nt.ca	✓	✓
<b>Government of the Northwest Territories (GNWT)</b>											
GNWT - Health and Social Services, Municipal and Community Affairs, and Public Works and Services Stanton Health Authority	NWT Drinking Water Quality Database	*The NWT drinking water database is an online tool where NWT residents can find information and results from water quality tests being performed in their communities, and view current and historical boil water advisories.  *Information on the parameters being measured, frequency of the sampling, drinking water quality standards and guidelines, and community water systems can be found on the database.	<b>Water quality</b> - physical parameters, nutrients, major ions, metals (including mercury), bacteriological, trihalomethanes, solids, turbidity  For sample frequency see: <a href="http://www.hltss.gov.nt.ca/pdf/brochures_and_fact_sheets/environmental_health/2007/english/nwt_drinking_water_sampling_and_testing_requirements.pdf">http://www.hltss.gov.nt.ca/pdf/brochures_and_fact_sheets/environmental_health/2007/english/nwt_drinking_water_sampling_and_testing_requirements.pdf</a>	*Aklavik • Ulukhaktok • Inuvik • Sachs • Harbour • Tuktoyaktuk • Paulatuk • Fort McPherson • Tsiigehtchic • Colville Lake • Déline • Fort Good Hope • Norman Wells • Tullit'a • Fort Liard • Fort Providence • Fort Simpson • Jean Marie River • Nahanni Butte • Trout Lake • Wrigley • Gameti • Behchokó • Wekweéti • Whati • Yellowknife • Enterprise • Fort Resolution • Fort Smith • Hay River • Hay River Reserve • Lútselk'é • Kakisa	NWT-wide	Between 1994 and 2007 depending on the community	*Data available online by following this link: <a href="http://www.maca.gov.nt.ca/?page_id=1664">http://www.maca.gov.nt.ca/?page_id=1664</a>	*GNWT Report on Drinking Water (May 2010). This report can be found online at : <a href="http://www.maca.gov.nt.ca/resources/GNWT_Report_on_Drinking_Water_2010.pdf">http://www.maca.gov.nt.ca/resources/GNWT_Report_on_Drinking_Water_2010.pdf</a>	<a href="http://www.maca.gov.nt.ca/?page_id=1659">http://www.maca.gov.nt.ca/?page_id=1659</a>		
GNWT - Transportation	Yellowknife Airport Surveillance Network Program as per type B water licence MV2001L3-0012	*Surface and groundwater monitoring are undertaken at the Yellowknife airport to monitor for the presence of glycol (from airplane de-icing) in the event of discharge of potential glycol impacted water into Long Lake as per their type B water licence Surveillance Network Program (SNP).	<b>Water quality</b> - physical parameters, ethylene glycol, propylene glycol, dyethelene glycol, chemical oxygen demand  <b>Groundwater quality</b> - physical parameters, ethylene glycol, propylene glycol, dyethelene glycol, chemical oxygen demand	City of Yellowknife	North Slave	2001	*Reports are submitted to the Mackenzie Valley Land and Water Board.	*Annual Surveillance Network Program reports are submitted to the Mackenzie Valley Land and Water Board.	<a href="http://www.mviwb.ca/mv/registry.aspx">http://www.mviwb.ca/mv/registry.aspx</a>		
GNWT - Industry, Tourism and Investment AANDC - Cumulative Impact Monitoring Program Tetit Gwich'in Renewable Resource Council Gwich'in Tribal Council Gwich'in Renewable Resources Board Fisheries and Oceans Canada Academic institutions	A Watershed Approach to Monitoring Cumulative Impacts of Landscape Change	*This monitoring program was initiated in response to community concerns and scientific interest related to the recent acceleration in mega-slump growth in the Peel Plateau, along the eastern slopes of the Richardson and Mackenzie Mountains. Mega slumps are massive areas of landscape collapse that have created crater like scars up to 50 hectares in area and debris flows up to several kilometers in length, which have filled numerous stream valleys. Terrain mapping indicates that hundreds of streams are impacted by these disturbances which are anticipated to increase in size and abundance with climate change. Hydrology, water quality, invertebrate habitat, geochemistry and ecology of streams are all impacted. Sediment cores from impacted lakes have been collected. Remote sensing is used to monitor and map the distribution of mega slumps.  *A multidisciplinary approach is in place to understand the impacts of the disturbance. Long-term monitoring sites have been established. Local community observers have provided real time observations of environmental change, a longer-term perspective on regional environmental conditions, and important guidance on the design and implementation of field studies. Monitoring and research began in 2009, and in 2011 a community-based monitoring program was established to track key indicators for changes or emerging trends. Community monitors participating in this program collect data on snow, vegetation and permafrost conditions activities at long-term monitoring sites.	<b>Water quality</b> - physical parameters, major and trace cations, anions, stable isotopes, dissolved oxygen, nutrients  <b>Sediment quality</b>  <b>Water quantity</b>  <b>Permafrost</b>  <b>Fish health</b>  <b>Benthic invertebrates</b>	<b>Stony Creek watershed</b> (67.3873,-134.9246) (36 stream sites, including bi-weekly water quality sampling of the Peel River, Stony Creek and Vitrekwa River)	Gwich'in	2009	*Annual reports are submitted to the NWT Cumulative Impact Monitoring Program, and presentations made at annual workshops.  *Regular reporting to the the community takes place, and feedback is gathered.  *Development of plain language pamphlet highlighting research results from 2012/13.  *The team will continue to support the Gwich'in Renewable Resource Board priority setting workshop by providing technical expertise and financial support to bring together key knowledge holders from Gwich'in communities.	*Kokelj, S. V., D. Lacle, T. C. Lantz, J. Tunnicliffe, L. Malone, I. D. Clark, and K. S. Chin (2013). <i>Thawing of massive ground ice in mega slumps drives increases in stream sediment and solute flux across a range of watershed scales</i> . J. Geophys. Res. Earth Surf., 118, doi: 10.1002/jgrf.20063.  *See NWT Discovery Portal for project reports and for other related publications.	Email: cimp@aandc-aadnc.gc.ca	✓	✓
<b>Aboriginal governments</b>											
Tijchô Government AANDC - Cumulative Impact Monitoring Program	Marian Watershed Community-based Aquatic Effects Monitoring Program	*Regional data is collected on background water quality, sediment quality, fish, aquatic characteristics to assess the range of natural variability pre- and post-development of Fortune Minerals' Nico mine (awaiting water licencing - environmental assessment recently approved). Sampling locations are located both up- and downstream of the proposed mine site and the historic Rayrock mine (closed). Monitoring will focus on areas of importance for Tijchô citizens outside areas where direct effects are predicted from Fortune's project, but within areas where cumulative effects may occur.  *This regional-scale project will address a monitoring gap between the high intensity monitoring undertaken by industry in and around their developments and relatively low intensity local monitoring done in or near Tijchô communities through programs such as the Tijchô Aquatic Ecosystem Monitoring Program (see above). In future years, a direct linkage to Fortune Minerals' aquatic effects monitoring may become an important part of this program; however, it is crucial for Tijchô citizens to define the framework and priorities for regional aquatic monitoring and be in control of the program and data.	<b>Water quality</b> - physical parameters, nutrients, metals, solids  <b>Sediment quality</b> - physical parameters, nutrients, metals, solids  <b>Fish health</b> - abundance, diversity, tissue metals  Additionally the YSI sonde 6600 measures temperature, conductivity, pH, oxidation/reduction potential, dissolved oxygen, turbidity, chlorophyll. The polyethylene membrane device measures dissolved polycyclic aromatic hydrocarbons and the diffusive gradients in thin-films measures dissolved metals, methyl mercury and vanadium.	<b>Marian River and Marian Lake</b> (63.0002, -116.2514) <b>Hislop Lake</b> (63.5169, -116.9181)	Wek'èezhii	2013	*Annual reporting as part of the NWT Cumulative Impact Monitoring Program.  *Reporting to Tijchô communities	*See NWT Discovery Portal for project reports.	Email: cimp@aandc-aadnc.gc.ca  <a href="http://nwt.discoveryportal.enr.gov.nt.ca">http://nwt.discoveryportal.enr.gov.nt.ca</a>	✓	✓
Dehcho First Nations Fisheries and Oceans Canada - AAROM Deh Gah Gotie Dene Band, Nahanni Butte Dene Band, Sambaa K'e Dene Band, Liidlii Kue First Nation, Ka'a'gee Tu First Nation, Jean Marie River First Nation, Pehdzeh Ke First Nation, K'atloedeche First Nation and West Point First Nation Partnerships with GNWT Environment and Natural Resources, AANDC, Aurora College, and/or Environment Canada	Aboriginal Aquatic Resource and Oceans Management (AAROM) Community-based Monitoring - Dehcho Region	*The Dehcho AAROM program monitors basic water quality as a part of a long-term community-based monitoring program at several river and lake locations in the Dehcho region. The program also undertakes sport fishery and subsistence harvesting surveys with anglers through boat patrols/summer monitors, creel surveys, and general fisheries monitoring with the goal of managing fisheries in a sustainable manner. Traditional Knowledge information relevant to the rivers, creeks and lakes being surveyed is recorded. The goal of AAROM is to help Aboriginal groups participate effectively in advisory and decision-making processes used for aquatic resource management.  *AAROM has entered into several partnerships to undertake this monitoring. More in-depth water quality monitoring takes place in partnership with GNWT Environment and Natural Resources; analyzing for mercury in fish is undertaken in partnership with Environment Canada and AANDC Northern Contaminants Program at specific lakes; and results from AAROM monitoring feed into the Ka'a'gee Tu First Nation <i>Environmental change and human development in the Tathlina Watershed monitoring program</i> discussed below, as well as a new project for predicting fish mercury levels in the Dehcho region (both AANDC Cumulative Impact Monitoring Program) projects.  *Jean Marie River First Nation also works in collaboration with the GNWT Protected Areas Strategy, Dehcho First Nations and AAROM to collect information on fish and water quality on Ekali, Sanguez and Gargan Lakes for use in establishing the Five Fish Lakes Protected Area.	<b>Water quality</b> - physical parameters  <b>Fish</b> - community food fishery catch, creel harvest surveys, habitat studies, mercury analysis  Additional sampling equipment was provided through GNWT Environment and Natural Resources including: the YSI sonde 6600 which measures temperature, conductivity, pH, oxidation/reduction potential, dissolved oxygen, turbidity, chlorophyll; the polyethylene membrane device which measures dissolved polycyclic aromatic hydrocarbons; and the diffusive gradients in thin-films which measures dissolved metals, methyl mercury and vanadium.	<b>Mackenzie River and tributaries</b> (near Fort Simpson and near Jean Marie River) <b>Mackenzie River</b> (near Fort Providence) <b>Beaver Lake</b> (between Wrigley Harbour and Mills Lake) <b>Trout Lake and Island River</b> (60.4334,-121.2515) <b>Kakisa Lake</b> (60.9334,-117.7181) (along the Kakisa River in the area of the Territorial Park and the Bridge Day Park) <b>Ekali Lake</b> (61.2915,-120.5905) <b>Sanguez Lake</b> (61.2601,-120.4981) <b>Gargan Lake</b> (61.2480,-120.3808)	Dehcho	2011	*The AAROM coordinator and/or technical advisor report the results to the communities involved. Workshops have and continue to be held.  *Fisheries and Oceans Canada analyzes and reports the results, and may publish the data.  *Traditional Knowledge information stays with the community.  *For Sambaa K'e mercury in fish sampling, Environment Canada analyzes and reports the results to the AANDC Northern Contaminants Program annually.	*See <a href="http://www.dehcho.org/aarom.htm">http://www.dehcho.org/aarom.htm</a> for various reports including the <i>Return to Country Foods Workshop (August 2012)</i> (funded by the AANDC Northern Contaminants program and the Dehcho AAROM program) which provides an overview of the Dehcho AAROM program and other related monitoring and presentation from partners on monitoring results.	<a href="http://www.dehcho.org/aarom.htm">http://www.dehcho.org/aarom.htm</a>  <a href="http://www.dfo-mpo.gc.ca/fm-gp/aboriginal-autochtones/aarom-pagrao/index-eng.htm">http://www.dfo-mpo.gc.ca/fm-gp/aboriginal-autochtones/aarom-pagrao/index-eng.htm</a>	✓	

# Northwest Territories Water Monitoring Inventory

Version 1 (November 2013)

ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
<p><b>Ka'a'gee Tu First Nation</b></p> <p><b>AANDC - Cumulative Impact Monitoring Program</b></p> <p><b>Fisheries and Oceans Canada - AAROM</b></p> <p><b>Various academic institutions</b></p>	<p>Environmental change and human development in the Tathlina Watershed</p>	<p>*This monitoring program has and continues to be developed as a result of the Ka'a'gee Tu First Nation's concerns about possible impacts of the Paramount Cameron Hills oil and gas development on Tathlina Lake and the Kakisa River, including impacts to the commercial fishery, as well as concerns regarding changes in environmental conditions in the recent past and drivers for those changes. The program seeks to understand current aquatic ecosystem health in the Tathlina watershed and how this system has changed over time.</p> <p>*Three YSI sonde units at Tathlina Lake and one at Kakisa were installed to establish baseline water quality data in the immediate watershed. Sediment coring has taken place in the east and west Cameron River deltas to determine changes in metal and hydrocarbon contaminants over time from water flowing off the Cameron Hills. Sediment cores were also collected at lakes adjacent to oil and gas installations and at "control" lakes on the Cameron Plateau. A detailed water quality and benthic invertebrate sampling program was initiated in 2012 at 30 sites to analyze for the presence of organic contaminants, metals etc.</p>	<p><b>Water quality</b> - physical parameters, metals, nutrients, organic contaminants</p> <p><b>Sediment quality</b> - testing for metal (including mercury) and hydrocarbon contaminants (both suspended sediment sampling and sediment cores)</p> <p><b>Benthics</b> - community composition and metals/organic contaminants in tissue</p> <p><b>Fish health</b> - reproductive endocrine status by measurement of reproductive steroid levels in collected tissue and blood samples to assess the potential impact of source water and contaminants on reproduction. Fuel reserves in the fish are measured to better understand the energetic/nutritional status of the fish. Measurements include determinations of muscle and liver lipid, protein and carbohydrate reserves, to provide an index of how well fish have been feeding. Levels of selected metals will be quantified in fish tissues.</p>	<p><b>Tathlina Lake</b> (60.5501, -117.5348)  <b>Kakisa Lake</b> (60.9334,-117.7181)  <b>Cameron River</b> (at the mouth)  <b>Cameron River Delta</b> (60.4422, -117.4701)</p>	Dehcho	2011	<p>*Annual reports will be submitted to the NWT Cumulative Impact Monitoring Program.</p> <p>*Regular reporting to the the community will take place.</p> <p>*Traditional knowledge information will be shared on a need-to-know basis and according to an information use agreement.</p>	<p>*Presentation made during the NWT Environmental Monitoring Results Workshop 2013 is found at: <a href="http://sdw.enr.gov.nt.ca/nwtdp_upload/Chicot-Palmer-Tathlina.pdf">http://sdw.enr.gov.nt.ca/nwtdp_upload/Chicot-Palmer-Tathlina.pdf</a></p>	<p>Email: <a href="mailto:cimp@aandc-aadnc.gc.ca">cimp@aandc-aadnc.gc.ca</a></p> <p><a href="http://nwtdiscoveryportal.enr.gov.nt.ca">http://nwtdiscoveryportal.enr.gov.nt.ca</a></p>	✓	✓
<p><b>Akaiicho Territory Government</b></p> <p><b>Yellowknives Dene, Deninu Kue, and Lutsel K'e Dene First Nations</b></p> <p><b>Fisheries and Oceans Canada - AAROM</b></p> <p><b>Partnerships with GNWT Environment and Natural Resources, Environment Canada, and AANDC Northern Contaminants Program and Cumulative Impact Monitoring Program</b></p>	<p>Aboriginal Aquatic Resource and Oceans Management (AAROM) Community-based Monitoring - Akaiicho Region</p>	<p>*The Akaiicho AAROM program monitors basic water quality and undertakes sport fishery and subsistence harvesting surveys with anglers through boat patrols/summer monitors. The aim is to help determine the ability of the water to sustain viable fish populations, and the suitability of fish for consumption. The goal of AAROM is to help Aboriginal groups participate effectively in advisory and decision-making processes used for aquatic resource management.</p> <p>*The Yellowknives Dene First Nation's Yellowknife River inconnu monitoring program will collect data within the Yellowknife River-Prosperous Lake system. Documentation will include gillnet-set information, biometrics of fish (size, age, gender, maturity), tissue samples for genetics and metal analysis, water quality measurements, and habitat characteristics for each location and gillnet set.</p> <p>*Lutsel K'e Dene First Nation's Ni hat'ni Dene Watching the Land monitoring program monitors the fisheries and water quality of the East Arm of Great Slave Lake (a proposed Thaidene Nene National Park). Monitors have been trained in scientific and traditional knowledge methodologies. AANDC's Northern Contaminants Program monitors contaminant levels in lake trout near Lutsel K'e.</p>	<p><b>Water quality</b> - physical parameters, depth, turbidity</p> <p><b>Fish health and habitat</b> - community food fishery catch, habitat studies, mercury analysis</p>	<p><b>Yellowknife River at Tartan Rapids</b> (62.5571, -114.2082)</p> <p><b>East arm of Great Slave Lake:</b>  <b>Lockhart River at mouth</b> (62.7980, -108.9466)  <b>Hoarfrost River at mouth</b> (62.8593, -109.2736)  <b>Barnston River at mouth</b> (62.9331, -110.2037)  <b>Waldron River at mouth</b> (62.9323, -110.5770)  <b>Talthelei Narrows</b> (62.6272, -111.4912)  <b>McLeod Bay</b> (62.8849, -110.3643)</p> <p><b>Fort Resolution</b> (61.1711,-113.6720)  Water intake pipe in the Resolution Bay areas</p>	North Slave	2011/2012	<p>*The AAROM coordinator and/or technical advisor report the results to the communities involved. Workshops have and continue to be held.</p> <p>*Fisheries and Oceans Canada analyzes and reports the results, and may publish the data.</p> <p>*Annual reporting to the AANDC Northern Contaminants Program and/or NWT Cumulative Impact Monitoring Program.</p>	<p>*See <a href="http://lutselkandthaidenenene.files.wordpress.com/2008/06/bennett-et-al-2010-indigenous-benefits-of-national-park.pdf">http://lutselkandthaidenenene.files.wordpress.com/2008/06/bennett-et-al-2010-indigenous-benefits-of-national-park.pdf</a></p>	<p><a href="http://www.dfo-mpo.gc.ca/lm-gp/aboriginal-autochtones/aarom-pagrao/index-eng.htm">http://www.dfo-mpo.gc.ca/lm-gp/aboriginal-autochtones/aarom-pagrao/index-eng.htm</a></p> <p><a href="http://www.akaiichterritory.com/Organization/Staff.aspx">http://www.akaiichterritory.com/Organization/Staff.aspx</a> (AAROM coordinator)</p> <p>Email: <a href="mailto:cimp@aandc-aadnc.gc.ca">cimp@aandc-aadnc.gc.ca</a></p>	✓	✓
<p><b>Yellowknives Dene First Nation</b></p> <p><b>AANDC - Cumulative Impact Monitoring Program</b></p> <p><b>Queens University</b></p>	<p>Establishing a Water Quality Dataset for Cumulative Effects Assessment in the North Slave</p>	<p>*The primary goal of this program is to understand what drives regional water quality variations in the North Slave (such as influence of landscape condition, ecology, lake size, catchment and latitude). Specific research questions regarding the influence of ice road development (Tibbitt-Contwoyo corridor) on water quality of North Slave lakes will be addressed. An additional outcome will be a compiled database housing water quality information collected throughout the North Slave region over the last 30 years.</p>	<p><b>Water quality</b> - physical parameters, depth</p> <p><b>Sediment quality</b> - sediment core sampling</p>	<p>Approximately 30 lakes in the North Slave region, near the Tibbitt to Contwoyo ice road (2013/2014)</p>	North Slave	2013	<p>*Annual reporting as part of the NWT Cumulative Impact Monitoring Program will take place.</p> <p>*Compiled water quality data will be publically available through the NWT Discovery Portal.</p> <p>*Research results will be reported through regional leadership meetings and to the communities.</p>	<p>*See NWT Discovery Portal for project reports.</p>	<p>Email: <a href="mailto:cimp@aandc-aadnc.gc.ca">cimp@aandc-aadnc.gc.ca</a></p> <p><a href="http://nwtdiscoveryportal.enr.gov.nt.ca">http://nwtdiscoveryportal.enr.gov.nt.ca</a></p>	✓	✓
<p><b>Numerous Aboriginal governments and communities</b></p> <p><b>GNWT - Environment and Natural Resources</b></p> <p><b>AANDC - Cumulative Impact Monitoring Program</b></p>	<p>Community-Based Water Monitoring</p>	<p>*Community-based water monitoring began in 2012 and continued in 2013. Water quality monitoring equipment was deployed near 17 communities along the Slave, Hay, Mackenzie, Great Bear River, Little Bear River, Peel, Liard, Yellowknife Rivers, Franks Channel, Slater and Bogg Creeks, Kakisa, Trout, and Great Slave Lakes. YSI sondes were used for continuous water quality monitoring. Polyethylene membrane devices (PMDs) and diffusive gradients in thin-films (DGTs) were used to monitor over a longer period (30 days and 3-5 days respectively). Monitoring stations were visited monthly during the ice free season to change equipment and take surface water grab samples.</p> <p>*Sampling was conducted in partnership with community members. Dehcho AAROM partnered to complete 9 Dehcho monitoring sites (see above). This program contributes to community-based monitoring development in NWT communities, including Sambaa K'e, Fort Good Hope and the Slave River and Delta Partnership (see descriptions below).</p>	<p><b>Water quality</b> - surface grab samples are analyzed for physical parameters, nutrients, ions, and total and dissolved metals. Ultralow total and dissolved mercury was introduced in 2013.</p> <p>The YSI sonde 6600 measures temperature, conductivity, pH, oxidation/reduction potential, dissolved oxygen, turbidity, chlorophyll. These measurements are taken every 2 hours.</p> <p>The polyethylene membrane devices (PMDs) measure dissolved polycyclic aromatic hydrocarbons and the diffusive gradients in thin-films (DGTs) measure dissolved metals, methyl mercury and vanadium.</p>	<p><b>Slave River</b> (at Fort Smith and Fort Resolution)  <b>Hay River</b> (at Hay River, at mouth and upstream of Northern Transportation Company Ltd.)  <b>Liard River</b> (at Fort Simpson (mouth))  <b>Mackenzie River</b> (at Fort Simpson, Fort Providence, Wrigley, Tullita, Norman Wells upstream and downstream, San Sault Rapids (2012 only), Fort Good Hope, Fort Good Hope upstream of Ramparts (2012 only), Tsiigehtchic upstream, East Channel at Inuvik)  <b>Peel River</b> (at Fort McPherson upstream of ferry, Aklavik)  <b>Trout Lake/Island River</b> - see below  <b>Yellowknife River</b> (upstream of Ingraham Bridge)  <b>Franks Channel</b> (upstream of Highway 3 bridge)  <b>Kakisa River</b> (downstream of Kakisa Lake)  <b>Rabbitskin River</b> (near Fort Good Hope, just upstream of Mackenzie River confluence)  <b>Jackfish Lake</b> (near Fort Good Hope)  <b>Great Bear River, Little Bear River, Slater Creek, Bogg Creek and Mackay Creek</b> (all just upstream of Mackenzie River confluence)  <b>Great Slave Lake</b> (in Resolution Bay)  <b>Arctic Red River</b> (near community of Tsiigehtchic)</p>	NWT-wide	2012 (12 sites) 2013 (36 sites)	<p>*Results are reported through community meetings, regional meetings, report cards and a calendar (2014). Data may be published.</p> <p>*Annual reports are submitted to the NWT Cumulative Impact Monitoring Program.</p>	<p>*See NWT Discovery Portal for project reports.</p>	<p>Data will be available on the NWT Water Stewardship website <a href="http://www.nwtwaterstewardship.ca">http://www.nwtwaterstewardship.ca</a></p> <p><a href="http://nwtdiscoveryportal.enr.gov.nt.ca">http://nwtdiscoveryportal.enr.gov.nt.ca</a></p> <p>Email: <a href="mailto:nwtwaterstewardship@gov.nt.ca">nwtwaterstewardship@gov.nt.ca</a></p>	✓	✓
<p><b>Numerous Aboriginal, federal, and community governments, and academic institution partners</b></p> <p><b>GNWT - Environment and Natural Resources</b></p> <p><b>AANDC - Cumulative Impact Monitoring Program</b></p>	<p>Slave River and Delta Partnership State of the Knowledge and Vulnerability Assessment</p>	<p>*The Slave River and Delta Partnership supports communities along the Slave River and Delta in developing research and monitoring to address concerns and questions raised by local residents about the water and the ecosystem.</p> <p>* In 2011/2012 the Partnership completed: a: State of the Knowledge Report about the Slave River and Delta; a vulnerability assessment and monitoring priorities; and, sampling of sediments from lakes in the Slave River Delta (sediment cores were taken and analyzed for types of contaminants). Community-based water monitoring began in 2012 (see above).</p> <p>*The Slave River and Delta Partnership is comprised of: NWT Métis Nation, Fort Resolution Métis Council, Fort Smith Métis Council, Deninu K'ue First Nation, Smith's Landing First Nation, Salt River First Nation, GNWT Department of Environment and Natural Resources, Fisheries and Oceans Canada, Environment Canada, Parks Canada (Wood Buffalo National Park), Aboriginal Affairs and Northern Development Canada, Aurora Research Institute, Aurora College, University of Waterloo, Wilfrid Laurier University, and, Center for Indigenous Environmental Resources.</p>	<p><b>Sediment quality</b></p> <p><b>Fish</b></p> <p><b>Water quality and quantity</b> (via existing federal government monitoring programs and at community-based sites)</p>	<p><b>Slave River near Fort Smith</b> (60.0161, -111.8897)  <b>Slave River near Fort Resolution</b> (61.2673, -113.4157)</p>	South Slave	2010	<p>*All results are reported to the communities first, through a workshop meeting or conference call. Results are also reported through regional meetings, report cards and a calendar (2014). Data may be published.</p> <p>*Reporting is also completed through the NWT Cumulative Impact Monitoring Program (see NWT Discovery Portal).</p>	<p>*See NWT Discovery Portal for project reports.</p>	<p>Email: <a href="mailto:nwtwaterstewardship@gov.nt.ca">nwtwaterstewardship@gov.nt.ca</a></p> <p><a href="http://www.nwtwaterstewardship.ca">http://www.nwtwaterstewardship.ca</a></p> <p><a href="http://nwtdiscoveryportal.enr.gov.nt.ca">http://nwtdiscoveryportal.enr.gov.nt.ca</a></p>	✓	✓
<p><b>Sambaa K'e Dene Band</b></p> <p><b>GNWT - Environment and Natural Resources</b></p> <p><b>AANDC - Cumulative Impact Monitoring Program</b></p>	<p>Community-based Water Monitoring in Trout Lake and Island River</p>	<p>*The GNWT and Sambaa K'e Dene Band are working together to develop a state of knowledge report and vulnerability assessment to prioritize community research and monitoring needs. Water quality monitoring programs began in 2012 at 8 sites at Trout Lake and Island River. This partnership follows a framework adapted to community-based monitoring.</p> <p>*Water quality monitoring equipment (YSI sondes, polyethylene membrane devices and diffusive gradients in thin-films) was deployed for continuous water quality monitoring. Polyethylene membrane devices (PMDs) and diffusion gradient in thin films (DGTs) were deployed to capture dissolved hydrocarbons and dissolved metals over a longer period. The sites are visited monthly during the ice free season to change equipment and take surface water grab samples. Monitoring is being undertaken in collaboration with the AAROM program (see Aboriginal government monitoring).</p>	<p><b>Water quality</b> - surface grab samples are analyzed for physical parameters, nutrients, ions, and total and dissolved metals. Ultralow total and dissolved mercury was introduced in 2013.</p> <p>The YSI sonde 6600 measures temperature, conductivity, pH, oxidation/reduction potential, dissolved oxygen, turbidity, chlorophyll. These measurements are taken every 2 hours.</p> <p>The polyethylene membrane devices (PMDs) measure dissolved polycyclic aromatic hydrocarbons and the diffusive gradients in thin-films (DGTs) measure dissolved metals, methyl mercury and vanadium.</p>	<p><b>Trout Lake</b> (60.4334,-121.2515)</p> <p>There are several sites in Trout Lake.</p>	Dehcho	2012 (7 sites) 2013 (4 sites)	<p>*All results are reported to the communities first, through a workshop meeting or conference call. Results are also reported through regional meetings, report cards and a calendar (2014).</p> <p>*Reporting is also completed through the NWT Cumulative Impact Monitoring Program (see NWT Discovery Portal).</p>	<p>*See NWT Discovery Portal for project reports as per the requirements of the NWT Cumulative Impact Monitoring Program funding.</p>	<p>Email: <a href="mailto:nwtwaterstewardship@gov.nt.ca">nwtwaterstewardship@gov.nt.ca</a></p> <p><a href="http://www.nwtwaterstewardship.ca">http://www.nwtwaterstewardship.ca</a></p>	✓	✓

