

CANADA-NEWFOUNDLAND and LABRADOR WATER QUALITY MONITORING AGREEMENT

Progress Report 2018-2019



Water Resources Management Division
Department of Municipal Affairs & Environment
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 WRMD staff to document progress made on all activities under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* during 2018-2019. This document is formatted to reflect the same layout as the 2018-2019 Annual Work Schedule. Additionally, a table has been added to include activities completed solely by WRMD staff.

Work Shared Activities for Fiscal Year 2018-2019

Activity	Responsible Agency	Remarks
Cost Shared and Work-Shared Ambient Water Quality Monitoring and Data Management Activities	Newfoundland and Labrador Department of Municipal Affairs and Environment <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 Municipal Affairs and Environment <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 Municipal Affairs and Environment <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 Municipal Affairs and Environment	Refer to Appendix A for WRMD tasks/projects

Ambient Water Quality Sampling

During 2018-2019, the ambient water quality grab sampling proceeded as outlined in the corresponding Annual Work Schedule. 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, due to scheduling conflicts, human resource limitations and adverse weather conditions some samples were missed.

In the upcoming fiscal year, NL ENVC staff will aim to ensure that the number of samples collected reflect the number of samples scheduled as outlined in the Annual Work Schedule 2019-2020.

Table 1: Provincial Samples Collected in 2018-2019 Fiscal Year in Newfoundland (Island Portion of the Province)

Station #	Description	Number of Samples Scheduled in 18-19	Number of Samples Collected in 18-19
<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 18-19	Number of Samples Collected in 18-19
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	4

Station #	Description	Number of Samples Scheduled in 18-19	Number of Samples Collected in 18-19
NF02YL0106	South Brook below TCH	4	3
NF02YG0020	Eagle Mountain Brook below Eagle Mountain Pond	4	2
NF02YH0018	Lomond River at Route 431	4	4
NF02YJ0004	Pinchgut Brook at TCH	10	8
NF02YK0022	Humber Canal at Main Dam Road	4	3
NF02YL0011	Humber River at Little Falls Bridge	4	3
NF02YL0012	Humber River at Humber Village Bridge	10	6
NF02YL0013	Corner Brook at Margaret Bowater Park	4	3
NF02YL0029	Wild Cove Brook at Route 440	4	3
NF02YN0001	Lloyds River at Route 480	5	5
NF02YN0043	Peter Stride's Lake at Route 780	4	3
NF02ZA0006	Grand Codroy River below Overfall Brook	4	4
NF02ZC0020	Buck Lake on Route 480	4	2

Notes:

1. Total number of samples collected in 2018-19 does include duplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2018-19 for Eastern region was 106; 106 were sampled, plus 12 duplicates and 4 trip blanks.
3. Total number of samples planned for 2018-19 for Central region was 44; 44 were sampled, plus 4 duplicates and 3 trip blanks.
4. Total number of samples planned for 2018-19 for Western region was 79; 62 were sampled, plus 3 duplicates and 2 trip blanks.

Table 2: Northern Samples Collected in 2018-2019 Fiscal Year in Labrador

Station #	Description	Number of Samples Scheduled in 18-19	Number of Samples Collected in 18-19
NF02XA0001	Little Mecatina River above Lac Fourmont	4	4
NF03NF0013	Ugjoktok River below Harp Lake	4	6
NF03OA0020	Ashuanipi River at Ferguson Bay	4	4
NF03OC0012	Atikonak River above Panchia Lake	4	3
NF03OD0011	East Metchin River at TLH	4	4
NF03OD0012	Wilson River East Branch	4	3
NF03OE0001	Churchill River Above Upper Muskrat Falls	4	3
NF03OE0050	Churchill River 6.15kms below Lower Muskrat Falls	4	5
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	4
NF03PB0028	Cape Caribou River at Grand Lake	4	4
NF03PB0029	Grand Lake Outflow at North West River	4	5
NF03PB0030	Seal Lake at Narrows	4	5
NF03PB0032	Susan River North of Beaver River	4	4
NF03PB0037	Wuchusk Lake at Naskaupi River Inflow	4	3
NF03QA0044	Carter Basin Outflow	4	4
NF03QA0045	Kenamu River near Mouth	4	4
NF03QC0001	Eagle River above Falls	4	1
NF03QC0002	Alexis River near Port Hope Simpson	4	2
NF03XB0018	Tributary to St. Augustin River	4	3

Notes:

1. Total number of samples collected in 2018-19 does include duplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2018-19 for Labrador region was 100; 93 were sampled, plus 4 duplicates and 2 trip blanks.

