

# **CANADA-NEWFOUNDLAND and LABRADOR WATER QUALITY MONITORING AGREEMENT**

## **Progress Report 2012-2013**



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 2012-2013. This document is formatted to reflect the same layout as the 2012-2013 Annual Work Schedule. Additionally, a table has been added to include activities completed solely by WRMD staff.



**Work Shared Activities for Fiscal Year 2012-2013**

**Work Shared Activities 2012-2013**

Activity	Responsible Agency	Remarks
<b>Ambient Water Quality Sampling</b>	Newfoundland and Labrador Department of Environment and Conservation	Refer to <b>Table 1</b> for sampling details in Newfoundland  Refer to <b>Table 2</b> for sampling details in Labrador
<b>Ambient Water Quality Analysis</b>	Environment Canada – National Laboratory for Environmental Testing (NLET)	Refer to <b>Table 3</b> for laboratory analysis details
<b>Recurring Data Management Activities</b>	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to <b>Table 4</b> for projects/tasks
<b>Work-shared Special Projects</b>	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to <b>Table 5</b> for Work-shared Project info
<b>Cost Shared Activities</b>	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to <b>Table 6</b> for Cost Shared activities
<b>Additional WRMD Activities</b>	Newfoundland and Labrador Department of Environment and Conservation	Refer to Appendix A for WRMD tasks/projects listed in the Divisional Work Plan 2012-2013

### Ambient Water Quality Sampling

During 2012-2013, 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, 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 2013-2014.

**Table 1: Provincial Samples Collected in 2012-2013 Fiscal Year in Newfoundland (Island Portion of the Province)**

Station #	Description	Number of Samples Scheduled in 12-13	Number of Samples Collected in 12-13
<b><u>EASTERN REGION</u></b>			
NF02ZK0005	Northeast River	8	6
NF02ZL0029	Goulds Brook	5	5
NF02ZM0004	Waterford River at Commonwealth Ave.	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	Rennies River at Carnell Drive	4	4
NF02ZM0020	Broad Cove Brook	4	4
NF02ZM0098	Virginia River at headwaters	4	4
NF02ZM0109	Mundy Pond at Outlet	4	4
NF02ZM0144	Kelly's Brook at Portugal Cove Rd.	4	4
NF02ZM0175	Waterford River at Brookfield Rd.	4	4
NF02ZM0176	South Brook at Mouth	4	4
NF02ZM0177	Rennies River at Portugal Cove Rd.	4	4
NF02ZM0178	Learys Brook at Clinch Cres.	5	5
NF02ZM0179	Virginia River at Guzwell Drive	4	4

Station #	Description	Number of Samples Scheduled in 12-13	Number of Samples Collected in 12-13
NF02ZM0180	Virginia River at Newfoundland Drive	4	4
NF02ZM0181	Waterford River at Blackhead Rd.	5	5
NF02ZM0182	Waterford River at Bremigans Pond	4	4
NF02ZM0183	Kelligrews River at Kelliview Cres.	4	4
NF02ZM0184	Learys Brook at Outer Ring Road	4	4
NF02ZM0185	South Brook at Headwaters	4	4
NF02ZN0004	Salmonier River	4	4
NF02ZM0294	Manuals River	4	4
NF02ZM0359	Paddy's Pond at Outlet	4	4
<b><u>CENTRAL REGION</u></b>			
NF02YM0004	South West Brook at Baie Verte	4	4
NF02YM0003	Indian Brook	4	5
NF02YO0189	Joe's Lake	4	4
NF02YO0107	Exploits River at Millertown Dam	5	5
NF02YO0020	Exploits River at Aspen Brook	4	3
NF02YO0001	Exploits River at Grand Falls	4	4
NF02YO0128	Exploits River below Grand Falls	4	4
NF02YO0142	Corduoy Brook	4	4
NF02YO0143	Exploits River at Bond Bridge	4	4
NF02YR0001	Pound Cove Brook	4	4
NF02YO0121	Peter's River	4	4
NF02YQ0006	North West Gander River	4	3
NF02YQ0030	Gander River at Appleton	8	8
NF02YS0001	Terra Nova River at Terra Nova	4	4
NF02YS0011	Terra Nova River at ES Spencer Bridge	5	5

Station #	Description	Number of Samples Scheduled in 12-13	Number of Samples Collected in 12-13
NF02YS0083	Northwest River at Terra Nova	4	4
<b><u>WESTERN REGION</u></b>			
NF02YE0004	Portland Creek	4	4
NF02YE0005	Western Brook	5	5
NF02YG0001	Main River at Bridge	5	5
NF02YG0009	Main River at Paradise Pool	4	3
NF02YG0020	Eagle Mountain Brook	4	3
NF02YH0018	Lomond River	4	4
NF02YJ0004	Pinchgut Brook	8	8
NF02YK0022	Humber Canal	4	4
NF02YL0011	Humber River at Little Falls	4	3
NF02YL0012	Humber River at Humber Village Bridge	5	5
NF02YL0013	Corner Brook at Margaret Bowater Park	4	4
NF02YL0029	Wild Cove Brook	4	4
NF02YN0001	Lloyds River	5	5
NF02ZA0006	Grand Corduroy River	4	4
NF02ZC0020	Buck Lake	4	4
NF02YN0043	Peter Stride's Lake	4	4

Notes:

1. Total number of samples collected in 2012-13 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2012-13 for Eastern region was 107; 114 were sampled, 9 of these samples were triplicates.
3. Total number of samples planned for 2012-13 for Central region was 70; 76 were sampled, 7 of these samples were triplicates.
4. Total number of samples planned for 2012-13 for Western region was 72; 74 were sampled, 5 of these samples were triplicates.

