CANADA-NEWFOUNDLAND and LABRADOR
WATER QUALITY MONITORING AGREEMENT

Progress Report
2013-2014

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

Atlantic Water Quality Monitoring - Surveillance de la qualité de l'eau de l'Atlantique
Environment Canada - Environnement Canada
Dartmouth, Nova Scotia

Introduction

The following progress report was prepared by NL ENVC staff to document progress made on all activities under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* during 2013-2014. This document is formatted to reflect the same layout as the 2013-2014 Annual Work Schedule. Additionally, a table has been added to include activities completed solely by WRMD staff.

Work Shared Activities for Fiscal Year 2013-2014

Activity	Responsible Agency	Remarks
Ambient Water Quality Sampling	Newfoundland and Labrador Department of Environment and Conservation	Refer to **Table 1** for sampling details in Newfoundland Refer to **Table 2** for sampling details in Labrador
Ambient Water Quality Analysis	Environment Canada – National Laboratory for Environmental Testing (NLET)	Refer to **Table 3** for laboratory analysis details
Ambient Water Quality Monitoring and Data Management/Reporting	Newfoundland and Labrador Department of Environment and Conservation and Environment Canada	Refer to **Table 4** for projects/tasks
Additional Core Activities	Newfoundland and Labrador Department of Environment and Conservation and Environment Canada	Refer to **Table 5** for Additional Core Activities
Special Projects	Newfoundland and Labrador Department of Environment and Conservation and Environment Canada	Refer to **Table 6** for Special Projects
WRMD Activities	Newfoundland and Labrador Department of Environment and Conservation	Refer to Appendix A for WRMD tasks/projects

Ambient Water Quality Sampling

During 2013-2014, 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 2014-2015.

Table 1: Provincial Samples Collected in 2013-2014 Fiscal Year in Newfoundland (Island Portion of the Province)

Station #	Description	Number of Samples Scheduled in 13-14	Number of Samples Collected in 13-14
EASTERN REGION			
NF02ZK0005	Northeast River	8	8
NF02ZL0029	Goulds Brook	5	4
NF02ZM0004	Waterford River at Commonwealth Ave.	4	3
NF02ZM0009	Waterford River at Kilbride	4	3
NF02ZM0014	Virginia River at the Boulevard	4	4
NF02ZM0015	Quidi Vidi at Outlet	4	4
NF02ZM0016	Rennies River at Carnell Drive	4	4
NF02ZM0020	Broad Cove Brook	4	4
NF02ZM0098	Virginia River at headwaters	4	3
NF02ZM0109	Mundy Pond at Outlet	4	4
NF02ZM0144	Kelly's Brook at Portugal Cove Rd.	4	2
NF02ZM0175	Waterford River at Brookfield Rd.	4	3
NF02ZM0176	South Brook at Mouth	4	3
NF02ZM0177	Rennies River at Portugal Cove Rd.	4	4
NF02ZM0178	Learys Brook at Clinch Cres.	5	4
NF02ZM0179	Virginia River at Guzwell Drive	4	4

Station #	Description	Number of Samples Scheduled in 13-14	Number of Samples Collected in 13-14
NF02ZM0180	Virginia River at Newfoundland Drive	4	3
NF02ZM0181	Waterford River at Blackhead Rd.	5	5
NF02ZM0182	Waterford River at Bremigans Pond	4	3
NF02ZM0183	Kelligrews River at Kelliview Cres.	4	3
NF02ZM0184	Learys Brook at Outer Ring Road	4	2
NF02ZM0185	South Brook at Headwaters	4	3
NF02ZN0004	Salmonier River	4	3
NF02ZM0294	Manuals River	4	3
NF02ZM0359	Paddy's Pond at Outlet	4	3
CENTRAL REGION			
NF02YM0004	South West Brook at Baie Verte	4	4
NF02YM0003	Indian Brook	4	4
NF02YO0189	Joe's Lake	4	3
NF02YO0107	Exploits River at Millertown Dam	5	4
NF02YO0020	Exploits River at Aspen Brook	4	3
NF02YO0001	Exploits River at Grand Falls	4	3
NF02YO0128	Exploits River below Grand Falls	4	3
NF02YO0142	Corduroy Brook	4	4
NF02YO0143	Exploits River at Bond Bridge	4	3
NF02YR0001	Pound Cove Brook	4	4
NF02YO0121	Peter's River	4	3
NF02YQ0006	North West Gander River	4	3
NF02YQ0030	Gander River at Appleton	8	8
NF02YS0001	Terra Nova River at Terra Nova	4	3
NF02YS0011	Terra Nova River at ES Spencer Bridge	5	4