Ambient Water Quality Analysis

During 2018-2019 analytical service for major ions, physical-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 2018-2019 as seen in **Table 3**.

Table 3: Analytical Parameters, Holding Times and Schemas for 2018-2019

Schema Name	Parameter	Holding Times (recommended by ALET)
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	24 hours
M_Conductivity	Conductivity	28 days
M_Colour	Colourv - apparent	48 hours*
M_Turbidity	Turbidity	48 hours
NUTRIENTS		
M-Anions	Nitrate	24 hours*
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 2018-2019, significant effort from both EC and NL ENVC 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 MAE	See Table 1 and 2 for list of samples scheduled and collected.
	Laboratory Analysis and Quality Control Processes	ECCC	301 discrete + 23 QA/QC samples were analysed for 54 separate analytes. All data were verified at the time of sample reception and upon insertion to NAQUA. In 2018 DOC changed to TOC. It was never filtered so the results should always have been TOC.
Data Management	Processing and Loading of WQ analytical data	ECCC	This has been completed and up to date for 2017-2018.
	Accessibility/Availability of NL WQMA Dataset	ECCC	Data from NAQUA was provided to NL in September 2018 and March 2019. In Feb 2019, the Open Data links from ECCC were added to the WRMD website to increase accessibility of data to the public.
Data Management Special Projects	Data Verification and Validation of Sample/Masurement Data	ECCC <hr/> NL MAE	Initiated the WQMA data verification process for all 2018 samples across NL regions involving staff members.

			Forwarded inconsistency for some station data and parameters to ECCC.
	Data extraction tools development and updates	ECCC _____ NL MAE	No additional tools were developed in 2018-19.

Table 5: Additional Core Activities 2018-2019 (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 MAE	The three annual CABIN sites were sampled in 2018: Northeast River (Eastern), Careless Cove Brook (Central) and Pinchgut Brook (Western).
	Baseline Report on Reference Invertebrate Assemblages in NL	ECCC _____ NL MAE	No progress due to lack of resources for evaluation of data.
	Share spatial data with EC, for use in the reference model	NL MAE	This task is ongoing as new data becomes available each year.
	Field certification and training (as needed)	NL MAE	No training was requested or provided in 2018-2019.
	Develop CABIN reference model and associated tools	ECCC	ECCC’s Watershed Hydrology and Ecology Research Division. It will be available end of 2021. Continued calibration and testing of Atlantic Canada model by EC, WRMD and partners.

	Prepare course/presentation on how to look at data in Atlantic	ECCC	Planned for 2021-22
Canadian Environmental Sustainability Indicators (CESI)	Compile, analyse and interpret water quality data at core CESI stations according to CESI protocols	NL MAE	This has been completed and up to date for 2018-2019.
	Update CANAL metadata website for current year's CESI data	NL MAE	Drivers of WQI scores and rankings were completed but not updated in CANAL. Deferred to 2019-2020.
	Final report validating/contributing to CESI core stations review for longer term WQI national reporting	NL MAE	This was completed for 2018-2019.
	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 2018-2019.
	CESI WQI Error Fact Sheet	NL MAE	CESI Error Fact sheet was compiled and forwarded to ECCC using many years of commonly user error.
	Modifications/ Improvements to CESI WQI Calculator	Troubleshooting support and corresponding update in CESI Calculator coding.	NL MAE
Update of CESI Calculator Help Manual as required		NL MAE	CESI Calculator Manual is kept up-to-date as needed.
Investigate how Trends Analysis can be incorporated into the CESI calculator.		ECCC	Ongoing

Data Management Special Projects	Prepare and host R workshop/training session for ECCC.	NL MAE	A half day R- workshop training was delivered to ECCC.
Chemical Management Plan	Special water sampling at a select station on the Waterford River	NL MAE	Two CMP water samples were collected for Nonylphenols and Nonylphenol Ethoxylates (NP-NPE) and Perfluorochemicals (PFC) from Waterford River in April 2018.
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 _____ NL MAE	Northern sampling and analysis proceeded as outlined in the Annual Work Schedule 2018-2019. See Table 2.