**Table 2: Northern Samples Collected in 2012-2013 Fiscal Year in Labrador**

Station #	Description	Number of Samples Scheduled in 12-13	Number of Samples Collected in 12-13
<b><u>LABRADOR REGION</u></b>			
NF02XA0001	Little Mecatina River	5	3
NF03NF0013	Ugjoktok River	5	3
NF03OC0012	Atikonak River	4	5
NF03OD0011	East Metchin River	4	4
NF03OE0001	Churchill River Above Upper Muskrat	4	5
NF03OE0030	Minipi River	5	5
NF03OE0032	Pinus River	4	4
NF03OE0033	Big Pond Brook	4	3
NF03PB0025	Naskaupi River	5	4
NF03QC0001	Eagle River	5	3
NF03QC0002	Alexis River	4	4
NF03OD0012	Wilson River E. Branch	4	4
NF03OE0035	Dominion Lake	4	3
NF03OE0037	Cache River	4	4
NF03PB0028	Cape Caribou River	4	4
NF03PB0029	Northwest River	4	3
NF03PB0030	Seal Lake Narrows	4	4
NF03PB0032	Susan River	4	4
NF03PB0037	Wuchusk Lake	4	3
NF03QA0044	Carter Basin	4	4
NF03QA0045	Kenamu River	4	4
NF03OA0020	Ashuanipi River	4	4

Notes:

1. Total number of samples collected in 2012-13 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2012-13 for Labrador region was 73; 92 were sampled, 8 of these samples were triplicates.

### Ambient Water Quality Analysis

During 2012-2013, 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 2012-2013 as seen in **Table 3**.

**Table 3: Analytical Parameters, Holding Times and Schemas for 2012-2013**

Parameter	Holding Times (recommended by NLET)
<b>MAJOR IONS</b>	
Alkalinity	24 hours
Chloride	28 days
Sulphate	28 days
Calcium	8 weeks
Magnesium	8 weeks
Sodium	8 weeks
Potassium	8 weeks
<b>PHYSICAL</b>	
pH	24 hours
Conductivity	28 days
Colour	48 hours
Turbidity	24 hours
<b>NUTRIENTS</b>	
Nitrate	24 hours
Total Nitrogen	24 hours
Total Phosphorus	1 year
DIC/DOC	24 hours
<b>METALS</b>	
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
<b>1</b>	ALKPHCOND	alkalinity, pH, conductivity
<b>2</b>	MI4-U	Ca, Mg, Na, and K
<b>5</b>	ANION1-U	NO3 by IC
<b>6</b>	ANION2-U	Cl and SO4 by IC
<b>11</b>	TP1-U	total phosphorus
<b>12</b>	TN1-U	total nitrogen
<b>13</b>	DIC/DOC1	dissolved inorganic and organic carbon
<b>22</b>	HARDNESS1	Calculation derived from Ca and Mg
<b>23</b>	COL-APP	Colour-apparent (unfiltered sample)
<b>24</b>	TURBIDITY3	turbidity
<b>31</b>	TM2003/T27W	Total metals-27 elements



### ENVIRODAT and Data Management/Reporting

During 2012-2013, 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: Recurring Data Management Activities**

Management Activities		Lead Agency	Progress Evaluation
<b>Sample Submission</b>	Laboratory procedures and quality control practices	Environment Canada	All procedures remained the same in 2012-2013.
	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 2012-2013.
	Sample/Project/Station Initialization and Modifications	Environment Canada	All procedures remained the same in 2012-2013.
<b>Management of national water quality database (ENVIRODAT)</b>	Processing and Loading of NLET Data	Environment Canada	Analytical data from NLET was transferred by EC into the Atlantic ENVIRODAT for data up to and including March 31, 2013.
	ENVIRODAT ongoing management	Environment Canada	Atlantic ENVIRODAT was maintained in 2012-2013. Work to move the Atlantic ENVIRODAT into a new water quality database called NAQUA continued.
	Historical Data Issues and Problem Resolution	Environment Canada  Newfoundland and Labrador Department of Environment and Conservation – staff	Minor data issues with known resolutions were identified by WRMD and fixed by EC.