# Northwest Territories Water Monitoring Inventory

Version 1 (November 2013)

ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
<b>K'asho Got'ine Charter Community Council</b>  <b>Yamoga Land Corporation</b>  <b>GNWT - Environment and Natural Resources</b>  <b>AANDC - Cumulative Impact Monitoring Program</b>	Community-based Water Monitoring along the Mackenzie River from Norman Wells to Fort Good Hope	<p>•GNWT Environment and Natural Resources and K'asho Got'ine Charter Community Council and Yamoga Land Corporation are working together to develop a state of knowledge report and vulnerability assessment to prioritize community research and monitoring needs. Water quality monitoring began in 2012 at 5 sites from upstream of Norman Wells to Fort Good Hope on the Mackenzie River. This partnership follows a framework adapted to community-based monitoring.</p> <p>•Water quality monitoring equipment (YSI sondes, polyethylene membrane devices and diffusive gradients in thin-films) was deployed for continuous water quality monitoring. Polyethylene membrane devices (PMDs) and diffusion gradient in thin films (DGTs) were deployed to capture dissolved hydrocarbons and dissolved metals over a longer period. The sites are visited monthly during the ice free season to change equipment and take surface water grab samples. Monitoring is being undertaken in collaboration with the AAROM program (see Aboriginal government monitoring).</p>	<p><b>Water quality</b> - surface grab samples are analyzed for physical parameters, nutrients, ions, and total and dissolved metals. Ultralow total and dissolved mercury was introduced in 2013.</p> <p>The YSI sonde 6600 measures temperature, conductivity, pH, oxidation/reduction potential, dissolved oxygen, turbidity, chlorophyll. These measurements are taken every 2 hours.</p> <p>The polyethylene membrane devices (PMDs) measure dissolved polycyclic aromatic hydrocarbons and the diffusive gradients in thin-films (DGTs) measure dissolved metals, methyl mercury and vanadium.</p>	<b>Mackenzie River</b> (6 sites from upstream of Norman Wells to Fort Good Hope)	Sahtu	2012 (5 sites) 2013 (7 sites)	<p>•All results are reported to the communities first, through a workshop meeting or conference call. Results are also reported through regional meetings, report cards and a calendar (2014).</p> <p>•Annual reports are submitted to the NWT Cumulative Impact Monitoring Program.</p>	<p>•See NWT Discovery Portal for project reports.</p>	Email: <a href="mailto:nwtwaterstewardship@gov.nt.ca">nwtwaterstewardship@gov.nt.ca</a>  <a href="http://www.nwtwaterstewardship.ca">http://www.nwtwaterstewardship.ca</a>	✓	✓
<b>Resource Management Boards</b>											
<b>Wek'èezhii Renewable Resource Board</b>  <b>Tìjchò Government</b>  <b>Wek'èezhii Land and Water Board</b>  <b>Fisheries and Oceans Canada</b>  <b>AANDC - Cumulative Impact Monitoring Program &amp; Northern Contaminants Program</b>	Tìjchò Aquatic Ecosystem Monitoring Program	<p>•The purpose is to develop and implement a monitoring program that meets the needs of the Tìjchò communities in determining how and if fish health, and water and sediment quality is changing over time and whether fish and water remain safe to consume. Sampling is based on both Tìjchò and scientific knowledge. Tìjchò youth, elders, traditional knowledge researchers, and scientists come together at annual camps to share knowledge and ways to assess the health of fish and their habitat. A Tìjchò scientific monitoring protocol and traditional knowledge based protocol are also being developed.</p> <p>•In 2010/2011 the focus was on Marian and Russell Lakes near Behchokò, in 2012 the camp was set up near Wekweèti, in 2013 was near Gamèti, and Whatì is scheduled for 2014. This program will complement the soon to be developed Marian Watershed Community-based Aquatic Effects Monitoring Program.</p>	<p><b>Water quality</b> - physical parameters, nutrients, total and dissolved metals, bacteriological, total suspended and dissolved solids</p> <p><b>Sediment quality</b> - physical parameters, nutrients, total and dissolved metals, total suspended and dissolved solids</p> <p><b>Fish health</b> - abundance, diversity, tissue metals</p>	<b>Russell Lake</b> (63.0002,-115.7847) <b>Marian Lake</b> (63.0002,-116.2514) <b>Siemon Lake</b> (63.2169,-116.0347) <b>Wekweèti</b> (64.1890,-114.179) <b>Gamèti</b> (64.11219,-117.35398) <b>Whatì</b> (63.1526,-117.24262)	Wek'èezhii	2011	<p>•Results are reported back to camp participants and community members through regular workshops.</p> <p>•A traditional knowledge indicators workshop took place in January 2012.</p> <p>•Production of videos and other communication tools are undertaken.</p> <p>•Annual reports are submitted to the NWT Cumulative Impact Monitoring Program.</p> <p>•Results are reported through the Wek'èezhii Renewable Resource Board website and facebook page</p>	<p>•NWT Cumulative Impact Monitoring Program final report - <i>Jhdak'èti Aquatic Ecosystem Monitoring Project Final Report - March 2012</i>  <a href="http://www.wrrb.ca/content/aquatic-ecosystem-monitoring-project">http://www.wrrb.ca/content/aquatic-ecosystem-monitoring-project</a></p> <p>•See NWT Discovery Portal for project reports.</p>	<a href="http://www.wrrb.ca/content/aquatic-ecosystem-monitoring-project">http://www.wrrb.ca/content/aquatic-ecosystem-monitoring-project</a>  Email: <a href="mailto:cimp@aandc-aadnc.gc.ca">cimp@aandc-aadnc.gc.ca</a>  <a href="http://nwtwaterstewardship.ca">http://nwtwaterstewardship.ca</a>	✓	✓
<b>Communities</b>											
<b>NWT Communities with Municipal Water Licences</b>	Surveillance Network Program monitoring as per type A or B water licences	<p>•Most NWT communities have a water licence (type A or B) for the use of water or deposit of waste for municipal water uses, while some smaller communities are in the process of obtaining water licences. The four larger communities with type A water licences are highlighted below. A condition of the water licence is regular monitoring of water quality through the Surveillance Network Program (SNP). Water quality may be monitored at the outflow of sewage lagoons, at the landfills to monitor for spread of contaminants, at storm sewer outlets and at other points of concern throughout or around the communities. Drinking water quality is monitored separately through the GNWT Municipal and Community Affairs (see above).</p>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), solids, organics, bacteriological, phenols, petroleum hydrocarbons, BTEX, ammonia (Note: parameters vary by community)	Aklavik, Ulukhaktok, Inuvik, Sachs Harbour, Tuktoyaktuk, Paulatuk, Fort McPherson, Tsiigehtchic, Deline, Norman Wells, Tulita, Fort Good Hope, Fort Liard, Fort Providence, Fort Simpson, Wrigley, Gamèti, Behchokò, Wekweèti, Whatì, Yellowknife, Dettah, Enterprise, Hay River, Fort Smith (Note: Fort Resolution, Lutsel'k'e, Nahanni Butte, Kakisa, Jean Marie River, Trout Lake and Colville Lake do not currently have water licences)	NWT-wide	Between 1970s and present depending on the community	<p>•SNP reports are posted on the public registries of the appropriate regulatory board (Mackenzie Valley Land and Water Board, Wek'èezhii Land and Water Board, Sahtu Land and Water Board, Gwich'in Land and Water Board or NWT Water Board).</p>	<p>•Annual reports and SNP reports are posted on public registries of the appropriate regulatory board.</p>	<a href="http://www.mvlwb.ca">http://www.mvlwb.ca</a> <a href="http://www.wlwb.ca">http://www.wlwb.ca</a> <a href="http://www.slwb.ca">http://www.slwb.ca</a> <a href="http://www.glwb.ca">http://www.glwb.ca</a> <a href="http://www.nwtwb.ca">http://www.nwtwb.ca</a>		
<b>City of Yellowknife</b>	Surveillance Network Program and Stormwater Effluent Monitoring Program as per type A water licence MV2009L3-007	<p>•Water quality is monitored at the outflow of sewage lagoons, at the landfill, and at other locations of concern within and around the community as part of the Surveillance Network Program (SNP) required under the water licence.</p> <p>•Water quality monitoring following spring freshet and during the summer is monitored at stormwater outlets flowing into surrounding lakes as part of the Stormwater Effluent Monitoring Program.</p>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), solids, organics, bacteriological, phenols, petroleum hydrocarbons, BTEX, ammonia	City of Yellowknife and surrounding waterbodies	North Slave	1974 (for SNP) 2009 (for Stormwater Effluent Monitoring Program)	<p>•SNP reports and Stormwater Effluent Monitoring Program reports (as part of the annual report) are posted on the Mackenzie Valley Land and Water Board public registry.</p>	<p>•Annual reports, Stormwater Effluent Monitoring Program reports and SNP reports are posted on Mackenzie Valley Land and Water Board public registry.</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		
<b>Town of Hay River</b>	Surveillance Network Program as per type A water licence MV2009L3-005	<p>•Water quality is monitored at the outflow of sewage lagoons and at the landfill, or other locations of concern within and around the community as part of the Surveillance Network Program (SNP) required under the water licence.</p>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), solids, organics, bacteriological, phenols, petroleum hydrocarbons, BTEX, ammonia	Town of Hay River and surrounding waterbodies	South Slave	1975	<p>•SNP reports are posted on the Mackenzie Valley Land and Water Board public registry.</p>	<p>•Annual reports and SNP reports are posted on the Mackenzie Valley Land and Water Board public registry.</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		
<b>Town of Fort Smith</b>	Surveillance Network Program as per type A water licence MV2011L3-001	<p>•Water quality is monitored at the outflow of sewage lagoons and at the landfill, or other locations of concern within and around the community as part of the Surveillance Network Program (SNP) required under the water licence.</p>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), solids, organics, bacteriological, phenols, petroleum hydrocarbons, BTEX, ammonia	Town of Fort Smith and surrounding waterbodies	South Slave	1981	<p>•SNP reports are posted on the Mackenzie Valley Land and Water Board public registry.</p>	<p>•Annual reports and SNP reports are posted on the Mackenzie Valley Land and Water Board public registry.</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		
<b>Village of Fort Simpson</b>	Surveillance Network Program as per type A water licence MV2003L3-011	<p>•Water quality is monitored at the outflow of sewage lagoons and at the landfill, or other locations of concern within and around the community as part of the Surveillance Network Program (SNP) required under the water licence.</p>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), solids, organics, bacteriological, phenols, petroleum hydrocarbons, BTEX, ammonia	Village of Fort Simpson and surrounding waterbodies	Dehcho	1976	<p>•SNP reports are posted on the Mackenzie Valley Land and Water Board public registry.</p>	<p>•Annual reports and SNP reports are posted on the Mackenzie Valley Land and Water Board public registry.</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		
<b>Industry</b>											
<b>Dominian Diamond Ekati Corporation</b>	Ekati Diamond Mine Surveillance Network Program as per type A water licence W2012L2-0001	<p>•The Ekati diamond mine opened in 1998 and is the NWT's first diamond mine (open pit and underground). It is located approximately 300km north of Yellowknife. The extensive Surveillance Network Program (SNP), as required under the water licence, consists of specific sites at which water quality and/or quantity are measured. It is designed to aid the proponent and regulators in ensuring the effluent quality criteria are being and will continue to be consistently met.</p>	<p><b>Water quality</b> - parameters monitored vary between SNP stations and include some or all of the following: physical parameters, major ions, total ammonia-n, total suspended solids, total dissolved solids, total metals, organics, bacteriological, nutrients</p> <p><b>Water quantity</b> - flow, volume and evaporation</p>	<b>North of Lac de Gras</b> (64.7167, -110.6500)	Wek'èezhii	1997	<p>•Monthly SNP reports outlining all data and information are submitted to the Wek'èezhii Land and Water Board including the results of the approved quality assurance/quality control program.</p>	<p>•Monthly SNP reports are found on the Wek'èezhii Land and Water Board public registry (see website).</p>	<a href="http://www.mvlwb.ca/WLWB/Registry.aspx">http://www.mvlwb.ca/WLWB/Registry.aspx</a>		
<b>Dominian Diamond Ekati Corporation</b>	Ekati Diamond Mine Aquatic Effects Monitoring Program as per type A water licence W2012L2-0001	<p>•The Ekati diamond mine opened in 1998 and is the NWT's first diamond mine (open pit and underground). It is located approximately 300km north of Yellowknife. The main objective of the Aquatic Effects Monitoring Program (AEMP) is to determine if the mine is having short- and long-term effects on the surrounding aquatic environment. AEMPs can indicate if the water quality standards set for a receiving environment are being met.</p> <p>•Control sites are established outside the immediate zone of influence of mining operations (reference conditions), and monitoring sites are established within the zone of influence. A summary of how Traditional Knowledge is collected and incorporated into the AEMP is provided. Special effects studies are carried out on an as needed basis to answer questions raised as a result of AEMP monitoring that require further investigation.</p>	<p><b>Water quality</b> - physical parameters, nutrients (including ammonia), metals, solids</p> <p><b>Water quantity</b> - stream flow</p> <p><b>Sediment quality</b> - hydrocarbons (special study)</p> <p><b>Zooplankton/phytoplankton</b></p> <p><b>Stream and lake benthos</b></p> <p><b>Fish health</b></p>	<b>North of Lac de Gras</b> (64.7167, -110.6500)	Wek'èezhii	1997	<p>•All AEMP data and information is submitted to the Wek'èezhii Land and Water Board on an annual basis.</p> <p>•The results of special effects studies are reported in the AEMP annual report.</p> <p>•A summary of AEMP information is provided in the Annual Environmental Agreement report, which is produced every year. The executive summary of this report is translated into several Aboriginal languages. Communities are updated during community visits.</p>	<p>•AEMP data and annual reports are found on the Wek'èezhii Land and Water Board public registry (see website).</p>	<a href="http://www.mvlwb.ca/WLWB/Registry.aspx">http://www.mvlwb.ca/WLWB/Registry.aspx</a>  See also Independent Environmental Monitoring Agency at <a href="http://www.monitoringagency.net">http://www.monitoringagency.net</a>	✓	
<b>Rio Tinto</b>	Diavik Diamond Mine Surveillance Network Program as per type A water licence W2007L2-0003	<p>•The Diavik diamond mine opened in 2003 and is the NWT's second diamond mine (initially open pit and now underground). It is located approximately 300km north of Yellowknife on the shore of Lac de Gras. The extensive Surveillance Network Program (SNP), as required under the water licence, consists of specific sites at which water quality and/or quantity are measured. It is designed to aid the proponent and regulators in ensuring the effluent quality criteria are being and will continue to be consistently met.</p>	<p><b>Water quality</b> - parameters monitored vary between SNP stations and include some or all of the following: physical parameters, major ions, total ammonia-n, total suspended solids, total dissolved solids, total metals (including mercury), organics, bacteriological, nutrients, dissolved organic carbon</p> <p><b>Water quantity</b> - flow, volume and evaporation</p>	<b>Lac de Gras</b> (64.5167, -110.1333)	Wek'èezhii	2001	<p>•Monthly SNP reports outlining all data and information are submitted to the Wek'èezhii Land and Water Board including the results of the approved quality assurance/quality control program.</p>	<p>•Monthly SNP reports are found on the Wek'èezhii Land and Water Board public registry (see website).</p>	<a href="http://www.mvlwb.ca/WLWB/Registry.aspx">http://www.mvlwb.ca/WLWB/Registry.aspx</a>		