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.	ECCCC _____ NL MAE	<p>Risk-Based Assessment (station level): Keep updating RBA website as needed.</p> <p>Risk-Based Assessment (basin level): Analysis was performed at station level only for this fiscal year.</p> <p>Power Analysis / Trend Analysis: Updated WQMA biannual data transfer to E-Trend application.</p> <p>Developed an R script to export all updated biannual WQMA data transfer to individual csv file based on station and region.</p>
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 MAE	The MEMP was deployed November 2017 to June 2018 at Northwest Pond – drinking water supply for Ramea. The deployment caused wind damage to instrumentation and repairs are required.
	Sharing of instrumentation purchase, deployment and maintenance expenses for	ECCC _____ NL MAE	Continuous water quality instrumentation belonging to EC, being used at select NL real time stations, was evaluated, assessed and repaired as necessary by NL MAE Staff.

	monitoring stations of joint interest.		
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 MAE	Presentation of conductivity vs ionic concentration model for Leary’s Brook, Waterford River, Long Harbour (Rattling Brook below Bridge) and Humber River at the Real Time Water Quality Workshop.
Real-time water quality monitoring products	Technical reports for real-time and automated water quality monitoring activities.	ECCC _____ NL MAE	Report on review of long-term continuous monitoring results (IOC – 10 years) was deferred to 2019-2020. No RTWQ station audits were conducted for 2018-2019.
Real-time water quality monitoring workshop	Real-time water quality monitoring workshop was hosted in November 2018.	ECCC _____ NL MAE	The Real-Time Water Quality workshop was hosted by NL MAE November 7 th & 8 th , 2018. The workshop brought together individuals working with this technology and allowed a forum for the exchange of information and networking. Additionally, the manufacturers of automated water quality equipment and associated products provided a trade show. NL MAE organized and hosted the workshop. ECCC paid for keynote speaker.
Progress Reports	Progress reports for auditing purposes	ECCC _____ NL MAE	Reports deferred to 2019-2020.

In fiscal year 2018-2019, select WRMD staff attended and presented at many conferences and training initiatives. They are as follow:

- R Introductory Training – May 2018
- Webinar: Launch of 2017 Data Collection Process – May 2018
- Pleasure Craft Operator Course – August 2018
- GNSS Training – September 2018
- Real-Time Water Quality Workshop Presentations – November 2018
- Atlantic Canada Cyanobacteria Workshop – November 2018
- Emergency First Aid – February 2019
- Presentations for Marine Institute Water Quality Course – March 2019
- Drinking Water Safety Workshop – March 2019
- ESRI Training: Going Places with Spatial Analysis – March 2019
- Drone Training – March 2019

Table 7: Industry Monthly and Annual Real-Time Water Quality Reports Completed by WRMD for 2018-2019

Partners	Monthly Deployment Reports	Annual Deployment Reports
Vale (Voisey's Bay)	Jun 2018 – Aug 2018 Aug 2018 – Sep 2018 Sep 2018 – Oct 2018 *Removed Winter Months	Jun 2018 – Oct 2018
Vale (Long Harbor)	Mar 2018 – Apr 2018 Apr 2018 – Jul 2018 Jul 2018 – Aug 2018 Aug 2018 – Oct 2018 Oct 2018 – Dec 2018 Dec 2018 – Jan 2019 Jan 2019 – Mar 2019 Mar 2019 – Apr 2019	Jan 2018 – Dec 2018
Duck Pond Operations (TECK)	Nov 2017 – May 2018 May 2018 – Jul 2018 Jul 2018 – Sep 2018 Sep 2018 – Nov 2018 Nov 2018 – May 2019	Jan 2018 – Dec 2018
Tacora Resources (formally Wabush Mines)	Jun 2018 – Jul 2018 Jul 2018 – Sep 2018 Sep 2018 – Oct 2018 *Removed Winter Months	Jun 2018 – Oct 2018
IOC	Jun 2018 – Jul 2018 Jul 2018 – Sep 2018 Sep 2018 – Oct 2018 *Removed Winter Months	Jun 2018 – Oct 2018
Tata Steel Minerals Canada Limited (TSMC)	Jun 2018 – Jul 2018 Jul 2018 – Sep 2018 Sep 2018 – Oct 2018 *Removed Winter Months	Jun 2018 – Oct 2018
Nalcor	May 2018 – Jul 2018 Jul 2018 – Aug 2018 Aug 2018 – Oct 2018 Oct 2018 – Nov 2018 *Removed Winter Months	May 2018 – Nov 2018
Canada Fluorspar Inc	May 2018 – Jun 2018 Jun 2018 – Jul 2018 Jul 2018 – Aug 2018 Aug 2018 – Sep 2018 Sep 2018 – Nov 2018 Nov 2018 – Jan 2019 *Removed Winter Months	May 2018 – Jan 2019

