

CANADA-NEWFOUNDLAND and LABRADOR WATER QUALITY MONITORING AGREEMENT

Progress Report 2010-2011



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 2010-2011. This document is formatted to reflect the same layout as the 2010-2011 Annual Work Schedule.



Work Shared Activities for Fiscal Year 2010-2011

Work Shared Activities 2010-2011

Activity	Responsible Agency	Remarks
Ambient Water Quality Sampling	Newfoundland and Labrador Department of Environment and Conservation	Refer to Table 1 for sampling details in Newfoundland Refer to Table 2 for sampling details in Labrador
Ambient Water Quality Analysis	Environment Canada – National Laboratory for Environmental Testing (NLET)	Refer to Table 3 for laboratory analysis details
ENVIRODAT and Data Management/Reporting	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to Table 4 for ENVIRODAT projects/tasks Refer to Table 5 for Data Management/Reporting tasks
Special Projects	Newfoundland and Labrador Department of Environment and Conservation <u>and</u> Environment Canada	Refer to Table 6 for Special Projects (work shared activities)

Ambient Water Quality Sampling

During 2010-2011, 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 2011-2012.

Table 1: Provincial Samples Collected in 2010-2011 Fiscal Year in Newfoundland (Island Portion of the Province)

Station #	Description	Number of Samples Scheduled in 10-11	Number of Samples Collected in 10-11
<u>EASTERN REGION</u>			
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 10-11	Number of Samples Collected in 10-11
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
<u>CENTRAL REGION</u>			
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	5
NF02YO0128	Exploits River below Grand Falls	4	5
NF02YO0142	Corduoy Brook	4	4
NF02YO0143	Exploits River at Bond Bridge	4	5
NF02YR0001	Pound Cove Brook	4	4
NF02YO0121	Peter's River	4	5
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 10-11	Number of Samples Collected in 10-11
NF02YS0083	Northwest River at Terra Nova	4	4
<u>WESTERN REGION</u>			
NF02YE0004	Portland Creek	4	4
NF02YE0005	Western Brook	5	5
NF02YG0001	Main River at Bridge	5	4
NF02YG0009	Main River at Paradise Pool	4	4
NF02YG0020	Eagle Mountain Brook	4	4
NF02YH0018	Lomond River	4	4
NF02YJ0004	Pinchgut Brook	8	8
NF02YK0022	Humber Canal	4	4
NF02YL0011	Humber River at Little Falls	4	4
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 Codroy River	4	4
NF02ZC0020	Buck Lake	4	4
NF02YN0043	Peter Stride's Lake	4	4

Notes:

1. Total number of samples collected in 2010-11 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2010-11 for Eastern region was 107; 105 were sampled, 8 of these samples were triplicates.
3. Total number of samples planned for 2010-11 for Central region was 70; 74 were sampled, 7 of these samples were triplicates.
4. Total number of samples planned for 2010-11 for Western region was 72; 71 were sampled, 4 of these samples were triplicates.

Table 2: Northern Samples Collected in 2010-2011 Fiscal Year in Labrador

Station #	Description	Number of Samples Scheduled in 10-11	Number of Samples Collected in 10-11
<u>LABRADOR REGION</u>			
NF02XA0001	Little Mecatina River	4	4

Station #	Description	Number of Samples Scheduled in 10-11	Number of Samples Collected in 10-11
NF03NF0013	Ugjoktok River	5	5
NF03OC0012	Atikonak River	5	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	4
NF03PB0025	Naskaupi River	5	5
NF03QC0001	Eagle River	5	4
NF03QC0002	Alexis River	4	4
NF03NG0034	Shipiskan Lake East	3	3
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	4
NF03PB0030	Seal Lake Narrows	4	5
NF03PB0032	Susan River	4	4
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 2010-11 does include triplicate samples. The total does not include bottle blanks.
2. Total number of samples planned for 2010-11 for Labrador region was 96; 98 were sampled, 5 of these samples were triplicates.