Station #	Description	Number of Samples Scheduled in 13-14	Number of Samples Collected in 13-14
NF02YS0083	Northwest River at Terra Nova	4	3
WESTERN REGION			
NF02YE0004	Portland Creek	4	3
NF02YE0005	Western Brook	5	4
NF02YG0001	Main River at Bridge	5	4
NF02YG0009	Main River at Paradise Pool	4	3
NF02YG0020	Eagle Mountain Brook	4	3
NF02YH0018	Lomond River	4	3
NF02YJ0004	Pinchgut Brook	8	6
NF02YK0022	Humber Canal	4	3
NF02YL0011	Humber River at Little Falls	4	3
NF02YL0012	Humber River at Humber Village Bridge	5	3
NF02YL0013	Corner Brook at Margaret Bowater Park	4	3
NF02YL0029	Wild Cove Brook	4	3
NF02YN0001	Lloyds River	5	4
NF02ZA0006	Grand Codroy River	4	2
NF02ZC0020	Buck Lake	4	3
NF02YN0043	Peter Stride's Lake	4	3

Notes:
1. Total number of samples collected in 2013-14 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2013-14 for Eastern region was 107; 97 were sampled, 8 of these samples were triplicates.
3. Total number of samples planned for 2013-14 for Central region was 70; 66 were sampled, 7 of these samples were triplicates.
4. Total number of samples planned for 2013-14 for Western region was 72; 55 were sampled, 2 of these samples were triplicates.

Table 2: Northern Samples Collected in 2013-2014 Fiscal Year in Labrador

Station #	Description	Number of Samples Scheduled in 13-14	Number of Samples Collected in 13-14
LABRADOR REGION			
NF02XA0001	Little Mecatina River	5	4
NF03NF0013	Ugjoktok River	5	4
NF03OC0012	Atikonak River	4	5
NF03OD0011	East Metchin River	4	4
NF03OE0001	Churchill River Above Upper Muskrat	4	5
NF03OE0030	Minipi River	5	6
NF03OE0032	Pinus River	4	5
NF03OE0033	Big Pond Brook	4	5
NF03PB0025	Naskaupi River	5	5
NF03QC0001	Eagle River	5	4
NF03QC0002	Alexis River	4	3
NF03OD0012	Wilson River E. Branch	4	4
NF03OE0035	Dominion Lake	4	5
NF03OE0037	Cache River	4	4
NF03PB0028	Cape Caribou River	4	4
NF03PB0029	Northwest River	4	5
NF03PB0030	Seal Lake Narrows	4	5
NF03PB0032	Susan River	4	5
NF03PB0037	Wuchusk Lake	4	5
NF03QA0044	Carter Basin	4	5
NF03QA0045	Kenamu River	4	5
NF03OA0020	Ashuanipi River	4	4

Notes:
1. Total number of samples collected in 2013-14 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2013-14 for Labrador region was 73; 101 were sampled, 7 of these samples were triplicates.

Ambient Water Quality Analysis

During 2013-2014, the ambient water quality samples were analyzed at NLET in Burlington, ON. There were no lab issues/delays encountered. All shipping/analysis were carried out as agreed upon in the Annual Work Schedule 2013-2014 as seen in **Table 3**.

Table 3: Analytical Parameters, Holding Times and Schemas for 2013-2014

Parameter	Holding Times (recommended by NLET)
MAJOR IONS	
Alkalinity	24 hours
Chloride	28 days
Sulphate	28 days
Calcium	8 weeks
Magnesium	8 weeks
Sodium	8 weeks
Potassium	8 weeks
PHYSICAL	
pH	24 hours
Conductivity	28 days
Colour	48 hours
Turbidity	24 hours
NUTRIENTS	
Nitrate	24 hours
Total Nitrogen	24 hours
Total Phosphorus	1 year
DIC/DOC	24 hours
METALS	
Total Metals-27 elements	6 months

***27 Metals include:**

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

Schema Number	Schema Name	Parameter/ Grouping
1	ALKPHCOND	alkalinity, pH, conductivity
2	MI4-U	Ca, Mg, Na, and K
5	ANION1-U	NO3 by IC
6	ANION2-U	Cl and SO4 by IC
11	TP1-U	total phosphorus
12	TN1-U	total nitrogen
13	DIC/DOC1	dissolved inorganic and organic carbon
22	HARDNESS1	Calculation derived from Ca and Mg
23	COL-APP	Colour-apparent (unfiltered sample)
24	TURBIDITY3	turbidity
31	TM2003/T27W	Total metals-27 elements

Ambient Water Quality Monitoring and Data Management/Reporting

During 2013-2014, 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 and Data Management Activities

Management Activities		Lead Agency	Progress Evaluation
Water Quality Sampling and Analysis	Collection of water samples under WQMA program	Newfoundland and Labrador Department of Environment and Conservation – staff	See Table 1 and 2 for list of samples scheduled and collected.
	Entering field data onto field sheets and subsequent submission to laboratory	Newfoundland and Labrador Department of Environment and Conservation – staff	This has been completed and up to date for 2013-2014.
	Laboratory Analysis and Quality Control Processes	Environment Canada	All procedures remained the same in 2013-2014.
Data Management	Processing and Loading of NLET Data	Environment Canada	This has been completed and up to date for 2013-2014.
	Accessibility/Availability of NL WQMA Dataset	Environment Canada	The Atlantic ENVIRODAT extraction tool was decommissioned in 2013-2014. EC was working on a new tool (similar to the tool used by Pacific-Yukon region) to replace the Atlantic extraction tool. Select data was accessible through the web mapping application, GENIE.
Data Management Special Projects	Laboratory Comparison Study	Environment Canada _____ Newfoundland and Labrador Department of Environment and	In 2013-2014 draft results of the lab comparison work was reviewed by NL ENVC staff. Comments were provided to EC as requested. EC proceeded in developing a data analysis methodology and

