ANNUAL REPORT • 2009

CANADA • ALBERTA • SASKATCHEWAN • MANITOBA

PRAIRIE PROVINCES WATER BOARD

PRAIRIE PROVINCES WATER BOARD

ANNUAL REPORT

FOR THE FISCAL YEAR

APRIL 1, 2009 TO MARCH 31, 2010

ISSN 0704-8726

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LETTER OF TRANSMITTAL

October 19, 2010

Honourable Jim Prentice
Minister of the Environment
Ottawa, Ontario

Honourable Rob Renner
Minister of Alberta Environment
Edmonton, Alberta

Honourable Gerry Ritz
Minister of Agriculture & Agri-Food
Ottawa, Ontario

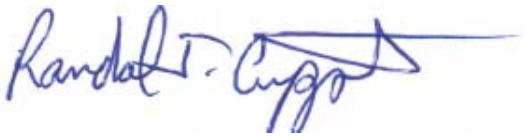
Honourable Christine Melnick
Minister of Manitoba Water Stewardship
Winnipeg, Manitoba

Honourable Dustin Duncan
Minister Responsible for Saskatchewan Watershed Authority
Regina, Saskatchewan

Honourable Ministers:

On behalf of the members of the Prairie Provinces Water Board, it is my pleasure to submit herewith the Annual Report of the Prairie Provinces Water Board for the fiscal year from April 1, 2009 to March 31, 2010.

Yours truly



Randal Cripps
Chair
Prairie Provinces Water Board

MESSAGE FROM THE CHAIR

The Prairie Provinces Water Board (PPWB) Strategic Plan, approved in 2006, continued to guide the work of the Board during 2009 - 2010.

External influences on Board activities were notably:

- a growing interest in the relationship between climate variability, climate change, and water resources; and

- the need for involvement of upstream jurisdictions in resolving water quality issues in Lake Winnipeg.

Operations of the Board continued to be affected by the same factors that are challenging other government agencies to improve accountability and transparency. These challenges, together with financial, human resource and travel challenges, are expected to persist into the future.

During 2008 - 2009, the Board, its three Committees, and the Secretariat, completed the development of a costed multi-year work plan for 2008 to 2013. This initiative, which was well received by Ministers, continued to guide the work of the Board in 2009-2010 and provided a solid foundation for resource allocation over a five-year period.

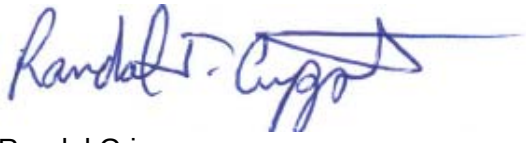
In October 2009, the Board met with the Partners FOR the Saskatchewan River Basin to exchange information about each organization and explore opportunities for collaboration.

In March 2010, Manitoba hosted a joint meeting with the Board and Senior Executives from Manitoba Water Stewardship. This meeting provided a forum to discuss Lake Winnipeg issues and inform Senior Managers about PPWB activities, furthering Goal 6.

Mike Norton became the Alternate Board Member for Environment Canada in March 2010. Carl Hrenchuk is filling in for Mike, who is on French training.

I thank Jamshed Merchant and Cal Straub for their capable representation as the Regular and Alternate Members for Agriculture and Agri-Food Canada. In July 2009, Rick Butts was appointed as the Regular Board Member and David Phillips as the Alternate Member for Agriculture and Agri-Food Canada – Agri-Environment Services Branch. The positions were reversed in January 2010. I welcome them to the Board and look forward to working with them.

The success of the Board is largely due to the work of the Secretariat and its three standing committees, including the Committee on Hydrology (COH), the Committee on Water Quality (COWQ), and the Committee on Groundwater (COG). Secretariat support is housed within Environment Canada. The Executive Director manages the Secretariat staff and chairs the three standing committees. Committee members consist of representatives from all of the parties. It is their work that helps to ensure that the Board and the parties can meet their obligations under the *Master Agreement on Apportionment* (MAA). The Board appreciates their professional conduct and dedication to the PPWB.



Randal Cripps
Chair

MESSAGE FROM THE EXECUTIVE DIRECTOR

During 2009 - 2010, the work of the PPWB Secretariat and three standing committees focused on achieving the seven goals outlined in the PPWB Strategic Plan and activities listed in the 2008 – 2013 Work Plan.

During 2009, agreed interprovincial apportionment of flows on all eastward flowing streams was achieved for all PPWB river reaches

The Committee on Hydrology (COH) continued work, begun in 2005, on its modernization of computational infrastructure that are used to calculate apportionable flows. Optimal Solutions Ltd, the software contractor, began work in May 2008 and presented an initial version of the River Basin Assessment Tool to the Secretariat and made a presentation to the COH in March 2010. The Secretariat and COH members have been engaged in testing the new software platform and comparing results with the FORTRAN programs used historically. The COH also began the review of the apportionment methods used on the North Saskatchewan River, as part of the ten-year rotational review.

The PPWB's involvement in the Prairie Hydrological model was completed in November 2009. This model simulated the effects of land use changes, wetland drainage, and wetland restoration on runoff. The study was led by the University of Saskatchewan, in collaboration with other partners, including PPWB member agencies.

The Committee on Groundwater (COG) continued to develop concepts of a groundwater schedule (Schedule F) that will be added to the *Master Agreement on Apportionment.*

The Committee on Water Quality (COWQ) continued work on a comprehensive review of the PPWB water quality objectives, as required by the *Master Agreement on Apportionment.* The development of nutrient objectives remained a priority.