Ambient Water Quality Analysis

During 2010-2011, 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 2010-2011 as seen in **Table 3**.

Table 3: Analytical Parameters, Holding Times and Schemas for 2010-2011

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

***27 Metals include:**

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

Schema Number	Schema Name	Parameter/ Grouping
1	ALKPHCOND	alkalinity, pH, conductivity
2	MI4-U	Ca, Mg, Na, and K
5	NO3ATL-U	NO3 by IC
6	CLSO4-U	Cl and SO4 by IC
11	TP1-U	total phosphorus
12	TN1-U	total nitrogen
13	DIC/DOC1	dissolved inorganic and organic carbon
22	HARDNESS1	Calculation derived from Ca and Mg
23	COL-APP	Colour-apparent (unfiltered sample)
24	TURBIDITY3	turbidity
31	TM2003/T27W	Total metals-27 elements

ENVIRODAT and Data Management/Reporting

During 2010-2011, 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. All data management and reporting activities were carried out as agreed upon in the Annual Work Schedule 2010-2011 as seen in **Table 4 & 5**.

Table 4: ENVIRODAT – Data Management

Management Activities		Lead Agency	Progress Evaluation
Current/Ongoing Special Projects	Data Verification and Validation of Sample/Measurement Data	Environment Canada – ALET/CIOB <hr/> Newfoundland and Labrador Department of Environment and Conservation – staff	Sample verification and validation procedures were developed by EC staff. Programming of application initiated also.
	Variable Grouping	Environment Canada – ALET/CIOB <hr/> Newfoundland and Labrador Department of Environment and Conservation – staff	Contract prepared by EC WQMSD staff for chemist to compare analytical methods of project AT215, among others. However, EC procurement delays did not allow it to be implemented.
	ALET Client Package: -Distribution of standardized forms to clients for review. - Review of standardized forms and provisions of feedback/comments -Revisions/Changes to standardized forms -Adoption of new standardized forms by NL WRMD	Environment Canada – ALET/CIOB <hr/> Newfoundland and Labrador Department of Environment and Conservation - staff	NL WRMD staff reviewed new forms and provided feedback/comments to ALET

Sample Submission	Laboratory procedures and quality control practices	Environment Canada – ALET	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 2010-2011
	Sample/Project/Station Initialization and Modifications	Environment Canada – ALET	Proceeded as per EC’s protocols
Management of national water quality database (ENVIRODAT)	Processing and Loading of NLET Data	Environment Canada – CIOB	Proceeded as per EC’s protocols
	ENVIRODAT ongoing management	Environment Canada – CIOB	Proceeded as per EC’s protocols
	Establishment of a formal data sharing agreement	Environment Canada – ALET/CIOB _____ Newfoundland and Labrador Department of Environment and Conservation – staff	It was decided by both EC and that a formal data sharing agreement was not necessary.
	Historical Data Issues and Problem Resolution	Environment Canada – CIOB _____ Newfoundland and Labrador Department of Environment and Conservation – staff	Issues are being addressed as they are detected.
Data Extraction Tool/Web Services	Accessibility/Availability of NL WQMA dataset	Environment Canada – CIOB/WQMS	Proceeded as per Environment Canada’s protocols

	ENVIRODAT Web Services	Environment Canada – CIOB/WQMS <hr/> Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde	Ongoing
	ENVIRODAT Data Extraction Tool	Environment Canada – CIOB/WQMS	Tool maintained on the EC external website for use by Provincial Dept. and the public.
	Regular request of archived NL WQMA data from ENVIRODAT	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	Ongoing

- * Activities listed in this table are work-shared activities
- **CIOB** – Chief Information Officer Branch
- **ALET** – Atlantic Laboratory for Environmental Testing
- **WQMS**– Water Quality Monitoring and Surveillance

Table 5: Technical Documents and Reporting

Project	Activity	Responsible Agency	Progress Evaluation
CANAL / Site Documentation Database / Bacteriological Database	Structural changes/modifications to CANAL webpage	Environment Canada – WQMS <hr/> Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde/Kyla Brake	Meeting was held in-house and it was decided that the Site Documentation Database needs to be updated before CANAL can be modified. This project will continue in fiscal year 2011-2012.
	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. However, in order to fully accomplish this significant task, the update will proceed using a tiered approach in 2011-2012.
	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 2010-2011; therefore an update of the bacteriological database was not necessary.
	On-going updating of the Water Quality Index scores	Newfoundland and Labrador Department of Environment and Conservation – Kyla	Awaiting the completion of the Site Documentation Database. This project will proceed in 2011-2012.