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Version 1 (November 2013)

ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
Rio Tinto	Diavik Diamond Mine Aquatic Effects Monitoring Program as per type A water licence W2007L2-0003	<p>The Diavik diamond mine opened in 2003 and is the NWT's second diamond mine (initially open pit and now underground). It is located approximately 300km north of Yellowknife on the shore of Lac de Gras. The main objective of the Aquatic Effects Monitoring Program (AEMP) is to determine if the mine is having short- and long-term effects on the surrounding aquatic environment. AEMPs can indicate if the water quality standards set for a receiving environment are being met.</p> <p>Control sites are established outside the immediate zone of influence of mining operations (reference conditions), and monitoring sites are established within the zone of influence. A summary of how Traditional Knowledge is collected and incorporated into the AEMP is provided. Special effects studies are carried out on an as needed basis to answer questions raised as a result of AEMP monitoring that require further investigation.</p>	<p><b>Water quality</b> - physical parameters, nutrients (including ammonia), metals, solids</p> <p><b>Water quantity</b> - stream flow</p> <p><b>Sediment quality</b> - total organic carbon, bismuth, calcium, lead, uranium, potassium, sodium</p> <p><b>Zooplankton/phytoplankton</b></p> <p><b>Stream and lake benthos</b></p> <p><b>Fish health</b> - including palatability</p>	Lac de Gras (64.5167, -110.1333)	Wek'èezhii	2001	<p>All AEMP data and information is submitted to the Wek'èezhii Land and Water Board on an annual basis.</p> <p>The results of special effects studies are reported in the AEMP annual report.</p> <p>A summary of AEMP information is provided in the Annual Environmental Agreement report, which is produced every year. The executive summary of this report is translated into several languages. Communities are updated during community visits.</p>	<p>AEMP data and annual reports are found on the Wek'èezhii Land and Water Board public registry (see website).</p> <p>See also Environmental Monitoring Advisory Board at <a href="http://www.emab.ca">http://www.emab.ca</a></p>	<a href="http://www.mvlwb.ca/WLWB/Registry.aspx">http://www.mvlwb.ca/WLWB/Registry.aspx</a>	✓	
De Beers Canada Inc.	De Beers Snap Lake Mine Surveillance Network Program as per type A water licence MV2011L2-0004	<p>The Snap Lake diamond mine opened in 2008 and is the NWT's third diamond mine (underground). It is located approximately 300km northeast of Yellowknife. The extensive Surveillance Network Program (SNP), as required under the water licence, consists of specific sites at which water quality and/or quantity are measured. It is designed to aid the proponent and regulators in ensuring the effluent quality criteria are being and will continue to be consistently met.</p>	<p><b>Water quality</b> - parameters monitored vary between SNP stations and include some or all of the following: physical parameters, major ions, total ammonia-n, total suspended solids, total dissolved solids, total metals (including mercury), organics, bacteriological, nutrients</p> <p><b>Water quantity</b> - flow and volume</p>	Snap Lake (63.5833, -110.8667)	North Slave	2004	<p>Monthly SNP reports outlining all data and information are submitted to the Mackenzie Valley Land and Water Board including the results of the approved quality assurance/quality control program.</p>	<p>Monthly SNP reports are found on the Mackenzie Valley Land and Water Board public registry (see website).</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>	✓	
De Beers Canada Inc.	De Beers Snap Lake Mine Aquatic Effects Monitoring Program as per type A water licence MV2011L2-0004	<p>The Snap Lake diamond mine opened in 2008 and is the NWT's third diamond mine (underground). It is located approximately 300km northeast of Yellowknife. The main objective of the Aquatic Effects Monitoring Program (AEMP) is to determine if the mine is having short- and long-term effects on the surrounding aquatic environment. AEMPs can indicate if the water quality standards set for a receiving environment are being met.</p> <p>Control sites are established outside the immediate zone of influence of mining operations (reference conditions), and monitoring sites are established within the zone of influence. A summary of how Traditional Knowledge is collected and incorporated into the AEMP is provided. Special effects studies are carried out on an as needed basis to answer questions raised as a result of AEMP monitoring that require further investigation.</p>	<p><b>Water quality</b> - physical parameters, nutrients (including ammonia), metals (including mercury), solids, biological oxygen demand</p> <p><b>Water quantity</b> - stream flow</p> <p><b>Sediment quality</b> - total organic carbon, bismuth, calcium, lead, uranium, potassium, sodium</p> <p><b>Zooplankton/phytoplankton</b></p> <p><b>Stream and lake benthos</b></p> <p><b>Fish health</b> - including palatability</p>	Snap Lake (63.5833, -110.8667)	North Slave	2004	<p>All AEMP data and information is submitted to the Mackenzie Valley Land and Water Board on an annual basis.</p> <p>The results of special effects studies are reported in the AEMP annual report.</p> <p>A summary of AEMP information is provided in the Annual Environmental Agreement report, which is produced every year. The executive summary of this report is translated into several languages. Communities are updated during community visits.</p>	<p>AEMP data and annual reports are found on the Mackenzie Valley Land and Water Board public registry (see website).</p> <p>See also Snap Lake Mine Environmental Monitoring Agency at <a href="http://www.slema.ca">http://www.slema.ca</a></p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>	✓	
North American Tungsten	Cantung Mine Surveillance Network Program as per type A water licence MV2002L2-0019	<p>The Cantung mine is the NWT's only tungsten concentrate mine, located along the NWT/Yukon border along the Flat River, upstream of Nahanni National Park. Open pit mining began in 1962 and underground mining in 1974. The mine was shutdown 1986-2001 and 2003-2005, followed by shorter periods of care and maintenance due to low tungsten prices.</p> <p>The extensive Surveillance Network Program (SNP), as required under the water licence, consists of specific sites at which water quality and/or quantity are measured. It is designed to aid the proponent and regulators in ensuring the effluent quality criteria are being and will continue to be consistently met.</p>	<p><b>Water quality</b> - parameters monitored vary between SNP stations and include some or all of the following: physical parameters, major ions, nutrients, total ammonia, total suspended solids, total dissolved solids, total and dissolved metals (including mercury), organics (including BTEX), bacteriological</p> <p><b>Groundwater quality</b> - nutrients, total suspended solids, total and dissolved metals (including mercury), organics (BTEX), cyanide</p> <p><b>Water quantity</b> - flow and level</p>	Flat River at NWT/Yukon border (61.9500, -128.2666)	Dehcho	1975	<p>SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p>SNP reports are found on the Mackenzie Valley Land and Water Board public registry (see website).</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		
North American Tungsten	Cantung Mine Environmental Effects Monitoring (EEM)	<p>The Metal Mining and Effluent Regulations under the Fisheries Act requires all metal mines discharging effluent to undertake effluent monitoring and environmental effects monitoring (EEM) to evaluate the effects of treated mine effluent on fish and fish habitat.</p> <p>An EEM program consists of effluent and water quality monitoring and reporting, submission of a study design for biological monitoring, implementing the program in the field (reference and exposure areas), data interpretation, and submission of an interpretive report. The program consists of several phases and to date three phases have been completed at Cantung Mine (latest report submitted March 2013).</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total suspended solids, total and dissolved metals (including mercury), radium, cyanide</p> <p><b>Sediment quality</b> - total organic carbon, total metals (including mercury)</p> <p><b>Fish health</b></p> <p><b>Benthic invertebrates</b></p>	Flat River at NWT/Yukon border (61.9500, -128.2666)	Dehcho	2006	<p>Reports for each phase of the EEM program are submitted to Environment Canada. Reports are also found on the Mackenzie Valley Land and Water Board website.</p>	<p>EBA Engineering Consultants Ltd. (2013). <i>Cantung Mine Metal Mining Effluent Regulations Third Interpretive Report for Environmental Effects Monitoring Studies</i>. March 2013</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		
Canadian Zinc Corporation	Prairie Creek Mine Surveillance Network Program as per type A water licence MV2008L2-0002	<p>In September 2013 a type A water licence (MV2008L2-0002) was issued for the use of water and disposal of waste associated with mining and milling of zinc, following the environmental assessment phase. A Surveillance Network Program (SNP) has been in place since 2003 for mining exploration, underground decline development and operation of a metallurgical pilot plant (see type B water licence MV2001L2-0003).</p> <p>An expanded SNP consisting of specific sites at which water quality and/or quantity are measured is in place. It is designed to aid the proponent and regulators in ensuring the effluent quality criteria are being and will continue to be consistently met. An Aquatic Effects Monitoring Program (AEMP) and Environmental Effects Monitoring (EEM) will also be required once construction is underway.</p> <p>The mine site is located within the Nahanni National Park watershed.</p>	<p><b>Water quality</b> - parameters monitored vary between SNP stations and include some or all of the following: physical parameters, major ions, nutrients, total ammonia, total suspended solids, total dissolved solids, total metals (including mercury), organics (including total petroleum hydrocarbons), bacteriological, cyanide</p> <p><b>Water quantity</b> - stream flow</p>	Prairie Creek (61.5500, -124.4000)	Dehcho	2003	<p>SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p> <p>Once AEMP and EEM programs are implemented, reports will also be submitted.</p>	<p>Dube, M. and Harwood A. (2010). <i>Development of Site-Specific Water Quality Guidelines for Prairie Creek, NWT</i>. Report prepared for Canadian Zinc, Saskatchewan Research Council Publication No. 10432-1C10.</p> <p>SNP reports are found on the Mackenzie Valley Land and Water Board public registry (see website).</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		
De Beers Canada Inc.	Gahcho Kue Diamond Project Baseline Monitoring Program as per type A water licence application MV2005L2-0015 Surveillance Network Program as per type B water licence MV2003L2-0005 for advanced exploration	<p>The Gahcho Kue diamond project is located in the North Slave region at Kennedy Lake. If approved the mine will consist of open pits (created by draining lakes), and associated roads, camp and diamond processing facility.</p> <p>Baseline studies have been conducted in Kennedy Lake and downstream lakes and streams to support the Environmental Impact Statement (EIS) as part of the Environmental Impact Review (EIR) process. The Report of EIR was approved in October 2013. De Beers has committed to continue ongoing data collection prior to mine construction until collection is no longer required or these activities evolve into future monitoring programs associated with an approved Project.</p> <p>Surveillance Network Program (SNP) monitoring began in 2004 as a requirement of the type B water licence for advanced exploration. An expanded SNP and an Aquatic Effects Monitoring Program (AEMP) will be outlined in the type A water licence following the regulatory phase</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total ammonia, total suspended solids, total dissolved solids, total and dissolved metals (including mercury), organics, as well as automated water quality monitoring</p> <p><b>Sediment quality</b> - texture, nutrients, metals (including mercury), organics</p> <p><b>Water quantity</b> - flow</p> <p><b>Fish health and habitat</b> - substrate, plankton, bank/shoreline characteristics</p> <p><b>Benthic invertebrates</b></p>	Kennedy Lake watershed (63.4189, -109.2000)	North Slave	2004 (Surveillance Network Program) 2011-2012 supplemental baseline data	<p>Meetings have taken place in all affected communities to provide updates.</p> <p>SNP, supplemental monitoring and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p> <p>Monitoring data were submitted to the Mackenzie Valley Review Board as part of environmental impact review process.</p>	<p>The 2010 Environmental Impact Statement was submitted to the Mackenzie Valley Review Board.</p> <p>The 2012 Water Quality and Sediment Quality Supplemental Monitoring Report and 2012 Fish and Aquatic Resources Supplemental Monitoring Report were submitted to the Mackenzie Valley Review Board</p> <p>SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a> <a href="http://www.reviewboard.ca/registry">http://www.reviewboard.ca/registry</a>		
Fortune Minerals Ltd.	NICO project Surveillance Network Program as per type B water licence W2011L2-0002 for advanced mineral exploration Type A water licence application W2008L2-0004	<p>The proposed cobalt-gold-bismuth mining and milling NICO project is within the Tlìchò territory and part of the Wek'èezhii co-management lands. The mine site will be comprised of open pit and underground operations, ore processing mill facilities, tailings and mine rock management areas, a camp site, waste management facilities, an effluent treatment facility and roads.</p> <p>A type B water licence for advanced mineral exploration and associated Surveillance Network Program (SNP) has been in place since 2004 (six SNP stations are sampled). In 2008 a type A water licence application was submitted for the development of the mine. The environmental assessment was approved by the Minister of AANDC and the Tlìcho Government in July 2013. The site is currently under care and maintenance until a type A water licence consisting of an expanded SNP and Aquatic Effects Monitoring Program (AEMP) is issued once the regulatory phase is complete. Environmental Effects Monitoring (EEM) will also be required in the future.</p>	<p><b>Water quality</b> - physical parameters, nutrients, solids, ammonia, organics, total metals, total arsenic, bacteriological</p> <p><b>Fish health and habitat</b></p>	50km northwest of Whati (63.5500, -116.7500)	Wek'èezhii	2004 (Surveillance Network Program)	<p>SNP reports are submitted to the Wek'èezhii Land and Water Board.</p> <p>Monitoring data were submitted to the Mackenzie Valley Review Board as part of environmental assessment process.</p>	<p>SNP reports are submitted to the Wek'èezhii Land and Water Board.</p> <p>The 2011 Environmental Impact Statement was submitted to the Mackenzie Valley Review Board.</p>	<a href="http://www.mvlwb.ca/WLWB/Registry.aspx">http://www.mvlwb.ca/WLWB/Registry.aspx</a> <a href="http://www.reviewboard.ca/registry">http://www.reviewboard.ca/registry</a>		



