EASTERN ATHABASCA REGIONAL MONITORING PROGRAM 2015/2016 COMMUNITY INTERIM REPORT

Final Report

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EXECUTIVE SUMMARY

The Eastern Athabasca Regional Monitoring Program (EARMP) was established in 2011 under the Province of Saskatchewan's Boreal Watershed Initiative. The EARMP community program was established to monitor the safety of traditionally harvested country foods by collecting and testing representative water, fish, berry, and mammal samples from the seven communities located in the region. Harvesting and consuming traditional country foods (berries, fish, and wild game) are an important part of the culture in northern Saskatchewan and contribute to an overall healthy lifestyle through physical activity and healthy eating. The intent of the EARMP community program is to provide confidence to community members that their traditional country foods are safe to eat today and will remain safe for future generations.

The 2015/2016 EARMP community sampling program included testing berries, moose, and barren-ground caribou samples collected independently by, or with the aid of, community members from Black Lake, Camsell Portage, Fond du Lac Denesuline First Nation, Stony Rapids, Uranium City, Wollaston Lake, and Hatchet Lake Denesuline First Nation. The evaluation of the country foods data shows that most chemical concentrations are below available guidelines, similar to concentrations expected for the region, and similar to the established baseline data. Based on the available information, chemicals in the 2015/2016 EARMP community country foods are not generally considered a concern and are safe for consumption. The 2016/2017 EARMP community program will focus on sampling additional berries, fish, and mammals and completing a more detailed analysis of the country foods dataset.

1.0 INTRODUCTION

1.1 Background

The Eastern Athabasca Regional Monitoring Program (EARMP) is a joint, long-term environmental monitoring program established in 2011 under the Province of Saskatchewan's Boreal Watershed Initiative. The program is supported by contributions from several stakeholders including Cameco Corporation, AREVA Resources Canada Inc., and the Saskatchewan Ministry of Environment. One of the primary goals of the Boreal Watershed Initiative is to assess the ecological integrity of Saskatchewan's northern watersheds in order to address potential environmental concerns and to identify sustainable management practices in the region. The EARMP was designed to identify potential cumulative effects downstream of uranium mining and milling operations in the Eastern Athabasca region of northern Saskatchewan (Figure 1).

Cumulative effects are defined as impacts on the environment that result from the incremental impact of an action when added to other past, present, and foreseeable future actions (Joint Panel 1992). Cumulative effects might occur when projects overlap spatially, such as when two watersheds exposed to uranium mining and milling activities converge. Cumulative effects may also occur temporally if contaminants are emitted into the environment over extended periods of time. The EARMP was developed to establish baseline conditions and facilitate the examination of spatial and temporal changes over the long term.

Extensive amounts of environmental monitoring are completed near each uranium mining and milling operation in northern Saskatchewan, which are regulated by both federal and provincial agencies including Environment and Climate Change Canada, the Canadian Nuclear Safety Commission, and the Saskatchewan Ministry of Environment. In addition, regional sampling occurs through the Athabasca Working Group (AWG) Environmental Monitoring Program, which started in 2000. The EARMP was designed to complement other monitoring programs and allows a more comprehensive evaluation of potential cumulative effects from industry in northern Saskatchewan.

The EARMP framework includes two programs: a community program and a technical program. The technical program was established to monitor potential long-term changes in the aquatic environment far far-field downstream of uranium mining and milling operations in the Eastern Athabasca region. Information from the technical program is

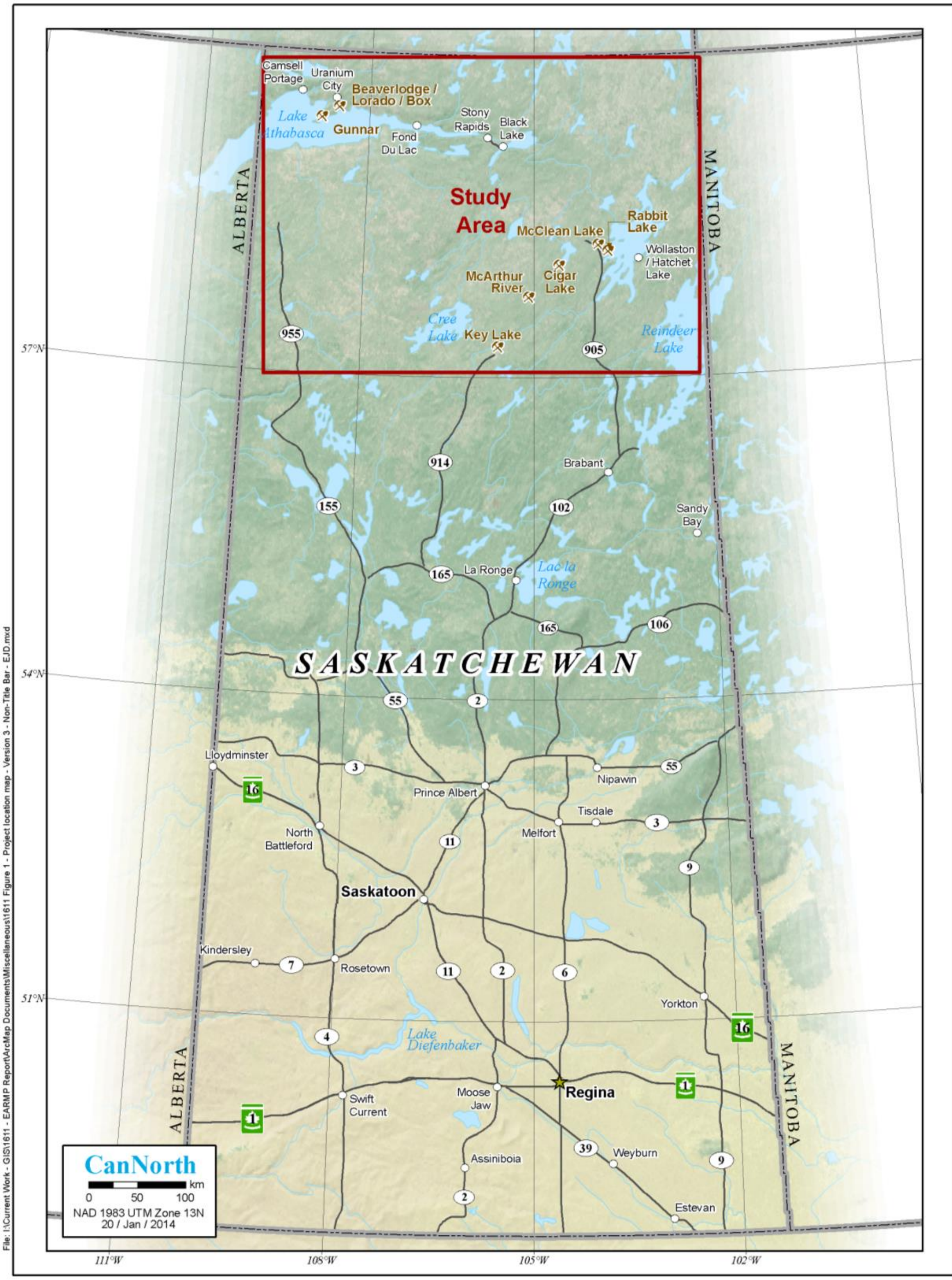

Figure 1.

Study location.

presented in a separate report. The community program was established to monitor the safety of traditionally harvested country foods by collecting and testing water, fish, berry, and mammal samples from the seven communities located in the Eastern Athabasca region. The objective of this document is to present an update of the results from the sampling program completed in 2015/2016.

1.1.1 Uranium Mining and Milling Operations in the Region

There are five active uranium mines in the Eastern Athabasca region. These include Key Lake, McArthur River, McClean Lake, Rabbit Lake, and Cigar Lake. In addition, other decommissioned and/or abandoned uranium mine sites are located in the region and near the community of Uranium City. The locations of these uranium mining and milling operations are presented in Figure 2. Extensive monitoring in the local study areas generally includes testing the air, soil, vegetation, water, sediment, benthic invertebrates, and fish (EcoMetrix 2010a, 2010b; SENES 2010, 2012; AREVA 2012). These sampling programs are designed specifically for each mine and are a requirement under the provincial operating licence.

1.1.2 Communities in the Region

There are seven communities in the region, including Black Lake, Fond du Lac Denesuline First Nation, Stony Rapids, Wollaston Lake, Hatchet Lake Denesuline First Nation, Camsell Portage, and Uranium City (Figure 2). For the EARMP community program, the communities of Wollaston Lake and Hatchet Lake Denesuline First Nation were assessed together, creating a total of six community study areas.

1.2 EARMP Community Program Objectives

The EARMP community program was developed to address potential concerns about the safety of country foods that community members routinely consume. Country foods can be defined as "traditional native foods that are obtained from the land, such as wild game, birds, fish, and berries by local residents during subsistence hunting and gathering" (Peace Athabasca Delta Group Project 1972). Country food studies in Hatchet Lake and

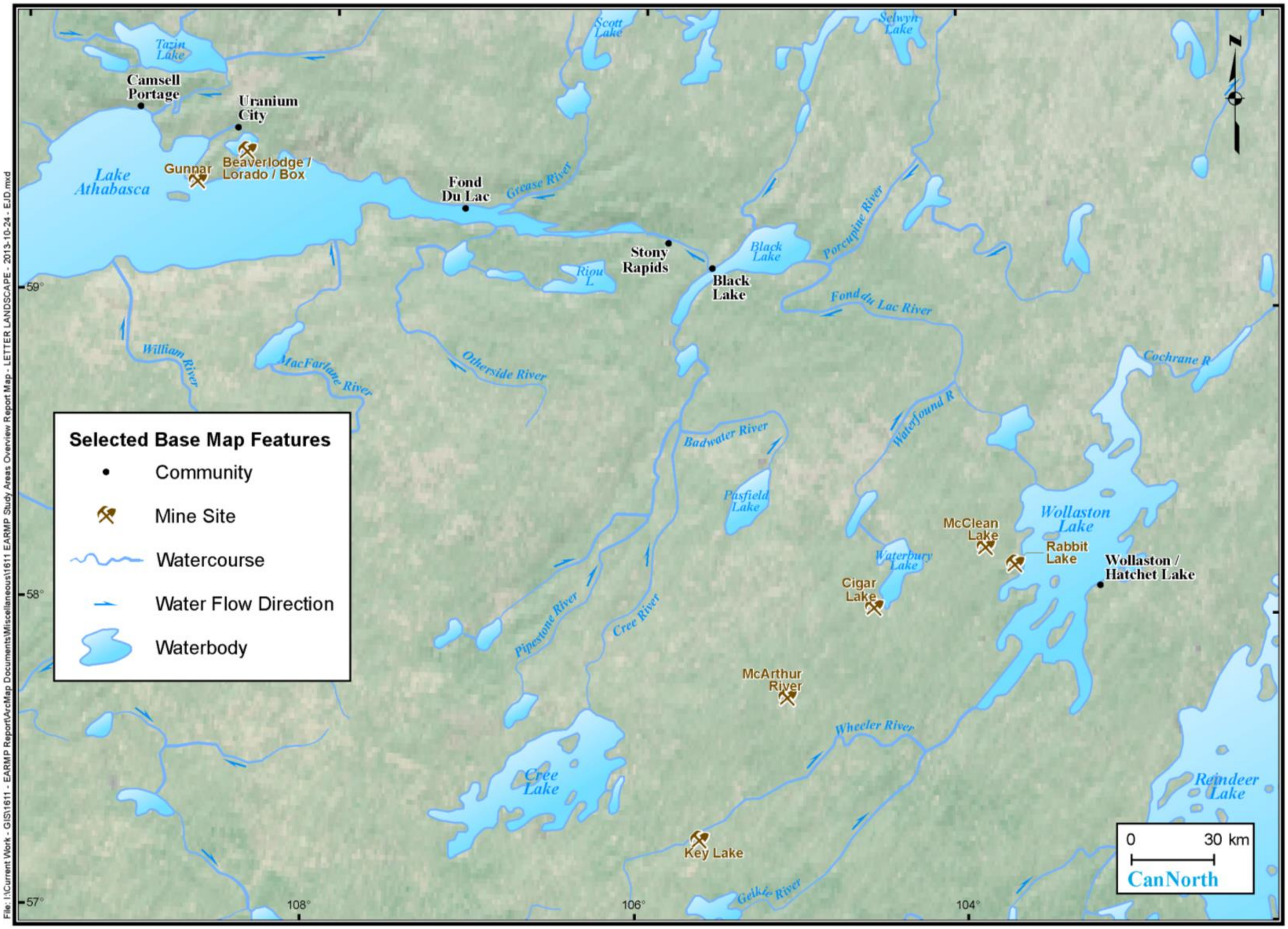

Figure 2.
Study area overview.

Uranium City have established that fish, berries, and wild game are important food sources for communities located in northern Saskatchewan (CanNorth 1999, 2011). In this way, the EARMP community program provides important information to the residents of northern Saskatchewan.

The EARMP community monitoring program objectives are to:

1. determine the safety of traditionally harvested food for local consumption;
2. establish long-term monitoring at community sampling areas to assess variability and potential changes over time;
3. build mutually beneficial relationships as well as engage and involve community members in the gathering of information for the program; and
4. communicate monitoring results to community members and other stakeholders through reporting, public media, and meetings.

1.3 Summary of EARMP Community Program Framework

1.3.1 Community Involvement

The community monitoring program relies on the participation of community members for the selection of sampling locations and sample collection. Prior to commencing the fieldwork in the summer of 2011, notices describing a new environmental monitoring program were distributed to the band chief/mayor and council for circulation and discussion within each community. The purpose of the notices was to invite community members to select representatives from each community to carry out the country foods sampling for the EARMP. Community members were selected from each community and provided training in the collection and shipping procedures for the EARMP community sampling program.

The collection of country food samples is carried out in one of two ways: either independently by the community member or in conjunction with a representative of CanNorth, who is responsible for the management of the program. The sampling locations within each community were established during the field training session when physical variables such as water depth, fishing locations, and berry patches could be determined.

1.3.2 Communications Program in 2015/2016

Communicating the yearly monitoring results and getting feedback from the community members and leaders are among the primary goals of the EARMP community program. In order to accomplish this, numerous communication and engagement strategies are implemented yearly and are summarized below.

EARMP Promotions

The EARMP website continues to be the primary promotional strategy used to inform community members on upcoming events and reports available. The website is routinely updated with any new event pictures, information on community visits, sampling programs, and maps. The website (www.earmp.ca) also contains a wealth of information about the project objectives, contact information, downloads and data files, as well as links to other websites such as the stakeholders.

Additional marketing materials include free EARMP calendars in English and Dene that are shipped to the Athabasca communities once a year and circulated within each community through the band offices, community health centers, post offices, and schools. Ads are also posted in Opportunity North magazine, which is distributed throughout the north and includes information about the program as well as contact information for those who have any questions or concerns. Other promotional materials including hats, toques, fish hooks, coffee mugs, and water bottles are often shipped to communities for fish derbies and community events.

Northern Saskatchewan Environmental Quality Committee (NSEQC)

As an advisory committee of the provincial government, the NSEQC gives northerners a voice on environmental, socio-economic, and Occupational Health and Safety (OH&S) issues in regards to the northern Saskatchewan uranium industry (from exploration to decommissioning). Although not a regulatory body, the NSEQC is a well informed and well respected group which assists in the free flow of information and understanding among communities, industry, and government. The committee is composed of trusted and knowledgeable people each nominated by his/her community, is a bridge between northerners, government, and the uranium mining industry. The main responsibility of NSEQC representatives is to bring community issues, concerns, and recommendations on the uranium industry to this forum and in turn to bring information, decisions, and directions back to their communities.

The EARMP community program results are presented to the NSEQC members yearly (2012 to 2015) and provide an opportunity to facilitate the communication of the results of the program and to answer any questions, concerns, or suggestions of community members in relation to the monitoring program. Unfortunately in 2016 EARMP could not present to the NSEQC as they were awaiting approval by the Government of Saskatchewan as every five-year term concludes with a review of the program’s current and future relevance and value to the industry, regulators, and northern communities.

Moving forward EARMP is committed to engaging with the NSEQC membership and attending the next EQC meeting in order to update the Athabasca community representatives on the results of the program.

Science Ambassador Program

The Science Ambassador Program pairs senior university science, engineering, and health science students with rural and remote Aboriginal community schools, to support creative and culturally-relevant science teaching and learning. Science Ambassadors work alongside teachers to present hands-on science activities, facilitate class discussions, and mentor students exploring possibilities for careers and continuing science education.

In 2015, EARMP teamed up with the University of Saskatchewan (U of S) and conducted a five day tour of four of the six communities with schools in the Athabasca region. With the permission of the local school principal/teacher and working with the U of S Science Ambassador Program, a science lesson was developed around the environmental monitoring that currently takes place across northern Saskatchewan. In 2016 EARMP continued to work with the program by working with elders in three communities providing lake trout for classroom fish dissections. EARMP also sponsored the purchase of digital field microscopes for three Athabasca Basin communities involved in the 2016 Science Ambassador Program (for more details on the program visit www.artsandscience.usask.ca/scienceoutreach/).

1.3.3 Study Design and Objectives of the 2015/2016 Program

The specific objective of the 2015/2016 EARMP community monitoring program is to continue to monitor the chemical characteristics of traditionally harvested foods by testing samples gathered by community members in 2015 and 2016 and comparing the results to the baseline established during the previous sampling years to assess potential changes over time.

In 2015/2016, updates are only available for berry (16 samples collected) and ungulate (13 samples collected) chemistry from the communities. Additional lake trout (14 samples) were also collected from reference areas near the communities to improve the regional reference data set for this species. As discussed above, sample selection and collection was completed directly by, or with the assistance of, community residents. Although a full suite of chemical parameters were measured for each sample, this report focused on a smaller list of chemicals[1], which have been identified as the chemicals of most interest for uranium operations by regulatory agencies, environmental assessments, as well as other monitoring programs (see Table 1 below).

Table 1

Chemicals assessed for the EARMP community program.

Chemicals	
Aluminum	Molybdenum
Ammonia*	Nickel
Arsenic	Polonium-210
Cadmium	Radium-226
Cobalt	Selenium
Copper	Thorium-230
Iron	Uranium
Lead	Vanadium
Lead-210	Zinc
Mercury**	

*For water only.
**Mercury is not associated with uranium mining and milling operations (refer to Appendix A for more information).

Chemistry results from the country foods tested in 2015/2016 were compared to available guidelines, to chemical concentrations measured in country foods collected throughout northern Saskatchewan during other monitoring programs (i.e., regional reference range),

[1] Referred to as Constituents of Potential Concern by industry.

and to chemical concentrations measured as part of the baseline. Comparing the results of the EARMP community program to available guidelines and regional reference data is valuable because although most foods contain detectable levels of environmental chemicals, they are not necessarily a concern to human health. A full description of the EARMP community monitoring framework is provided in CanNorth 2015.

A more detailed assessment of the country foods data will be provided in 2016/2017 EARMP Community Report which will include additional country foods (e.g., fish flesh).

1.4 Report Structure

The EARMP community report is subdivided into six major sections including appendices:

1.0 Introduction
2.0 Berry Chemistry
3.0 Mammal Chemistry
4.0 Summary

Appendix A presents the results of detailed data analyses completed on the 2015/2016 community data, while the raw data are provided in Appendix B.

2.0 BERRY CHEMISTRY

Near each study community, berry samples were hand-collected by local community members independently or with the aid of CanNorth personnel. Sampling was conducted at three locations (reduced from five) typically used for berry collection by community members (Figure 3). It is noted that only one bog cranberry sample was available from Uranium City. Depending on accessibility and on current local abundance, the type of berry selected for collection was either blueberry or bog cranberry. In total, twelve blueberry and four cranberry samples were collected for the 2015/2016 program. All samples were double-bagged and frozen until submission to SRC for chemical analysis.

A summary of the EARMP community program berry chemistry results is presented in Table 2. The detailed data analyses are presented in Appendix A and are summarized below. The raw chemistry data for berries are provided in Appendix B.

Table 2

Summary results of the 2015 EARMP community berry chemistry program.

Community	Within the Regional Reference Range	Similar to Baseline Levels	Safe to Eat
Black Lake	✓	✓	Yes
Camsell Portage	✓	✓	Yes
Fond du Lac	✓	✓	Yes
Stony Rapids	✓, 1 exception	✓, 1 exception	Yes
Uranium City	✓	✓	Yes
Wollaston Lake/ Hatchet Lake	✓	✓	Yes

The levels of chemicals in the berry samples were often too low for the laboratory to measure. This included levels of cadmium, selenium, uranium, thorium-230, arsenic, and vanadium which were too low to measure in more than half of the samples from most communities. Aluminum levels measured in berries from the communities of Black Lake, Fond du Lac, Stony Rapids, and Wollaston Lake in 2015 were slightly higher compared to the 2014 results, but remained well within the regional reference range.

Levels of lead, molybdenum, nickel, and cobalt in the blueberries from Fond du Lac and molybdenum, nickel, and cobalt in blueberries from Wollaston Lake were higher in 2014 as compared to previous monitoring years and as compared to the regional reference range. However, 2015 levels decreased to within their respective regional reference ranges. The only chemical to measure above its regional reference range value was lead in blueberry samples from Stony Rapids. However, after consultation of the toxicity reference values used in the previous Human Health Risk Assessment, and other available literature and guidelines, these concentrations are considered low. The level of lead in blueberries will continue to be monitored during future monitoring cycles to ensure that it is not increasing over time. Overall, the 2016 berry chemistry indicates the berries are safe to eat.

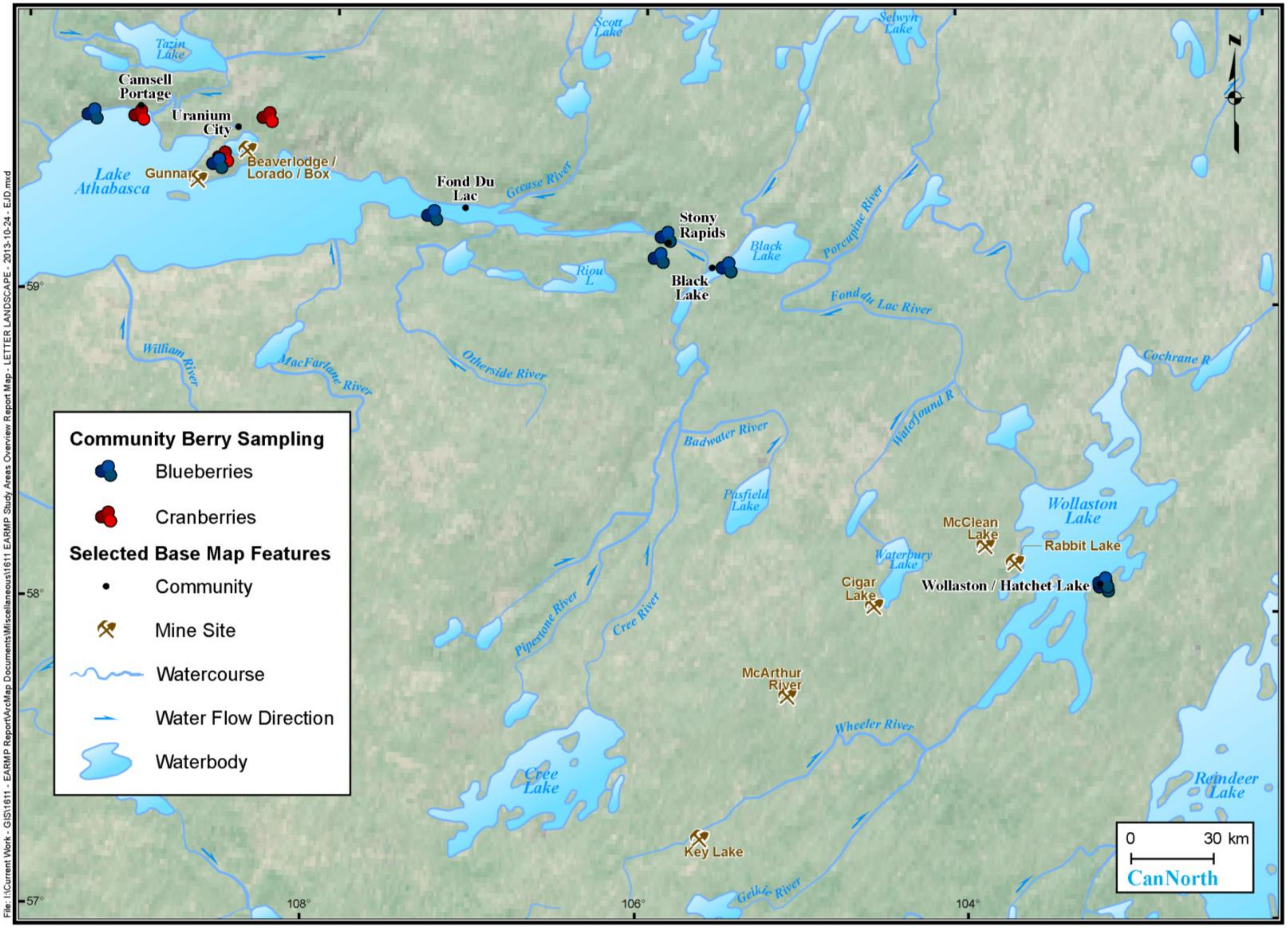

Figure 3
Berry chemistry sampling areas, 2011 to 2015

3.0 MAMMAL CHEMISTRY

Mammal samples were collected by local community members during their routine hunting activities. Two main species commonly hunted and consumed in northern Saskatchewan were targeted; barren-ground caribou and moose. Moose samples were collected near the communities of Uranium City and Camsell Portage (Figure 4). Although barren-ground caribou samples were collected from most communities, it should be noted that several communities hunt in the same general area (Figure 4) but hunting locations do vary from year to year and species availability.

In the winter of 2015/2016, two barren-ground caribou flesh samples from Fond du Lac were collected. In Uranium City, one moose sample was collected in 2015/2016. In addition, organ samples (livers and kidneys) were retained from some of the moose and caribou as requested by the communities. This included caribou kidney from Black Lake and Fond du Lac and moose liver and kidney from the communities of Uranium City and Camsell Portage. In total, three moose flesh, five moose organs, two barren-ground caribou flesh, and three barren-ground caribou organs were received. Once samples were received from the communities they were submitted by CanNorth to SRC for chemical analysis.

A summary of the EARMP community program mammal chemistry results is presented in Table 3. The detailed data analyses are presented in Appendix A and are summarized below. The raw mammal chemistry data are provided in Appendix B. The focus of the discussion below will be on flesh samples since more organ samples are required over time to complete a comparison.

The levels of certain chemicals were often too low for the laboratory to measure. In barren-ground caribou meat, levels of aluminum, molybdenum, nickel, uranium, lead-210, thorium-230, and vanadium were often too low for the laboratory to measure. In moose meat, molybdenum, nickel, uranium, lead-210, thorium-230, arsenic, and vanadium were below the lab's detection levels in more than half of the samples from each community.

