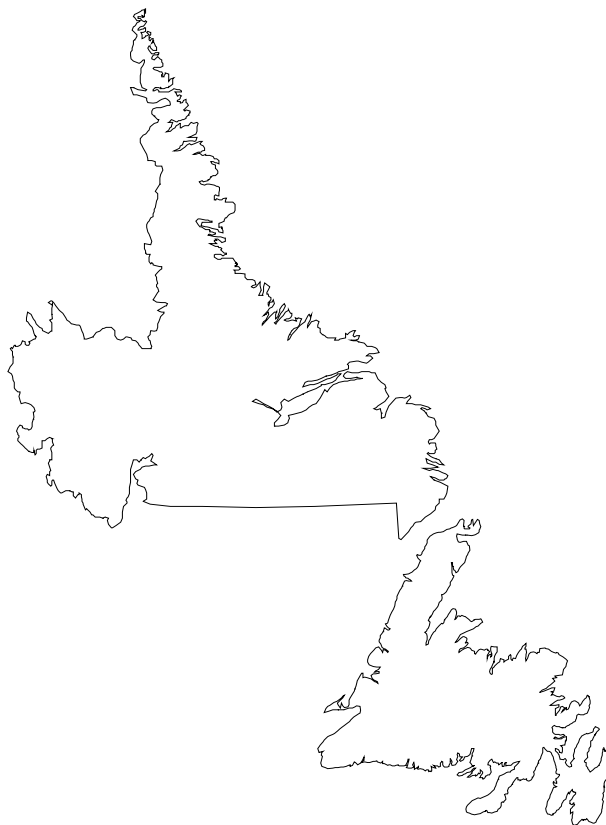


CANADA-NEWFOUNDLAND and LABRADOR WATER QUALITY MONITORING AGREEMENT

Progress Report 2021-2022



Water Resources Management Division
Department of Environment and Climate Change
St. John's, Newfoundland and Labrador

Atlantic Water Quality Monitoring - Surveillance de
la qualité de l'eau de l'Atlantique
Environment and Climate Change Canada -
Environnement et Changement climatique Canada
Dartmouth, Nova Scotia

Introduction

The following progress report was prepared by NL ECC staff to document progress made on all activities under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* during 2021-2022. This document is formatted to reflect the same layout as the 2021-2022 Annual Work Schedule. Additionally, a table has been added to include activities completed solely by WRMD staff.

Work Shared Activities for Fiscal Year 2021-2022

Activity	Responsible Agency	Remarks
Cost Shared and Work-Shared Ambient Water Quality Monitoring and Data Management Activities	Newfoundland and Labrador Department of Environment and Climate Change <u>and</u> Environment and Climate Change Canada	Refer to Table 1 for sampling details in Newfoundland Refer to Table 2 for sampling details in Labrador Refer to Table 3 for laboratory analysis details Refer to Table 4 for Shared Activities
Additional Cost-Shared Core Activities	Newfoundland and Labrador Department of Environment and Climate Change <u>and</u> Environment and Climate Change Canada	Refer to Table 5 for additional shared activities
Work-Shared Special Projects	Newfoundland and Labrador Department of Environment and Climate Change <u>and</u> Environment and Climate Change Canada	Refer to Table 4 for shared activities related to ambient water quality monitoring and data management Special projects Refer to Table 5 for cost shared core activities Refer to Table 6 for work-shared special projects
WRMD Activities	Newfoundland and Labrador Department of Environment and Climate Change	Refer to Appendix A for WRMD tasks/projects

Ambient Water Quality Sampling

During 2021-2022, the ambient water quality grab sampling proceeded as outlined in the corresponding Annual Work Schedule amendment. A comparison of the number of samples scheduled vs. the number of samples collected can be seen in **Table 1** and **Table 2**. In the majority of cases, the number of samples actually collected reflected the number of samples scheduled. In some instances, scheduling conflicts, human resource limitations, helicopter issues and adverse weather conditions some samples were missed.

In the upcoming fiscal year, NL ECC staff will aim to ensure that the number of samples collected reflect the number of samples scheduled as outlined in the Annual Work Schedule 2022-2023.