# Northwest Territories Water Monitoring Inventory

Version 1 (November 2013)

ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
<b>Avalon Rare Metals Inc.</b>	Thor Lake Rare Earth Element Project  Type A water licence application MV2010L2-0005	<p>The Thor Lake Rare Earth Element project for mining and milling rare earth elements (carbonate and oxides, zirconium, niobium and tantalum oxides, and gallium) has two locations. The underground mine will be at the Nechalacho site near Thor Lake and will include a flotation plant, tailings management facility, access road and barge docking facilities on Great Slave Lake. The associated metallurgical plant will be located at the former Pine Point mine area, south of Great Slave Lake.</p> <p>In 2010 a type A water licence application was submitted for the development of the mine and the environmental assessment (EA) was approved in November 2013. Surface and groundwater quality baseline sampling took place at both the Thor Lake and Pine Point sites. No active monitoring was underway during the EA process. A type A water licence outlining a Surveillance Network Program (SNP) and Aquatic Effects Monitoring Program (AEMP) will be issued once the regulatory phase is complete. Environmental Effects Monitoring (EEM) will also be required in the future.</p>	<p><b>Groundwater quality</b> - physical parameters, nutrients, major ions, total and dissolved metals, and organics (total organic carbon)</p> <p><b>Water quality</b> - physical parameters, nutrients, major ions, total metals, cyanides, radionuclides (radium-226, radium-228, lead-210, thorium-230 and thorium-232)</p>	<p><b>Thor Lake</b> (mine site)- 100km southeast of Yellowknife (62.1208, -112.6007) <b>Pine Point</b> (metallurgical plant) - 85km east of Hay River (60.8884, -114.4185)</p>	North Slave	2008	<p>Monitoring data were submitted to the Mackenzie Valley Review Board as part of environmental impact review process.</p>	<p>The 2011 Environmental Impact Statement was submitted to the Mackenzie Valley Review Board.</p>	<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a> <a href="http://www.reviewboard.ca/registry">http://www.reviewboard.ca/registry</a></p>		
<b>Tyhee Development NWT Ltd</b>	Yellowknife Gold Project Surveillance Network Program as per type B water licence MV2002L2-0017 for advanced exploration  Type A water licence application for mining and milling MV2008L2-0003 was referred to environmental assessment	<p>The proposed Yellowknife Gold Project north of Yellowknife is based on open pit mining the Ormsby and Nicholas Lake deposits followed by underground operations, and milling at the Ormsby property.</p> <p>In 2008 a type A water licence application was submitted for mine development. The project was referred to environmental assessment (EA) and the environmental impact statement was submitted to the Review Board in 2011. Tyhee has requested the EA process be put on hold due to poor market conditions.</p> <p>A type B water licence for advanced mineral exploration and the associated Surveillance Network Program has been in place since 2003.</p> <p>The site is located very close to the AANDC Discovery Mine remediation project and one of the lakes within the Yellowknife Gold Project has received untreated tailings from the historic Discovery mine and receives surface runoff from these tailings.</p>	<p><b>Water quality</b> - physical parameters, nutrients, major ions, total metals, solids, bacteriological, organics</p>	<b>Ormsby Lake</b> (63.1833, -113.8500)	North Slave, South Slave	2003	<p>SNP reports are submitted to the Mackenzie Valley Land and Water Board.</p> <p>Monitoring data are submitted to the Mackenzie Valley Review Board as part of environmental assessment process.</p>	<p>Annual SNP reports are submitted to the Mackenzie Valley Land and Water Board.</p> <p>The 2011 Environmental Impact Statement was submitted to the Mackenzie Valley Review Board.</p>	<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a> <a href="http://www.reviewboard.ca/registry">http://www.reviewboard.ca/registry</a></p>		
<b>Nighthawk Gold Corp Inc.</b>	Indin Lake area Advanced mineral exploration program  Surveillance Network Program as per type B water licence W2012L1-0002	<p>Advanced exploration for gold is taking place on the Indin Lake property which includes the former Colomac Mine property (remediated by AANDC). Nighthawk acquired the mineral claims and leases from AANDC. The camp and fuel storage facilities have recently been moved to the Colomac mine site. The Damoti site includes a portal, decline ramp, waste rock/ore pile area, and historic settling pond, monitored under the Surveillance Network Program (SNP) for the water licence (and previous water licences). Other sites which have previously been explored are being reclaimed.</p> <p>A more comprehensive water quality monitoring program was requested by the Wek'èezhii Land and Water Board thus Nighthawk will be adding SNP stations to better monitor and understand water quality downstream of the Damoti waste rock and ore piles.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, solids, total metals (including mercury), bacteriological</p> <p><b>Water quantity</b> - flow and volume</p>	<p><b>40km west of Wekweti</b> Min/Max Latitude (64.1028 / 64.5058) Min/Max Longitude (-115.0214 / -115.3786)</p>	Wek'èezhii	2006	<p>SNP reports are submitted to the Wek'èezhii Land and Water Board.</p> <p>Monitoring data were submitted to the Mackenzie Valley Review Board as part of environmental assessment process.</p>	<p>Monthly SNP reports are found on the Wek'èezhii Land and Water Board public registry.</p>	<p><a href="http://www.mvlwb.ca/WLWB/Registry.aspx">http://www.mvlwb.ca/WLWB/Registry.aspx</a></p>		
<b>Newmont North America - Miramar Northern Mining Ltd.</b>	Con Mine Surveillance Network Program as per type A water licence MV2007L8-0025	<p>Con Mine's type A water licence (MV2007L8-0025) was issued for closure activities including the initial closure phase from 2007 to 2010 (decommissioning, demolition, site cleanup and revegetation) and the initial phase of post-closure monitoring and maintenance of the site (2011-2013). In 2003, the gold mine was closed after 65 years of mining in Yellowknife.</p> <p>A Surveillance Network Program (SNP) is in place to monitor treated effluent from the water treatment plant, surface water quality, groundwater quality, seepage water quality at sump locations, and mine water quality. The groundwater monitoring program is further described below.</p>	<p><b>Water quality</b> - parameters monitored vary between SNP stations and include some or all of the following: physical parameters, major ions, nutrients, total ammonia, total suspended solids, total dissolved solids, total metals (including mercury), organics (including total petroleum hydrocarbons), cyanide</p>	<b>Con Mine, Yellowknife</b> (62.4330, -114.3830)	North Slave	1977 (original SNP) 2004 (current SNP post-production)	<p>SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p>SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a></p>		
<b>Newmont North America - Miramar Northern Mining Ltd.</b>	Con Mine Groundwater Monitoring Program as per type A water licence MV2007L8-0025 Surveillance Network Program	<p>The shallow groundwater well monitoring system for Con Mine consists of 20 active monitoring wells to characterize the shallow groundwater regime under each of the mine facilities and in the adjacent areas. Eight wells were installed in 2004/2005 and the well network was expanded in 2008 to include an additional 12 monitoring wells in the Crank Lake tailings containment area, the Rat Lake Area, the Upper, Middle, and Lower Pud tailings containment area (Pud Area), and Negus Area.</p> <p>The objectives of the groundwater monitoring program at Con Mine are to characterize water table elevations and groundwater quality of the shallow aquifer on the mine property as outlined in the approved closure and reclamation plan, and to provide data demonstrating that the closure and reclamation activities are achieving proposed remediation objectives. The groundwater beneath Con Mine consists of a deep bedrock system that is currently flooding the voids in the underground mine workings, and an upper near-surface aquifer system.</p>	<p><b>Ground water quality</b> - physical parameters, major ions, nutrients, total ammonia, total suspended solids, total dissolved solids, total metals (including mercury), organics (including BTEX), cyanide</p> <p><b>Flow regime and water table elevation</b></p>	<b>Con Mine, Yellowknife</b> (62.4330, -114.3830)	North Slave	2004	<p>Annual groundwater monitoring program reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p>Miramar Northern Mining Ltd. Con Mine Groundwater Monitoring Program 2011 Annual Report</p>	<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a></p>		
<b>Newmont North America - Miramar Northern Mining Ltd.</b>	Con Mine Environmental Effects Monitoring (EEM)	<p>The Metal Mining and Effluent Regulations (MMER) under the Fisheries Act require all metal mines discharging effluent to undertake effluent monitoring and environmental effects monitoring (EEM) to evaluate the effects of treated mine effluent on fish and fish habitat.</p> <p>An EEM program consists of effluent and water quality monitoring and reporting, submission of a study design for biological monitoring, implementation of the program in the field (reference and exposure areas), data interpretation, and submission of an interpretive report. The program consists of several phases and to date three phases have been completed at Con Mine.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total ammonia, total suspended solids, total dissolved solids, total metals (including mercury), cyanide, radium 226</p> <p><b>Sediment quality</b></p> <p><b>Fish health</b></p> <p><b>Benthic invertebrates</b></p>	<b>Con Mine, Yellowknife</b> (62.4330, -114.3830)	North Slave	2003	<p>Reports for each phase of the EEM program are submitted to Environment Canada. Reports are also found on the Mackenzie Valley Land and Water Board website.</p>	<p>Golder 2010. Miramar Northern Mining Ltd. Con Mine Environmental Effects Monitoring Phase 3 Investigation of Cause Final Report</p>	<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a></p>		
<b>Teck Cominco Metals Ltd.</b>	Pine Point Care and Maintenance Operations Surveillance Network Program as per type B water licence MV2006L2-0013	<p>Teck Cominco Ltd.'s zinc and lead mine at Pine Point operated between 1964 and 1988. The first water licence was issued in 1975. Tailings from the milling operation were deposited into the tailings disposal area located immediately north of the mill site.</p> <p>Since mine closure in 1988, monitoring of treated effluent discharge from the tailings pond at the former mine site has been ongoing as part of the Surveillance Network Program under the water licence for care and maintenance operations.</p>	<p><b>Water quality</b> - physical parameters, solids, total zinc, total lead, total copper</p>	<p><b>Pine Point, South shore of Great Slave Lake - 85 km east of Hay River</b> Min/Max Latitude (60.8949, -114.4185)</p>	South Slave	1975 Post closure monitoring 1990 to present	<p>SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p>SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a></p>		
<b>Strategic Oil &amp; Gas Ltd. (formerly Paramount Resources Ltd.)</b>	Cameron Hills, NWT Project Site-Wide Monitoring Program as per type A water licence MV2010L1-0001	<p>The Cameron Hills project consists of oil and gas exploration, development, production, and associated activities as per the type A water licence. A site-wide monitoring program is being developed to ensure that management and mitigations are effective in either reducing or avoiding potential impacts on water. Currently project components or activities that are the focus of annual monitoring include runoff from disturbed land surfaces, runoff from retention ponds, the disposal of drilling wastes into sumps, decant or discharge of wastewater, main camp sewage lagoon, and pipeline water course crossings.</p>	<p><b>Water quality</b> - physical parameters, nutrients, metals, solids, bacteriological, organics (oil and grease), biological oxygen demand</p>	<b>Cameron Hills</b> (60.3500, -117.6700)	South Slave	2011	<p>Once the Site-Wide Monitoring Program is approved an Annual Report will be submitted to the Mackenzie Valley Land and Water Board.</p>		<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a></p>		
<b>Imperial Oil Resources Ltd.</b>	Norman Wells Surveillance Network Program and 5yr Aquatic Effects Monitoring Program as per type A water licence S03L1-001	<p>The Norman Wells oil and gas operation consists of producing wells drilled from natural and artificial islands, and a central processing facility which also generates electricity and provides natural-gas service for the town of Norman Wells. There are two active Surveillance Network Program (SNP) stations on site as required under the water licence. The SNP is designed to aid the proponent and regulators in ensuring that effluent quality criteria are being and will continue to be consistently met.</p> <p>A 5 year Aquatic Effects Monitoring Program (AEMP) was completed to determine if the operation was effecting the surrounding aquatic environment.</p>	<p><b>Water quality</b> - physical parameters, nutrients (including ammonia), solids, metals, organics (phenols, oil and grease, PAHs)</p> <p><b>Sediment quality</b> - physical parameters, metals, organics (including PAHs) (AEMP only)</p> <p><b>Fish health</b> (AEMP only)</p>	<b>Mackenzie River at Norman Wells</b> (65.2833, -126.8500)	Sahtu	1984 (SNP) AEMP 2002-2007	<p>SNP reports and AEMP report are submitted to the Sahtu Land and Water Board.</p>	<p>SNP and AEMP data are found on the Sahtu Land and Water Board public registry.</p>	<p><a href="http://mvlwb.ca/Boards/slwb/SitePages/registry.aspx">http://mvlwb.ca/Boards/slwb/SitePages/registry.aspx</a></p>		

