

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

## **Progress Report 2011-2012**



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 2011-2012. This document is formatted to reflect the same layout as the 2011-2012 Annual Work Schedule.



## Work Shared Activities for Fiscal Year 2011-2012

### Work Shared Activities 2011-2012

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>ENVIRODAT and Data Management/Reporting</b>	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to <b>Table 4</b> for ENVIRODAT projects/tasks  Refer to <b>Table 5</b> for Data Management/Reporting tasks
<b>Real-Time Water Quality Monitoring</b>	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to <b>Table 8</b> for Real-Time Water Quality Monitoring station info
<b>Special Projects</b>	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to <b>Table 6</b> for Special Projects (work shared activities)

### Ambient Water Quality Sampling

During 2011-2012, 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 2012-2013.

**Table 1: Provincial Samples Collected in 2011-2012 Fiscal Year in Newfoundland (Island Portion of the Province)**

Station #	Description	Number of Samples Scheduled in 11-12	Number of Samples Collected in 11-12
<b><u>EASTERN REGION</u></b>			
NF02ZK0005	Northeast River	8	8
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 11-12	Number of Samples Collected in 11-12
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	6
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	6
NF02ZM0359	Paddy's Pond at Outlet	4	3
<b><u>CENTRAL REGION</u></b>			
NF02YM0004	South West Brook at Baie Verte	4	4
NF02YM0003	Indian Brook	4	4
NF02YO0189	Joe's Lake	4	4
NF02YO0107	Exploits River at Millertown Dam	5	5
NF02YO0020	Exploits River at Aspen Brook	4	4
NF02YO0001	Exploits River at Grand Falls	4	4
NF02YO0128	Exploits River below Grand Falls	4	4
NF02YO0142	Corduroy 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	4
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 11-12	Number of Samples Collected in 11-12
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	1
NF02YG0020	Eagle Mountain Brook	4	3
NF02YH0018	Lomond River	4	3
NF02YJ0004	Pinchgut Brook	8	8
NF02YK0022	Humber Canal	4	3
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	3
NF02YL0029	Wild Cove Brook	4	3
NF02YN0001	Lloyds River	5	5
NF02ZA0006	Grand Codroy River	4	3
NF02ZC0020	Buck Lake	4	3
NF02YN0043	Peter Stride's Lake	4	3

Notes:

1. Total number of samples collected in 2011-12 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2011-12 for Eastern region was 107; 117 were sampled, 7 of these samples were triplicates.
3. Total number of samples planned for 2011-12 for Central region was 70; 78 were sampled, 8 of these samples were triplicates.
4. Total number of samples planned for 2011-12 for Western region was 72; 62 were sampled, 2 of these samples were triplicates.

**Table 2: Northern Samples Collected in 2011-2012 Fiscal Year in Labrador**

Station #	Description	Number of Samples Scheduled in 11-12	Number of Samples Collected in 11-12
<b><u>LABRADOR REGION</u></b>			
NF02XA0001	Little Mecatina River	5	4
NF03NF0013	Ugjoktok River	5	3
NF03OC0012	Atikonak River	4	4
NF03OD0011	East Metchin River	4	4
NF03OE0001	Churchill River Above Upper Muskrat	4	5
NF03OE0030	Minipi River	5	5
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	4
NF03OD0012	Wilson River E. Branch	4	4
NF03OE0035	Dominion Lake	4	4
NF03OE0037	Cache River	4	4
NF03PB0028	Cape Caribou River	4	4
NF03PB0029	Northwest River	4	5
NF03PB0030	Seal Lake Narrows	4	4
NF03PB0032	Susan River	4	5
NF03PB0037	Wuchusk Lake	4	3
NF03QA0044	Carter Basin	4	5
NF03QA0045	Kenamu River	4	5
NF03OA0020	Ashuanipi River	4	4

Notes:

1. Total number of samples collected in 2011-12 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2011-12 for Labrador region was 93; 104 were sampled, 9 of these samples were triplicates.

### Ambient Water Quality Analysis

During 2011-2012, 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 2011-2012 as seen in **Table 3**.