Table 1: Provincial Samples Collected in 2021-2022 Fiscal Year in Newfoundland (Island Portion of the Province)

Station #	Description	Number of Samples Scheduled in 21-22	Number of Samples Collected in 21-22
<u>EASTERN REGION</u>			
NF02ZK0005	Northeast River near Placentia	5	5
NF02ZL0029	Goulds Brook near Makinsons	5	5
NF02ZM0004	Waterford River at Commonwealth Avenue	4	4
NF02ZM0009	Waterford River at Kilbride	4	4
NF02ZM0014	Virginia River at the Boulevard	4	4
NF02ZM0015	Quidi Vidi at Outlet	4	4
NF02ZM0016	Rennie's River at Carnell Drive	4	4
NF02ZM0020	Broad Cove Brook near St. Phillips	4	4
NF02ZM0098	Virginia River at headwaters	4	4
NF02ZM0109	Mundy Pond at Outlet	4	4
NF02ZM0175	Waterford River at Brookfield Rd.	4	4
NF02ZM0176	South Brook at Mouth	4	4
NF02ZM0177	Rennie's River at Portugal Cove Road	4	4
NF02ZM0178	Learys Brook at Prince Phillip Drive	10	10
NF02ZM0179	Tributary to Virginia River at Guzzwell Drive	4	4

Station #	Description	Number of Samples Scheduled in 21-22	Number of Samples Collected in 21-22
NF02ZM0180	Virginia River at Newfoundland Drive	4	4
NF02ZM0181	Waterford River at Blackhead Road	10	10
NF02ZM0182	Waterford River at Bremigans Pond Dam	4	4
NF02ZM0183	Kelligrews River at Kelliview Crescent	4	4
NF02ZM0185	South Brook at Headwaters	4	4
NF02ZM0294	Manuels River above Manuels Access Road	4	4
NF02ZM0359	Paddy's Pond at Outlet	4	4
NF02ZN0004	Salmonier River at St. Catherines	4	4
<u>CENTRAL REGION</u>			
NF02YO0001	Exploits River at Grand Falls	4	4
NF02YO0020	Exploits River at Aspen Brook	4	4
NF02YO0107	Exploits River near Millertown	4	4
NF02YO0128	Exploits River below Grand Falls	4	4
NF02YO0142	Corduroy Brook near Centennial Park	4	4
NF02YO0143	Exploits River at Bond Bridge	4	4
NF02YQ0030	Gander River at Appleton	4	4
NF02YQ0072	Careless Brook at Resource Road Steel Bridge	4	4
NF02YS0001	Terra Nova River at Terra Nova	4	4
NF02YS0011	Terra Nova River at Spencer Bridge	4	4
NF02YS0083	Northwest River at Terra Nova National Park	4	4
<u>WESTERN REGION</u>			
NF02YE0004	Portland Creek at Route 430	4	4
NF02YE0005	Western Brook at Route 430	5	5
NF02YG0001	Main River at Route 420	5	2

Station #	Description	Number of Samples Scheduled in 21-22	Number of Samples Collected in 21-22
NF02YL0106	South Brook below TCH	4	4
NF02YG0020	Eagle Mountain Brook below Eagle Mountain Pond	4	4
NF02YH0018	Lomond River at Route 431	4	4
NF02YJ0004	Pinchgut Brook at TCH	10	9
NF02YK0022	Humber Canal at Main Dam Road	4	4
NF02YL0011	Humber River at Little Falls Bridge	4	4
NF02YL0012	Humber River at Humber Village Bridge	10	9
NF02YL0013	Corner Brook at Margaret Bowater Park	4	4
NF02YL0029	Wild Cove Brook at Route 440	4	4
NF02YN0001	Lloyds River at Route 480	5	5
NF02YN0043	Peter Stride's Lake at Route 780	4	4
NF02ZA0006	Grand Codroy River below Overfall Brook	4	4
NF02ZC0020	Buck Lake on Route 480	4	4

Notes:

1. Total number of samples collected in 2021-22 does include duplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2021-22 for Eastern region was 106; 106 were sampled, plus 8 duplicates and 3 trip blanks.
3. Total number of samples planned for 2021-22 for Central region was 44; 44 were sampled, plus 4 duplicates and 2 trip blanks.
4. Total number of samples planned for 2021-22 for Western region was 79; 75 were sampled, plus 8 duplicates and 0 trip blanks.