All three Committees completed work on a generic Event Contingency Plan and Report to further Goal 4: Reporting of Emergency and Unusual Water Conditions for surface or groundwater quantity and quality events. The Board approved this Plan in March 2010.

Esther Kienholtz, PPWB Secretary, since 2005, retired in August 2009. I thank her for her dedication and excellent work. Michele Williamson is welcomed as the new PPWB Secretary. Joanne Sketchell joined the Secretariat in September 2009 as the Secretary to the Committee of Water Quality. A special thanks to Robert Harrison, Alberta member and Terry Hanley, Saskatchewan COWQ member, for their assistance in the staffing process.

The Board continued its role in helping to ensure coordination of water management and planning that may have transboundary implications. As an example, through the PPWB Chair and Executive Director, the Board represented the provinces of Saskatchewan and Alberta on the Federal – Provincial Lake Winnipeg Basin Coordination Committee. Similarly, the Board continued to provide a forum for sharing information on developments with interprovincial implications, including implications of drainage projects in Saskatchewan on Manitoba and the Montana-Alberta Water Management Initiative.

Mike Renouf
Executive Director

SUMMARY OF PERFORMANCE RESULTS

During 2009 - 2010, apportionment responsibilities of the Board were met through the following activities:

- reviewing and approving the apportionment monitoring network comprised of hydrometric and meteorological stations;
- monitoring apportionment of Cold Lake, North Saskatchewan River, South Saskatchewan River below the Red Deer River, Battle Creek, Lodge Creek, Middle Creek, Churchill River, Saskatchewan River, Red Deer River (Saskatchewan), Qu'Appelle River, Assiniboine River, and Pipestone Creek;
- continuing work on the modernization of the natural and apportionable flow computation software programs;
- developing a process to review apportionment methods in basins on a ten-year rotation period, and starting the review of the North Saskatchewan River;
- and completing the Prairie Hydrology study.

Apportionment requirements were met on all streams.

In 2009, water quality objectives were adhered to an average of 95.5% of 2707 samples.

The Committee on Water Quality (COWQ) continued the comprehensive review of water quality objectives, with nutrient objectives being a top priority.

The 2010 water quality monitoring program was approved by the Board in October 2009.

Efforts continued in 2009 - 2010 to document the concepts and principles of a groundwater Schedule to the *Master Agreement on Apportionment*.

Through reporting procedures outlined in the PPWB Interprovincial Water Quality and newly approved Event Contingency Plan, Board members were informed of one diesel spill and fire on the Lake of the Prairies, Manitoba. This reservoir on the Assiniboine River is downstream of the border. No impacts resulted to the upstream jurisdiction.

During the year, the PPWB discussed the following projects and initiatives of joint interest to the jurisdictions:

- water quality in Lake Winnipeg;
- downstream impacts of drainage in Saskatchewan upon Manitoba;
- St. Mary and Milk River Water Management Initiative; and
- potential collaborative opportunities with the Partners FOR the Saskatchewan River Basin.

The PPWB member agencies were informed about PPWB activities through:

- Board and Committee Minutes, Quarterly and Annual Reports, brochures/fact sheets, technical reports, and the PPWB website;
- presentations to senior managers of PPWB agencies in conjunction with Board meetings;
- and a joint meeting with Manitoba Water Stewardship Executives on March 25, 2010.

Internal communication was enhanced through regular meetings between Board members and their respective Committee members.

A consultant, The Noblet Design Group, began work to develop a new PPWB website with the PPWB Secretary.

1. INTRODUCTION

This report summarizes the activities of the Prairie Provinces Water Board (PPWB), its Secretariat, and three standing committees that supported PPWB activities for the period April 1, 2009 to March 31, 2010.

The PPWB administers the *Master Agreement on Apportionment*, signed on October 30, 1969 by Canada and the provinces of Alberta, Saskatchewan, and Manitoba.

The Agreement provides for an equitable sharing of available waters for all eastward flowing streams that cross interprovincial boundaries, including interprovincial lakes. It also serves to protect interprovincial aquifers and surface water quality. Schedules to the Agreement describe the role of the Board, stipulate how the water shall be apportioned, and set water quality objectives for the water passing from Alberta to Saskatchewan and from Saskatchewan to Manitoba.

The Board consists of three provincial members, representing the Provinces of Alberta, Saskatchewan, and Manitoba and two federal members, representing Environment Canada and Agriculture and Agri-Food Canada.

PPWB activities are jointly funded by the provinces and the federal government, with the provinces each contributing one-sixth and the federal government contributing one-half of the annual budget. The federal government pays for the costs of surface water quantity and quality monitoring. The Board approves the annual budget and work plan.

Section 2 of this Annual Report presents the performance results for each of the Goals in the Strategic Plan and 2009-2010 activities in the Work Plan.

Section 3 of this Annual Report reports on administration activities and financial expenditures for the year 2009 - 2010.

Appendices provide detailed information on the PPWB. Appendix I illustrates where monitoring is conducted to assess whether jurisdictions have met their requirements in the *Master Agreement on Apportionment*. Appendix II presents 2009 apportionable flow data. Appendices III and IV present the water quality parameters and the 2009 Excursion Report. Appendix V provides the organization chart and Appendix 6 lists agency representatives on the boards and committees. Appendix VII provides the Financial Expenditure Statement. Finally, Appendix VIII describes the history of the PPWB.

