

# **Northeast Water Strategy**

## **Surface Water Quality Data Summary for Northeast British Columbia**

British Columbia Ministry of Environment & Climate Change Strategy

Water Protection and Sustainability Branch

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## EXECUTIVE SUMMARY

The Surface Water Quality Data Summary for Northeast British Columbia (B.C.) began in 2016 as a project under the Northeast Water Strategy (NEWS) to inventory the available water quality data, up to January 2018, and identify gaps to inform future monitoring. This data summary fulfills the NEWS Action Area 1: Enhancing information to support decision-making. Once water quality knowledge gaps in Northeast B.C. are identified, we can begin to address them as part of the NEWS Action Area 4: Enhancing monitoring and reporting.

Summarizing available water quality data is an essential first step in defining an effective water quality monitoring program. In order to make informed decisions, it is important to first determine what data are available and what additional data are required to answer a given question. This report inventoried available data from the B.C. Ministry of Environment and Climate Change Strategy (ENV) Environmental Monitoring System (EMS) Database and the Environment and Climate Change Canada (ECCC) Canadian Aquatic Biomonitoring Network (CABIN) open government portal. This report compliments a previous NEWS project, the Disturbance-Sensitivity Based Approach, which established the 69 watershed boundaries used in this report and ranked the watersheds in order of water monitoring priority.

This report is divided into two parts: Part 1 is an overall data summary including a map of all 69 watersheds and a table summarizing the corresponding water quality data; Part II provides more detail on the water quality data available for each watershed, including waterbody and type of parameters measured.

Fifty-one of the 69 watersheds had water quality data, collected from 1971 to 2017 at 360 monitoring sites. The most recent data are from CABIN sampling programs, with 24 of the 51 watersheds having only CABIN data available.

This project is an important step in developing an understanding of the water quality data gaps in Northeast B.C. The data summary presented here, along with the watershed monitoring priorities in the Disturbance-Sensitivity Based Approach report, will help prioritize the allocation of future water quality monitoring resources in Northeast B.C.

Recommendations are as follows:

1. Of the 33 high monitoring priority watersheds, the 5 watersheds without data should be considered a priority for future water quality monitoring. These watersheds include Farrell Creek, Cameron River, Kyklo River, Doig River, and the Upper Beatton River.
2. The allocation of water quality monitoring resources should consider input from local government, First Nations and other partners in an area, recognizing that lower ranked watersheds may present a greater need for those resources.
3. The suitability of available water quality data to address a specific question within a given watershed should be assessed before additional monitoring resources are allocated. This will help ensure that the available monitoring data are being used effectively to address government priorities in managing B.C.'s water resources.

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## INTRODUCTION

The Northeast region of British Columbia (B.C.) is experiencing increased industrial growth and development. The expansion of natural gas and oil, forestry, agriculture and mining activities has created new demands for water in the region. As Northeast B.C. is a large area with various industrial activities, it is important to connect with partners and develop a co-monitoring plan for surface water quality monitoring that will inform decision making and protect water quality now and into the future.

The Northeast Water Strategy (NEWS) was released on March 20, 2015 to measure, manage and map water resources across B.C.'s Northeast region (Government of B.C. 2015). The NEWS recognizes that water is the Province's most valuable resource and that all water-related decisions in the Northeast must be built on the values of sustainability, collaboration and transparency. Effective stewardship is vital to successfully manage increasing water demands in Northeast B.C.

The objective of the Surface Water Quality Data Summary for Northeast B.C. is to provide a preliminary summary of available water quality data (number of monitoring sites, years of data, timing of data collection and parameter type) in 69 Northeast B.C. watersheds to help prioritize future water quality monitoring activities. Individual watershed assessments, water quality characterization and data quality assessment are outside the scope of this report.

This project inventoried available data from the B.C. Ministry of Environment and Climate Change Strategy (ENV) Environmental Monitoring System (EMS) Database and the Environment and Climate Change Canada (ECCC) Canadian Aquatic Biomonitoring Network (CABIN) online data portal. The 69 watersheds included in this summary were previously ranked in order of high, moderate or low priority for water quality monitoring using a disturbance-sensitivity based approach. More information on this ranking approach can be found on the [Northeast Water Strategy](#). As this ranking approach did not describe existing data availability, this report will help inform the allocation of water quality monitoring resources to where they are needed most.

The Surface Water Quality Data Summary for Northeast B.C. helps fulfill the NEWS Action Area 1: *Enhancing information to support decision-making*. By determining where water quality knowledge gaps exist in this region, they can be addressed as part of the NEWS Action Area 4: *Enhancing monitoring and reporting*. Knowledge of the existing water quality data in Northeast B.C. is an essential first step in effectively managing water resources.

## METHODS

### STUDY AREA

Watershed delineations in Northeast B.C. were defined according to the B.C. Oil and Gas Commission's *Water Management Basins* map layer. Sixty-nine water management basins, or watersheds, were previously identified in the NEWS *Disturbance - Sensitivity Report* (NEWS 2017) and are used to define the major watersheds in this report.

### DATA COMPILATION

Two primary sources of water quality data were used: ENV's EMS database and ECCC's CABIN database.

The *EMS Database* is B.C.'s data storage system for water, sediment and biological data and contains data collected by ENV and permittees.

The *CABIN Database* contains water quality, benthic macroinvertebrate and habitat data collected by CABIN users as part of the national biomonitoring program. A considerable amount of CABIN data have been collected in the past few years by ENV and ECCC in Northeast B.C. watersheds as part of developing a Reference Condition Approach (RCA) model in this area. There is currently a preliminary model for the Fort Nelson/Liard/Petitot River area which is currently being updated with the latest August 2017 data collection. These models use benthic macroinvertebrate communities as an indicator of aquatic ecosystem health. CABIN data are available for download through the ECCC *Open Data Portal*.

Although there are other sources of water quality data available in Northeast B.C. (eg: municipal governments, First Nations etc.), this report focuses on ambient water quality data available in EMS and CABIN, as of January 2018. Ambient data refers to water quality in the natural receiving environment outside of an initial dilution zone. Water quality data from permitted discharges are not included in this summary, however it is recognized that some of the monitoring sites included in this report are located downstream of permitted discharges.

### MONITORING PRIORITY RANKING

The 69 watersheds analyzed in this report were previously ranked by vulnerability and then in order of high, moderate or low priority for water quality monitoring as part of the NEWS *Disturbance - Sensitivity Report* (NEWS 2017). This ranking, coupled with the data gaps identified in this report, are used to identify future monitoring priorities.

### MONITORING SITE SELECTION

Existing EMS and CABIN monitoring sites were identified within the 69 watersheds using the *Water Management Basins* and *Environmental Monitoring Stations – Water Sites (Water Monitoring)* map layers in *iMapBC*. The EMS monitoring sites selected included “Background” or “Trend” sites located on rivers, streams and creeks. All water quality data

at these monitoring sites were included in this summary. Lake sites were not included in this analysis.

## DATA SUMMARY

Both ENV and ECCC establish CABIN reference and test sites; both are included in this data summary. All CABIN sites were imported into iMapBC so they could be viewed by watershed. Reference and potential reference sites are those minimally influenced by human activities and are used to develop CABIN RCA models. Test sites are located in areas where there may be concerns about the condition of the aquatic ecosystem; results from these sites are assessed using the appropriate CABIN RCA model to determine how much they deviate from the reference condition (i.e., background).

The EMS water quality dataset was generated using the R script [rems](#) which utilizes the [EMS open data object](#) housed on the [BC Data Warehouse](#). The available water quality data for each watershed were extracted from EMS. Simple data cleaning steps involved refining the dataset to include only the chosen subset of background and trend EMS and ENV CABIN monitoring sites. ECCC CABIN monitoring sites were manually added to the data set.

Water quality data were summarized by watershed. For each monitoring site within a watershed, the waterbody, monitoring site ID, database, number of years of data, most recent data and the type of parameters measured, were all summarized. A minimum of one sampling day per year constituted one year of data.

Individual data summary tables were prepared for each watershed. The database from which each site was selected is specified and defined as follows:

- EMS: Background or trend monitoring site data stored in EMS.
- EMS (CABIN data): ENV collected CABIN data stored in EMS and the CABIN database. The EMS ID is provided with the corresponding CABIN ID listed in Appendix A.
- ECCC CABIN: ECCC collected CABIN data stored in the ECCC CABIN online data portal.

The data summary tables also specify a “Parameter Type” column to provide a general overview of the water quality data available. The parameter groups are defined as follows:

- General: temperature, pH, conductivity, total suspended solids, turbidity
- Ions: calcium, magnesium, sulphate, bicarbonate
- Metals: iron, cadmium, zinc, lead etc.
- Organic Matter: total organic matter, dissolved organic matter, carbon
- Nutrients: phosphorus and all forms of nitrogen
- Microbiological: fecal coliforms, *E. coli*, total coliforms, *Enterococci*
- Organic Pollutants: naphthalene, benzo(a)anthracene, benzo(a)pyrene, phenanthrene, styrene etc.
- Inorganics: sulphide, fluoride, boron, cyanide etc.

The R code used for generating the EMS and ENV CABIN raw dataset is available on [GitHub](#), a web-based version control repository where B.C. government code is commonly housed.

## RESULTS

### PART I – OVERALL DATA SUMMARY

There were 360 monitoring sites within 51 of the 69 watersheds which had water quality data (Figure 1). The watershed vulnerability ranking and full watershed data summaries are available in Table 1. Graphs summarizing the years of data for each watershed (Figure 2), the most recent sampling year per watershed (Figure 3), and the number of water quality monitoring sites per watershed (Figure 4) are shown below.

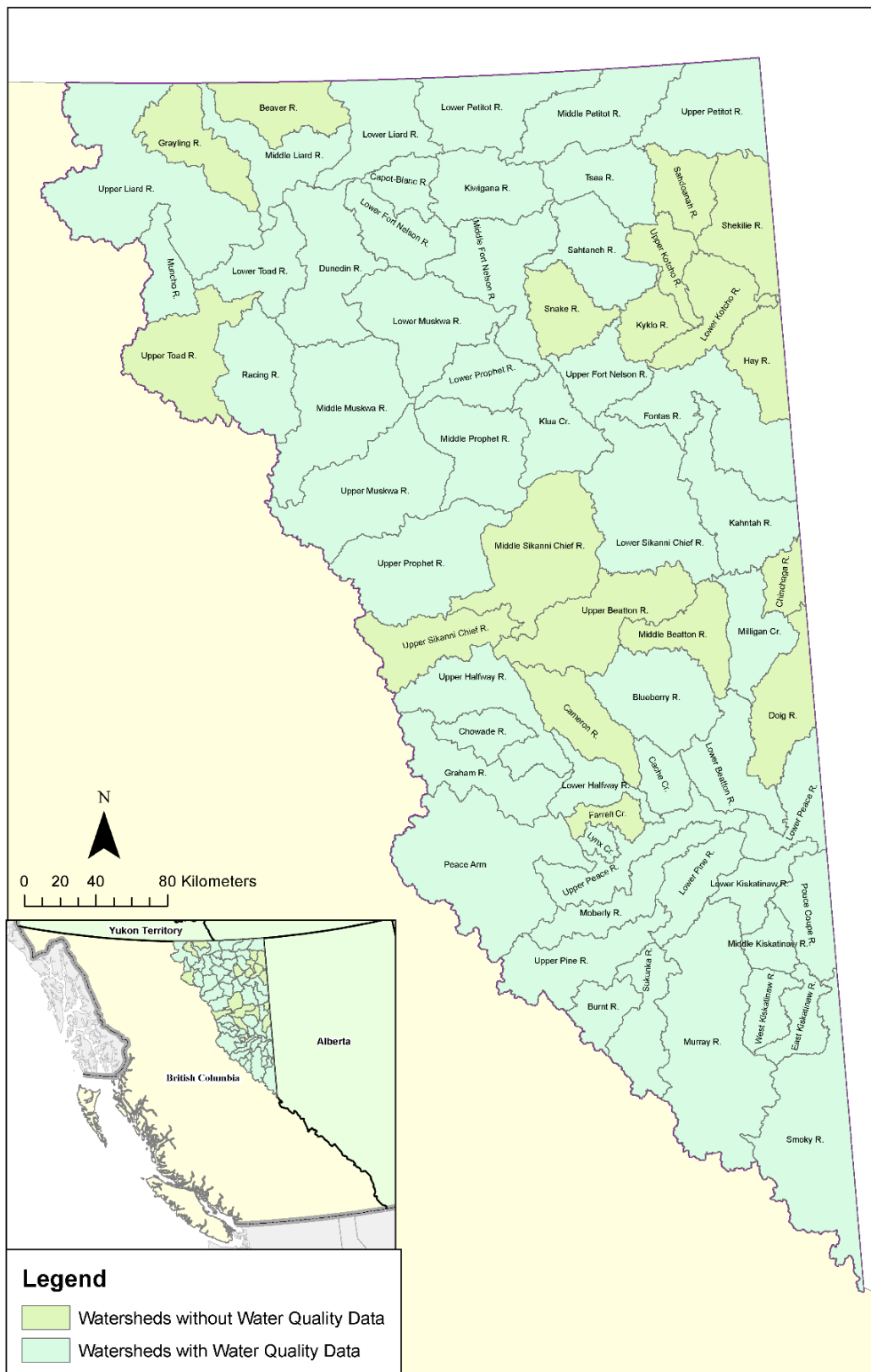


Figure 1. Northeast B.C. major watersheds according to the B.C. Oil and Gas Commissions Water Management Basins and corresponding EMS background, EMS trend and CABIN water quality data.