Table 2: Northern Samples Collected in 2021-2022 Fiscal Year in Labrador

Station #	Description	Number of Samples Scheduled in 21-22	Number of Samples Collected in 21-22
NF02XA0001	Little Mecatina River above Lac Fourmont	4	4
NF03NF0013	Ugjoktok River below Harp Lake	4	4
NF03OA0020	Ashuanipi River at Ferguson Bay	4	4
NF03OC0012	Atikonak River above Panchia Lake	4	2
NF03OD0011	East Metchin River at TLH	4	4
NF03OD0012	Wilson River East Branch	4	4
NF03OE0050	Churchill River 6.15kms below Lower Muskrat Falls	4	4
NF03OE0057	Muskrat Falls Reservoir at Lower Brook	4	4
NF03OE0029	Churchill River above Grizzle Rapids	4	4
NF03OE0030	Minipi River below Minipi Lake	4	4
NF03OE0032	Pinus River above TLH	4	4
NF03OE0033	Big Pond Brook below Big Pond	4	3
NF03OE0035	Dominion Lake Outflow	4	3
NF03OE0037	Cache River at TLH	4	4
NF03PB0025	Naskaupi River below Naskaupi Lake	4	3
NF03PB0028	Cape Caribou River at Grand Lake	4	4
NF03PB0029	Grand Lake Outflow at North West River	4	4
NF03PB0030	Seal Lake at Narrows	4	4
NF03PB0032	Susan River North of Beaver River	4	4
NF03PB0037	Wuchusk Lake at Naskaupi River Inflow	4	4
NF03QA0044	Carter Basin Outflow	4	4
NF03QA0045	Kenamu River near Mouth	4	4
NF03QC0001	Eagle River above Falls	4	3
NF03QC0002	Alexis River near Port Hope Simpson	4	2
NF03XB0018	Tributary to St. Augustin River	4	2

Notes:

1. Total number of samples collected in 2021-22 does include duplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2021-22 for Labrador region was 100; 90 were sampled, plus 4 duplicates and 3 trip blanks.

Ambient Water Quality Analysis

During 2021-2022 analytical service for major ions, physic-chemical, and major ions analyses were conducted at ALET and metals analyses at NLET. All shipping/analysis were carried out as agreed upon in the Annual Work Schedule 2021-2022 as seen in **Table 3**.

Table 3: Analytical Parameters, Holding Times and Schemas for 2021-2022

Schema Name	Parameter	Holding Times (recommended by private laboratory)
MAJOR IONS		
M_Alkalinity	Alkalinity	14 days
M_Anions	Chloride	28 days
	Sulphate	28 days
M_Metals_TR ICO-OES	Calcium	180 days
	Magnesium	180 days
	Sodium	180 days
	Potassium	180 days
PHYSICAL		
M_pH auto	pH	0 hours
M_Conductivity	Conductivity	28 days
M_Colour	Colourv - apparent	2 days
M_Turbidity	Turbidity	2 days
NUTRIENTS		
M-Anions	Nitrate	3 days
M_TN	Total Nitrogen	28 days
M_TP	Total Phosphorus	28 days
M_TOC	TOC	28 days
METALS		
TM2004/T27W	Total Metals-27 elements*	6 months (analyzed at NLET)

*27 Metals include:

aluminum	bismuth	iron	nickel	uranium
antimony	cadmium	lanthanum	rubidium	vanadium
arsenic	cobalt	lead	selenium	zinc
barium	copper	lithium	silver	
beryllium	chromium	manganese	strontium	
boron	gallium	molybdenum	thallium	

Ambient Water Quality Monitoring and Data Management/Reporting

During 2021-2022, significant effort from both ECCC and NL ECC was put into ensuring the Agreement data was accessible in a timely manner to any potential end-users of this water quality information. Numerous products were developed to help make the water quality information more user-friendly. Status of each task can be seen in **Table 4 & 5**.