		Conservation – Staff	continued to work with the data throughout 2013-2014. A report will be generated in fiscal year 2014-2015.
	Data Verification and Validation of Sample/Measurement Data	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Staff	In 2013-2014, EC hosted a webinar to introduce select NL ENVC staff to the data validation tool (EVAL) being used by EC to verify and validate samples. NL ENVC continued to assess the potential to adapt/integrate this tool.
	Data extraction tools development and updates	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Staff	The Atlantic ENVIRODAT extraction tool was decommissioned in 2013-2014. EC was working on a new tool (similar to the tool used by Pacific-Yukon region) to replace the Atlantic extraction tool. Select data was accessible through the web mapping application, GENIE.

Note: Activities listed in this table are work-shared activities

Table 5: Additional Core Activities 2013-2014 (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 Environment and Conservation – Kyla Brake	Four CABIN sites were sampled in 2013, including the 3 annual sites and an urban test site.
	Baseline Report on Reference Invertebrate Assemblages in NL	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	This has been deferred until fiscal year 2014-2015.
	Share spatial data with EC, for use in the reference model	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	This task is ongoing as new data becomes available each year.
	Develop CABIN reference model and associated tools	Environment Canada	Model incorporating Newfoundland reference sites is now functional. Clarification and categorization of output will take place in fiscal year 2014-2015.
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 Environment and Conservation – staff	This has been completed and up to date for 2013-2014.
	Produce an overview document indicating issues driving the ratings and spatial trends.	Newfoundland and Labrador Department of Environment and Conservation – staff	Drivers of WQI scores and rankings added to CANAL WQI Comments section. This will be updated every year.

	Final report validating/contributing to CESI core stations review for longer term WQI national reporting	Newfoundland and Labrador Department of Environment and Conservation – staff	Not completed in fiscal year 2013-2014.
	QA/QC of submitted data/results and report to the public on the web page	Environment Canada	This has been completed and up to date for 2013-2014.
Modifications/ Improvements to CESI WQI Calculator	Evaluate CESI Calculator and document solutions to issues encountered	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	An excel spreadsheet was created, detailing the support provided to EC on issues encountered using the CESI calculator, the solutions provided were included. All emails sent to EC regarding the CESI calculator are separated to compile this documentation. This document was forwarded to EC in March 2014 for review.
	Incorporate improvements to the calculator including addition of statistical data summaries, redesign interface to reflect the new CCME WQI Calculator (i.e. better conceptual flow for end users) and documentation of installation procedures for R Programming and statconnDCOM	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	Documented options for CESI WQI Calculator enhancements. Redesigned the front end interface based on the CCME Calculator look but retained all the original functionalities of the CESI Calculator. Added a statistical component in the Calculator which shows the carious statistical measurement of the parameters used in the CESI WQI computation. Prepared two help manuals on how to download and install R Programming and statconnDCOM. Updated the location of the web service in the new setup file for the CESI Calculator. Corresponded with CESI group regarding the redesign and improvements.
	Determine the influence of each parameter on the WQI score	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	Functionality to determine the influence of each parameter on the CESI WQI score was included in the CESI Calculator. The front end design was added where the user can view the influence. The influence is provided as a percentage value on the overall WQI score. Detailed testing was performed to verify the accuracy of the functionality.
	Make appropriate improvements to the help manual	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	All design and functionality changes have been reflected in the updated Help Manual for the CESI Calculator. The Help Manual has been added as a part of the new installation package for the CESI Calculator and forwarded to EC along with the setup components for the 2013-2014 fiscal year.