<b>Data Extraction Tool/Web Services</b>	Accessibility/Availability of NL WQMA dataset	Environment Canada	The data extraction tool Genie remained in 2012-2013. The use of the external extraction tool used by Pacific office of EC was explored; however the tool had not yet been given clearance for some of the internal (EC) accessibility requirements.
	ENVIRODAT Web Services	Environment Canada <hr/> Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	No longer applicable as the web services have been discontinued from EC.
	Regular request of archived NL WQMA data from ENVIRODAT	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	Downloaded the updated version of ENVIRODAT database from Environment Canada in March 2013, and then compared it to the previous version to check for consistency and accuracy.

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

**Table 5: Work-shared Special Projects**

Project	Activity	Responsible Agency	Progress Evaluation
<b>Data Management Special Projects</b>	Data verification and Validation of Sample/Measurement Data	Environment Canada <hr/> Newfoundland and Labrador Department of Environment and Conservation – Staff	The data validation tool was provided to NL ENVC. Training on the use of the tool was conducted via webinar. NL ENVC is assessing the potential to adapt the national lead developed protocol.
	Variable Grouping	Environment Canada <hr/> Newfoundland and Labrador Department of Environment and Conservation – Staff	All new methods were given national variable method codes (VMV codes) according to EC national procedures. This ensures that changes in methods are tracked and identifies where similar methods are used across the country. This work did not include assessing comparability of similar methods for the same variable. This was deemed a lower priority by EC since comparability is related to the data end use.
	Laboratory Comparison Study	Environment Canada <hr/> Newfoundland and Labrador Department of Environment and Conservation – Staff	Samples were collected by ENVC in accordance with protocols described in the NLET-ALET Laboratory Comparability project outline, 5 WQMA stations were sampled 4 times between October 2012 and January 2013. Sample analyses were completed by both EC labs, and data interpretation by EC was begun. A draft report was reviewed by DOEC and two concerns were highlighted. 1.) In some cases there were no significant differences in the parameter concentrations measured at each lab, but in other cases significant differences were found. 2.) There was also a problem with specific parameter MDLs at ALET being higher than the corresponding MDL at NLET, as well as higher than parameter concentrations being measured at NLET in water samples obtained from these stations.

	ENVIRODAT Data Extraction Tools/Testing & Evaluation of GENIE	Environment Canada Newfoundland and Labrador Department of Environment and Conservation – Staff	EC is working on moving ENVIRODAT to another server location and eventually into a new database called NAQUA that will also contain data from other parts of Canada in addition to Atlantic Canada. Significant changes are planned to the ENVIRODAT data extraction tool and will be made in the upcoming fiscal year 2013-2014. WRMD was shown GENIE as a data extraction demo. WRMD tested GENIE and comments were sent to EC in October 2012.
	Structural changes/modifications to CANAL webpage	Environment Canada Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde/Kyla Brake	Waiting for completion of the site documentation database update, then structural changes to the CANAL webpage will be made in 2013-2014.
<b>Monitoring Network Evaluation and Optimization</b>	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 on “Evaluation and Redesign of the Water Quality Monitoring Network” was analyzed to determine which parts from that report can be incorporated into the statistical evaluation of the WQMA network. A Query was formulated in the ENVIRODAT database based on the above report and to identify which contains sample count greater than 40. These stations will be used for the network evaluation of WQMA network.
<b>Intensive Survey Technical Report</b>	Completion of Intensive Survey 2009-10 Report (Bonne Bay Ponds)	Environment Canada Newfoundland and Labrador Department of Environment and Conservation – Ian Bell	This report is ongoing and will be finalized in fiscal year 2014-2015.

<b>Site-Specific Guidelines Project</b>	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.
<b>Real-Time/Web camera Technology Special Projects</b>	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	The MEMP was deployed on Outer Cove Brook in Logy Bay-Middle Cove-Outer Cove. Major bridge and culvert work just upstream of the development site requires removal of equipment. While the station is out of service, major upgrades including camera installation will be performed.
	Maintenance of camera technology at Leary’s Brooke Real-Time Station	Environment Canada Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde/Ryan Pugh	This is an on-going task. Status is monitored daily. Camera repositioned, cleaned, and maintained as necessary.
	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 testing/deployment of the UV sensor (ie.S::can) owned by NL ENVC was put on hold as of March 2013 due to issues in integrating the new technology into the existing infrastructure. If/when NL ENVC reassesses the technology, any knowledge gained will be transferred to EC. 2) Plan to test buoy in Churchill River System during summer 2013, any knowledge gained will be transferred to EC.

	Instrumentation to monitor water quality at key joint monitoring sites	<p>Environment Canada</p> <hr/> <p>Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Tara Clinton/Ryan Pugh</p>	Environment Canada instrumentation continued to be maintained on an annual basis as part of WRMD’s PTE program.
	Comparison Study between Various Turbidity Monitoring Instrumentation	<p>Environment Canada</p> <hr/> <p>Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh</p>	Multi-year project is temporarily on hold while awaiting availability of comparison equipment.
	Statistical project to determine extrapolation of non-measured data at select real-time stations	<p>Environment Canada</p> <hr/> <p>Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman</p>	Performed statistical analysis, graphical analysis and data analysis to create the following reports: 1) Comparison of Total Suspended Solids (TSS) Concentration vs Real-Time Turbidity Readings 2) Comparison of Ion Concentration vs Real-Time Specific Conductivity Readings. Updated all info on the Real Time Network Drive.