		Brake/Paul Neary	
	Development of Fact Sheets for selected WQMA stations	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	Awaiting the completion of the Site Documentation Database project. This project will proceed in 2011-2012.
	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 the following activities completed in 2010-2011: a) assembled a list of all active hydrometric, RTWQ, WQMA and CABIN stations; b) created GIS layers of all active stations; c) prioritized the order in which station watersheds need to be delineated; d) organized GIS inventory of previously drawn watersheds to determine what station watersheds require delineation; e) reviewed and tested automated watershed delineation process.
Automatic Data Retrieval System (ADRS)	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 2010-2011. This activity will continue in fiscal year 2011-2012.
	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 2011-2012.
	Testing/Review of ADRS Search Engine	Newfoundland and Labrador Department of Environment and Conservation - staff	This task was an on-going activity throughout 2010-2011. This activity will continue in fiscal year 2011-2012.
	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 2011-2012.

	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 2011-2012. 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 2011-2012.
	Maintenance of camera technology at Leary’s Brook Real-Time Station	Environment Canada – WQMS <hr/> Newfoundland and Labrador Department of Environment and Conservation – Paul Neary/Leona Hyde/Ryan Pugh	This project has been deferred to fiscal year 2011-2012.
WQMA Search Engine	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.
Technical Documents – WQMA	Completion of Stability Study Report	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney	Completed June 2010.
	Maintenance of NL-WQMA Sampling Manual	Newfoundland and Labrador Department of Environment and Conservation – Joanne	This is an on-going task.

		Sweeney	
	Completion of Intensive Survey 2008-09 Report (Churchill River)	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	This report is completed and posted to the departmental website. Joint effort by EC and NL ENVC.
	Completion of Intensive Survey 2009-10 Report (Bonne Bay Ponds)	Environment Canada – WQMS Newfoundland and Labrador Department of Environment and Conservation – Ian Bell	Most data has been received from the lab and work on the first draft of the report has commenced. WRMD will prepare/finalize the report in 2011-2012 with review being carried out by EC.
	Updating of the Trend Analysis Report	Newfoundland and Labrador Department of Environment and Conservation – staff (TBD)	This project has been deferred to fiscal year 2011-2012.
	On-going updating of WQMA website	Newfoundland and Labrador Department of Environment and Conservation – Joanne Sweeney/Paul Neary	This task is ongoing.
Technical Documents - RTWQ	Real-Time Water Quality Deployment and Annual Reports	Newfoundland and Labrador Department of Environment and Conservation – staff	Please refer to Table 8 .
	Completion of Real-Time Water Quality Manual	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Grace Gillis/Tara Clinton/Ryan Pugh	No work was completed on this report during fiscal year 2010-2011. This work will take place in fiscal year 2011-2012.

	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 2011-2012.
	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.
Education / Outreach	Educational Displays	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	The educational displays for fiscal year 2010-2011 have been completed as follows: a) presentation at the Marine Institute; b) display and presentation at the Fluvarium (Water Conservation and Security Fair).
	Maintenance/Troubleshooting the real time water monitoring display at the Fluvarium	Environment Canada – WQMS ----- 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 work will take place in 2011-2012.
	Updating of all posters	Newfoundland and Labrador Department of Environment and Conservation – Kyla Brake	This project has been deferred to 2011-2012 fiscal year.