	Publication on the development and application of the CESI WQI Calculator	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Staff	All comments provided by EC have been incorporated. An annex was prepared to include details for the CESI WQI methodology and computation process. The focus of the paper's abstract was discussed with EC (i.e. how the calculator helps resolves challenges faced by the user and how it helps determine the outlier). The paper was revamped based on this suggested correction. A new section was formulated on challenges and how CESI WQI Calculator overcomes the challenges.
	Conversion of the CESI WQI Calculator to a version for the CCME	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Staff	Re-designed the front end look of the Calculator and added back end functionality for front end users, based on direction provided by EC. Corrected all errors related to loading of data into the calculator. Incorporated all English to French translations in the Calculator. Ensured that the Confidence Interval was providing correct results using newer version of R Programming and statconnDCOM. Performed testing of the CCME calculator during various phases of its development.
Chemical Management Plan	Monthly water sampling at a select station on the Waterford River	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	A CMP water sample was collected monthly for Triclosan, and quarterly for Perfluorooctane Sulphonate (PFOS) and Bisphenyl-A (BPA) and 1 CMP sediment sample was collected from Waterford River from April 1, 2013 to March 31, 2014.
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 Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	Northern sampling and analysis proceeded as outlined in the Annual Work Schedule 2013-2014. 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 Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Staff	A report entitled "Guidance Manual for Optimizing Water Quality Monitoring Program Design" (prepared by CCME) was analyzed to determine which statistical methods from that report could be incorporated into the statistical evaluation of the WQMA network. A query was formulated in the ENVIRODAT database based on the above report to identify which stations contains sample counts greater than 40. These stations will be used for the network evaluations of the WQMA network.
Intensive Survey Technical Report	Completion of Intensive Survey 2009-10 Report (Bonne Bay Ponds)	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Ian Bell	This report has been reviewed by EC. Currently waiting on editing to be completed. Report will be finalized in 2014-2015.
Site-specific Guidelines Project	Development of site-specific guidelines for select NL water bodies in partnership with industry	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake / Joanne Sweeney	This activity has been delayed and will only be pursued if the need for site specific guidelines is identified by an industry partner.
Real-time/Web camera Technology Special Projects	In-site water quality/quantity/climate monitoring using a mobile environmental monitoring platform (MEMP) on a need-basis across the province	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh	Upgrades underway to integrate a Web Camera and High-Speed Ethernet network in the MEMP to allow for delivery of Real-Time imagery and faster downloading of data. The MEMP will be deployed at a select location once upgrades are complete in 2013-2014.

	Maintenance of camera technology at Leary's Brook Real-Time Station	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh	Camera imagery is monitored daily and the camera is maintained as necessary to ensure proper camera angle, color saturation, and focus.
	Collaboration / transfer of knowledge on: 1) Set up and deployment of UV sensor owned by EC 2) Set up and deployment of buoys owned by EC	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh	1) The deployment of the S::Can Spectro::lyser owned by NL ENVC has been put on hold due to challenging integration issues. When time is available the Spectro::lyser will be revisited and any knowledge gained will be transferred to EC. 2) With the assistance of EC, the buoy was deployed in the Churchill River during the summer of 2013. Unfortunately, a portion of the buoy was lost during the deployment, including the instrument inside. Sturdier buoy applications will be investigated.
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. Results may be applicable to the national program, reducing sampling and analytical costs at some stations.	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	Compiled a report on the regression models for Sodium, Chloride, Calcium and Sulphate using four stations (Leary's Brook, Waterford River, Rattling Brook Below Bridge and Humber River). This report consisted of the background, methodology and detailed description of the application of the model in reducing sampling and analytical costs for stations where better parameter estimations were obtained.
Instrumentation to monitor water quality at key joint monitoring sites	Sharing of instrumentation purchase and maintenance expenses for real-time monitoring stations of joint interest	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson / Tara Clinton / Ryan Pugh	Continuous water quality instrumentation belonging to EC, being used at select NL real time stations, was evaluated, assessed and repaired as necessary by NL ENVC Staff.

In fiscal year 2013-2014, select WRMD staff attended and presented at many conferences and training initiatives. They are as follow:

- CR1000 Training
- Ice Safety and Rescue Awareness
- Snowmobile Safety
- Clean and Safe Drinking Water Workshop
- CABIN (Canadian Aquatic Bio monitoring Network) Field Training
- 2013 CESI Workshop – presentation on Northern perspectives – monitoring in remote regions (K.Brake)
- YSI/EXO introductory course
- Maximizing Your Supervisory Potential – April 2013
- In-house Hydrolab Training Course for Industry Partners – May 2013

Table 7. Monthly and Annual Real-Time Water Quality Reports Completed for 2013-2014

