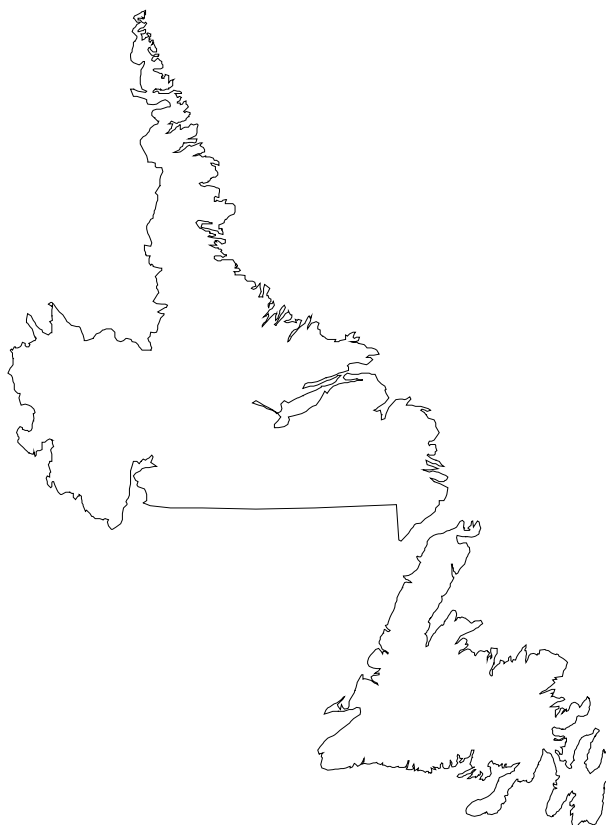


CANADA-NEWFOUNDLAND and LABRADOR WATER QUALITY MONITORING AGREEMENT

Progress Report 2016-2017



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

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 2016-2017. This document is formatted to reflect the same layout as the 2016-2017 Annual Work Schedule. Additionally, a table has been added to include activities completed solely by NL MAE staff.

Work Shared Activities for Fiscal Year 2016-2017

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 (NL MAE) <u>and</u> Environment and Climate Change Canada (ECCC)	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 2016-2017, 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 MAE staff will aim to ensure that the number of samples collected reflect the number of samples scheduled as outlined in the Annual Work Schedule 2017-2018.

Table 1: Provincial Samples Collected in 2016-2017 Fiscal Year in Newfoundland (Island Portion of the Province)

Station #	Description	Number of Samples Scheduled in 16-17	Number of Samples Collected in 16-17
<u>EASTERN REGION</u>			
NF02ZK0005	Northeast River near Placentia	4	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	12	12
NF02ZM0179	Tributary to Virginia River at Guzzwell Drive	4	4

Station #	Description	Number of Samples Scheduled in 16-17	Number of Samples Collected in 16-17
NF02ZM0180	Virginia River at Newfoundland Drive	4	4
NF02ZM0181	Waterford River at Blackhead Road	12	12
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	Manuals 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 at 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
NF02YG0020	Eagle Mountain Brook below Eagle Mountain Pond	4	3

Station #	Description	Number of Samples Scheduled in 16-17	Number of Samples Collected in 16-17
NF02YH0018	Lomond River at Route 431	4	4
NF02YJ0004	Pinchgut Brook at TCH	12	9
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	12	8
NF02YL0013	Corner Brook at Margaret Bowater Park	4	4
NF02YL0029	Wild Cove Brook at Route 440	4	3
NF02YL0106	South Brook near Pasadena Beach	4	3
NF02YN0001	Lloyds River at Route 480	5	5
NF02YN0043	Peter Stride's Lake at Route 870	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 2016-17 does include duplicates samples. The total does not include bottle blanks.
2. Total number of samples planned for 2016-17 for Eastern region was 109; 110 were sampled plus 10 duplicates and 3 trip blanks.
3. Total number of samples planned for 2016-17 for Central region was 44; 44 were sampled plus 4 duplicates and 3 trip blanks.
4. Total number of samples planned for 2016-17 for Western region was 83; 70 were sampled plus 5 duplicates and 6 trip blanks.