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

**Cost Shared Activities for Fiscal Year 2012-2013**

**Table 6: Cost Shared Activities 2012-2013**

Project	Progress Evaluation
<p><b>Canadian Aquatic Biomonitoring Network (CABIN)</b></p> <p>-Monitoring of benthic invertebrates to better assess the aquatic ecosystem health to complement physical chemical work.</p> <p>-Development of data organization tool for Atlantic Model Input</p> <p>-Investigation into new research and development in the field of aquatic biomonitoring, notably in context of new decision tools.</p> <p>-Completion of Baseline Report on Reference Invertebrate Assemblages in NL, as part of the initial investment for long term effect based monitoring.</p>	<p>- Monitoring of benthic invertebrates to better assess the aquatic ecosystem health to complement physical chemical work was completed.</p> <p>- Development of data organization tool for Atlantic Model input was completed.</p> <p>- Investigation into new research and development in the field of aquatic biomonitoring is ongoing as new techniques and methods become known.</p> <p>- Recently sampled sites will be included in the report. There were a total of 21 CABIN sampling sites in Newfoundland and Labrador during fiscal year 2012-2013.</p> <p>- CABIN field certification was held in August 2012, 6 WRMD employees attended and were field certified at this time.</p>
<p><b>Canadian Environmental Sustainability Indicators (CESI)</b></p> <p><b>Provincial Input to National CESI Reporting</b></p> <p>-Site selection, water quality data extraction, and manipulation.</p> <p>-Decision on WQI inputs and calculation of ratings for each core CESI station.</p> <p>-Overview interpretation of results (short document on parameters &amp; issue driving the ratings and spatial trends; issues encountered; etc.).</p>	<p>- Site selection, water quality data extraction and manipulation were completed for 2012-2013. The CESI WQI Calculator was tested by EC and NL ENVC with issues being addressed as they arose throughout the fiscal year.</p> <p>- Decision on WQI inputs and calculation of ratings for each station was completed.</p> <p>- Overview interpretation of results was completed.</p>



<p>-Data analysis and report preparation. NL will validate/contribute to CESI core sites review for longer term WQI national reporting.</p> <p>-Sensitivity analysis sampling frequency on WQI score study using selected core CESI stations.</p>	<p>- Data analysis and report preparation was completed for 2012-2013.</p> <p>- Sensitivity analysis sampling frequency on WQI score study is on-going, a minimum 3 years of data is required.</p> <p>- (<b>Note:</b> This study requires more samples and will continue into 2013-2014.)</p>
<p><b>Canadian Environmental Sustainability Indicators (CESI)</b></p> <p><b>Modifications/Improvements to CESI Calculator</b></p> <p>-Provision of fixes/solutions to issues encountered with calculator</p> <p>-Documentation of issues/fixes</p> <p>-Improvements to the Help Manual</p> <p>-Publish a paper documenting the development and application of the CESI WQI Calculator in a peer-review journal</p> <p>-Initiate investigation into how to make the product accessible to CCME (i.e. convert from CESI to CCME Calculator)</p>	<p><b>Provision of fixes/solutions to issues encountered with calculator</b></p> <p>-Due to previous compatibility issues the new version of R Programming was linked to the calculator to compute the confidence interval. A separate application (StatconnDCOM) was required to be installed by the end user in order to make this work.</p> <p>-Regular front end updates are performed related to the design of the Calculator</p> <p>-Regular back end programming updates are performed related to the functionality of the Calculator.</p> <p>-Updates were performed on the English to French translation feature.</p> <p>-The Calculator was tested for compatibility with Windows 7 Operating System and Microsoft Office.</p> <p>-Created a new setup file allowing the Calculator to run in 32 and 64 bit computers with Windows 7 Operating System and Microsoft Office.</p> <p>-The new version of the Calculator was successfully tested on divisional computers.</p> <p><b>Documentation of issues/fixes</b></p> <p>-The final package, including documentation of fixes and solutions for 2012-2013 was sent to Environment Canada.</p> <p>-Corresponded with EC on Microsoft Office version compatibility with the CESI WQI Calculator.</p> <p>-Responded to EC on the CESI Computation Error due to Zero values for DO. This was resolved by removing the zero values.</p>