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ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
Conoco Phillips Canada	Surface and Groundwater Monitoring Program as per type B water licences S12L1-005 and S13L1-004 (exploration licence 470)	<p>Oil and gas exploration is taking place in the Tulita District. A type B water licence was issued in 2013 for horizontal drilling and hydraulic fracturing and an earlier type B water licence was issued for vertical drilling in 2012, both for 5 year periods for the use of water in oil and gas exploration. The 2013 water licence is the first water licence issued in the NWT for hydraulic fracturing.</p> <p>A Surface and Groundwater Monitoring Plan, including monitoring locations, depths of wells, frequency of monitoring events, chemical parameters tested, and data analysis, has been developed due to concerns related to hydraulic fracturing drilling techniques and associated use of chemical additives, as well as concerns about the volume of water used, quality of water, and potential cumulative effects. Additionally, a Surveillance Network Program (SNP) station is in place for the 2012 water licence to monitor sewage effluent discharge at the camp.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total suspended solids, total dissolved solids, total and dissolved metals (including mercury), organics, bacteriological at up to three monitoring wells on each of five monitoring well pads quarterly, and surface water samples from a minimum of nine water sources sampled semi-annually during open water season</p> <p><b>Water quantity</b> - surface water volumes withdrawn by source per month and annually and depth to groundwater (quarterly monitoring)</p>	South-west side of the Mackenzie River, south of Norman Wells (65.6764, -127.3211)	Sahtu	2012	<p>Surface and groundwater monitoring plan results are to be reported in the Annual Report submitted to the Sahtu Land and Water Board.</p>	<p>Surface and groundwater monitoring plan results and SNP data are found on the Sahtu Land and Water Board public registry.</p>	<a href="http://mvlwb.ca/Boards/slwb/SitePages/registry.aspx">http://mvlwb.ca/Boards/slwb/SitePages/registry.aspx</a>		
Husky Oil Operations Limited	Surface and Groundwater Monitoring Program as per type A land use permit S12X-006 (linked to type B water licences S11L1-003 and S13L1-005 (exploration licences 462 and 463))	<p>Oil and gas exploration is taking place in the Slater River and Tulita Districts. A type B water licence was issued in 2013 for horizontal drilling and hydraulic fracturing in the Slater River District and an earlier type B water licence was issued in 2011 for vertical drilling in the Tulita District, both for 5 year periods for the use of water in oil and gas exploration.</p> <p>A Surface and Groundwater Monitoring Plan, including monitoring locations, depths of wells, frequency of monitoring events, chemical parameters tested, and data analysis, has been developed due to concerns related to hydraulic fracturing drilling techniques and associated use of chemical additives, as well as concerns about the volume of water used, quality of water, and potential cumulative effects. This monitoring plan is associated with the type A land use permit S12X-006.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total suspended solids, total dissolved solids, total and dissolved metals (including mercury), organics, bacteriological at up to ten monitoring wells on each of seven monitoring well pads quarterly, and surface water samples from a minimum of 39 water sources sampled semi-annually during open water season</p> <p><b>Water quantity</b> - flow volumes will be monitored at selected locations (Slater River, Bogg Creek)</p> <p><b>Sediment quality</b> - sampling is proposed in both 2013 and 2015 to capture sediment characteristics both early and late within the monitoring period (2012-2015)</p>	South-southeast of Norman Wells (approximately 40km) (65.0984, -126.2680)	Sahtu	2012	<p>Surface and groundwater monitoring plan results are to be reported in the Annual Report submitted to the Sahtu Land and Water Board.</p> <p>Husky will also prepare a "plain language" summary report and share information gathered for the programs with the community and community leadership during public consultations. The report will include recommendations for any changes.</p>	<p>Surface and groundwater monitoring plan results and SNP data are found on the Sahtu Land and Water Board public registry.</p>	<a href="http://mvlwb.ca/Boards/slwb/SitePages/registry.aspx">http://mvlwb.ca/Boards/slwb/SitePages/registry.aspx</a>		
Northwest Territories Power Corporation	Talston Hydro Project Water Effects Monitoring Program as per type A water licence MV2011L4-0002	<p>As water is stored and diverted for power generation, water level and flow are monitored as per its Surveillance Network Program (SNP) (see water quantity).</p> <p>The Water Effects Monitoring Program (WEMP) began in 2003 to describe existing conditions of water, ice, fish and furbearers in and around the Talston Hydro project. The WEMP was initiated under water licence N1L4-0154. Intensive sampling occurred in 2003/04 and some sampling continues on a 5 year cycle. The aquatic sampling program is limited to Nonacho and Rutledge lakes. The hydrology and ice component is extensive, with monitoring from upstream of Nonacho reservoir down to Great Slave Lake.</p> <p>Water quantity, quality, fish and wildlife data were collected during the environmental assessment process for the proposed, but now discontinued, expansion of the Talston hydro dam by the Deze Energy Corporation. Data is still available on the public registry.</p>	<p><b>Water quality</b> - physical parameters, nutrients, total dissolved solids, physical limnology (transparency), mercury analysis in aquatic plants</p> <p><b>Sediment quality</b> - mercury</p>	Talston River area including Nonacho Lake (61.0417, -110.1666) (approximately 64km north of Fort Smith)	South Slave	2003	<p>Annual reports and WEMP are submitted to the Mackenzie Valley Land and Water Board.</p>	<p>The WEMP reports are found on the Mackenzie Valley Land and Water Board public registry at: <a href="http://www.mvlwb.ca/Boards/mv/SitePages/search.aspx?app=N1L4-0154">http://www.mvlwb.ca/Boards/mv/SitePages/search.aspx?app=N1L4-0154</a></p> <p>Reports pertaining to the now discontinued environmental assessment for the Talston expansion are available on the Mackenzie Valley Review Board public registry.</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a> <a href="http://www.reviewboard.ca/registry">http://www.reviewboard.ca/registry</a>		
Northwest Territories Power Corporation	Bluefish Power Generation Facilities Surveillance Network Program as per type A water licence MV2005L4-0008  Aquatic Monitoring Program as per type A water licence MV2009L4-0004 for dam replacement	<p>As water is stored and diverted for power generation, water level and flow are monitored as per its Surveillance Network Program (SNP) (MV2005L4-0008) (see water quantity).</p> <p>A type A water licence (MV2009L4-0004) is in place for the replacement of the Bluefish dam which was recently completed. An Aquatic Monitoring Program was developed for the construction and post-construction period (2013/14) to monitor potential impacts from construction on water quality. Additionally, a Mercury Special Effects Study terms of reference is in place in order to determine the effects of the release of methyl mercury as a result of flooding the area upstream of the new Bluefish Lake Dam. The studies mentioned above are cross referenced between the two water licences.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, solids, turbidity, total metals</p> <p><b>Water quantity</b> - water flow, water level</p> <p><b>Sediment quality and fish</b> - mercury</p>	Yellowknife River and Duncan, Bluefish and Prosperous Lakes (62.6830, -114.2686)	North Slave	1990 (SNP water flow only) 2012 (Aquatic monitoring program)	<p>Annual reports are submitted to the Mackenzie Valley Land and Water Board.</p>	<p>The Aquatic Monitoring Plan is found on the Mackenzie Valley Land and Water Board website.</p>	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		

Academia - Numerous academic research/monitoring programs take place through the NWT Cumulative Impact Monitoring Program, Wilfrid Laurier University/GNWT Environment and Natural Resources partnership, and other initiatives. Contact [nwtwaterstrategy@gov.nt.ca](mailto:nwtwaterstrategy@gov.nt.ca) for more information, see the Aurora Research Institute for research permits at <http://data.nwtresearch.com>, or see CIMP's comprehensive project list at <http://www.aadnc-aandc.gc.ca/eng/1353423269390/1353423371305>

**Water and Sediment Quality**  
**Past Monitoring or Research**  
 \*Only limited past monitoring and research undertaken predominantly by the federal government is highlighted at this time. Please see Aurora Research Institute at <http://data.nwtresearch.com> for past research undertaken by academia or industry.

**Federal Government**

Environment Canada partnership with Aboriginal Affairs and Northern Development Canada (AANDC)	Arctic Wastewater Research	<p>The objective of this research was to assess the performance of lagoons and wetlands in the treatment of municipal wastewater in Canada's Arctic as part of the Canada-wide Strategy for the Management of Municipal Wastewater Effluent which includes national performance standards for the release of total suspended solids, carbonaceous biochemical oxygen demand and total residual chlorine in municipal wastewater effluent.</p> <p>Samples were taken from the influent (raw sewage) and effluent (treated wastewater) during the period of discharge at the wastewater system. A single sample has been taken at most NWT communities; for lagoons that discharge continuously over the summer, samples were taken at least twice. Intensive sampling took place in Fort Providence, Paulatuk, Ulukhaktok, and Behchoko.</p>	<p><b>Raw sewage and treated wastewater quality</b> - physical parameters, nutrients, major ions, total and dissolved metals, hydrocarbons, bacteriological, residual chlorine, carbonaceous biochemical oxygen demand, total suspended solids, chlorophyll (2011 only)</p>	Aklavik, Ulukhaktok, Inuvik, Sachs Harbour, Tuktoyaktuk, Paulatuk, Fort McPherson, Tsiigehtchic, Déline, Norman Wells, Tulita, Fort Liard, Fort Providence, Fort Simpson, Jean Marie River, Nahanni Butte, Trout Lake, Wrigley, Gameti, Behchoko, Edzo, Wekweëti, Whati, Yellowknife, Dettah, Enterprise, Hay River, Lutselkè, Fort Smith	NWT-wide	2007-2012	<p>A summary of data/information is sent to communities and is available to the public upon request.</p> <p>Some of the reports are available on the Northern Research Working Group (NRWG) website.</p>	<p>Dillon Consulting Ltd. (2011). <i>Canada-Wide Strategy for the Management of Municipal Wastewater Effluent - Northern Research Working Group: 2007-2010 Summer Sampling Final Report</i>. March 31, 2011</p>	<a href="http://www.mvlwb.ca/NRWG/default.aspx">http://www.mvlwb.ca/NRWG/default.aspx</a>		
Environment Canada	Northern Energy Project	<p>The purpose of the project was to collect baseline data for sites that would be crossed by the Mackenzie Gas Pipeline, and test equipment and methods for a future automated monitoring program.</p> <p>Sondes were deployed at three locations along the proposed Mackenzie Gas Pipeline route during open water season and transmitted near real-time water quality data via satellite uplink for five parameters.</p>	<p><b>Water quality</b> - physical parameters, total and dissolved metals, major ions, nutrients</p>	The three automated monitoring sites were located at: Oscar Creek near its mouth (65.4333, -127.4561) Travaillant River (67.4666, -131.5022) Jean-Marie-River at Highway 1	Gwich'in, Sahtu, Dehcho	2005-2009	<p>Data from water samples are stored in a national database (ACBIS) and are available upon request.</p>	<p>Pippy, K.A. et al. 2010. <i>Water Quality Monitoring and Surveillance Activities Associated with the Mackenzie Gas Project in the Mackenzie Valley</i>. Environment Canada, Water Quality Monitoring and Surveillance Division</p>	Email: <a href="mailto:enviroinfo@ec.gc.ca">enviroinfo@ec.gc.ca</a>		
Environment Canada Fisheries and Oceans Canada AANDC	Northern Energy Project	<p>The purpose of the Northern Oil and Gas Science Research Initiative was to collect baseline information on water courses that would be crossed by the proposed Mackenzie Gas Project by monitoring water quality in addition to biota characterization, fish habitat, shorebirds/waterfowl, permafrost and climate.</p>	<p><b>Water quality</b> - physical parameters, total and dissolved metals, major ions, nutrients</p> <p><b>Fish habitat</b></p> <p><b>Benthic invertebrates</b></p> <p><b>Permafrost</b></p>	Lakes near the Mackenzie Gas Project Anchor sites (Mackenzie Delta/Tuktoyaktuk area) Mackenzie Delta - Tuktoyaktuk Peninsula lakes and ponds near proposed Mackenzie Gas Pipeline production sites. Streams and rivers in the Mackenzie Valley and Mackenzie Delta	Inuvialuit, Gwich'in, Sahtu	2003-2007	<p>See <a href="http://publications.gc.ca/collections/collection_2011/aicn-inac/R3-147-2011-eng.pdf">http://publications.gc.ca/collections/collection_2011/aicn-inac/R3-147-2011-eng.pdf</a></p>		<a href="http://publications.gc.ca/collections/collection_2011/aicn-inac/R3-147-2011-eng.pdf">http://publications.gc.ca/collections/collection_2011/aicn-inac/R3-147-2011-eng.pdf</a>		
Environment Canada	Northern River Basin Study and Northern Rivers Ecosystem Initiative	<p>The Northern Rivers Ecosystem Initiative (NREI) was a 5-year study aimed at providing an understanding of impacts of development on northern river ecosystems as well as addressing the recommendation from the Northern River Basin Study.</p> <p>The recommendations were to continue environmental research in northern rivers and emphasize northern studies related to pollution prevention, science-based ecological management, contaminant and nutrient issues, endocrine disruption, and long-range transport of atmospheric pollutants.</p>	<p><b>Water quality</b> - physical parameters, total and dissolved metals, major ions, nutrients</p>	Athabasca and Peace River Basin in northern Alberta and Slave River Basin in the NWT and Alberta	South Slave, Alberta	1998-2003	<p>A series of reports were published.</p>	<p>Northern Rivers Ecosystem Initiative (NREI) Synthesis Report and Final Report</p>	<a href="http://www.ec.gc.ca/nature/default.aspx?lang=En&amp;n=9F1F07FE-1">http://www.ec.gc.ca/nature/default.aspx?lang=En&amp;n=9F1F07FE-1</a>		