- * Activities listed in this table are work-shared activities
- **WQMS** – Water Quality Monitoring and Surveillance

Table 6: Special Projects for Fiscal Year 2010-2011 (work shared activities)

Project	Activity	Responsible Agency	Progress Evaluation
Automated Uploading of Field Data	Testing of equipment that is capable of automatically uploading field data into correct forms as required by the laboratory	Environment Canada – WQMS Newfoundland and Labrador Department of Environment and Conservation - staff	This project was dependent on receiving new equipment, which was not received. This project has been deferred to fiscal year 2011-2012.
Site-specific Guidelines Project	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 2011-2012.
Mobile Environmental Monitoring Platform (MEMP)	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 Environment Canada - WQMS	The MEMP was initially deployed on Outer Cove Brook in the town of Logy Bay-Middle Cove-Outer Cove in December 2010 and resides there at this time. Its programming is to be upgraded in June 2011. Further updates are to include a directional cellular antenna to increase reception and a web camera.
Blue-green Algae Monitoring	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	Monthly observation of all ponds in the Paddy’s Pond watershed was conducted from May-August of 2010 and a limited number of water samples were analyzed for nutrient content.
Real-Time Related Projects	Trouble-shooting with issues at real-time stations	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	This is an on going task.
	Audit real-time stations visits/meet with clients	Newfoundland and Labrador Department of	Numerous meetings were held between WRMD and select industry clients as follow: - Nalcor Energy (May, June &

	Environment and Conservation – Renee Paterson	October 2010; March 2011); - City of St. John’s (May 2010 & March 2011); - Iron Ore Company of Canada (July 2010); - Vale-Long Harbour Project (September & October 2010; quarterly Community Liaison Committee meetings); - MiawpukeK First Nations (June 2010). Additional conference calls and email correspondence aided in open communication between WRMD and industry clients throughout 2010-2011.
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.
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.
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 field cleaning protocol was implemented and tested from March 2010 until December 2010. The pilot project results were then reviewed. In January 2011, it was decided that data correction was not warranted
Establishment of Quality Control Laboratory	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/staff to be determined	An Engineering Co-Op student was hired to provide various floor plan options for this project during fall 2010. There were initial discussions with the Department of Transportation and Works regarding how the renovations would be completed.
Development/Testing of new Automated Deployment Spreadsheet	Newfoundland and Labrador Department of Environment and Conservation – staff	Throughout the fiscal year, all staff were using and testing this spreadsheet, at all real time stations. They were performing error correction (using Before/After Field Cleaning and Calibration drift). A final analysis of this pilot project resulted in the decision to cease the correction of data.
Preparation for 3 rd national Real-Time Water Quality	Newfoundland and Labrador Department of	Preparation for the workshop included meeting with the coordinator and developing a theme, obtaining quotes for the

	Monitoring Workshop 2011 (June 2011)	Environment and Conservation – Renee Paterson/Tara Clinton Environment Canada – WQMS	room rental, food, beverages and rental of the meeting room. The booking of transportation, arrangement for pick up at the airport, transportation to the workshop and the field trip was also planned. An invitation list was created, verified addresses/names, researched potential participants to invite and communicated with all suppliers of interest. It also included drafting the invitation which contained information concerning the hotel, location and events, contact information for the coordinator of the workshop, the dates and any food requirements. Also, the expression of interest to present or establish a booth. The actual workshop took place in the next fiscal year (June 2011).
	Comparison Study between various water quality monitoring equipment (Hydrolab; YSI; S::CAN)	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh Environment Canada – WQMS	Paddy’s Pond will see the establishment of three individual monitoring platforms carrying the range of equipment used by the Real-Time network in various configurations not commonly seen throughout the rest of the network. No equipment was added during fiscal year 2010-2011. This comparison project will continue throughout 2011-2012.
	Organization of Hydrolab Training Course for all real-time staff	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson	There was a Hydrolab Training Course offered in St. John’s on July 27 th and 28 th , 2010 and was made available to all WRMD real-time staff.
	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	The buoy was deployed in the summer of 2010 (Hydrolab logging internally; Standalone with no telemetry). Additional equipment will be added in 2011-2012.
	Statistical project to determine extrapolation of non-measured data at select real-time stations	Newfoundland and Labrador Department of Environment and Conservation – Shibly Rahman	Grab samples have been collected for TSS data. Field data is collected using the turbidity data. An initial model has been developed between turbidity and TSS but the number of samples is not sufficient to capture enough variability in the model. More samples are required to complete the model. Grab samples have been collected for Sodium, Calcium,