Table 2: Northern Samples Collected in 2016-2017 Fiscal Year in Labrador

Station #	Description	Number of Samples Scheduled in 15-16	Number of Samples Collected in 15-16
<u>LABRADOR REGION</u>			
NF02XA0001	Little Mecatina River above Lac Fourmont	4	4
NF03NF0013	Ugjoktok River below Harp Lake	5	3
NF03OC0012	Atikonak River above Panchia Lake	5	4
NF03OD0011	East Metchin River at TLH	4	4
NF03OE0001	Churchill River Above Upper Muskrat Falls	4	4
NF03OE0030	Minipi River below Minipi Lake	5	5
NF03OE0032	Pinus River above TLH	4	5
NF03OE0033	Big Pond Brook below Big Pond	4	4
NF03PB0025	Naskaupi River below Naskaupi Lake	5	4
NF03QC0001	Eagle River above Falls	5	3
NF03QC0002	Alexis River near Port Hope Simpson	4	2
NF03OD0012	Wilson River East Branch	4	4
NF03OE0035	Dominion Lake Outflow	4	5
NF03OE0037	Cache River at TLH	4	4
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	3
NF03QA0044	Carter Basin Outflow	4	4
NF03QA0045	Kenamu River near Mouth	4	3
NF03OA0020	Ashuanipi River at Ferguson Bay	4	4

Notes:

1. Total number of samples collected in 2016-17 does include duplicates samples. The total does not include bottle blanks.
2. Total number of samples planned for 2016-17 for Labrador region was 93; 85 were sampled plus 4 duplicates and 2 trip blanks.

Ambient Water Quality Analysis

During 2016-2017 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 2016-2017 as seen in **Table 3**.

Table 3: Analytical Parameters, Holding Times and Schemas for 2019-2020

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_DOC	DOC	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 2016-2017, significant effort from both ECCC and NL WRMD 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 and field data submission to laboratory	Newfoundland and Labrador Department of Municipal Affairs and Environment	See Table 1 and 2 for list of samples scheduled and collected.
	Laboratory Analysis and Quality Control Processes	Environment and Climate Change Canada	309 discrete + 23 QA/QC samples were analysed for 54/55 separate analytes. All data were verified at the time of sample reception and upon insertion to NAQUA.
Data Management	Processing and Loading of WQ analytical data	Environment and Climate Change Canada	This has been completed and up to date for 2016-2017.
	Accessibility/Availability of NL WQMA Dataset	Environment and Climate Change Canada	Data from NAQUA was provided to NL in September 2016 and March 2017.
Data Management Special Projects	Data Verification and Validation of Sample/Masurement Data	Environment and Climate Change Canada Newfoundland and Labrador Department of Municipal Affairs and Environment	E-val eventually integrated into E-grapher and discussion between MAE and ECCC took place to transfer data that requires to be QA/QC'd in Excel file using E-grapher format. Updated Verification/Validations Protocol for the WQMA Manual.
	Data extraction tools development and updates	Environment and Climate Change Canada	No new data extraction tools were developed this year. GENIE continued to be the toll for public access to data.

		Newfoundland and Labrador Department of Municipal Affairs and Environment	
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Table 5: Additional Core Activities 2016-2017 (Cost-Shared)

Project	Activity	Responsible Agency	Progress Evaluation
Canadian Aquatic Biomonitoring Network (CABIN)	Monitoring of benthic invertebrates at selected waster 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	Newfoundland and Labrador Department of Municipal Affairs and Environment	The three Annual CABIN sites were sampled in 2016: Northeast River (Eastern), Careless Cove Brook (Central) and Pinchgut Brook (Western). NL MAE sampled one site on the Waterford River in partnership with Northeast Avalon ACAP (NAACAP) - Year 2.
	Baseline Report on Reference Invertebrate Assemblages in NL	Newfoundland and Labrador Department of Municipal Affairs and Environment	This has been deferred until fiscal year 2017-2018.
	Share spatial data with EC, for use in the reference model	Newfoundland and Labrador Department of Municipal Affairs and Environment	This task is ongoing as new data becomes available each year.
	Review Atlantic Model guidance document and procedures	Newfoundland and Labrador Department of Municipal Affairs and Environment	This task is ongoing as new updates to guidance and procedures for the Model are provided by ECCC.
	Develop CABIN reference model and associated tools and maintains database	Environment and Climate Change Canada	An update to the model was conducted via contract, however no reliable updates to the original model resulted from the work.