Of those chemicals with levels that the laboratory could measure, only cadmium and cobalt exceeded the regional reference range and baseline levels in moose samples. This occurred in samples from Uranium City. Cadmium concentrations in moose meat samples from Camsell Portage decreased to within the reference range as compared to the 2014/2015 samples. Despite remaining above the regional reference range, cadmium levels in moose meat samples from Uranium City have decreased compared to the 2014/2015 samples and are now below the guideline set for supermarket meats by the European Commission (European Commission Regulation 629/2008). The level of cobalt in mammal meat samples increased compared to all other monitoring periods and measured above the regional reference range. After consultation of the Human Health Risk Assessment completed previously for EARMP, cobalt levels are not considered a concern. Special attention to these chemicals will be made in future monitoring years to ensure concentrations are not increasing over time.

Table 3

Summary results of the 2015/2016 EARMP community mammal chemistry program.

Community	Within the Regional Reference Range	Similar to Baseline Assessment	Safe to Eat
Camsell Portage	✓	✓	Yes
Fond du Lac	✓	✓	Yes
Uranium City	✓, 2 exceptions	✓, 2 exceptions	Yes

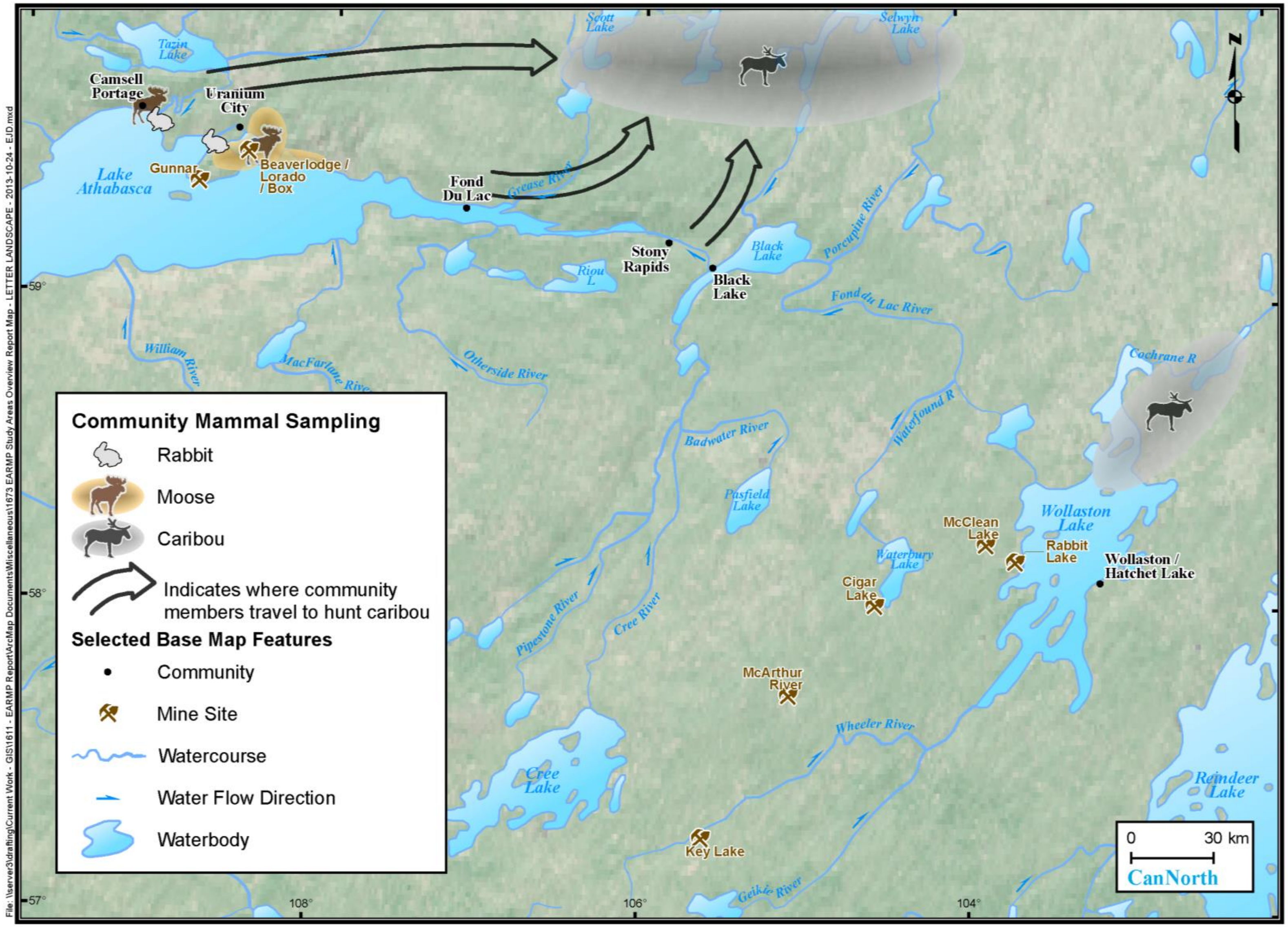

Figure 4.
Mammal chemistry sampling areas, 2011 to 2016

4.0 SUMMARY

The monitoring program that was carried out in 2015/2016 analyzed blueberries or cranberries from all the Athabasca communities. Generally, the levels of chemicals in blueberries were found to be within or below the regional reference range and all levels were considered safe to eat. All cranberry samples, collected from only Camsell Portage and Uranium City, tested within or below the regional reference range.

Moose samples were only available from Camsell Portage and Uranium City and tested similar to baseline levels and were within the regional reference ranges with exceptions from Uranium City. Both cadmium and cobalt were found to be greater than the regional reference range and baseline levels. However, it is noted that cadmium levels were decreased largely from 2014/2015 levels. Caribou samples were only available from Fond du Lac and all levels of chemicals were found to be within or below regional reference range values, not generally considered a concern, and safe to eat.

Data collection including additional fish tissue chemistry will be completed in 2016/2017 program to provide a more detailed assessment of the country foods generally assessed by the EARMP.

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APPENDICES

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APPENDIX A

DETAILED DATA ANALYSIS

APPENDIX A: DETAILED DATA ANALYSIS

1.0 BERRY CHEMISTRY

To evaluate the EARMP community berry chemistry data, concentrations of the reduced chemical list were compared to:

1. regional reference data; and
2. previous monitoring phases.

Summaries of available chemical concentrations measured in regional reference data, baseline data, and the 2014 EARMP community data are presented in Appendix A, Figure 1 and 2 and Appendix A, Table 1 and 2. Data were graphed if >50% of the concentrations for a certain chemical were above the MDL in at least one community. The raw berry chemistry results are presented in Appendix B, Tables 1 and 2.

Levels of chemicals in the blueberries were often too low for the laboratory to measure. This included levels of cadmium, selenium, uranium, thorium-230, arsenic, and vanadium, which were below measurable levels in more than half of the samples from most communities. Levels of several chemicals measured in berries from the communities of Black Lake, Fond du Lac, and Wollaston Lake in 2015 have decreased from 2014 levels to be within the regional reference ranges. This included levels of uranium (0.01 µg/g) in the blueberries from Black Lake, levels of lead (0.03 ± 0.015 µg/g), molybdenum (0.3 ± 0.06 µg/g), and nickel (0.9 ± 0.33 µg/g) in the blueberries from Fond du Lac, and levels of molybdenum (0.1 ± 0.06 µg/g) and nickel (1.1 ± 0.42 µg/g) in blueberries from Wollaston Lake. Lead levels in Stony Rapids blueberries increased in 2015 (0.1 ± 0.14 µg/g) as compared to 2014 (0.012 ± 0.004) and were also above the regional reference range.

Overall, blueberries are considered safe to eat in all of the EARMP community; however, particular attention will be paid to levels of lead during future monitoring years to ensure they are not increasing over time.

In the cranberries from Camsell Portage and Uranium City, the level of chemicals were generally low, with cadmium, selenium, thorium-230, arsenic, and vanadium at levels too low to measure in more than half of the samples. Copper, lead, and cobalt levels in cranberries from Uranium City have been the only chemicals to have levels above the regional reference range in past monitoring periods. Levels for all three chemicals decreased to within the regional reference range in 2015. The remaining chemicals were similar to previous years or fell within the range of concentrations expected for the region.

2.0 MAMMAL CHEMISTRY

To evaluate the EARMP community barren-ground caribou and moose chemistry data, concentrations of the reduced chemical list were compared to:

1. regional reference data; and
2. previous monitoring phases.

Summaries of available caribou and moose chemical concentrations measured in regional reference data, baseline data, and the 2015/2016 EARMP community data are presented in Appendix A, Figure 3 and 4 and Appendix A, Table 3 and 4. It is noted that mammals are collected throughout the fall and winter season, thus the sampling year spans from late 2015 to early 2016. Data were graphed if >50% of the concentrations for a certain chemical were above the MDL in at least one community. The raw mammal chemistry results are presented in Appendix B, Tables 3 to 7.

Concentrations of chemicals that were too low for the laboratory to measure varied only slightly between the barren-ground caribou and moose flesh samples. In barren-ground caribou flesh, levels of aluminum, molybdenum, nickel, uranium, lead-210, thorium-230, arsenic, and vanadium were below MDLs in more than half of the samples in Fond du Lac. In moose flesh, molybdenum, nickel, uranium, lead-210, radium-226, thorium-230, arsenic, and vanadium were below MDLs in more than half of the samples from each community.

Two barren-ground caribou flesh samples were collected from the Fond du Lac area in 2015/2016. Levels of cadmium, copper, iron, lead, and radium-226 increased slightly compared to the previous sampling year but remained within the respective regional reference ranges. Chemicals that decreased in the 2015/2016 sampling period included selenium, zinc, polonium-210, and cobalt. All were within the available regional reference range.

Only one moose flesh sample was collected from the Uranium City area, while two samples were collected from the Camsell Portage area in 2015/2016. Levels of cadmium in the moose samples collected from both communities in 2014/2015 exceeded the regional reference range and were higher than previous monitoring years. However, in 2015/2016, cadmium in moose from Camsell Portage decreased to within the regional reference range and resembled baseline values. Cadmium in the moose sample from Uranium City also decreased largely from the previous year to levels below the European Commission maximum limit for consumption of cadmium in supermarket meat of 0.05 µg/g (European Commission Regulation 629/2008). Levels remained slightly higher than the regional reference range but within the range observed in the Yukon by Gamberg (2000).

No additional snowshoe hare were submitted in 2014/2015 (Appendix A, Table 5); however, caribou and moose kidney and liver samples were submitted by community members for analysis. This represents the second year for which organ tissue samples were available for analysis. These data are presented in Appendix A, Table 6. Metals are known to occur in higher levels in the livers and kidneys as compared to muscle tissue. Therefore, as was expected, the liver and kidney samples collected in 2015/2016 had higher levels of chemicals than the flesh samples. In terms of cadmium levels in the organs from the moose from Uranium City and Camsell Portage, both liver and kidney levels were considerably lower than those observed by Gamberg (2000; liver: 3.09 µg/g[2], kidney: 26.4 µg/g[10]) in the Yukon. EARMP community program will focus on collecting more ungulate kidney and liver samples during future monitoring cycles to provide a larger dataset for comparison over time.

[2] Converted to wet weight using percent moisture values presented in Gamberg 2000.

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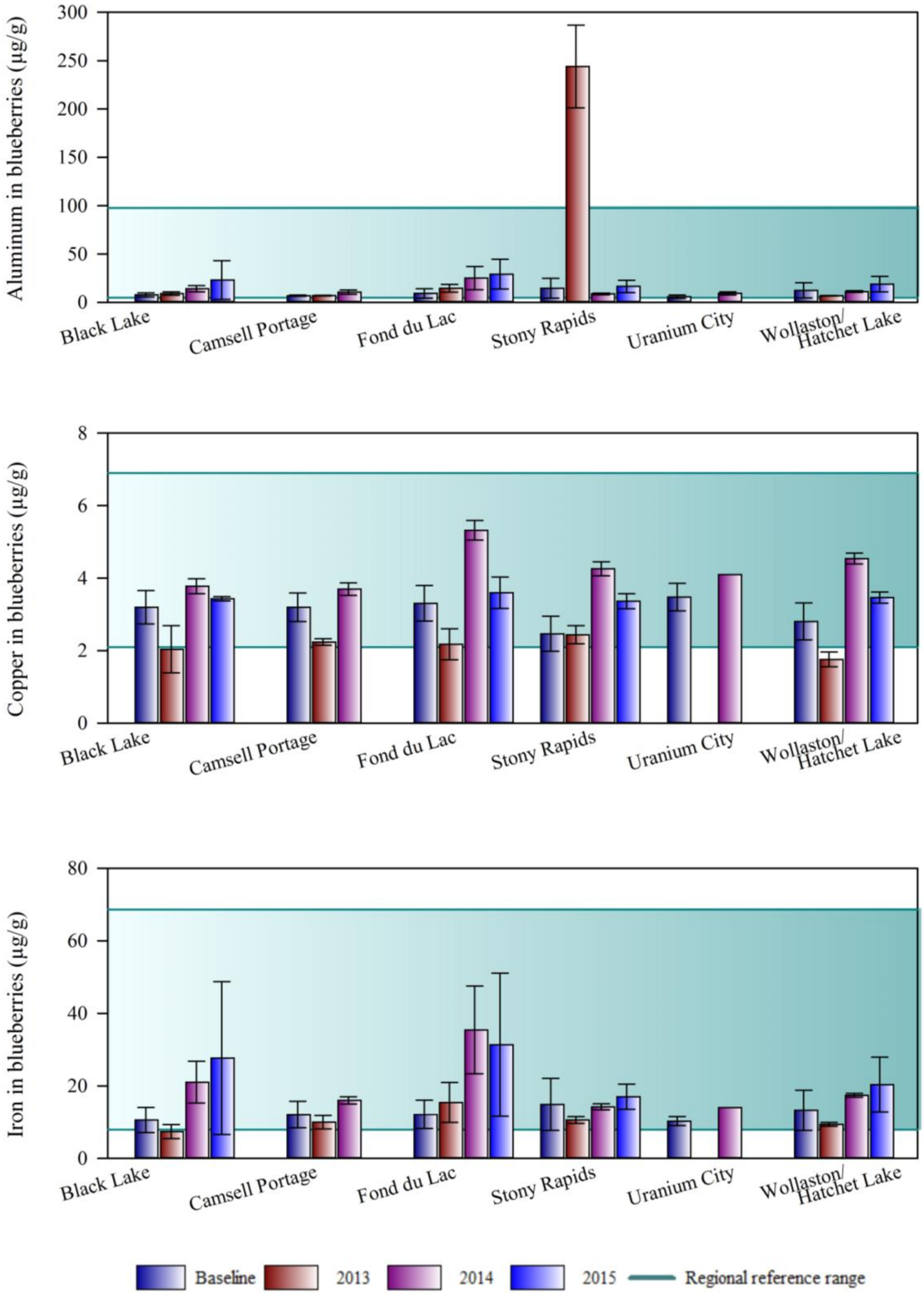
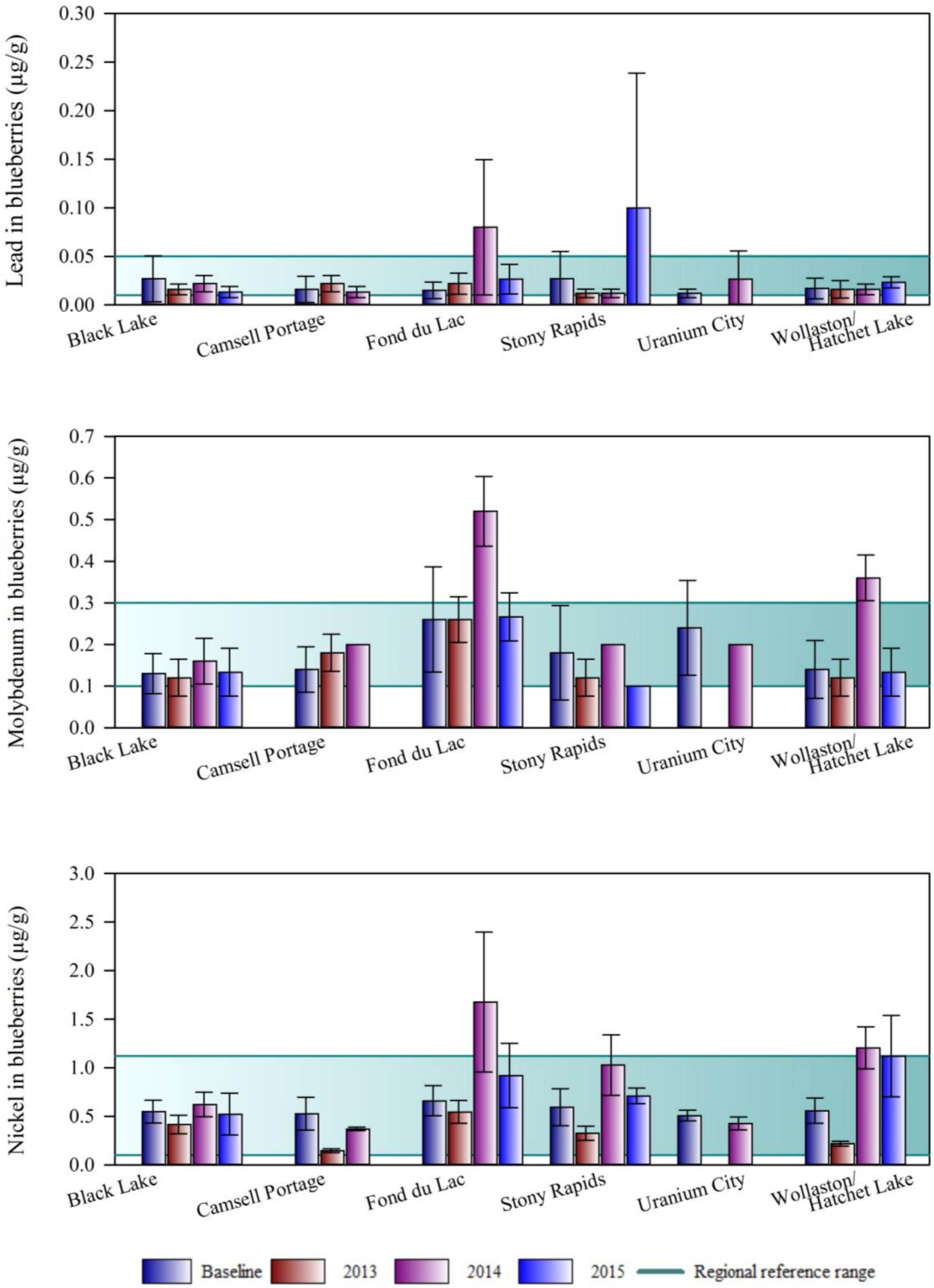


Appendix A, Figure 1
Chemicals in blueberries from the EARMP community study area, 2011 to 2015.



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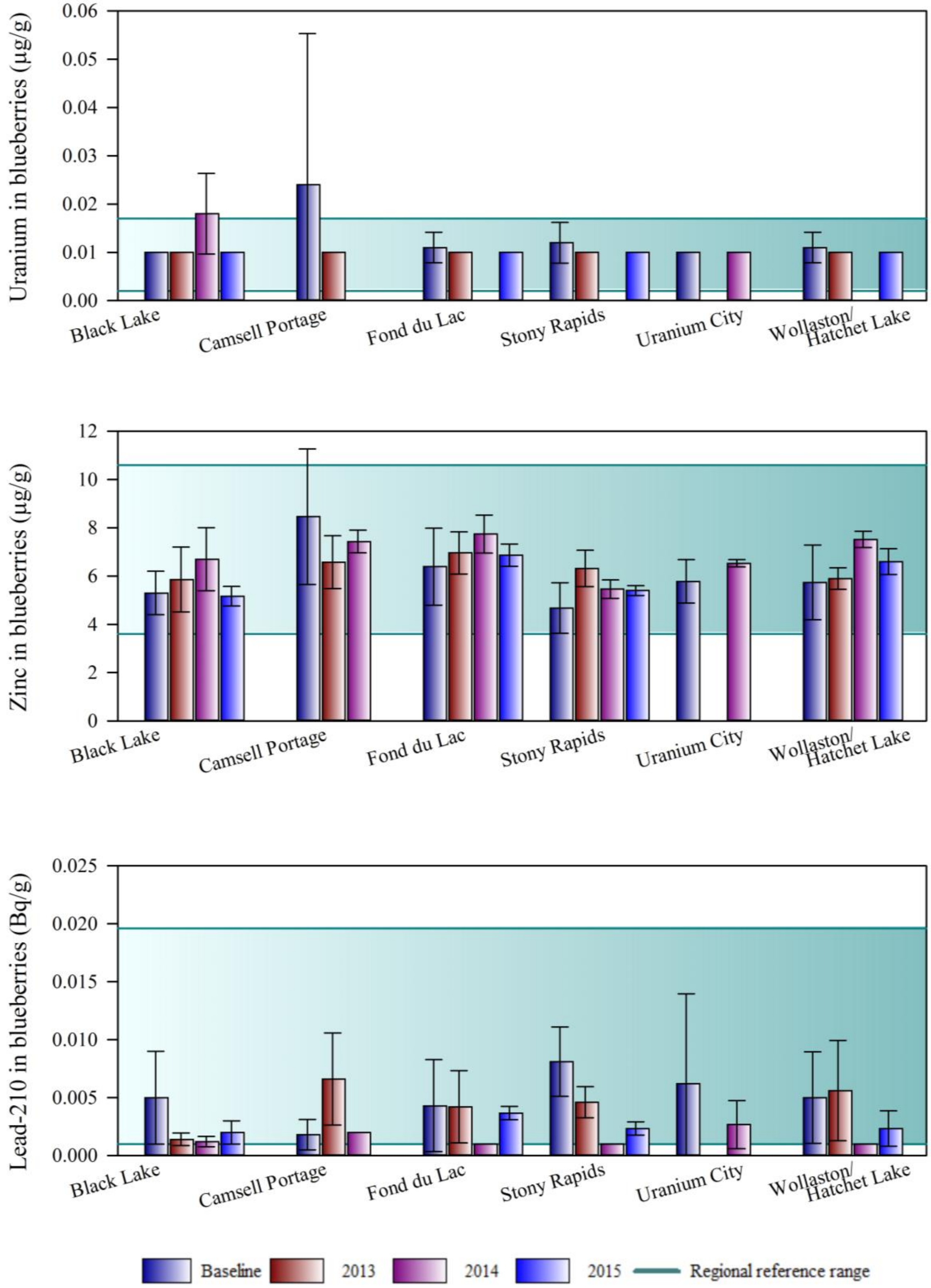

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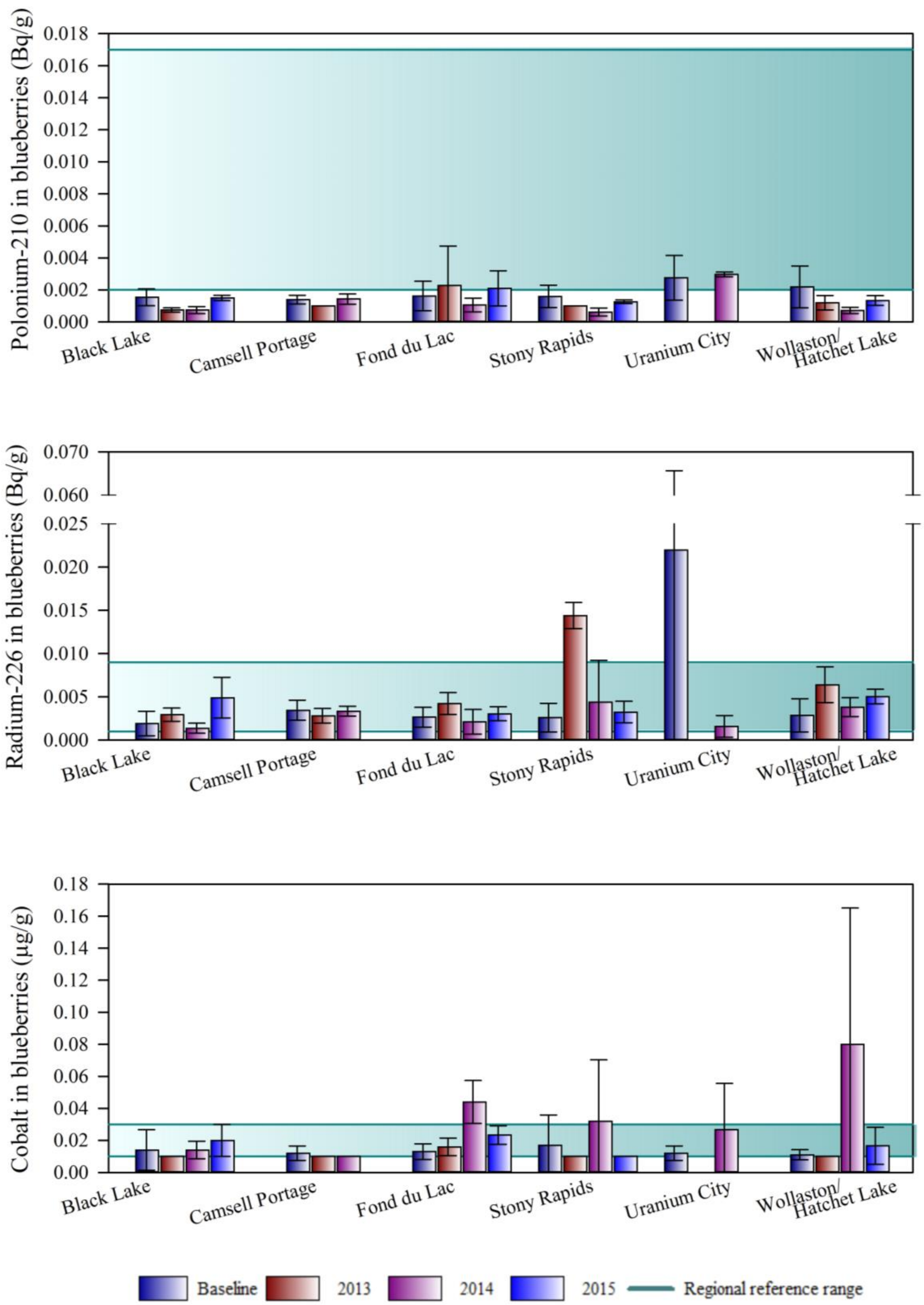