Table 1. Northeast Water Quality Data Summary by Watershed.

| Rank of Watershed by Vulnerability <sup>1</sup> | Watershed                | Monitoring Priority Ranking | Number of Monitoring Sites with Data | Number of Years Sampled | Most Recent Data | Parameter Type   | Available Assessment Reports  |
|---|--------------------------|-----------------------------|--------------------------------------|-------------------------|------------------|--|---|
| 1   | Murray River             | High                        | 97                                   | 17                      | 2017             | General, metals, ions, nutrients, organic matter, microbiological, organic pollutants    | <a href="#">Bullmoose Creek Sub-basin Water Quality Assessment and Objectives</a>   |
| 2   | Pouce Coupe River        | High                        | 20                                   | 16                      | 2011             | General, ions, metals, organic matter, nutrients, microbiological                        | <a href="#">Pouce Coupe River Sub-basin Water Quality Assessment and Objectives</a> |
| 3   | Upper Peace River        | High                        | 9                                    | 19                      | 2016             | General, metals, ions, organic matter, nutrients, organic pollutants and microbiological | <a href="#">Peace River Mainstem Water Quality Assessment and Objectives</a>        |
| 4   | Upper Pine River         | High                        | 12                                   | 15                      | 2011             | General, metals, ions, organic matter, nutrients   | <a href="#">Pine River Sub-basin Water Quality Assessment and Objectives</a>        |
| 5   | Middle Fort Nelson River | High                        | 3                                    | 2                       | 2012             | General, metals, nutrients   |   |
| 6   | Blueberry River          | High                        | 2                                    | 3                       | 2004             | General, metals, ions, microbiological, nutrients, organic matter                        |   |
| 7   | Farrell Creek            | High                        | No data                              | No data                 | No data          | No data  |   |
| 8   | Lower Beatton River      | High                        | 13                                   | 9                       | 2009             | General, metals, ions, microbiological, nutrients  | <a href="#">Charlie Lake Sub-basin Water Quality Assessment and Objectives</a>      |

<sup>1</sup> Watershed vulnerability based on Disturbance-Sensitivity Based Approach to prioritizing water monitoring in Northeast B.C. The report and supporting information can be found here: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-planning-strategies/northeast-water-strategy/key-resources>

| Rank of Watershed by Vulnerability <sup>1</sup> | Watershed               | Monitoring Priority Ranking | Number of Monitoring Sites with Data | Number of Years Sampled | Most Recent Data | Parameter Type  | Available Assessment Reports   |
|---|-------------------------|-----------------------------|--------------------------------------|-------------------------|------------------|---|--|
|   |                         |                             |                                      |                         |                  |   | <a href="#">Charlie Lake Limnological Data Survey</a>  |
| 9   | Lower Pine River        | High                        | 4                                    | 14                      | 2011             | General, metals, ions, microbiological, nutrients   | <a href="#">Pine River Sub-basin Water Quality Assessment and Objectives</a>                                     |
| 10  | Lower Peace River       | High                        | 14                                   | 39                      | 2017             | General, ions, metals, microbiological, organic matter, inorganics, organic pollutants, nutrients | <a href="#">Water Quality Assessment Of Peace River Above Alces River (1984 – 2002)</a>                          |
| 11  | Cameron River           | High                        | No data                              | No data                 | No data          | No data   |  |
| 12  | Lynx Creek              | High                        | 13                                   | 4                       | 2006             | General, metals, microbiological, nutrients, organic pollutants                                   | <a href="#">A Baseline and Watershed Assessment in the Lynx Creek, Brenot Creek and Portage Creek Watersheds</a> |
| 13  | Lower Muskwa River      | High                        | 22                                   | 5                       | 2016             | General, metals, ions, nutrients  |  |
| 14  | Moberly River           | High                        | 5                                    | 6                       | 2016             | General, metals, microbiological, organic matter, nutrients                                       |  |
| 15  | Smoky River             | High                        | 13                                   | 2                       | 2007             | General, metals, nutrients  |  |
| 16  | Kyklo River             | High                        | No data                              | No data                 | No data          | No data   |  |
| 17  | Doig River              | High                        | No data                              | No data                 | No data          | No data   |  |
| 18  | Middle Kiskatinaw River | High                        | 3                                    | 8                       | 2007             | General, metals, organic matter, nutrients, ions  |  |
| 19  | Upper Beatton River     | High                        | No data                              | No data                 | No data          | No data   |  |



| Rank of Watershed by Vulnerability <sup>1</sup> | Watershed                  | Monitoring Priority Ranking | Number of Monitoring Sites with Data | Number of Years Sampled | Most Recent Data | Parameter Type   | Available Assessment Reports  |
|---|----------------------------|-----------------------------|--------------------------------------|-------------------------|------------------|--|---|
| 20  | East Kiskatinaw River      | High                        | 1                                    | 4                       | 2007             | General, ions, microbiological, nutrients, organic matter            |   |
| 21  | Lower Kiskatinaw River     | High                        | 2                                    | 3                       | 2005             | General, ions, metals, organic matter, nutrients, organic pollutants | <a href="#">Bacteria and Parasite Source Identification in the Kiskatinaw Watershed</a> |
| 22  | Cache Creek                | High                        | 2                                    | 3                       | 2006             | General, metals, ions, organic carbon, microbiological, nutrients    |   |
| 23  | Lower Halfway River        | High                        | 1                                    | 3                       | 2005             | General, metals, nutrients, microbiological                          |   |
| 24  | Milligan Creek             | Moderate                    | 3                                    | 3                       | 2004             | General, metals, ions, organic carbon, nutrients, microbiological    |   |
| 25  | West Kiskatinaw River      | Moderate                    | 1                                    | 2                       | 2005             | General, metals, nutrients   |   |
| 26  | Middle Beatton River       | Moderate                    | No data                              | No data                 | No data          | No data  |   |
| 27  | Tsea River                 | Moderate                    | 4                                    | 4                       | 2013             | General, metals, nutrients, organic carbon, ions                     |   |
| 28  | Middle Sikanni Chief River | Moderate                    | No data                              | No data                 | No data          | No data  |   |
| 29  | Sahtaneh River             | Moderate                    | 3                                    | 3                       | 2014             | Metals, organic carbon, nutrients, suspended solids, ions            |   |
| 30  | Kiwigana River             | Moderate                    | 3                                    | 1                       | 2011             | Metals, suspended solids, organic matter, nutrients                  |   |

| Rank of Watershed by Vulnerability <sup>1</sup> | Watershed               | Monitoring Priority Ranking | Number of Monitoring Sites with Data | Number of Years Sampled | Most Recent Data | Parameter Type                                      | Available Assessment Reports  |
|---|-------------------------|-----------------------------|--------------------------------------|-------------------------|------------------|---|---|
| 31  | Sahdoanah River         | Moderate                    | No data                              | No data                 | No data          | No data   |   |
| 32  | Burnt River             | Moderate                    | 3                                    | 2                       | 2008             | Metals, suspended solids, organic carbon, nutrients |   |
| 33  | Upper Petitot River     | Moderate                    | 8                                    | 4                       | 2016             | General, metals, nutrients, ions                    |   |
| 34  | Lower Petitot River     | Moderate                    | 11                                   | 6                       | 2017             | General, metals, nutrients, ions                    |   |
| 35  | Snake River             | Moderate                    | No data                              | No data                 | No data          | No data   |   |
| 36  | Lower Liard River       | Moderate                    | 2                                    | 1                       | 2013             | General, metals, nutrients, ions                    | <a href="#">State of Water Quality of Liard River at Lower Crossing 1984-1994</a> |
| 37  | Upper Fort Nelson River | Moderate                    | 1                                    | 1                       | 2014             | General, metals, nutrients, ions                    |   |
| 38  | Middle Petitot River    | Moderate                    | 8                                    | 5                       | 2016             | General, ions, organic matter, nutrients            |   |
| 39  | Sukunka River           | Moderate                    | 4                                    | 7                       | 2014             | General, metals, ions, organic matter, nutrients    |   |
| 40  | Middle Prophet River    | Moderate                    | 8                                    | 3                       | 2016             | General, metals, nutrients, ions                    |   |
| 41  | Kahntah River           | Moderate                    | 1                                    | 1                       | 2016             | General, metals, nutrients, ions                    |   |
| 42  | Beaver River            | Moderate                    | No data                              | No data                 | No data          | No data   |   |
| 43  | Peace Arm               | Moderate                    | 1                                    | 1                       | 2016             | General, metals, ions, organic matter, nutrients    |   |
| 44  | Chinchaga River         | Moderate                    | No data                              | No data                 | No data          | No data   |   |
| 45  | Dunedin                 | Moderate                    | 4                                    | 2                       | 2014             | General, metals, ions,                              |   |

| Rank of Watershed by Vulnerability <sup>1</sup> | Watershed               | Monitoring Priority Ranking | Number of Monitoring Sites with Data | Number of Years Sampled | Most Recent Data | Parameter Type  | Available Assessment Reports |
|---|-------------------------|-----------------------------|--------------------------------------|-------------------------|------------------|---|------------------------------|
|   | River                   |                             |                                      |                         |                  | organic matter, nutrients   |                              |
| 46  | Hay River               | Moderate                    | No data                              | No data                 | No data          | No data   |                              |
| 47  | Shekilie River          | Low                         | No data                              | No data                 | No data          | No data   |                              |
| 48  | Upper Halfway River     | Low                         | 2                                    | 1                       | 2016             | General, metals, ions, organic matter, nutrients                  |                              |
| 49  | Chowade River           | Low                         | 2                                    | 1                       | 2016             | General, metals, ions, organic matter, nutrients                  |                              |
| 50  | Upper Kotcho River      | Low                         | No data                              | No data                 | No data          | No data   |                              |
| 51  | Klua Creek              | Low                         | 2                                    | 1                       | 2015             | General, metals, ions, organic matter, nutrients, microbiological |                              |
| 52  | Upper Liard River       | Low                         | 8                                    | 1                       | 2017             | General, metals, nutrients, ions                                  |                              |
| 53  | Lower Prophet River     | Low                         | 3                                    | 2                       | 2016             | General, metals, nutrients, ions                                  |                              |
| 54  | Fontas River            | Low                         | 2                                    | 2                       | 2016             | General, metals, nutrients, ions                                  |                              |
| 55  | Graham River            | Low                         | 1                                    | 1                       | 2016             | General, metals, ions, organic matter, nutrients                  |                              |
| 56  | Capot-Blanc River       | Low                         | 1                                    | 1                       | 2013             | General, metals, nutrients, ions                                  |                              |
| 57  | Lower Kotcho River      | Low                         | No data                              | No data                 | No data          | No data   |                              |
| 58  | Lower Fort Nelson River | Low                         | 5                                    | 3                       | 2017             | General, metals, nutrients, ions                                  |                              |
| 59  | Middle Liard            | Low                         | 2                                    | 1                       | 2014             | General, metals, nutrients,                                       |                              |

| Rank of Watershed by Vulnerability <sup>1</sup> | Watershed                 | Monitoring Priority Ranking | Number of Monitoring Sites with Data | Number of Years Sampled | Most Recent Data | Parameter Type                                   | Available Assessment Reports |
|---|---------------------------|-----------------------------|--------------------------------------|-------------------------|------------------|--|------------------------------|
|   | River                     |                             |                                      |                         |                  | ions   |                              |
| 60  | Upper Sikanni Chief River | Low                         | No data                              | No data                 | No data          | No data  |                              |
| 61  | Grayling River            | Low                         | No data                              | No data                 | No data          | No data  |                              |
| 62  | Upper Muskwa River        | Low                         | 2                                    | 2                       | 2017             | General, metals, nutrients, ions                 |                              |
| 63  | Upper Prophet River       | Low                         | 7                                    | 1                       | 2016             | General, metals, nutrients, ions                 |                              |
| 64  | Middle Muskwa River       | Low                         | 14                                   | 2                       | 2017             | General, metals, nutrients, ions                 |                              |
| 65  | Lower Sikanni Chief River | Low                         | 2                                    | 2                       | 2016             | General, metals, nutrients, ions                 |                              |
| 66  | Upper Toad River          | Low                         | No data                              | No data                 | No data          | No data  |                              |
| 67  | Lower Toad River          | Low                         | 2                                    | 2                       | 2017             | General, metals, ions, organic matter, nutrients |                              |
| 68  | Racing River              | Low                         | 2                                    | 1                       | 2017             | General, metals, nutrients, ions                 |                              |
| 69  | Muncho River              | Low                         | 2                                    | 1                       | 2017             | General, metals, ions, organic matter, nutrients |                              |

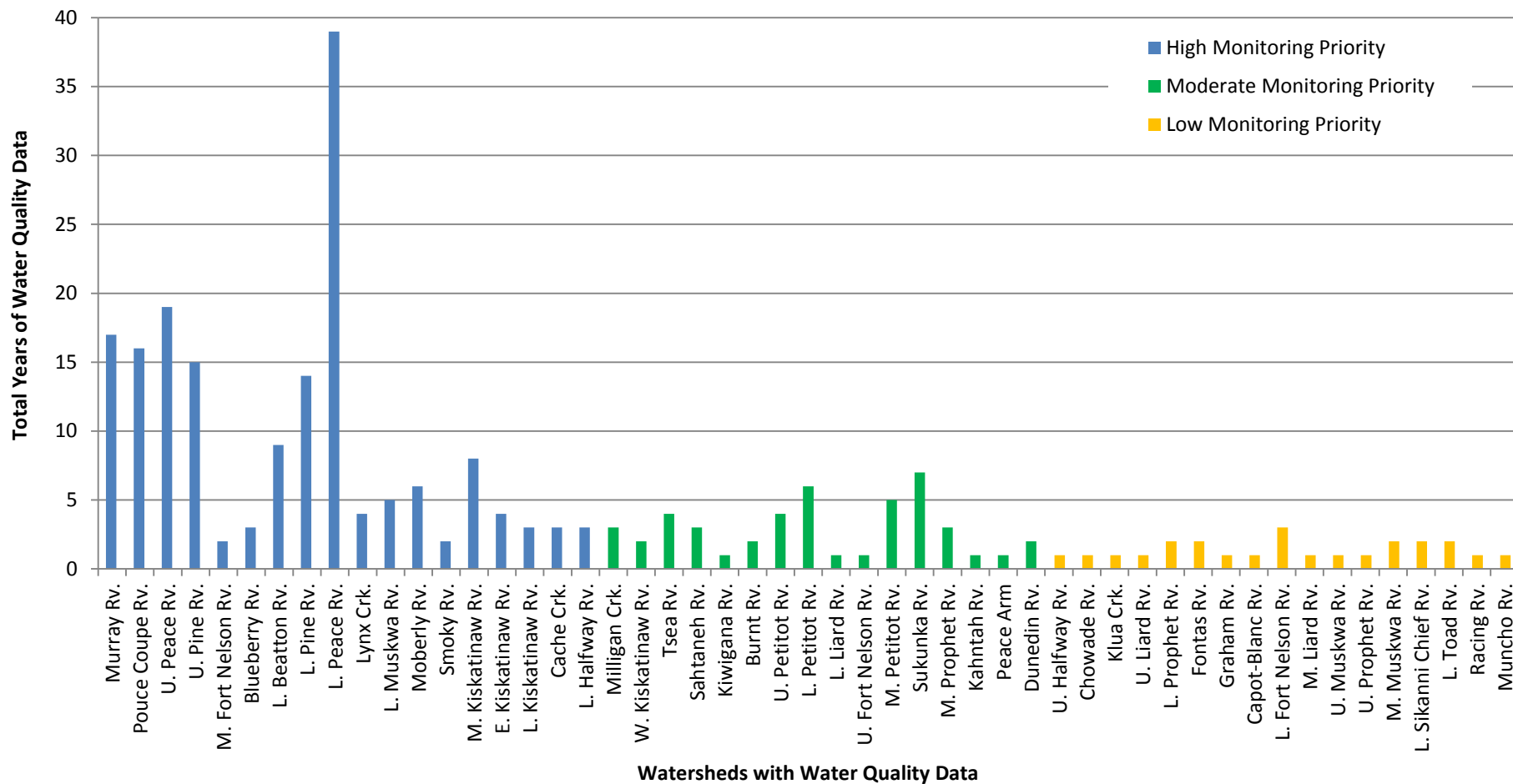


Figure 2. Northeast B.C. watersheds and the total number of years of water quality data per watershed. Blue represents the high monitoring priority watersheds, green represents moderate monitoring priority watersheds and yellow represents low monitoring priority watersheds according to the disturbance - sensitivity analysis vulnerability ranking. The watersheds without data are not shown in this graph.