	Environment Canada – WQMS	Sulphate and Chloride. Field data (from the field sonde) is collected using the specific conductance data. Four stations (Leary Brook, Waterford River, Rattling Brook and Humber River) were chosen to perform site specific regression model. An initial abstract was drafted as a starting point to write the report on “Ionic Concentration Estimation of urban and Non Urban Water Bodies of Newfoundland and Labrador using Real Time Water Quality Data”.
LCD Screen Display	Newfoundland and Labrador Department of Environment and Conservation – Renee Paterson/Paul Neary/Leona Hyde	This project has been deferred to 2011-2012 fiscal year.
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	Completed draft by Tara Clinton, awaiting review by Renee Paterson. The case study will then be sent to Vale Long Harbour for approval before being submitted to HACH.
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	Data was partly assessed for the following: <ul style="list-style-type: none"> • In depth analysis of well data and changes overtime • Investigation of the effects of well purging on real-time values • Integration of weather station data More work will be completed on this project 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	Ongoing. The email alerting system has been established for the stations associated with the Vale Long Harbour Project. Parameter limits have been adjusted based on statistical study of the turbidity and TSS data. This is an on going process as more real-time grab sample data becomes available. This work is being carried out in partnership with the Pollution Prevention Division of NL ENVC. The email alert system will be extended and applied to other stations throughout the province in 2011-2012.
Testing and implementation of autosampler technology at	Newfoundland and Labrador Department of	This task has been put on hold until an opportunity is presented to revisit the technology.

	select real-time stations	Environment and Conservation – Ryan Pugh	
	Testing, implementation and integration of S::CAN technology into real-time program	Newfoundland and Labrador Department of Environment and Conservation – Ryan Pugh	Preliminary work has been undertaken in gathering the needed cabling and converters to allow Modbus communication between the Spectro:lyser, Con:nect Box and CR1000 datalogger. This will be undertaken with the upgrading of the MEMP program in June 2011.
	Collaboration/transfer of knowledge on set up and deployment of UV sensor owned by EC	Environment Canada – WQMS 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 such conferences/trade shows as the National Water Monitoring Workshop (April 2010) and the CWRA conferences.
Application of Earth Observation for Water Quality Monitoring	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	Newfoundland and Labrador Department of Environment and Conservation – Keith Abbott	Data requirements for mapping wetlands were summarized. A list of current commercial satellites used for landcover mapping was assembled. Researched the use of RADAR data for mapping impervious land cover. Prepared a 12-page document outlining the use of data for water resources management. Subscribed to newsletters distributed by NASA, ESA, and CSA.

Automated Weather Stations	Operation of four automated weather stations to provide valuable climate information to support water quantity and quality analysis	Newfoundland and Labrador Department of Environment and Conservation – staff	This task is on-going.
Partnering on technical projects	Partnering with various organizations in collaborative effort to investigate new and innovative techniques and technologies	Newfoundland and Labrador Department of Environment and Conservation – staff	Numerous meetings were held throughout 2010-2011 as information sharing sessions on a variety of technical projects that are proceeding at Memorial University. Some of the topics discussed include: a) use of new fibre optic technology in conjunction with water monitoring; b) transect project on west coast of NL; c) development of automated surface water vehicle; d) investigation of the use of wireless technology in the RTWQ program.