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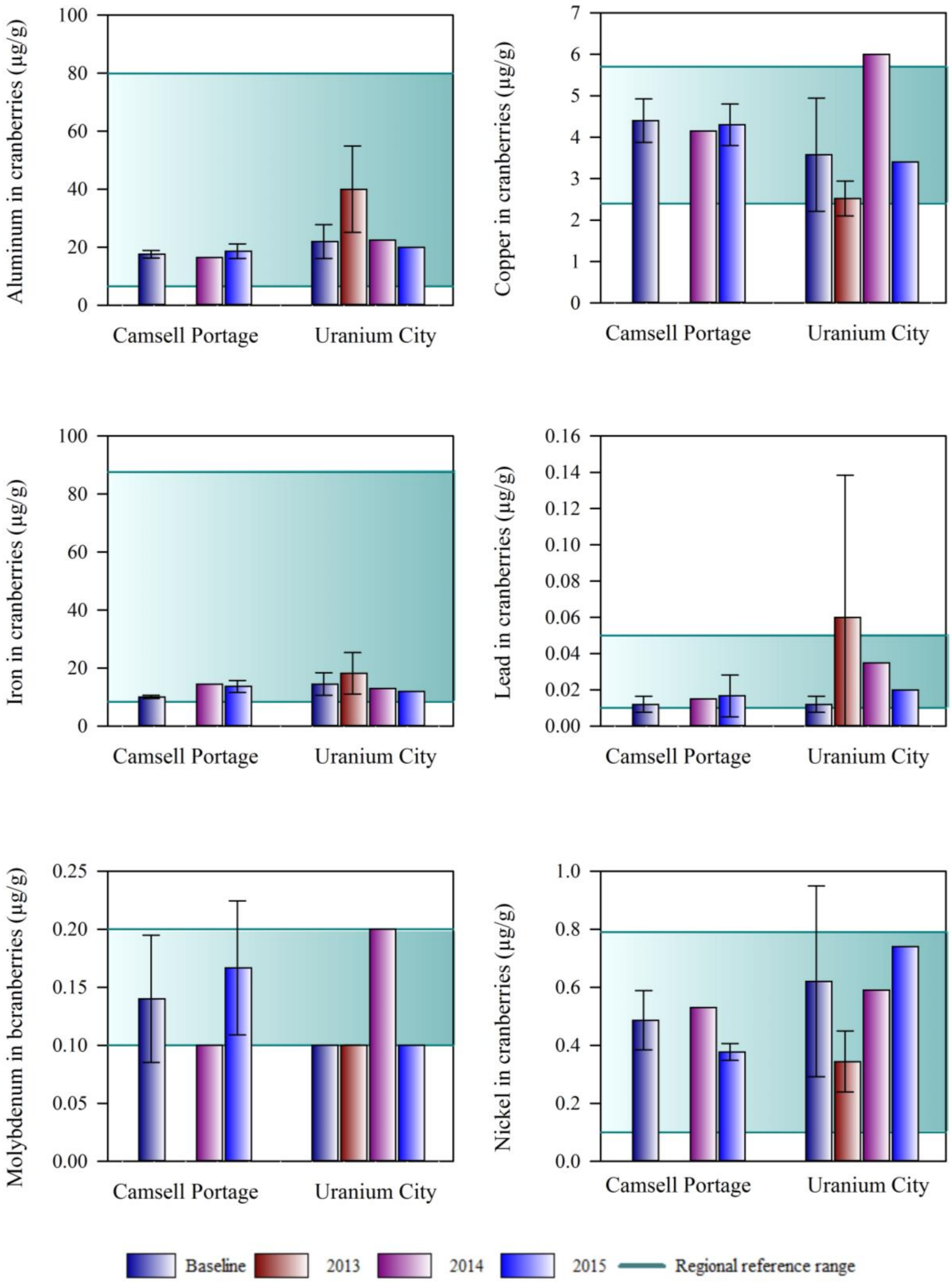
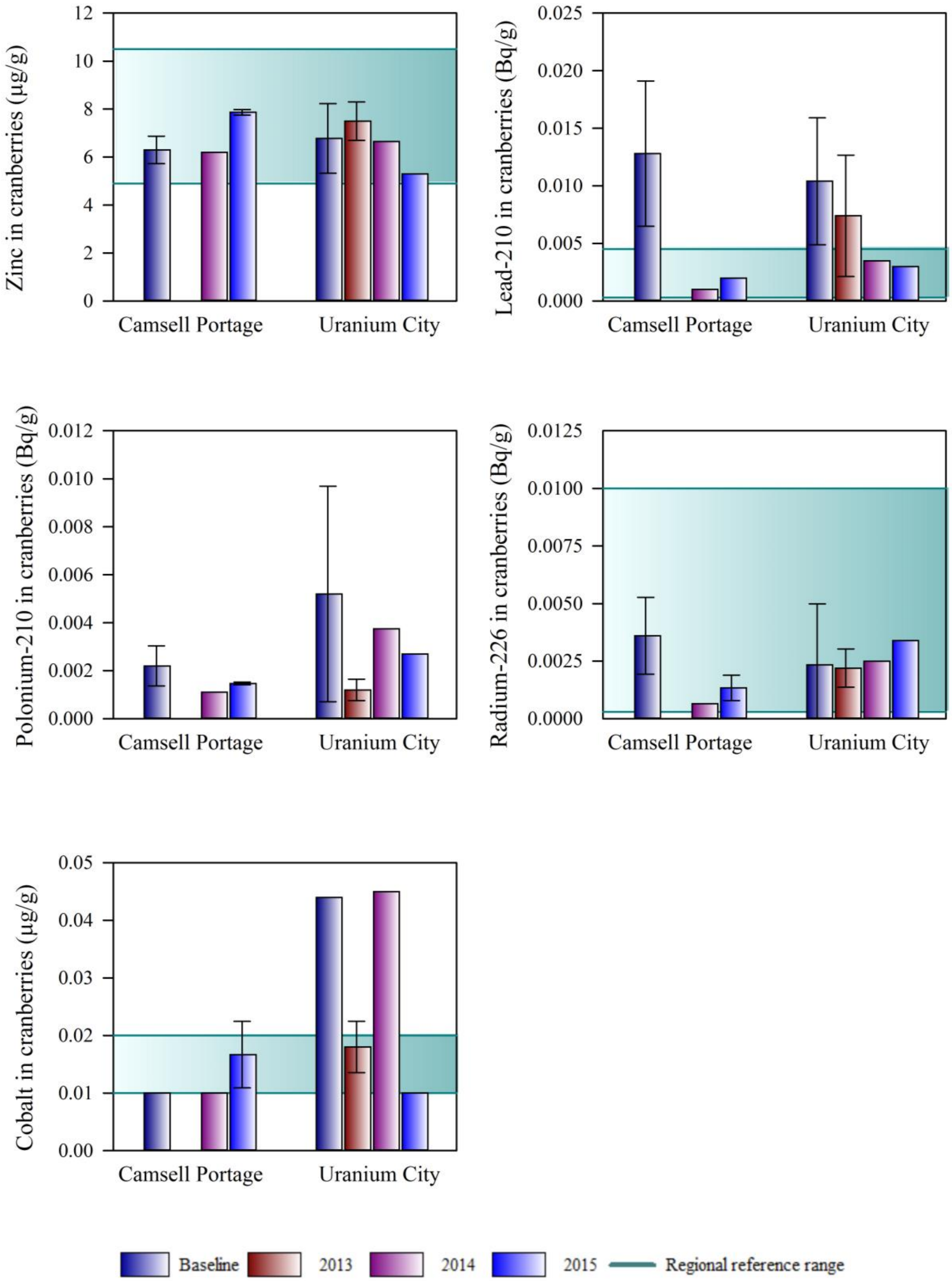
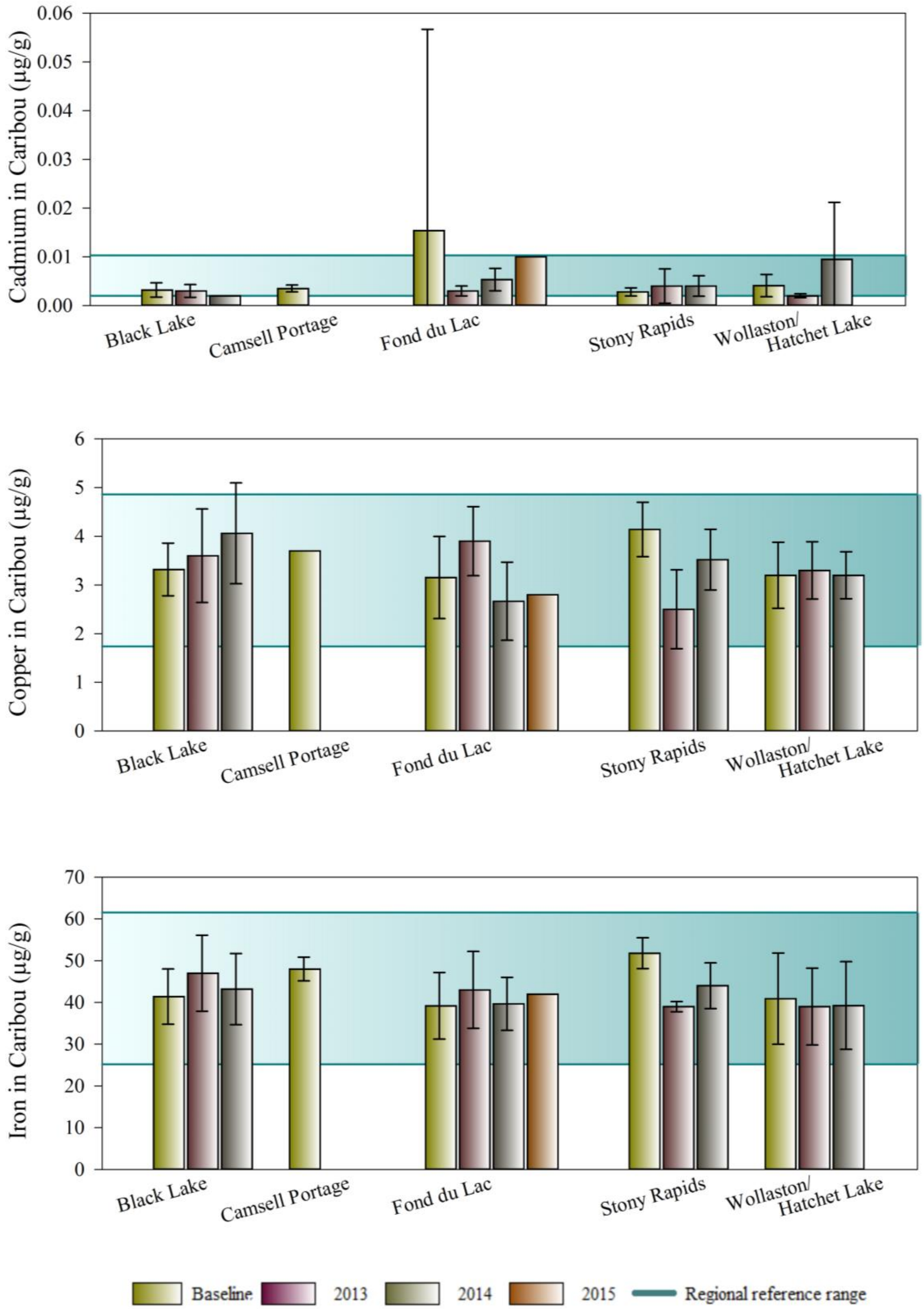


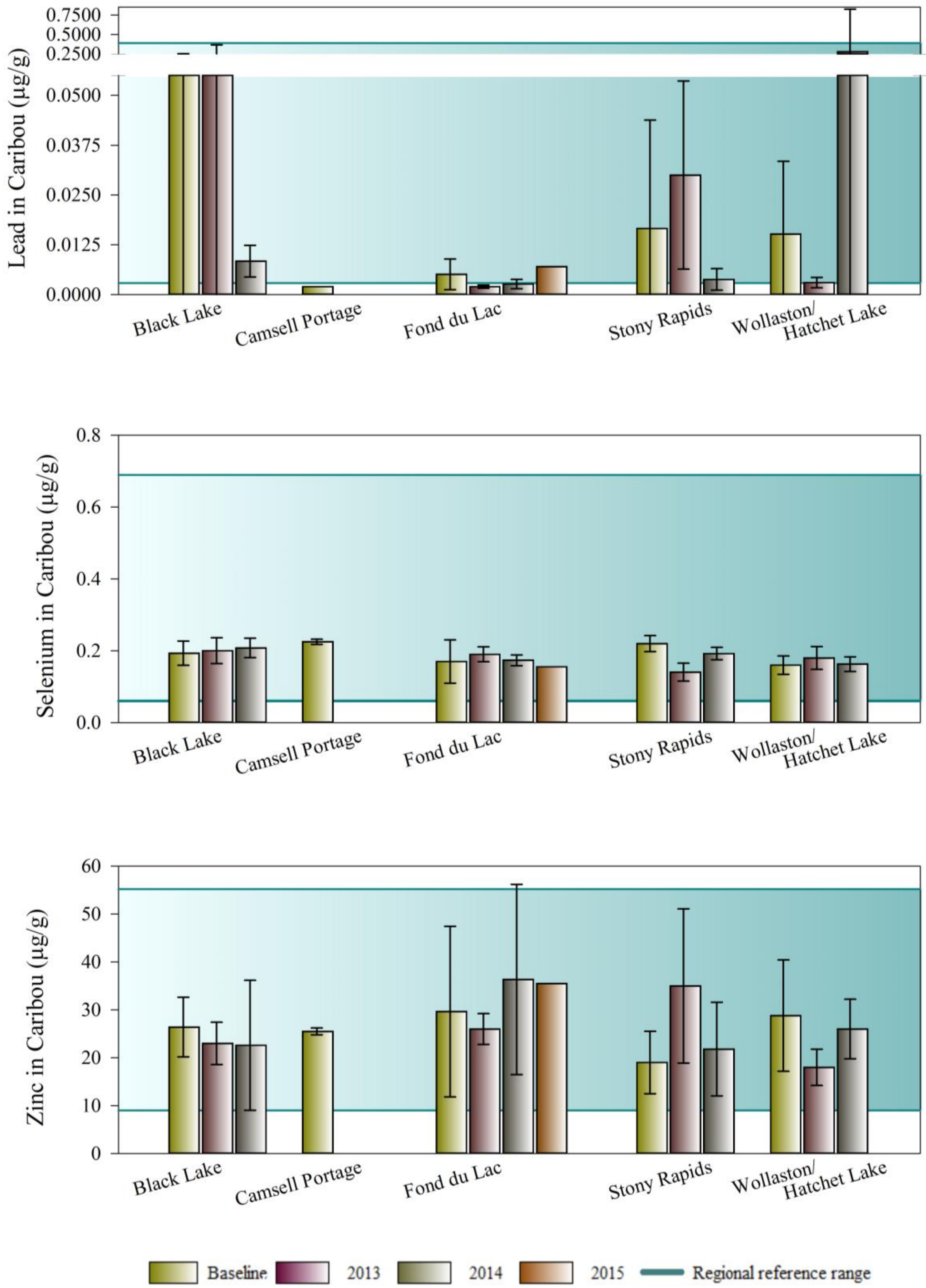
Appendix A, Figure 2
Chemicals in cranberries from the EARMP community study area, 2011 to 2015.



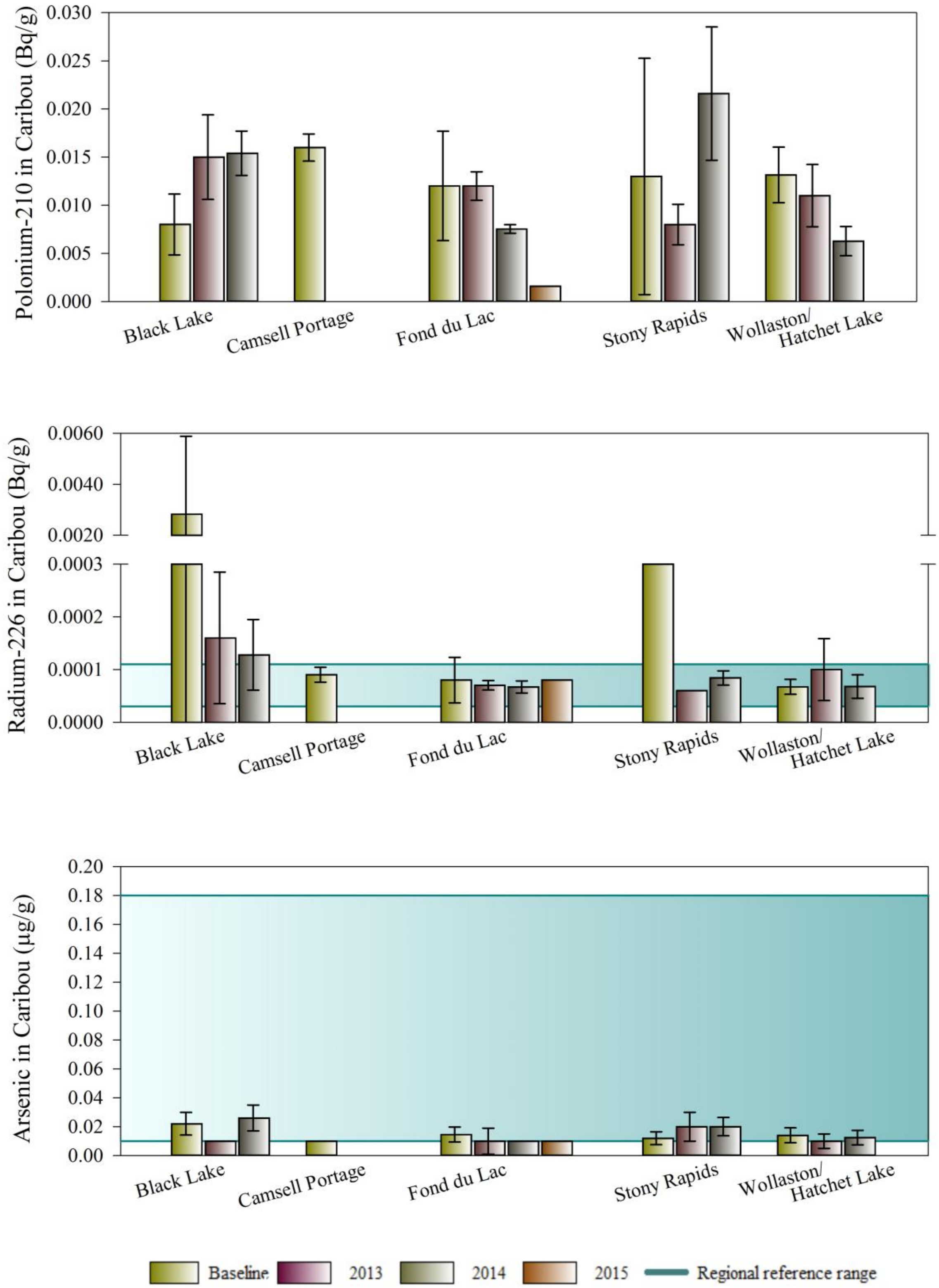
Appendix A, Figure 2
Chemicals in cranberries from the EARMP community study area, 2011 to 2015.



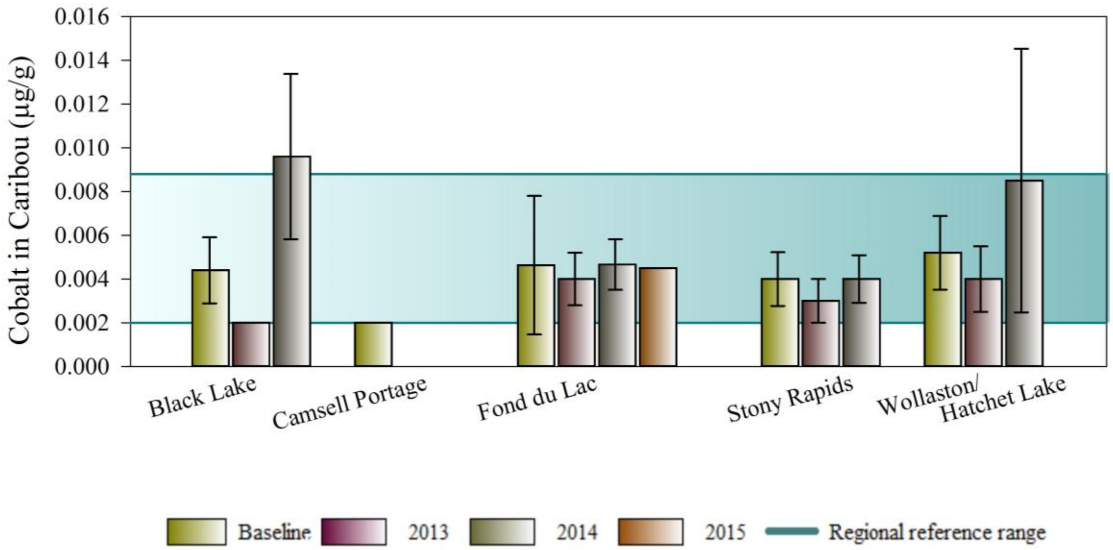
Appendix A, Figure 3
Chemicals in barren-ground caribou from the EARMP community study area, 2011 to 2016.



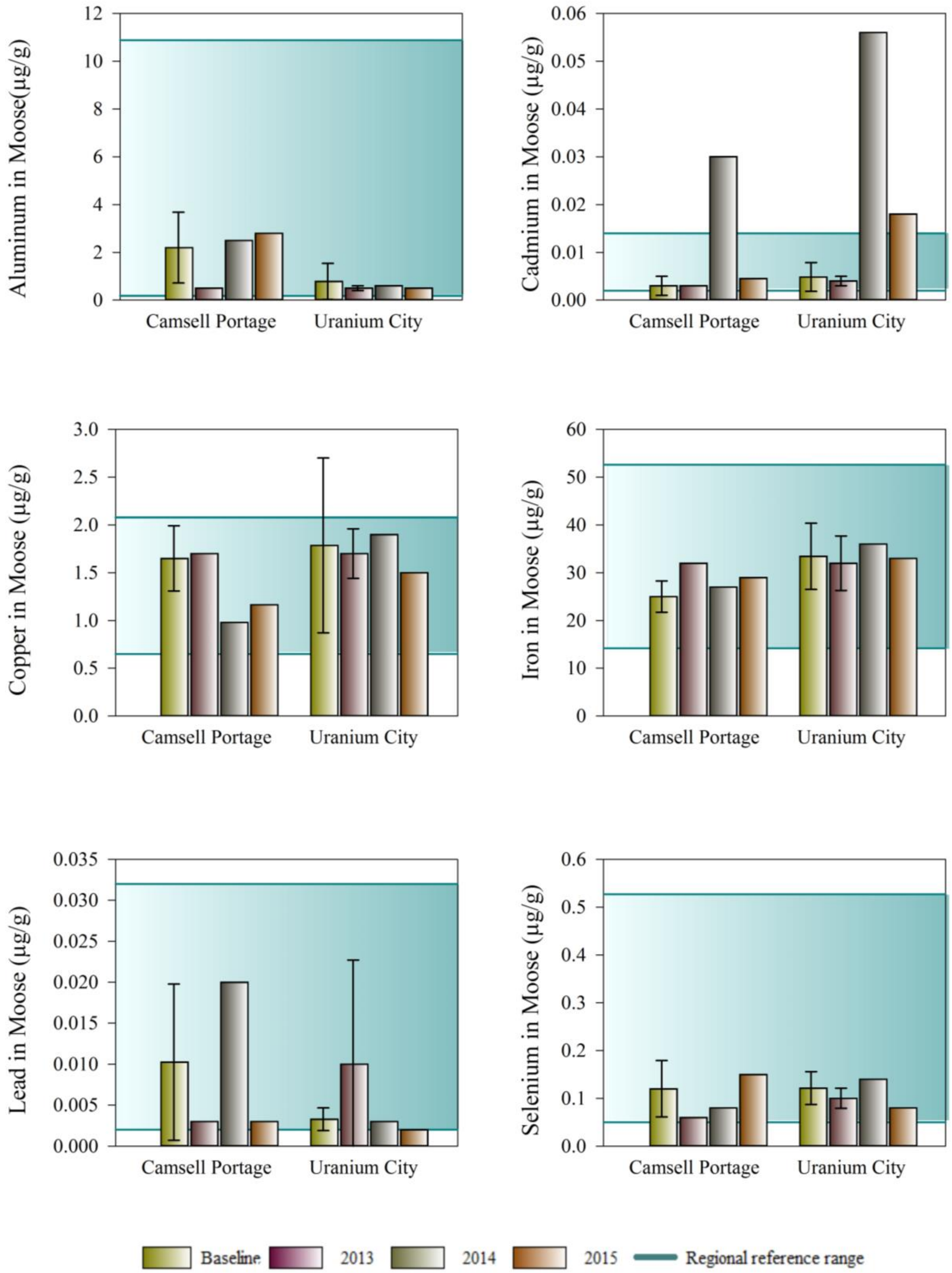
Appendix A, Figure 3
Chemicals in barren-ground caribou from the EARMP community study area, 2011 to 2016.



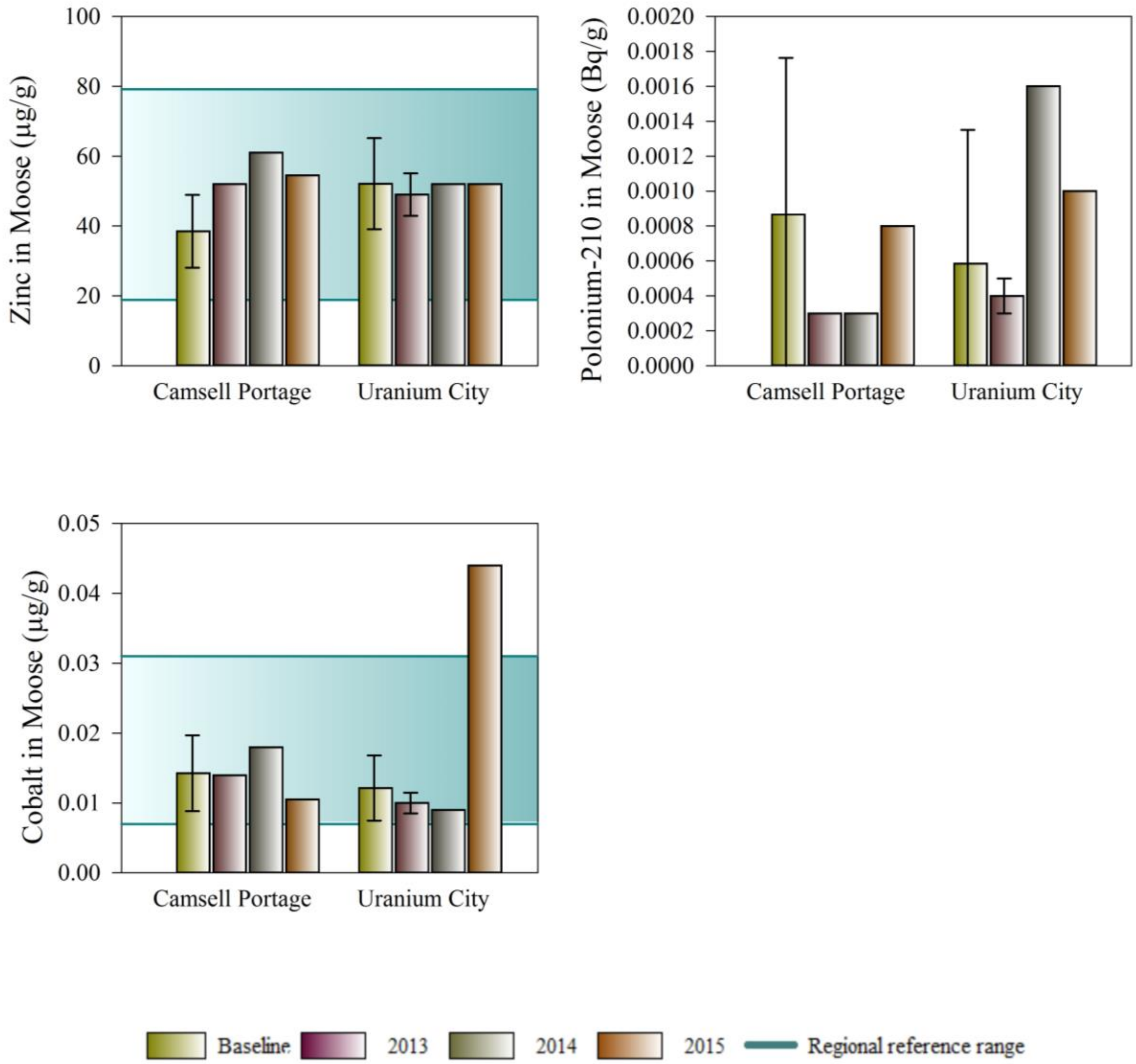
Appendix A, Figure 3
Chemicals in barren-ground caribou from the EARMP community study area, 2011 to 2016.