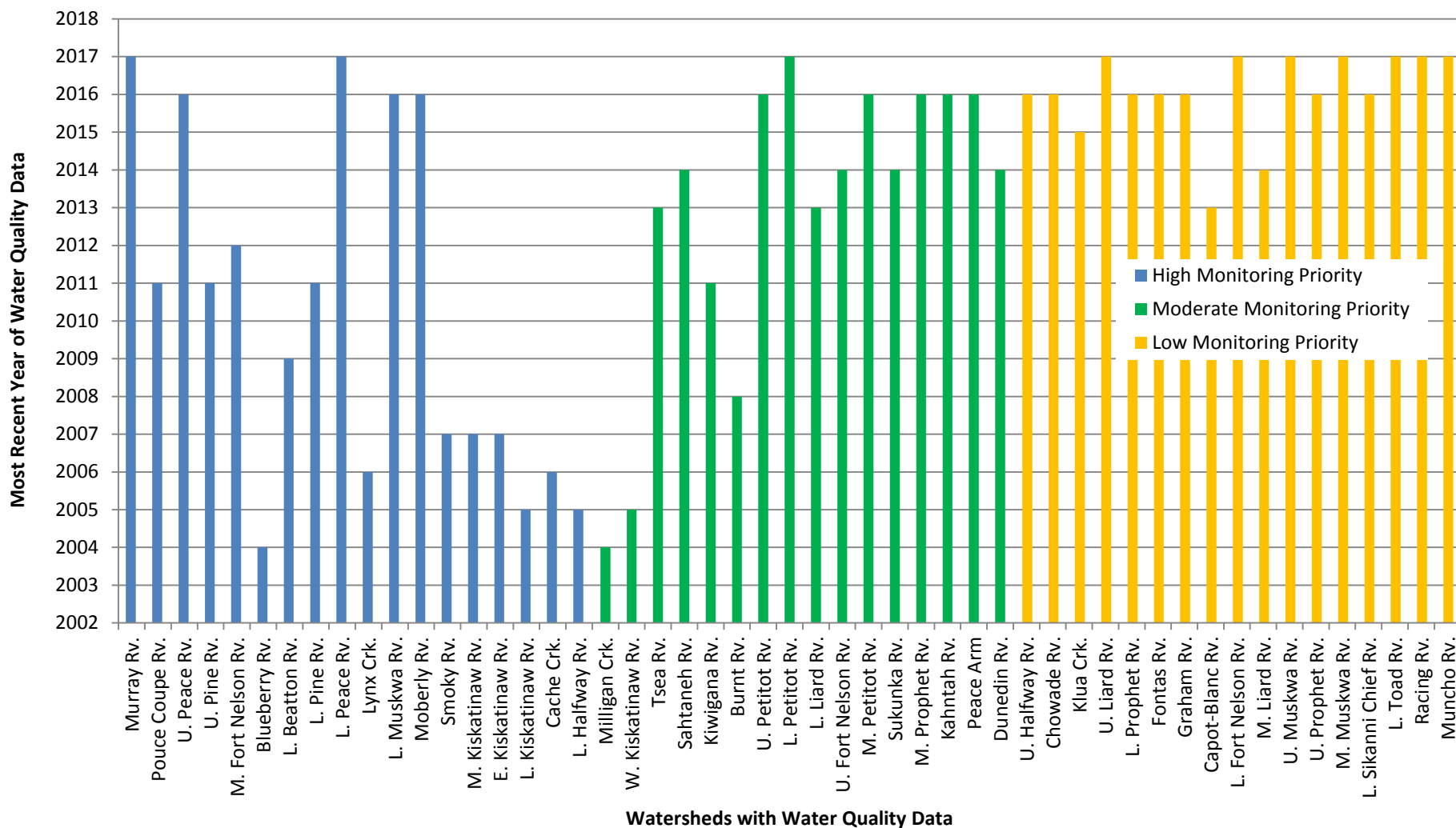


Figure 3. Northeast B.C. watersheds and the most recent year of water quality data. Blue represents the high monitoring priority watersheds, green represents moderate monitoring priority watersheds and yellow represents low monitoring priority watersheds according to the disturbance - sensitivity analysis vulnerability ranking. The watersheds without data are not shown in this graph.

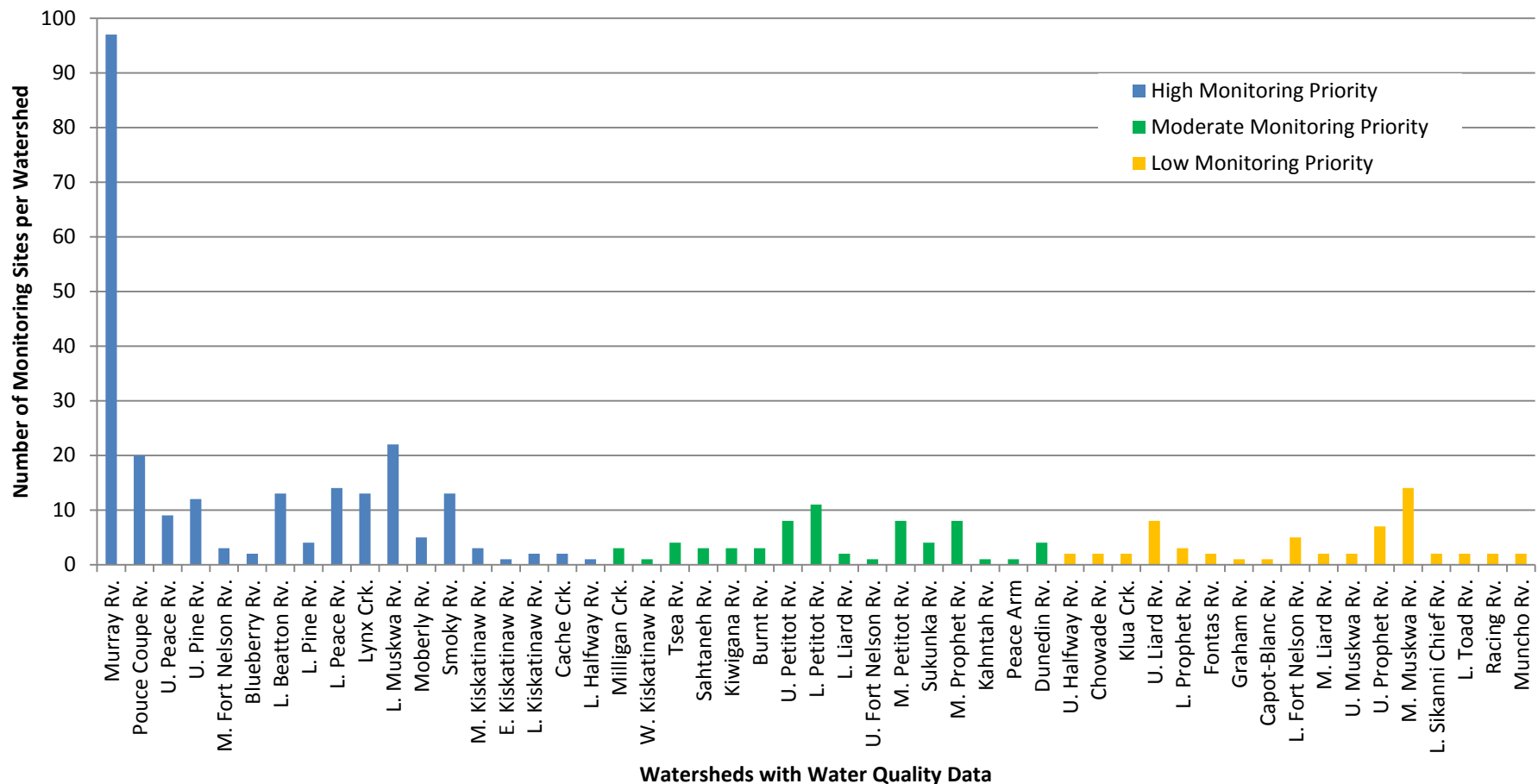


Figure 4. Northeast B.C. watersheds and the number of water quality monitoring sites with data per watershed. Blue represents the high monitoring priority watersheds, green represents moderate monitoring priority watersheds and yellow represents low monitoring priority watersheds according to the disturbance - sensitivity analysis vulnerability ranking. The watersheds which did not have water quality data are not included in this graph.

## PART II - WATERSHED DATA SUMMARY

Detailed water quality data summaries organized by watershed are presented below. The watersheds are listed in order of vulnerability according to the Disturbance - Sensitivity Based Approach watershed vulnerability ranking (NEWS 2017).

### 1) Murray River Watershed

There are 77 EMS sites and 20 CABIN sites located throughout the Murray River Watershed. Of these, 33 include data collected within the last 10 years (Table 2). Only data from the last 10 years are summarized in Table 2 due to the volume of monitoring sites and the fact these data are more likely to represent current conditions. Overall, water quality data were collected during 1982-83, 1985-90, 1992, 1994, 1998-2000, 2008-2009, 2012-2013 and 2016-2017. A wide variety of water quality parameters have been measured, including general, metals, organic pollutants, major ions and nutrients.

As part of the Canada-British Columbia Water Quality Monitoring Agreement, a water quality monitoring site (E279733) was installed on the Murray River in January 2017 near its confluence with the Pine River. This site will deliver consistent water quality data into the future. In addition, as part of the effort to increase water quality knowledge in this watershed, the Murray River Watershed Partnership is completing a cumulative effects assessment which will contribute to the development of water quality objectives for the Murray River. Water quality objectives (WQOs) may be developed for specific water bodies to protect water uses in that watershed. Attainment monitoring is used to determine if WQOs are being met. *Water quality objectives* were developed for Bullmoose Creek in the Murray River Watershed in 1987 (Ministry of Environment 1987a). WQOs attainment monitoring was conducted in 2006; WQOs were met resulting in a water quality index rating of "Good" for South Bullmoose Creek and "Fair" for Bullmoose and West Bullmoose Creeks (Ministry of Environment 2008a).



Table 2. Water quality data summary by monitoring site in the Murray River Watershed.

| Waterbody               | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type  |
|-------------------------|--------------------|------------------|---------------|------------------|---|
| Babcock Cr.             | E273199            | EMS (CABIN data) | 1             | 2008             | General, ions, metals, nutrients                                      |
| Bullmoose Cr.           | 0410094            | EMS              | 13            | 2016             | General, metals, ions, nutrients                                      |
| Bullmoose Cr.           | E206225            | EMS              | 9             | 2016             | General, metals, ions, nutrients                                      |
| Bullmoose Cr.           | E206226            | EMS              | 9             | 2016             | General, metals, ions, nutrients                                      |
| Bullmoose Cr.           | E206227            | EMS              | 10            | 2016             | General, metals, ions, nutrients                                      |
| Bullmoose Cr.           | E206228            | EMS              | 12            | 2016             | General, metals, ions, nutrients                                      |
| Bullmoose Cr.           | E206232            | EMS              | 11            | 2016             | General, metals, ions, nutrients                                      |
| Bullmoose Cr.           | E273198            | EMS (CABIN data) | 1             | 2008             | General, ions, metals, nutrients                                      |
| Bullmoose Cr. Tributary | E273197            | EMS (CABIN data) | 3             | 2012             | General, ions, metals, nutrients                                      |
| Cowie Cr.               | E308498            | EMS              | 1             | 2017             | General, organic pollutants, metals, ions, microbiological, nutrients |
| Elephant Cr.            | E306399            | EMS (CABIN data) | 1             | 2016             | General, ions, metals, nutrients                                      |
| Flatbed Cr.             | E289554            | EMS              | 3             | 2014             | General, ions, organic matter, metals, nutrients                      |
| Gordon Cr.              | E277177            | EMS (CABIN data) | 1             | 2009             | General, ions, metals, nutrients                                      |
| Gwillam R.              | E308497            | EMS              | 1             | 2017             | General, organic pollutants, metals, ions, microbiological, nutrients |
| Hambler Cr.             | E273200            | EMS (CABIN data) | 1             | 2008             | General, ions, metals, nutrients                                      |
| Hambrook Cr.            | E306400            | EMS (CABIN data) | 1             | 2016             | General, ions, metals, nutrients                                      |
| Imperial Cr.            | E273193            | EMS (CABIN data) | 1             | 2008             | General, ions, metals, nutrients                                      |
| Imperial Cr. Tributary  | E273194            | EMS (CABIN data) | 1             | 2008             | General, ions, metals, nutrients                                      |
| Kinuseo Cr.             | E308494            | EMS              | 1             | 2017             | General, organic pollutants, metals, ions, microbiological, nutrients |

| Waterbody        | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type  |
|------------------|--------------------|------------------|---------------|------------------|---|
|                  |                    |                  |               |                  | nutrients   |
| Leyland Cr.      | E306408            | EMS (CABIN data) | 1             | 2016             | General, ions, metals, nutrients  |
| M20 Cr.          | E277178            | EMS (CABIN data) | 1             | 2009             | General, ions, metals, nutrients  |
| Mast Cr.         | E206526            | EMS              | 8             | 2016             | General, ions, metals, inorganics, nutrients  |
| Mesa Cr.         | E206319            | EMS              | 8             | 2016             | General, metals, ions, nutrients, microbiological                                     |
| Mesa Cr.         | E206521            | EMS              | 8             | 2016             | General, ions, metals, inorganics, nutrients  |
| Mesa Cr.         | E277173            | EMS (CABIN data) | 1             | 2009             | General, ions, metals, nutrients  |
| Murray R.        | 1177702            | EMS              | 4             | 2017             | General, metals, ions, nutrients, organic matter, microbiological, organic pollutants |
| Murray R.        | E277609            | EMS              | 3             | 2013             | Metals  |
| Murray R.        | E277610            | EMS              | 3             | 2013             | Metals  |
| Murray R.        | E277611            | EMS              | 3             | 2013             | Metals  |
| Murray R.        | E277612            | EMS              | 3             | 2013             | Metals  |
| Murray R.        | E277613            | EMS              | 3             | 2013             | Metals  |
| Murray R.        | E277614            | EMS              | 3             | 2013             | Metals  |
| Murray R.        | E279733            | EMS              | 1             | 2017             | General, ions, organic matter, nutrients  |
| Murray R.        | E289552            | EMS              | 3             | 2014             | General, ions, organic matter, metals, nutrients                                      |
| Murray R.        | E289555            | EMS              | 3             | 2014             | General, ions, organic matter, metals, nutrients                                      |
| Murray R.        | E289556            | EMS              | 3             | 2014             | General, ions, organic matter, metals, nutrients                                      |
| Murray R.        | E308493            | EMS              | 1             | 2017             | General, organic pollutants, metals, ions, microbiological, nutrients                 |
| Murray R.        | E308495            | EMS              | 1             | 2017             | General, organic pollutants, metals, ions, microbiological, nutrients                 |
| Perry Cr.        | E277174            | EMS (CABIN data) | 1             | 2009             | General, ions, metals, nutrients  |
| S. Bullmoose Cr. | E206229            | EMS              | 11            | 2013             | General, metals, ions, nutrients  |
| Salt Cr.         | E308496            | EMS              | 1             | 2017             | General, organic pollutants, metals, ions, microbiological, nutrients                 |

| <b>Waterbody</b>        | <b>Monitoring Site ID</b> | <b>Database</b>  | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>  |
|-------------------------|---------------------------|------------------|----------------------|-------------------------|--|
| Unnamed Cr.             | E306397                   | EMS (CABIN data) | 1                    | 2016                    | General, ions, metals, nutrients                             |
| Unnamed Cr.             | E306398                   | EMS (CABIN data) | 1                    | 2016                    | General, ions, metals, nutrients                             |
| Unnamed Cr.             | E306409                   | EMS (CABIN data) | 1                    | 2016                    | General, ions, metals, nutrients                             |
| Upper Blue Lake Outflow | E298950                   | EMS (CABIN data) | 1                    | 2016                    | General, ions, metals, nutrients                             |
| Wolverine Cr.           | E277175                   | EMS (CABIN data) | 1                    | 2009                    | General, ions, metals, nutrients                             |
| Wolverine R.            | 0410061                   | EMS              | 9                    | 2016                    | General, ions, metals, organic matter, nutrients, inorganics |
| Wolverine R.            | 0410097                   | EMS              | 8                    | 2016                    | General, metals, ions, nutrients                             |
| Wolverine R.            | E289553                   | EMS              | 3                    | 2014                    | General, ions, organic matter, metals, nutrients             |
| Wolverine R.            | E295109                   | EMS              | 2                    | 2014                    | General, ions, metals  |
| Wolverine R.            | 0410060                   | EMS              | 9                    | 2016                    | General, ions, metals, organic matter, nutrients, inorganics |
| Wolverine R.            | E273195                   | EMS (CABIN data) | 1                    | 2008                    | General, ions, metals, nutrients                             |
| Wolverine R.            | E273196                   | EMS (CABIN data) | 1                    | 2008                    | General, ions, metals, nutrients                             |