- **WQMS** – Water Quality Monitoring and Surveillance (Jean-Francois Bibeault)

Cost Shared Activities for Fiscal Year 2010-2011

Table 7: Cost Shared Activities 2010-2011

Project	Progress Evaluation
<p>Real-time Water Quality Monitoring Network</p> <p>Operation of NL Real-Time Water Quality Monitoring Network</p>	<p>- Industry instruments were deployed throughout the fiscal year 2010-2011, see Table 8.</p>
<p>Mobile Environmental Monitoring Platform (MEMP)</p> <p>Operation of Mobile Environmental Monitoring Platform designated for NL region.</p>	<p>- The MEMP was deployed in December 2010 on Outer Cove Brook in the town of Logy Bay-Middle Cove-Outer Cove and resides there at this time. Its programming will be updated in June 2011. Further updates are to include a directional cellular antenna to increase reception and a web camera.</p>
<p>Chemical Management Plan</p> <p>Priority Substances</p>	<p>Sample collection under the Chemical Management Plan is completed for 2010-2011.</p>
<p>Canadian Aquatic Biomonitoring Network (CABIN)</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>- 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>-In preparation for the Baseline Report on Reference Invertebrate Assemblages in NL, the Initial investigation and analysis have been completed.</p> <p>-There were a total of 25 CABIN sampling sites in Newfoundland and Labrador during fiscal year 2010-2011.</p>

<p>Canadian Environmental Sustainability Indicators (CESI)</p> <p>Provincial Input to National CESI Reporting</p> <p>-Site selection, water quality data extraction, and manipulation.</p> <p>-Decision on WQI inputs and calculation of ratings for each station.</p> <p>-Overview interpretation of results (short document on parameters & issue driving the ratings and 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.</p>	<p>- Site selection, water quality data extraction and manipulation was completed for 2010-2011. 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>- Data analysis and report preparation was completed for 2010-2011.</p> <p>- Sensitivity analysis sampling frequency on WQI score study is on-going, 3 years of data is required.</p>
<p>Canadian Environmental Sustainability Indicators (CESI)</p> <p>Modifications/Improvements to CESI Calculator</p> <p>-Provision of fixes/solutions to issues encountered</p> <p>-Documentation of issues/fixes</p> <p>-Improvements to the Help Manual</p> <p>-Investigation utilizing “R” Software for determination of confidence intervals</p> <p>-Implementation of utilizing “R” software for determination of</p>	<p>- All issues/resolutions were documented in a detailed spreadsheet and distributed as part of the final deliverable package.</p> <p>- English version of the Help Manual created.</p> <p>- A link was established between Visual Basic.NET and R programming.</p> <p>- Successfully integrated Confidence Interval in Visual Basic.Net using Dr. Shaarawi’s R code written in R Programming.</p>

confidence intervals	
-Testing of calculator (with added statistical functionality)	- The CESI WQI Calculator underwent extensive testing by EC and NL ENVC.
Canadian Environmental Sustainability Indicators (CESI)	
Northern Sampling and Analysis (Labrador)	
-Labrador water samples are collected by both federal and provincial staff in support of CESI reporting (for more remote core sites).	- Northern sampling and analysis proceeded as outlined in the Annual Work Schedule 2010-2011. See Table 2 .

Table 8. Monthly and Annual Real-Time Water Quality Reports Completed for 2010-2011