Appendix A, Figure 3
Chemicals in barren-ground caribou from the EARMP community study area, 2011 to 2016.



Appendix A, Figure 4
Chemicals in moose from the EARMP community study area, 2011 to 2015.



Appendix A, Figure 4
Chemicals in moose from the EARMP community study area, 2011 to 2015.

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Appendix A, Table 1

Summary blueberry chemistry results for the EARMP community program.

Chemical[1]	Regional Reference Range[2, 3]			
	Lower Limit	Median	Upper Limit	N
Metals				
Aluminum	4.9	12.1	97.7	43
Cadmium	-	-	-	22
Copper	2.1	3.6	6.9	43
Iron	7.9	15.3	68.6	43
Lead	<0.01	0.01	0.05	22
Molybdenum	<0.1	0.1	0.3	43
Nickel	0.10	0.57	1.12	43
Selenium	-	-	-	22
Uranium	<0.002	0.003	0.017	21
Zinc	3.6	6.9	10.6	43
Radionuclides				
Lead-210 (Bq/g)	<0.001	0.004	0.020	19
Polonium-210 (Bq/g)	<0.002	0.003	0.014	8
Radium-226 (Bq/g)	0.001	0.003	0.009	30
Thorium-230 (Bq/g)	-	-	-	8
Trace Elements				
Arsenic	-	-	-	22
Cobalt	<0.01	0.01	0.03	22
Vanadium	-	-	-	22

Appendix A, Table 1

Summary blueberry chemistry results for the EARMP community program.

Chemical[1]	Black Lake														
	Baseline			2013				2014				2015			
	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N
Metals															
Aluminum	7.9	2.07	10	9.2	1.8	0	5	14	3.19	0	5	23	19.99	0	3
Cadmium	0.01	-	10	0.01	0.004	3	5	0.01	-	5	5	0.01	-	3	3
Copper	3.2	0.46	10	2.0	0.65	0	5	3.8	0.20	0	5	3.4	0.06	0	3
Iron	10.6	3.47	10	7.4	1.95	0	5	21	5.79	0	5	28	21.08	0	3
Lead	0.03	0.024	10	0.02	0.005	2	5	0.02	0.0084	1	5	0.01	0.0058	1	3
Molybdenum	0.1	0.05	10	0.1	0.04	1	5	0.2	0.055	2	5	0.1	0.058	0	3
Nickel	0.55	0.117	10	0.42	0.095	0	5	0.62	0.126	0	5	0.52	0.215	0	3
Selenium	0.05	0.010	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Uranium	0.01	-	10	0.01	0	4	5	0.02	0.0084	1	5	0.01	-	3	3
Zinc	5.3	0.90	10	5.9	1.34	0	5	6.7	1.31	0	5	5.2	0.40	0	3
Radionuclides															
Lead-210 (Bq/g)	0.005	0.0040	10	0.001	0.0005	3	5	0.001	0.00045	4	5	0.002	0.0010	0	3
Polonium-210 (Bq/g)	0.0015	0.00053	10	0.0007	0.00013	0	5	0.00074	0.00022	0	5	0.0015	0.00017	0	3
Radium-226 (Bq/g)	0.0019	0.00141	10	0.0029	0.00077	0	5	0.001	0.00059	0	5	0.0049	0.0024	0	3
Thorium-230 (Bq/g)	0.002	0.0005	10	0.002	-	5	5	0.001	-	5	5	0.00063	0.00023	2	3
Trace Elements															
Arsenic	0.05	-	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Cobalt	0.01	0.013	10	0.01	0	4	5	0.01	0.0055	0	5	0.02	0.010	1	3
Vanadium	0.1	-	10	0.1	-	5	5	0.1	-	5	5	0.1	-	3	3

Appendix A, Table 1

Summary blueberry chemistry results for the EARMP community program.

Chemical[1]	Camsell Portage										
	Baseline			2013				2014			
	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N
Metals											
Aluminum	7.0	0.57	5	7.1	0.39	0	5	11	2.25	0	3
Cadmium	0.01	-	5	0.01	-	5	5	0.01	-	3	3
Copper	3.2	0.39	5	2.2	0.09	0	5	3.7	0.17	0	3
Iron	12.1	3.68	5	10.0	1.87	0	5	16	1.00	0	3
Lead	0.02	0.013	5	0.02	0.008	1	5	0.01	0.0058	0	3
Molybdenum	0.1	0.05	5	0.2	0.04	0	5	0.2	0	0	3
Nickel	0.53	0.169	5	0.15	0.019	0	5	0.37	0.0173	0	3
Selenium	0.05	-	5	0.05	-	5	5	0.05	-	3	3
Uranium	0.02	0.031	5	0.01	-	5	5	0.01	0	0	3
Zinc	8.5	2.80	5	6.6	1.09		5	7.4	0.47	0	3
Radionuclides											
Lead-210 (Bq/g)	0.002	0.0013	5	0.007	0.0040	2	5	0.002	0	0	3
Polonium-210 (Bq/g)	0.0014	0.00027	5	0.0010	0	4	5	0.0014	0.00032	0	3
Radium-226 (Bq/g)	0.003	0.0012	5	0.0028	0.00084	0	5	0.003	0.00058	0	3
Thorium-230 (Bq/g)	0.001	-	5	0.002	-	5	5	0.001	-	3	3
Trace Elements											
Arsenic	0.05	-	5	0.05	-	5	5	0.05	-	3	3
Cobalt	0.01	0.004	5	0.01	-	5	5	0.01	0	2	3
Vanadium	0.1	-	5	0.1	-	5	5	0.1	-	3	3

Appendix A, Table 1

Summary blueberry chemistry results for the EARMP community program.

Chemical[1]	Fond du Lac														
	Baseline			2013				2014				2015			
	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N
Metals															
Aluminum	9.4	4.88	10	14.6	4.04	0	5	25	12.1	0	5	29	15.5	0	3
Cadmium	0.01	-	10	0.01	-	5	5	0.01	-	5	5	0.01	-	3	3
Copper	3.3	0.49	10	2.2	0.43	0	5	5.3	0.27	0	5	3.6	0.44	0	3
Iron	12.1	3.90	10	15.4	5.50	0	5	35	12.1	0	5	31	19.7	0	3
Lead	0.02	0.008	10	0.02	0.011	0	5	0.08	0.070	0	5	0.03	0.015	0	3
Molybdenum	0.3	0.13	10	0.3	0.05	0	5	0.5	0.08	0	5	0.3	0.06	0	3
Nickel	0.66	0.156	10	0.55	0.117	0	5	1.7	0.72	0	5	0.9	0.33	0	3
Selenium	0.06	0.011	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Uranium	0.01	0.003	10	0.01	-	5	5	0.01	0	1	5	0.01	-	3	3
Zinc	6.4	1.59	10	7.0	0.87	0	5	7.7	0.789	0	5	6.9	0.462	0	3
Radionuclides															
Lead-210 (Bq/g)	0.004	0.0040	10	0.004	0.0031	2	5	0.001	0	3	5	0.0037	0.00058	0	3
Polonium-210 (Bq/g)	0.0016	0.00092	10	0.0023	0.00246	1	5	0.0011	0.00043	0	5	0.0021	0.00110	0	3
Radium-226 (Bq/g)	0.003	0.0011	10	0.0042	0.0013	0	5	0.002	0.0014	1	5	0.0030	0.0008	0	3
Thorium-230 (Bq/g)	0.001	-	10	0.002	-	5	5	0.001	-	5	5	0.001	0.0009	2	3
Trace Elements															
Arsenic	0.05	-	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Cobalt	0.01	0.005	10	0.02	0.005	1	5	0.04	0.013	0	5	0.02	0.006	0	3
Vanadium	0.1	-	10	0.1	-	5	5	0.1	-	5	5	0.1	-	3	3

Appendix A, Table 1

Summary blueberry chemistry results for the EARMP community program.

Chemical[1]	Stony Rapids														
	Baseline			2013				2014				2015			
	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N
Metals															
Aluminum	14.7	10.21	10	244	43		5	8.9	0.856	0	5	16.5	6.384	0	3
Cadmium	0.01	0.003	10	0.01	-	5	5	0.01	-	5	5	0.01	-	3	3
Copper	2.5	0.49	10	2.4	0.25		5	4.3	0.19	0	5	3.4	0.21	0	3
Iron	14.9	7.18	10	10.6	0.91		5	14	0.837	0	5	17	3.46	0	3
Lead	0.03	0.028	10	0.01	0.004	3	5	0.01	0.0045	2	5	0.10	0.14	0	3
Molybdenum	0.2	0.11	10	0.1	0.04	2	5	0.2	0	0	5	0.1	0	2	3
Nickel	0.59	0.189	10	0.33	0.073		5	1.0	0.31	0	5	0.7	0.08	0	3
Selenium	0.05	0	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Uranium	0.01	0.004	10	0.01	-	5	5	0.01	0.0089	3	5	0.01	-	3	3
Zinc	4.7	1.05	10	6.3	0.75		5	5.5	0.378	0	5	5.4	0.20	0	3
Radionuclides															
Lead-210 (Bq/g)	0.008	0.0030	10	0.005	0.0013	4	5	0.001	0	3	5	0.002	0.00058	0	3
Polonium-210 (Bq/g)	0.002	0.0007	10	0.001	0	3	5	0.0006	0.00025	1	5	0.0013	0.00012	0	3
Radium-226 (Bq/g)	0.003	0.0017	10	0.014	0.0015		5	0.004	0.0048	0	5	0.003	0.0012	0	3
Thorium-230 (Bq/g)	0.002	-	10	0.002	-	5	5	0.001	-	5	5	0.001	0.0001	2	3
Trace Elements															
Arsenic	0.05	-	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Cobalt	0.02	0.019	10	0.01	-	5	5	0.03	0.038	1	5	0.01	0	2	3
Vanadium	0.1	-	10	0.1	-	5	5	0.1	-	5	5	0.1	-	3	3

Appendix A, Table 1

Summary blueberry chemistry results for the EARMP community program.

Chemical[1]	Uranium City							Wollaston Lake/Hatchet Lake														
	Baseline			2014				Baseline			2013				2014				2015			
	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N
Metals																						
Aluminum	5.9	1.6	5	9.3	1.65	0	3	12.5	7.77	10	7.0	0.32	0	5	11	0.837	0	5	19	7.94	0	3
Cadmium	0.01	-	5	0.01	-	3	3	0.01	-	10	0.01	-	5	5	0.01	-	5	5	0.01	-	3	3
Copper	3.5	0.4	5	4.1	0	0	3	2.8	0.51	10	1.8	0.21	0	5	4.5	0.152	0	5	3.5	0.15	0	3
Iron	10.3	1.3	5	14	0	0	3	13.3	5.51	10	9.4	0.55	0	5	17	0.548	0	5	20	7.57	0	3
Lead	0.012	0.0045	5	0.03	0.029	1	3	0.02	0.011	10	0.02	0.009	3	5	0.02	0.005	2	5	0.02	0.006	0	3
Molybdenum	0.2	0.1	5	0.2	0	0	3	0.1	0.07	10	0.1	0.04	3	5	0.4	0.05	0	5	0.1	0.06	0	3
Nickel	0.5	0.055	5	0.43	0.067	0	3	0.56	0.129	10	0.22	0.026	0	5	1.2	0.217	0	5	1.1	0.42	0	3
Selenium	0.05	-	5	0.05	-	3	3	0.05	0	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Uranium	0.01	-	5	0.01	0	2	3	0.01	0.003	10	0.01	-	5	5	0.01	0.0089	3	5	0.01	-	3	3
Zinc	5.8	0.9	5	6.5	0.153	0	3	5.7	1.54	10	5.9	0.45		5	7.5	0.335	0	5	6.6	0.53	0	3
Radionuclides																						
Lead-210 (Bq/g)	0.0062	0.008	5	0.003	0.0021	0	3	0.0050	0.00394	10	0.006	0.0043	2	5	0.001	0	4	5	0.002	0	1	3
Polonium-210 (Bq/g)	0.00276	0.0014	5	0.0030	0.00015	0	3	0.0022	0.00131	10	0.0012	0.00045	4	5	0.0007	0.00019	0	5	0.0013	0.00031	0	3
Radium-226 (Bq/g)	0.022	0.044	5	0.002	0.0013	0	3	0.003	0.0019	10	0.0064	0.0021	0	5	0.004	0.0011	0	5	0.005	0.0008	0	3
Thorium-230 (Bq/g)	0.0012	0.0004	5	0.001	-	3	3	0.0016	-	10	0.002	-	5	5	0.001	-	5	5	0.001	-	3	3
Trace Elements																						
Arsenic	0.05	-	5	0.05	-	3	3	0.05	-	10	0.05	-	5	5	0.05	-	5	5	0.05	-	3	3
Cobalt	0.012	0.004	5	0.03	0.029	2	3	0.01	0.003	10	0.01	0	3	5	0.08	0.085	0	5	0.02	0.012	0	3
Vanadium	0.1	-	5	0.1	-	3	3	0.1	-	10	0.1	-	5	5	0.1	-	5	5	0.1	-	3	3

[1]All concentrations are in µg/g on a dry weight basis, unless specified otherwise.

[2]Regional reference data are from the AWG program (2000 to 2010) and the Uranium City Country Foods program (2011). Data are not available from all communities in all years. The median corresponds to the 50th percentile, while the lower and upper limits are the 2.5th and 97.5th percentiles that delimit the 95% range of the reference data.

[3]Regional reference ranges could not be computed when all or nearly all values were lower than the method detection limit (MDL).

S.D. = Standard deviation; standard deviations of 0 signify "no variance between samples," not "a very small variance."

<MDL = less than the laboratory method detection limit.
Values less than the MDL were set equal to the MDL when calculating summary statistics.

Appendix A, Table 2

Summary bog cranberry chemistry results for the EARMP community program.

Chemical[1]	Regional Reference Range[2, 3]				Camsell Portage											
					Baseline			2014				2015				
	Lower Limit	Median	Upper Limit	N	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N
Metals															
Aluminum	6.5	21.1	79.9	18	17.6	1.3	5	16.5	-	0	2	19	2.5	0	3
Cadmium	<0.01	<0.01	0.03	18	0.01	0	5	0.01	-	2	2	0.01	0	1	3
Copper	2.4	3.7	5.7	55	4.4	0.5	5	4.2	-	0	2	4.3	0.50	0	3
Iron	8.4	12.1	87.6	55	10.1	0.5	5	14.5	-	0	2	14	2.1	0	3
Lead	<0.01	0.02	0.05	18	0.012	0.004	5	0.015	-	1	2	0.02	0.012	2	3
Molybdenum	<0.1	<0.1	0.2	55	0.14	0.05	5	0.1	-	2	2	0.2	0	0	3
Nickel	<0.1	0.35	0.79	55	0.49	0.10	5	0.53	-	0	2	0.38	0.029	0	3
Selenium	-	-	-	55	0.05	0	5	0.05	-	2	2	0.05	-	3	3
Uranium	0.001	0.003	0.029	37	0.012	0.004	5	0.01	-	1	2	0.02	0.017	2	3
Zinc	4.9	7.2	10.5	55	6.3	0.57	5	6.2	-	0	2	7.9	0.12	0	3
Radionuclides															
Lead-210 (Bq/g)	<0.0003	0.0015	0.0045	17	0.013	0.006	5	0.001	-	1	2	0.002	0	0	3
Polonium-210 (Bq/g)	-	-	-	0	0.0022	0.0008	5	0.0011	-	0	2	0.001	0.00006	0	3
Radium-226 (Bq/g)	<0.0003	0.0018	0.0100	55	0.0036	0.0017	5	0.0007	-	1	2	0.0013	0.00055	0	3
Thorium-230 (Bq/g)	-	-	-	0	0.002	0	5	0.001	-	2	2	0.001	-	3	3
Trace Elements															
Arsenic	-	-	-	55	0.05	0	5	0.05	-	2	2	0.05	-	3	3
Cobalt	<0.01	<0.01	0.02	18	0.01	0	5	0.01	-	0	2	0.02	0.006	0	3
Vanadium	-	-	-	55	0.1	0	5	0.1	-	2	2	0.1	-	3	3

Appendix A, Table 2

Summary bog cranberry chemistry results for the EARMP community program.

Chemical[1]	Regional Reference Range[2, 3]				Uranium City														
					Baseline			2013				2014				2015			
	Lower Limit	Median	Upper Limit	N	Average	S.D.	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N	Average	S.D.	<MDL	N
Metals																			
Aluminum	6.5	21.1	79.9	18	22	5.8	5	40	14.9	0	5	23	-	0	2	20	-	0	1
Cadmium	<0.01	<0.01	0.03	18	0.01	-	5	0.02	0.004	1	5	0.01	-	2	2	0.01	-	1	1
Copper	2.4	3.7	5.7	55	3.6	1.36	5	2.5	0.42	0	5	6.0	-	0	2	3.4	-	0	1
Iron	8.4	12.1	87.6	55	15	3.9	5	18	7.2	0	5	13	-	0	2	12	-	0	1
Lead	<0.01	0.02	0.05	18	0.01	0.004	5	0.06	0.078	0	5	0.04	-	0	2	0.02	-	0	1
Molybdenum	<0.1	<0.1	0.2	55	0.1	-	5	0.1	0	1	5	0.2	-	0	2	0.1	-	0	1
Nickel	<0.1	0.35	0.79	55	0.62	0.33	5	0.34	0.105	0	5	0.59	-	0	2	0.74	-	0	1
Selenium	-	-	-	55	0.05	-	5	0.05	-	5	5	0.05	-	2	2	0.05	-	1	1
Uranium	0.001	0.003	0.029	37	0.01	0.004	5	0.01	0.009	4	5	0.02	-	1	2	0.01	-	1	1
Zinc	4.9	7.2	10.5	55	6.8	1.45	5	7.5	0.80	0	5	6.7	-	0	2	5.3	-	0	1
Radionuclides																			
Lead-210 (Bq/g)	<0.0003	0.0015	0.0045	17	0.010	0.0055	5	0.007	0.0053	3	5	0.004	-	0	2	0.003	-	0	1
Polonium-210 (Bq/g)	-	-	-	0	0.005	0.0045	5	0.001	0.0004	1	5	0.0038	-	0	2	0.0027	-	0	1
Radium-226 (Bq/g)	<0.0003	0.0018	0.0100	55	0.002	0.0026	5	0.0022	0.0008	1	5	0.003	-	0	2	0.003	-	0	1
Thorium-230 (Bq/g)	-	-	-	0	0.002	-	5	0.002	-	5	5	0.001	-	2	2	0.001	-	1	1
Trace Elements																			
Arsenic	-	-	-	55	0.05	-	5	0.05	-	5	5	0.05	-	2	2	0.05	-	1	1
Cobalt	<0.01	<0.01	0.02	18	0.04	0.054	5	0.02	0.004	0	5	0.05	-	0	2	0.01	-	1	1
Vanadium	-	-	-	55	0.1	-	5	0.1	-	5	5	0.1	-	2	2	0.1	-	1	1

[1]All concentrations are in µg/g on a dry weight basis, unless specified otherwise.

[2]Regional reference data are from the AWG program (2000 to 2010) and the Uranium City Country Foods program (2011). Data are not available from all communities in all years. The median corresponds to the 50th percentile, while the lower and upper limits are the 2.5th and 97.5th percentiles that delimit the 95% range of the reference data.

[3]Regional reference ranges could not be computed when all or nearly all values were lower than the method detection limit (MDL).

S.D. = Standard deviation; standard deviations of 0 signify "no variance between samples," not "a very small variance," when less than three samples were collected, S.D. was not computed.

<MDL = less than the laboratory method detection limit.

Values less than the MDL were set equal to the MDL when calculating summary statistics.

Appendix A, Table 3

Summary barren-ground caribou flesh chemistry results for the EARMP community program.

Chemical[1]	Regional Reference Range[2, 3]			
	Lower Limit	Median	Upper Limit	N
Metals				
Aluminum	0.02	0.3	1.1	11
Cadmium	0.002	0.004	0.010	13
Copper	1.7	2.9	4.9	30
Iron	25	39	62	32
Lead	0.003	0.003	0.389	13
Molybdenum	-	-	-	-
Nickel	0.01	0.02	0.04	32
Selenium	0.06	0.28	0.69	32
Uranium	0.001	0.001	0.003	32
Zinc	9	29	55	32
Radionuclides				
Lead-210 (Bq/g)	0.001	0.001	0.003	32
Polonium-210 (Bq/g)				
Radium-226 (Bq/g)	0.00003	0.00006	0.00011	25
Thorium-230 (Bq/g)	-	-	-	-
Trace Elements				
Arsenic	0.01	0.04	0.18	32
Cobalt	0.001	0.004	0.009	13
Vanadium	-	-	-	-

Appendix A, Table 3

Summary barren-ground caribou flesh chemistry results for the EARMP community program.

Chemical[1]	Black Lake													
	Baseline			2013/2014				2014/2015						
	Average	S.D.	N	Average	S.D.	< MDL	N	1	2	3	4	5	Average	S.D.
Metals														
Aluminum	0.5	0	10	0.7	0.30	2	5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	-
Cadmium	0.003	0.0015	10	0.003	0.0013	1	5	0.002	<0.002	<0.002	<0.002	<0.002	0.002	-
Copper	3.3	0.54	10	3.6	0.96	0	5	4.9	3.5	4.6	4.8	2.5	4.1	1.04
Iron	41	6.6	10	47	9.1	0	5	46	32	53	48	37	43	8.5
Lead	0.084	0.1688	10	0.120	0.2460	1	5	0.015	0.009	0.007	0.005	0.006	0.008	0.0040
Molybdenum	0.02	-	10	0.02	-	5	5	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	-
Nickel	0.01	0.005	10	0.01	-	5	5	0.01	0.01	<0.01	0.04	0.04	0.02	0.016
Selenium	0.19	0.034	10	0.20	0.036	0	5	0.22	0.18	0.24	0.22	0.18	0.21	0.027
Uranium	0.001	0	10	0.001	-	5	5	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	-
Zinc	26	6.2	10	23	4.4	0	5	14	23	15	15	46	23	13.6
Radionuclides														
Lead-210 (Bq/g)	0.001	0	10	0.001	-	5	5	0.002	<0.001	<0.001	<0.001	0.001	0.001	-
Polonium-210 (Bq/g)	0.008	0.0032	10	0.015	0.0044	0	5	0.019	0.014	0.015	0.016	0.013	0.015	0.0023
Radium-226 (Bq/g)	0.0028	0.00305	10	0.00016	0.00013	2	5	0.0002	0.0002	<0.00008	0.0001	<0.00006	0.0001	0.00007
Thorium-230 (Bq/g)	0.0001	-	10	0.0001	-	5	5	<0.0002	<0.0001	<0.0002	<0.0001	<0.0001	0.0001	0.00005
Trace Elements														
Arsenic	0.02	0.008	10	0.01	0	2	5	0.02	0.03	0.02	0.04	0.02	0.03	0.009
Cobalt	0.004	0.0015	10	0.002	0	3	5	0.009	0.006	0.009	0.008	0.016	0.010	0.0038
Vanadium	0.02	-	10	0.02	-	5	5	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	-

Appendix A, Table 3

Summary barren-ground caribou flesh chemistry results for the EARMP community program.

Chemical[1]	Fond du Lac															
	Baseline			2014/2015				2014/2015				2015/2016			
	Average	S.D.	N	Average	S.D.	< MDL	N	Average	S.D.	< MDL	N	1	2	Average	S.D.
Metals															
Aluminum	0.5	-	11	0.5	0	4	5	0.5	0.06	2	3	<0.5	<0.5	0.5	-
Cadmium	0.015	0.0414	11	0.003	0.0010	1	5	0.005	0.0023	0	3	0.009	0.011	0.010	-
Copper	3.2	0.84	11	3.9	0.71	0	5	2.7	0.80	0	3	2.3	3.3	2.8	-
Iron	39	8.0	11	43	9.2	0	5	40	6.4	0	3	41	43	42	-
Lead	0.005	0.0038	11	0.002	0.0004	3	5	0.003	0.0012	2	3	<0.002	0.012	0.007	-
Molybdenum	0.02	-	11	0.02	-	5	5	0.02	-	3	3	<0.02	<0.02	0.02	-
Nickel	0.02	0.021	11	0.01	-	5	5	0.01	0	2	3	<0.01	<0.01	0.01	-
Selenium	0.17	0.060	11	0.19	0.021	0	5	0.17	0.015	0	3	0.15	0.16	0.16	-
Uranium	0.001	0.0004	11	0.001	-	5	5	0.001	-	3	3	<0.001	<0.001	0.001	-
Zinc	30	17.8	11	26	3.2	0	5	36	19.9	0	3	46	25	36	-
Radionuclides															
Lead-210 (Bq/g)	0.002	0.0021	11	0.001	-	5	5	0.001	-	3	3	<0.001	<0.001	0.001	-
Polonium-210 (Bq/g)	0.0120	0.00568	11	0.0118	0.00148	0	5	0.0075	0.00045	0	3	0.0014	0.0018	0.0016	-
Radium-226 (Bq/g)	0.00008	0.000043	11	0.00007	0.000009	3	5	0.00007	0.000012	2	3	0.0001	0.00006	0.00008	-
Thorium-230 (Bq/g)	0.0001	0.00007	11	0.0001	-	5	5	0.0001	-	3	3	<0.0001	<0.0001	0.0001	-
Trace Elements															
Arsenic	0.01	0.005	11	0.01	0.009	4	5	0.01	0	1	3	0.01	0.01	0.01	-
Cobalt	0.005	0.0032	11	0.004	0.0012	1	5	0.005	0.0012	0	3	0.005	0.004	0.005	-
Vanadium	0.02	-	11	0.02	-	5	5	0.02	-	3	3	<0.02	<0.02	0.02	-

Appendix A, Table 3

Summary barren-ground caribou flesh chemistry results for the EARMP community program.