2. PERFORMANCE RESULTS

All activities in the 2008-2013 PPWB work plan target achieving the seven goals in the PPWB's Strategic Plan. Progress made in 2009-2010 is discussed below for each of these goals.

GOAL 1: Agreed Interprovincial Apportionment of Water Is Achieved

The PPWB's Strategic Goal 1 is to achieve interprovincial apportionment of water that was agreed to in the 1969 *Master Agreement on Apportionment's* Schedule A and Schedule B.

Apportionment Monitoring of Rivers

The *Master Agreement on Apportionment* states that all eastward flowing streams are subject to apportionment. Currently, the Board conducts apportionment monitoring of Cold Lake, North Saskatchewan River, South Saskatchewan River below the Red Deer River, Battle Creek, Lodge Creek, Middle Creek on the Alberta-Saskatchewan border; and Churchill River, Saskatchewan River, Red Deer River, Qu'Appelle River, Assiniboine River, and Pipestone Creek on the Saskatchewan-Manitoba border.

Water Quantity Monitoring

The PPWB is required to monitor and report on whether apportionment requirements were met. Environment Canada is responsible for water quantity monitoring at PPWB stations and other flow and meteorological stations. In 2009-2010, the PPWB Secretariat calculated apportionable flows using monitoring data from 88 hydrometric stations, 18 meteorological stations and other meteorological and water use data (see Appendix 1).

In October 2009, the Board approved the monitoring stations lists for 2010 - 2011. The hydrometric network increased to 89 stations. Two changes occurred for the meteorological stations, and the number of stations increased from 18 to 19. Other meteorological and water use data will be used as well.

Flows Reported in 2009-2010

Flow reporting was done throughout 2009 – 2010. Quarterly reports presented interim recorded and apportionable flows for each quarter in the fiscal year 2009-2010 for the South Saskatchewan River, and Middle and Lodge Creeks and from January to September for Cold Lake.

Appendix II presents the monthly and total 2009 final apportionment results. All apportionment requirements were met in the calendar year of 2009. For all apportioned rivers and creeks, recorded flows were higher than the amounts that Alberta was obligated to deliver to Saskatchewan. Similarly, Saskatchewan delivered higher recorded flows on all rivers and creeks than the amounts they were obligated to deliver to Manitoba. The combined daily recorded flows for the South Saskatchewan and Red Deer Rivers at the Alberta-Saskatchewan border exceeded the minimum flow requirement of 42.5 m^3 / sec (1,500 cfs).

Figures 1 and 2 below show the flow amounts (dam^3) for the entire record of apportionment data. The dark blue bar shows the amount of apportionable flows that were required to be delivered by Alberta to Saskatchewan (Figure 1) and by Saskatchewan to Manitoba (Figure 2). The light blue bar shows the flow surplus amounts that were delivered in excess of required flows. The red bar indicates amounts of required flows that were not delivered (*i.e.,* deficits).