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Vale Inco (Voisey's Bay)	Upper Reid Brook	Jun 05, 2010–Jul 20, 2010 Jul 21, 2010– Aug 16, 2010 Aug 17, 2010– Oct 11, 2010 *Removed Winter Months	Jun 05, 2010 – Oct 11, 2010
		Lower Reid Brook	Jun 05, 2010–Jul 20, 2010 Jul 21, 2010– Aug 16, 2010 Aug 17, 2010– Oct 11, 2010 *Removed Winter Months	Jun 05, 2010 – Oct 11, 2010
		Camp Pond Brook	Jun 05, 2010–Jul 20, 2010 Jul 21, 2010– Aug 16, 2010 Aug 17, 2010– Oct 11, 2010 *Removed Winter Months	Jun 05, 2010 – Oct 11, 2010
		Tributary to Lower Reid Brook	Jun 05, 2010–Jul 20, 2010 Jul 21, 2010– Aug 16, 2010 Aug 17, 2010– Oct 11, 2010 *Removed Winter Months	Jun 05, 2010 – Oct 11, 2010
	Vale Inco (Long Harbor)	Rattling Brook below Bridge	Mar 31, 2010-May 04, 2010 May 05, 2010-Jun 10, 2010 Jun 11, 2010-Jul 15, 2010 Jul 16, 2010-Aug 12, 2010 Aug 13, 2010-Sep 15, 2010 Sep 16, 2010-Oct 13, 2010 Oct 14, 2010-Nov 17, 2010 Nov 18, 2010-Dec 16, 2010 Dec 17, 2010-Jan 20, 2011 Jan 24, 2011-Feb 24, 2011 Feb 25, 2011-Mar 31, 2011	Mar 31, 2010 – Jan 20, 2011
		Rattling Brook Big Pond	Mar 31, 2010-May 04, 2010 May 05, 2010-Jun 10, 2010 Jun 11, 2010-Jul 15, 2010 Jul 16, 2010-Aug 12, 2010 Aug 13, 2010-Sep 15, 2010 Sep 16, 2010-Oct 13, 2010 Oct 14, 2010-Nov 17, 2010 Nov 18, 2010-Dec 16, 2010 Dec 17, 2010-Jan 20, 2011 Jan 24, 2011-Feb 24, 2011 *Removed due to ice conditions	Mar 31, 2010 – Jan 20, 2011
		Rattling Brook below Plant Discharge	Mar 31, 2010-May 04, 2010 May 05, 2010-Jun 10, 2010 Jun 11, 2010-Jul 15, 2010 Jul 16, 2010-Aug 12, 2010 Aug 13, 2010-Sep 15, 2010 Sep 16, 2010-Oct 13, 2010 Oct 14, 2010-Nov 17, 2010 Nov 18, 2010-Dec 16, 2010 Dec 17, 2010-Jan 20, 2011 Jan 24, 2011-Feb 24, 2011 Feb 25, 2011-Mar 31, 2011	Mar 31, 2010 – Jan 20, 2011

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Industry Partners Network	Duck Pond Operations (TECK)	Tributary to Gills Pond Brook	April 28, 2010-July 05, 2010 July 07, 2010-Aug 31, 2010 Sep 02, 2010-Oct 18, 2010 Oct 21, 2010-Nov 30, 2010 Nov 30, 2010-May 3, 2011	Jan 2010 – Dec 2010
		East Pond Brook	April 28, 2010-July 05, 2010 July 07, 2010-Aug 31, 2010 Sep 02, 2010-Oct 18, 2010 Oct 21, 2010-Nov 30, 2010 Nov 30, 2010-May 3, 2011	Jan 2010 – Dec 2010
		Well After Tailings Dam – Duck Pond	April 28, 2010-July 05, 2010 July 07, 2010-Aug 31, 2010 Sep 02, 2010-Oct 18, 2010 Oct 21, 2010-Nov 30, 2010 Nov 30, 2010-May 3, 2011	Jan 2010 – Dec 2010
	IOC	Wabush Lake at Dolomite Road	May 31, 2010-Jun 28, 2010 Jun 29, 2010-Aug 2, 2010 Aug 3, 2010- Sept 6, 2010 Sept 7, 2010-Oct 20, 2010 * Removed Winter Months	May 31 2010 – Oct 20 2010
		Wabush Lake at Julienne Narrows	May 31, 2010-Jun 29, 2010 Jun 29, 2010-Aug 3, 2010 Aug 3, 2010- Sept 7, 2010 Sept 7, 2010-Oct 20, 2010 * Removed Winter Months	May 31 2010 – Oct 20 2010
	NL Refining Corporation (Come By Chance)	Come by Chance	Project suspended	Project suspended