Chemical[1]	Stony Rapids													
	Baseline			2013/2014				2014/2015						
	Average	S.D.	N	Average	S.D.	< MDL	N	1	2	3	4	5	Average	S.D.
Metals														
Aluminum	0.6	0.31	8	0.5	-	3	3	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	-
Cadmium	0.003	0.0008	8	0.004	0.0035	1	3	0.007	<0.002	<0.002	0.006	0.003	0.004	0.0021
Copper	4.1	0.56	8	2.5	0.81	0	3	2.4	4.3	3.6	3.8	3.5	3.5	0.62
Iron	52	3.7	8	39	1.2	0	3	34	43	46	47	50	44	5.5
Lead	0.017	0.0272	8	0.030	0.0236	0	3	0.004	0.002	<0.002	0.009	<0.002	0.004	0.0027
Molybdenum	0.02	-	8	0.020	-	3	3	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	-
Nickel	0.01	0	8	0.08	0.087	1	3	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	-
Selenium	0.22	0.022	8	0.14	0.025	0	3	0.17	0.18	0.22	0.20	0.19	0.19	0.017
Uranium	0.001	0.0004	8	0.001	-	3	3	0.002	<0.001	<0.001	<0.001	<0.001	0.001	0.0004
Zinc	19	6.5	8	35	16.1	0	3	41	15	15	18	20	22	9.8
Radionuclides														
Lead-210 (Bq/g)	0.001	0.0004	8	0.001	0.0006	2	3	<0.001	<0.001	0.001	<0.001	<0.001	0.001	-
Polonium-210 (Bq/g)	0.013	0.0123	8	0.008	0.0021	0	3	0.013	0.017	0.025	0.033	0.02	0.022	0.0069
Radium-226 (Bq/g)	0.001	0.0005	8	0.00006	-	3	3	<0.00007	0.0001	0.00008	<0.00007	0.0001	0.00008	0.000014
Thorium-230 (Bq/g)	0.002	-	8	0.0001	-	3	3	<0.0001	<0.0002	<0.0002	<0.0001	<0.0002	0.0002	-
Trace Elements														
Arsenic	0.01	0.004	8	0.02	0.010	0	3	0.02	0.02	0.03	0.02	0.01	0.02	0.006
Cobalt	0.004	0.0012	8	0.003	0.0010	0	3	0.005	0.004	0.002	0.005	0.004	0.004	0.0011
Vanadium	0.02	-	8	<0.02	-	3	3	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	-

Appendix A, Table 3

Summary barren-ground caribou flesh chemistry results for the EARMP community program.

Chemical[1]	Wollaston Lake/Hatchet Lake												
	Baseline			2013/2014				2014/2015					
	Average	S.D.	N	Average	S.D.	< MDL	N	1	2	3	4	Average	S.D.
Metals													
Aluminum	0.52	0.063	10	0.5	0.04	4	5	<0.5	<0.5	<0.5	<0.5	0.5	-
Cadmium	0.004	0.0023	10	0.002	0.0004	0	5	0.003	0.003	0.005	0.027	0.010	0.012
Copper	3.2	0.68	10	3.3	0.59	0	5	3.1	3	2.8	3.9	3.2	0.48
Iron	41	10.9	10	39	9.2	0	5	42	36	27	52	39	10.5
Lead	0.015	0.0183	10	0.003	0.0013	3	5	<0.002	1.1	<0.002	<0.002	0.28	0.549
Molybdenum	0.02	-	10	0.02	-	5	5	<0.02	<0.02	<0.02	<0.02	0.02	-
Nickel	0.01	0.003	10	0.01	-	5	5	<0.01	<0.01	<0.01	<0.01	0.01	-
Selenium	0.16	0.026	10	0.18	0.032	0	5	0.14	0.16	0.16	0.19	0.16	0.021
Uranium	0.001	-	10	0.001	-	5	5	<0.001	<0.001	<0.001	<0.001	0.001	-
Zinc	29	11.6	10	18	3.8	0	5	33	29	23	19	26	6.2
Radionuclides													
Lead-210 (Bq/g)	0.001	0.0003	10	0.001	-	5	5	<0.001	<0.001	<0.001	<0.001	0.001	-
Polonium-210 (Bq/g)	0.0132	0.00289	10	0.0109	0.00324	0	5	0.0079	0.0072	0.0047	0.0053	0.0063	0.00152
Radium-226 (Bq/g)	0.00007	0.000014	10	0.0001	0.00006	3	5	<0.00006	<0.00005	<0.00006	0.0001	0.00007	0.000022
Thorium-230 (Bq/g)	0.0001	-	10	0.0001	0.00005	5	5	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	-
Trace Elements													
Arsenic	0.01	0.005	10	0.01	0.005	2	5	<0.01	0.01	0.02	<0.01	0.01	0.005
Cobalt	0.005	0.0017	10	0.004	0.0015	1	5	0.017	0.006	0.003	0.008	0.009	0.0060
Vanadium	0.02	-	10	0.02	-	5	5	<0.02	<0.02	<0.02	<0.02	0.02	-

[1]All concentrations are reported in µg/g wet weight basis, except when specified otherwise.

[2]Regional reference data are from the AWG program (2000 to 2010) and the Uranium City Country Foods program (2011). Data are not available from all communities in all years. The median corresponds to the 50th percentile, while the lower and upper limits are the 2.5th and 97.5th percentiles that delimit the 95% range of the reference data.

[3]Regional reference ranges could not be computed when all or nearly all values were lower than the method detection limit (MDL).

S.D. = Standard deviation; standard deviations of 0 signify "no variance between samples," not "a very small variance."

<MDL = less than the laboratory method detection limit.

Values less than the MDL were set equal to the MDL when calculating summary statistics.

Appendix A, Table 4

Summary moose flesh chemistry results for the EARMP community program.

Chemical[1]	Regional Reference Range[2, 3]				Camsell Portage											
					Baseline			2013/2014			2014/2015			2015/2016		
	Lower Limit	Median	Upper Limit	N	Average	S.D.	N	1	2	Average	1	2	Average	1	2	Average
Metals																
Aluminum	0.2	0.5	10.9	40	2.2	1.48	4	<0.5	<0.5	0.5	0.6	4.4	2.5	5.1	0.5	2.8
Cadmium	0.002	0.004	0.014	10	0.003	0.0020	4	0.002	0.003	0.003	0.003	0.05	0.03	0.005	0.004	0.0045
Copper	0.7	1.3	2.1	40	1.7	0.34	4	1.5	1.8	1.7	0.56	1.4	0.98	0.93	1.4	1.17
Iron	14	30	53	40	25	3.27	4	29	34	32	22	32	27	29	29	29
Lead	0.002	0.010	0.032	10	0.010	0.0095	4	0.004	<0.002	0.003	0.029	0.011	0.020	0.004	<0.002	0.003
Molybdenum	-	-	-	-	0.02	-	4	<0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.02
Nickel	0.01	0.01	0.10	38	0.02	0.006	4	<0.01	<0.01	0.01	<0.01	<0.01	0.01	0.02	<0.01	0.015
Selenium	0.05	0.23	0.53	37	0.12	0.059	4	0.06	0.06	0.06	0.08	0.08	0.08	0.17	0.13	0.15
Uranium	0.001	0.001	0.011	36	0.001	-	4	<0.001	<0.001	0.001	<0.001	0.002	0.002	0.002	<0.001	0.0015
Zinc	19	48	79	40	39	10.4	4	59	45	52	63	58	61	61	48	54.5
Radionuclides																
Lead-210 (Bq/g)	0.0001	0.0002	0.0013	35	0.0008	-	4	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001
Polonium-210 (Bq/g)	-	-	-	-	0.0009	0.00090	3	0.0004	<0.0002	0.0003	0.0004	<0.0002	0.0003	0.0011	0.0005	0.0008
Radium-226 (Bq/g)	0.00005	0.00005	0.00009	35	0.00010	0.000066	4	0.00006	0.00007	0.00007	<0.00006	<0.00006	0.00006	0.00005	0.00008	0.00007
Thorium-230 (Bq/g)	-	-	-	-	0.0001	0.00006	3	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.00009	<0.0001	0.00010
Trace Elements																
Arsenic	0.01	0.02	0.21	37	0.01	-	4	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01
Cobalt	0.007	0.015	0.031	10	0.014	0.0054	4	0.012	0.015	0.014	0.02	0.016	0.018	0.015	0.006	0.011
Vanadium	-	-	-	-	0.02	-	4	<0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.02

Appendix A, Table 4

Summary moose flesh chemistry results for the EARMP community program.

Chemical[1]	Uranium City									
	Baseline			2013/2014					2014/2015	2015/2016
	Average	S.D.	N	1	2	3	Average	S.D.	1	1
Metals										
Aluminum	0.8	0.76	7	<0.5	0.6	<0.5	0.5	0.1	0.6	<0.5
Cadmium	0.005	0.0030	7	0.004	0.005	0.003	0.004	0.0010	0.056	0.018
Copper	1.8	0.92	7	1.6	2.0	1.5	1.7	0.26	1.9	1.5
Iron	33	6.9	7	34	37	26	32	5.7	36	33
Lead	0.003	0.0012	7	0.003	0.025	0.003	0.010	0.0127	0.003	0.002
Molybdenum	0.02	-	7	<0.02	<0.02	<0.02	0.02	-	<0.02	<0.02
Nickel	0.01	0.005	7	<0.01	<0.01	<0.01	0.01	-	<0.01	<0.01
Selenium	0.12	0.034	7	0.09	0.12	0.08	0.10	0.021	0.14	0.08
Uranium	0.001	0.0008	7	<0.001	<0.001	<0.001	0.001	-	<0.001	<0.001
Zinc	52	13.0	7	44	48	56	49	6.1	52	52
Radionuclides										
Lead-210 (Bq/g)	0.0007	0.00075	7	<0.001	<0.001	<0.001	0.001	-	<0.001	<0.001
Polonium-210 (Bq/g)	0.0006	0.00076	7	0.0004	0.0005	0.0003	0.0004	0.00010	0.0016	0.001
Radium-226 (Bq/g)	0.00007	-	7	0.00008	0.00010	<0.00005	0.00008	0.000025	<0.00005	0.00006
Thorium-230 (Bq/g)	0.0001	0.00005	7	<0.0001	<0.0001	<0.0001	0.0001	-	<0.0001	<0.0001
Trace Elements										
Arsenic	0.01	0	7	<0.01	<0.01	<0.01	0.01	-	<0.01	<0.01
Cobalt	0.012	0.0047	7	0.010	0.011	0.008	0.010	0.0015	0.009	0.044
Vanadium	0.02	-	7	<0.02	<0.02	<0.02	0.02	-	<0.02	<0.02

[1]All concentrations are reported in µg/g wet weight basis, except when specified otherwise.

[2]Regional reference data are from the AWG program. Data used are from 2000 to 2010. However, data are not available from all communities in all years.

[3]Regional reference ranges could not be computed when all or nearly all values were lower than the method detection limit (MDL).

S.D. = Standard deviation; standard deviations of 0 signify "no variance between samples," not "a very small variance."

<MDL = less than the laboratory method detection limit.

Values less than the MDL were set equal to the MDL when calculating summary statistics.

Appendix A, Table 5

Summary of additional mammal chemistry (snowshoe hare) collected from Uranium City and Camsell Portage, 2013/2014.

Chemical[1]	Camsell Portage						Uranium City				
	Baseline[2]			2013/2014			Baseline[2]			2013/2014	
	Average	S.D.	N	1	2	3	Average	S.D	N	1	2
Metals											
Aluminum	0.5	0.04	5	<0.5	<0.5	<0.5	0.5	0.04	5	<0.5	0.5
Cadmium	0.002	-	5	<0.002	0.004	0.006	0.004	0.0033	5	<0.002	0.0050
Copper	1.8	0.38	5	1.9	2.1	1.8	1.8	0.37	5	2.4	2.10
Iron	26	6.6	5	19	25	20	26	3.6	5	21	31.0
Lead	0.003	0.0005	5	0.003	0.002	0.002	0.003	0.0017	5	0.002	<0.002
Molybdenum	0.02	-	5	<0.02	<0.02	<0.02	0.02	-	5	<0.02	<0.02
Nickel	0.01	0	5	<0.01	<0.01	0.07	0.02	0.009	5	0.02	0.050
Selenium	0.06	0.012	5	0.03	0.08	0.14	0.06	0.044	5	0.15	0.070
Uranium	0.001	-	5	<0.001	<0.001	<0.001	0.001	-	5	<0.001	<0.001
Zinc	13	3.2	5	13	11	16	15	4.7	5	10	16.0
Radionuclides											
Lead-210 (Bq/g)	0.001	-	5	<0.001	<0.001	<0.001	0.001	-	5	<0.001	<0.001
Polonium-210 (Bq/g)	0.002	0.0007	5	0.002	0.002	0.002	0.002	0.0004	5	0.002	0.00150
Radium-226 (Bq/g)	0.00017	0.000097	5	0.00010	<0.00006	0.00010	0.00011	0.000050	5	0.00010	<0.00007
Thorium-230 (Bq/g)	0.0001	-	5	<0.0001	<0.0001	<0.0001	0.0001	-	5	<0.0002	<0.0001
Trace Elements											
Arsenic	0.01	-	5	<0.01	<0.01	<0.01	0.01	-	5	0.02	<0.01
Cobalt	0.004	0.0008	5	<0.002	0.005	0.032	0.006	0.0027	5	0.005	0.0040
Vanadium	0.02	-	5	<0.02	<0.02	<0.02	0.02	-	5	<0.02	<0.02

[1]All concentrations are reported in µg/g wet weight basis, except when specified otherwise.

[2]Baseline data for snowshoe hare were collected in 2011 as part of the Uranium City County Foods Program (CanNorth and SENES 2012). Values less than MDLs were set equal to MDLs for the calculation of average and standard deviations.

S.D. = Standard deviation; standard deviations of 0 signify "no variance between samples," not "a very small variance."

<MDL = less than the laboratory method detection limit.

Appendix A, Table 6

Summary barren-ground caribou and moose organ chemistry results for the EARMP community program, 2014/2015 and 2015/2016.

2014/2015 Sampling Year										
Chemical[1]	Fond du Lac			Uranium City		Camsell Portage				Wollaston Lake
	Caribou Kidney			Moose Liver	Moose Kidney	Moose Liver		Moose Kidney		Caribou Liver
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 1	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1
Metals										
Aluminum	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	1.1	<0.5	1.2	0.7
Cadmium	6.2	9.6	6.8	0.48	8	1.7	1.1	8.6	6.5	0.65
Copper	3.6	4.9	4.3	28	3	38	47	2.1	3.8	26
Iron	40	60	60	120	41	100	150	70	90	140
Lead	0.073	0.068	0.078	0.008	0.002	<0.002	0.003	<0.002	0.002	0.097
Molybdenum	0.12	0.11	0.14	0.65	0.24	0.9	1	0.21	0.42	1
Nickel	<0.01	0.01	0.01	<0.01	0.04	<0.01	<0.01	0.05	0.06	<0.01
Selenium	1.3	1.6	1.4	0.2	0.67	0.22	0.21	0.71	0.78	0.4
Uranium	<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.01	<0.001	<0.001	<0.01
Zinc	23	28	27	14	25	15	20	16	23	24
Radionuclides										
Lead-210 (Bq/g)	0.072	0.054	0.042	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.088	0.081	0.086	0.0021	0.0032	0.0036	0.0024	0.0018	0.0023	0.0093
Radium-226 (Bq/g)	0.0003	0.0009	0.0005	0.00007	<0.00006	0.0001	<0.0001	<0.00006	0.0005	0.0002
Thorium-230 (Bq/g)	<0.0003	<0.0006	<0.0005	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0004	<0.0001
Trace Elements										
Arsenic	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
Cobalt	0.029	0.044	0.046	0.054	0.097	0.25	0.2	0.12	0.2	0.075
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Appendix A, Table 6

Summary barren-ground caribou and moose organ chemistry results for the EARMP community program, 2014/2015 and 2015/2016.

2015/2016 Sampling Year								
Chemical[1]	Black Lake	Fond du Lac		Uranium City		Camsell Portage		
	Caribou Kidney			Moose Live	Moose Kidney	Moose Liver	Moose Kidney	
	Sample 1	Sample 1	Sample 2	Sample 1	Sample 1	Sample 1	Sample 1	Sample 2
Metals								
Aluminum	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Cadmium	6.9	10	7.3	0.054	20	0.66	6.8	4.9
Copper	5	4.4	3.6	0.55	2.2	15	3.8	2.6
Iron	37	28	40	680	33	160	52	30
Lead	0.07	0.12	0.089	<0.002	<0.002	0.003	<0.002	0.004
Molybdenum	0.15	0.16	0.12	<0.02	0.17	1.1	0.45	0.25
Nickel	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.03	0.04
Selenium	1	1.2	1.1	0.18	0.53	0.92	1.2	0.78
Uranium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	24	26	25	15	24	20	26	20
Radionuclides								
Lead-210 (Bq/g)	0.049	0.077	0.073	0.002	0.002	0.001	0.002	0.002
Polonium-210 (Bq/g)	0.064	0.083	0.066	0.0018	0.0037	0.026	0.027	0.0076
Radium-226 (Bq/g)	0.0005	0.0003	0.0003	0.0003	0.00007	0.0002	0.00010	0.0003
Thorium-230 (Bq/g)	<0.0003	0.0005	<0.0003	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001
Trace Elements								
Arsenic	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	0.035	0.036	0.025	0.068	0.25	0.18	0.18	0.058
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

[1]All concentrations are reported in µg/g wet weight basis, unless specified otherwise.

APPENDIX B

DETAILED DATA ANALYSIS

LIST OF TABLES

APPENDIX B, TABLE 1

Detailed blueberry chemistry results for the EARMP community program, 2011 to 2015.

Chemical[1]	Black Lake																						
	2011					2012					2013					2014					2015		
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3
Metals																							
Aluminum	6	8.6	7.9	8.6	6	13	6	7.1	7.9	7.7	11	7.1	11	8.9	7.8	19	16	12	12	12	45	19	5.7
Barium	12	15	13	11	15	13	14	17	15	15	11	12	14	14	7	21	18	24	22	24	14	15	12
Boron	6	5	5	3	5	6	8	5	5	7	8	4	7	5	13	4	4	4	4	4	4	4	6
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	3.3	3.2	2.5	2.6	3.1	2.8	3.8	3.5	3.4	3.8	3.2	1.8	1.8	1.8	1.6	3.7	3.6	4	3.6	4	3.5	3.4	3.4
Iron	8.4	11	8.6	11	10	20	10	8.1	8.8	9.8	10	6	8	8	5	31	21	18	18	17	51	22	10
Lead	0.07	0.02	0.02	0.07	<0.01	0.03	<0.01	<0.01	0.02	<0.01	0.02	0.02	<0.01	0.02	<0.01	0.03	0.03	0.02	0.02	<0.01	0.02	0.01	<0.01
Manganese	160	130	120	180	220	100	100	170	170	120	160	220	200	250	160	220	200	89	98	83	300	390	200
Molybdenum	0.2	0.2	0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.2	0.1	<0.1	<0.1	<0.1	0.2	0.2	0.2	0.2	0.1	0.1
Nickel	0.66	0.68	0.54	0.56	0.38	0.32	0.56	0.58	0.66	0.54	0.58	0.38	0.41	0.37	0.34	0.47	0.55	0.78	0.59	0.72	0.69	0.6	0.28
Selenium	<0.05	0.08	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	<0.05	0.08	0.06	0.1	0.15	0.1	0.05	0.05	0.08	<0.05	0.11	<0.05	0.12	0.07	0.06	0.69	0.52	0.23	0.22	0.34	3.4	0.98	0.2
Uranium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	0.03	0.02	0.02	<0.01	<0.01	<0.01
Zinc	4.8	6.1	5	3.9	5.5	3.9	6.1	6	5.3	6.4	5.8	6.2	6.7	7	3.6	8.8	7.1	6.2	5.7	5.7	5.6	5.1	4.8
Physical Properties																							
Moisture (%)	86.24	86.69	85.12	86.04	87.39	86.19	85.89	84.95	84.99	84.86	84.23	83.47	84.32	83.26	84.73	85.74	85.93	87.13	86.97	87.28	85.47	85.47	84.86
Radionuclides																							
Lead-210 (Bq/g)	0.009	0.005	0.007	0.009	0.012	0.002	0.002	<0.001	0.002	<0.001	0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.003	0.001	0.002
Polonium-210 (Bq/g)	0.001	0.002	0.001	0.002	<0.0009	0.0015	0.002	0.0024	0.0014	0.0012	0.0008	0.0008	0.0005	0.0008	0.0008	0.0007	0.0007	0.0011	0.0005	0.0007	0.0017	0.0014	0.0014
Radium-226 (Bq/g)	0.002	0.004	0.004	0.002	0.002	<0.00003	0.0012	<0.00003	0.0028	0.001	0.0025	0.0042	0.0029	0.0028	0.0022	0.002	0.0008	0.001	0.001	0.002	0.0059	0.0066	0.0022
Thorium-230 (Bq/g)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.0009	<0.0005	<0.0005
Trace Elements																							
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	0.05	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.02	<0.01
Strontium	2.1	4.4	3.5	2.1	1.2	1.1	1.7	1.7	2	1.8	1.7	1.8	3	2	2	3.7	3.6	11	9.8	9.9	1.5	1.6	0.9
Vanadium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

APPENDIX B, TABLE 1

Detailed blueberry chemistry results for the EARMP community program, 2011 to 2015.

Chemical[1]	Camsell Portage												
	2012					2013					2014		
	1	2	3	4	5	1	2	3	4	5	1	2	3
Metals													
Aluminum	7.2	7.3	7	7.4	6	6.8	7.7	6.7	7.1	7.2	10	13	8.6
Barium	12	24	20	22	20	11	13	12	12	13	22	24	20
Boron	5	8	8	8	6	4	4	4	4	4	5	6	5
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	3.5	3	3.4	3.5	2.6	2.2	2.2	2.2	2.2	2.4	3.8	3.8	3.5
Iron	11	8.7	9.7	18	13	8	10	10	13	9	15	17	16
Lead	<0.01	0.04	<0.01	<0.01	<0.01	0.03	0.02	0.03	<0.01	0.02	0.01	0.02	0.01
Manganese	280	490	490	480	580	350	390	360	380	360	430	470	370
Molybdenum	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel	0.44	0.37	0.6	0.79	0.44	0.12	0.17	0.16	0.14	0.14	0.36	0.36	0.39
Selenium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	0.15	0.21	0.14
Uranium	0.01	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01
Zinc	13	6.5	8.9	8	5.9	6	6.7	5.6	8.4	6.2	7.6	7.8	6.9
Physical Properties													
Moisture (%)	83.98	85.16	84.30	84.62	85.57	84.78	84.99	84.99	84.76	84.82	84.37	84.9	83.77
Radionuclides													
Lead-210 (Bq/g)	0.001	0.004	<0.001	0.001	0.002	<0.004	0.013	0.004	0.008	<0.004	0.002	0.002	0.002
Polonium-210 (Bq/g)	0.0014	0.0017	0.0013	0.001	0.0016	<0.001	0.001	<0.001	<0.001	<0.001	0.002	0.001	0.001
Radium-226 (Bq/g)	0.0025	0.0028	0.0025	0.0049	0.0045	0.003	0.002	0.002	0.004	0.003	0.003	0.004	0.003
Thorium-230 (Bq/g)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.0009	<0.001
Trace Elements													
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Strontium	1.4	1.4	1.4	1.6	1.5	0.9	1	1	1	1.1	1.9	1.8	2
Vanadium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

APPENDIX B, TABLE 1

Detailed blueberry chemistry results for the EARMP community program, 2011 to 2013.

Chemical[1]	Fond du Lac																						
	2011					2012					2013					2014					2015		
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3
Metals																							
Aluminum	4.4	9.5	6.2	7	6.2	14	20	7.3	13	5.9	10	21	13	14	15	29	13	33	12	39	47	18	23
Barium	12	12	13	13	12	12	9.9	14	11	11	14	14	16	18	15	20	16	22	14	29	18	14	18
Boron	8	6	7	8	6	14	6	5	8	5	6	4	5	4	6	6	7	6	5	7	5	5	6
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	2.7	3	3.6	3.2	3.9	2.8	3.9	3.3	3.9	2.8	1.8	2.4	2.8	1.8	2.1	5.2	5	5.6	5.2	5.6	3.9	3.8	3.1
Iron	10	8.2	9.7	11	9.3	14	21	12	16	10	10	23	17	17	10	48	23	40	22	44	54	18	22
Lead	<0.01	0.02	<0.01	0.03	0.01	0.03	0.01	<0.01	0.01	<0.01	0.04	0.02	0.02	0.01	0.02	0.02	0.03	0.17	0.14	0.04	0.04	0.01	0.03
Manganese	140	150	140	140	130	280	460	240	370	310	460	410	660	700	460	400	380	400	390	390	290	340	480
Molybdenum	0.4	0.2	0.4	0.4	0.4	0.2	0.2	<0.1	0.2	<0.1	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.6	0.4	0.6	0.3	0.3	0.2
Nickel	0.97	0.67	0.75	0.8	0.74	0.48	0.55	0.54	0.6	0.5	0.4	0.7	0.62	0.53	0.48	2.2	0.89	2.3	0.89	2.1	1.3	0.69	0.77
Selenium	<0.05	<0.05	<0.05	0.08	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.05
Titanium	<0.05	0.08	0.08	0.08	0.1	0.35	0.88	0.07	0.42	0.05	0.21	0.86	0.43	0.4	0.21	1.5	0.46	2	0.33	1.7	3.3	0.76	0.77
Uranium	<0.01	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01
Zinc	5.6	6	7.5	7	7.1	4.4	5.1	10	5.4	5.8	6.7	6.2	7.1	8.4	6.4	7.7	7.7	8.6	6.5	8.2	6.6	6.6	7.4
Physical Properties																							
Moisture (%)	87.10	85.50	86.68	84.60	86.31	83.99	83.87	84.56	83.79	84.11	84.33	83.47	84.18	84.47	83.71	84.83	82.79	84.76	82.2	84.79	86.12	86.14	86.17
Radionuclides																							
Lead-210 (Bq/g)	<0.004	0.007	0.01	0.011	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.004	0.002	<0.001	0.009	0.005	<0.001	<0.001	0.001	0.001	<0.001	0.003	0.004	0.004
Polonium-210 (Bq/g)	0.001	0.002	0.001	0.004	0.002	0.0012	0.0009	0.0015	0.0012	0.0014	0.001	0.0066	0.0008	0.002	<0.001	0.001	0.001	0.0008	0.0007	0.0018	0.001	0.0021	0.0032
Radium-226 (Bq/g)	0.002	0.004	0.003	0.001	0.005	0.0023	0.0018	0.0026	0.0021	0.0026	0.003	0.0033	0.0038	0.006	0.005	0.001	0.004	<0.0005	0.002	0.003	0.0022	0.0031	0.0038
Thorium-230 (Bq/g)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0004	<0.001	<0.0003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0009	<0.0009	<0.0009	0.002	<0.0005	<0.0005
Trace Elements																							
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	0.02	0.02	0.02	0.01	0.05	0.03	0.05	0.03	0.06	0.03	0.02	0.02
Strontium	1.3	1.3	1.4	1.6	1.3	2.8	1.8	1.8	2.6	1.6	1.8	2.4	1.8	1.8	2	6.4	2.5	6.3	1.9	5	4.4	2.6	2.5
Vanadium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

APPENDIX B, TABLE 1

Detailed blueberry chemistry results for the EARMP community program, 2011 to 2015.