**Table 3: Analytical Parameters, Holding Times and Schemas for 2011-2012**

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 2011-2012, 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: ENVIRODAT – Data Management**

	<b>Management Activities</b>	<b>Lead Agency</b>	<b>Progress Evaluation</b>
<b>Current/Ongoing Special Projects</b>	Data Verification and Validation of Sample/Measurement Data	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – staff	Data validation tool was developed but not implemented. Draft data validation and verification method prepared but still awaiting national consistency.
	Variable Grouping	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – staff	Contract for VMV grouping was cancelled due to insufficient resources.
<b>Sample Submission</b>	Laboratory procedures and quality control practices	Environment Canada	Proceeded as per EC’s protocols.
	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 2011-2012.
	Sample/Project/Station Initialization and Modifications	Environment Canada	Proceeded as per EC’s protocols.

<b>Management of national water quality database (ENVIRODAT)</b>	Processing and Loading of NLET Data	Environment Canada	Proceeded as per EC's protocols.
	ENVIRODAT ongoing management	Environment Canada	Proceeded as per EC's protocols.
	Historical Data Issues and Problem Resolution	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – staff	Issues are being addressed as they are detected.
<b>Data Extraction Tool/Web Services</b>	Accessibility/Availability of NL WQMA dataset	Environment Canada	Proceeded as per Environment Canada's protocols.
	ENVIRODAT Web Services	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	Ongoing.
	ENVIRODAT Data Extraction Tool	Environment Canada	The old extraction tool was maintained for this fiscal year but no improvements.
	Regular request of archived NL WQMA data from ENVIRODAT	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	Ongoing – transfer every six months.

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

**Table 5: Technical Documents and Reporting**

Project	Activity	Responsible Agency	Progress Evaluation
<b>CANAL / Site Documentation Database / Bacteriological Database</b>	Structural changes/modifications to CANAL webpage	Environment Canada <hr/> Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde/Kyla Brake	This project will proceed when the Site Documentation Database update is completed.
	Intense ground-truthing and updating of the Site Documentation Database (ie: review of all stations)	Newfoundland and Labrador Department of Environment and Conservation - staff	NL ENVC staff made some progress in updating the required information for select stations, using a tiered approach in 2011-2012. This project will continue in fiscal year 2012-2013.
	On-going <u>maintenance</u> of the Site Documentation Database	Newfoundland and Labrador Department of Environment and Conservation – staff	This is an on-going task that will be performed after the Site Documentation Database project has been completed.
	On-going <u>populating</u> of the Site Documentation Database	Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Rob Holloway	This is an on-going task that will be performed after the Site Documentation Database project has been completed.
	On-going <u>maintenance</u> of the Bacteriological Database	Newfoundland and Labrador Department of Environment and Conservation – Staff	No bacterial monitoring took place in 2011-2012; therefore a update of the bacteriological database was not necessary.
	On-going updating of the Water Quality Index scores	Newfoundland and Labrador Department of Environment and	This is an on-going task that will be performed after the Site Documentation Database project has been completed.

		Conservation – Kyla Brake/Paul Neary	
	Development of Fact Sheets for selected WQMA stations	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	This is an on-going task that will be performed after the Site Documentation Database project has been completed.
	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	This project is multi-phased with initial progress made in determining the batch methodology to undertake the delineation in fiscal year 2011-2012. This project will continue in fiscal year 2012-2013.
<b>Automatic Data Retrieval System (ADRS)</b>	On-going Real-time Service Delivery (ADRS – reporting)	Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	This task was an on-going activity throughout 2011-2012. This activity will continue in fiscal year 2012-2013.
	Upgrades to ADRS as needed	Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	Upgrades are performed as they are required. This is an on-going task and will continue in fiscal year 2012-2013.
	Continued testing/Review of ADRS Search Engine	Newfoundland and Labrador Department of Environment and Conservation - staff	This task was an on-going activity throughout 2011-2012. This activity will continue in fiscal year 2012-2013.
	Improvements to ADRS Search Engine	Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	Improvements are made as issues are identified. This is an on-going task that will continue in fiscal year 2012-2013.

	Implementation of Automated Deployment Spreadsheet into ADRS	Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	This project has been deferred to fiscal year 2013-2014. Testing of the deployment spreadsheet is on-going by staff.
	Maintenance of Inventory/Serviceing Spreadsheet	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This document is currently up to date. It will be periodically updated throughout 2012-2013.
	Maintenance of camera technology at Leary’s Brook Real-Time Station	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde/Ryan Pugh	This activity was completed in 2011-2012. The work on this activity included adjusting the camera position, improving the image resolution, and establishing a staff gauge measurement tool as a visual reference point.
<b>WQMA Search Engine</b>	Development and Testing of WQMA Search Engine (utilizing EC web services)	Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	Due to developments from EC (ie: potential to discontinue use of web services), this project is on hold until further notice.
<b>Technical Documents – WQMA</b>	Maintenance of NL-WQMA Sampling Manual	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	Updates to applicable NL material (appendix to main manual) are made as needed.