	Field Training	Newfoundland and Labrador Department of Municipal Affairs and Environment	NL MAE provides CABIN field training in NL as required. In 2016-2017, no Field Training Sessions were requested.
Canadian Environmental Sustainability Indicators (CESI)	Compile, analyse and interpret water quality data at core CESI stations according to CESI protocols	Newfoundland and Labrador Department of Municipal Affairs and Environment	This has been completed and up to date for 2016-2017.
	Update CANAL metadata website with current year's CESI data	Newfoundland and Labrador Department of Municipal Affairs and Environment	Drivers of WQI scores and rankings updated every year to CANAL WQI Comments section.
	Review CESI final report from EC for accuracy	Newfoundland and Labrador Department of Municipal Affairs and Environment	This was completed for 2016-2017.
	QA/QC of submitted data/results and report to the public on the web page	Environment and Climate Change Canada	This has been completed and up to date for 2016-2017.
Modifications/ Improvements to CESI WQI Calculator	Ability to calculate confidence intervals without having to install certain problematic stats components (Stat Conn)	Newfoundland and Labrador Department of Municipal Affairs and Environment	The option to compute Confidence Interval without the need to install Stat Conn DCOM components were added into the CESI WQI calculator in 2016-2017.
	Regular troubleshooting support	Newfoundland and Labrador Department of Municipal Affairs and Environment	All regular troubleshooting support was documented into and Excel file for the 2016-2017 fiscal year.
	Investigate how Trend Analysis can be incorporated into the CESI Calculator	Environment and Climate Change Canada	Given the data requirements and the continued development of the trend methodology, we concluded that it was not worthwhile to initiate the programming work on the application.

	Inclusion of French version of CESI Help Manual	Environment and Climate Change Canada	CESI French help manual was completed.
Chemical Management Plan	Special water sampling at a select station on the Waterford River	Newfoundland and Labrador Department of Municipal Affairs and Environment	CMP water samples were collected quarterly for Triclosan, Bisphenyl-A (BPA), Dysprosium (DY3), Nonylphenols and Nonylphenol Ethoxylates (NP-NPE) and Perfluorochemicals (PFC) from Waterford River from April 1, 2016 to March 31, 2017.
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).	Environment and Climate Change Canada Newfoundland and Labrador Department of Municipal Affairs and Environment	Northern sampling and analysis proceeded as outlined in the Annual Work Schedule 2016-2017. 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.	Environment and Climate Change Canada Newfoundland and Labrador Department of Municipal Affairs and Environment	<p>Risk-Based Assessment (station level): A website was created showing all NL stations with RBA ranking and maps. Option was created to view the stations in google earth using kmz files.</p> <p>Risk-Based Assessment (basin level): No progress in 2016-2017</p> <p>Power Analysis / Trend Analysis: An updated Power Analysis code was obtained from ECCC and analyzed for possible integration into Envirotrend.</p>

			Results of the completed Power Analysis by ECCC revealed a need to increase sampling at 4 sites to monthly, rather than quarterly.
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.	Environment and Climate Change Canada <hr/> Newfoundland and Labrador Department of Municipal Affairs and Environment	The MEMP unit shell, borrowed from ECCC in the Fall of 2015, underwent extensive additions and modifications in 2016-2017 to make it operational. However, the MEMP was not ready for deployment in 2016-2017, but will be deployed in 2017-2018.
	Sharing of instrumentation purchase and maintenance expenses for real-time monitoring stations of joint interest	Environment and Climate Change Canada <hr/> Newfoundland and Labrador Department of Municipal Affairs and Environment	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.
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.	Environment and Climate Change Canada <hr/> Newfoundland and Labrador Department of Municipal Affairs and Environment	Ionic Concentration Vs Sodium, Calcium, Chloride and Sulphate: All corrections for the journal submission paper finalized and the paper was published in Water Quality Research journal of Canada. Graphs for extrapolated parameters were updated into the Real Time Web page. Turbidity vs TSS Continual collection and analysis of the Turbidity and TSS data across the province to ensure sufficient samples are obtained to develop model.
Real-time water quality monitoring products	Technical reports for real-time and automated water quality monitoring activities	Environment and Climate Change Canada	Teck – Duck Pond Operations 10 year report completed on May 31, 2016.