Chemical[1]	Stony Rapids																						
	2011					2012					2013					2014					2015		
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3
Metals																							
Aluminum	21	8	27	37	10	9.6	8.9	7	11	7.6	300	180	250	240	250	7.8	9.3	10	8.3	8.9	22	18	9.5
Barium	15	15	16	8.9	13	14	12	12	10	13	10	9	13	14	13	22	21	21	18	21	13	15	15
Boron	12	5	4	3	4	5	4	11	14	6	4	4	4	5	5	4	5	5	5	16	5	5	7
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	2.9	3.2	3	2.4	2.9	1.9	2	2.3	2.1	2	2.4	2.8	2.1	2.5	2.4	4.5	4.2	4.2	4	4.4	3.6	3.3	3.2
Iron	16	12	23	32	11	12	12	11	10	9.9	9.9	10	10	11	12	14	15	14	13	15	19	19	13
Lead	0.01	<0.01	0.02	0.04	<0.01	0.1	<0.01	0.03	0.03	<0.01	<0.01	0.02	<0.01	<0.01	0.01	<0.01	0.01	<0.01	0.02	0.01	0.26	0.02	0.02
Manganese	140	100	130	70	180	290	250	230	240	260	210	200	270	340	300	130	150	140	270	140	130	150	220
Molybdenum	0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1	0.4	0.3	0.3	0.2	0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	0.2	0.2	<0.1	<0.1	0.1
Nickel	0.75	0.68	0.84	0.82	0.74	0.39	0.48	0.47	0.37	0.4	0.38	0.42	0.24	0.3	0.29	1.1	1.1	1.4	0.54	1	0.68	0.65	0.8
Selenium	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07
Titanium	0.26	0.12	1.6	1.4	0.19	0.2	0.23	0.09	0.26	0.11	0.08	0.14	0.07	0.06	0.06	0.12	0.3	0.17	0.08	0.26	0.7	0.81	0.28
Uranium	<0.01	<0.01	0.02	0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	5.8	6.4	5.1	4.9	5.3	3.3	3.7	4.9	3.4	4	5.9	5.8	5.9	7.6	6.4	5.2	5.2	5.5	6.1	5.3	5.2	5.4	5.6
Physical Properties																							
Moisture (%)	85.84	85.47	84.14	85.08	86.57	85.35	85.14	84.42	85.08	84.82	85.92	85.78	86.59	86.18	86.45	86.37	86.04	86.1	86.52	86.16	86.67	86.62	86.11
Radionuclides																							
Lead-210 (Bq/g)	<0.004	0.005	0.012	0.006	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	0.007	<0.004	<0.004	<0.004	<0.004	0.001	0.001	<0.001	<0.001	<0.001	0.003	0.002	0.002
Polonium-210 (Bq/g)	0.002	0.002	0.002	0.003	0.002	0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.0002	8E-04	7E-04	8E-04	6E-04	0.0012	0.0014	0.0012
Radium-226 (Bq/g)	0.003	0.006	0.001	<0.0009	0.001	0.003	<0.001	0.003	0.003	0.004	0.015	0.014	0.016	0.012	0.015	0.003	0.002	0.002	0.013	0.002	0.004	0.0039	0.0018
Thorium-230 (Bq/g)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0009	<0.001	<0.001	<0.001	<0.001	<0.0005	0.0007	<0.0005
Trace Elements																							
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	0.01	0.07	0.01	0.02	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.02	0.1	<0.01	0.02	<0.01	<0.01	0.01
Strontium	2.6	1.7	2.9	2.5	2	1.7	1.5	2.9	2.6	2.4	3.4	3	3.5	4.5	3.8	2.5	2.5	2.2	5.3	2.6	1.6	1.7	3.1
Vanadium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

APPENDIX B, TABLE 1

Detailed blueberry chemistry results for the EARMP community program, 2011 to 2015.

Chemical[1]	Uranium City							
	2012					2014		
	1	2	3	4	5	1	2	3
Metals								
Aluminum	5.3	5.6	8.7	4.4	5.4	9.2	7.7	11
Barium	12	11	12	12	9.9	14	14	14
Boron	8	8	9	6	7	3	4	3
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	3.9	3.4	3.7	3.5	2.9	4.1	4.1	4.1
Iron	11	9.7	10	12	8.7	14	14	14
Lead	0.01	0.01	0.02	0.01	<0.01	<0.01	0.06	0.01
Manganese	280	330	280	200	140	430	440	450
Molybdenum	0.2	0.2	0.3	0.4	<0.1	0.2	0.2	0.2
Nickel	0.54	0.47	0.58	0.44	0.51	0.37	0.41	0.5
Selenium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	<0.05	<0.05	<0.05	0.05	0.05	0.17	0.13	0.21
Uranium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Zinc	6.3	5.9	6.2	6.3	4.2	6.7	6.5	6.4
Physical Properties								
Moisture (%)	84.40	83.99	84.04	85.06	84.43	89.62	89.29	89.56
Radionuclides								
Lead-210 (Bq/g)	0.002	0.004	0.003	0.002	0.02	0.001	0.005	0.002
Polonium-210 (Bq/g)	0.0021	0.005	0.0032	0.0015	0.002	0.0031	0.003	0.0028
Radium-226 (Bq/g)	0.0014	0.006	0.0016	0.1	0.001	0.0007	0.003	0.001
Thorium-230 (Bq/g)	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001
Trace Elements								
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	0.01	<0.01	0.01	<0.01	0.02	<0.01	<0.01	0.06
Strontium	1.3	1.1	1.4	1.3	1.6	1.3	1.3	1.4
Vanadium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

APPENDIX B, TABLE 1

Detailed blueberry chemistry results for the EARMP community program, 2011 to 2015.

Chemical[1]	Wollaston Lake/Hatchet Lake																						
	2011					2012					2013					2014					2015		
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3
Metals																							
Aluminum	6.1	3.9	8.7	6.2	5.9	14	20	12	26	22	7.4	6.8	6.8	6.7	7.3	11	11	10	12	12	28	13	16
Barium	16	17	15	14	15	10	9.9	7.7	16	16	13	13	11	12	10	21	19	15	22	18	17	13	14
Boron	7	4	7	13	6	5	7	17	7	8	4	5	4	5	5	5	5	8	6	5	6	7	6
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	2.9	1.7	3	3	2.6	3.4	2.9	2.5	2.6	3.5	1.8	1.7	2.1	1.6	1.6	4.5	4.4	4.5	4.8	4.5	3.5	3.3	3.6
Iron	6.8	5.4	12	9.5	9	17	17	15	21	20	10	9	10	9	9	17	18	18	17	17	29	15	17
Lead	0.04	<0.01	0.01	<0.01	<0.01	<0.01	0.01	0.03	0.02	0.02	0.03	<0.01	0.02	<0.01	<0.01	<0.01	0.02	0.02	<0.01	0.02	0.02	0.02	0.03
Manganese	270	290	300	290	260	150	160	110	180	190	150	140	150	140	150	100	81	90	84	59	160	170	180
Molybdenum	<0.1	<0.1	<0.1	0.1	0.1	0.3	0.1	0.1	0.2	0.2	0.1	<0.1	0.2	<0.1	<0.1	0.3	0.4	0.3	0.4	0.4	0.2	0.1	0.1
Nickel	0.66	0.28	0.59	0.5	0.59	0.66	0.44	0.68	0.5	0.68	0.23	0.19	0.24	0.19	0.24	1.1	0.92	1.2	1.3	1.5	1.6	0.82	0.94
Selenium	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	<0.05	0.07	0.13	0.09	0.09	0.38	1.3	0.4	0.91	0.51	0.1	0.05	0.05	0.11	0.09	0.16	0.17	0.14	0.17	0.25	1.1	0.34	0.88
Uranium	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	5.7	3	5.5	5.1	4.4	6.6	7.7	4.7	6.7	8	6.4	6	6.2	5.6	5.3	7.3	8.1	7.3	7.5	7.4	6	6.8	7
Physical Properties																							
Moisture (%)	85.31	84.46	84.79	84.44	85.11	84.44	84.81	84.13	85.40	84.17	85.61	85.47	85.66	85.56	85.51	86.34	86.99	86.93	87.01	86.51	88	84.22	84.43
Radionuclides																							
Lead-210 (Bq/g)	0.005	0.009	0.008	0.01	0.004	<0.001	0.001	0.001	<0.001	<0.01	0.008	0.002	<0.002	0.012	<0.004	0.001	<0.001	<0.001	<0.001	<0.001	0.004	0.002	<0.001
Polonium-210 (Bq/g)	0.002	0.002	0.004	0.004	0.004	0.0012	0.0012	0.0008	0.0017	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.0006	0.001	0.0005	0.0008	0.0007	0.0016	0.001	0.0014
Radium-226 (Bq/g)	<0.001	0.001	<0.001	0.006	<0.001	0.0024	0.0032	0.0032	0.0057	0.004	0.008	0.005	0.006	0.009	0.004	0.004	0.002	0.004	0.005	0.004	0.006	0.0046	0.0045
Thorium-230 (Bq/g)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0009	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.0009	<0.0006	<0.0005	<0.0005
Trace Elements																							
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.02	0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	0.02	0.01	0.2	0.03	0.14	0.03	0.01	0.01
Strontium	3.4	1.2	3.1	3.8	3.6	1.3	1.2	1.1	1.4	2.8	1.8	2.3	1.6	1.8	1.5	2.6	3.7	1.5	2.6	5.4	3.1	1.4	1.6
Vanadium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

[1]All concentrations are presented in µg/g dry weight, unless specified otherwise.

APPENDIX B, TABLE 2

Detailed bog cranberry chemistry results for the EARMP community program, 2011 to 2015.

Chemical[1]	Camsell Portage										Uranium City												
	2011					2014		2015			2011					2013					2014		2015
	1	2	3	4	5	1	2	1	2	3	1	2	3	4	5	1	2	3	4	5	1	2	1
Metals																							
Aluminum	17	17	19	19	16	17	16	16	19	21	20	29	15	19	27	21	56	50	45	28	22	23	20
Barium	14	13	14	15	9.1	15	15	18	19	19	13	9.1	11	9.4	13	10	12	14	12	10	13	12	15
Boron	9	8	8	10	9	6	5	10	6	6	10	9	8	14	10	18	16	15	7	5	6	6	9
Cadmium	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.02	0.02	0.02	<0.01	<0.01	<0.01
Chromium	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
Copper	4.5	4.2	4.8	4.9	3.6	4	4.3	4.3	3.8	4.8	5.9	3.6	2.6	2.6	3.2	2.6	2.1	2.3	2.4	3.2	5.6	6.4	3.4
Iron	9.7	9.7	10	10	11	15	14	16	12	13	16	20	9.5	13	14	13	12	26	26	14	12	14	12
Lead	<0.01	<0.01	<0.01	0.01	0.02	0.02	<0.01	0.03	<0.01	<0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.2	0.03	0.02	0.03	0.04	0.03	0.02
Manganese	110	120	100	100	80	170	170	140	200	220	150	110	300	210	220	210	150	100	81	100	160	160	90
Molybdenum	0.1	0.1	0.2	0.2	<0.1	<0.1	<0.1	0.2	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1
Nickel	0.46	0.46	0.49	0.65	0.37	0.54	0.52	0.36	0.36	0.41	1.1	0.8	0.28	0.5	0.42	0.2	0.28	0.42	0.46	0.36	0.59	0.59	0.74
Selenium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tin	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.9	<0.05	1.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Titanium	0.06	0.06	<0.05	0.08	0.17	0.08	0.08	0.1	0.11	0.12	0.07	0.47	0.06	0.18	0.14	0.11	0.56	0.6	0.7	0.33	0.16	0.11	0.19
Uranium	0.01	<0.01	0.01	<0.01	0.02	<0.01	0.01	0.04	<0.01	<0.01	0.01	0.02	<0.01	0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Zinc	6.6	6.4	6.5	6.7	5.3	6.2	6.2	7.8	7.8	8	8.9	7.3	5.7	5.2	6.8	7.2	8.9	7.4	7	7	6.2	7.1	5.3
Physical Properties																							
Moisture (%)	87.53	87.36	87.13	86.87	86.78	86.06	86.2	87.73	87.24	87.37	88.39	87.69	87.22	86.9	87.44	84.89	85.4	85.63	85.57	85.84	86.38	86.63	85.92
Radionuclides																							
Lead-210 (Bq/g)	0.007	0.006	0.020	0.013	0.018	0.001	<0.001	0.002	0.002	0.002	0.005	0.005	0.016	0.010	0.016	0.016	0.009	<0.004	<0.004	<0.004	0.005	0.002	0.003
Polonium-210 (Bq/g)	0.003	0.002	0.001	0.002	0.003	0.001	0.0011	0.0015	0.0014	0.0015	0.003	0.003	0.013	0.002	0.005	0.002	0.001	0.001	<0.001	0.001	0.004	0.004	0.0027
Radium-226 (Bq/g)	0.004	0.002	0.006	0.004	0.002	8E-04	<0.0005	0.0016	0.0017	0.0007	0.002	0.007	<0.0009	<0.0009	<0.0009	<0.001	0.002	0.003	0.002	0.003	0.003	0.002	0.0034
Thorium-230 (Bq/g)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0006	<0.0005	<0.0005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.0005
Trace Elements																							
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.14	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.05	0.04	<0.01
Strontium	2.3	2	2.1	2.5	1.8	2.3	2.3	3.1	3.8	4.5	3.4	2.5	2.5	2.4	1.8	2.1	2.2	2.2	2.1	1.5	1.6	1.5	3.7
Vanadium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

[1]All concentrations are presented in µg/g dry weight, unless specified otherwise.

APPENDIX B, TABLE 3

Detailed barren-ground caribou flesh chemistry results for the EARMP community program, 2011 to 2016.

Chemical[1]	Black Lake																				Camsell Portage	
	2011/2012					2012/2013					2013/2014					2014/2015					2012/2013	
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2
Metals																						
Aluminum	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	0.2	0.03	0.04	0.03	0.25	0.04	0.02	0.02	0.01	<0.01	0.02	0.05	0.11	0.33	0.02	0.04	0.03	0.02	0.03	0.02	0.02	<0.01
Boron	0.7	0.2	0.6	<0.2	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	0.002	0.004	0.002	<0.002	<0.002	0.004	0.003	0.002	0.006	0.005	0.002	<0.002	0.003	0.005	0.004	0.002	<0.002	<0.002	<0.002	<0.002	0.004	0.003
Chromium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Copper	4.3	2.6	3.0	3.0	3.3	3.3	4.2	3.4	3.0	3.1	4.6	3.3	3.2	2.4	4.6	4.9	3.5	4.6	4.8	2.5	3.7	3.7
Iron	43	29	40	38	45	33	49	44	50	43	49	38	58	37	52	46	32	53	48	37	50	46
Lead	0.013	<0.002	0.008	<0.002	0.005	0.003	0.31	0.003	0.48	0.013	<0.002	0.008	0.56	0.028	0.004	0.015	0.009	0.007	0.005	0.006	<0.002	<0.002
Manganese	0.45	0.29	0.35	0.38	0.42	0.28	0.53	0.34	0.3	0.26	0.48	0.56	0.48	0.34	0.42	0.49	0.34	0.54	0.48	0.3	0.35	0.26
Molybdenum	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	0.04	0.04	<0.01	<0.01
Selenium	0.15	0.2	0.21	0.19	0.2	0.15	0.27	0.18	0.2	0.18	0.24	0.15	0.21	0.17	0.21	0.22	0.18	0.24	0.22	0.18	0.23	0.22
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin						<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.08	0.08	0.07	0.07	0.08	0.09	0.11	0.08	0.08	0.08	0.06	0.1	0.07	0.1	0.09	0.07	0.07	0.07	0.07	0.06	0.08	0.07
Uranium	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	17	31	21	16	29	26	29	33	30	32	19	21	23	30	20	14	23	15	15	46	26	25
Physical Properties																						
Moisture (%)	74.06	74.11	74.21	73.58	72.53	76.52	73.84	75.07	75.5	74.1	70.87	67.93	65.21	69.85	71.08	73.58	73.63	72.12	72.03	73.79	72.15	72.11
Radionuclides																						
Lead-210 (Bq/g)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.011	0.0095	0.0083	0.01	0.011	0.0007	0.0052	0.0065	0.0085	0.0094	0.023	0.014	0.013	0.015	0.012	0.019	0.014	0.015	0.016	0.013	0.017	0.015
Radium-226 (Bq/g)	<0.00006	<0.00006	<0.00006	<0.00006	<0.00006	0.008	<0.005	<0.005	<0.005	<0.005	<0.00006	0.0003	<0.00006	0.0003	0.0001	0.0002	0.0002	<0.00008	0.0001	<0.00006	<0.00008	<0.0001
Thorium-230 (Bq/g)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0002
Trace Elements																						
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	0.06	0.04	0.38	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	0.02	0.01	0.02	0.02	0.02	0.04	0.02	0.03	0.02	0.02	0.01	0.01	0.01	<0.01	<0.01	0.02	0.03	0.02	0.04	0.02	<0.01	<0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.005	0.004	0.003	0.003	0.003	0.008	0.005	0.004	0.004	0.005	<0.002	0.002	0.002	<0.002	0.002	0.009	0.006	0.009	0.008	0.016	0.002	<0.002
Strontium	0.03	0.03	0.02	0.02	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.06	0.12	0.27	0.05	0.04	0.03	0.02	0.02	0.03	0.04	0.04
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

APPENDIX B, TABLE 3

Detailed barren-ground caribou flesh chemistry results for the EARMP community program, 2011 to 2016.

Chemical[1]	Fond du Lac																				
	2011/2012					2012/2013						2013/2014					2014/2015			2015/2016	
	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	1	2	3	1	2
Metals																					
Aluminum	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	0.6	<0.5	<0.5
Barium	0.08	0.02	0.03	0.04	0.02	0.05	0.14	0.11	0.08	0.12	0.32	0.01	<0.01	0.02	0.02	0.04	<0.01	<0.01	0.18	0.06	0.01
Boron	0.4	0.5	0.3	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	0.004	0.002	0.003	0.002	<0.002	0.004	0.002	0.005	<0.002	0.003	0.14	0.004	0.004	<0.002	0.003	0.002	0.004	0.004	0.008	0.009	0.011
Chromium	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	3.9	2.3	2.2	4.1	3.1	1.8	2.6	3.2	3.3	3.9	4.3	4.2	4.3	2.6	4	4.2	3.5	2.6	1.9	2.3	3.3
Iron	48	31	29	48	32	30	36	43	50	39	45	46	47	27	48	49	47	36	36	41	43
Lead	0.008	<0.002	<0.002	<0.002	<0.002	0.006	0.006	0.008	<0.002	0.014	0.004	0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	0.004	<0.002	0.012
Manganese	0.39	0.26	0.25	0.43	0.32	0.24	0.26	0.33	0.37	0.53	0.8	0.38	0.35	0.32	0.39	0.44	0.41	0.33	0.29	0.34	0.4
Molybdenum	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	0.08	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Selenium	0.15	0.15	0.15	0.18	0.15	0.12	0.13	0.16	0.2	0.14	0.34	0.19	0.17	0.17	0.18	0.22	0.19	0.17	0.16	0.15	0.16
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin						0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.08	0.08	0.07	0.08	0.09	0.08	0.05	0.09	0.08	0.08	0.08	0.06	0.13	0.12	0.05	0.13	0.07	0.07	0.08	<0.01	<0.01
Uranium	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	22	56	59	16	49	40	15	23	12	16	18	28	22	30	26	24	22	28	59	46	25
Physical Properties																					
Moisture (%)	71.24	76.19	74.05	73.91	73.77	71.94	71.95	72.9	73.46	71.99	68.45	62.73	71.46	75.61	72.28	70.81	73.17	73	71.99	74.29	73.45
Radionuclides																					
Lead-210 (Bq/g)	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	0.002	0.002	<0.001	<0.001	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.0042	0.0084	0.0098	0.0096	0.0021	0.015	0.015	0.015	0.016	0.016	0.021	0.012	0.012	0.011	0.01	0.014	0.0071	0.008	0.0075	0.0014	0.0018
Radium-226 (Bq/g)	<0.00005	0.0002	0.0001	<0.00004	0.00008	<0.00006	<0.00006	<0.00006	<0.00007	<0.00007	0.00009	<0.00006	<0.00006	<0.00006	0.00007	0.00008	<0.00006	0.00008	<0.00006	0.0001	0.00006
Thorium-230 (Bq/g)	<0.0001	0.0003	<0.0002	<0.00008	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Trace Elements																					
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	<0.01	<0.01	<0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.01	<0.01	0.01	0.01	0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.004	0.006	0.006	0.003	0.003	0.003	<0.002	0.003	0.002	0.006	0.013	0.005	0.004	0.005	0.004	<0.002	0.004	0.004	0.006	0.005	0.004
Strontium	0.07	0.05	0.06	0.05	0.03	0.06	0.07	0.07	0.05	0.08	0.14	0.04	0.04	0.03	0.05	0.05	0.03	0.04	0.07	0.05	0.05
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

APPENDIX B, TABLE 3

Detailed barren-ground caribou flesh chemistry results for the EARMP community program, 2011 to 2016.

Chemical[1]	Stony Rapids												
	2012/2013					2013/2014			2014/2015				
	1	2	3	4	5	1	2	3	1	2	3	4	5
Metals													
Aluminum	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.04	0.12	0.03	0.01	0.02	0.02	0.01
Boron	<0.2	0.8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	0.003	0.004	0.002	0.003	0.002	<0.002	0.002	0.008	0.007	<0.002	<0.002	0.006	0.003
Chromium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1
Copper	4.0	4.6	4.7	3.3	4.1	2.4	3.4	1.8	2.4	4.3	3.6	3.8	3.5
Iron	52	55	46	51	55	38	38	40	34	43	46	47	50
Lead	0.002	0.065	0.009	0.003	0.004	0.005	0.052	0.032	0.004	0.002	<0.002	0.009	<0.002
Manganese	0.46	0.55	0.42	0.44	0.44	0.3	0.28	0.36	0.21	0.47	0.41	0.42	0.51
Molybdenum	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	<0.01	<0.01	0.01	<0.01	<0.01	0.18	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	0.21	0.26	0.21	0.21	0.21	0.16	0.14	0.11	0.17	0.18	0.22	0.2	0.19
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.03	0.12	0.2	0.09	0.11	0.13	0.04	0.08	0.07	0.07	0.06	0.08	0.07
Uranium	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Zinc	22	13	16	29	15	40	17	48	41	15	15	18	20
Physical Properties													
Moisture (%)	70.86	70.2	70	70.4	71	74.41	74.78	67.52	73.27	73.71	72.62	72.05	71.78
Radionuclides													
Lead-210 (Bq/g)	<0.001	0.001	<0.002	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.026	0.001	<0.001	0.012	0.025	0.0083	0.01	0.0059	0.013	0.017	0.025	0.033	0.02
Radium-226 (Bq/g)	0.002	<0.001	<0.001	0.002	0.001	<0.00006	<0.00006	<0.00005	<0.00007	0.0001	0.00008	<0.00007	0.0001
Thorium-230 (Bq/g)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0002
Trace Elements													
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	0.01	0.01	0.01	0.02	0.01	0.03	0.02	0.01	0.02	0.02	0.03	0.02	0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.006	0.003	0.004	0.004	0.003	0.004	0.002	0.003	0.005	0.004	0.002	0.005	0.004
Strontium	0.02	0.03	0.02	<0.02	<0.02	0.05	0.04	0.17	0.03	0.02	0.03	0.04	0.03
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

APPENDIX B, TABLE 3

Detailed barren-ground caribou flesh chemistry results for the EARMP community program, 2011 to 2016.

Chemical[1]	Wollaston Lake/Hatchet Lake																		
	2011/2012					2012/2013					2013/2014					2014/2015			
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4
Metals																			
Aluminum	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	0.04	0.09	0.03	0.04	0.09	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	0.4	<0.2	0.4	0.3	0.4	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	0.005	0.008	0.002	0.004	0.002	0.008	0.003	<0.002	0.004	0.003	0.002	0.002	<0.002	<0.002	0.003	0.003	0.003	0.005	0.027
Chromium	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	3.1	3.2	2.5	3.9	3.1	4.4	2.3	2.4	3.6	3.5	3.6	3.3	2.3	3.8	3.5	3.1	3	2.8	3.9
Iron	37	35	26	45	29	63	36	43	52	43	42	43	23	44	45	42	36	27	52
Lead	0.013	0.002	<0.002	0.046	0.051	0.006	0.003	0.013	0.014	<0.002	<0.002	<0.002	0.003	0.005	<0.002	<0.002	1.1	<0.002	<0.002
Manganese	0.35	0.29	0.25	0.53	0.33	0.46	0.27	0.29	0.5	0.44	0.31	0.37	0.21	0.37	0.41	0.39	0.29	0.29	0.4
Molybdenum	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	0.15	0.17	0.17	0.19	0.13	0.18	0.13	0.12	0.19	0.17	0.21	0.13	0.16	0.2	0.18	0.14	0.16	0.16	0.19
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin						<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.07	0.07	0.07	0.07	0.07	0.11	0.09	0.11	0.08	0.09	0.03	0.06	0.06	0.07	0.11	0.06	0.06	0.06	0.06
Uranium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	33	30	30	20	29	16	52	42	20	16	16	20	18	13	23	33	29	23	19
Physical Properties																			
Moisture (%)	74.5	73.6	75.2	74.14	75.2	72.82	78.45	77.45	73.98	72.58	75.58	74.52	75	74.43	73.43	76.77	73.74	74.44	68.86
Radionuclides																			
Lead-210 (Bq/g)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.016	0.013	0.011	0.015	0.011	0.011	0.012	0.0095	0.019	0.014	0.0082	0.0083	0.012	0.016	0.01	0.0079	0.0072	0.0047	0.0053
Radium-226 (Bq/g)	<0.00006	<0.00007	<0.00006	<0.00006	<0.00005	<0.00008	<0.00006	<0.00006	0.0001	<0.00007	<0.00008	<0.00009	0.0002	<0.00006	0.00007	<0.00006	<0.00005	<0.00006	0.0001
Thorium-230 (Bq/g)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Trace Elements																			
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02
Arsenic	<0.01	<0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	<0.01	0.02	<0.01	0.01	0.02	<0.01	<0.01	0.01	0.02	<0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.003	0.003	0.007	0.005	0.004	0.008	0.006	0.006	0.004	0.006	0.003	0.006	<0.002	0.003	0.004	0.017	0.006	0.003	0.008
Strontium	0.04	0.03	0.03	0.02	0.03	0.05	0.03	0.03	0.02	<0.02	0.02	0.04	0.05	0.03	0.04	0.02	0.03	0.02	0.03
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

[1]All concentrations are presented in µg/g wet weight basis, unless specified otherwise.

APPENDIX B, TABLE 4

Detailed moose flesh chemistry results for the EARMP community program, 2011 to 2016.