	Completion of Intensive Survey 2009-10 Report (Bonne Bay Ponds)	Environment Canada <hr/> Newfoundland and Labrador Department of Environment and Conservation – Ian Bell	All water quality and sediment data was received and processed, draft mapping was concluded and the report outline was finished with 50% of the draft content completed. WRMD will finalize this report in 2012-2013 with final review being carried out by EC in 2013-2014.
	Updating of the Trend Analysis Report	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	The existing Trend Analysis Report was reviewed and analyzed. A document was then created listing the Trend Analysis requirements for stations and variables. Data was compiled including, Variables used in Envirodat, variables used by Paula, and CESI Variables. Compiled stations queried from Envirodat with more than 10 years of data. This data was compared with the stations used in the existing report. Compiled existing trend analysis methodologies and parameters used in these methodologies in a tabular format using available literature.
	On-going updating of WQMA website	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney/Paul Neary	Updates to links and WQMA information are performed as they are required.
<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> .
	Completion of Real-Time Water Quality Manual	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Grace Gillis/Tara Clinton/Ryan Pugh	The majority of the preparation for this report was done in 2011-2012. Activities included, finalizing the procedures and protocols based on pilot study. Compiled photos, diagrams, and schematics. Worked on the document structure, table of contents, scope, and purpose. Assigned specific report sections to individuals based on expertise. Began to compile first draft.

	Completion of Bio-fouling Report	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This report has been reviewed and drafted for submission onto the WRMD website. There are some small changes to be made with formatting and the appendix and should be ready for final draft in 2012-2013.
	On-going updating of Real-Time Water Quality Website	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Paul Neary	This task is on-going.
<b>Education / Outreach</b>	Educational Displays	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	The educational displays for fiscal year 2011-2012 have been completed as follows: a) divisional brochure; b) presentation at the Marine Institute; c) Real-Time poster completed for the Real-Time Water Quality workshop.
	Maintenance/Troubleshooting the real time water monitoring display at the Fluvarium	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	An issue was identified with the display at the Fluvarium. One of the real-time stations used for the display was removed and it requires the addition of a new station to function properly. This problem was not resolved in 2011-2012 and work will take place in 2012-2013.
	Updating of all posters	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	This project has been deferred to 2013-2014 fiscal year.

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

**Table 6: Special Projects for Fiscal Year 2011-2012 (work shared activities)**

<b>Project</b>	<b>Activity</b>	<b>Responsible Agency</b>	<b>Progress Evaluation</b>
<b>Automated Uploading of Field Data</b>	Testing of equipment that is capable of automatically uploading field data into correct forms as required by the laboratory	Environment Canada <hr/> Newfoundland and Labrador Department of Environment and Conservation - staff	This project has been deferred to a later date, if equipment becomes available.
<b>Site-specific Guidelines Project</b>	Development of site-specific guidelines for select NL water bodies	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake/Joanne Sweeney	There was some discussion regarding the terminology to be used for this project as well as the path forward. This project will continue in fiscal year 2012-2013.
<b>Mobile Environmental Monitoring Platform (MEMP)</b>	In-situ water quality/quantity monitoring using a mobile environmental monitoring platform on a need-basis across the province	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh <hr/> Environment Canada – WQMS	The MEMP was deployed on Outer Cove Bridge in Torbay, Middle Cove, Outer Cove. WRMD Staff attempted to make a Spectro::Lyser connection to MEMP in June 2011, without success. In July, a Satlink II logger and water level sensor were installed.
<b>Blue-green Algae Monitoring</b>	Monitoring of blue-green algae on a need basis (Paddy’s Pond and surrounding water bodies)	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	On-going monitoring and sampling when deemed necessary.
<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.