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Environment Canada	Effects of water quality on habitat use by lesser scaup broods in the boreal, NWT	<p>*Waterfowl and limnological data were collected in ponds and borrow pits along the roadside near Yellowknife to describe characteristics of ponds and evaluate potential variables influencing the use of water bodies by lesser scaup.</p> <p>*This study analyzed water quality in ponds and borrow pits created during highway construction, and evaluated habitat preferences of lesser scaup, by comparing water quality, physical features and invertebrate abundance. Water samples were collected in 48 water bodies.</p>	<p><b>Water quality</b> - physical parameters, total and dissolved metals, major ions, nutrients</p> <p><b>Benthic invertebrates</b></p>	Ponds and borrow pits located in a 38km <sup>2</sup> area along the roadside near Yellowknife	North Slave	1999-2006		<p>•Walsh, K.A. et al. 2006. <i>Effects of water quality on habitat use by lesser scaup (Aythya affinis) broods in the boreal Northwest Territories, Canada</i>. Hydrobiologia 567:101-111</p>	Email: enviroinfo@ec.gc.ca		
Environment Canada	Historic Water Quality Sampling Stations in the NWT	*The Water Quality Monitoring and Surveillance Division of Environment Canada conducted extensive water quality sampling at numerous sites in the NWT, including locations in national parks, which are no longer being monitored.	<b>Water quality</b> - metals, major ions, organics, physicals, nutrients	NWT-wide	NWT-wide				Email: enviroinfo@ec.gc.ca		
Aboriginal Affairs and Northern Development Canada (AANDC)	Yellowknife-Back Bay Summer Water Quality Monitoring Program	<p>*Due to concerns brought forth by the Yellowknives Dene Band with regards to the quality of the water and fish in the Yellowknife-Back Bay area a study took place from 1992-1994 which concluded that the water was safe to drink with prior treatment (boiling or chlorinating) and that the fish were safe to consume.</p> <p>*Follow up water quality monitoring took place in 1995 with an increased sampling frequency from the initial study. Additionally, water quality results of mine outlets (Giant and Con) and storm drain outlets from the city of Yellowknife were compared. The main objective was to collect water quality samples on a weekly basis to obtain water quality trends at the five sites during the summer months and collect water quality samples after every rainfall from the storm drain outlets.</p>	<b>Water quality</b> - physical parameters, nutrients, major ions, total metals (including mercury), bacteriological	Yellowknife River (used as control site) Baker Creek Outlet at Great Slave Lake, Yellowknife Tip of Latham Island, Yellowknife Dettah dock Peg Outlet at Great Slave Lake	North Slave	1992-1995		<p>•Aboriginal Affairs and Northern Development Canada report on Yellowknife-Back Bay Summer Water quality Monitoring Program (1998)</p>	Email:northwestTerritoriesWaters@aandc.gc.ca		
AANDC - Contaminants and Remediation Directorate	Silver Bear mines, Contact Lake mine, El Bonanza, Sawmill Bay remediation project	<p>*The Contaminants and Remediation Directorate, in conjunction with the Water Resources Division, operates snow survey, water quality and hydrology stations at contaminated sites.</p> <p>*Water licence S09L8-001 was issued for the remediation project encompassing Silver Bear mines (including Terra, Northrim, Norex, Graham Vein and Smallwood Mines), El Bonanza Mines (including El Bonanza and Bonanza), Contact Lake Mine and Sawmill Bay Mine east of Great Slave Lake. Monitoring at Silver Bear mine sites began in 2005 and continued through to 2010 but is currently on hold. Water quality monitoring is required under the current water licence's Surveillance Network Program. Currently monitoring is only conducted to fill data gaps.</p>	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), solids, hydrocarbons, phenols	<b>Silver Bear mines, Contact Lake mine, El Bonanza, Sawmill Bay</b> Min/Max Latitude (65.5667 / 66.0078) Min/Max Longitude (-117.8000 / -118.9206)  For a complete list of monitoring site locations refer to the most recent Surveillance Network Program report.	Sahtu	2004-2009	*Internal reports	<p>•Internal annual reports</p> <p>•Annual Surveillance Network Program reports were previously submitted to the Sahtu Land and Water Board.</p>	Email: ntcad@aandc.gc.ca  http://www.aandc-aandc.gc.ca/eng/1100100026203/1100100026204  http://www.mvlwb.ca/SLWB/registry.aspx		
AANDC - Contaminants and Remediation Directorate	Hidden Lake mine remediation project	<p>*The Contaminants and Remediation Directorate, in conjunction with the Water Resources Division, operates snow survey, water quality and hydrology stations at contaminated sites.</p> <p>*The Hidden Lake Mine was a gold mine operating from 1959-1969 located 45km northeast of Yellowknife. The water quality monitoring program at the Hidden Lake mine site was undertaken post-remediation to determine the effectiveness of the surface reclamation by testing whether contaminants in groundwater, surface water and sediments were migrating into the immediate and surrounding area. Results indicated good water quality with no evidence to suggest that the former mine is affecting the water quality at Hidden Lake. There is no future water quality monitoring expected.</p>	<p><b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), hydrocarbons, solids</p> <p><b>Groundwater quality</b> - physical parameters, major ions, nutrients, total and dissolved metals (including mercury), hydrocarbons, solids</p> <p><b>Sediment quality</b> - metals (including mercury)</p>	<b>Hidden Lake mine (Hidden Lake)</b> (62.56307, -113.51773)	North Slave	2004-2011	*Internal reports	•Internal annual reports	Email: ntcad@aandc.gc.ca		
AANDC	West Kitikmeot/ Slave Study	*Various lake sediment cores were collected from Slipper Lake and Lac du Savage in 1997 as undisturbed lake sediments can provide a valuable tool in interpreting changes over time with regard to water quality, climate change and deposition rates of long range contaminants.	<b>Water quality</b> - major ions, nutrients, metals, physical parameters	<b>Slipper Lake</b> (64.7167, -110.5000) <b>Lac du Sauvage</b> (64.6169, -109.9677)	Wek'èezhii	1997		•Aboriginal Affairs and Northern Development Canada Final Report for Results from Sediment Cores Collected from an Arctic Tundra Lake, NWT	Email: NorthwestTerritoriesWaters@aandc.gc.ca		
AANDC	Lac de Gras Area Water Quality Sampling Program	*A water quality sampling program was carried out on five major lakes found in the Dominion Diamond (formerly BHP) claim block. Grab water samples were collected from Slipper, Nema, Moose, Vulture and Kodiak Lakes in 1996 to help determine baseline values for the lakes' parameters and detect water quality changes that may result from mining activities in the future. The program also provided some of the only under ice sampling done in the area during that time.	<b>Water quality</b> - major ions, nutrients, metals, physical parameters	<b>Lac de Gras areas lakes - Slipper Lake, Nema Lake, Moose, Lake, Vulture Lake and Kodiak Lake</b> Min/Max Latitude (64.7167-64.8500) Min/Max Longitude (110.5000-110.6500)	Wek'èezhii	1996		•Lac de Gras Area Water Quality Sampling Program Spring 1996	Email: NorthwestTerritoriesWaters@aandc.gc.ca		
AANDC	Lake Bottom Sediment Quality in the Slave Structural Province Area	*The objectives of the study included identifying the presence and concentration of trace and heavy metals in lake bottom sediment, and measuring the current lake sediment quality and water quality within the Slave Structural Province area with emphasis on areas that were devoid of data. The study provided information to enable assessments of changes caused by current and potential developments.	<b>Sediment quality</b> - metals	Area between the north shore of Great Slave Lake (south boundary) and the Coronation Gulf (north boundary), and between Camsell River (west boundary) and Artillery Lake (east boundary)	North Slave	1993 and 1994 open water seasons		•An Overview of Lake Bottom Sediment Quality in the Slave Structural Province area of Northwest Territories	Email: NorthwestTerritoriesWaters@aandc.gc.ca		
AANDC	Central Arctic Study	*The objectives of this study included measuring the current lake water quality in the Slave Structural Province area with emphasis on areas that were devoid of data; identifying impacted areas; and identifying anomalous areas (area of high concentrations) that could support future studies.	<b>Water quality</b> - physical parameters, nutrients, major ions, cyanide, metals (including mercury), bacteriological	Includes most of the Slave and Bear Provinces (refer to report for geographical description)	North Slave, Sahtu	1993		•An Overview of Lake Water Quality in the Slave Structural Province Area, NWT	Email: NorthwestTerritoriesWaters@aandc.gc.ca		
AANDC	Mackenzie River, Fort Good Hope, Multi Media Monitoring Program	*The objectives of this study were to investigate and answer local concerns about the quality of the fish and water in the area, and determine whether these concerns were related to possible releases of hydrocarbons, either natural or industrial (via the Norman Wells, Esso Operation).	<b>Water quality</b> - physical parameters, nutrients, major ions, metals, hydrocarbons	<b>Norman Wells</b> (65.2820, -126.8310) <b>Fort Good Hope</b> (66.2569, -128.6353)	Sahtu	1994		<p>•Sikstrom, C.B., 1994. <i>Proving the Negative: Norman Wells Development and Refinery Effluents are not causing Significant Adverse Effects on Fish Health and Water Quality in the Mackenzie River</i>.</p> <p>•Arctic Environmental Strategy, NWT Water Component/Project Reports 1994 - 1995</p>	Email: NorthwestTerritoriesWaters@aandc.gc.ca	✓	
AANDC	Arctic Riverine Inputs of Contaminants	*The objectives of this study were to estimate and characterize the total contaminant load delivered by major river systems to the arctic marine environment; to determine the source of the total contaminant burden of selected rivers using biogeochemical markers; to refine existing temperate riverine system contaminant delivery models or develop new ones for arctic rivers; and in the long term, to provide input to a deposition, transport, and loading model which, together with snow contaminant loading data, could estimate contaminant loadings to arctic marine coastal zones.	<p><b>Water quality</b> - chlorobenzenes, PCBs, PAHs, acyclic hydrocarbons, toxaphene</p> <p><b>Sediment quality</b> - chlorobenzenes, PCBs, PAHs, acyclic hydrocarbons, toxaphene</p>	Mackenzie River Delta at Arctic Red River, Inuvik (east channel), Aklavik (west channel)  Anderson, Coppermine, Dubawnt, and Thelon Rivers	Inuvialuit, Gwich'in, North Slave, South Slave	1994		•Arctic Environmental Strategy, NWT Water Component/Project Reports 1994 - 1995	Email: NorthwestTerritoriesWaters@aandc.gc.ca		
AANDC Fisheries and Oceans Canada	Lac de Gras Fish Contaminant Study	*The objectives of the study were to collect pre-development baseline data from an area of the NWT where few or no environmental data have been gathered and which has a very strong potential for development; to assess contaminant levels in water and fish in the study area and allow comparison with other lakes in the Canadian Arctic barrens; to evaluate effects of development on water quality in undeveloped areas, including long-range atmospheric transport of contaminants; and to provide predevelopment baseline data for comparison with other programs.	<p><b>Water quality</b> - physical parameters, nutrients, major ions, metals</p> <p><b>Fish quality</b> - heavy metals, physiological indicators of stress PAHs, biological factors</p>	<b>Lac de Gras</b> (64.4839, -110.1333)	Wek'èezhii	1993		•Arctic Environmental Strategy, NWT Water Component/Project Reports 1994 - 1995	Email: NorthwestTerritoriesWaters@aandc.gc.ca		
<b>Aboriginal Governments/Renewable Resource Boards</b>											
Sahtu Renewable Resources Board	Bosworth Creek Monitoring Project	*The Bosworth Creek Monitoring Project was a multi-disciplinary, long-term study of a local watershed by high school students from Mackenzie Mountain School, Norman Wells, lead by the Sahtu Renewable Resources Board.	<b>Water quality</b> - physical parameters, nutrients, major ions, metals, hydrocarbons	<b>Bosworth Creek</b> (65.282, -126.87546)	Sahtu	2006-2010	<p>•Reports are published on the Sahtu Renewable Resources Board and the Aurora Research Institute websites.</p> <p>•Community members were informed about progress through Sahtu Renewable Resources Board newsletters, public presentations and workshops.</p>	<p>•Northwest Territories Water and Waste Association Journal (February 2009)</p> <p>•Up Here Magazine (March 2009)</p> <p>•Sahtu Renewable Resources Board newsletters (March 2008, September 2008 and January 2009)</p>	Email: rrc@srbb.nt.ca  http://www.srbb.nt.ca  http://www.nwtresearch.com	✓	✓
AANDC - Cumulative Impact Monitoring Program		*The seasonal phases of the creek (open water, freeze-up, frozen and break-up) were sampled for biological and chemical baseline inventories that help monitor potential impacts resulting from industrial activities and climate change.	<b>Water quantity</b> - water flow								