Table 4: Ambient Water Quality Monitoring and Data Management Activities (Cost-Shared and Work-Shared)

	Management Activities	Lead Agency	Progress Evaluation
Water Quality Sampling and Analysis	Collection of water samples under WQMA program	NL ECC	See Table 1 and 2 for list of samples scheduled and collected.
	Entering field data onto field sheets and subsequent submission to laboratory	NL ECC	This has been completed and up to date for 2021-2022.
	Laboratory Analysis and Quality Control Processes	ECCC	All procedures remained the same in 2021-2022.
Data Management	Processing and Loading of WQ analytical data	ECCC	This has been completed and up to date for 2021-2022.
	Accessibility/Availability of NL WQMA Dataset	ECCC	ECCC provided complete data to NL ECC in September 2021 and March 2022.
Data Management Special Projects	Data Verification and Validation of Sample/Measurement Data	ECCC _____ NL ECC	Data validation completed in 2021-2022. Automated data verification protocols worked on by WRMD in 2021-2022.
	Data extraction tools development and updates	ECCC _____ NL ECC	No advances or updates made due to upcoming purchase of new Data Management Solution.

Table 5: Additional Core Activities 2021-2022 (Cost-Shared)

Project	Activity	Responsible Agency	Progress Evaluation
Canadian Aquatic Biomonitoring Network (CABIN)	Monitoring of benthic invertebrates at selected water bodies (reference sites, core CESI sites and annual sites) for maintenance of the long-term reference network in support of the Atlantic Reference Approach Model	NL ECC	Three annual CABIN sites were sampled in 2021.
	Baseline Report on Reference Invertebrate Assemblages in NL	ECCC	Draft report shared with NL ECC for review. To be completed and shared for final review in 2022-2023.
		NL ECC	
	Share spatial data with EC, for use in the reference model	NL ECC	This task is ongoing as new data becomes available each year.
	Field certification and training (as needed)	NL ECC	Seven staff completed online training in 2021-22. Field training scheduled to be completed in Spring 2022.
	Develop CABIN reference model and associated tools	ECCC	ECCC's Watershed Hydrology and Ecology Research Division – Updated Atlantic Reference Model and DNA model being reviewed. Will be available in 2022-2023.
Continued calibration and testing of Atlantic Canada model by ECCC, WRMD and partners.			
Prepare course/presentation on how to look at data in Atlantic	ECCC	Plans have changed: Normal Ranges metric calculations package document will be shared in 2022.	
Canadian Environmental Sustainability	Compile, analyse and interpret water quality data at core CESI stations according to CESI protocols	NL ECC	This has been completed and up to date for 2021-2022.

Indicators (CESI)	Update CANAL metadata website for current year's CESI data	NL ECC	Drivers of WQI scores and rankings updated every year to CANAL WQI Comments section.
	Final report validating/contributing to CESI core stations review for longer term WQI national reporting	NL ECC	This was completed for 2021-2022.
	QA/QC of submitted data/results and report to the public on the web page	ECCC	This has been completed and up to date for 2021-2022.
Modifications/Improvements to CESI WQI Calculator	Troubleshooting support and corresponding update in CESI Calculator coding.	NL ECC	Updates to CESI WQI calculator were documented in the ongoing Excel spreadsheet maintained and updated by WRMD.
	Updates to input files and data export to excel and access	NL ECC	
	Investigate how Trends Analysis can be incorporated into the CESI calculator.	ECCC	This activity is still on hold for ECCC, due to workload for other priorities.
	Inclusion of French version of CESI Help Manual.	ECCC	Carried over to 2022-2023.
Chemical Management Plan	Special water sampling at a select station on the Waterford River	NL ECC	CMP water samples were collected four time for Alkylphenols and PFOS from Waterford River from April 1, 2021 to March 31, 2022.
Labrador Remote Station Sampling	Labrador water samples are collected by both federal and provincial staff in support of CESI reporting (for more remote core sites).	ECCC	Northern sampling and analysis proceeded as outlined in the Annual Work Schedule 2021-2022. See Table 2.
		NL ECC	

Table 6: Special Projects (Work Shared)