<p><b>Application of Earth Observation for Water Quality Monitoring</b></p>	<p>Assessing if Earth Observations can be used to monitor the impact of development projects on water resources. Building knowledge in using high resolution data/imagery to extract water resources related information such as land cover, wetlands and water bodies</p>	<p>Newfoundland and Labrador Department of Environment and Conservation – Keith Abbott</p>	<p>Researched water quality monitoring products provided by Blue Water Satellite Inc., including products monitoring Cyanobacteria, Total Phosphorus, Chlorophyll-<i>a</i> , and total vegetation coverage derived from Landsat-5 &amp; -7 data.</p>
<p><b>Monitoring Network Evaluation and Optimization</b></p>	<p>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.</p>	<p>Environment Canada  <hr/> Newfoundland and Labrador Department of Environment and Conservation – staff</p>	<p>A path forward to approach the network evaluation and optimization was developed in 2011-2012. Progress on this activity included formulating a query on HYDAT database to retrieve flow and precipitation data for NL WQMA stations. Identifying climate stations in NL under the climate agreement and checking for stations with more than 30 years of data, and creating a dendograph using R programming.</p>
<p><b>Real-Time Related Projects</b></p>	<p>Trouble-shooting with issues at real-time stations</p>	<p>Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson</p>	<p>This is an on-going task.</p>
	<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 2011); Nalcor Energy (May &amp; July 2011); Vale-Long Harbour Project (April, July &amp; November 2011; quarterly Community Liaison Committee meetings); Miawpukek First Nations (June 2011, October 2011); Vale – Voisey’s Bay Project (March 2012). Additional conference calls and email correspondence aided in open communication between WRMD and industry clients throughout 2011-2012.</p>

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	Tata Steel Minerals Canada Limited signed a MOA in April 2011; The City of St. John’s signed a new MOA in July 2011; Nalcor Energy (Lower Churchill Project) signed an extension to their MOA January 2012; Vale (Voisey’s Bay Project) signed an extension to their MOA in March 2012; and Teck (Duck Pond Operations) signed an extension to their MOA in March 2012.
Provide training on procedures to clients	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Grace Gillis/Robert Wight/Tara Clinton/Ryan Pugh	Training sessions were held in May 2011 in Goose Bay, NL for staff from Labrador Iron Mines and Vale (Voisey’s Bay Project). Hands on training was provided to staff of Miawpukek First Nations as needed.
Regular graph review and alerting appropriate staff	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This is an on-going task. Periodically all real-time water quality graphs are reviewed by Tara Clinton. Additionally, the staff responsible for each station also checks the online graphs daily for items of interest.
Advanced specialized training on servicing/repair of HACH equipment	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton/Ryan Pugh	The advanced training of two WRMD staff took place during the previous fiscal year (2010-2011) in Loveland, Colorado.
Establishment of Quality Control Laboratory	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/staff to be determined	Renovations to the workspace in the Howley building were completed throughout spring/summer 2011-2012. This was the initial PTE year. WRMD staff organized a regional schedule and ordered the required parts and supplies. Staff also performed PTEs and made repairs where necessary. Approximately 40 PTE’s were done by staff in this fiscal year.

	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>	Instrumentation was maintained/repared for water quality at key joint monitoring sites.
	Review/Revision of QA/QC protocols for Real-Time Water Quality data	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Tara Clinton/Ryan Pugh/Grace Gillis	A draft report was generated that documented the findings of the pilot project. The report will be reviewed in house and by EC colleagues in fiscal year 2012-2013. It will be finalized and posted on the departmental webpage in fiscal year 2013-2014.
	Continued Testing and Implementation of new Automated Deployment Spreadsheet	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh/Leona Hyde	Throughout the fiscal year 2011-2012, all field staff continued to use/test the spreadsheet for data grooming and reporting.
	Host 3 <sup>rd</sup> national Real-Time Water Quality Monitoring Workshop 2011 (June 2011)	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Tara Clinton	The 3 <sup>rd</sup> Real Time Water Quality Monitoring Workshop was hosted in St. John’s, NL on June 7 <sup>th</sup> and 8 <sup>th</sup> , 2011. The workshop was well attended with over 60 participants with a total of 11 presentations and 3 discussion groups relating to real-time water quality monitoring.
	Comparison Study between Various Turbidity Monitoring Instrumentation	<p>Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh</p> <hr/> <p>Environment Canada</p>	Comparison study between YSI Turbidity Probe, Hydrolab Turbidity Probe and DTS-12 Turbidity Probe. Installed monitoring gear in September and removed in October. Produced paper titled “Comparison of Three Turbidity Instruments: DTS-12, YSI, and Hydrolab”. The Report will be reviewed in house and posted on the departmental webpage in fiscal year 2013-2014.