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<p><b>Detailed list of water and sediment quality parameters and their categorizations</b></p> <p><b>Physical parameters</b> - pH, conductivity, temperature, colour, dissolved oxygen, and may include total suspended solids (TSS), total dissolved solids (TDS) and turbidity  <b>Nutrients</b> - biological oxygen demand, carbonaceous biological oxygen demand, carbon, nitrogen, phosphorus, ammonia, chlorine, silica  <b>Solids</b> - total suspended solids (TSS), total dissolved solids (TDS), turbidity (note: these are sometimes included under physical parameters)  <b>Bacteriological</b> - fecal coliforms, total coliforms, e.coli, fecal streptococci  <b>Major ions</b> - alkalinity, calcium, chloride, sulphate, magnesium, fluoride, potassium, sodium, hardness  <b>Metals</b> - aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, cesium, chromium, cobalt, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, rubidium, selenium, silver, strontium, titanium, thallium, uranium, vanadium, zinc  <b>Radionuclides</b> - uranium, thorium, molybdenum, barium, etc.  <b>Organics</b> - hydrocarbons, BTEX (benzene, toluene, ethylbenzene, xylene), PCBs (polychlorinated biphenyls), polycyclic aromatic hydrocarbons (PAHs), hexane, phenols, chlorophenols, oil and grease, naphthalene, cyanide suite, dioxins, furans, other pesticides</p>											
<p><b>Water Quantity</b></p> <p><b>Ongoing Monitoring</b></p> <p><b>Federal / Territorial Government</b></p>											
AANDC - Water Resources	Northwest Territories Snow Survey Network	*The snow cover melts in spring to yield a depth of snow water equivalent, called the annual spring freshet. To estimate the freshet snow water equivalent, end-of-winter snow surveys are conducted at each station before spring melt.	<b>Snow</b> - depth and density (calculated) <b>Water quantity</b> - snow water equivalent (weight)	46 active stations Sites and geographic coordinates can be found on the AANDC website ( <a href="http://www.aandc-aandc.gc.ca/eng/1100100027479">http://www.aandc-aandc.gc.ca/eng/1100100027479</a> )	NWT-wide	1965	*Data available on the AANDC website.		<a href="http://www.aandc-aandc.gc.ca/eng/1100100027479">http://www.aandc-aandc.gc.ca/eng/1100100027479</a>		
NWT Power Corporation		*At each station a survey consists of ten measurements of snow depth and snow water equivalent (weight).									
Environment Canada	NWT Hydrometric Program	*The NWT Hydrometric Program is part of a National Network which includes 2500 stations across Canada. In the NWT, water level and discharge measurements of lakes and streams are recorded at 88 stations.	<b>Water quantity</b> - water level and flow	88 stations throughout the NWT (as of 2013)	NWT-wide	1938 (most sites since 1960s)	*Data from active and discontinued stations are stored in two national databases: HYDEX and HYDAT. HYDEX contains information about the stations such as location, equipment and types of data collected. HYDAT contains the computed data such as daily and monthly means of flow, water levels, and for some sites, sediment concentrations, peaks and extremes. The HYDAT database can be downloaded from the Water Survey of Canada website. The website also offers recent hydrometric information using their online search tools and real-time website.		For real time water level and flow data: <a href="http://www.wateroffice.ec.gc.ca/index_e.html">http://www.wateroffice.ec.gc.ca/index_e.html</a>  For archived water level and flow data: <a href="http://www.wsc.ec.gc.ca/applications/H2O/index-eng.cfm">http://www.wsc.ec.gc.ca/applications/H2O/index-eng.cfm</a>		
AANDC - Water Resources		*The hydrometric program provides information on the availability and variability of NWT water resources, and data imperative to sound water management including: environmental assessment of industrial developments (e.g., hydro-electricity, mining and petroleum), flood management and mitigation, flow forecasting for ferry and barge transportation, cumulative effects assessment, and, negotiation of bilateral agreements with respect to transboundary flows.									
NWT Power Corporation											
Canadian Coast Guard											
Parks Canada											
GNWT - Transportation											
Industry (Debeers/Esso)											
Environment Canada	Changing hydrology in the Taiga Shield: geochemical and resource management implications	*The objectives of this project are to describe and understand the consequences of recent changes in winter streamflow and geochemical regimes in the North Slave Taiga Shield, and implications to water quality and resulting impacts on the environment. In the Baker Creek watershed, an analysis of lake-bottom sediment cores, a model framework for predicting streamflow, a report on icing locations due to increased winter streamflow, year round water quality sampling, stream flow measurements at gauge sites along Baker Creek and its tributaries, and soil water storage measurements, are undertaken. Sampling should show how different landscapes respond to either snowmelt or rainfall runoff events. Baker Creek flows through the Giant mine site.  *This project will provide outreach opportunities by hosting local elementary and high school students at one or more of the sentinel monitoring sites to participate and observe in the field monitoring and research occurring at the sites. This is a NWT Cumulative Impact Monitoring Program project.	<b>Water quality</b> - physical parameters, major ions, nutrients, stable isotopes, metals and groundwater chemistry <b>Water quantity</b> - stream flow <b>Permafrost</b> - soil moisture storage, frost table measurements  Other parameters include those related to hydrology, vegetation, permafrost conditions (ground temperature, ice content and soil properties), snow conditions, surficial geology and location and spatial extent of icings	Baker Creek watershed (62.5120, -114.3672) - detailed studies on hydrology, surface and groundwater quality, ground temperatures, and extent of icings. <b>Yellowknife River</b> (62.5200, -114.3120) - vegetation monitoring, air and ground temperatures, surface water quality (see AANDC water quality network program Yellowknife region). <b>Ingraham trail and Highway 3</b> - ground temperatures, ground ice, soil properties, surficial geology	North Slave	2008	*Reports are submitted to the Cumulative Impact Monitoring Program and Aurora Research Institute.  *Geological Survey of Canada open files/ scientific journal articles are published.  *The principal investigator intends to report regularly on research progress with the Lands and Environment Coordinator of the Yellowknives Dene First Nation, the North Slave Métis Alliance and water managers to ensure the transfer of knowledge for the benefit of northerners. This can range from annual progress reports to community meetings, as resources permit.	*See NWT Discovery Portal for project reports as per the requirements of the NWT Cumulative Impact Monitoring Program funding.  *Spence, C., Kokelj, S.V., and S.A. Kokelj (2012). <i>Changing streamflow in the North Slave: Results, implications and next steps</i> . Report to the GIANT Mine Remediation Team and the Cumulative Impact Monitoring Program, 8 pages  *Spence, C., S.V. Kokelj and E. Ehsanzadeh (2011). Precipitation trends contribute to streamflow regime shifts in northern Canada. Cold Region Hydrology in a Changing Climate - Proceedings of a symposium held during IUGG 2011 at Melbourne, Australia, June, 2011. IAHS Publ. No. 346, 3-8	Email: <a href="mailto:cimp@aandc-aandc.gc.ca">cimp@aandc-aandc.gc.ca</a>  <a href="http://nwt.discoveryportal.enr.gov.nt.ca">http://nwt.discoveryportal.enr.gov.nt.ca</a>	✓	✓
AAANC - Water Resources											
Natural Resource Canada											
Wilfrid Laurier University											
Environment Canada	Canadian Aquatic Biomonitoring Network (CABIN)	*Water quality is analyzed and basic hydrometric measurements such as velocity and stream slope are recorded at each site. Standardized benthic invertebrates collection methods are used for assessing aquatic ecosystem health. There are over 100 sites in the NWT. Sites are generally only sampled once or twice a year and not on an ongoing basis. The number of new sites added each year is variable.  *CABIN applies the Reference Condition Approach for site assessment which compares benthic communities from test sites (sites that have potentially been impaired) to reference sites (sites with little human disturbances) and an assessment is made based on the similarity or divergence.	<b>Water quality</b> - physical parameters, major ions, nutrients, total and dissolved metal <b>Water quantity</b> - velocity, discharge, slope of the stream <b>Benthic invertebrates</b>	A map with sites location and information is posted on the Canadian Aquatic Biomonitoring Network website ( <a href="http://cabin.cciw.ca/cabin/main/cabin_current_activities.asp?lang=en-ca">http://cabin.cciw.ca/cabin/main/cabin_current_activities.asp?lang=en-ca</a> ).  Numerous sites are located in Nahanni National Park Reserve, the Mackenzie Delta and the proposed Mackenzie Gas Pipeline corridor.	NWT-wide	2005	*Data and information are stored in the Canadian Aquatic Biomonitoring Network database available online (special training is required to gain access to the database).	*Scrimgeour, Garry. Evaluating the impacts of mining on the ecological integrity of streams in the South Nahanni Watershed. Presented at the National CABIN Science Forum, November 17-18, 2010, Vancouver, BC. <a href="http://www.ec.gc.ca/Publications/4C111093-DCE4-4D87-B7FA-DB3E46435D9E%5CNationalCABINScienceForumProceedings2010.pdf">http://www.ec.gc.ca/Publications/4C111093-DCE4-4D87-B7FA-DB3E46435D9E%5CNationalCABINScienceForumProceedings2010.pdf</a>	<a href="http://www.ec.gc.ca/rcba-cabin">http://www.ec.gc.ca/rcba-cabin</a>  (go to Database/login to view a map of current CABIN sites)		
Fisheries and Oceans Canada											
AANDC - Cumulative Impact Monitoring Program											
AANDC - Contaminants and Remediation Directorate (CARD)	Northwest Territories evaporation/water balance studies at contaminated sites	*The Contaminants and Remediation Directorate, in conjunction with the Water Resources Division undertakes water level monitoring at the Tundra and Colomac mine sites, and evaporation modelling on the Giant mine site. In the past, monitoring has also taken place at Discovery and Silver Bear remediation sites.  *Remediation has been ongoing at the Tundra mine site (as per water licence MV2009L8-0008) and at the Colomac mine site (as per water licence W2009L8-0003).  *Evaporation modelling is in its 20th year at Pocket Lake on the Giant mine site.	<b>Water quantity</b> - water level	<b>Tundra mine</b> (64.0489, -111.1680) <b>Colomac mine</b> (64.4467, -115.1052) <b>Giant mine</b> (62.51, -114.3719)	North Slave, Wek'èezhii	Tundra mine (1992) Colomac mine (1995) Pocket Lake, Giant mine (1993)	*Internal reports are produced annually for CARD.	*Gibson, J.J., R. Reid and C. Spence (1998). <i>A six-year isotopic record of lake evaporation at a mine site in the Canadian subarctic: results and validation</i> . Hydrological Processes 12:1779-1792  *Gibson, J.J. and R. Reid (2010). <i>Stable isotopic fingerprint of open-water evaporation losses and effective drainage area fluctuations in a subarctic shield watershed</i> . Journal of Hydrology 381:142-150  *Spence, C., X. J. Guan, R. Phillips, N. Hedstrom, R. Granger and R. Reid (2010). <i>Storage dynamics and streamflow in a catchment with a variable contributing area</i> . Hydrological Processes 24:2209-2221  *Kane, D.L. and D. Yang (eds.) (2004). <i>Northern Research Basins Water Balance</i> . IAHS Pub. 290	Email: <a href="mailto:ntcard@aandc.gc.ca">ntcard@aandc.gc.ca</a>		
<p><b>Industry</b></p>											
NWT Power Corporation - Snare hydro	Surveillance Network Program as per type A water licences N1L4-0150 and MV2003L4-0014	*Snare hydro electric facilities are operated under water licence N1L4-0150 along the Snare River at four separate hydro plants: Snare Rapids, Snare Forks, Snare Falls and Snare Cascades. The Snare Cascades facility is run by the Dogrib Power Corporation under water licence MV2003L4-0014. The system contains four turbines (generating up to 20.2 MW) and provides power to Yellowknife, Dettah and Behchoko. As water is stored and diverted for power generation, water level and flow are monitored as per its Surveillance Network Program (SNP).	<b>Water quantity</b> - water level and flow	<b>Snare River</b> (63.4250, -116.1666) (approximately 140km northwest of Yellowknife)	Wek'èezhii	1972	*SNP reports and annual reports are submitted to the Wek'èezhii Land and Water Board.	*Regular SNP reports are found on the Wek'èezhii Land and Water Board public registry.	<a href="http://www.mvlwb.ca/WLWB/Registry.aspx">http://www.mvlwb.ca/WLWB/Registry.aspx</a>		
Dogrib Power Corporation - Cascade											
NWT Power Corporation - Bluefish hydro	Surveillance Network Program as per type A water licence MV2005L4-0008	*Bluefish hydro electric facilities are operated under water licence MV2005L4-0008 along the Yellowknife River between Bluefish and Prosperous Lakes. The system contains 3.5MW and 4.0 MW hydro units and provides power to Yellowknife, Dettah and Behchoko. Since water is stored and diverted for power generation, water level and flow are monitored as per its Surveillance Network Program (SNP).	<b>Water quantity</b> - water level and flow	<b>Yellowknife River and Duncan, Bluefish and Prosperous Lakes</b> (62.6830, -114.2686)	North Slave	1990	*SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.	*Regular SNP reports are found on the Mackenzie Valley Land and Water Board public registry.	<a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a>		

# Northwest Territories Water Monitoring Inventory

Version 1 (November 2013)

ORGANIZATION	MONITORING PROGRAM	DESCRIPTION	PARAMETERS MONITORED (GROUPED BY VALUED COMPONENTS)	LOCATION OF MONITORING	REGION	DATE PROGRAM BEGAN	REPORTING MECHANISM	REPORTS AND ARTICLES	WEBSITE AND EMAIL	TRADITIONAL/ LOCAL KNOWLEDGE	POSTED ON NWT DISCOVERY PORTAL?
<b>NWT Power Corporation - Talston hydro</b>	Surveillance Network Program as per type A water licence MV2011L4-0002	<p>*Talston hydro electric facilities are operated under water licence MV2011L4-0002 along the Talston River. The system contains an 18MW hydro unit and provides power to Fort Smith, Hay River, Fort Resolution and Enterprise. As water is stored and diverted for power generation, water level and flow are monitored as per its Surveillance Network Program (SNP).</p> <p>*Water quantity, quality, fish and wildlife data were collected during the environmental assessment process for the proposed expansion of the Talston hydro dam by the Deze Energy Corporation, which has been discontinued. Data is still available on the public registry.</p>	<b>Water quantity</b> - water level and flow	<b>Talston River</b> (61.04167, -110.1666) (approximately 64km north of Fort Smith)	North Slave	1976	*SNP reports and annual reports are submitted to the Mackenzie Valley Land and Water Board.	<p>*Regular SNP reports are found on the Mackenzie Valley Land and Water Board public registry.</p> <p>*Reports pertaining to the now discontinued environmental assessment for the Talston expansion are available on the Mackenzie Valley Review Board public registry.</p>	<p><a href="http://www.mvlwb.ca/mv/registry.aspx">http://www.mvlwb.ca/mv/registry.aspx</a></p> <p><a href="http://www.reviewboard.ca/registry">http://www.reviewboard.ca/registry</a></p>		
<p><b>Academia</b> - Numerous academic research/monitoring programs take place through the NWT Cumulative Impact Monitoring Program, Wilfrid Laurier University/GNWT Environment and Natural Resources partnership, and other initiatives. Contact <a href="mailto:nwtwaterstrategy@gov.nt.ca">nwtwaterstrategy@gov.nt.ca</a> for more information, see the Aurora Research Institute for research permits at <a href="http://data.nwtresearch.com">http://data.nwtresearch.com</a>, or see CIMP's comprehensive project list at <a href="http://www.aadnc-aandc.gc.ca/eng/1353423269390/1353423371305">http://www.aadnc-aandc.gc.ca/eng/1353423269390/1353423371305</a></p>											
<b>Water Quantity</b>		<b>Only limited past monitoring and research is highlighted. Please see Aurora Research Institute for further research.</b>									
<b>Past Monitoring or Research</b>											
<p><b>University of Alberta</b></p> <p><b>Town of Hay River</b></p> <p><b>Kati'odeeche First Nation</b></p> <p><b>Aboriginal Affairs and Northern Development Canada</b></p>	Hay River Ice Jam Study	<p>*Through collection of observational, hydrological and meteorological data combined with significant advancements in ice jam flood forecasting techniques lead by University of Alberta, a flood forecasting model has been developed for Hay River.</p> <p>*Data collection and input into the model was required in real time to validate the model. Methods of data collection were as follows: observing and recording timing and location of events (e.g., water levels at various points along the Hay River upstream of town; monitoring upstream sites where ice has begun to break up; ice runs and ice jams at various locations); flying upstream of the river to observe and record the location of ice runs and ice jams that were not visible from the ground; and downloading images of ice runs and ice jams recorded on cameras in key locations.</p>	<p><b>Water quantity</b> - water level and flow</p> <p><b>Ice</b> - ice level and location of ice runs and jams</p>	<b>Hay River</b> (60.8331, -115.7778)	South slave	2007-2012	*During the breakup, updates were available through the town's web site. After breakup, updates will be through the web site, phone meetings and through the project reports and scientific articles.	<p>*Brayall M., Andrishak R., and Hicks, F. Ice Jam Flood Forecasting Expert System for the Hay River at Hay River (NWT, Canada). Dept. of Civil and Environmental Engineering, University of Alberta</p> <p>See website for articles and reports.</p>	<p><a href="http://staff.civil.ualberta.ca/water/FEHicks/Hay_River_Breakup_2008.htm">http://staff.civil.ualberta.ca/water/FEHicks/Hay_River_Breakup_2008.htm</a></p>	✓	