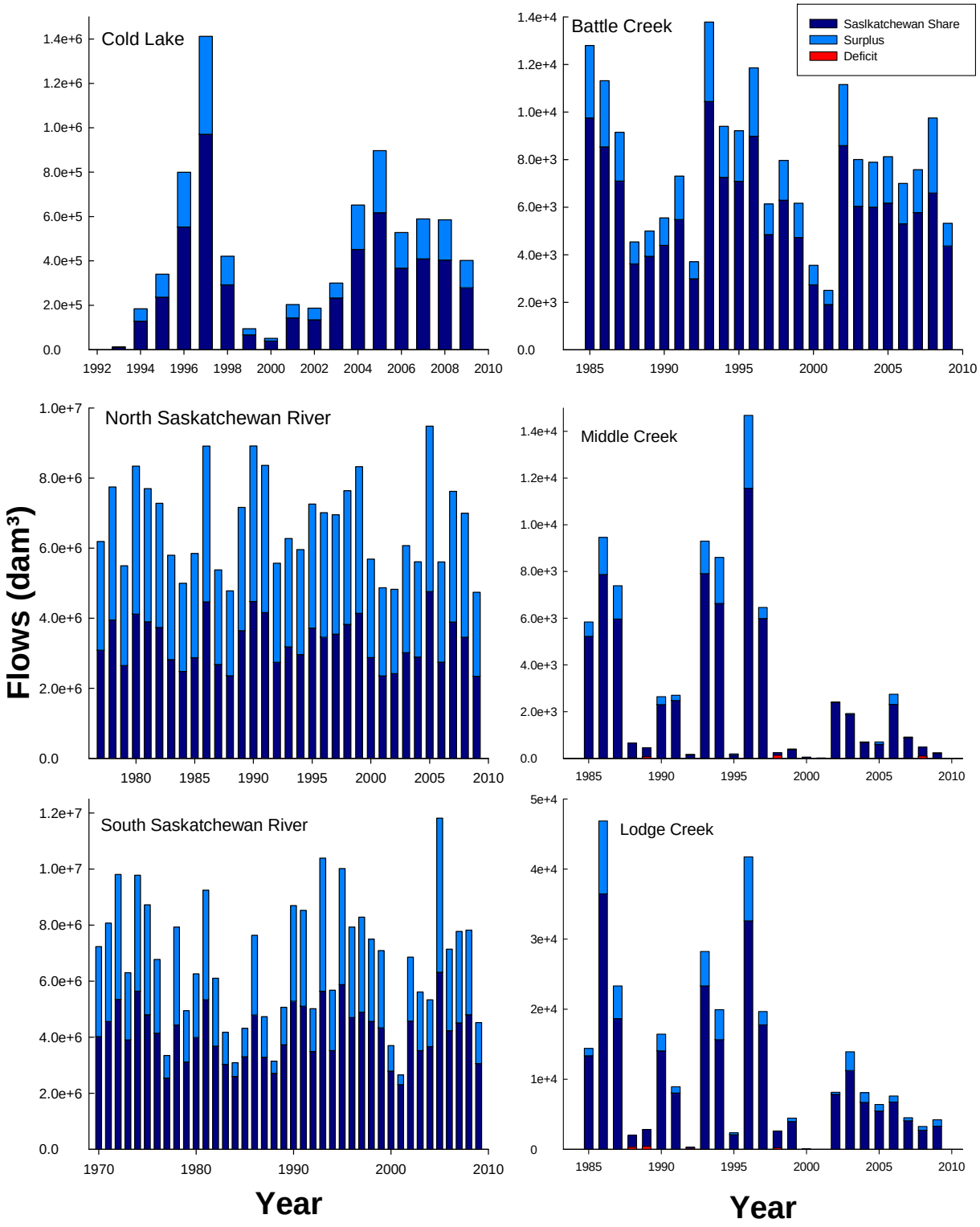


Figure 1. Historic River Flows on the Alberta-Saskatchewan Border

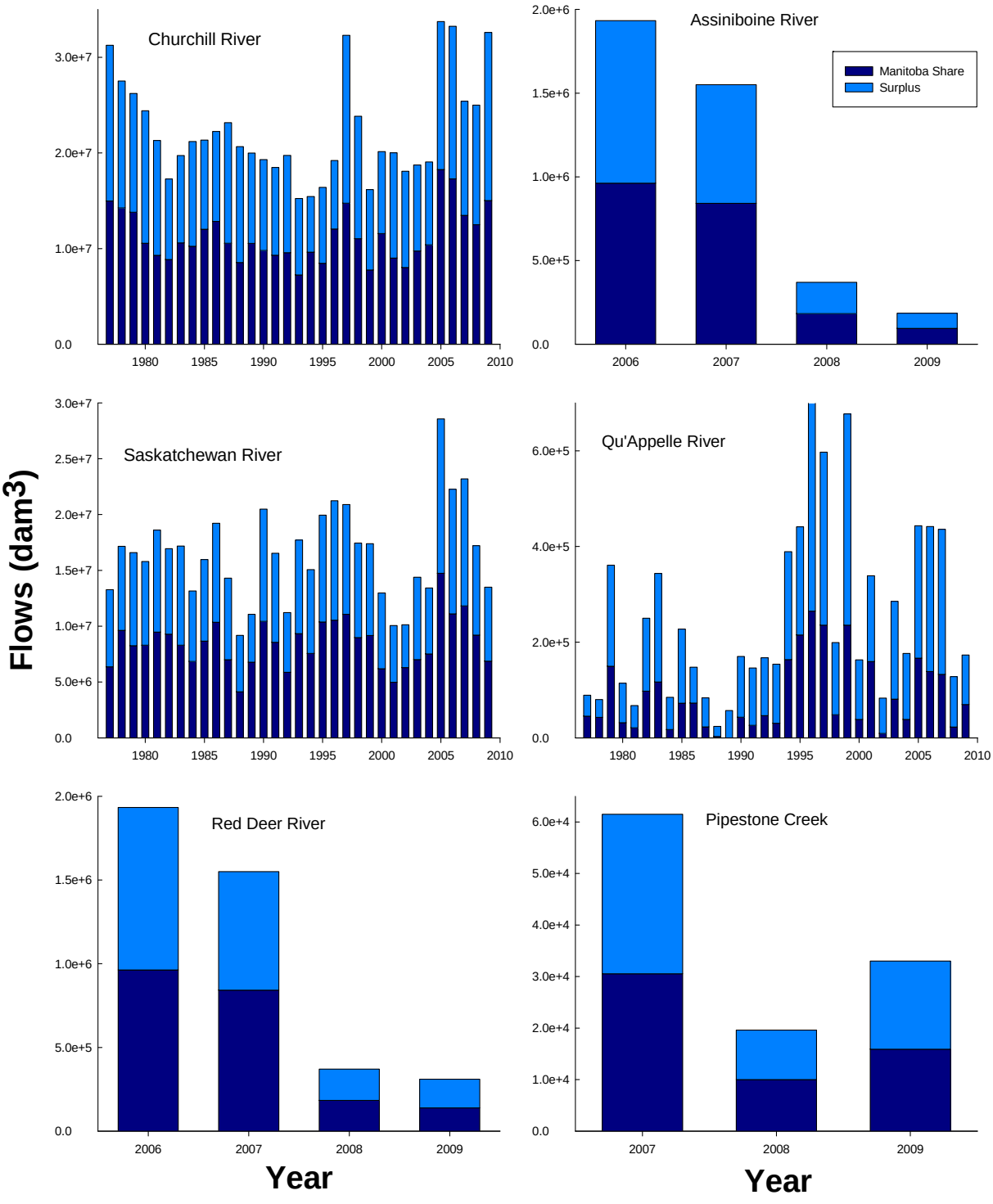


Figure 2. Historic River Flows on the Saskatchewan-Manitoba Border

For rivers with surplus flows, the combined dark blue (provincial share) and light (surplus) stacked bars show the total recorded flows. For rivers with deficit flows, the combined area also indicates recorded flow as the amounts of flow deficits are subtracted from the provincial share. The required provincial share is the combined area of the dark blue and red bars.