## 2) Pouce Coupe River Watershed

There are 20 EMS sites in the Pouce Coupe River Watershed located throughout the watershed (Table 3). Water quality data were collected during 1974-1975, 1983-1985, 1987-1990, 1992, 1999, 2000-2001 and 2011 and include a wide range of parameters for most of the monitoring sites. WQOs were developed for the *Pouce Coupe River* in 1985 to protect aquatic life and recreational uses in the watershed (Ministry of Environment, 1985a). Municipal waste discharges and agricultural land use were identified as potential risks to water quality. Water quality objective attainment monitoring was last completed in 2006 and WQOs were not met at that time (Ministry of Environment 2008a).

*Table 3. Water quality data summary by monitoring site in the Pouce Coupe River Watershed.*

| Waterbody         | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type  |
|-------------------|--------------------|----------|---------------|------------------|---|
| Albright Cr.      | E209204            | EMS      | 1             | 1987             | Nutrients, microbiological  |
| Albright Cr.      | E209205            | EMS      | 1             | 1987             | Nutrients, microbiological  |
| Dawson Cr.        | 0410039            | EMS      | 9             | 2011             | General, ions, metals, organic matter, nutrients, microbiological |
| Dawson Cr.        | 0410032            | EMS      | 2             | 1975             | General, metals, nutrients, microbiological, organic matter       |
| Dawson Cr.        | 0410031            | EMS      | 4             | 1984             | General, metals, nutrients  |
| Dawson Cr.        | 0410034            | EMS      | 7             | 2011             | General, nutrients, organic matter, ions, microbiological         |
| Little Tupper Cr. | E209202            | EMS      | 1             | 1987             | General, nutrients  |
| Little Tupper Cr. | E209208            | EMS      | 1             | 1987             | General, nutrients  |
| Nichyeskwa Cr.    | E234288            | EMS      | 1             | 2004             | General, metals   |
| Peavine Cr.       | E209206            | EMS      | 1             | 1987             | General, nutrients  |
| Pouce Coupe R.    | 0410041            | EMS      | 2             | 1983             | Microbiological, ions, nutrients                                  |
| Pouce Coupe R.    | 0410042            | EMS      | 3             | 1987             | General, ions, metals, organic matter, nutrients                  |
| Pouce Coupe R.    | E206705            | EMS      | 9             | 2011             | General, ions, metals, organic matter, nutrients, microbiological |
| Pouce Coupe R.    | E206959            | EMS      | 9             | 2011             | General, ions, metals, organic matter, nutrients, microbiological |
| Pouce Coupe R.    | E206706            | EMS      | 5             | 2011             | General, metals, organic matter, nutrients, microbiological       |
| Pouce Coupe R.    | 0410040            | EMS      | 2             | 1975             | General, metals, organic matter, nutrients                        |
| S. Dawson Cr.     | 0410033            | EMS      | 2             | 1975             | General, metals, nutrients, microbiological, organic matter       |

|            |         |     |   |      |                            |
|------------|---------|-----|---|------|----------------------------|
| Tupper Cr. | E206703 | EMS | 2 | 1987 | Nutrients, microbiological |
| Tupper Cr. | E209207 | EMS | 1 | 1987 | Nutrients, microbiological |
| Tupper Cr. | E209201 | EMS | 1 | 1987 | Nutrients                  |

### 3) Upper Peace River Watershed

There are 8 EMS sites and 1 CABIN site in the Upper Peace River Watershed (Table 4). This watershed includes the inflows into the Peace River between Hudson's Hope and Taylor, with monitoring sites located throughout the watershed. Water quality data were collected during 1971-1975, 1980, 1988-1994, 2002-2009 and 2016. Parameter types measured include general, metals, ions, organic matter, nutrients, organic pollutants and microbiological. *Water quality objectives* were developed for the main-stem of the Peace River in 1987 to protect drinking water, aquatic life, wildlife, recreational uses and agricultural uses in the watershed (Ministry of Environment 1987b). Water quality objective attainment monitoring was completed in 2006; WQOs were met with a water quality index rating of "Excellent" (Ministry of Environment 2008a).

Table 4. Water quality data summary by monitoring site in the Upper Peace River Watershed.

| Waterbody   | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type   |
|-------------|--------------------|------------------|---------------|------------------|--|
| Maurice Cr. | E306407            | EMS (CABIN data) | 1             | 2016             | General, metals, ions, organic matter, nutrients                 |
| Peace R.    | 0400134            | EMS              | 12            | 2009             | General, ions, metals, nutrients, microbiological                |
| Peace R.    | 0400492            | EMS              | 11            | 2009             | General, metals, nutrients, microbiological                      |
| Portage Cr. | E253389            | EMS              | 2             | 2004             | General, metals, organic pollutants, nutrients, microbiological  |
| Unnamed Cr. | E207906            | EMS              | 4             | 1993             | Microbiological, nutrients                                       |
| Peace R.    | 0400136            | EMS              | 4             | 1974             | General, metals, ions microbiological, nutrients, organic matter |
| Peace R.    | 0400135            | EMS              | 6             | 1989             | General, metals, ions microbiological, nutrients, organic matter |
| Peace R.    | 0410018            | EMS              | 4             | 1990             | General, metals, ions, nutrients, microbiological                |
| Peace R.    | 0400491            | EMS              | 2             | 1980             | General, metals, ions, nutrients, microbiological                |

### 4) Upper Pine River Watershed

There are 6 EMS sites and 6 CABIN sites in the Upper Pine River Watershed (Table 5). This watershed extends west from Chetwynd to Pine Le Moray Provincial Park with monitoring sites located throughout the watershed. Water quality data were collected during 1982, 1983, 1985, 1987, 1992, 2008 and 2009 and include a range of parameters. *Water quality*

*objectives* were developed for the Pine River in 1985 to protect drinking water, aquatic life and recreational uses in the watershed (Ministry of Environment, 1985b). WQO attainment monitoring was last completed in 2006; WQOs were met at that time with a water quality index rating of “Good” (Ministry of Environment 2008a).

*Table 5. Water quality data summary by monitoring site in the Upper Pine River Watershed.*

| <b>Waterbody</b>       | <b>Monitoring Site ID</b> | <b>Database</b>  | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>  |
|------------------------|---------------------------|------------------|----------------------|-------------------------|--|
| Boulder Cr.            | E277169                   | EMS (CABIN data) | 1                    | 2009                    | General, metals, ions, organic matter, nutrients             |
| Callazon Cr. Tributary | E277182                   | EMS (CABIN data) | 1                    | 2009                    | General, metals, ions, organic matter, nutrients             |
| Doonan Cr.             | E277181                   | EMS (CABIN data) | 1                    | 2009                    | General, metals, ions, organic matter, nutrients             |
| Hasler Cr.             | E273190                   | EMS (CABIN data) | 1                    | 2008                    | General, metals, ions, organic matter, nutrients             |
| Link Cr.               | E277180                   | EMS (CABIN data) | 1                    | 2009                    | General, metals, ions, organic matter, nutrients             |
| Pine R.                | 0400562                   | EMS              | 1                    | 1976                    | General, ions, metals, organic matter, nutrients             |
| Pine R.                | 0410029                   | EMS              | 5                    | 1992                    | Organic matter, microbiological, nutrients, ions             |
| Willow Cr.             | E277170                   | EMS (CABIN data) | 1                    | 2009                    | General, metals, ions, organic matter, nutrients             |
| Hasler Cr.             | E250093                   | EMS              | 4                    | 2008                    | General, metals, ions, organic matter, nutrients, pesticides |
| Hasler Cr.             | E242324                   | EMS              | 1                    | 2000                    | General, metals, ions, organic matter, nutrients             |
| Pine R.                | E206235                   | EMS              | 7                    | 2011                    | General, ions, organic matter, nutrients, microbiological    |
| Pine R.                | 0410093                   | EMS              | 1                    | 1983                    | General, nutrients   |

## 5) Middle Fort Nelson River Watershed

There are 3 CABIN sites in the Middle Fort Nelson River Watershed with data collected in 2010 and 2012 (Table 6). This watershed spans from the confluence with Klua Creek north to the confluence with the Kiwigana River. The monitoring sites are located on tributaries in the lower part of the watershed and parameter types measured include general, metals, ions and nutrients.

*Table 6. Water quality data summary by monitoring site in the Middle Fort Nelson River Watershed.*

| <b>Waterbody</b>        | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>            |
|-------------------------|---------------------------|-----------------|----------------------|-------------------------|----------------------------------|
| Stanolind Cr.           | STND02                    | ECCC CABIN      | 1                    | 2012                    | General, metals, ions, nutrients |
| Stanolind Cr. Tributary | STND01                    | ECCC CABIN      | 1                    | 2012                    | General, metals, ions, nutrients |
| Tsimeh Cr.              | E283430                   | EMS (CABIN      | 1                    | 2010                    | General, metals, nutrients       |

|  |  |       |  |  |  |
|--|--|-------|--|--|--|
|  |  | data) |  |  |  |
|--|--|-------|--|--|--|

## 6) Blueberry River Watershed

There are 2 EMS sites in the Blueberry River Watershed with data collected most recently in 2004 (Table 7). These sites are located in the upper and lower half of the watershed. Water quality parameter types include general, metals, ions, nutrients, microbiological and organic matter.

Table 7. Water quality data summary by monitoring site in the Upper Pine River Watershed.

| Waterbody    | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type  |
|--------------|--------------------|----------|---------------|------------------|---|
| Blueberry R. | E250094            | EMS      | 2             | 2004             | General, metals, ions, microbiological, nutrients                 |
| Blueberry R. | E257094            | EMS      | 1             | 2004             | General, metals, ions, microbiological, nutrients, organic matter |

## 7) Farrell Creek Watershed

There are no EMS or CABIN water quality data for this watershed.

## 8) Lower Beaton River Watershed

There are 13 EMS sites in the Lower Beaton River Watershed; all located in the mid to lower half of the watershed (Table 8). This watershed spans from just south of the confluence with Milligan Creek, south to the confluence with the Peace River, halfway between Taylor and the Alberta border. Water quality data were collected during 1971-74, 1988-89, 1993-94 and most recently in 2009. Parameter types include general, metals, ions, nutrients and microbiological parameters.

WQOs were developed for the Charlie Lake Sub-basin of this watershed in 1985 to protect drinking water, aquatic life and recreational uses (Ministry of Environment 1985c). WQO attainment monitoring was last completed in 2006; all WQOs were met except for phosphorus. The [Charlie Lake Limnological Data Survey](#) report provides additional water quality information for Charlie Lake (Ministry of Environment, Lands and Parks 1999).

Table 8. Water quality data summary by monitoring site for the Lower Beaton River Watershed.

| Waterbody | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type                                    |
|-----------|--------------------|----------|---------------|------------------|---|
| Beaton R. | 0400145            | EMS      | 4             | 1974             | General, metals, ions, microbiological, nutrients |
| Beaton R. | E207448            | EMS      | 5             | 2009             | General, metals, ions, microbiological, nutrients |
| Beaton R. | E207449            | EMS      | 4             | 2009             | General, metals, ions, microbiological, nutrients |
| Beaton R. | E219248            | EMS      | 1             | 1993             | General, metals, ions,                            |

|                                      |         |     |   |      |   |
|--------------------------------------|---------|-----|---|------|---|
|                                      |         |     |   |      | microbiological, nutrients  |
| Beaton R.                            | E219248 | EMS | 1 | 1993 | General, microbiological  |
| St. John's Cr.                       | E218979 | EMS | 2 | 1994 | General, microbiological  |
| Stoddart Cr.<br>below Charlie<br>Lk. | 0410023 | EMS | 1 | 1982 | General, nutrients,<br>microbiological                                  |
| Unnamed Cr. at<br>281 Rd.            | E207902 | EMS | 5 | 1993 | Microbiological, nutrients  |
| Coffee Cr. at<br>114 Rd.             | E207901 | EMS | 5 | 1993 | Microbiological, nutrients  |
| Stoddart Cr.<br>above Charlie<br>Lk. | E250091 | EMS | 2 | 2003 | General, metals, ions,<br>microbiological, nutrients                    |
| Stoddart Cr.<br>above Charlie<br>Lk. | E207904 | EMS | 5 | 1993 | General, metals, ions,<br>microbiological, nutrients                    |
| Stoddart Cr. at<br>114 Rd.           | E249803 | EMS | 2 | 2004 | General, metals, ions, organic<br>matter, microbiological,<br>nutrients |
| Stoddart Cr.<br>above Charlie<br>Lk. | 0400397 | EMS | 5 | 2004 | General, organic matter,<br>nutrients                                   |

## 9) Lower Pine River Watershed

There are 4 EMS sites in the Lower Pine River Watershed located in the upper half of the watershed (Table 9). The watershed boundaries are from the District of Chetwynd to the confluence with the Peace River at Taylor. Water quality data were collected in 1971-1974, 1976, 1983-1984, 1986-1990, 1992 and 2011 and include general, metals, ions, organic matter, nutrients and microbiological parameter types. *Water quality objectives* were developed for the Pine River in 1985 to protect drinking water, aquatic life and recreational uses in the watershed (Ministry of Environment 1985b). Water quality objective attainment monitoring was completed in 2006. Objectives were met for the Pine River with a water quality index rating of "Good" (Ministry of Environment 2008a).