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
	Nalcor	Above Muskrat Falls	May 20, 2010-Jun 23, 2010 Jun 24, 2010-Jul 23, 2010 Jul 23, 2010-Aug 22, 2010 Aug 22, 2010-Sept 21, 2010 Sept 21, 2010-Nov 2, 2010 *Removed Winter Months	May 20, 2010-Nov 3, 2010
		Below Metchin River	May 20, 2010-Jun 23, 2010 Jun 24, 2010-Jul 23, 2010 Jul 23, 2010-Aug 22, 2010 Aug 22, 2010-Sept 21, 2010 Sept 21, 2010-Nov 2, 2010 *Removed Winter Months	May 20, 2010-Nov 3, 2010
		6.15km below Muskrat Falls	May 20, 2010-Jun 23, 2010 Jun 24, 2010-Jul 23, 2010 Jul 23, 2010-Aug 22, 2010 Aug 22, 2010-Sept 21, 2010 Sept 21, 2010-Nov 3, 2010 *Removed Winter Months	May 20, 2010-Nov 3, 2010
		Below Grizzle Rapids	*Instrument not deployed due to ice wall Jun 24, 2010-Jul 23, 2010 Jul 23, 2010-Aug 22, 2010 Aug 22, 2010-Sept 21, 2010 Sept 21, 2010-Nov 2, 2010 *Removed Winter Months	May 20, 2010 – Nov 3, ,2010
Federal Partner Network	Environment Canada and NL WRMD	Minipi River	May 20, 2010-Jun 24, 2010 Jun 24, 2010-Jul 24, 2010 Jul 24, 2010-Aug 22, 2010 Aug 22, 2010-Sept 21, 2010 Sept 21, 2010-Nov 03, 2010 *Removed Winter Months	N/A
		Southwest Brook below Southwest Pond	Mar 03, 2010-May 08, 2010 May 12, 2010-Jun 29, 2010 Jun 29, 2010-Aug 24, 2010 Aug 25, 2010-Oct 19, 2010 Oct 19, 2010-Nov 14, 2010 Nov 14, 2010-Dec 19, 2010 Dec 19, 2010-Feb 13, 2011 Feb 13, 2011-Mar 21, 2011	N/A
		Main River at Paradise Pool	May 19, 2010-Jun 29, 2010 Jun 29, 2010-Aug 24, 2010 Aug 24, 2010-Nov 3, 2010 *Station discontinued	N/A

Networks	Partners	Station Name	Monthly Deployment Reports	Annual Deployment Reports
Provincial Network	NL WRMD	Leary's Brook at Prince Philip Drive	Feb 23, 2010-May 11, 2010 May 11, 2010-Jun 16, 2010 Jun 16, 2010-Jul 14, 2010 Jul 14, 2010-Aug 11, 2010 Aug 11, 2010-Sept 08, 2010 Sept 08, 2010-Oct 27, 2010 Oct 27, 2010-Nov 19, 2010 Nov 19, 2010-Dec 16, 2010	N/A
		Humber River at Humber Village Bridge	Mar 25, 2010-Jun 16, 2010 Jun 17, 2010-Jul 21, 2010 Jul 21, 2010-Sept 24, 2010 Sept 27, 2010-Dec 15, 2010 Dec 16, 2010-Feb 22, 2010 Feb 24, 2010-June 24, 2011	N/A
		Waterford River at Kilbride	Apr 21, 2010-May 27, 2010 May 27, 2010-Jun 24, 2010 Jun 24, 2010-Jul 28, 2010 Jul 28, 2010-Aug 26, 2010 Aug 27, 2010-Sept 30, 2010 Sept 30, 2010-Oct 26, 2010 Oct 27, 2010-Dec 14, 2010 Dec 14, 2010-Jan 26, 2011 Jan 27, 2011-Feb 28, 2011 Feb 28, 2011-Mar 29, 2011	N/A

Conclusion

A significant amount of work took place under the *Canada-Newfoundland and Labrador Water Quality Monitoring Agreement* for fiscal year 2010-2011. The number of available products from this program continues to grow annually. Activities for 2011-2012 will be clearly outlined in the upcoming Annual Work Schedule.

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*.