Figures 1 and 2 illustrate that the vast majority of delivery requirements were met throughout the entire data records. Large surpluses are fairly common for many of the rivers. The amounts of flows vary considerably over the years. Because flows vary so much, scientific notation[1] is used on the y-axis to show the magnitude of differences of flows across rivers.

Only two streams have experienced deficits throughout the data records: Middle and Lodge Creeks. For Middle Creek, five minor deficits were found in 1988, 1989, 1998, 2000 and 2008. Deficits were, however, so small in 1988 and 2000 that they can not be seen on Figure 1. For Lodge Creek, five minor deficits were found in 1988, 1989, 1992, 1998 and 2000. Deficits were too small to be seen on Figure 1 in 1992 and 2000. Deficits were in part due to Alberta being required to deliver 75% of apportionable flows to Saskatchewan, so as to allow Saskatchewan an equitable share of flows, and still meet Canada's 50% delivery commitment to the USA on these international streams, and in part due to water allocations which pre-date the agreement and often exceed the small highly variable flow experienced on these stream courses. Alberta and Saskatchewan worked cooperatively to address these deficits as they occurred.

[1] The number following the e in the Scientific Notation shows how many zeros should be placed to the right of the decimal place.

Improving Apportionment Methods

The Committee on Hydrology (COH) is engaged in a review of apportionment methods and associated documentation to ensure apportionment monitoring and calculations are accurate.

Reviewing Streams and Basins

Apportionment monitoring of an eastward flowing watercourse is generally initiated when water use in the upstream jurisdiction increases to a level where the downstream jurisdiction's entitlement may not be met without active management.

The 1993 COH report "Strategies for Apportionment Monitoring of Small Interprovincial Streams" (PPWB Report No. 122), evaluated and ranked interprovincial streams on their potential requirement for apportionment monitoring using the following criteria.

- the number of times an apportionment deficit has, or could have, occurred in the past;
- the present level of use and forecasted future demands in both upstream and downstream provinces;
- the existence of storage projects in the upstream province; and
- the perception of basin residents towards the reality of an apportionment problem.

Since 1993, the COH has reviewed these watercourses occasionally and made recommendations to the Board on whether watercourses should be monitored for apportionment.

The Board agreed in 2008 that the COH will review computational procedures used to monitor apportionment on all basins on a ten-year rotational basis. The 2009 - 2010 Work Plan included the development of the process used to evaluate apportionment computation procedures and started reviewing the North Saskatchewan River. The objective is to review two basins per year using this new decision criteria and process.

Modernizing Apportionment Software

The PPWB Secretariat uses approximately 50 FORTRAN programs to compute interprovincial apportionable flows. The COH is modernizing these computational programs and data management techniques. In 2006-2007, "Phase 1, Charter and Requirements Documents", was completed under contract. From 2007 to 2010, work continued to develop a new software platform. Optimal Solutions Ltd, the contractor, began work in May 2008, and presented the new software, the River Basin Assessment Tool (RBAT) to the Secretariat and at a COH meeting in March 2010. The Secretariat and COH Members have been engaged in reviewing this new platform and calibrating the results of RBAT to the FORTRAN program outputs that have been used historically. The cost of this contract is a significant component of the 2009 - 2010 PPWB budget.

South Saskatchewan River Irrigation Return Flows Study

Phase 1 of an interim report entitled "South Saskatchewan River Natural Flow and Apportionment: Irrigation Return Flows 2001-2005" was prepared for the COH by Environment Canada's Water Survey of Canada – Calgary Office. The report presents a review of the impact of irrigation return flow on apportionable flow for the South Saskatchewan River Basin. Once completed, the COH will make a number of implementation recommendations to the Board on how to address irrigation return flows in apportionment methods.

Return flow data were reviewed from the 13 irrigation districts of southern Alberta. The adequacy of the data's accuracy and timelines was also reviewed. Overall, return flow from all the sources comprises about five percent of the South Saskatchewan River apportionable flow at the Alberta-Saskatchewan border.

The COH reviewed the Phase 1 report in September 2008 and Environment Canada has been revising the report in 2009-2010. The timing of future work for Phase 2 will depend upon the availability of funding.

GOAL 2: Interprovincial Groundwater Aquifers are Protected and Used Sustainably

The PPWB's Strategic Goal 2 protects groundwater quantity and quality and sustainable use of transboundary aquifers.

The *Master Agreement on Apportionment* currently has a general statement to refer any transboundary groundwater issues to the Board for their review and recommendation. No issues or concerns were identified in 2009-2010.

Groundwater Schedule

In October 2007, the Board directed the Committee on Groundwater (COG) to focus on the development of a possible groundwater schedule to the *Master Agreement on Apportionment.* The Schedule is expected to be completed by March 2012.

A task group was established in 2008 to organize a workshop that was held on January 13-15, 2009. The workshop's objective was to review concepts and principles on which a groundwater schedule could be based. The results of the workshop were discussed with the Board at a joint meeting in March 2009.