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Vale (Voisey's Bay)	Upper Reid Brook	June 13, 2013 – Jul 15, 2013 Jul 16, 2013 – Aug 24, 2013 Aug 25, 2013 – Sep 26, 2013 Sep 27, 2013 – Nov 6, 2013 *Removed Winter Months	Jun 2013 – Nov 2013
		Lower Reid Brook	June 13, 2013 – Jul 15, 2013 Jul 16, 2013 – Aug 24, 2013 Aug 25, 2013 – Sep 26, 2013 Sep 27, 2013 – Nov 5, 2013 *Removed Winter Months	Jun 2013 – Nov 2013
		Camp Pond Brook	June 13, 2013 – Jul 15, 2013 Jul 16, 2013 – Aug 24, 2013 Aug 25, 2013 – Sep 26, 2013 Sep 27, 2013 – Nov 7, 2013 *Removed Winter Months	Jun 2013 – Nov 2013
		Tributary to Lower Reid Brook	June 13, 2013 – Jul 15, 2013 Jul 16, 2013 – Aug 24, 2013 Aug 25, 2013 – Sep 26, 2013 Sep 27, 2013 – Nov 5, 2013 *Removed Winter Months	Jun 2013 – Nov 2013
	Vale (Long Harbor)	Rattling Brook below Bridge	Apr 5, 2013 – May 14, 2013 May 14, 2013 – Jun 20, 2013 Jun 21, 2013 – Jul 25, 2013 Jul 26, 2013 – Aug 22,2 013 Aug 23, 2013 – Oct 3, 2013 Oct 4, 2013 – Nov 7, 2013 Nov 7, 2013 – Jan 9, 20114 Jan 10, 2014 – Feb 18, 2014 Feb 19, 2014 – Mar 20, 2014	Jan 2013 – Dec 2013
		Rattling Brook Big Pond	Apr 5, 2013 – May 14, 2013 May 15, 2013 – June 20, 2013 Jun 21, 2013 – Jul 25, 2013 Jul 26, 2013 – Aug 22,2 013 Aug 23, 2013 – Oct 3, 2013 Oct 4, 2013 – Nov 7, 2013 Nov 7, 2013 – Jan 9, 2014 *Instrument not deployed due to ice conditions	Jan 2013 – Dec 2013
		Rattling Brook below Plant Discharge	Apr 5, 2013 – May 14, 2013 May 15, 2013 – Jun 20, 2013 Jun 21, 2013 – Jul 25, 2013 Jul 26, 2013 – Aug 23, 2013 Aug 23, 2013 – Oct 3, 2013 Oct 4, 2013 – Nov 7, 2013 Nov 8, 2013 – Jan 9, 20114 Jan 10, 2014 – Feb 18, 2014 Feb 19, 2014 – Mar 20, 2014	Jan 2013 – Dec 2013

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Duck Pond Operations (TECK)	Tributary to Gills Pond Brook	Jan 01, 2013 – May 10, 2013 May 10, 2013 – Jun 11, 2013 Jun 13, 2013 – Jul 22, 2013 Jul 23, 2013 – Aug 13, 2013 Aug 13, 2013 – Oct 8, 2013 Oct 8, 2013 – Nov 14, 2013 Nov 14, 2013 – Dec 31, 2012 Jan 01, 2014 – May 13, 2014	Jan 2013 – Dec 2013
		East Pond Brook	Jan 01, 2013 – May 10, 2013 May 10, 2013 – Jun 11, 2013 Jun 13, 2013 – Jul 22, 2013 Jul 23, 2013 – Aug 13, 2013 Aug 13, 2013 – Oct 8, 2013 Oct 8, 2013 – Nov 14, 2013 Nov 14, 2013 – Dec 31, 2012 Jan 01, 2014 – May 13, 2014	Jan 2013 – Dec 2013
		Well After Tailings Dam – Duck Pond	Jan 01, 2013 – May 10, 2013 May 10, 2013 – Jun 11, 2013 Jun 13, 2013 – Jul 22, 2013 Jul 23, 2013 – Aug 13, 2013 Aug 13, 2013 – Oct 8, 2013 Oct 8, 2013 – Nov 14, 2013 Nov 14, 2013 – Dec 31, 2012 Jan 01, 2014 – May 13, 2014	Jan 2013 – Dec 2013
	IOC	Wabush Lake at Dolomite Road	Jun 04, 2013 – Jul 23, 2013 Jul 24, 2013 – Aug 13, 2013 Aug 13, 2013 – Sep 18, 2013 Sep 20, 2013 – Oct 30, 2013 *Removed Winter Months	Jul 2013 – Oct 2013
		Wabush Lake at Julienne Narrows	Jun 05, 2013 – Jul 24, 2013 Jul 24, 2013 – Aug 14, 2013 Aug 14, 2013 – Sep 19, 2013 Sep 19, 2013 – Oct 29, 2013 *Removed Winter Months	Jul 2013 – Oct 2013

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Nalcor	Above Muskrat Falls	May 24, 2013 – Jun 27, 2013 Jun 27, 2013 – Aug 08, 2013 Aug 08, 2013 – Sep 12, 2013 Sep 12, 2013 – Oct 11, 2013 Oct 11, 2013 – Nov 6, 2013 *Removed Winter Months	May 2013 – Nov 2013
		Below Metchin River	May 23, 2013 – Jun 26, 2013 Jun 26, 2013 – Aug 08, 2013 Aug 08, 2013 – Sep 14, 2013 Sep 14, 2013 – Oct 10, 2013 Oct 10, 2013 – Nov 6, 2013 *Removed Winter Months	May 2013 – Nov 2013
		6.15km below Muskrat Falls	May 24, 2013 – Jun 27, 2013 Jun 27, 2013 – Aug 09, 2013 Aug 09, 2013 – Sep 12, 2013 Sep 12, 2013 – Oct 11, 2013 Oct 11, 2013 – Nov 8, 2013 *Removed Winter Months	May 2013 – Nov 2013
		Below Grizzle Rapids	May 23, 2013 – Jun 26, 2013 Jun 26, 2013 – Aug 08, 2013 Aug 08, 2013 – Sep 14, 2013 Sep 14, 2013 – Oct 10, 2013 Oct 10, 2013 – Nov 6, 2013 *Removed Winter Months	May 2013 – Nov 2013
	Tata Steel Minerals Canada Limited (TSMC)	Elross Creek Below Pinette Lake Inflow	Jun 04, 2013 – Jul 03, 2013 Jul 03, 2013 – Aug 07, 2013 Aug 07, 2013 – Sep 11, 2013 Sep 11, 2013 – Oct 08, 2013 *Removed Winter Months	Jun 2013 – Oct 2013
		Goodream Creek 2KM Northwest of Timmins 6	Jun 04, 2013 – Jul 03, 2013 *Not deployed due to low flow conditions Aug 07, 2013 – Sep 11, 2013 Sep 11, 2013 – Oct 08, 2013 *Removed Winter Months	Jun 2013 – Oct 2013