Project	Activity	Responsible Agency	Progress Evaluation
Monitoring Network Evaluation and Optimization	This on-going project focuses on evaluating the network on a regular basis to ensure that the partner’s monitoring objectives are being met and that the network will be sustainable in the long-term.	ECCC _____ NL ECC	<u>Environment and Climate Change Canada</u> - ECCC continued to provide guidance and advice as required and work with NL ECC to optimize approach for NL waters. - Sampling frequencies were evaluated on an on-going basis. <u>NL Department of Environment and Climate Change</u> - Initiation of the Phase 3 of the trend report for WQMA stations with 2006-2020 data. - Completion of the precipitation network evaluation work which identified the precipitation station clusters based on precipitation data and also prioritized stations within each cluster. The work prepared to be presented in NL Climate owners working group workshop.
Real-time instrumentation special projects	In-situ water quality/quantity/climate monitoring using a mobile environmental monitoring platform (MEMP) on a need-basis across the province.	ECCC _____ NL ECC	Significant work on the body and equipment components was completed on the MEMP in 2021-2022. The MEMP is ready for deployment for 2022.
	Sharing of instrumentation purchase, deployment and maintenance expenses for monitoring stations of joint interest.	ECCC _____ NL ECC	The camera at Leary’s Brook experienced numerous issues from July – November 2021 and ceased working in February 2022.
Extrapolation of non-measured data at select real-time stations	Development of regression models to extrapolate water quality parameters from real-time measurements of related parameters	ECCC _____ NL ECC	<u>NL Department of Environment and Climate Change</u> - Completion of the draft technical report of TSS-Turbidity regression models (Churchill River sites) describing the model and the current phase of work. More data is expected before finalization of the report. <u>Environment and Climate Change Canada</u> - ECCC will continue to provide technical advice and review on the approach considering its national applicability.

In fiscal year 2021-2022, select WRMD staff attended and presented at many conferences and training initiatives. They are as follow:

- WHMIS – June 2021
- Canadian Ecotoxicity Workshop (online) – October 2021
- Virtual Harmful Algal Bloom Research Symposium – January 2022

Table 7: Industry Monthly and Annual Real-Time Water Quality Reports Completed for 2021-2022

Partners	Monthly Deployment Reports	Annual Deployment Reports
Canada Fluorspar Inc	Apr 2021 – May 2021 May 2021 – Jun 2021 Jun 2021 – Jul 2021 Jul 2021 – Aug 2021 Aug 2021 – Sep 2021 Sep 2021 – Nov 2021 *Removed Winter Months	Apr 2021 – Jan 2022
Duck Pond Operations (TECK)	Nov 2020 – May 2021 May 2021 – Jun 2021 Jun 2021 – Jul 2021 Jul 2021 – Aug 2021 Aug 2021 – Oct 2021 Oct 2021 – May 2022	Jan 2021– Dec 2021
Nalcor	May 2021 – Jul 2021 Jul 2021 – Aug 2021 Aug 2021-Sep 2021 Sep 2021 – Oct 2021 *Removed Winter Months	May 2021 – Oct 2021
Northern Harvest Smolt Ltd	n/a	Jan 2021 – Dec 2021
Grieg NL Nurseries	Mar 2021 – Jun 2021 Jun 2021 – Aug 2021 Aug 2021 – Nov 2021	Nov 2022 – Nov 2021
IOC	Jun 2021 – Jul 2021 Jul 2021 – Sept 2021 Sep 2021 – Oct 2021 *Removed Winter Months	Jun 2021 – October 2021
Rambler Metals and Mining Inc	May 2021 – Jul 2021 Jul 2021 – Sep 2021 Sep 2021 – Nov 2021 *Removed Winter Months	May 2021 – Nov 2021
Tacora Resources (formally Wabush Mines)	Jun 2021 – Jul 2021 Jul 2021 – Sep 2021 Sep 2021 – Oct 2021 *Removed Winter Months	Jun 2021 – Oct 2021
Tata Steel Minerals Canada Limited (TSMC)	Jun 2021 Jun 2021 – Jul 2021 Jul 2021 – Sep 2021 *Removed Winter Months	Jun 2021 – Sep 2021
Vale (Long Harbour)	Mar 2021 – Apr 2021 Apr 2021 – May 2021 May 2021 – Jun 2021 Jun 2021 – Aug 2021 Aug 2021 – Sep 2021 Sep 2021 – Nov 2021 Nov 2021 – Dec 2021	Jan 2021– Dec 2021