In 2009-2010, the COG developed a number of potential concepts and principles based on the discussions held at the workshop and with the Board. These concepts and principles will be submitted to the Board to obtain further direction on the development of the possible groundwater Schedule F.

Reporting of Transboundary Withdrawals

The COG have been developing guidelines to report projects that have large groundwater withdrawals near interprovincial borders for the Prairie Provinces. The Committee agreed that the types of projects for which the neighbouring provinces should be notified include:

1) projects with the cone of depression potentially extending into the neighbouring province; and

2) projects with high withdrawals where the cone of depression from the project may not be expected to extend into the neighbouring province.

Provincial COG members have contacted their respective water rights offices to inform them of the need to report groundwater projects with significant withdrawals to the neighbouring province. No transboundary groundwater withdrawal projects were brought to the attention of the PPWB in 2009 - 2010.

Water Wells Database

The COG has undertaken a number of projects over the years to evaluate transboundary aquifers or other groundwater issues that are relevant for the PPWB. In 2009-2010, a contract was issued to compile a water well database that includes historical water levels and other information for wells within each of the Prairie Provinces.

GOAL 3: Agreed Interprovincial Water Quality Objectives Are Achieved

The PPWB's Strategic Goal 3 is to achieve agreed interprovincial water quality objectives that are included in Schedule E of the *Master Agreement on Apportionment* for a number of key watercourses at the Alberta-Saskatchewan and Saskatchewan-Manitoba borders.

Water Quality Monitoring

The PPWB water quality monitoring locations are shown in Appendix I. The PPWB water quality monitoring parameters are shown in Appendix III.

In 2009, Environment Canada sampled all 11 PPWB water quality sites for a total of 114 events in accordance with the approved monitoring plan, except for the Saskatchewan River that was not sampled in January, April and November due to unsafe ice conditions and the Churchill River that was not sampled in May due to inclement weather conditions. In addition, three water quality samples were obtained from Cold River to establish a baseline data set, although site-specific objectives have yet to be developed for this site.

In October 2009, the PPWB approved the water quality monitoring program for the calendar year 2010.

Adherence or Excursions to Water Quality Objectives

The PPWB has established river-specific water quality objectives for individual parameters based on values that protect human drinking, agricultural and recreational uses and the aquatic environment.

A total of 2,707 water quality samples were compared to the PPWB river-specific objectives to determine whether any excursions to the objectives occurred in 2009. If there are any excursions, the Committee on Water Quality (COWQ) prepares a work plan to assess the cause and the potential to mitigate. The work plan is then carried out by the provincial agencies.

The PPWB Water Quality Excursion Report for 2009 is shown in Appendix IV. This report was recommended by the COWQ and approved by the Board on October 14, 2010. Results are summarized below.

In 2009, the PPWB river-specific objectives were adhered to on average of 95.5 % of samples (Figure 3 below). Only the Battle, Carrot and Qu'Appelle Rivers had an adherence rate of less than 90%.

Annual adherence rates of rivers have varied only slightly since 2003. The Red Deer River in Alberta and Qu'Appelle River had the most variation in adherence rates. Compared to 2008, six rivers slightly improved their adherence rates, two remained the same and three had slight decreases.

In 2009, 16 parameters had excursions to the PPWB objectives. Of these, phosphorous, dissolved manganese, sodium and total dissolved solids contributed to 74% of the total excursions. These parameters and all other water quality objectives can be influenced by numerous factors (*e.g.* flow rates, natural background concentrations).