Categorization of Turbidity Alerts	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton/Shibly Rahman/Leona Hyde	The technical working group had initial meetings to better understand concepts associated with categorizing turbidity alert values. This project will continue in fiscal year 2012-2013
Organization of Datalogger Programming Course of all real-time staff	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	A select number of WRMD staff took part in a training course on the CR-1000 datalogger, hosted by Campbell Scientific on June 6, 2011.
Coordination of Temperature Probe Installation	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	Water temperature probes have been installed at all WQMA-Hydrometric co-located stations, where flow and ice conditions deem it practical.
Establishment of Standalone Station on Paddy’s Pond (testing of communication equipment; testing of instrumentation)	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh/Joanne Sweeney	WRMD staff installed monitoring equipment in September 2011. Equipment included a Sutron Satlink II datalogger equipped with a Hydrolab DS5X. The Initial transmission of data occurred on September 22 <sup>nd</sup> , 2011.
Statistical project to determine extrapolation of non-measured data at select real-time stations	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman  Environment Canada	Progress on this item in 2011-2012 includes, finalized data compilation (grab samples) from the four chosen stations (Leary’s Brook, Rattling Brook Below Bridge, Waterford River and Humber River), created scatter plots for the four stations, performed normality and box plots, compiled minimum and maximum values for certain parameters. The models were tabulated and graphed. Also, computed bias correction and compared model to grab samples.
LCD Screen Display	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Paul Neary/Leona Hyde	This project is approximately 80% complete; WRMD staff contributed their ideas as to what should be displayed. This project will continue in 2012-2013.

	Preparation of “Application Note” for HACH web page detailing case study – VALE (Long Harbour Project)	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton	This has been deferred to a later date.
	In-depth data analysis for real-time stations in partnership with Teck (Duck Pond Operations)	Newfoundland and Labrador Department of Environment and Conservation – Robert Wight	This project was completed in fiscal year 2011-2012.
	Definition of parameter limits for email alert system; implementation of email alert system	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton/Kyla Brake	Ongoing. The email alerting system is still operating for the stations associated with the Vale Long Harbour Project. The email alert system will be extended and applied to other stations throughout the province in 2012-2013.
	Testing and implementation of autosampler technology at select real-time stations	Newfoundland and Labrador Department of Environment and Conservation – Tara Clinton/Ryan Pugh	This task has been put on hold until an opportunity is presented to revisit the technology.
	Testing, implementation and integration of S::CAN technology into real-time program	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh	Worked on connecting Spectro::lyser to MEMP’s CR1000 logger in June 2011, without success. Needs additional consultation when time permits.
	Collaboration/transfer of knowledge on set up and deployment of UV sensor owned by EC	Environment Canada _____ Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh	Informal discussions occur as EC deems necessary and when new information becomes available.

	Collaboration / transfer of knowledge on set up and deployment of buoys owned by EC	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh	Informal discussions occur as EC deems necessary and when new information becomes available.
	Research and development of new technologies	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh/Tara Clinton/Renee Paterson	An introduction to new technologies is gained through informal and ongoing discussions with presenters at conferences/trade shows.
<b>Partnering on technical projects</b>	Partnering with various organizations in collaborative effort to investigate new and innovative techniques and technologies	Newfoundland and Labrador Department of Environment and Conservation – staff	There were no additional partnerships investigating new innovative technologies initiated in fiscal year 2011-2012.

**Cost Shared Activities for Fiscal Year 2011-2012**

**Table 7: Cost Shared Activities 2011-2012**

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>-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>-Poster presentation at the Canadian Water Resources Association Workshop in June 2011 and the Science and Technology Forum (Atlantic Canada) in November 2011.</p>	<p>- Monitoring of benthic invertebrates to better assess the aquatic ecosystem health to complement physical chemical work 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>- Recent sites have been created and will be included in report.</p> <p>- This task was completed.</p> <p>-There were a total of 18 CABIN sampling sites in Newfoundland and Labrador during fiscal year 2011-2012.</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</p>	<p>- Site selection, water quality data extraction and manipulation was completed for 2011-2012. The CESI WQI Calculator was tested by EC and NL ENVC with any 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>spatial trends; issues encountered; etc.).</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. <b>(Note:</b> This study requires three years of data which will be completed in 2012-2013)</p>	<p>- Data analysis and report preparation was completed for 2011-2012.</p> <p>- Sensitivity analysis sampling frequency on WQI score study is on-going, 3 years of data is required.</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>-Modifications regarding storing of information in Access (ie: storing of metal variables using hardness based guidelines; storing confidence intervals and related results; etc.)</p>	<p>- All issues/resolutions were documented in a detailed spreadsheet and distributed as part of the final deliverable package.</p> <p>- Year 3 developments were added to the CESI WQI Help Manual.</p> <p><b>- Detection Limit Storing for Confidence Interval:</b> Detection limit keyword stored in the CESI WQI database and been added for the three options when confidence interval is computed. These are:          « DL » if the method of replacement uses the value of the Detection Limit          « HF » if the method of replacement uses the value of Half the Detection Limit          « ZR » if the method of replacement uses the value Zero</p> <p><b>- Valid Detection Limit Symbol:</b> Of the two less than detection limit symbol (“L” and “&lt;”), only “L” is stored in the database.</p> <p><b>- NULL values:</b> All textual NULL values is converted to CHAR(0) before it is exported into the Access database.</p> <p><b>- Storing metal based hardness guidelines:</b> All hardness based metal guidelines are now stored in the CESI WQI Database. Modification has been made in the code to incorporate this change.</p>

