



**Environment and Climate Change Canada**

**Agency Report to the  
Mackenzie River Basin Board**

**Meeting 62 of the  
Mackenzie River Basin Board  
Date: December 4 and 5, 2019  
Location: Edmonton**

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For each topic in agency report, please include:

- Ministry/Department Contact Information
- Contact information related to specific topics listed in agency report
- Website addresses
- Photos, maps, illustrations, tables, and other visual-friendly media

## **1 Bilateral Water Management Agreements**

Not applicable

(Intent: Updates on negotiations / implementation status / Bilateral Water Management Committee activities)

## **2 Water-Related Legislation / Policy / Regulations / Planning**

To Be Developed

(Intent: Highlight new initiatives, updates on existing initiatives and/or key milestones)

## **3 Science, Monitoring and Information**

(Intent: Highlight information produced that may be of interest to the MRBB / new initiatives)

### **Water Quality Monitoring and Surveillance Report**

The Water Quality Monitoring and Surveillance (WQMS) Division of ECCC's Science and Technology Branch supports the Federal government's water quality-related obligations under various acts and agreements e.g. Canada Water Act; Canadian Environmental Protection Act, 1999 (CEPA); Fisheries Act; International Boundary Waters Treaty Act; Federal/provincial/territorial agreements; Canada-United States water quality agreements; and, Federal Sustainable Development Strategy. Responsibilities include transboundary waters, waters on federal land, and waters of national importance. WQMS main activities consist of water sample collection, data analysis and interpretation, scientific advice, and reporting on results.

**A risk-based adaptive management framework** (Contact: [arash.shahsavarani@canada.ca](mailto:arash.shahsavarani@canada.ca))

ECCC's Freshwater Quality Monitoring and Surveillance (FWQMS) program provides water quality monitoring in Canada through a risk-based adaptive management framework. Decisions on where and how to monitor watersheds are based on the level of risk, helping to ensure focused and objective programming. Risk is assessed based on the nature, probability, frequency and severity of threats to the watersheds. Through this framework, and ongoing collaboration with our provincial, territorial, other government and non-governmental partners, the federal government provides targeted, adaptable and efficient monitoring to ensure quality of service delivery and value for money for Canadians. The FWQMS program framework includes three key components:

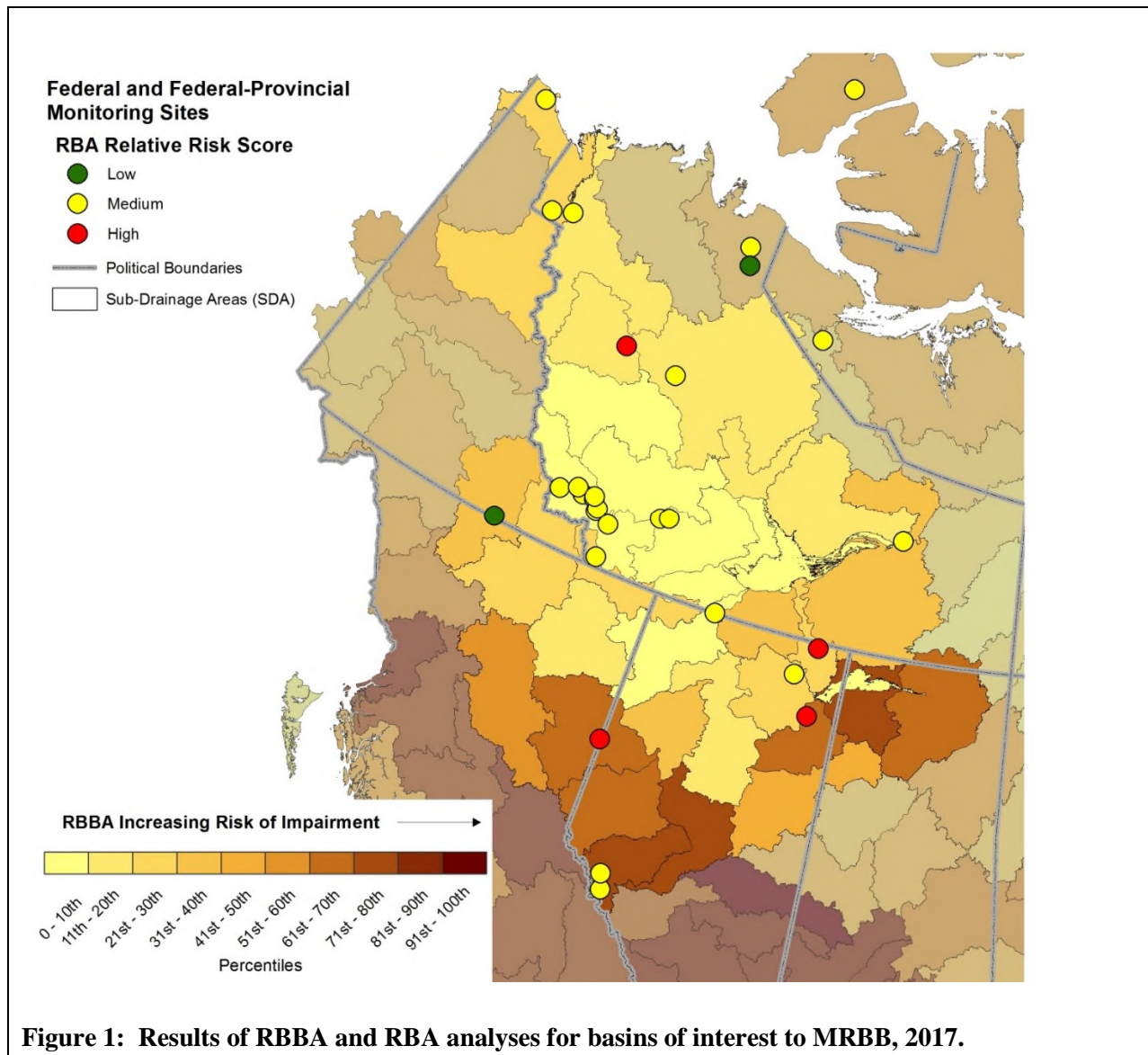
- (i) A regular review of ECCC's roles and responsibilities to ensure that our activities are consistent with our departmental mandate;
- (ii) A regular assessment of the level of risk for watersheds using three types of analyses:
- risk-based site-specific analysis of all monitoring sites in ECCC's current monitoring network, based on chemical and biological measurements, upstream human activities, and vulnerability of the ecosystem;
  - risk-based basin-level analysis of all watersheds across Canada to identify areas where monitoring should be conducted or the scope of monitoring enhanced. The analysis is based on the aggregation of multiple point source and non-point source threats;
  - statistical power analysis to assess the ability of the monitoring network to accurately detect change to ensure optimal sampling frequencies; and
- (iii) A Quality Management System that focuses on continuous program improvement through a Plan-Do-Check-Improve model.

**Risk-based basin analysis (RBBA)** (Contact: [arash.shahsavarani@canada.ca](mailto:arash.shahsavarani@canada.ca))

The risk-based basin analysis (RBBA) is a spatial analysis tool used to quantify the relative risk to water quality from 16 human activities in 1138 sub-sub-drainage areas. These include stressors like point sources of pollution, various types of land use and changes, deposition of atmospheric contaminants and climate change. The RBBA tool aggregates these stressors and classifies basins on a relative risk scale (see Figure 1).

**Risk-based analysis (RBA)** (Contact: [arash.shahsavarani@canada.ca](mailto:arash.shahsavarani@canada.ca))

Risk-based analysis (RBA) is done at the monitoring site level to assess the likelihood, extent and potential severity of impacts from human activities on water quality and the aquatic ecosystem. For each monitoring site, risks are scored between 0 and 10, weighted by risk group based on a list of 14 criterion (e.g., point sources, guideline exceedances, water uses) and aggregated to obtain an overall score out of 100. The higher the score, the higher the potential risk to water quality is at the site (see Figures 1). The WQMS division aims to review RBA sites scores every 5 years.