Chemical[1]	Uranium City Study Area											
	2011/2012				2012/2013			2013/2014			2014/2015	2015/2016
	Mackintosh Bay	Deadman Channel	Melville Lake	Orbit Bay	Ace Creek	Gunnar	Milliken Lake	Sample 1	Sample 2	Sample 3	Sample 1	Sample 1
Metals												
Aluminum	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.6	<0.5
Barium	0.03	0.02	<0.01	0.02	0.04	0.22	0.08	0.02	0.09	0.02	<0.01	0.04
Boron	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	0.003	<0.002	0.002	0.004	0.011	0.006	0.003	0.004	0.005	0.003	0.056	0.018
Chromium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	1.3	1.8	3.8	1.7	1.2	1.4	1.3	1.6	2	1.5	1.9	1.5
Iron	30	25	42	42	35	34	26	34	37	26	36	33
Lead	<0.002	<0.002	<0.002	<0.002	0.005	0.004	0.003	0.003	0.025	0.003	0.003	0.002
Manganese	0.16	0.16	0.33	0.14	0.17	0.18	0.15	0.14	0.24	0.14	0.22	0.23
Molybdenum	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	0.11	0.16	0.18	0.09	0.1	0.11	0.1	0.09	0.12	0.08	0.14	0.08
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.14	0.08	0.1	0.13	0.08	0.08	0.06	0.06	0.06	0.06	0.09	0.01
Uranium	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	50	49	31	49	75	56	55	44	48	56	52	52
Physical Properties												
Moisture (%)	74.42	72.36	72.74	73.84	69.87	74.09	74.28	74.01	71.23	74.71	75.54	76.93
Radionuclides												
Lead-210 (Bq/g)	0.002	<0.001	<0.001	<0.001	<0.00002	<0.00001	<0.00002	<0.001	<0.001	<0.001	<0.001	<0.001
Polonium-210 (Bq/g)	<0.0002	0.0005	0.0023	0.0003	0.0002	0.0004	<0.0002	0.0004	0.0005	0.0003	0.0016	0.001
Radium-226 (Bq/g)	<0.00006	<0.0001	<0.00006	<0.00007	<0.00009	<0.00006	<0.00008	0.00008	0.0001	<0.00005	<0.00005	0.00006
Thorium-230 (Bq/g)	<0.0001	<0.0002	<0.0001	<0.0001	<0.0002	0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Trace Elements												
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.013	0.014	0.003	0.017	0.016	0.01	0.012	0.01	0.011	0.008	0.009	0.044
Strontium	<0.02	<0.02	0.04	0.03	0.08	0.05	0.05	0.02	0.03	0.03	0.04	0.03
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

APPENDIX B, TABLE 4

Detailed moose flesh chemistry results for the EARMP community program, 2011 to 2016.

Chemical[1]	Camsell Portage Study Area									
	2011/2012				2013/2014		2014/2015		2015/2016	
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2
Metals										
Aluminum	1.5	3	<0.5	3.8	<0.5	<0.5	0.6	4.4	5.1	0.5
Barium	0.04	0.15	0.03	0.02	0.05	0.02	0.07	0.04	0.05	0.02
Boron	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	<0.002	0.006	0.002	<0.002	0.002	0.003	0.003	0.05	0.005	0.004
Chromium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	2.0	1.2	1.8	1.6	1.5	1.8	0.56	1.4	0.93	1.4
Iron	21	25	25	29	29	34	22	32	29	29
Lead	0.018	0.019	<0.002	0.002	0.004	<0.002	0.029	0.011	0.004	<0.002
Manganese	0.2	0.18	0.21	0.13	0.13	0.16	0.38	0.27	0.2	0.18
Molybdenum	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01
Selenium	0.2	0.06	0.1	0.12	0.06	0.06	0.08	0.08	0.17	0.13
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.09	0.25	0.09	0.08	0.07	0.07	0.1	0.22	0.14	<0.01
Uranium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.001
Zinc	24	38	47	45	59	45	63	58	61	48
Physical Properties										
Moisture (%)	75.01	73.92	75.02	75.12	73.27	72.65	73.14	70.99	73.2	74.63
Radionuclides										
Lead-210 (Bq/g)	<0.001	<0.001	<0.001	<0.0003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.0019	0.0004	0.0003	-	0.0004	0.0002	0.0004	<0.0002	0.0011	0.0005
Radium-226 (Bq/g)	<0.00008	<0.00007	0.0002	<0.00006	0.00006	0.00007	<0.00006	<0.00006	0.00005	0.00008
Thorium-230 (Bq/g)	<0.0002	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.00009	<0.0001
Trace Elements										
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.014	0.011	0.022	0.01	0.012	0.015	0.02	0.016	0.015	0.006
Strontium	0.1	0.06	0.03	0.02	0.06	0.04	0.06	0.09	0.06	0.02
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

[1]All concentrations are presented on a µg/g wet weight basis, unless specified otherwise.

APPENDIX B, TABLE 5

Detailed snowshoe hare flesh chemistry results for the EARMP community program, 2011 to 2014.

Chemical[1]	Uranium City							Camsell Portage							
	2011					2014		2011					2014		
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 1	Sample 2	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 1	Sample 2	Sample 3
Metals															
Aluminum	0.6	<0.5	<0.5	0.5	<0.5	<0.5	0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	0.27	0.05	0.09	0.04	0.05	0.13	0.28	0.09	0.04	0.08	0.03	0.08	0.18	0.1	0.12
Boron	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	0.004	<0.002	0.003	0.003	<0.002	<0.002	0.005	0.003	0.004	0.01	<0.002	0.002	<0.002	0.004	0.006
Chromium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	1.5	1.5	1	1.4	1.1	2.4	2.1	1.8	2.4	1.5	1.8	1.5	1.9	2.1	1.8
Iron	27	22	22	14	20	21	31	31	28	24	22	24	19	25	20
Lead	<0.002	0.003	<0.002	<0.002	0.003	0.002	<0.002	0.003	<0.002	0.006	<0.002	<0.002	0.003	0.002	0.002
Manganese	0.27	0.2	0.37	0.29	0.18	0.24	1.1	0.72	0.46	0.32	0.22	0.22	0.36	0.28	0.39
Molybdenum	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	0.01	0.02	<0.01	<0.01	<0.01	0.02	0.05	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.07
Selenium	0.13	0.05	0.1	0.12	0.06	0.15	0.07	0.04	0.03	0.13	0.02	0.06	0.03	0.08	0.14
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	0.02	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.02	0.02	<0.01	<0.01	<0.01
Titanium	0.07	0.04	0.07	0.08	0.15	0.05	0.1	0.08	0.07	0.05	0.08	0.04	0.09	0.06	0.09
Uranium	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	25	24	17	10	19	10	16	14	11	23	13	13	13	11	16
Physical Properties															
Moisture (%)	77.55	77.14	77.49	78.65	78.51	70.07	65.8	77.61	76.53	75.79	77.6	78.45	71.24	75.39	73.89
Radionuclides															
Lead-210 (Bq/g)	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.0014	0.0013	0.0015	0.00003	0.0016	0.0022	0.0015	0.0011	0.0018	0.0021	0.0013	0.0012	0.0017	0.002	0.0018
Radium-226 (Bq/g)	<0.00006	0.00009	0.0001	0.0001	0.00009	0.0001	0.00007	0.0001	<0.00007	0.0001	0.0001	0.0002	0.0001	<0.00006	0.0001
Thorium-230 (Bq/g)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Trace Elements															
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.007	0.005	0.004	0.004	0.006	0.005	0.004	0.01	0.006	0.007	0.003	0.004	<0.002	0.005	0.032
Strontium	0.39	0.1	0.28	0.1	0.19	0.14	0.19	0.27	0.07	0.22	0.05	0.09	0.2	0.1	0.29
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

[1]All concentrations are presented in µg/g wet weight basis, unless specified otherwise.

APPENDIX B, TABLE 6

Detailed moose and caribou liver and kidney chemistry results from the EARMP community program, 2014/2015.

Chemical[1]	Fond du Lac			Uranium City		Camsell Portage				Wollaston Lake
	Caribou Kidney			Moose Liver	Moose Kidney	Moose Liver		Moose Kidney		Caribou Liver
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 1	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1
Metals										
Aluminum	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	1.1	<0.5	1.2	0.7
Barium	0.58	0.45	0.41	0.1	0.27	0.1	0.12	0.23	0.44	0.02
Boron	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	6.2	9.6	6.8	0.48	8	1.7	1.1	8.6	6.5	0.65
Chromium	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<0.1
Copper	3.6	4.9	4.3	28	3	38	47	2.1	3.8	26
Iron	40	60	60	120	41	100	150	70	90	140
Lead	0.073	0.068	0.078	0.008	0.002	<0.002	0.003	<0.002	0.002	0.097
Manganese	1.8	2	1.8	1.4	1	1.3	2.2	1.2	2	3.6
Molybdenum	0.12	0.11	0.14	0.65	0.24	0.9	1	0.21	0.42	1
Nickel	<0.01	0.01	0.01	<0.01	0.04	<0.01	<0.01	0.05	0.06	<0.01
Selenium	1.3	1.6	1.4	0.2	0.67	0.22	0.21	0.71	0.78	0.4
Silver	0.003	0.003	<0.002	0.01	<0.002	0.009	0.014	<0.002	<0.002	0.12
Thallium	0.02	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.06	0.08	0.07	<0.5	0.04	<0.5	<0.5	0.03	0.08	<0.5
Uranium	<0.001	<0.001	<0.001	<0.01	<0.001	<0.01	<0.01	<0.001	<0.001	<0.01
Zinc	23	28	27	14	25	15	20	16	23	24
Physical Properties										
Moisture (%)	48.56	66.49	42.82	58.58	78.25	74.05	70.38	76.94	78.33	71.23
Radionuclides										
Lead-210 (Bq/g)	0.072	0.054	0.042	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Polonium-210 (Bq/g)	0.088	0.081	0.086	0.0021	0.0032	0.0036	0.0024	0.0018	0.0023	0.0093
Radium-226 (Bq/g)	0.0003	0.0009	0.0005	0.00007	<0.00006	0.0001	<0.0001	<0.00006	0.0005	0.0002
Thorium-230 (Bq/g)	<0.0003	<0.0006	<0.0005	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0004	<0.0001
Trace Elements										
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.029	0.044	0.046	0.054	0.097	0.25	0.2	0.12	0.2	0.075
Strontium	0.18	0.18	0.16	0.1	0.11	0.06	0.07	0.17	0.13	0.04
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

[1]All concentrations are presented in µg/g wet weight basis, unless specified otherwise.

APPENDIX B, TABLE 7

Detailed moose and caribou liver and kidney chemistry results from the EARMP community program, 2015/2016.

Chemical[1]	Black Lake	Fond du Lac		Uranium City		Camsell Portage		
	Caribou Kidney			Moose Liver	Moose Kidney	Moose Liver	Moose Kidney	
	Sample 1	Sample 1	Sample 2	Sample 1	Sample 1	Sample 1	Sample 1	Sample 2
Metals								
Aluminum	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Barium	0.2	0.43	0.43	0.48	0.16	0.11	0.12	0.13
Boron	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	6.9	10	7.3	0.054	20	0.66	6.8	4.9
Chromium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	5	4.4	3.6	0.55	2.2	15	3.8	2.6
Iron	37	28	40	680	33	160	52	30
Lead	0.07	0.12	0.089	<0.002	<0.002	0.003	<0.002	0.004
Manganese	1.8	1.7	1.5	0.09	0.8	2.1	2.7	1.5
Molybdenum	0.15	0.16	0.12	<0.02	0.17	1.1	0.45	0.25
Nickel	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.03	0.04
Selenium	1	1.2	1.1	0.18	0.53	0.92	1.2	0.78
Silver	<0.002	<0.002	<0.002	<0.002	<0.002	0.033	<0.002	<0.002
Thallium	0.01	0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Titanium	0.02	0.05	0.04	<0.01	<0.01	0.03	<0.01	<0.01
Uranium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	24	26	25	15	24	20	26	20
Physical Properties								
Moisture (%)	69.25	54.43	54	72.88	83.14	68.14	78.43	82.17
Radionuclides								
Lead-210 (Bq/g)	0.049	0.077	0.073	0.002	0.002	0.001	0.002	0.002
Polonium-210 (Bq/g)	0.064	0.083	0.066	0.0018	0.0037	0.026	0.027	0.0076
Radium-226 (Bq/g)	0.0005	0.0003	0.0003	0.0003	0.00007	0.0002	0.0001	0.0003
Thorium-230 (Bq/g)	<0.0003	0.0005	<0.0003	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001
Trace Elements								
Antimony	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Beryllium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cobalt	0.035	0.036	0.025	0.068	0.25	0.18	0.18	0.058
Strontium	0.1	0.11	0.12	0.06	0.1	0.05	0.11	0.09
Vanadium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

[1]All concentrations are presented in µg/g wet weight basis, unless specified otherwise.

APPENDIX C

SCIENCE AMBASSADOR PROGRAM

the 2016 SCIENCE AMBASSADOR PROGRAM

Annual Report

UNIVERSITY OF SASKATCHEWAN

College of Arts & Science
SCIENCE OUTREACH

The Science Ambassador Program is offered by the **University of Saskatchewan** through the **College of Arts & Science** *with support from:*

The **College of Nursing**; The **College of Pharmacy & Nutrition**; The **College of Agriculture & Bioresources**; The **School of Environment & Sustainability**; The **Office of the Vice-Provost Teaching & Learning**

artsandscience.usask.ca/scienceoutreach/

Legend of images:

Front cover. Soil paint artwork from Minahik Waskahigan School, Pinehouse Lake. Inside cover. Skylight in our Gordon Oakes Red Bear Student Centre & Intercultural Gathering Place.

p3. Science Odyssey poster from St. Pascal School, Green Lake

p5. Collecting soil samples at Father Porte School, Black Lake

p6-7. Clockwise: ambassadors Ahmad and Marzieh at Constable Robin School, Beardy's & Okemasis; surface tension experiment, St. Pascal School, Green Lake; Beanie-boo diffraction photography and exploring solution density, Valley View School, Beauval; Chemistry 20 potash solubility lab, Rossingol Community School, Île-à-la-Crosse; DNA candy modelling challenge, Oscar Lathlin Collegiate, Opaskwayak Cree Nation

p8-9. Clockwise: ambassadors Aida and Cree hiking in Wollaston Lake; face painting at culture days, St. Pascal School, Green Lake; smoky sunrise and outdoor cooking at culture camp, Île-à-la-Crosse; erecting a teepee and dressing ducks, Pike Lake Day, Opaskwayak Cree Nation; team boat engineering challenge, Charlebois Community School, Cumberland House

p10. Painting by Michael Lonechild commemorating Gordon Oakes Red Bear and the opening of our new Student Centre and Intercultural Gathering Place, named in his honour; screenshot from the Facebook page of the Senate of Canada featuring our Science Ambassadors with The Hon. Senator Dr. Lillian Dyck

p11. Science fair projects from Twin Lakes School, Buffalo Narrows – how gaming affects the body, how the moisture of tinder affects fire, how potash dissolves; ambassador Venkat leading trout dissection activities at Stony Rapids School, Stony Rapids; petrographic microscope activities at Father Porte School, Black Lake

p13. Student projects at Minahik Waskahigan school representing what they learned about water remediation (top, grade 4), forest fire succession (middle, grade 5) and traditional land use (bottom, kindergarten)

Back cover. Polymer science activities at Father Porte School, Black Lake; horse harness bells in cultural display, from The Pas

compiled by Dr. Sandy Bonny, Science Ambassador Program Coordinator, College of Arts & Science, University of Saskatchewan; © September 2016; 16pp.

A Message from the College of Arts & Science

"Our science outreach programs are committed to helping schools find and create experiences that open students' eyes, spark exploration and learning, and shine a light on the richness of experience they already know.

We are excited to partner with remote Northern Community Schools in delivering the Science Ambassador Program and in opening doors for Aboriginal youth to participate in the diverse educational experiences, degree paths, and careers made available by studying science.

Through this program, participating communities have extended an inspiring culture of youth advocacy to our University, one that actively develops our students' professional and cultural capacity as future science, health science, education, and engineering graduates – Thank you so much!"

- Dr. Peta Bonham-Smith, Interim Dean

What we do

The Science Ambassador Program enhances teaching and learning in remote Aboriginal community schools by providing hands-on support through our Science Ambassadors, upper-year undergraduate and graduate university students with strong disciplinary backgrounds in math and science. We work alongside teachers to plan, select, and deliver creative and culturally-relevant science demonstrations and experiments; facilitate class discussions; guide student projects; explore 'big questions' in science; and mentor students who are exploring possibilities for careers and continuing education in science, technology, engineering and mathematics (STEM). We work hard to connect our activities to community priorities for the cultural and academic development of youth.

"Making Science Fun & Relevant, One Community at a Time!"

Culturally-vibrant communities & educators + **STEM expertise via academic role models** =

Enhancing community-based STEM learning!

Building Saskatchewan's STEM capacity!

Our Goals

- to provide fun and engaging science experiences to students and teachers;
- to form learning partnerships with teachers, schools and communities;
- to have Science Ambassadors serve as role models to younger generations;
- to engage schools and post-secondary institutions in dialogue to enhance science education overall;
- **and to broaden the pool of future U of S students and homegrown STEM professionals!**

Our USASK Science Ambassador Program

Initiated in 2007 by Dr. Julita Vassileva, NSERC/Cameco Prairie Women in Science and Engineering Chair (2006-2011), the Science Ambassador Program has now organized 104 Science Ambassador placements!

Our 2016 program saw 24 Science Ambassadors working in 12 Northern communities, with 150+ Teachers and Educational Assistants, and 2430 students (96% First Nations or Métis as reported by school administrators).

Surveys and community consultation indicate a positive correlation between hosting Science Ambassadors and student attitudes toward school-based math and science, extra-curricular STEM learning opportunities, and careers and continuing education in science and professional disciplines.*

Our program is coordinated through the College of Arts & Science, which hosts the University of Saskatchewan's largest direct-entry undergraduate programs, including the Aboriginal Student Achievement Program learning community (ASAP). It has been exciting to begin meeting students in ASAP who were mentored by Science Ambassadors during their high school science courses and who are now navigating post-secondary pathways to degrees in nursing, environmental chemistry, archaeology, and more.

The Science Ambassador Program has received broad support from U of S science, engineering, agriculture, and health science colleges – and as the program's capacity has grown, we have enjoyed new opportunities for dialogue around increasing access to academic and professional programs for Aboriginal students in Saskatchewan.

The Science Ambassador Program is unique among STEM outreach initiatives in terms of both student and community buy-in. Science Ambassadors are matched with communities based on best fits between their areas of study and the teaching and learning needs in the schools.

Science Ambassadors prepare for their placements by learning about the schools they will work with, and through professional development workshops. In 2016, these included:

- *Science Ambassador Program Orientation & workplace safety overview*
- *Hands-on Science Pedagogy*; a workshop led by Dr. Sandy Bonny, Project Lead STEM Access Initiatives, Arts & Science
- *Aboriginal Education; Past, Present and Future Legacies*; a seminar developed with guidance from the Indigenous Voices Program, Gwenna Moss Centre for Teaching Effectiveness
- *Indigenous Perspectives on Science*; a facilitated discussion led by Dr. Jeff Baker, Assistant Professor & Chair in Aboriginal Education, Education
- *Community School Engagement* Q & A; lessons from previous Science Ambassadors

Ambassadors are actively hosted by the school and community, who provide room, board, and cultural mentorship during 4-6 week placement residencies scheduled between the end of the post-secondary winter term (mid-April) and the end of the elementary school year (early June).

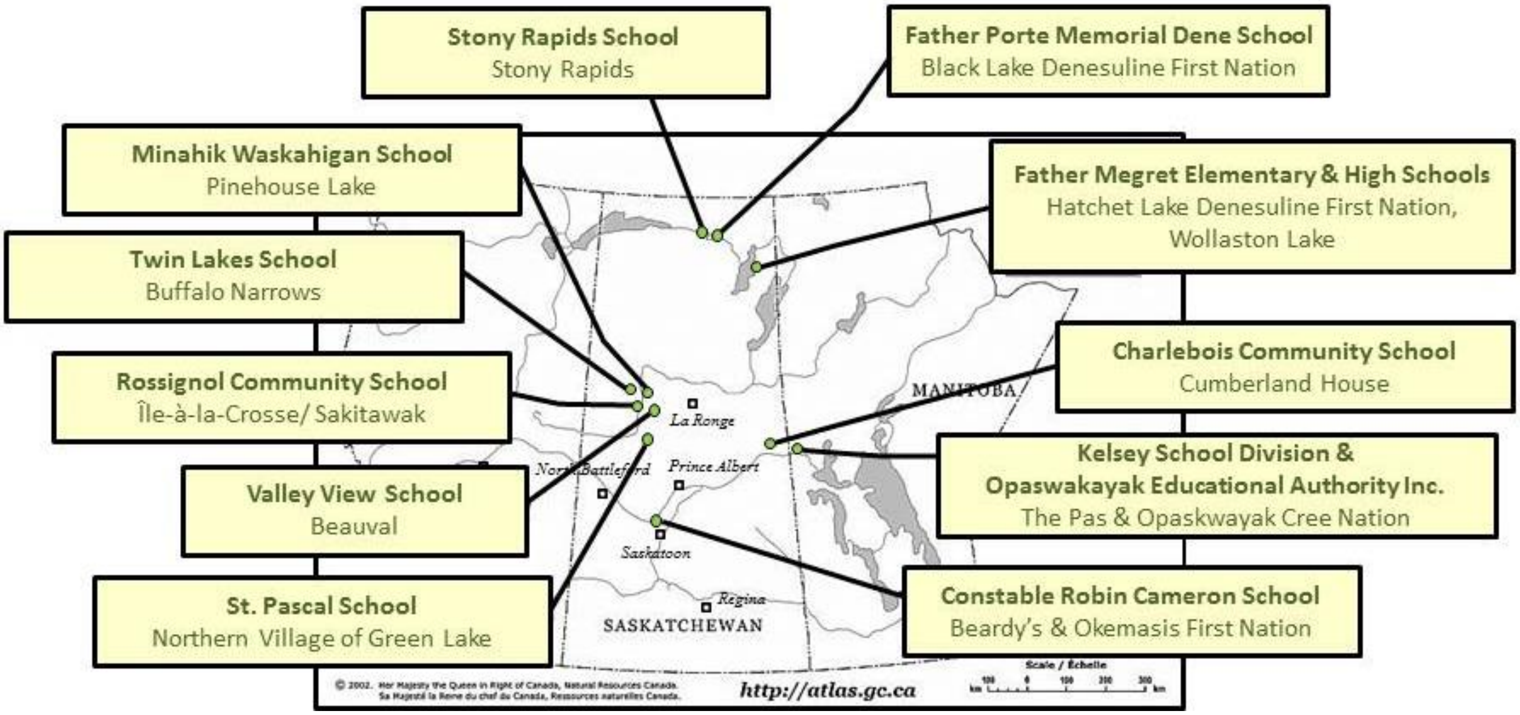
These relatively long-term placements allow our Science Ambassadors to build meaningful learning relationships with students, teachers, and community members; to participate in community life and culture; and to enjoy and learn from the natural environment.

In preparation for Science Ambassador placements, participating teachers liaise with the program coordinator about topics of special interest for their schools through planning surveys, email, teleconferences, and face-to-face meetings at spring teacher development conferences (e.g. AWASIS, 2016). This information is passed along to Science Ambassadors who begin to connect directly with teachers as they plan activities for students and coordinate logistics of travel and accommodations.

"Remember that the future comes from behind you… if we are to create a new future, we must recognize that the future is now and know that the universe is breathing and imbued with intelligence…"

- Paula Gunn Allen, American Indian scholar and poet

* Annual Reports 2012-2015; Vassileva, J. 2011. NSERC PrairieWISE reports: http://wise.usask.ca/.



Participating Schools and Communities

Thank you to all those who help us, each step of the way!

- The Northern Lights School Division provided a home to Science Ambassadors in Stony Rapids, Beauval, Green Lake, Cumberland House, Buffalo Narrows, Cumberland House, and Pinehouse Lake
- The University College of the North donated dormitory space and meals to Science Ambassadors working in The Pas and at Opaskwayak Cree Nation
- The Departments of Biology, Chemistry, Geological Sciences, Physics and Engineering Physics, and the College of Arts & Science Office of Science Outreach and Sci-Fi Camps loaned equipment and learning materials

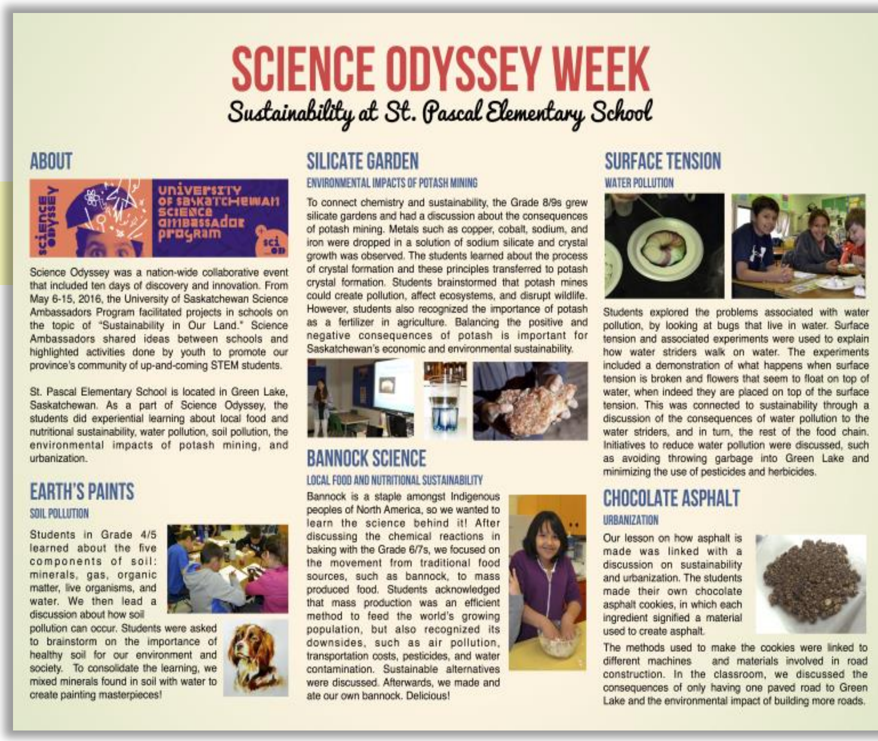
From May 6-15th we partnered with:

SCIENCE ODYSSEY @ science.gc.ca

Our "Sci_OD" Science Ambassador activities connected through the theme:

Sustainability in Our Land!

From Traditional Harvesting, to Bannock Science, Forest Fire Succession, Fish Identification and Making Paint with Saskatchewan Soil – we worked with community educators, Elders and Knowledge keepers to bring science home and share it in accessible forums like science fairs, culture camps, school open houses, posters and Facebook!



2016 Science Ambassadors

Our Science Ambassadors are recruited competitively from the University of Saskatchewan's Science, Technology, Engineering and Mathematics (STEM) programs. Successful candidates have excellent communication skills, strong disciplinary backgrounds, enthusiasm for teaching, and creative approaches to problem solving and scientific inquiry.

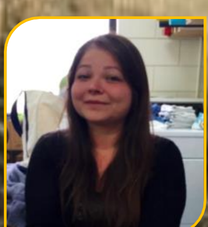
Profile sheets introducing our Science Ambassadors are sent to schools, Band Councils, and/or Civic Offices ahead of community placements, along with letters of introduction acknowledging our sponsors and providing an overview of our program:

DEAR FATHER MEGRET SCHOOL...

MEET YOUR 2016 Science Ambassadors!

Aida: "I am a fourth year student in geography and environmental science. I have traveled to many places during my degree and I love how you learn so much from each new place that you go. I am looking forward to sharing lessons and fun science activities with students, and would love to learn about Northern Saskatchewan and hope to learn some Dene words – I hope the students will teach me!"

Cree: "I am a land and resource management student. I have been taking courses from the Prince Albert U of S campus, and am excited to be heading to Saskatoon in the fall to finish my final year in the College of Agriculture & Bio resources. BUT, first, I am excited to come and spend time learning with students in Wollaston Lake! I have never been this far North and am excited to learn about the culture, the environment, and the land!"