<p>-Addressing issues as identified by EC (ie: less than detects; commas; index periods; invalid units; null values; etc.)</p> <p>-Initiate investigation into how to make the product accessible to CCME</p>	<p>- <b>Storing hardness, pH and temp sample values:</b> All hardness, pH and temp sample values are stored in its proper location in the CESI WQI Database. Modification has been made in the code to incorporate this change.</p> <p>- <b>Storing Confidence Interval:</b> The confidence interval is stored in the CESI WQI Database. Modification has been made in the code to incorporate this change.</p> <p>- <b>Test Application:</b> A test application has been sent to EC which check that no comma is appearing in the exported Access Database. The same logic has been incorporated to exclude comma from the input file of the Calculator.</p> <p>- <b>IndexPeriod:</b> A second option for IndexPeriod has been added which allows the user to use the valid Index Period stated in the IndexPeriod column. The word “IndexPeriod” should not have any gap in between.</p> <p>- <b>Capitalization of Compliance_id:</b> All compliance id has been capitalized to reduce error when data is transferred from the exported CESI Access Database to the Enterprise SQL database.</p> <p>- <b>Valid Variable_id and Unit_id:</b> Variable_id and Unit_id are checked against the valid Variable and unit id stored in the Web Service. If variable/units are valid then the Calculator detects it with a green background. Otherwise red background will appear for invalid variable/unit. The background of a cell changes from red to green when valid variable/unit id is selected. Message has been added for the unit conversion when invalid units are changed to valid units in the User Guideline where the user needs to be warned to ensure that the correct conversion has been made manually in the actual input file.</p> <p>- The help manual was used to make this product accessible to CCME.</p>
<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 2011-2012. See <b>Table 2</b>.</p>

In fiscal year 2011-2012, select WRMD staff attended and presented at many conferences and training initiatives. They are as follow:

- Swiftwater Rescue
- Wilderness First Aid
- Wildlife Encounters
- Chemistry for Water and Wastewater
- CWRA Conference
- CABIN (Canadian Aquatic Biomonitoring Network)
- Working Alone Safety workshop
- CR1000 Data Logger
- Clean and Safe Drinking Water workshop
- Fall Protection
- WHMIS
- GIS – Spatial Statistic Tools
- Northeast Avalon NAACAP workshop
- CESI/CCME workshop
- Effective Safety Talks
- Problem Solving Training
- First Aid