		<p>_____</p> <p>Newfoundland and Labrador Department of Municipal Affairs and Environment</p>	<p>WRMD finalized station audit procedures and shared with Fresh Water Quality Monitoring and Surveillance.</p> <p>The Performance Testing and Evaluation (PTE) Process Manual was finalized in April 2016. This will be updated annually as required.</p> <p>Monthly and annual real-time reports were reviewed and posted to NL MAE webpage when completed.</p>
Progress Reporting	Progress reports for auditing purposes	Newfoundland and Labrador Department of Municipal Affairs and Environment	Progress reports deferred to 2017-2018.

In fiscal year 2016-2017, select WRMD staff attended training initiatives and presented at conferences. They are as follow:

- Fall Arrest training – July 2016
- Snow Fall Adapter training – November 2016
- Webinar - Data Analysis with R: Introduction, Basics, and Possibilities – December 2016
- Risk Management – January 2017
- Prolonged Sitting: MSI Controls – March 2017
- UAV Workshop, Corner Brook - Feb 2017
- Standard First Aid
- WHMIS 2015
- Lifting Techniques: Preventing Musculoskeletal Injuries

Table 7: Industry Monthly and Annual Real-Time Water Quality Reports Completed for 2016-2017

Partners	Monthly Deployment Reports	Annual Deployment Reports
Vale (Voisey's Bay)	Jun 2016 – Jul 2016 Jul 2016 – Aug 2016 Aug 2016 – Sep 2016 Sep 2016 – Oct 2016 *Removed Winter Months	Jun 2016 – Oct 2016
Vale (Long Harbor)	Mar 2016 – Apr 2016 Apr 2016 – Jun 2016 Jun 2016 – Aug 2016 Aug 2016 – Sep 2016 Sep 2016 – Nov 2016 Nov 2016 – Jan 2017 Jan 2017 – Feb 2017 Feb 2017 – Apr 2017	Jan 2016 – Dec 2016
Duck Pond Operations (TECK)	Jan 2016 – May 2016 May 2016 – Jul 2016 Jul 2016 – Aug 2016 Aug 2016 – Oct 2016 Oct 2016 – Nov 2016 Nov 2016 – May 2017	Jan 2016 – Dec 2016
Tacora Resources (formally Wabush Mines)	Jun 2016 – Jul 2016 Jul 2016 – Aug 2016 Aug 2016 – Oct 2016 *Removed Winter Months	Jun 2016 – Oct 2016
Iron Ore Company of Canada	Jun 2016 – Jul 2016 Jul 2016 – Aug 2016 Aug 2016 – Oct 2016 *Removed Winter Months	N/A
Tata Steel Minerals Canada Limited (TSMC)	May 2016 – Jul 2016 Jul 2016 – Aug 2016 Aug 2016 – Sept 2016 Sep 2016 – Oct 2016 *Removed Winter Months	May 2016 – Oct 2016
Nalcor	May 2016 – Jun 2016 Jun 2016 – Aug 2016 Aug 2016 – Sep 2016 Sep 2016 – Nov 2016 *Removed Winter Months	May 2016 – Nov 2016
Canada Fluorspar Inc	Nov 2016 – Jan 2017 *Removed Winter Months	May 2016 – Dec 2016

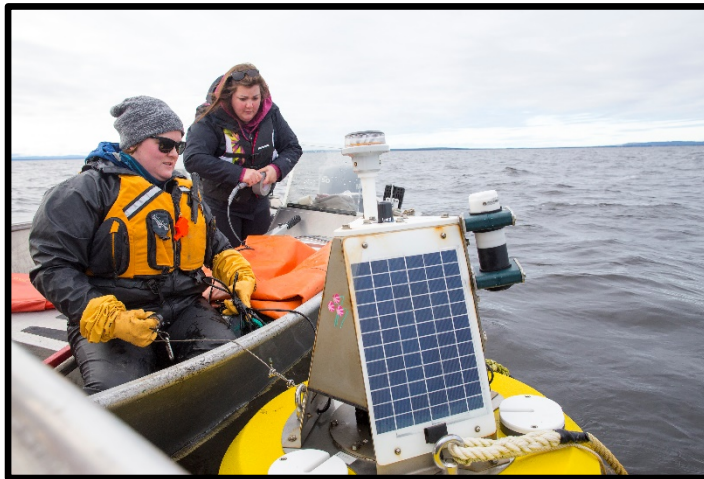
Table 8: WRMD Monthly Real-Time Water Quality Reports Completed for 2016-2017