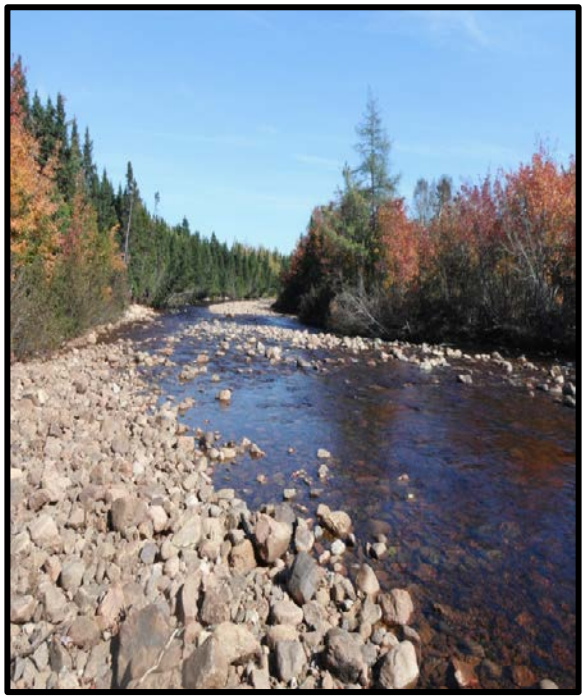
Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Provincial Network	Labrador Iron Mines	James Creek Above Bridge	Jun 04, 2013 – Jul 01, 2013 Jul 02, 2013 – Aug 05, 2013 Aug 06, 2013 – Sep 10, 2013 Sep 10, 2013 – Oct 07, 2013 *Removed Winter Months	Jun 2013 – Oct 2013
		Unnamed Tributary Below Settling Pond	Jun 04, 2013 – Jul 01, 2013 Jul 02, 2013 – Aug 05, 2013 Aug 06, 2013 – Sep 10, 2013 Sep 10, 2013 – Oct 07, 2013 *Removed Winter Months	Jun 2013 – Oct 2013
		Houston Creek above Road Culvert	Aug 08, 2013 – Sep 09, 2013 Sep 10, 2013 – Oct 07, 2013 *Removed Winter Months	Jun 2013 – Oct 2013
	NL WRMD	Lake Melville East of Little River	*Instrument not deployed due to repeated damage to the instrument at this station	N/A
		Churchill River at English Point	May 24, 2013 – Jun 27, 2013 Jun 27, 2013 – Aug 13, 2013 Aug 13, 2013 – Sep 12, 2013 Sep 12, 2013 – Oct 11, 2013 Oct 11, 2013 – Nov 8, 2013 *Removed Winter Months	N/A
		Minipi River	May 23, 2013 – Jun 26, 2013 Jun 26, 2013 – Aug 08, 2013 Aug 08, 2013 – Sep 14, 2013 Sep 14, 2013 – Oct 10, 2013 Oct 10, 2013 – Nov 06, 2013 *Removed Winter Months	N/A

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Provincial Network	NL WRMD	Southwest Brook below Southwest Pond	Apr 04, 2013 – Apr 16, 2013 Apr 16, 2013 – Jun 24, 2013 Jun 24, 2013 – Oct 02, 2013 Oct 10, 2013 – May 14, 2014	N/A
		Leary's Brook at Prince Philip Drive	Mar 21, 2013 – Apr 24, 2013 Apr 24, 2013 – May 30, 2013 May 30, 2013 – Jul 04, 2013 Jul 04, 2013 – Jul 31, 2013 Jul 31, 2013 – Aug 27, 2013 Aug 27, 2013 – Oct 2, 2013 Oct 2, 2013 – Oct 30, 2013 Oct 30, 2013 – Nov 21, 2013 Jan 1, 2014 – Mar 12, 2014	N/A
		Humber River at Humber Village Bridge	Feb 04, 2013 – May 10, 2013 May 10, 2013 – Jun 11, 2013 Jun 11, 2013 – Aug 20, 2013 Aug 22, 2013 – Nov 05, 2013 Nov 06, 2013 – Jan 16, 2014	N/A
		Waterford River at Kilbride	Jan 16, 2013 – Apr 30, 2013 Apr 30, 2013 – May 24, 2013 May 24, 2013 – Jun 25, 2013 Jun 27, 2013 – Jul 23, 2013 Jul 23, 2013 – Aug 27, 2013 Aug 27, 2013 – Sep 30, 2013 Sep 30, 2013 – Oct 30, 2013 Oct 30, 2013 – Dec 4, 2013 Dec 4, 2013 – Jan 31, 2014 Jan 31, 2014 – Apr 29, 2014	N/A