USASK Science Ambassadors in The Pas and Opaskwayak Cree Nation worked as a team with teacher candidates recruited from the University College of the North Teacher Education Program: **Colleen Ducharme** and **Emy Young** contributed expertise in the areas of elementary science and Indigenous science teaching methods

Among the benefits of hosting Science Ambassadors in their classrooms, teachers noted increased student motivation, positive academic mentorship, and loads of hands-on FUN!

"I saw engagement, excitement and building confidence in science!"
G4 teacher, Black Lake Denesuline First Nation

Our USASK Science Ambassadors: from top left -> right

Kelly Doud 2nd Year, Biology

Mohamed Kassem (Egypt) 4th Year, Computer Science

Helen Tang 3rd Year, Physiology & Pharmacology

Aida Baumann 4th Year, Geography

Brayden McDonald MSc. Geology

Cree Longjohn 3rd Year, Agriculture & Bioresources

Christine Taylor (Jamaica) BSc. Biology, M. Agricultural Policy

Mackenzie Moleski 3rd Year, Physiology & Pharmacology

Venkata Pasupulleti (India) PhD. Veterinary Biomedical Science

Franco Le Roux (S. Africa) B.Sc., 1st year Pharmacy & Nutrition

Kumkum Azad (Bangladesh) MSc. Biology

Sara Patenaude 2nd Year, Pharmacy & Nutrition

Fahd Hussain 3rd Year, Civil Engineering

Hyemi Kim 2nd Year, Biochemistry

Harshina Brijlall (S. Africa) 4th Year, Secondary Science

Gen Zha (China) BSc. Biochemistry, Law

Ahmad Ghadyani (Iran) BSc. Physics, MA. Philosophy

Jay Kim 3rd Year, Physiology & Pharmacology

David Wei (China) BSc Chemistry, M. Economics

Samuel Simonsen 3rd Year, Pharmacy & Physiology

Hui (Jane) She (China) PhD. Civil Engineering

Marzieh Eskandari (Iran) BSc. Physics, MA. Philosophy

Our 2016 Science Ambassadors represented…
7 International Students and 5 U of S STEM Colleges

Program Feedback: On a 5 point scale teachers and administrators ranked their experience with the 2016 Science Ambassadors as 'Great' (4) or 'Excellent' (5) at every location!

We asked students…

How much did you like having the Science Ambassadors at your school?

0 — 1 — 2 — 3 — 4 — 5

Not much ... it was great!

4.4 (avg. of 610 responses)

We asked teachers…

'what was the greatest benefit of hosting Science Ambassadors?'

"**Positive role models** got the kids excited about science - that was great to see." *G4 Teacher, The Pas*

"The students were **very interested and impressed with the activities** – and I was impressed with questions that were asked after and during the activities. The students didn't want our Science Ambassadors to leave!" *G 5 & 6 Teacher, Île-à-la-Crosse*

"The Science Ambassadors added a **big boost of science interest** into my students and reinvigorated my personal love of science as well!" *G6 Teacher, Beardy's & Okemasis*

"I loved experiencing **new ways of looking at science and engineering.** The discussions around global issues and cultural stories went a long way to making connections." *G10 Teacher, Cumberland House*

" The Science Ambassadors brought the message that **science = fun!** Meeting people who work and study in the field of science had the students realizing that **they could do this too!**" *G7 Teacher, Opaskwayak Cree Nation*

"The process of **asking 'big questions' and chasing the answer** supported our goals of inquisitiveness and exploratory learning." *G7 Teacher, Green Lake*

2016 Activity Highlights

Science Ambassador activities are tailored to meet teacher requests, student learning needs, and community priorities for youth. This year, we led hundreds of hands-on activities, facilitated student research projects, hosted four science fairs and two science symposiums, worked with adult basic education classes, and led outdoor science activities at culture days and immersion camps.

'Hit Activities' for 2016:

"Meeting STEM subjects through a hands-on approach got the kids so involved, and excited!" *G 9 Teacher, Beauval*

Wollaston Lake ukulele science, DNA extraction, chemiluminescent finger painting, code academy, our medicinal plant walk, and hosting our Mother's Day Tea!

Black Lake polymer science, testing air rockets, Venkat's fish dissections, using microscopes to explore samples from *everywhere*, and science at culture camp!

Stony Rapids growing seeds, building a roller coaster on the playground, building circuits, pressure-powered scooters, marshmallow launchers, and exploring fish scales!

Beardy's & Okemasis playground physics, building circuits, studying 'lightning bug' physics, chemosynthetic solutions, and comparing Cree & Iranian perspectives on science!

Beauval raising plants for the garden, excavating soil horizons, earth paints, solution density, combustion labs for Chem 30, and talks on nature, science and engineering!

Green Lake leaf chromatography, earth paints, balancing eagles, chocolate asphalt, surface tension, hydrodynamic flowers and boats, bannock science, the Bohr model of the atom, outdoor engineering, making slime, and getting Mackenzie in the canoe club!

Pinehouse Lake precipitating crystals, oil spill cleanup, forest fire succession, digestive tract modeling, exploring stream ecology, designing new solar ovens, post-secondary prep activities, and our community-wide science symposium!

Île-à-la-Crosse sediment settling columns, flute physics, agar cultures, making paint with soil samples, sand-castle stress tests, exploring owl pellets, potash solution mining, outdoor science games , nature studies at culture camp, and Métis fiddle lessons for Gen the violinist!

Buffalo Narrows sand dune science, magnetic slime, volcanic eruptions, robotics club, talking about academic readiness, exploring the physics of light, identifying rocks and minerals, teaching Sam and Mo to DAB, and our school-wide science fair!

Cumberland House water testing, sports physics, building a scale model of the EB Campbell Dam!... and ALL the engineering challenges – boats, bridges, towers, and helmets!

The Pas / Opaskwayak Cree Nation candy model DNA building challenge, real DNA extraction, modeling volcanoes with fast and slow reactions, physics of light, bridge building challenge, and teaching Franco to dress ducks at Pike Lake culture days!


Exploring principles of science through design challenges sets learning 'afloat'! A triangle sail lightens the paddling load for a voyageur canoe during Green Lake's Grade nine outdoor school; traditional fishing boat models floated more coins than irregular rafts in a freight challenge; and stacked Styrofoam plate, bowl and cup boats harnessed the power of gravity to self-propel!

Student surveys asked…

What was your favourite activity?

- slime!
- dissecting the fish
- extracting DNA
- we made paint!
- solar ovens
- bannock science
- acid rain
- growing seeds
- 30 million year old fossils!

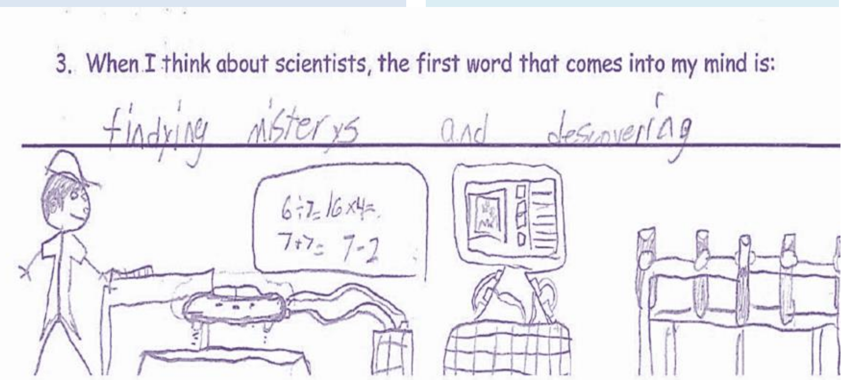
The best thing you learned?

Science fundamentals

- what electricity is
- triangles are part of engineering
- i learned water has oxygen in it
- everyone has 99% the same DNA and that 1% is what makes us unique!

Learning strategies & perspective

- "science can be fun!"
- "what I have to do to get into nursing"
- "you have to be creative when you do science"
- "how to work a problem backward"
- "how science relates to other things… everything!"
- "I learned science isn't just reading and following instructions… it's working and learning about the stuff you want to learn about"



G4 student: Science means:
"finding mysteries, and discovering!"

"Has hosting Science Ambassadors impacted my students? ABSOLUTELY! I see a group of future engineers & biologists"
G5 Teacher, Cumberland House

We asked students how excited they were to take high school and post-secondary science courses, on a scale from 0 (not at all) to 5 (very!).

The average response from grade 2-7 students was 4.3; and grade 8-12 students was 3.2. **Most students are interested to see what they can learn in science next! *WHY?***

"…because **science has do to with almost everything** and **I love having the knowledge**" (G6)

"…I'd like to be a neurosurgeon and some science skills are kind of **required for the job**!" (G8)

"…at high school and the University I heard the experiments that you do are **eye-openers**" (G7)

"…you know, **I really like the potions and explosions**!" (G2)

Two-way Learning : Kiskiaumatowin

Kiskiaumatowin is a Swampy Cree word used to describe a type of learning where teacher and student are learning from one another in an interactional way, changing them both*

Hosted in culturally-vibrant community schools, our Science Ambassadors are immersed in new experiences as they learn about the students, their communities, and the Northern environment. We thank educators, Elders, and Knowledge keepers who have acted as mentors to our Science Ambassadors, inviting them to learn and to bring their talents forward to contribute to extra-curricular, community, and cultural events.

Our Science Ambassadors return to the university with fresh perspectives on science, and new appreciation for Aboriginal community and culture:

"I was constantly LEARNING in Pinehouse... learning **how to communicate** effectively to all age groups, all kinds of people, that was my proudest achievement." – *Jay Kim*

"Working in Île-à-la-Crosse I learned so much about Michif culture, and about **science being more than formulas and facts – it's an evolving understanding** of everything around us." – *Gen Zha*

"I was so **excited to go to culture camp and took away so many ways to get my thinking outside of the box** – I have now seen so many methods of teaching, from campfires to science labs." – *Harshina Brijlall*

"This experience expanded my awareness of the challenges to education created by isolation in the North, and has **refueled my desire to be a role model**, encouraging kids to pursue their goals." – *Cree Longjohn*

"Being a Science Ambassador has changed the way I perceive rural Aboriginal communities, and how connected all the town members are to one another. It has been **inspiring and eye-opening!**" – *Hyemi Kim*

* Goulet, & Goulet, *Teaching Each Other*, UBC Press, 2014.

We asked youth…

'What is the best thing your Science Ambassadors Learned from you?'

- how to DAB!
- patience
- how to set up a tent
- how to make bannock
- Dene, Cree and Michif words!
- how to feel quiet and peaceful up here
- how we live in the North
- they learned that there are some mosquitos around here…

"Sometimes we would be building something and they were shocked and amazed because they'd never seen it before!"

"Is there another topic that should be included in our Science Ambassador development workshops? I thought about it, and I wish I had known how teaching is so much like learning! I didn't know how very much I would be learning, how much I would prepare and change. I don't know how you tell Ambassadors that before the experience, though!" – *Kumkum Azad, MSc. Biology*

Indicators of Success:

Momentum

Every participating community has requested to host the program again in spring 2017; and new communities have sent requests to participate

Changing Attitudes

Teachers report that interacting with Science Ambassadors is changing students' confidence and receptivity to learning in science classrooms

Expectations

Surveys and follow-up interviews demonstrate that hosting Science Ambassadors in successive years has raised both teachers' and parents' ambitions for inquiry-based learning

Patterns of STEM Engagement

High school administrators in The Pas report a 40% increase in high school science enrolment since 2007, and have had to restrict registration in an after-school science club at one school; teachers in many communities report improved attendance and engagement during Science Ambassador activities

Every Science Ambassador responded that - 'YES' - they would recommend the program to other U of S students!

Science Ambassadors' participation in cultural activities can 'go a long way'…

"I really appreciated having our Ambassadors join culture camp – we weren't able to make a fire because of the province-wide fire ban, so they improvised and led the kids in creating solar-ovens to make their S'mores!"
- Krissy Bouvier-Lemaigre, Ile a la Crosse

"Fahd and Dave brought new ways of looking at science. Discussions around global issues and cultural stories followed them outside of the classroom and really made the connections – they were invited to people's homes and to a moose tanning project – it was excellent!"
- Renee Carriere, Cumberland House

"They were friendly, had all the students engaged, and showed great interest in our traditions. I have many students now expressing an interest in studying engineering and biology. Next year, I would like them in my classroom longer, and to have more time to share our culture." – *Cheryl Sutherland, Beardy's & Okemasis*

"Our Science Ambassadors went above and beyond the call of duty and spent much of their free time interacting in positive and meaningful ways with our community. They were wonderful , strong female role models."
- Jordan Kolbeck, Green Lake

Celebrating 10 years since our Program Pilot!

On August 18th we held our annual Science Ambassador Celebration to share this year's program with the University community and our sponsors. This year we gathered at a new venue, the Gordon Oakes Red Bear* Centre, situated at the University of Saskatchewan on Treaty 6 Territory and the Homeland of the Métis.

Our guests included The Honourable Senator Dr. Lillian Dyck, who spoke of the importance of increasing Aboriginal student participation in post-secondary education and the role of teachers and mentors – like our Science Ambassadors – in igniting curiosity and a passion to learn. She emphasized that in our province, reconciliation includes examining how Indigenous Knowledge and Western Science can be interwoven to face the challenges related to rapid environmental and socioeconomic change that affect us all.

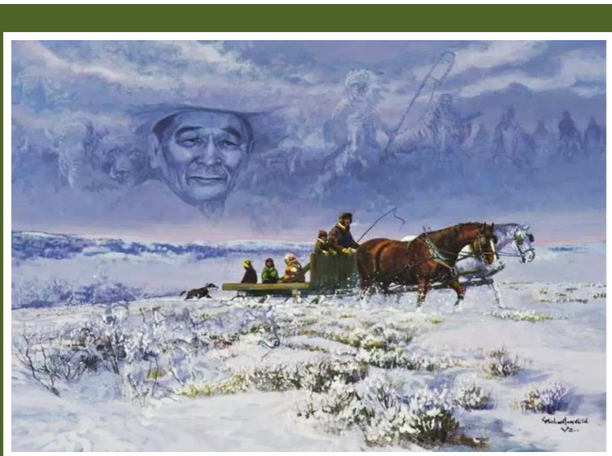
Minister of Advanced Education, Ms. Bronwyn Wallace, brought greetings from the province of Saskatchewan to the event, as well as encouragement for the program's mission of making science exciting and relevant not only for youth in schools, but for our diverse post-secondary student body.

The Honourable Senator Dr. Lillian Dyck with Science Ambassadors and Program Leadership at our celebration: (L-R) Venkata Pasupulleti, Ahmad Ghadyani, Marzieh Eskandari, Brayden MacDonald, Harshina Brijlall, Mackenzie Moleski, Cree Longjohn, Dr. Peta Bonham-Smith (Interim Dean, Arts & Science), Jay Kim, Sara Patenaude, Brooke Malinoski (USSU VP Academic), Kehan Fu (USSU President), Dr. Sandy Bonny (Program Coordinator).

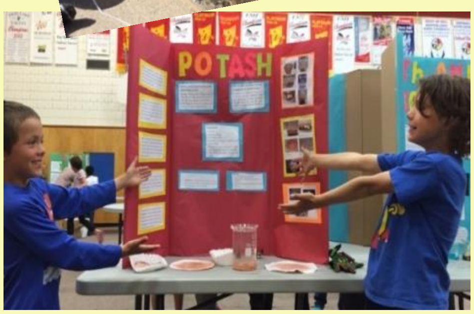
We were honoured to have representatives from the FSIN Education and Training Secretariat and leadership from diverse university colleges in attendance, as well as Interim Provost Dr. Ernie Barber; pioneering Cross-cultural science educator Dr. Glen Aikenhead; and past Cameco NSERC Prairie Women in Science and Engineering Chair, Dr. Julita Vassileva.

An overview of the program scope and feedback was provided by program coordinator Dr. Sandy Bonny, along with insights and goals for next year. Science Ambassadors shared their experiences with the program, highlighting the renewed joy of learning that they experienced 'discovering' alongside teachers and youth and their increased awareness of Northern community priorities and the contributions of Aboriginal peoples.

Our Science Ambassadors received Certificates of Appreciation from Dr. Peta Bonham-Smith, Interim Dean, College of Arts & Science, acknowledging their creative contributions to STEM teaching and learning experiences in our participating schools. We see their experiences of *Kiskiaumatowin* as a strong contribution to our university's commitment to creating spaces for dialogue that welcome Indigenous perspectives and ways of knowing into post-secondary learning.



* **Gordon Oakes Red Bear** was a leader from Nekaneet First Nation (1932-2002) who held a strong belief in education and honouring culture and traditions. He believed Aboriginal and non-Aboriginal peoples should work in mutual benefit, sharing the analog of a team of horses, pulling together in strength and living in balance. This painting by **Michael Lonechild** reflects that story and vision and inspires the activities held in our student centre and intercultural gathering place (students.usask.ca/).



Asking Our Own Questions!

Ambassadors encouraged students to follow their own interests to design unique science fair projects in Buffalo Narrows:

"Helping students celebrate and learn about science in a relevant way through their science fair projects was a privilege - watching a couple of grade 8 girls move from being bored and not confident enough in themselves to begin a project, to winning first place was an awesomely motivating experience!" –*Samuel Simonsen*

Program Administration

The 2016 Science Ambassador Program was offered through the College of Arts & Science, with support from University of Saskatchewan STEM colleges and the Office of the Vice-Provost Teaching & Learning.

Provincial School Divisions and Band Educational Authorities are active partners in the delivery of programming, hosting Science Ambassadors by providing room, board, and community mentorship.

Industry, Provincial, and Agency partnerships provide pivotal support to our program:

- The Cameco Community Investment Fund provided $30,000 in core funding for student wages and travel to fly-in communities
- The Saskatchewan Indian Gaming Authority $2,500 toward equipment costs
- The Saskatchewan Ministry of Advanced Education provided $10,000 for operational expenses
- Science Ambassadors in The Pas and Opaskwayak Cree Nation were hosted and activity costs generously sponsored by the University College of the North and Manitoba Education
- Current Prairie NSERC Chair for Women in Science and Engineering Annemieke Farenhorst contributed $7,500 toward Science Ambassador wages
- We secured 3-year funding through to 2017 in the amount of $22,000 from the NSERC PromoScience Grant Program

Valuable in-kind donations were contributed by:

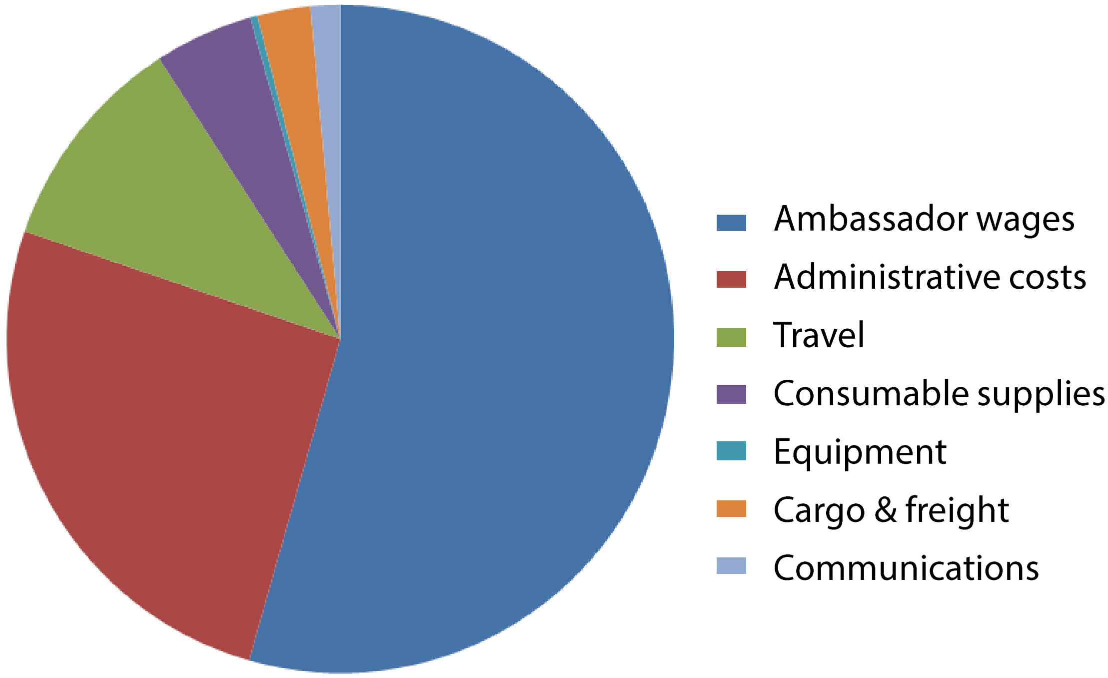
- PotashCorp: potash, DVD mine tours, and fossiliferous gravel (and shipping of that gravel!)
- Agriculture in the Classroom, Saskatchewan: seed identification and classification kits; little green thumb grow lights and germination trays; genomics activities and environmental science exploration materials
- Saskatchewan Mining Association: potash dissolution activity kits and geological posters and mineral samples

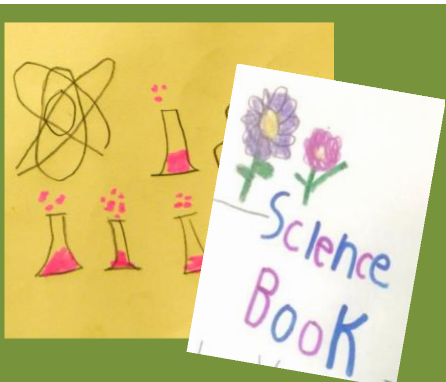
We welcome collaboration with new and returning donors – your support is truly essential to the quality and continuity of our Science Ambassador Program!

In 2015 and 2016, we partnered with the **Eastern Athabasca Regional Monitoring Program (EARMP)**, biologist **Ryan Froess**, and **Elders in Athabascan Communities** to bring fresh lake trout to the dissection table. Students learned about animal physiology and environmental career opportunities in the North and gained hands-on skills that will prepare them for success with our renewed Saskatchewan 9-12 science curriculum. *Following administrative interests to further develop hands-on teaching capacity in Athabascan schools, EARMP has sponsored the purchase of digital microscopes which our Science Ambassadors will introduce to inspire student-led environmental inquiry in spring 2017 — **we can't wait!***

Cost Summary

- 17 Schools
- 12 communities
- 24 Science Ambassadors
- 0.5 FTE Coordinator





Keeping the Books!

Students at St. Pascal school in Green Lake kept 'Science Books' to record their activities with Ambassadors Helen and Mackenzie, as well as their 'Big Science Questions' each week!

Science Ambassador Program expenses are met through a combination of monetary and in-kind donations from our partners. *This cost summary does not include accommodation costs, which are met by participating communities, nor does it include provision of office space and academic leadership from the College of Arts & Science, University of Saskatchewan.*

Expense Detail

Our largest expense is the provision of student compensation in the form of **Science Ambassador wages**. Averaging slightly over 50% of the program cost, this expense varies year to year, determined by the University of Saskatchewan Student Pay Scale (2016) which adjusts wages to academic program year and degree level.

Administrative Costs (25%) include a 0.5 FTE program coordinator's assignment, pre-placement training of student Science Ambassadors, printing of program manuals, telephone, fax, postal costs, and office supplies and equipment.

Travel Costs (10%) include air travel, bus service, and compensation for personal vehicle use to communities, and during packing and placement preparation.

Consumable Supplies for science activities (5%) and **Re-usable Equipment** purchases (0.5%) are kept relatively low by generous loans and in-kind donations from the University of Saskatchewan's science, engineering and health science colleges, the Arts & Science Office of Science Outreach, and external donors.

Cargo & Freight charges (3%) are associated primarily with the delivery and return of science materials and equipment from remote community locations.

Communication Costs (2%) for 2016 included expenses related to community engagement and cultural protocol, as well as program communications: printing brochures, flyers and reports; website maintenance; and hosting the 2016 Science Ambassador Celebration. Participation in the local educational community of practice included presentations at STEM Fest in fall 2015 (Saskatoon, SK); and attending the 2016 AWASIS Aboriginal Education Conference (Saskatoon, SK).

Future of the Science Ambassador Program

The Science Ambassador Program has grown fivefold since 2007, while maintaining a high standard for meeting STEM teaching and learning needs, 'One Community at a Time!' Demand is increasing and we anticipate continued enthusiasm from students and schools.

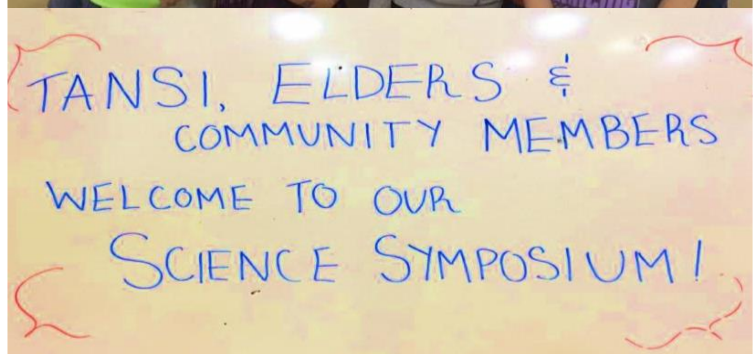
Our Science Ambassadors provide a valuable resource to teachers working in remote communities, bringing strong science backgrounds, practical hands-on support, and youthful enthusiasm for inquiry-based and cross-cultural learning.

Responding to teacher and student feedback, priorities for our 2017 Science Ambassador Program will include:

- supporting new 20 & 30 level provincial science offerings with hands-on lab and outdoor exploration activities
- supporting teachers' confidence with technologies provided to their classrooms, e.g. using interactive Smartboard apps and iPad-based coding programs
- emphasizing post-secondary opportunities and career awareness at the global, and regionally-focused levels
- facilitating student-led inquiry projects that connect to provincial curriculum, current topics of interest at the community level, and students' ambitions
- lots of messy, hands-on fun!

We want to support Aboriginal student success with K-12 science in the short term. In the longer term, as Science Ambassadors, community schools, and the University of Saskatchewan continue learning together, we are truly looking forward to increased representation of Aboriginal peoples and perspectives among our provinces' future STEM professionals!

We are committed to building post-secondary capacity among Saskatchewan's Aboriginal youth with partners who share our vision of creative and culturally-relevant STEM learning!



Students at Minahik Waskahigan School in Pinehouse Lake explored science topics connected to the theme of **Sustainability in Our Land**. Grades 9-12 came together to celebrate their learning with a school-wide Science Symposium! Invitations were posted online and at the health centre and Co-op store. Elders, parents, and other community members attended, and Science Ambassadors Jay and Hyemi Kim were blown away by the enthusiasm, kindness, and encouragement shown to the students, and to themselves!

Mahsi cho! Kinanaskomitin! Wopida!
Miigwech! Marsee! Merci!

…to all the Elders, teachers, administrators, parents, and especially to our participating youth: **THANK YOU** for helping our Science Ambassadors feel at home in your schools!

Guide to Contents

"I learned that I really like learning and science is kind of… fun!" – grade eight student, OCN

Get in touch… *give us a ring!*

the USASK SCIENCE AMBASSADOR PROGRAM

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Download our Annual Program Reports & LEARN MORE Online!