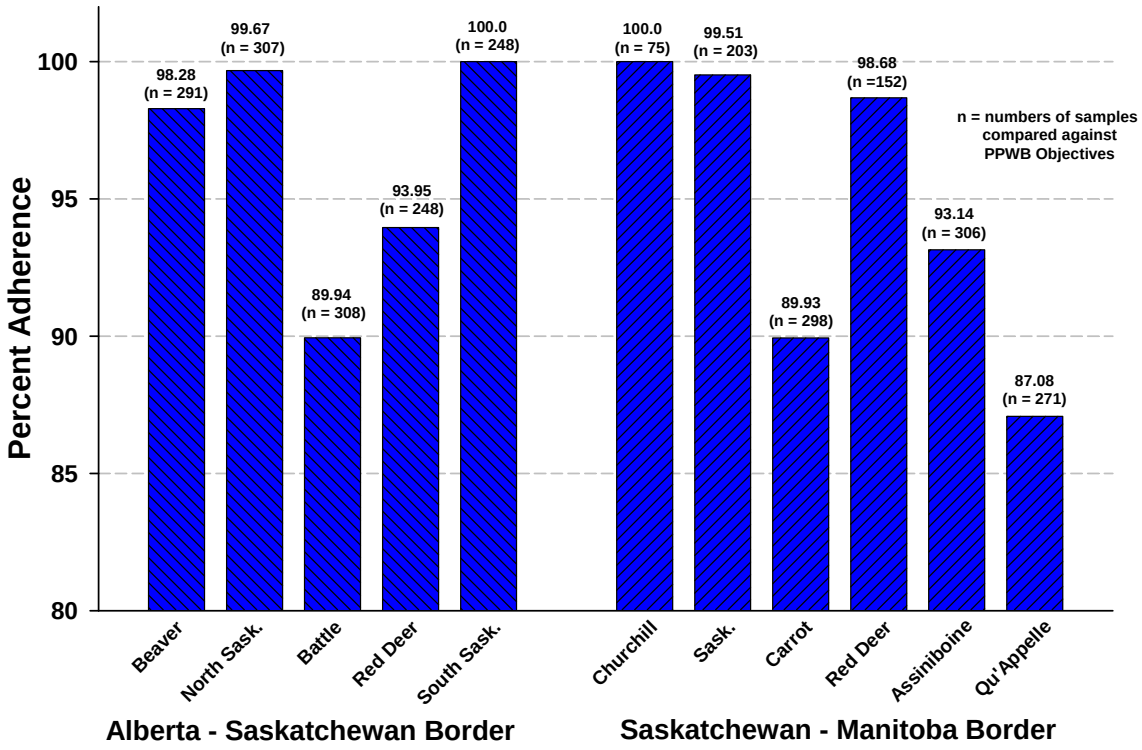


Figure 3: 2009 Percent Adherence to PPWB Objectives

Reviewing and Improving Water Quality Objectives

Work proceeded in 2009 - 2010 on the comprehensive review of the PPWB water quality objectives. A framework for the approach to water quality objectives review was developed by the COWQ and approved by the Board in March 2008. In 2009-2010, COWQ identified that all water uses were relevant for all PPWB rivers. The list of parameters requiring objectives was evaluated and is expected to be finalized next year. Seasons were delineated for many parameters to develop seasonal flow-weighted objectives. A review of existing objectives was initiated.

The development of nutrient objectives is the highest priority. Progress was made in developing the background approach that will be applied to revise existing or develop new nutrient objectives. Trends were analyzed for nutrient parameters to assess historic background levels.

Work will continue in 2010 – 2011 to review the water quality objectives, analyze trends and complete the review of existing water quality objectives in other jurisdictions.

This on-going review will improve the assessment of water quality data, improve the understanding of how and why excursions occur and provide meaningful information to water managers in each province so that water quality will continue to meet objectives established for the protection of human uses and the aquatic environment.

GOAL 4: Jurisdictions Are Informed About Emergency and Unusual Water Quantity and Quality Conditions

In the PPWB's Strategic Plan, Goal 4 is to inform jurisdictions of emergency and unusual water conditions, facilitating effective and cooperative interprovincial water management.

PPWB Contingency Plan

Historically, the PPWB Interprovincial Water Quality Contingency Plan has been an effective method of informing Board agencies of spills or unusual water quality conditions in interprovincial streams.

This plan had only considered spills that affected surface water quality but its scope was expanded in March 2010 to include emergency or unusual surface water quantity or groundwater quantity and quality events.

The revised Event Contingency Plan involves a "how to" guide to inform jurisdictions and evaluate potential impacts of emergency or unusual water conditions for surface and groundwater quantity and quality issues. An Event Notification Report was also updated and can be used to inform jurisdictions on the details of the event, allowing them to evaluate whether and what mitigation efforts are required to address the event and avoid impacts to neighbouring jurisdictions.

One spill was reported in 2009-2010:

- a diesel spill occurred on August 9, 2009 into the Lake of the Prairies reservoir in Manitoba near the Saskatchewan border. The diesel spill then caught fire.

The above spill did not affect water quality in the upstream jurisdiction.

GOAL 5: Conflicts over Interjurisdictional Water Issues are Avoided

The PPWB's Strategic Plan Goal 5 is to avoid conflicts and disagreements over interjurisdictional issues. During the year, the PPWB discussed issues related to several existing projects of interest to different jurisdictions.

Lake Winnipeg Nutrient Issues

Lake Winnipeg is Canada's sixth-largest freshwater lake, and is fed by a vast international basin covering 960,000 square km, extending over four provinces and four states. Concern over nutrient loading in Lake Winnipeg has risen in recent years, with reports of increased frequency, duration, and intensity of algal blooms. The Province of Manitoba, Environment Canada and many other partners have been engaged in several large initiatives to address water quality issues in Lake Winnipeg.

The PPWB provides a forum to exchange information on these initiatives with the Provinces of Saskatchewan and Alberta to avoid conflicts before they arise. The Provinces of Alberta and Saskatchewan agreed to have the PPWB represent their interests with respect to input to the Federal-Provincial Lake Winnipeg Basin Committee.

The Board was informed about activities conducted in relation to the Lake Winnipeg Basin Initiative, where the Government of Canada allocated $17.7 million for 2008-2012. This Initiative focuses on facilitating watershed governance; research, information and monitoring; and a stewardship fund for projects that reduce nutrient loads into the lake, improving water quality conditions. The PPWB Executive Director represented the Board at a March 2010 meeting of the Lake Winnipeg Research Consortium.

The Board was also kept informed of Manitoba's Lake Winnipeg Action Plan, a commitment that started in 2003 to reduce nutrient loading to Lake Winnipeg. The multi-stakeholder Lake Winnipeg Stewardship Board was formed as part of Manitoba's provincial plan to protect Lake Winnipeg. The Board's mandate was to assist the Manitoba government in identifying actions required to reduce nutrient loading to Lake Winnipeg. Since 2003, the Board has provided over 135 recommendations to the Manitoba Government and implementation is underway to reduce nutrient loading.