Table 8: WRMD Monthly Real-Time Water Quality Reports Completed by WRMD for 2018-2019

WRMD Network	Monthly Deployment Reports
Leary's Brook at Prince Philip Drive	Mar 2018 – Apr 2018 Apr 2018 – May 2018 May 2018 – Jul 2018 Jul 2018 – Aug 2018 Aug 2018 – Oct 2018 Oct 2018 – Dec 2018 Dec 2018 – Feb 2019 Feb 2019 – Apr 2019
Humber River at Humber Village Bridge	January 2018 – November 2018 *Not deployed due to equipment issues and staff vacancies.
Paddys Pond	Mar 2018 – May 2018 May 2018 – Jul 2018 Jul 2018 – Aug 2018 Aug 2018 – Oct 2018 Oct 2018 – Nov 2018 Nov 2018 – Apr 2019
Waterford River at Kilbride	Jan 2018 – Apr 2018 Apr 2018 – May 2018 May 2018 – Jul 2018 Jul 2018 – Aug 2018 Aug 2018 – Dec 2018 Dec 2018 – May 2019

Conclusion

A significant amount of work took place under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* for fiscal year 2019-2020. The number of available products from this program continues to grow annually.

NL ENVC would like to take this opportunity to thank our federal counterparts (ECCC 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 2018-2019

Project	Activity	Responsible Agency	Progress Evaluation
CANAL/Site Documentation Database/Bacteriological Database	Updating of the Site Documentation Database	Newfoundland and Labrador Department of Municipal Affairs and Environment	Updates to the Site Documentation Database are completed as needed.
	Calculation of the Water Quality Index scores	Newfoundland and Labrador Department of Municipal Affairs and Environment	In 2018-2019, CESI reporting was completed on 2015-2017 data.
Ambient Monitoring Activities	Blue-Green Algae Monitoring	Newfoundland and Labrador Department of Municipal Affairs and Environment	Data is collected each summer on a “needs basis”, in response to public requests. Monitoring was conducted at Millers Pond (PCSP) in 2018. A BGA report was prepared for 2018. The report is on the NL MAE webpage. NL MAE presented on the history of BGA blooms in NL at the Atlantic Canada Cyanobacteria Workshop in November 2018. NL MAE was a partner in the Atlantic Interprovincial Cyanobacteria Management Interests Planning Meeting in January 2019 and commenced a research project with NRC in January 2019 to study BGA species and toxins in NL during the summer of 2019.
Technical Documents/Activities (WQMA)	Updating of WQMA Sampling Manual	Newfoundland and Labrador Department of Municipal Affairs and Environment	Manual was completed in Spring 2018 and posted to the NL MAE webpage. This manual will be updated as required.
	Updating of Contour Maps	Newfoundland and Labrador Department of Municipal Affairs and Environment	Version 2 of the 43 water quality contour maps underwent quality review. Less-than-detect values were targeted for removal due to their influence on mapping results. GIS models were updated in preparation of creating version 3 maps once quality review is complete.

	Delineation of Watersheds Upload to Portal	Newfoundland and Labrador Department of Municipal Affairs and Environment	Three new ambient water monitoring sites and two new hydrometric stations had their watersheds delineated. These watersheds have not been uploaded to the internal and external web portals.
	Water Quality Calculator	Newfoundland and Labrador Department of Municipal Affairs and Environment	CCME WQI Calculator Help Manual is developed based on CESI WQI Calculator manual. Forwarded newer version of CCME input file and help manual to CCME group to be updated in the website. Added Help Manual FAQ in English and French.
	Water Quality Trends Report	Newfoundland and Labrador Department of Municipal Affairs and Environment	Presentation of Trend Analysis results to ECCC partners during face to face meeting in St. John's NL.
	Water Index (Quality/Quantity) Calculator	Newfoundland and Labrador Department of Municipal Affairs and Environment	Continue updating the front end forms and functions for the Water Quality/Quantity Calculator. Develop a documentation describing the functionalities of the calculator.
	Network Evaluation	Newfoundland and Labrador Department of Municipal Affairs and Environment	Initial analysis of Hydrometric Network evaluation using R programming tidyhydat. Exploring the R function for Entropy analysis based on similar work done in New Brunswick hydrometric network evaluation. Compile list of stations which are currently active and unregulated to be used for the network analysis. The initial findings of the Network Evaluation was presented during face to face meeting with ECCC partners in St. John's NL.
	R Training	Newfoundland and Labrador Department	A half day R-training was delivered to federal partners all across Canada.