*Table 9. Water quality data summary by monitoring site for the Lower Pine River Watershed.*

| <b>Waterbody</b> | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>                                |
|------------------|---------------------------|-----------------|----------------------|-------------------------|--|
| Pine R.          | 0400561                   | EMS             | 7                    | 2011                    | General, metals, ions,<br>microbiological, nutrients |
| Pine R.          | 0400560                   | EMS             | 3                    | 1984                    | General, metals, ions,<br>microbiological, nutrients |
| Pine R.          | E207956                   | EMS             | 2                    | 1990                    | General, metals, ions, organic<br>matter, nutrients  |
| Pine R.          | 0400141                   | EMS             | 4                    | 1974                    | General, metals, nutrients,<br>microbiological       |



## 10) Lower Peace River Watershed

There are 14 EMS sites in the Lower Peace River Watershed which have ambient water quality data (Table 10). This watershed spans east from Taylor to the Alberta border. Site E206585 is part of the Canada-British Columbia Water Quality Monitoring Agreement network and includes data collected annually from 1984 to 2017. This site is in the lower half of the watershed at the confluence of the Alces River, upstream of the Alberta border. The data include general, ions, metals, organic matter, nutrients, inorganics, organic pollutants and microbiological parameter types.

WQOs were developed for the main-stem of the Peace River in 1987 to protect drinking water, aquatic life, wildlife, agricultural uses and recreational uses in the watershed (Ministry of Environment 1987b). WQO attainment monitoring for this watershed was last completed in 2006. All WQOs were met at that time with a water quality index rating of “Excellent” (Ministry of Environment 2008a). The [Water Quality Assessment Of Peace River](#) was done under the Canada-B.C. Water Quality Monitoring Agreement in 2003 and showed water quality to be good with no remedial activities necessary at that time (Environment Canada & Ministry of Environment 2003).

*Table 10. Water quality data summary by monitoring site in the Lower Peace Watershed.*

| Waterbody | Monitoring Site ID | Database            | Years of Data | Most Recent Data | Parameter Type  |
|-----------|--------------------|---------------------|---------------|------------------|---|
| Peace R.  | E206585            | EMS (FED/PROV data) | 29            | 2017             | General, ions, metals, microbiological, organic matter, nutrients                                 |
| Peace R.  | E249800            | EMS                 | 3             | 2004             | General, ions, metals, microbiological, organic matter, nutrients                                 |
| Peace R.  | 0400146            | EMS                 | 5             | 1978             | General, ions, metals, microbiological, organic matter, nutrients                                 |
| Peace R.  | 0400147            | EMS                 | 4             | 1974             | General, ions, microbiological, organic matter, nutrients   |
| Peace R.  | 0400148            | EMS                 | 4             | 1974             | General, ions, microbiological, organic matter, nutrients   |
| Peace R.  | 0400142            | EMS                 | 12            | 2009             | General, ions, metals, microbiological, organic matter, nutrients, inorganics, organic pollutants |
| Peace R.  | 0400143            | EMS                 | 9             | 1992             | General, ions, metals, microbiological, organic matter, nutrients, inorganics, organic pollutants |

|          |         |     |    |      |   |
|----------|---------|-----|----|------|---|
| Peace R. | 0400144 | EMS | 4  | 1974 | General, ions, metals, microbiological, organic matter, nutrients, inorganics                     |
| Peace R. | E207631 | EMS | 7  | 1994 | General, ions, metals, microbiological, organic matter, nutrients, inorganics, organic pollutants |
| Peace R. | 0400139 | EMS | 6  | 1989 | General, ions, metals, microbiological, organic matter, nutrients                                 |
| Peace R. | 0400138 | EMS | 13 | 2009 | General, ions, metals, microbiological, organic matter, nutrients                                 |
| Peace R. | 0400140 | EMS | 4  | 1974 | General, ions, metals, microbiological, organic matter, nutrients                                 |
| Peace R. | 0410054 | EMS | 9  | 2009 | General, ions, metals, microbiological, nutrients, inorganics                                     |
| Peace R. | 0410055 | EMS | 1  | 1978 | General, metals, inorganics, nutrients  |

## 11) Cameron River Watershed

There are no EMS or CABIN water quality data for this watershed.

## 12) Lynx Creek Watershed

There are 13 EMS sites in the Lynx Creek Watershed (Table 11) located throughout the watershed. Water quality data were collected from 2003-2006 and include general, metals, nutrients, organic pollutants and microbiological parameter types. Water quality was assessed in the report *A Baseline and Watershed Assessment in the Lynx Creek, Brenot Creek and Portage Creek Watersheds*. This report recommended a multiple barrier approach to protect drinking water sources (Ministry of Water, Land and Air Protection 2005).

Table 11. Water quality data summary by monitoring site in the Lynx Creek Watershed.

| Waterbody  | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type                              |
|------------|--------------------|----------|---------------|------------------|---|
| Brenot Cr. | E253400            | EMS      | 2             | 2004             | General, metals, microbiological, nutrients |
| Brenot Cr. | E253401            | EMS      | 2             | 2004             | General, metals, microbiological, nutrients |
| Brenot Cr. | E253402            | EMS      | 2             | 2004             | General, metals, microbiological, nutrients |
| Carey Cr.  | E253406            | EMS      | 2             | 2004             | General, metals,                            |

|             |         |     |   |      |   |
|-------------|---------|-----|---|------|---|
|             |         |     |   |      | microbiological, nutrients                                      |
| Lynx Cr.    | E253393 | EMS | 4 | 2006 | General, metals, microbiological, nutrients, organic pollutants |
| Lynx Cr.    | E253394 | EMS | 4 | 2006 | General, metals, microbiological, nutrients, organic pollutants |
| Lynx Cr.    | E253395 | EMS | 2 | 2004 | General, metals, microbiological, nutrients                     |
| Lynx Cr.    | E253396 | EMS | 3 | 2006 | General, metals, microbiological, nutrients                     |
| Lynx Cr.    | E253397 | EMS | 4 | 2006 | General, metals, microbiological, nutrients                     |
| Lynx Cr.    | E253398 | EMS | 3 | 2006 | General, metals, microbiological, nutrients                     |
| Lynx Cr.    | E253399 | EMS | 2 | 2004 | General, metals, microbiological, nutrients                     |
| Mackle Cr.  | E253404 | EMS | 2 | 2004 | General, metals, microbiological, nutrients                     |
| Mackle Cr.  | E253405 | EMS | 2 | 2004 | General, metals, microbiological, nutrients                     |
| Wapoose Cr. | E253403 | EMS | 2 | 2004 | General, metals, microbiological, nutrients                     |

### 13) Lower Muskwa River Watershed

There is 1 EMS site and 21 CABIN sites located throughout the Lower Muskwa River Watershed (Table 12). This watershed spans from Fort Nelson west to the Tetsa River confluence with the Muskwa River. Water quality data have been collected for 5 years, from 2010 to 2016, and include general, metals, ions, organic matter and nutrients parameter types.

*Table 12. Water quality data summary by monitoring site in the Lower Muskwa River Watershed*

| <b>Waterbody</b>   | <b>Monitoring Site ID</b> | <b>Database</b>  | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>                            |
|--------------------|---------------------------|------------------|----------------------|-------------------------|--|
| Akue Cr.           | E283432                   | EMS (CABIN data) | 1                    | 2010                    | General, metals, ions, organic matter, nutrients |
| Akue Cr.           | AKUE03                    | ECCC CABIN       | 1                    | 2014                    | General, metals, ions, nutrients                 |
| Akue Cr.           | AKUE06                    | ECCC CABIN       | 1                    | 2014                    | General, metals, ions, nutrients                 |
| Akue Cr. Tributary | AKUE01                    | ECCC CABIN       | 1                    | 2014                    | General, metals, ions, nutrients                 |
| Akue Cr. Tributary | AKUE04                    | ECCC CABIN       | 1                    | 2014                    | General, metals, ions, nutrients                 |
| Akue Cr. Tributary | AKUE10                    | ECCC CABIN       | 1                    | 2014                    | General, metals, ions, nutrients                 |

|                         |         |                  |   |      |  |
|-------------------------|---------|------------------|---|------|--|
| Kledo Cr.               | E283431 | EMS (CABIN data) | 1 | 2010 | General, metals, ions, organic matter, nutrients |
| Kledo Cr.               | KLD02   | ECCC CABIN       | 1 | 2012 | General, metals, ions, nutrients                 |
| Kledo Cr.               | KLD06   | ECCC CABIN       | 1 | 2014 | General, metals, ions, nutrients                 |
| Kledo Cr. Tributary     | KLD01   | ECCC CABIN       | 1 | 2012 | General, metals, ions, nutrients                 |
| Kledo Cr. Tributary     | KLD03   | ECCC CABIN       | 1 | 2013 | General, metals, ions, nutrients                 |
| Kledo R.                | E283431 | EMS              | 1 | 2010 | General, metals, nutrients                       |
| Kledo R. Tributary      | KLD09   | ECCC CABIN       | 1 | 2016 | General, metals, ions, nutrients                 |
| Lower Akue Cr.          | MUSK01  | ECCC CABIN       | 1 | 2012 | General, metals, ions, nutrients                 |
| Muskwa R. Tributary     | MUSK03  | ECCC CABIN       | 1 | 2012 | General, metals, ions, nutrients                 |
| Muskwa R. Tributary     | MUSK04  | ECCC CABIN       | 1 | 2012 | General, metals, ions, nutrients                 |
| Muskwa R. Tributary     | MUSK05  | ECCC CABIN       | 1 | 2013 | General, metals, ions, nutrients                 |
| Raspberry Cr.           | RSP01   | ECCC CABIN       | 1 | 2012 | General, metals, ions, nutrients                 |
| Streamboat R.           | STMB02  | ECCC CABIN       | 1 | 2016 | General, metals, ions, nutrients                 |
| Tsachedza Cr.           | LPRO01  | ECCC CABIN       | 1 | 2016 | General, metals, ions, nutrients                 |
| Tsachedza Cr. Tributary | LPRO02  | ECCC CABIN       | 1 | 2016 | General, metals, ions, nutrients                 |
| Upper Akue Cr.          | MUSK02  | ECCC CABIN       | 1 | 2012 | General, metals, ions, nutrients                 |

#### 14) Moberly River Watershed

There are 3 EMS sites and 2 CABIN sites located throughout the Moberly River Watershed (Table 13). Water quality data have been collected in 2002, 2003, 2005, 2006, 2008 and 2016 and include general, metals, ions, organic matter, nutrients and microbiological parameter types.

Table 13. Water quality data summary by monitoring site in the Moberly River Watershed.

| Waterbody     | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                                   |
|---------------|--------------------|------------------|---------------|------------------|--|
| Frank Roy Cr. | E306406            | EMS (CABIN data) | 1             | 2016             | General, metals, ions, organic matter, nutrients |
| Moberly Cr.   | E277171            | EMS (CABIN data) | 1             | 2008             | General, metals, ions, organic matter, nutrients |
| Moberly R.    | E249798            | EMS              | 3             | 2005             | General, metals,                                 |

|            |         |     |   |      |   |
|------------|---------|-----|---|------|---|
|            |         |     |   |      | microbiological, organic matter, nutrients                  |
| Moberly R. | E260101 | EMS | 2 | 2006 | General, metals, microbiological, organic matter, nutrients |
| Moberly R. | E260102 | EMS | 2 | 2006 | General, metals, microbiological, organic matter, nutrients |

### 15) Smoky River Watershed

There are 13 EMS sites located throughout the Smoky River Watershed (Table 14). The majority of data are from 1977, but more recent data from 2007 are available from 2 sites on Fortune Creek. Water quality data include general, metals and nutrient parameter types.

*Table 14. Water quality data summary by monitoring site in the Smoky River Watershed.*

| <b>Waterbody</b> | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>      |
|------------------|---------------------------|-----------------|----------------------|-------------------------|----------------------------|
| Belcourt Cr.     | 1177737                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Fortune Cr.      | E265925                   | EMS             | 1                    | 2007                    | General, metals, nutrients |
| Fortune Cr.      | E265929                   | EMS             | 1                    | 2007                    | General, metals, nutrients |
| Red Deer Cr.     | 1177736                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Redwillow R.     | 1177730                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Redwillow R.     | 1177731                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Saxon Cr.        | 1177738                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Saxon Cr.        | 1177739                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Thunder Cr.      | 1177729                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Torrens R.       | 1177742                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Torrens R.       | 1177743                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Wapiti R.        | 1177732                   | EMS             | 1                    | 1977                    | General, metals, nutrients |
| Wapiti R.        | 1177733                   | EMS             | 1                    | 1977                    | General, metals, nutrients |

### 16) Kyklo River Watershed

There are no EMS or CABIN water quality data for this watershed.

### 17) Doig River Watershed

There are no EMS or CABIN water quality data for this watershed.

### 18) Middle Kiskatinaw River Watershed

There are 3 EMS sites in the Middle Kiskatinaw River Watershed (Table 15). This watershed spans from the intersection of Highway 97 and Highway 52 in the north to the confluence of Oetata Creek and the East Kiskatinaw River in the south. Water quality data were collected in 1976, 1983-1984, 1987 and 2004-2007 and include general, metals, organic matter, nutrients and ions parameters types.

Table 15. Water quality data summary by monitoring site in the Middle Kiskatinaw River Watershed.

| Waterbody     | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type  |
|---------------|--------------------|----------|---------------|------------------|---|
| Kiskatinaw R. | 0400545            | EMS      | 4             | 1987             | General, metals, organic matter, nutrients, ions          |
| Kiskatinaw R. | E256834            | EMS      | 4             | 2007             | General, ions, microbiological, nutrients, organic matter |
| Kiskatinaw R. | E256837            | EMS      | 4             | 2007             | General, ions, microbiological, nutrients, organic matter |

## 19) Upper Beaton River Watershed

There are no EMS or CABIN water quality data for this watershed.

## 20) East Kiskatinaw River Watershed

There is 1 EMS site in the East Kiskatinaw River Watershed located in the lower part of the watershed (Table 16). This watershed spans from the confluence with Oetata Creek south to the border of Bearhole Lake Provincial Park. The most recent water quality data collected at this site was in 2007. Parameter types measured at this site include general, ions, microbiological, nutrients and organic matter.

Table 16. Water quality data summary by monitoring site in the East Kiskatinaw River Watershed.

| Waterbody     | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type  |
|---------------|--------------------|----------|---------------|------------------|---|
| Kiskatinaw R. | E256840            | EMS      | 4             | 2007             | General, ions, microbiological, nutrients, organic matter |

## 21) Lower Kiskatinaw River Watershed

There are 2 EMS sites in the Lower Kiskatinaw River Watershed located near the mouth of the river in the lower part of the watershed (Table 17). This watershed spans from its confluence with the Peace River in the north to the intersection of Highway 97 and Highway 52 in the south. The most recent monitoring was conducted in 2005. Parameter types measured include general, ions, metals, organic matter, nutrients and organic pollutants. Additional water quality information is available in the report *Bacteria and Parasite Source Identification in the Kiskatinaw Watershed*. This study identified septic systems and livestock watering holes as risks to the Kiskatinaw River (Ministry of Environment 2008b).