**Table 8. Monthly and Annual Real-Time Water Quality Reports Completed for 2011-2012**

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Vale (Voisey's Bay)	Upper Reid Brook	Jun 19, 2011– Jul 20, 2011 Aug 31, 2011 – Sep 27, 2011 Sep 28, 2011 – Oct 28, 2011 *Removed Winter Months	Jun 2011 – Oct 2011
		Lower Reid Brook	Jun 19, 2011– Jul 20, 2011 Aug 31, 2011 – Sep 27, 2011 Sep 28, 2011 – Oct 28, 2011 *Removed Winter Months	Jun 2011 – Oct 2011
		Camp Pond Brook	Jun 19, 2011– Jul 20, 2011 Aug 31, 2011 – Sep 27, 2011 Sep 28, 2011 – Oct 28, 2011 *Removed Winter Months	Jun 2011 – Oct 2011
		Tributary to Lower Reid Brook	Jun 19, 2011– Jul 20, 2011 Aug 31, 2011 – Sep 27, 2011 Sep 28, 2011 – Oct 28, 2011 *Removed Winter Months	Jun 2011 – Oct 2011
		Rattling Brook below Bridge	Mar 28, 2011 - Apr 28, 2011 Apr 29, 2011 – Jun 16, 2011 Jun 17, 2011 – Jul 20, 2011 Jul 21, 2011 – Aug 11, 2011 Aug 12, 2011 – Sep 27, 2011 Sep 28, 2011 – Nov 03, 2011 Nov 04, 2011 – Dec 1, 2011 Dec 2, 2011 – Jan 12, 2011 Jan 13, 2012 – Feb 16, 2012 Feb 17, 2012 – Mar 29, 2012	Mar 2011 – Jan 2012
		Rattling Brook Big Pond	*Instrument removed due to ice conditions Apr 29, 2011 – Jun 16, 2011 Jun 17, 2011 – Jul 20, 2011 Jul 21, 2011 – Aug 11, 2011 Aug 12, 2011 – Sep 27, 2011 Sep 28, 2011 – Nov 03, 2011 Nov 04, 2011 – Dec 1, 2011 Dec 2, 2011 – Jan 12, 2011 Jan 13, 2012 – Feb 16, 2012 Feb 17, 2012 – Mar 29, 2012	Mar 2011 – Jan 2012
		Rattling Brook below Plant Discharge	Mar 28, 2011 - Apr 28, 2011 Apr 29, 2011 – Jun 16, 2011 Jun 17, 2011 – Jul 20, 2011 Jul 21, 2011 – Aug 11, 2011 Aug 12, 2011 – Sep 27, 2011 Sep 28, 2011 – Nov 03, 2011 Nov 04, 2011 – Dec 1, 2011 Dec 2, 2011 – Jan 12, 2011 Jan 13, 2012 – Feb 16, 2012 Feb 17, 2012 – Mar 29, 2012	Mar 2011 – Jan 2012

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Duck Pond Operations (TECK)	Tributary to Gills Pond Brook	Nov 30, 2011 – May 3, 2011 May 5, 2011 – Jul 12, 2011 Jul 14, 2011 – Aug 8, 2011 Aug 10, 2011 – Sep 16, 2011 Sep 20, 2011 – Nov 1, 2011 Nov 3, 2011 – Dec 31, 2011 Jan 1, 2012 – May 10, 2012	Jan 2011 – Dec 2011
		East Pond Brook	Dec 2, 2011 – May 3, 2011 May 5, 2011 – Jul 12, 2011 Jul 14, 2011 – Aug 8, 2011 Aug 10, 2011 – Sep 16, 2011 Sep 20, 2011 – Nov 1, 2011 Nov 3, 2011 – Dec 31, 2011 Jan 1, 2012 – May 10, 2012	Jan 2011 – Dec 2011
		Well After Tailings Dam – Duck Pond	Oct 21, 2010 – May 3, 2011 May 12, 2011 – Jul 12, 2011 *Instrument failed immediately and was removed Sep 7, 2011 – Sep 16, 2011 Sep 20, 2011 – Nov 1, 2011 Nov 3, 2011 – Dec 31, 2011 Jan 1, 2012 – May 10, 2012	Jan 2011 – Dec 2011
	IOC	Wabush Lake at Dolomite Road	Jun 5, 2011 – Jul 17, 2011 Jul 17, 2011 – Aug 14, 2011 Aug 17, 2011 – Sep 20, 2011 Sep 22, 2011 – Oct 16, 2011 *Removed Winter Months	Jun 2011 – Oct 2011
		Wabush Lake at Julienne Narrows	Jun 5, 2011 – Jul 19, 2011 Jul 19, 2011 – Aug 16, 2011 Aug 16, 2011 – Sep 22, 2011 Sep 22, 2011 – Oct 16, 2011 *Removed Winter Months	Jun 2011 – Oct 2011