Conclusion

A significant amount of work took place under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* for fiscal year 2013-2014. The number of available products from this program continues to grow annually. Activities for 2014-2015 will be clearly outlined in the upcoming Annual Work Schedule and Divisional Work Plan.

NL ENVC 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 2013-2014

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 Conservation – Staff	Updates to the Site Documentation Database are completed as needed. An upload of the updates to the database will be done yearly.
	Calculation of the Water Quality Index scores	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	2013 reporting was completed on 2009-2011 data. Please see Table 6 for more information.
	Completion of Fact Sheets for selected WQMA stations	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	Not complete. Awaiting completion of watershed delineation project in order to proceed.
	Delineation and digitization of all WQMA stations (Newfoundland and Labrador); including any new stations added (ie: CABIN: real-time)	Newfoundland and Labrador Department of Environment and Conservation – Keith Abbott	Completed edits to 159 Hydrometric, 134 WQMA, 15 RTWQ and 5 CABIN Newfoundland watershed boundaries based on feedback from in-house staff, Newfoundland and Labrador Hydro and Deer Lake Power. Delineated and edited 74 hydrometric, 16 WQMA, 18 RTWQ and 5 CABIN station watersheds in Labrador. Compared the drainage area values of hydrometric station watersheds of Newfoundland and the Churchill River basin calculated by ENVC and Environment Canada. Drainage area differences greater than 5% were examined and comments were provided to Environment Canada. Documented the watershed delineation process and initiated communications and shared delineation work with Environment Canada.

Real-Time Related Projects	Maintenance/Calibration of Real-Time Stations	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Staff	This is an on-going task.
	Trouble-shooting with issues at real-time stations	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	This is an on-going task.
	Audit real-time stations visits/meet with clients	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	Numerous meetings were held between WRMD and select industry clients as follows: - Vale - Voisey's Bay Project (April 2013; August 2013;); Nalcor Energy (May 2013; July 2013; October 2013; January 2014); Alderon - proposed Kami project (September 2013; January 2014; March 2014); TATA Steel Minerals Canada /Labrador Iron Mines - Howse Property (January 2014); Vale-Long Harbour Project (quarterly Community Liaison Committee meetings); Additional conference calls and email correspondence aided in open communication between WRMD and industry clients throughout 2013-2014.
	Planning for Real-Time Water Quality Monitoring for Mega-projects	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	This is an on-going task. Numerous Environmental Assessment registration documents are reviewed annually to determine if real-time water quality monitoring is needed.

	Negotiating/renewals of Memorandum of Agreements with industry	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	- Wabush Mines signed a Memorandum of Agreement to establish a real-time water quantity/quality station on Flora Creek in May 2013; the hydrometric portion of the station was established in Fall 2013 while the water quality portion of the station was established in spring 2014. - Churchill Falls (Labrador) Corporation Limited (CFLCo) signed a Memorandum of Agreement to re-establish one hydrometric station on Atikonak River in January 2014. - VALE – Voisey's Bay Project signed an amendment in May 2013 to install two new hydrometric stations; stations were installed in Fall 2013. - Nalcor Energy signed an amendment in May 2013 and August 2013 to install two new hydrometric stations; stations were installed in Fall 2013.
	Research and Development of New Technologies	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh/Tara Clinton	No new technologies were investigated in fiscal year 2013-2014.
	Maintenance of Inventory/Servicing Spreadsheet	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This task is on-going. Inventory/servicing spreadsheet is maintained as needed.
	Testing of Bouy System in Paddy's Pond	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney/Ryan Pugh	The bouy was shipped to Labrador in 2013 and was deployed as a trial in the Churchill River. Upon return to the station following the trial, it was discovered that the bottom portion of the buoy had become separated from the main floating portion and was not recovered.

	Categorization of Turbidity Alerts	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton/Shibly Rahman/Leona Hyde/Ryan Pugh	This task is currently in the production stage. The formatting and information content of the email alerts have been completed. Leona is working with OCIO to ensure that the email can be sent directly to an external email. This task is still ongoing.
	Implementation of Email Alert System throughout RT Network	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This task is on-going. Currently, email alerts come in for various stations for parameters such as, turbidity and dissolved oxygen. WRMD is looking at setting up more alerts as the process becomes more familiar. Eventually, alerts will be set around the site specific guidelines for specific stations.
	LCD Screen Display	Newfoundland and Labrador Department of Environment and Conservation – Leona Hyde	This project has not yet been completed. Will continue in fiscal year 2014-2015.
	Monthly Update of Temperature Probes	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	This has been changed to quarterly update of temperature probes, which is on-going.
	Real-time Instrumentation in-house Testing and Servicing	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton/Ryan Pugh	This program is on-going annually with revolving windows of equipment servicing by region. In the winter, PTE's are performed on Labrador Hydrolabs, followed by Central and Western Hydrolabs in the spring. Eastern Hydrolabs are evaluated throughout the summer and fall as required.