WRMD Network	Monthly Deployment Reports
Leary's Brook at Prince Philip Drive	Mar 2016 – May 2016 May 2016 – Jun 2016 Jun 2016 – Jul 2016 Jul 2016 – Sep 2016 Set 2016 – Oct 2016 Oct 2016 – Nov 2016 Nov 2016 – Jan 2017 Jan 2017 – Feb 2017 Feb 2017 – Apr 2017
Humber River at Humber Village Bridge	Apr 2016 – Jun 2016 Jun 2016 – Aug 2016 Aug 2016 – Sep 2016 *New instrument to be installed 2017
Paddys Pond	May 2016 – Jul 2016 Jul 2016 – Aug 2016 Aug 2016 – Sep 2016 Sep 2016 – Nov 2016 Nov 2016 – Apr 2017
Waterford River at Kilbride	Mar 2016 – May 2016 May 2016 – Jul 2016 Jul 2016 – Sep 2016 Sep 2016 – Oct 2016 Oct 2016 – Jan 2017 Jan 2017 – Apr 2017

Conclusion

A significant amount of work took place under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* for fiscal year 2016-2017. The number of available products from this program continues to grow annually. Activities for 2017-2018 will be clearly outlined in the upcoming Annual Work Schedule and Divisional Work Plan.

NL MAE 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 2016-2017

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. An upload of the updates to the database will be done yearly. Land cover data was updated on March 2, 2017.
	Calculation of the Water Quality Index scores	Newfoundland and Labrador Department of Municipal Affairs and Environment	Previous year info: In 2016-2017, CESI reporting was completed on 2013-2015 data, with updated scores added to CANAL along with relevant interpretive comments.
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), Paddy’s Pond and Grand Pond in 2016. A BGA report was prepared for 2016. The report is on the NL MAE webpage.
Technical Documents (WQMA)	Updating of WQMA Sampling Manual	Newfoundland and Labrador Department of Municipal Affairs and Environment	Work completed in documenting sampling procedures and streamlining paperwork in 2016-2017. Series of technical memos created. This information will be the cornerstone of the WQMA sampling manual. This is a multi-year project.
	Updating of Contour Maps	Newfoundland and Labrador Department of Municipal Affairs and Environment	Contour maps (version1) were created for 43 water quality parameters. The method used for map creation was being documented. Examined the use of bedrock geology information and tertiary drainage boundaries for creating contour maps. Verification of accuracy is on-going. This is a multi-year project.
	Delineation of Watersheds Upload to Portal	Newfoundland and Labrador Department of Municipal Affairs and Environment	Updated internal and external WQMA watershed portal layers and created new portal layers for hydrometric watersheds. New watersheds will be delineated as required.

	Water Quality Calculator	Newfoundland and Labrador Department of Municipal Affairs and Environment	The data quantity ranking procedure was reviewed and initial analysis performed for possible integration. A similar process was applied into Envirotrend where percentiles for the quantity stations were displayed using nearest distance or drainage from the quality stations.
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"> - Canada Fluorspar Ltd MoA was signed June 2016. - Churchill Falls (Labrador) Corporation Limited (CFLCo) signed an extension of the MOA in August 2016. - Labrador Iron decommissioned in Spring 2016 as project on hold indefinitely. - NL Hydro signed an extensions of the Exploits and General Agreement MOAs in January 2017, expiring December 31, 2021. - Nalcor Energy signed an amendment/extension in September 2016 to be reviewed in 2017 Q1 (expiry December 31, 2019).
	Research and Development of New Technologies	Newfoundland and Labrador Department of Municipal Affairs and Environment	<p>RT Buoy: Damage from previous year was repaired. Buoy was deployed in Lake Melville July-September.</p> <p>Drones completed two aerial surveys of flow control structures within the Avalon Wilderness Reserve with associated report.</p> <p>Research into new technology is ongoing.</p>
	Quarterly Update of Temperature Probes	Newfoundland and Labrador Department of Municipal Affairs and Environment	Quarterly updates of temperature probes were conducted and information relayed to WSC for replacement. Priority Chart was created in May 2016, ranking water temperature probe locations in order of importance for replacement purposes.