**Figure 1: Results of RBBA and RBA analyses for basins of interest to MRBB, 2017.**

ECCC provides credible, scientifically sound information to support decision making. The public release of our water quality monitoring data supports the Government of Canada open data initiative by providing access to water quality data to Canadians. Since January of 2017, national long-term water quality monitoring data are made available to the public on the Government of Canada’s Open Data portal, in both [English](#) and [French](#). The datasets include data for nutrients, metals, major ions, and other physical-chemical variables from 2000 to 2018 covering 22 basins across Canada. For the few monitoring sites located outside those basins, links are provided where the data are already available online or provided by partners. As of fall of 2017 these data files are refreshed on a monthly basis. In addition, ECCC is posting additional water quality datasets from programs such as automated monitoring and surveillance (e.g., pesticides) to Canada’s Open Data Portal.

Other online water quality data sources from ECCC include:

Acid Sensitive Lakes Study, Turkey Lakes Watershed Study,  
 Clean Air Regulatory Agenda Freshwater Inventory and Surveillance of Mercury  
 Great Lakes Basin (GLB) Monitoring and Surveillance  
 National Water Quality Pesticides Surveillance Data  
 Canadian Environmental Sustainability Indicators (CESI)

Of particular interest to MRBB, data for the following basins are published and regularly updated:

- [Lower Mackenzie](#)
- [Peace-Athabasca](#)

In addition, data pertaining to the Canada-Alberta Joint Oil Sands Monitoring Program are already available [on line](#) (contact: [philip.chau@canada.ca](mailto:philip.chau@canada.ca)).

**Support to the MRBB** (Contact [Nancy.Glozier@canada.ca](mailto:Nancy.Glozier@canada.ca))

The Government of Canada remains committed to the Mackenzie River Basin Transboundary Waters Master Agreement and to continuing cooperation on water monitoring in the region and sharing data.

Environment and Climate Change Canada (ECCC) currently operates 26 stations throughout the Mackenzie Basin as part of the federal network. Table 1 includes information on these stations, some of which have been in operation since the 1960's. This data is accessible to all partners upon request and through [Canada's Open Data portal](#).

As recommended by the Commissioner of Environment and Sustainable Development in 2010, ECCC manages its freshwater quality monitoring network based on a risk assessment of water quality impairment. As noted, the risk-based approach employs a suite of scientific and analytical tools and a standard for quality management effective water quality monitoring.

**Table 1. ECCC Water Quality Monitoring Sites in the Mackenzie River Basin**

<b>Station</b>	<b>Ter/ Prov</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Start Date of Long Term Monitoring</b>	<b>Status</b>	<b>Frequency (planned samples/yr)</b>
Great Bear R./Great Bear Lake	NT	65.1283	-123.5508	1969	Active	3
Liard River/Fort Liard	NT	60.2414	-123.4753	1998	Active	6
Liard River/Mouth	NT	61.7425	-121.2278	1960	Active	6

Lockhart River/ Artillery Lake	NT	62.8889	-108.4658	1969	Active	3
Mackenzie R./Norman Wells	NT	65.2739	-126.8442	1960	Active	6
Mackenzie R./Strong Point	NT	61.8164	-120.7917	1992	Active	6
Mackenzie River/Arctic Red R.	NT	67.4558	-133.7531	1960	Active	6
Peel River/Ft. McPherson	NT	67.2589	-134.8886	1960	Active	4
Hay R./NWT-Alta. Boundary	NT	60.0036	-116.9719	1969	Active	4
Slave River/Fitzgerald	AB	59.8575	-111.5987	1960	Active	6
Flat River/Mouth	NT	61.5297	-125.4106	1972	Active	3
Flat River/Pk. Boundary	NT	61.4278	-126.6299	1988	Active	3
Prairie Creek/ New park Boundary	NT	61.5219	-124.7126	2010	Active	3
Prairie Creek/above Cadillac Mine	NT	61.5583	-124.8125	2003	Active	3
Prairie Creek/below Cadillac Mine	NT	61.5561	-124.8108	2003	Active	3
Prairie Creek/Mouth	NT	61.2844	-124.4456	1988	Active	3
Prairie Creek/Old Park Boundary	NT	61.3485	-124.4153	2001	Active	3
S.Nahanni R./Nahanni Butte	NT	61.0991	-123.5899	1988	Active	3
S.Nahanni R./Virginia Falls	NT	61.6361	-125.7969	1996	Active	3
Peace River at Peace Point	AB	59.1193	-112.4502	1967	Active	9
Athabasca River at 27th Baseline	AB	58.1743	-111.3664	1989	Active	9
Athabasca River at Highway 16	AB	53.0417	-118.0872	1973	Active	4
Table 1. Continued...						
<b>Station</b>	<b>Ter/Prov</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Start Date of Long Term Monitoring</b>	<b>Status</b>	<b>Frequency (planned samples/yr)</b>
Athabasca River above Athabasca Falls	AB	52.6644	-117.8808	1972	Active	4
Liard River at Upper Crossing	YT	60.0477	-128.9018	1983	Active	12
Peace River above Alces River	BC	56.1260	-120.0600	1984	Active	12