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Nalcor	Above Muskrat Falls	May 26, 2011 – Jun 29, 2011 Jun 29, 2011 – Aug 2, 2011 Aug 2, 2011 – Sep 1, 2011 Sep 1, 2011 – Oct 4, 2011 Oct 5, 2011 – Nov 1, 2011 *Removed Winter Months	May 2011 – Nov 2011
		Below Metchin River	May 27, 2011 – Jun 29, 2011 Jun 29, 2011 – Aug 2, 2011 Aug 2, 2011 – Sep 1, 2011 Sep 1, 2011 – Oct 4, 2011 Oct 4, 2011 – Nov 1, 2011 *Removed Winter Months	May 2011 – Nov 2011
		6.15km below Muskrat Falls	May 27, 2011 – Jun 29, 2011 Jun 29, 2011 – Aug 2, 2011 Aug 3, 2011 – Sep 1, 2011 Sep 2, 2011 – Oct 5, 2011 Oct 4, 2011 – Nov 1, 2011 *Removed Winter Months	May 2011 – Nov 2011
		Below Grizzle Rapids	*Instrument not deployed due to ice conditions Jun 29, 2011 – Aug 2, 2011 Aug 2, 2011 – Sep 1, 2011 Sep 1, 2011 – Oct 4, 2011 Oct 4, 2011 – Nov 1, 2011 *Removed Winter Months	May 2011 – Nov 2011
	Tata Steel Minerals Canada Limited (TSMC)	Elross Creek Below Pinette Lake Inflow		October 2011
		Goodream Creek 2KM Northwest of Timmins 6		October 2011

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Provincial Network	Labrador Iron Mines	James Creek Above Bridge	Jun 4, 2011 – Jul 15, 2011 Jul 16, 2011 – Aug 13, 2011 Aug 13, 2011 – Sep 19, 2011 Sep 19, 2011 – Oct 16, 2011 *Removed Winter Months	Jun 2011 – Oct 2011
		Unnamed Tributary Below Settling Pond	Jun 4, 2011 – Jul 15, 2011 Jul 16, 2011 – Aug 13, 2011 Aug 13, 2011 – Sep 19, 2011 Sep 19, 2011 – Oct 16, 2011 *Removed Winter Months	Jun 2011 – Oct 2011
	NL WRMD	Lake Melville East of Little River	May 27, 2011 – Jun 30, 2011 Jun 30, 2011 – Aug 3, 2011 Aug 3, 2011 – Sep 2, 2011 Sep 2, 2011 – Oct 5, 2011 Oct 5, 2011 – Nov 2, 2011 *Removed Winter Months	N/A
		Churchill River at English Point	May 27, 2011 – Jun 29, 2011 Jun 30, 2011 – Aug 3, 2011 Aug 3, 2011 – Sep 1, 2011 Sep 1, 2011 – Oct 5, 2011 Oct 5, 2011 – Nov 2, 2011 *Removed Winter Months	N/A
		Minipi River	May 26, 2011 - Jun 29, 2011 Jun 29, 2011 – Aug 2, 2011 Aug 2, 2011 – Sep 2, 2011 Sep 2, 2011 – Oct 4, 2011 Oct 4, 2011 – Nov 3, 2011 *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 22, 2011 – Apr 25, 2011 Apr 26, 2011 – May 28, 2011 May 29, 2011 – Jul 24, 2011 Jul 25, 2011 – Sep 12, 2011 Sep 13, 2011 – Oct 23, 2011 Oct 24, 2011 – Dec 1, 2011 Dec 2, 2011 – Jan 23, 2012 Jan 24, 2012 – Mar 14, 2012 Mar 14, 2012 – Jul 11, 2012	N/A
		Leary's Brook at Prince Philip Drive	Dec 15, 2010 – Apr 27, 2011 Apr 27, 2011 – Aug 26, 2011 Aug 26, 2011 – Feb 15, 2012 Feb 15, 2012 – Aug 7, 2012	N/A
		Humber River at Humber Village Bridge	Feb 24, 2011 - Jun 24, 2011 Jun 24, 2011 - Aug 11, 2011 Aug 11, 2011 - Nov 1, 2011 Nov 25, 2011 - Feb 14, 2012 Feb 15, 2012 - May 03, 2012	N/A
		Waterford River at Kilbride	Mar 29, 2011 – May 3, 2011 May 3, 2011 – Jun 15, 2011 Jun 15, 2011 – Jul 21, 2011 Jul 22, 2011 – Aug 26, 2011 Aug 26, 2011 – Nov 9, 2011 *No report due for this period due to data transmission malfunctions. Jan 23, 2012 – Mar 2, 2012 Mar 2, 2012 – Apr 11, 2012	N/A



**Conclusion**

A significant amount of work took place under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* for fiscal year 2011-2012. The number of available products from this program continues to grow annually. Activities for 2012-2013 will be clearly outlined in the upcoming Annual Work Schedule.

In 2011, the WRMD's Real-Time Water Quality Program was awarded the Environmental Award by PEGNL (Professional Engineers and Geoscientists of Newfoundland and Labrador). This award recognizes the application of science, technology and engineering to human and resource environmental management in Newfoundland and Labrador.

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*.