	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 73 repairs conducted in 2016.
	Updating/Populating of Inventory, Calibration and Evaluation Database (ICED)	Newfoundland and Labrador Department of Municipal Affairs and Environment	This is an on-going task.
	Incorporation of QA/QCed data into ADRS	Newfoundland and Labrador Department of Municipal Affairs and Environment	Proof of concept completed and tested. Further discussions around data gaps and testing required before expansion of this process.
	Data Fix-it Tool	Newfoundland and Labrador Department of Municipal Affairs and Environment	The Shiny App Data Fix-It too, developed in 2015-2016, was implemented by staff for RT reporting. Further App development will occur in 2017-2018 to enhance its usability for staff.
	Training of Industry Partners	Newfoundland and Labrador Department of Municipal Affairs and Environment	Refresher training with Voisey's Bay Environmental Coordinator occurred on June 14, 2016.
Technical Documents (RTWQ)	Report on International Status of Real-time Monitoring Programs	Newfoundland and Labrador Department of Municipal Affairs and Environment	This report was completed in June 2016.
	Comparison of Multi-Parameter Instruments	Newfoundland and Labrador Department of Municipal Affairs and Environment	Report on comparison of YSI 6600, YSI Exo2 and Hydrolab HL4 was completed and posted to website in 2016-2017.
	Updating of RTWQ Sampling Manual	Newfoundland and Labrador Department of Municipal Affairs and Environment	This is updated annually as required.

	10 year RTWQ report for Teck (Duck Pond Operations), Newfoundland and Labrador	Newfoundland and Labrador Department of Municipal Affairs and Environment	This report was finalized and posted to the website in 2016-2017.
	10 year RTWQ report for Iron Ore Company of Canada, Newfoundland and Labrador	Newfoundland and Labrador Department of Municipal Affairs and Environment	Report as been delayed until 2017-2018.
	Categorization of Turbidity Alerts	Newfoundland and Labrador Department of Municipal Affairs and Environment	This was completed. The categorization process was used with one industry partner to assist in their environmental response and mitigation efforts. This product will be offered to other Industry partners and implemented as required.
	Report on the Comparison of TSS Concentration vs Real-time Turbidity Readings	Newfoundland and Labrador Department of Municipal Affairs and Environment	The first draft of the Turbidity-TSS report for the Lower Churchill sites was completed in 2016-2017.
Application of Earth Observation for Water Quality Monitoring	Monitor Changes in Turbidity and TSS along the Churchill River	Newfoundland and Labrador Department of Municipal Affairs and Environment	In 2016-2017, research was conducted into methods for measuring shallow water bathymetry using satellite data. Landsat-8 satellite imagery of Lake Melville and Canadian Hydrographic Service (CHS) digital sounding information for Lake Melville were acquired.
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	Wetland survey fieldwork was done for the Avalon pilot site in 2016-2017. Meetings with the steering committee twice in 2016-2017.
Automatic Data Retrieval System (ADRS)	Upgrades/Maintenance to ADRS as needed	Newfoundland and Labrador Department	This task is on-going.

		of Municipal Affairs and Environment	
Education/Outreach	Educational Displays	Newfoundland and Labrador Department of Municipal Affairs and Environment	<p>Upgrades to the Fluvarium Real-time monitoring display were discussed and attempted to obtain original coding. This will be investigated further in 2017-2018.</p> <p>Weird Stuff In Water: Additional topics of interest were researched and compiled. Website was drafted. Website will be added in 2017-2018.</p> <p>Educational displays or presentations included:</p> <ul style="list-style-type: none"> • Presentations at Marine Institute on CABIN, WQI/CESI, RT. • Take Kids to Work Day November 2016
	Webinar Series	Newfoundland and Labrador Department of Municipal Affairs and Environment	Preliminary investigations began in 2016-2017 into obtaining a webinar platform to host a webinar series in lieu of a Real Time Monitoring Workshop. Other methods will be investigated in e 2017-2018.