	<ul style="list-style-type: none"><li>-Responded to EC with regards to installing R Packages. MS Word document was prepared and sent with instructions to download and install the R Programming Packages, in order to run Confidence Interval.</li><li>-Correspondence detailing fixes, providing support and updates.</li><li>-Updated Help Manual, incorporating comments from EC. Added instructions in the Help Manual on how to install StatconnDCOM.</li></ul> <p><b>Publish a paper documenting the development and application of the CESI WQI Calculator in a peer-review journal</b></p> <ul style="list-style-type: none"><li>-Incorporated revisions in the CESI WQI abstract from divisional staff and EC.</li><li>-Compiled names of journals where CESI WQI paper could potentially be published.</li><li>-Compiled all emails related to CESI, into word document that helped to formulate the first draft version of the CESI Paper.</li><li>-Inclusion of CESI Flow chart that describes the CESI process.</li><li>-Compiled a table showing how the data is integrated in the CESI Score computation from different jurisdictions.</li><li>-Integrated the idea of challenges faced during CESI WQI Score compilation and computation, and how CESI WQI Calculator resolves these challenges.</li><li>-Prepared the first draft of the CESI WQI paper and reviewed with divisional staff and EC.</li><li>-Restructured the CESI WQI Calculator paper (for journal publication) based on reviews and suggestions from divisional staff and EC.</li><li>-Added reference and conclusion section.</li></ul> <p><b>Investigate into how to make the product accessible to CMME (i.e. convert from CESI to CCME Calculator)</b></p> <ul style="list-style-type: none"><li>-Created a new CCME calculator from existing CESI version.</li><li>-Designed the front end in accordance to the instructions provided by EC. This includes Tab based design for Input Data, Guidelines, Parameter Matching, Index Period and Exporting results to Excel. Added images to the tab button provided by EC.</li><li>-Commented all codes. Modified the alert section.</li></ul>
--	--

	<ul style="list-style-type: none"><li>-Added codes (classes, front end and alert section) from the CESI Calculator.</li> <li>-Removal of Web Service, method notes, selection of monitoring programs, and export to Access which was part of the CESI Calculator but not included in CCME.</li> <li>-Ensured that all steps of the CCME computation (input data file, input guideline file, parameter matching, and selection of index period, computation of WQI and computation of confidence interval) are properly functioning in the new version. Modified codes, front end design to ensure the proper function of the CCME computation process.</li> <li>-Added new CCME logo.</li> <li>-Completed Export to Excel step</li> <li>-Added a date range functionality as a fourth option in the Index Period</li> <li>-Worked out the compute WQI functionality for the Calculator</li> <li>-Worked out the Confidence Interval part of the Calculator.</li> <li>-Sent CCME Calculator screenshots to the CCME group for feedback.</li> <li>-Fixed the resolution issue with the Calculator and adjusted the calculator setting in accordance with resolution change. The anchor and dock property in the property setting was used for this purpose.</li> <li>-Added alert icon to the Calculator that alerted the user in case of non-fatal error.</li> <li>-Created a setup file for the CCME calculator and sent the first draft version of the CCME Calculator to Vincent, Leslie and Kyla.</li> <li>-Tested the Calculator for demonstration at the CESI 2013 workshop.</li></ul>
--	---

<p><b>Canadian Environmental Sustainability Indicators (CESI)</b></p> <p><b>Northern Sampling and Analysis (Labrador)</b></p> <p>-Labrador water samples are collected by both federal and provincial staff in support of CESI reporting (for more remote core sites).</p>	<p>-Northern sampling and analysis proceeded as outlined in the Annual Work Schedule 2012-2013. See <b>Table 2</b>.</p>
<p><b>Chemical Management Plan</b></p> <p>-Perform water and sediment sampling at a select location on the Waterford River.</p>	<p>-A CMP water sample was collected quarterly (4 in total) and 1 CMP sediment sample was collected from Waterford River from April 1, 2012 to March 31, 2013.</p>

In fiscal year 2012-2013, select WRMD staff attended and presented at many conferences and training initiatives. They are as follow:

- Introduction to Law Enforcement
- Defensive Driving course
- Respectful Workplace Training
- Clean and Safe Drinking Water Workshop
- CABIN (Canadian Aquatic Bio monitoring Network) Training
- Cabin Presentation to students of the Marine Institute Water Quality Class
- Presentation on CABIN at NAACAP AGM
- RTWQ training provided to Jordanians by WRMD
- Adobe InDesign course at Academy Canada
- YSI Maintenance workshop
- Display and presentation at Newleaf 2012
- Minerals Resources Review Conference
- Annual CESI workshop
- 8<sup>th</sup> National Monitoring Conference
- Maximizing Your Supervisory Potential
- WHMIS
- CCME Integrated Watershed Management Webinar – Cumulative Effects Assessment and Management
- Get More Accurate Measurements of Total Algae Biomass (YSI)