	Training/Invited Speaker	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	During fiscal year 2013-2014 this item was postponed.
Technical Documents (RTWQ)	Real-Time Water Quality Deployment and Annual Reports	Newfoundland and Labrador Department of Environment and Conservation – staff	Please refer to Table 7.
	Report on International Status of Real-time Monitoring Programs	Newfoundland and Labrador Department of Environment and Conservation – Maria Murphy	This report has not been completed. Will continue in fiscal year 2014-2015.
	Completion of Real-Time Water Quality Manual	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/ Grace de Beer/Tara Clinton/Ryan Pugh	There are two separate manuals ; 1.)Protocols Manual for Real-Time Water Quality Monitoring in NL 2.)Protocols Manual for Real-Time Water Quality Monitoring in NL – Calibration and Maintenance Guide for Industry Partners In 2013-2014, review comments from NL ENVC staff continued to be incorporated into the Protocols Manual for Real-Time Water Quality Monitoring in NL this manual is about 90% completed. Final review/editing needed before posting to webpage. In 2013-2014, the Protocols Manual for Real-Time Water Quality Monitoring in NL – Calibration and Maintenance Guide for Industry Partners, was

			updated and used for an in house industry partner training workshop. This manual is about 90 % completed. Final review/editing needed before posting to the webpage.
	Updating of Real-Time Water Quality Program Web Site	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Tara Clinton	This web site has been updated. All presentations, reports and current documents have been uploaded to the webpage.
Technical Documents (WQMA)	Updating of the Trend Analysis Report	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	An application on Trend Analysis ("EnviroTrend") was developed to determine whether trend exists for WQMA parameters.
	Updating of Water Quality Monitoring Agreement Web Site	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	This web site has been updated. It will continue to be updated as needed.
	Updating of Contour Maps	Newfoundland and Labrador Department of Environment and Conservation – Keith Abbott/Kyla Brake	This project is currently awaiting the completion of the trend analysis report. The maps will then be updated by Keith Abbott and Kyla Brake.
Blue-green Algae Study	Nutrient/Blue-Green Algae Study in Paddy's Pond System	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	Data is collected each summer on a "needs basis", basically in response to public requests. It is projected that there will be a BGA report prepared including all years of data, but no timeline has been set for this report.

Automated Weather Stations	Operation of four automated weather stations to provide valuable climate information to support water quantity and quality analysis	Newfoundland and Labrador Department of Environment and Conservation – Staff	This task is on-going.
Application of Earth Observation for Water Quality Monitoring	Monitor Changes in Turbidity and TSS along the Churchill River	Newfoundland and Labrador Department of Environment and Conservation – Keith Abbott	Conducted a literature review on the following topics: (i) remote sensing of water quality parameters (e.g., TSS and Chlorophyll-a), (ii) radiation transfer in water column and at the water surface, (iii) spectral properties of water (e.g., pure, turbid, chlorophyllous particles), and (iv) a comparative look at the performance of Landsat, MERIS, and MODIS imagery for water quality monitoring. Determined how to access MERIS full resolution data. Searched for MERIS and Landsat-8 data over Muskrat Falls and Lake Melville. Began discussions on using a buoy to monitor water quality in Lake Melville.
Automatic Data Retrieval System (ADRS)	On-going Real-time Service Delivery (ADRS – reporting)	Newfoundland and Labrador Department of Environment and Conservation – Leona Hyde	This task was an on-going activity throughout 2013-2014. This activity will continue in fiscal year 2014-2015.
	Upgrades/Maintenance to ADRS as needed	Newfoundland and Labrador Department of Environment and Conservation – Leona Hyde	This task is on-going.
	Improvements/Upgrades to ADRS Desktop Search Engine	Newfoundland and Labrador Department of Environment and Conservation – Leona Hyde	This task is on-going.

Education/Outreach	Preparation of Technical Program Videos	Newfoundland and Labrador Department of Environment and Conservation – Staff	This project was not completed in fiscal year 2013-2014. This project will go ahead as time permits.
	Educational Displays	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	During fiscal year 2013-2014 educational presentations or displays included: • CABIN demo and presentation to ENGOs May 2013 • Presentation at CESI Workshop 2013 in Montreal Also, arranged the purchase and completion of promotional display banners for all sections in WRMD.
	Updating/Troubleshooting for Fluvarium Project	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	Not complete. To be completed in fiscal year 2014-2015.
	Updating of all Posters	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	To be completed in fiscal year 2014-2015.