Table 17. Water quality data summary by monitoring site in the Lower Kiskatinaw Watershed.

| Waterbody     | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type   |
|---------------|--------------------|----------|---------------|------------------|--|
| Kiskatinaw R. | E228061            | EMS      | 3             | 2005             | General, ions, metals, organic matter, nutrients, organic pollutants |

|               |         |     |   |      |  |
|---------------|---------|-----|---|------|--|
| Kiskatinaw R. | E228062 | EMS | 3 | 2005 | General, ions, metals, organic matter, nutrients, organic pollutants |
|---------------|---------|-----|---|------|--|

## 22) Cache Creek Watershed

There are 2 EMS sites in the Cache Creek Watershed located at the mouth of Cache Creek near its confluence with the Peace River (Table 18). Water quality data were collected in 1989 and 2006. General, metals, ions, organic matter and microbiological parameter types were measured at site E260099. Water quality monitoring at site E207905 was limited to microbiological indicators and phosphorus.

*Table 18. Water quality data summary by monitoring site in the Cache Creek Watershed.*

| Waterbody       | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type  |
|-----------------|--------------------|----------|---------------|------------------|---|
| Cache Cr.       | E260099            | EMS      | 2             | 2006             | General, metals, ions, organic matter, microbiological, nutrients |
| Lower Cache Cr. | E207905            | EMS      | 1             | 1989             | Microbiological, phosphorus                                       |

## 23) Lower Halfway River Watershed

There is 1 EMS site in the Lower Halfway River Watershed located near the mouth of the river, at the confluence with the Peace River (Table 19). This watershed spans from its confluence with the Graham River in the north to the Peace River confluence in the south. Data were collected from 2002 to 2005 and include general, metals, nutrients and microbiological parameter types.

*Table 19. Water quality data summary by monitoring site in the Lower Halfway River Watershed.*

| Waterbody  | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type                              |
|------------|--------------------|----------|---------------|------------------|---|
| Halfway R. | E249801            | EMS      | 3             | 2005             | General, metals, nutrients, microbiological |

## 24) Milligan Creek Watershed

There are 3 EMS sites in the Milligan Creek Watershed located in the lower half of the watershed (Table 20). Water quality data were collected from 2002 to 2004 and include general, metals, ions, organic matter, nutrients and microbiological parameter types.

*Table 20. Water quality data summary by monitoring site in the Milligan Creek Watershed.*

| Waterbody    | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type  |
|--------------|--------------------|----------|---------------|------------------|---|
| Milligan Cr. | E249804            | EMS      | 3             | 2003             | General, metals, ions, organic matter, nutrients, microbiological |
| Milligan Cr. | E249805            | EMS      | 2             | 2004             | General, metals, ions, organic                                    |

|                   |         |     |   |      |   |
|-------------------|---------|-----|---|------|---|
|                   |         |     |   |      | matter, nutrients, microbiological                                |
| West Milligan Cr. | E250092 | EMS | 2 | 2003 | General, metals, ions, organic matter, nutrients, microbiological |

## 25) West Kiskatinaw River Watershed

There is 1 EMS site in the West Kiskatinaw River Watershed located in the middle part of the watershed (Table 21). This watershed spans from the East Kiskatinaw River fork to include all the Kiskatinaw River headwaters just north of Flatbed Creek. Water quality data were collected in 2004 and 2005 and include general, metals and nutrients parameter types.

*Table 21. Water quality data summary by monitoring site in the West Kiskatinaw River Watershed.*

| Waterbody    | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type             |
|--------------|--------------------|----------|---------------|------------------|----------------------------|
| Jackpine Cr. | E256842            | EMS      | 2             | 2005             | General, metals, nutrients |

## 26) Middle Beaton River Watershed

There are no EMS or CABIN water quality data for this watershed.

## 27) Tsea River Watershed

There are 4 CABIN sites in the Tsea River Watershed located in the lower half of the watershed (Table 22). Water quality data were collected from 2010 to 2013 and include general, metals, ions, nutrients and organic matter parameter types.

*Table 22. Water quality data summary by monitoring site in the Tsea River Watershed.*

| Waterbody         | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                             |
|-------------------|--------------------|------------------|---------------|------------------|--|
| Gote Cr.          | E286794            | EMS (CABIN data) | 1             | 2011             | General, metals, organic matter, nutrients |
| Thetlandoa Cr.    | THET01             | ECCC CABIN       | 2             | 2013             | General, metals, nutrients, ions           |
| Tsea R.           | TSEA001            | ECCC CABIN       | 2             | 2012             | General, metals, nutrients, ions           |
| Tsea R. Tributary | TSEA002            | ECCC CABIN       | 2             | 2012             | General, metals, nutrients, ions           |

## 28) Middle Sikanni Chief River Watershed

There are no EMS or CABIN water quality data for this watershed.



## 29) Sahtaneh River Watershed

There is 1 EMS site and 2 CABIN sites in the Sahtaneh River Watershed located in the upper half of the watershed (Table 23). Water quality data were collected in 2006, 2012 and 2014 and include general, metals, ions, organic matter and nutrients parameter types.

Table 23. Water quality data summary by monitoring site in the Sahtaneh River Watershed.

| Waterbody             | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                             |
|-----------------------|--------------------|------------|---------------|------------------|--|
| Prichard Cr.          | E263630            | EMS        | 1             | 2006             | General, metals, organic matter, nutrients |
| Lower Courvoisier Cr. | CVR01              | ECCC CABIN | 1             | 2012             | General, metals, nutrients, ions           |
| Courvosier Cr.        | CVR02              | ECCC CABIN | 1             | 2014             | General, metals, nutrients, ions           |

## 30) Kiwigana River Watershed

There are 3 CABIN sites in the Kiwigana River Watershed, with data only collected in 2011 (Table 24). Parameter types measured include general, metals, organic matter and nutrients.

Table 24. Water quality data summary by monitoring site in the Kiwigana River Watershed.

| Waterbody   | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                             |
|-------------|--------------------|------------------|---------------|------------------|--|
| Delkpay Cr. | E286790            | EMS (CABIN data) | 1             | 2011             | General, metals, organic matter, nutrients |
| Klente Cr.  | E286791            | EMS (CABIN data) | 1             | 2011             | General, metals, organic matter, nutrients |
| Kiwigana R. | E286795            | EMS (CABIN data) | 1             | 2011             | General, metals, organic matter, nutrients |

## 31) Sahdoanah River Watershed

There are no EMS or CABIN water quality data for this watershed.

## 32) Burnt River Watershed

There is 1 EMS site and 2 CABIN sites in the Burnt River Watershed located in the upper half of the watershed (Table 25). Water quality data were collected in 1977 and 2008 and include general, metals, nutrients and organic matter parameter types.

Table 25. Water quality data summary by monitoring site in the Burnt River Watershed.

| Waterbody | Monitoring Site ID | Database | Years of Data | Most Recent Data | Parameter Type                              |
|-----------|--------------------|----------|---------------|------------------|---|
| Burnt Cr. | 1177720            | EMS      | 1             | 1977             | General, metals, microbiological, nutrients |

|                   |         |                  |   |      |  |
|-------------------|---------|------------------|---|------|--|
| Upper Brazion Cr. | E273189 | EMS (CABIN data) | 1 | 2008 | General, metals, organic matter, nutrients |
| Upper Brazion Cr. | E273188 | EMS (CABIN data) | 1 | 2008 | General, metals, organic matter, nutrients |

### 33) Upper Petitot River Watershed

There are 8 CABIN sites in the Upper Petitot River Watershed (Table 26) located throughout the watershed. This watershed spans from the Alberta border west to the confluence with the Tsea River. Water quality data were collected from 2011 to 2013 and in 2016. Parameter types measured include general, metals, nutrients and ions.

*Table 26. Water quality data summary by monitoring site in the Upper Petitot River Watershed.*

| Waterbody     | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                   |
|---------------|--------------------|------------------|---------------|------------------|----------------------------------|
| Petitot R.    | E286793            | EMS (CABIN data) | 1             | 2011             | General, metals                  |
| Petitot R.    | PET08              | ECCC CABIN       | 3             | 2016             | General, metals, nutrients, ions |
| Petitot R.    | PET09              | ECCC CABIN       | 1             | 2013             | General, metals, nutrients, ions |
| Petitot R.    | PET89              | ECCC CABIN       | 1             | 2016             | General, metals, nutrients, ions |
| Thinahtea Cr. | THIN01             | ECCC CABIN       | 1             | 2012             | General, metals, nutrients, ions |
| Unnamed Cr.   | PET02              | ECCC CABIN       | 1             | 2012             | General, metals, nutrients, ions |
| Unnamed Cr.   | PET05              | ECCC CABIN       | 1             | 2012             | General, metals, nutrients, ions |
| Unnamed Cr.   | PET06              | ECCC CABIN       | 1             | 2012             | General, metals, nutrients, ions |

### 34) Lower Petitot River Watershed

There are 2 EMS sites in the Lower Petitot River Watershed, including site E282116 which is part of the Canada-B.C. Water Quality Monitoring Agreement (Table 27). This watershed extends east from the Stanislas Creek inflow to the where the Petitot River crosses the B.C. - Northwest Territories border. There are also 9 CABIN sites located close to the Northwest Territories border. Water quality data were collected between 2011 and 2017 and include general, metals, ions, nutrients and organic matter parameter types.

*Table 27. Water quality data summary by monitoring site for the Lower Petitot River Watershed.*

| Waterbody   | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type             |
|-------------|--------------------|------------------|---------------|------------------|----------------------------|
| D'Easum Cr. | E286792            | EMS (CABIN data) | 1             | 2011             | General, metals, nutrients |
| Fortune Cr. | E290869            | EMS              | 3             | 2015             | General, ions, nutrients,  |

|                      |         |                     |   |      |  |
|----------------------|---------|---------------------|---|------|--|
|                      |         |                     |   |      | organic matter                           |
| Fortune Cr.          | PET03   | ECCC CABIN          | 4 | 2017 | General, metals, nutrients, ions         |
| Lower Emile Cr.      | EML01   | ECCC CABIN          | 3 | 2017 | General, metals, nutrients, ions         |
| Petitot R.           | E282116 | EMS (FED/PROV data) | 3 | 2015 | General, ions, nutrients, organic matter |
| Petitot R.           | PET01   | ECCC CABIN          | 5 | 2017 | General, metals, nutrients, ions         |
| Petitot R. Tributary | PET02   | ECCC CABIN          | 1 | 2012 | General, metals, nutrients, ions         |
| Petitot R. Tributary | PET05   | ECCC CABIN          | 1 | 2012 | General, metals, nutrients, ions         |
| Petitot R. tributary | PET45   | ECCC CABIN          | 1 | 2016 | General, metals, nutrients, ions         |
| Unnamed Tributary    | STNS06  | ECCC CABIN          | 1 | 2013 | General, metals, nutrients, ions         |
| Upper Emile Cr.      | EML02   | ECCC CABIN          | 1 | 2012 | General, metals, nutrients, ions         |

### 35) Snake River Watershed

There are no EMS or CABIN water quality data for this watershed.

### 36) Lower Liard River Watershed

There are 2 CABIN sites located in the Lower Liard River Watershed (Table 28). This watershed spans from east of the Dunedin River and Fort Nelson River inflows north to where the Liard River crosses the B.C. – Yukon Territory border. Water quality data were collected in 2013 in tributaries to the Liard River and include general, metals, ions and nutrient parameter types. The assessment report [\*State of Water Quality of Liard River at Lower Crossing 1984-1994\*](#) was completed under the Canada-B.C. Water Quality Monitoring Agreement in 1996. Water quality samples were collected between 1984 and 1994 by Environment Canada and not included in this data summary. Water quality was found to be good with no water quality trends or concerns at that time (Environment Canada & Ministry of Environment, Lands and Parks, 1996).

Table 28. Water quality data summary by monitoring site for the Lower Liard River Watershed.

| Waterbody                  | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|----------------------------|--------------------|------------|---------------|------------------|----------------------------------|
| Liard R. Unnamed Tributary | DUN01              | ECCC CABIN | 1             | 2013             | General, metals, nutrients, ions |
| Liard R. Unnamed Tributary | LIA05              | ECCC CABIN | 1             | 2013             | General, metals, nutrients, ions |

### 37) Upper Fort Nelson River Watershed

There is 1 CABIN site in the Upper Fort Nelson River Watershed (Table 29) with water quality data from 2014. This watershed includes the confluence of the Fontas and Lower Sikanni Chief rivers to form the Fort Nelson River, and the Klua Creek inflow to the northwest. This monitoring site is located in the upper part of the watershed, downstream of the confluence of the Fontas and Sikanni Chief Rivers. Parameter types measured include general, metals, nutrients and ions.

*Table 29. Water quality data summary by monitoring site for the Upper Fort Nelson River Watershed.*

| <b>Waterbody</b>         | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>            |
|--------------------------|---------------------------|-----------------|----------------------|-------------------------|----------------------------------|
| Fort Nelson R. Tributary | FTNR01                    | ECCC CABIN      | 1                    | 2014                    | General, metals, nutrients, ions |

### 38) Middle Petitot River Watershed

There is 1 EMS site and 7 CABIN sites in the Middle Petitot River Watershed (Table 30). This watershed includes the Tsea River inflow in the east and the Stanislas Creek inflow to the west. EMS Site E290871 is at the same location as ECCC CABIN site PET07. This location includes both EMS and CABIN water quality data. Water quality data were collected between 2012 and 2016 and include general, metals, nutrients, ions and organic matter parameter types.

*Table 30. Water quality data summary by monitoring site for the Middle Petitot River Watershed.*

| <b>Waterbody</b>      | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>                    |
|-----------------------|---------------------------|-----------------|----------------------|-------------------------|--|
| Dilly Cr.             | DIL01                     | ECCC CABIN      | 1                    | 2012                    | General, metals, nutrients, ions         |
| Hossitl Cr.           | HOS01                     | ECCC CABIN      | 1                    | 2013                    | General, metals, nutrients, ions         |
| Hossitl Cr. Tributary | HOS02                     | ECCC CABIN      | 1                    | 2016                    | General, metals, nutrients, ions         |
| Petitot R.            | E290871                   | EMS             | 3                    | 2015                    | General, ions, organic matter, nutrients |
| Petitot R.            | PET07                     | ECCC CABIN      | 4                    | 2016                    | General, metals, nutrients, ions         |
| Petitot R. Tributary  | PET06                     | ECCC CABIN      | 1                    | 2012                    | General, metals, nutrients, ions         |
| Stanislas Cr.         | PET04                     | ECCC CABIN      | 1                    | 2012                    | General, metals, nutrients, ions         |
| Tsea R. Tributary     | TSE06                     | ECCC CABIN      | 1                    | 2013                    | General, metals, nutrients, ions         |

### 39) Sukunka River Watershed

There is 1 EMS site and 3 CABIN sites located throughout the Sukunka River Watershed (Table 31). Water quality data were collected in 1986, 1987, 2008, 2009 and 2012-2014. The parameter types measured include general, metals, ions, organic matter and nutrients.