**Table 8. Monthly and Annual Real-Time Water Quality Reports Completed for 2012-2013**

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports	
	Vale (Voisey's Bay)	Upper Reid Brook	Jul 19, 2012– Aug 15, 2012 Aug 15, 2012 – Sep 24, 2012 Sep 26, 2012 – Nov 04, 2012 *Removed Winter Months	Jul 2012 – Nov 2012	
		Lower Reid Brook	Jul 19, 2012– Aug 15, 2012 Aug 15, 2012 – Sep 24, 2012 Sep 26, 2012 – Nov 04, 2012 *Removed Winter Months	Jul 2012 – Nov 2012	
		Camp Pond Brook	Jul 19, 2012– Aug 15, 2012 Aug 15, 2012 – Sep 24, 2012 Sep 26, 2012 – Nov 04, 2012 *Removed Winter Months	Jul 2012 – Nov 2012	
		Tributary to Lower Reid Brook	Jul 19, 2012– Aug 15, 2012 Aug 15, 2012 – Sep 24, 2012 Sep 26, 2012 – Nov 04, 2012 *Removed Winter Months	Jul 2012 – Nov 2012	
	Industry Partners Network	Vale (Long Harbor)	Rattling Brook below Bridge	Mar 30, 2012 – May 10, 2012 May 11, 2012 – July 3, 2012 Jul 4, 2012 – Aug 23,2012 Aug 24, 2012 – Sep 27, 2012 Sep 28, 2012 – Nov 1, 2012 Nov 2, 2012 – Dec 20, 2012 Dec 21, 2012 – Feb 27, 2012 Feb 28, 2012 – Apr 3, 2012	Jan 2012 – Dec 2012
			Rattling Brook Big Pond	*Instrument not deployed due to ice conditions May 10, 2012 – July 3, 2012 Jul 4, 2012 – Aug 23,2012 Aug 24, 2012 – Sep 27, 2012 Sep 28, 2012 – Nov 1, 2012 Nov 2, 2012 – Dec 20, 2012 Dec 21, 2012 – Feb 27, 2013 *Instrument not deployed due to ice conditions	Jan 2012 – Dec 2012
			Rattling Brook below Plant Discharge	Mar 30, 2012 – May 10, 2012 May 11, 2012 – July 3, 2012 Jul 4, 2012 – Aug 23,2012 Aug 24, 2012 – Sep 27, 2012 Sep 28, 2012 – Nov 1, 2012 Nov 2, 2012 – Dec 20, 2012 Dec 21, 2012 – Feb 27, 2012 Feb 28, 2012 – Apr 3, 2013	Jan 2012 – Dec 2012

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Duck Pond Operations (TECK)	Tributary to Gills Pond Brook	Jan 01, 2012 – May 10, 2012 May 10, 2012 – Jul 04, 2012 Jul 06, 2012 – Aug 05, 2012 Aug 08, 2012 – Oct 01, 2012 Oct 03, 2012 – Nov 14, 2012 Nov 14, 2012 – Dec 31, 2012 Jan 01, 2013 – May 10, 2013	Jan 2012 – Dec 2012
		East Pond Brook	Jan 01, 2012 – May 10, 2012 May 10, 2012 – Jul 04, 2012 Jul 06, 2012 – Aug 5, 2012 Aug 8, 2012 – Oct 1, 2012 Oct 01, 2012 – Nov 14, 2012 Nov 14, 2012 – Dec 31, 2012 Jan 01 2013 – May 10, 2013	Jan 2012 – Dec 2012
		Well After Tailings Dam – Duck Pond	Sep 7, 2011 – May 14, 2012 Jul 04, 2012 – Oct 1, 2012 Oct 03, 2012 – Dec 31, 2012 Jan 01 2013 – May 10, 2013	Jan 2012 – Dec 2012
	IOC	Wabush Lake at Dolomite Road	Jul 12, 2012 – Aug 07, 2012 Aug 08, 2012 – Sept 04, 2012 Sept 05, 2012 – Oct 17, 2012 *Removed Winter Months	Jul 2012 – Oct 2012
		Wabush Lake at Julienne Narrows	Jul 12, 2012 – Aug 08, 2012 Aug 08, 2012 – Sept 05, 2012 Sept 5, 2013 – Oct 31, 2012 *Removed Winter Months	Jul 2012 – Oct 2012

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Nalcor	Above Muskrat Falls	Jun 29, 2012 – Jul 24, 2012 Jul 24, 2012 – Aug 21, 2012 Aug 21, 2012 – Sep 25, 2012 Sep 25, 2012 – Nov 1, 2012 *Removed Winter Months	Jun 2012 – Nov 2012
		Below Metchin River	Jun 29, 2012 – Jul 24, 2012 Jul 24, 2012 – Aug 22, 2012 Aug 21, 2012 – Sep 25, 2012 Sep 25, 2012 – Oct 31, 2012 *Removed Winter Months	Jun 2012 – Nov 2012
		6.15km below Muskrat Falls	Jun 29, 2012 – Jul 24, 2012 Jul 24, 2012 – Aug 21, 2012 Aug 21, 2012 – Sep 25, 2012 Sep 26, 2012 – Nov 1, 2012 *Removed Winter Months	Jun 2012 – Nov 2012
		Below Grizzle Rapids	Jun 29, 2012 – Jul 24, 2012 Jul 24, 2012 – Aug 21, 2012 Aug 21, 2012 – Sep 25, 2012 Sep 25, 2012 – Nov 7, 2012 *Removed Winter Months	Jun 2012 – Nov 2012
	Tata Steel Minerals Canada Limited (TSMC)	Elross Creek Below Pinette Lake Inflow	Jun 05, 2012 – Jul 14, 2012 Jul 14, 2012 – Aug 22, 2012 Aug 23, 2012 – Sep 27, 2012 Sep 27, 2012 – Oct 25, 2012	Jun 2012 – Oct 2012
		Goodream Creek 2KM Northwest of Timmins 6	Jun 05, 2012 – Jul 17, 2012 Jul 14, 2012 – Aug 22, 2012 Aug 23, 2012 – Sep 27, 2012 Sep 27, 2012 – Oct 25, 2012	Jun 2012 – Oct 2012



Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Provincial Network	Labrador Iron Mines	James Creek Above Bridge	Jun 6, 2012 – Jul 14, 2012 Jul 14, 2012 – Aug 21, 2012 Aug 22, 2012 – Sep 26, 2012 Sep 26, 2012 – Oct 25, 2012 *Removed Winter Months	Jun 2012 – Oct 2012
		Unnamed Tributary Below Settling Pond	Jun 6, 2012 – Jul 14, 2012 Jul 14, 2012 – Aug 21, 2012 Aug 22, 2012 – Sep 26, 2012 Sep 26, 2012 – Oct 24, 2012 *Removed Winter Months	Jun 2012 – Oct 2012
	NL WRMD	Lake Melville East of Little River	Jun 29, 2012 – Jul 25, 2012 Jul 25, 2012 – Aug 22, 2012 Aug 22, 2012 – Sep 26, 2012 Sep 26, 2012 – Oct 24, 2012 *Removed Winter Months	N/A
		Churchill River at English Point	Jun 29, 2012 – Jul 25, 2012 Jul 25, 2012 – Aug 22, 2012 Aug 22, 2012 – Sep 26, 2012 Sep 26, 2012 – Nov 01, 2012 *Removed Winter Months	N/A
		Minipi River	Jun 29, 2012 – Jul 24, 2012 Jul 24, 2012 – Aug 21, 2012 Aug 21, 2012 – Sep 25, 2012 Sep 25, 2012 – Nov 07, 2012 *Removed Winter Months	N/A

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Provincial Network	NL WRMD	Southwest Brook below Southwest Pond	Mar 14, 2012 – Jul 11, 2012 Jul 11, 2012 – Aug 14, 2012 Aug 15, 2012 – Oct 09, 2012 Oct 10, 2012 – Dec 08, 2012 Dec 09, 2012 – Jan 23, 2013	N/A
		Leary's Brook at Prince Philip Drive	Feb 15, 2012 – Aug 07, 2012 Aug 07, 2012 – Oct 12, 2012 Oct 12, 2012 – Nov 23, 2012 Nov 23, 2012 – Jan 30, 2013 Jan 30, 2013 – Feb 26, 2013 Feb 27, 2013 – Mar 21, 2013	N/A
		Humber River at Humber Village Bridge	Feb 15, 2012 – May 03, 2012 May 04, 2012 – Jun 07, 2012 Jun 08, 2012 – Jul 10, 2012 Jul 10, 2012 – Aug 03, 2012 Aug 03, 2012 – Sep 07, 2012 Sep 07, 2012 – Oct 09, 2012 Oct 09, 2012 – Nov 13, 2012 Nov 13, 2012 – Nov 28, 2012 Nov 28, 2012 – Jan 31, 2013 Feb 04, 2013 – May 10, 2013	N/A
		Waterford River at Kilbride	Mar 02, 2012 – Apr 11, 2012 Apr 11, 2012 – Jun 07, 2012 Jun 07, 2012 – Jul 24, 2012 Jul 25, 2012 – Sep 28, 2012 Sep 28, 2012 – Nov 05, 2012 Nov 05, 2012 – Dec 05, 2012 Dec 05, 2012 – Jan 16, 2013 Jan 16, 2013 – April 30, 2013	N/A

**Conclusion**

A significant amount of work took place under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* for fiscal year 2012-2013. The number of available products from this program continues to grow annually. Activities for 2013-2014 will be clearly outlined in the upcoming Annual Work Schedule and the 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 as outlined in the Divisional Work Plan 2012-2013

Project	Activity	Responsible Agency	Progress Evaluation
<b>CANAL/Site Documentation Database/Bacteriological Database</b>	Updating of the Site Documentation Database (ie: review of all stations)	Newfoundland and Labrador Department of Environment and Conservation – Staff	This task was completed for all stations by March 31, 2013.
	Calculation of the Water Quality Index scores	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	2012 reporting was completed on 2008-2010 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 site documentation update project.
	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	All WQMA, RTWQ and CABIN station cursory watersheds were drawn for Newfoundland, and the review and editing of these watersheds was well underway by the end of March 2013. There were a total of 130 WQMA, 15 RTWQ and 59 CABIN watersheds drawn for Newfoundland. No watersheds were drawn for Labrador during the 2012-2013 fiscal year.
<b>Real-Time Related Projects</b>	Maintenance/Calibration of Real-Time Stations	Environment Canada <hr/> 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.