	Dec 2021 – Jan 2022 Jan 2022 – Feb 2022 Feb 2022 – Mar 2021 Mar 2021 – Apr 2021	
Vale (Voisey's Bay)	May 2021 – Jul 2021 Jul 2021 – Aug 2021 Aug 2021 – Sep 2021 Sep 2021 – Oct 2021 *Removed Winter Months	May 2021 – Oct 2021

Table 8: WRMD Monthly Real-Time Water Quality Reports Completed for 2021-2022

WRMD Network	Monthly Deployment Reports
Leary's Brook at Prince Philip Drive	Mar 2021 – May 2021 May 2021 – Jul 2021 Jul 2021 – Oct 2021 Oct 2021 – Nov 2021 Nov 2021 – Feb 2022 Feb 2022 – Mar 2022
Humber River at Humber Village Bridge	Jan 2021 – May 2021 May 2021 – Jul 2021 Jul 2021 – Nov 2021 Nov 2021 – Feb 2022 Feb 2022 – Apr 2022
Paddys Pond	Jun 2021 – Jul 2021 Jul 2021 – Sep 2021 Sep 2021 – Nov 2021 Nov 2021 – Dec 2021 *Removed Winter Months
Waterford River at Kilbride	Jan 2021 – Aug 2021 Aug 2021 – Dec 2021 Dec 2021 – Feb 2022 Mar 2022 – May 2022

Conclusion

A significant amount of work took place under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* for fiscal year 2021-2022. The number of available products from this program continues to grow annually.

NL ECC would like to take this opportunity to thank our federal counterparts (EC Atlantic Region) for their on-going support and commitment in ensuring the delivery of the outcomes/products under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement*.



Appendix A
Additional WRMD Activities 2021-2022

Project	Activity	Responsible Agency	Progress Evaluation
CANAL/Site Documentation Database/Bacteriological Database	Updating of the Site Documentation Database	Newfoundland and Labrador Department of Environment and Climate Change	Updates to the Site Documentation Database are completed as needed.
	Calculation of the Water Quality Index scores	Newfoundland and Labrador Department of Environment and Climate Change	In 2021-2022, CESI reporting was completed on 2018-2020 data.
Ambient Monitoring Activities	Blue-Green Algae Monitoring	Newfoundland and Labrador Department of Environment and Climate Change	Data is collected each summer on a “needs basis”, in response to public requests. Monitoring was conducted at Millers Pond (PCSP) and Forest Pond (Salmon Cove) in 2021. A BGA report was prepared for 2021. The report is on the NL ECC webpage.
Technical Documents (WQMA)	Updating of Water Quality Monitoring Sampling Manual	Newfoundland and Labrador Department of Environment and Climate Change	Updated as required.
	Field Sampling Tablet Application	Newfoundland and Labrador Department of Environment and Climate Change	Digital field sheets using a tablet was utilized in the Labrador region in 2021-22.
	Water Index (Quality/Quantity) Calculator	Newfoundland and Labrador Department of Environment and Climate Change	Continued to test and explore the multi-guideline/multi-station feature and add code for site specific guideline option and aquatic adjustment.
Real-Time Related Projects	Piloting of Drone Technology	Newfoundland and Labrador Department of Environment	Eight flights completed for dams, CABIN, MET stations and water

		and Climate Change	monitoring investigations.
	Buoy System Deployment	Newfoundland and Labrador Department of Environment and Climate Change	Buoy deployed in Miller's Pond, PCSP from Sep 23 – Nov 18, 2021. Buoy payload included Hydrolab DS5X & aquaMeasure BGA sensor.
	Real-time Instrumentation in-house Testing and Servicing	Newfoundland and Labrador Department of Environment and Climate Change	This is an on-going task. Testing and evaluation generally takes place from Jan to April/May and involves a complete review of every water quality instruments in the network. There were 73 repairs conducted in 2021.
	Training of Industry Partners	Newfoundland and Labrador Department of Environment and Climate Change	No industry training was requested in 2021-2022 due to COVID-19 restrictions.
Education/Outreach	Outreach	Newfoundland and Labrador Department of Environment and Climate Change	No education/outreach was conducted in 2021-22 due to COVID-19 restrictions.