*Table 31. Water quality data summary by monitoring site in the Sukunka River Watershed.*

| <b>Waterbody</b> | <b>Monitoring Site ID</b> | <b>Database</b>  | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>                            |
|------------------|---------------------------|------------------|----------------------|-------------------------|--|
| Sukunka R.       | 0400556                   | EMS              | 2                    | 1987                    | General, metals, nutrients                       |
| Dickebusch Cr.   | E277179                   | EMS (CABIN data) | 4                    | 2014                    | General, metals, ions, organic matter, nutrients |
| Sukunka R.       | E273191                   | EMS (CABIN data) | 1                    | 2008                    | General, metals, ions, organic matter, nutrients |
| Sukunka R.       | E273192                   | EMS (CABIN data) | 1                    | 2008                    | General, metals, ions, organic matter, nutrients |

### 40) Middle Prophet River Watershed

There are 8 CABIN sites in the Middle Prophet River Watershed (Table 32) located throughout the watershed. This watershed spans from the Tenaka Creek inflow in the north to south of Bunch Creek. Data were collected in 2013, 2014 and 2016 and include general, metals, nutrients and ion parameter types.

*Table 32. Water quality data summary by monitoring site in the Middle Prophet River Watershed.*

| <b>Waterbody</b>     | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>            |
|----------------------|---------------------------|-----------------|----------------------|-------------------------|----------------------------------|
| Chipesia Cr.         | CHIP03                    | ECCC CABIN      | 1                    | 2014                    | General, metals, nutrients, ions |
| Enright Cr.          | ENR01                     | ECCC CABIN      | 1                    | 2013                    | General, metals, nutrients, ions |
| Seeds Cr. Tributary  | SEED01                    | ECCC CABIN      | 1                    | 2016                    | General, metals, nutrients, ions |
| Tenaka Cr.           | TEN05                     | ECCC CABIN      | 1                    | 2014                    | General, metals, nutrients, ions |
| Tenaka Cr.           | TEN01                     | ECCC CABIN      | 1                    | 2013                    | General, metals, nutrients, ions |
| Tenaka Cr.           | TEN03                     | ECCC CABIN      | 1                    | 2014                    | General, metals, nutrients, ions |
| Tenaka Cr. Tributary | TEN02                     | ECCC CABIN      | 1                    | 2013                    | General, metals, nutrients, ions |
| Tenaka Cr. Tributary | TEN04                     | ECCC CABIN      | 1                    | 2014                    | General, metals, nutrients, ions |

#### 41) Kahntah River Watershed

There is 1 CABIN site in the Kahntah River Watershed (Table 33) located in the lower half of the watershed. Data were collected in 2016 and include general, metals, nutrients and ion parameter types.

Table 33. Water quality data summary by monitoring site in the Kahntah River Watershed.

| Waterbody  | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|------------|--------------------|------------|---------------|------------------|----------------------------------|
| Kahntah R. | KAHN01             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |

#### 42) Beaver River Watershed

There are no EMS or CABIN water quality data for this watershed.

#### 43) Peace Arm Watershed

There is 1 CABIN site in the Peace Arm Watershed (Table 34) located in the upper part of the watershed. Data were collected in 2016 and include general, metals, ions, organic matter and nutrient parameter types. Most water quality monitoring sites in this watershed were located within the Williston Reservoir.

Table 34. Water quality data summary by monitoring site in the Peace Arm Watershed.

| Waterbody  | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                                   |
|------------|--------------------|------------------|---------------|------------------|--|
| Selwyn Cr. | E306405            | EMS (CABIN data) | 1             | 2016             | General, metals, ions, organic matter, nutrients |

#### 44) Chinchaga River Watershed

There are no EMS or CABIN water quality data for this watershed.

#### 45) Dunedin River Watershed

There are 4 CABIN sites in the Dunedin River Watershed (Table 35). Data were collected in 2011 and 2014 and include general, metals, ions, organic matter and nutrient parameter types.

Table 35. Water quality data summary by monitoring site in the Dunedin River Watershed.

| Waterbody  | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                                   |
|------------|--------------------|------------------|---------------|------------------|--|
| Odayin Cr. | DUN04              | ECCC CABIN       | 1             | 2014             | General, metals, nutrients, ions                 |
| Snake Cr.  | E286789            | EMS (CABIN data) | 1             | 2011             | General, metals, ions, organic matter, nutrients |
| Torpid Cr. | DUN05              | ECCC CABIN       | 1             | 2014             | General, metals, nutrients,                      |

|                      |       |            |   |      |                                  |
|----------------------|-------|------------|---|------|----------------------------------|
|                      |       |            |   |      | ions                             |
| Torpid Cr. Tributary | DUN03 | ECCC CABIN | 1 | 2014 | General, metals, nutrients, ions |

#### 46) Hay River Watershed

There are no EMS CABIN water quality data for this watershed.

#### 47) Shekilie River Watershed

There are no EMS or CABIN water quality data for this watershed.

#### 48) Upper Halfway River Watershed

There are 2 CABIN sites located in the top half of the Upper Halfway River Watershed (Table 36). This watershed spans to include all the Halfway River tributaries in the north, including the Chowade River, to the confluence with the Graham River in the south. Data were collected in 2016 and include general, metals, ions, organic matter and nutrient parameter types.

*Table 36. Water quality data summary by monitoring site in the Upper Halfway River Watershed.*

| Waterbody   | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                                   |
|-------------|--------------------|------------------|---------------|------------------|--|
| Unnamed Cr. | E306402            | EMS (CABIN data) | 1             | 2016             | General, metals, ions, organic matter, nutrients |
| Unnamed Cr. | E295021            | EMS (CABIN data) | 1             | 2016             | General, metals, ions, organic matter, nutrients |

#### 49) Chowade River Watershed

There are 2 CABIN sites in the Chowade River Watershed (Table 37). Data were collected in 2016 and include general, metals, ions, organic matter and nutrient parameter types.

*Table 37. Water quality data summary by monitoring site in the Chowade River Watershed.*

| Waterbody   | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                                   |
|-------------|--------------------|------------------|---------------|------------------|--|
| Russell Cr. | E306403            | EMS (CABIN data) | 1             | 2016             | General, metals, ions, organic matter, nutrients |
| Unnamed Cr. | E306401            | EMS (CABIN data) | 1             | 2016             | General, metals, ions, organic matter, nutrients |

#### 50) Upper Kotcho River Watershed

There are no EMS or CABIN water quality data for this watershed.

### 51) Klua Creek Watershed

There are 2 CABIN sites in the Klua Creek Watershed located in the upper half of the watershed (Table 38). Data were collected from 2001 to 2014. Parameter types measured include general, metals, ions, organic matter, nutrients and microbiological, with an emphasis on nutrients which have been measured throughout the entire sampling period.

*Table 38. Water quality data summary by monitoring site for the Klua Creek Watershed.*

| Waterbody          | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|--------------------|--------------------|------------|---------------|------------------|----------------------------------|
| West Klua Cr.      | WKLU01             | ECCC CABIN | 1             | 2014             | General, metals, nutrients, ions |
| Klua Cr. Tributary | KLUA02             | ECCC CABIN | 1             | 2014             | General, metals, nutrients, ions |

### 52) Upper Liard River Watershed

There are 8 CABIN sites in the Upper Liard River Watershed (Table 39) located throughout the watershed. This watershed includes the Grayling River inflow to the east, and extends west to the headwaters, including the Vents River and Smith River. All data were collected in August 2017 and include general, metals, nutrients, organic matter and ion parameter types.

*Table 39. Water quality data summary by monitoring site in the Upper Liard River Watershed.*

| Waterbody           | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                                   |
|---------------------|--------------------|------------------|---------------|------------------|--|
| Vents R. Tributary  | VENT03             | ECCC CABIN       | 1             | 2017             | General, metals, nutrients, ions                 |
| Vents R. Tributary  | VENT05             | ECCC CABIN       | 1             | 2017             | General, metals, nutrients, ions                 |
| Lapie Cr. Tributary | VENT06             | ECCC CABIN       | 1             | 2017             | General, metals, nutrients, ions                 |
| Lapie Cr.           | VENT07             | ECCC CABIN       | 1             | 2017             | General, metals, nutrients, ions                 |
| Fishing Cr.         | VENT08             | ECCC CABIN       | 1             | 2017             | General, metals, nutrients, ions                 |
| Brimstone Cr.       | E309217            | EMS (CABIN data) | 1             | 2017             | General, metals, ions, organic matter, nutrients |
| Liard R. Tributary  | E309218            | EMS (CABIN data) | 1             | 2017             | General, metals, ions, organic matter, nutrients |
| Moule Cr.           | E309547            | EMS (CABIN data) | 1             | 2017             | General, metals, ions, organic matter, nutrients |

### 53) Lower Prophet River Watershed

There are 3 CABIN sites in the Lower Prophet River Watershed (Table 40). This watershed spans from the Muskwa River confluence in the north to the Tenaka Creek confluence in



the south. Data were collected in 2014 and 2016 and include general, metals, nutrients and ion parameter types.

*Table 40. Water quality data summary by monitoring site in the Lower Prophet River Watershed.*

| <b>Waterbody</b>     | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>            |
|----------------------|---------------------------|-----------------|----------------------|-------------------------|----------------------------------|
| Big Beaver Cr.       | BBEA02                    | ECCC CABIN      | 2                    | 2016                    | General, metals, nutrients, ions |
| Prophet R. Tributary | LPRO02                    | ECCC CABIN      | 1                    | 2016                    | General, metals, nutrients, ions |
| Tsachedaza Cr.       | LPRO01                    | ECCC CABIN      | 1                    | 2016                    | General, metals, nutrients, ions |

#### 54) Fontas River Watershed

There are 2 CABIN sites in the Fontas River Watershed (Table 41). Data were collected in 2014 and 2016 and include general, metals, nutrients and ion parameter types.

*Table 41. Water quality data summary by monitoring site in the Fontas River Watershed.*

| <b>Waterbody</b>    | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>            |
|---------------------|---------------------------|-----------------|----------------------|-------------------------|----------------------------------|
| Fontas R. Tributary | FONT04                    | ECCC CABIN      | 1                    | 2016                    | General, metals, nutrients, ions |
| Fontas R. Tributary | FONT01                    | ECCC CABIN      | 1                    | 2014                    | General, metals, nutrients, ions |

#### 55) Graham River Watershed

There is 1 CABIN site in the Graham River Watershed located mid watershed (Table 42). Data were collected in 2016 and include general, metals, nutrients, organic matter and ion parameter types.

*Table 42. Water quality data summary by monitoring site in the Graham River Watershed.*

| <b>Waterbody</b> | <b>Monitoring Site ID</b> | <b>Database</b>  | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>                            |
|------------------|---------------------------|------------------|----------------------|-------------------------|--|
| Needham Cr.      | E306404                   | EMS (CABIN data) | 1                    | 2016                    | General, metals, ions, organic matter, nutrients |

#### 56) Capot-Blanc River Watershed

There is 1 CABIN site in the Capot-Blanc River Watershed located mid watershed (Table 43). Data were collected in 2013 and include general, metals, nutrients and ion parameter types.

*Table 43. Water quality data summary by monitoring site in the Capot-Blanc River Watershed.*

| <b>Waterbody</b> | <b>Monitoring Site ID</b> | <b>Database</b> | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b> |
|------------------|---------------------------|-----------------|----------------------|-------------------------|-----------------------|
|------------------|---------------------------|-----------------|----------------------|-------------------------|-----------------------|

|                           |       |            |   |      |                                  |
|---------------------------|-------|------------|---|------|----------------------------------|
| Capot-Blanc Cr. Tributary | CAP02 | ECCC CABIN | 1 | 2013 | General, metals, nutrients, ions |
|---------------------------|-------|------------|---|------|----------------------------------|

### 57) Lower Kotcho River Watershed

There are no EMS or CABIN water quality data for this watershed.

### 58) Lower Fort Nelson River Watershed

There are 5 CABIN sites located in the lower half of the Lower Fort Nelson River Watershed watershed (Table 44). This watershed includes the Kiwigana River inflow to the east and the confluence with the Liard River to the northwest. Data were collected in 2013, 2016 and 2017 and include general, metals, nutrients and ion parameter types.

*Table 44. Water quality data summary by monitoring site in the Lower Fort Nelson River Watershed.*

| Waterbody                      | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|--------------------------------|--------------------|------------|---------------|------------------|----------------------------------|
| Lower Fort Nelson R. Tributary | LFRT07             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Lower Fort Nelson R. Tributary | LFRT09             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Lower Fort Nelson R. Tributary | TSO02              | ECCC CABIN | 2             | 2017             | General, metals, nutrients, ions |
| Obole Cr.                      | OBO01              | ECCC CABIN | 1             | 2013             | General, metals, nutrients, ions |
| Etane Cr.                      | ETA01              | ECCC CABIN | 1             | 2013             | General, metals, nutrients, ions |

### 59) Middle Liard River Watershed

There are 2 CABIN sites in the Middle Liard River Watershed located in the lower part of the watershed (Table 45). This watershed spans from the Dunedin River inflow west to the Grayling River confluence. Data were collected in 2014 and include general, metals, nutrients and ion parameter types.

*Table 45. Water quality data summary by monitoring site in the Middle Liard River Watershed.*

| Waterbody         | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|-------------------|--------------------|------------|---------------|------------------|----------------------------------|
| Unnamed Tributary | LIA08              | ECCC CABIN | 1             | 2014             | General, metals, nutrients, ions |
| Upper Catkin Cr.  | CATK02             | ECCC CABIN | 1             | 2014             | General, metals, nutrients, ions |

## 60) Upper Sikanni Chief River Watershed

There are no EMS or CABIN water quality data for this watershed.

## 61) Grayling River Watershed

There are no EMS or CABIN water quality data for this watershed.

## 62) Upper Muskwa River Watershed

There are 2 CABIN sites in the Upper Muskwa River Watershed located mid watershed (Table 46). This watershed spans from the confluence with the Tuchodi River in the north to the southern border of the Northern Rocky Mountains Provincial Park. Data were collected in 2014 and 2017 and include general, metals, nutrients and ion parameter types.

Table 46. Water quality data summary by monitoring site in the Upper Muskwa River Watershed.

| Waterbody   | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|-------------|--------------------|------------|---------------|------------------|----------------------------------|
| Gathto Cr.  | GATH01             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Varrick Cr. | VAR01              | ECCC CABIN | 1             | 2014             | General, metals, nutrients, ions |

## 63) Upper Prophet River Watershed

There are 7 CABIN sites in the Upper Prophet River Watershed (Table 47) located in the lower half of the watershed. This watershed spans from the southern border of Redfern-Keily Provincial Park north to the Bunch Creek inflow. Data were collected in 2016 and include general, metals, nutrients and ion parameter types.