	<p>Audit real-time stations visits/meet with clients</p>	<p>Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson</p>	<p>Numerous meetings were held between WRMD and select industry clients as follows: - Teck (Duck Pond Operations) (May 2012); Labrador Iron Mines (August &amp; September 2012) Nalcor Energy (September 2012); Iron Ore Company of Canada (September 2012); Alderon (proposed Kami project) (September 2012 &amp; January 2013); TATA Steel Minerals Canada (September 2012); Labec Century Iron Ore (proposed Joyce Lake Project) (October &amp; November 2012); Newspar (proposed Flourspar mine) (October &amp; November 2012); 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 2012-2013.</p>
	<p>Planning for Real-Time Water Quality Monitoring for Mega-projects</p>	<p>Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson</p>	<p>This is an on-going task. Numerous Environmental Assessment registration documents are reviewed annually to determine if real-time water quality monitoring is needed.</p>
	<p>Negotiating/renewals of Memorandum of Agreements with industry</p>	<p>Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson</p>	<p>Labrador Iron Mines (LIM) signed an amendment in March 2013 to install a new station, station was installed in August 2013; VALE – Long Harbour Project signed an amendment in February 2013 to install 5 new stations, stations were installed in December 2012 and January 2013; Iron Ore Company of Canada (IOC) signed an extension to their MOA in March 2013; Labrador Iron Mines (LIM) signed an extension to their MOA in March 2013; Vale – Long Harbour Project signed an extension to their MOA in March 2013.</p>

	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 2012-2013.
	Maintenance of Inventory/Servicing Spreadsheet	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This 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 buoy was in storage at this time.
	Categorization of Turbidity Alerts	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton/Shibly Rahman/Leona Hyde/Ryan Pugh	This project has been placed on hold due to key staff on leave. Will resume in 2014-2015.
	Implementation of Email Alert System throughout RT Network	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This 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 2013-2014.

	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 2012-2013 this item was postponed.
<b>Technical Documents (RTWQ)</b>	Real-Time Water Quality Deployment and Annual Reports	Newfoundland and Labrador Department of Environment and Conservation – staff	Please refer to <b>Table 8</b> .
	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 2013-2014.



	Completion of Real-Time Water Quality Manual	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/ Grace de Beer/Tara Clinton/Ryan Pugh	This manual now consists of two components: Completion of the Protocols Manual for Real-Time Water Quality Monitoring in NL – this project is 80% complete. In house review was completed in September 2012 and all comments from the group were addressed. Completion of the Calibration Manual for (Industry) Partners – this project is 80% complete. This manual was adapted for the Jordanian training project in June 2012. No changes were made to this document following the Jordanian training session.
	Revision of Bio-fouling Report	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	Complete and posted to departmental website.
	Updating of Real-Time Water Quality Program Web Site	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Tara Clinton	This update has been deferred and will be completed in fiscal year 2013-2014.
<b>Technical Documents (WQMA)</b>	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 update has been deferred and will be completed in fiscal year 2013-2014.

	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.
<b>Blue-green Algae Study</b>	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.
<b>Automated Weather Stations</b>	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.
	Relocation of Churchill River Weather Station	Newfoundland and Labrador Department of Environment and Conservation – Grace de Beer/Maria Murphy	This weather station was not relocated, instead a bank restoration project was completed and the bank is stable once again.
<b>Application of Earth Observation for Water Quality Monitoring</b>	Monitor Changes in Turbidity and TSS along the Churchill River	Newfoundland and Labrador Department of Environment and Conservation – Keith Abbott	Conducted a preliminary review of Landsat-7 and its capability of monitoring turbidity and TSS water quality parameters. Downloaded 57 Landsat-7 image datasets of the Churchill River acquired between 2009 and 2013, which coincides with RTWQ data acquisition.
<b>Automatic Data Retrieval System (ADRS)</b>	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 2012-2012. This activity will continue in fiscal year 2013-2014.

	Upgrades/Maintenance to ADRS as needed	Newfoundland and Labrador Department of Environment and Conservation – Leona Hyde	This is on-going.
	Improvements/Upgrades to ADRS Desktop Search Engine	Newfoundland and Labrador Department of Environment and Conservation – Leona Hyde	This is on-going.
<b>Education/Outreach</b>	Preparation of Technical Program Videos	Newfoundland and Labrador Department of Environment and Conservation – Staff	This project was not completed in fiscal year 2012-2013. This project will go ahead as time permits.
	Educational Displays	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	<p>During fiscal year 2012-2013 there were numerous educational displays:</p> <ul style="list-style-type: none"> <li>• NAACAP AGM Presentation on CABIN (May 10, 2012)</li> <li>• Presentation to Department on CABIN sampling during Environment Week (June 2012)</li> <li>• Presentation on Environmental Science as a Career at Newleaf for Youth 2012 (October 23, 2012)</li> <li>• Booth setup with Public Service NL at Newleaf for Youth 2012 (October 23, 2012)</li> <li>• Various presentations to the Water Quality Advanced Diploma students at the Marine Institute (March 1, 2013)</li> <li>• Display in lobby of Confederation Building Environment Week (June 2012)</li> </ul> <p>Also, arranged the purchase and completion of promotional display banners for all sections in WRMD.</p>

	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.