		of Municipal Affairs and Environment	
Real-Time Related Projects	Negotiating/renewals of Memorandum of Agreements with industry – New MOAs and Renewals	Newfoundland and Labrador Department of Municipal Affairs and Environment	<ul style="list-style-type: none"> - Churchill Falls (Labrador) Corporation Limited (CFLCo) signed an extension of the MOA in September 2018. - Rambler Metals and Mining Canada Ltd signed a new MoA in March 2019. - TSMC signed an amendment to relocate the Goodream station and extended the agreement to March 2020. - Vale Long Harbour signed an amendment in March 2019 for the addition of two weather stations to the MoA. - Preliminary discussions begun with Northern Harvest Smolt Ltd and Grieg Nurseries NL Ltd.
	Research and Development of New Technologies	Newfoundland and Labrador Department of Municipal Affairs and Environment	Beta testing conducted during the summer of 2018 on HL7 (Hach), Exo3 (YSI) and Eureka (by Eureka). Incorporation of water turbine was investigated (Water Lily).
	Piloting of Drone Technology	Newfoundland and Labrador Department of Municipal Affairs and Environment	Standard Operating Procedures document created. One new pilot trained in 2018-2019.
	Redeployment of Buoy System in Lake Melville	Newfoundland and Labrador Department of Municipal Affairs and Environment	Buoy deployed in Lake Melville from August 15, 2018 to October 25, 2018. Deployment was delayed due to heavy ice conditions.
	Development of ADRS Console	Newfoundland and Labrador Department of Municipal Affairs and Environment	This is a multi-year project. An admin version was completed in 2018-2019 and put into operation.
	Implementation of Improvements to RTWQ Data Report on Departmental Website	Newfoundland and Labrador Department of Municipal Affairs and Environment	Following a review of national and international water quality data reporting methodologies, a guidance document was drafted to initiate improvements to water quality data dissemination

			on the WRMD website. It was determined that due to OCIO restrictions, the webpage changes proposed in the report were not feasible for 2018-2019.
	Real-time Instrumentation in-house Testing and Servicing	Newfoundland and Labrador Department of Municipal Affairs and Environment	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 75 repairs conducted in 2018.
	Incorporation of QA/QCed data into ADRS	Newfoundland and Labrador Department of Municipal Affairs and Environment	Preliminary discussions began in January 2019 but deferred to 2019-2020 due to workloads.
	Training of Industry Partners	Newfoundland and Labrador Department of Municipal Affairs and Environment	No industry training was requested in 2018-2019.
Technical Documents (RTWQ)	Report on the Comparison of TSS Concentration vs Real-time Turbidity Readings	Newfoundland and Labrador Department of Municipal Affairs and Environment	Continue collecting turbidity and TSS data for all real time stations across the province to identify which stations consists the required number of samples for model development.
Application of Earth Observation	Monitor Changes in Turbidity and TSS along the Churchill River	Newfoundland and Labrador Department of Municipal Affairs and Environment	The methodology was finalized to map turbid waters at the mouth of Churchill River and southern portion of Lake Melville using bathymetric data and satellite imagery in 2018-2019.
Wetlands Inventory Partnership	Inventory and classification project with multiple partners to aid in wetlands inventory and classification systems	Newfoundland and Labrador Department of Municipal Affairs and Environment	A map product of Avalon pilot site created by C-CORE based on three years of field data contributed by the WRMD (2015-2017) was developed in 2018-2019.
Education/Outreach	Educational Displays	Newfoundland and Labrador Department of Municipal Affairs and Environment	An initial meeting at the Fluvarium to improve the digital display took place in January 2019.