Table 47. Water quality data summary by monitoring site in the Upper Prophet River Watershed.

| Waterbody    | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|--------------|--------------------|------------|---------------|------------------|----------------------------------|
| Bat Cr.      | UPRO02             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Duffield Cr. | RICH03             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Granger Cr.  | BESA01             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Kravac Cr.   | KRAV02             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Milliken Cr. | UPRO03             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Prophet R.   | KRAV01             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Townsley Cr. | RICH02             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |

## 64) Middle Muskwa River Watershed

There are 14 CABIN sites in the Upper Muskwa River Watershed located on tributaries throughout the watershed (Table 48). This watershed spans from the Tuchodi River inflow north to the Tetsa River inflow to the Muskwa River. Data were collected in 2016 and 2017 and include general, metals, nutrients and ion parameter types.

*Table 48. Water quality data summary by monitoring site in the Middle Muskwa River Watershed.*

| Waterbody                             | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|---------------------------------------|--------------------|------------|---------------|------------------|----------------------------------|
| Chischa R.                            | MMUS01             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Chischa R.                            | CHIS02             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Durkin Cr.                            | TUCH01             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Falk Cr.                              | MMUS06             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Flack Cr.                             | MMUS04             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Margison Cr.                          | TUCH04             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Tetsa R. Tributary                    | TETS03             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Upper Tetsa R. Tributary              | TETS05             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Tetsa R. Tributary                    | TETS01             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Tetsa R. Tributary                    | TETS02             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Tetsa R. Tributary                    | TETS04             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Tributary downstream of Tuchodi Lakes | TUCH05             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Upper Tuchodi R. Tributary            | TUCH06             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Tributary upstream of Tuchodi Lakes   | TUCH07             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |

## 65) Lower Sikanni Chief River Watershed

There are 2 CABIN sites in the Lower Sikanni Chief River Watershed located in the lower half of the watershed (Table 49). This watershed spans from the Trutch Creek inflow north to the confluence of the Sikanni Chief and Fontas Rivers. Data were collected in 2014 and 2016 and include general, metals, nutrients and ion parameter types.

Table 49. Water quality data summary by monitoring site in the Lower Sikanni Chief River Watershed.

| Waterbody                        | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|----------------------------------|--------------------|------------|---------------|------------------|----------------------------------|
| Lower Sikanni Chief R. Tributary | SIKA04             | ECCC CABIN | 1             | 2016             | General, metals, nutrients, ions |
| Lower Sikanni Chief R. Tributary | SIKA01             | ECCC CABIN | 1             | 2014             | General, metals, nutrients, ions |

## 66) Upper Toad River Watershed

There are no EMS or CABIN water quality data for this watershed.

## 67) Lower Toad River Watershed

There are 2 CABIN sites in the Lower Toad River Watershed located on tributaries in the upper part of the watershed (Table 50). The watershed extends north from the Racing River confluence to the Liard River confluence. Data were collected in 2014 and 2017 and include general, metals, nutrients, organic matter and ion parameter types.

Table 50. Water quality data summary by monitoring site in the Lower Toad River Watershed.

| Waterbody         | Monitoring Site ID | Database         | Years of Data | Most Recent Data | Parameter Type                                   |
|-------------------|--------------------|------------------|---------------|------------------|--|
| Four Mile Cr.     | E309216            | EMS (CABIN data) | 1             | 2017             | General, metals, ions, organic matter, nutrients |
| Toad R. Tributary | TOAD01             | ECCC CABIN       | 1             | 2014             | General, metals, nutrients, ions                 |

## 68) Racing River Watershed

There are 2 CABIN sites in the Racing River Watershed (Table 51). Data were collected in 2017 and include general, metals, nutrients and ions parameter types.

Table 51. Water quality data summary by monitoring site in the Racing River Watershed.

| Waterbody    | Monitoring Site ID | Database   | Years of Data | Most Recent Data | Parameter Type                   |
|--------------|--------------------|------------|---------------|------------------|----------------------------------|
| Wokkpash Cr. | TOAD09             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |
| Yash Cr.     | TOAD08             | ECCC CABIN | 1             | 2017             | General, metals, nutrients, ions |

## 69) Muncho River Watershed

There are 2 CABIN sites in the Muncho River Watershed located in the upper part of the watershed (Table 49). Data were collected in 2017 and include general, metals, nutrients, organic matter and ion parameter types.

Table 52. Water quality data summary by monitoring site in the Muncho River Watershed.

| <b>Waterbody</b>         | <b>Monitoring Site ID</b> | <b>Database</b>  | <b>Years of Data</b> | <b>Most Recent Data</b> | <b>Parameter Type</b>                            |
|--------------------------|---------------------------|------------------|----------------------|-------------------------|--|
| Tributary to Muncho Lake | E309215                   | EMS (CABIN data) | 1                    | 2017                    | General, metals, ions, organic matter, nutrients |
| Trout R. Tributary       | E309189                   | EMS (CABIN data) | 1                    | 2017                    | General, metals, ions, organic matter, nutrients |

## DISCUSSION

The NEWS Disturbance-Sensitivity Report (NEWS 2017) previously ranked 69 watersheds in Northeast B.C. for water quality monitoring priority based on current and future watershed disturbance by industry, environmental sensitivity and population constraints. While this work was an important first step in prioritizing areas for additional surface water quality monitoring in northeast B.C., it did not take into account the current level of water quality data available for each watershed. The current report summarizes the water quality data available in the provincial EMS database and the federal CABIN database. The availability of current and sufficient water quality data should be a key consideration in the allocation of new monitoring resources.

Water quality data were available for 51 of the 69 watersheds. The watersheds with the most data were ranked high for monitoring priority and included the Upper and Lower Peace River, the Murray River and the Pouce Coupe River (Figure 2). The Lower Peace River Watershed had the longest consecutive data record of 39 years; 33 of those years comprised water quality measurements at the Federal-Provincial water quality monitoring site at the Alces River. Various watersheds within each of the high, moderate and low monitoring priority designations had limited data (Figure 2). For the high monitoring priority watersheds, 8 had less than 5 years of data. Twenty out of 23 moderate monitoring priority watersheds had data records less than 5 years. All 23 low monitoring priority watersheds had 1 to 5 years of data (Figure 2).

Eighteen watersheds had no data. This lack of data was similarly distributed between the high, moderate and low monitoring priority watersheds. In the high priority watersheds, data were not available for 5 watersheds: Farrell Creek, Cameron River, Kyklo River, Doig River, and the Upper Beatton River. For the moderate priority watersheds, 7 watersheds had no data: Middle Beatton River, Middle Sikanni Chief River, Sahdoanah River, Snake River, Beaver River, Chinchaga River, and the Hay River. For the low priority watersheds, 6 watersheds had no data: Shekilie River, Upper Kotcho River, Lower Kotcho River, Upper Sikanni Chief River, Grayling River, and the Upper Toad River.

All watersheds with water quality data have been sampled within the last 13 years (Figure 3). Five of the high priority watersheds have been sampled in the last 2 years: the Murray River, Upper and Lower Peace River, Lower Muskwa River and the Moberly River. All other high priority watersheds have not been sampled since 2012. Six moderate priority watersheds have been sampled in the last 2 years, mostly through CABIN: the Upper, Middle and Lower Petitot River, Kahntah River, Peace Arm and the Middle Prophet River. Most of the recently-sampled watersheds are low priority (Figure 3) and consist entirely of CABIN data.

Some of the high priority watersheds have not been sampled for at least 10 years including the Blueberry River (2004), Lynx Creek (2006), Lower Kiskatinaw River (2005), Lower Halfway River (2005) and Milligan Creek (2004). The Murray River, Pouce Coupe River, Upper Peace River, Upper Pine River, Lower Beatton River, Lower Pine River, Smoky River, Middle Kiskatinaw River and the Burnt River watersheds include historic data dating back

to the 1970's. These data should be assessed carefully as outdated method detection limits may limit the usefulness of the data in characterizing water quality and assessing against more recent data and current water quality guidelines.

Water quality data were collected from a total of 360 monitoring sites within the 51 watersheds with data (Figure 4). High priority watersheds had the greatest number of sites with 10 having more than 5 sites. Of these, the Murray River, Pouce Coupe River and Lower Muskwa River Watersheds had the highest number of sites with at least 20 per watershed. The highest ranked watershed, the Murray River Watershed, had the most monitoring sites with 97. Only 4 of each the moderate and low priority watersheds had more than 5 sites.

The CABIN data collected in Northeast B.C. provides a snapshot of water quality for many watersheds where no EMS data are available; the CABIN data collected by ENV and ECCC account for almost half of the water quality data in this report. Of the 360 monitoring sites, 167 were CABIN sites and 193 were EMS sites. Twenty-four watersheds have only CABIN sites, which provide most of the most recent data from 2016 and 2017; these were mainly lower monitoring priority watersheds. CABIN requires minimally impacted reference sites for the development of predictive models. Without the CABIN program, Northeast B.C. would have significantly less water quality data, especially in unimpacted watersheds. Although CABIN water quality monitoring involves single grab samples at a site, a large set of water quality parameters are measured, providing a good overview of water quality at the time of sampling.

Twenty-five watersheds had data only from tributaries to the main river. Of these, 3 were high, 7 were moderate, and 15 were low monitoring priority watersheds. Depending on the area of interest within a watershed and the reason for monitoring, new monitoring sites on the main river may be required. For a given situation, the availability of data and its applicability to the monitoring question being asked should be assessed relative to other projects before finalizing the allocation of monitoring resources.

Knowing the watershed vulnerability, subsequent monitoring priority ranking, and the available water quality data, informed decisions can be made regarding water quality monitoring funding and resource allocation. However, further considerations should include: input from potential partners, stakeholders, and other levels of government (including First Nations); linkages to other government priority initiatives (e.g., Bilateral Water Management Agreements under the McKenzie River Basin Transboundary Waters Master Agreement); and information on pending development in an area. Depending on this input, a lower ranked watershed may be a better choice for the allocation of additional monitoring funds. For example, the Murray River Watershed is ranked number 1 for monitoring priority in the NEWS Disturbance - Sensitivity Analysis. Given that 17 years of water quality data have been collected and data collection continues under the Murray River Partnership, this watershed may not be the highest priority for additional monitoring funding, considering there are other high priority watersheds with little or no water quality monitoring data.



## CONCLUSION AND RECOMMENDATIONS

This report reviewed the availability of EMS trend, EMS background and CABIN water quality data collected by ENV and ECCC in 69 watersheds in Northeast B.C. Water quality data were available for 51 watersheds at 360 monitoring sites with data collection records ranging from 1 to 39 years per watershed and spanning a combined total of 47 years between 1971 and 2017.

High monitoring priority watersheds had the largest datasets per watershed and the most monitoring sites. The Lower Peace River had the longest range of data collection while the Murray River, Lower Muskwa River and Pouce Coupe River had the largest number of monitoring sites. The most recent water quality data in Northeast B.C. was from CABIN sampling. These data exclusively covered 24 watersheds, most of which were given a moderate or low monitoring priority. All watersheds with data have been sampled within the last 13 years. Eighteen watersheds had no water quality data, 5 of which were given a high monitoring priority: Farrell Creek, Cameron River, Kyklo River, Doig River and Upper Beatton River. Coordinating watershed vulnerability, available data, local knowledge and provincial water quality priorities will ensure the most efficient use of water quality monitoring funding and resources.

Recommendations are as follows:

1. Of the 33 high monitoring priority watersheds, the 5 watersheds without data should be considered a priority for future water quality monitoring. These watersheds include Farrell Creek, Cameron River, Kyklo River, Doig River, and the Upper Beatton River.
2. The allocation of water quality monitoring resources should consider input from local government, First Nations and other partners in an area, recognizing that lower ranked watersheds may present a greater need for those resources.
3. The suitability of available water quality data to address a specific question within a given watershed should be assessed before additional monitoring resources are allocated. This will help ensure that the available monitoring data are being used effectively to address government priorities in managing B.C.'s water resources.

## REFERENCES

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## APPENDIX A

Corresponding CABIN ID's for Ministry of Environment and Climate Change Strategy EMS ID's.

| Watershed                | EMS ID  | CABIN ID |
|--------------------------|---------|----------|
| Burnt River              | E273188 | PINE004  |
| Burnt River              | E273189 | PINE005  |
| Chowade River            | E306401 | UHAF05   |
| Chowade River            | E306403 | UHAF06   |
| Dunedin River            | E286789 | DUNE001  |
| Graham River             | E306404 | LHAF02   |
| Kiwigana River           | E286790 | LFRT002  |
| Kiwigana River           | E286791 | LFRT003  |
| Kiwigana River           | E286795 | LFRT005  |
| Lower Muskwa River       | E283432 | MUSK001  |
| Lower Muskwa River       | E283431 | MUSK002  |
| Lower Petitot River      | E286792 | LPET004  |
| Lower Toad River         | E309216 | TOAD02   |
| Middle Fort Nelson River | E283430 | FNR001   |
| Moberly River            | E306406 | UPCE08   |
| Moberly River            | E306406 | UPCE08   |
| Moberly River            | E277171 | MOBE001  |
| Muncho River             | E309189 | TROU05   |
| Muncho River             | E309215 | TROU04   |
| Murray River             | E273193 | MURR004  |
| Murray River             | E273194 | MURR005  |
| Murray River             | E273195 | MURR006  |
| Murray River             | E273196 | MURR007  |
| Murray River             | E273197 | MURR003  |
| Murray River             | E273198 | MURR002  |
| Murray River             | E273199 | MURR001  |
| Murray River             | E273200 | KISK001  |
| Murray River             | E298950 | MURR08   |
| Murray River             | E306397 | MURR16   |
| Murray River             | E306398 | MURR15   |
| Murray River             | E306399 | MURR11   |
| Murray River             | E306400 | MURR09   |
| Murray River             | E306408 | MURR10   |
| Murray River             | E306409 | MURR12   |
| Murray River             | E277177 | GORD001  |
| Murray River             | E277178 | M20001   |
| Murray River             | E277175 | WOLV004  |
| Murray River             | E277174 | PERR001  |
| Murray River             | E277173 | MESA002  |
| Peace Arm                | E306405 | PCEA01   |
| Sukunka River            | E273191 | PINE002  |
| Sukunka River            | E273192 | PINE003  |
| Sukunka River            | E277179 | DICK001  |
| Tsea River               | E286794 | TSEA003  |
| Upper Halfway River      | E295021 | UHAF07   |
| Upper Halfway River      | E306402 | UHAF01   |
| Upper Liard River        | E309217 | LIAR01   |
| Upper Liard River        | E309218 | LIAR03   |
| Upper Liard River        | E309547 | LIAR05   |
| Upper Peace River        | E306407 | UPCE05   |
| Upper Petitot River      | E286793 | UPET002  |
| Upper Pine River         | E273190 | PINE001  |
| Upper Pine River         | E277169 | BOUL001  |
| Upper Pine River         | E277170 | WILL001  |
| Upper Pine River         | E277180 | LINK001  |
| Upper Pine River         | E277181 | DOON001  |
| Upper Pine River         | E277182 | CALA001  |