Petitot River below Hwy 77	BC	59.98421	-122.92784	2012	Active	4
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## 4 Major Projects

To Be Developed

(Intent: describe status of major private and public sector activities directly or indirectly related to water, including projects undergoing environmental assessments.)

## 5. Events, Conferences and Seminars

Nil

(Intent: Highlight key government/non-government meetings related to water management in the Mackenzie River Basin)

## 6. Other

(Intent: forum for any other water-related activities that may not fit neatly into any of the previous categories)

### **Update to PPWB and MRRB on Whirling Disease - Operational Impacts to Field and Laboratory Operations** (Contact: [Paul.Klawunn@canada.ca](mailto:Paul.Klawunn@canada.ca); [Nancy.glozier@canada.ca](mailto:Nancy.glozier@canada.ca))

While Whirling Disease has only been recently introduced and detected in Canada, it has been present in the USA for more than 20 years and follows a cycle of activity and relative dormancy. This parasite will eventually infect many prairie river systems leading into Lake Winnipeg, Hudson's Bay and potentially north through the Athabasca and Peace rivers. Whirling disease has no known human health effects (WDI 2006) and is an infectious disease of finfish caused by a parasite, *Myxobolus cerebralis*. There are no treatment options currently available and containment and prevention are the focus for minimizing the spread of the parasite. Conventional wastewater treatment practices are not totally effective at deactivating the parasite.

To date, the Bow, Oldman, Red Deer and North Saskatchewan River watersheds have been officially declared as whirling disease impacted (<https://www.alberta.ca/whirling-disease.aspx>). Watersheds not officially declared affected but logically implicated as being impacted may include:

- Milk River Watershed– receives water from the St. Mary's diversion which is in the Oldman River Watershed.



- South Saskatchewan River Watershed – both the Bow River and the Red Deer River join the South Saskatchewan River. The Bow River joins upstream of the PPWB sampling site, the Red Deer River downstream.

Other watersheds that may be implicated and are listed as at risk include:

- Athabasca River Watershed – with headwaters in Jasper National Park and outflows into the Peace Athabasca Delta (PAD), Lake Athabasca and eventually through to the Slave River.
- Peace River Watershed – with headwaters in British Columbia and outflows into the Peace Athabasca Delta (PAD), Lake Athabasca and eventually through to the Slave River.

In response to this new threat, WSTD has liaised and reviewed protocols with Alberta Environment and Parks Canada to implement field and laboratory processes to mitigate spread of this parasite (for more information: <http://aep.alberta.ca/fish-wildlife/wildlife-diseases/whirling-disease/stop-the-spread.aspx>, <https://www.pc.gc.ca/en/pn-np/ab/banff/info/gestion-management/enviro/aqua/lac-johnson-lake#reduce>). In the field, personnel use a combination of dedicated field equipment and sampling equipment decontamination between sites and risk areas to mitigate the spread of the organism. For all samples from Alberta and the Alberta/Saskatchewan border,, staff also are required to wipe down the interior of the shipping cooler and each individual sample bottle with a disinfecting wipe prior to shipping to the lab. Our labs have implemented a process whereby the instrument waste and any unused sample is collected and treated prior to disposal into municipal sewage. Currently these modifications for field and laboratory processes have been applied to 6 of the 12 PPWB water quality monitoring sampling sites (all sites on the AB/SK border) and all of the sites in the Lower Athabasca River during sampling for Oil Sands related water quality and biomonitoring sampling.