Manitoba/Saskatchewan Drainage Task Force

In September 2008, the Minister of Manitoba Water Stewardship wrote to the Minister responsible for the Saskatchewan Watershed Authority requesting support for interprovincial meetings of staff responsible for licensing drainage works, investigating complaints, and enforcing against illegal drainage activities. Through discussion at the Board meeting in the fall 2008, bilateral meetings were organized by the Board members for Manitoba and Saskatchewan. A co-operative approach was agreed upon to understand and resolve bilateral drainage issues.

A bilateral Saskatchewan-Manitoba Task Force was created in 2009 to develop a strategy for dealing with drainage in Saskatchewan watersheds that affect lands in Manitoba. A consultant was hired and prepared a report to assess the causes of erosion and potential erosion control mitigation.

The PPWB will continue to be updated on the Task Force's progress made by Manitoba and Saskatchewan.

Annual Report on Interprovincial Drainage Projects

The COH prepares an annual report on drainage projects approved in Saskatchewan that could have downstream impacts in Manitoba.

The Board agreed that Alberta only needs to provide the PPWB with drainage project information if there is a specific project that could have an impact on Saskatchewan.

In 2009-2010, Saskatchewan licensed two drainage projects which drain to Manitoba. Alberta did not licence any project that had impacts on Saskatchewan.

St. Mary and Milk River Water Management Initiative

The Alberta member informed the Board in 2008 of an initiative between Alberta and Montana related to sharing of the waters in the St. Mary and Milk Rivers. The purpose of this initiative is to cooperatively explore and evaluate options for improving both Montana's and Alberta's access to the shared water of the St. Mary and Milk Rivers, and to make joint recommendations on preferred options to both governments for their consideration and approval.

This Alberta provincial-Montana state initiative also furthers the goals of the Governments of Canada and the USA which have an existing international water agreement to share the waters of the St. Mary and Milk Rivers.

The Terms of Reference for the Joint Initiative Team does not include Alberta's sharing of water with Saskatchewan under the *Master Agreement on Apportionment*. Nonetheless, the Alberta member will inform the Saskatchewan member of issues relevant to Saskatchewan under the St. Mary-Milk River Initiative and the *Master Agreement on Apportionment*.

In 2009-2010, the Joint Initiative Team developed a water management model of the St. Mary and Milk rivers and simulated 45 water management scenarios to assess the impacts on water supplies for water users in Alberta and Montana.

GOAL 6: Jurisdictions Are Informed About PPWB Activities

The PPWB's Strategic Goal 6 is to keep jurisdictions informed about PPWB activities. This transparency ensures that cost-shared activities are delivered efficiently and effectively and are consistent with the mandate of the PPWB.

The PPWB member agencies were informed about PPWB activities through various means, including the ongoing distribution of Board and Committee Minutes and Quarterly and Annual Reports, as well as through brochures and fact sheets, technical reports, and the PPWB website.

The PPWB website had been housed on the Environment Canada's website for a number of years. In 2009-2010, a project was initiated to move the website to an external host to inform the public and interested parties of PPWB activities, and provide a means for Member Agencies to exchange information and facilitate the business of the PPWB. The Noblet Design Group was awarded a contract to develop the website with the PPWB Secretary. The website is expected to be completed in August 2010 and the address will be www.ppwb.ca.

In 2009 - 2010, the Board continued the practice of inviting senior officials of the host agency to meet with the Board. Senior managers and executives from Manitoba Water Stewardship met with the Board during its spring meeting in Winnipeg. This meeting focused on updating the Executives on PPWB activities, and have several presentations and a discussion on Lake Winnipeg issues and other initiatives of mutual interest.

The practice was begun in 2007 - 2008 as Board members recognized that the introduction of numerous new senior officials in all agencies, along with internal organizational restructuring, necessitated greater efforts to increase general awareness of the PPWB and agency responsibilities related to implementation of the *Master Agreement on Apportionment*.

This approach to increasing awareness of senior officials within PPWB agencies will continue in the future.

GOAL 7: Information, Knowledge and Research Are Shared Among Jurisdictions

The PPWB provides a forum to foster effective and cooperative water management on the Prairies. Goal 7 facilitates cooperation by exchanging information and knowledge amongst jurisdictions and participating in research projects of mutual interest and relevance to the PPWB mandate.

Resilience of the *Master Agreement on Apportionment* to Climate Change

In March 2008, the PPWB initiated a project to assess how resilient the *Master Agreement on Apportionment* is to predicted impacts of and adaptations to climate change. The Ministers had asked this question in their June 2007 Meeting and continued their discussion on how to assess resilience at their June 2008 Meeting.

Planning commenced in 2009-2010 to host a workshop that will explore "What if" scenarios of potential circumstances to test the resilience of the agreement. Various potential climate impacts will be considered including potential increased variability in future flows, flooding, multi-year hydrological droughts and increased water use. The workshop will consider hydrological issues and associated surface and groundwater quality issues.

Prairie Hydrological Model Study

The Board is one of several partners which supported work on a "Prairie Hydrological Model Study" being undertaken by the Centre for Hydrology, University of Saskatchewan, under the leadership of Dr. John Pomeroy. The objective of the study is to assess the sensitivity of stream flow, wetland water storage and soil moisture to changes in drainage and land use. A model was developed for the Smith Creek Research Basin in east central Saskatchewan.

The PPWB Executive Director was a member of the Science Advisory Committee. The PPWB provided partial funding for this project until March 2009.

The final project report was submitted in November 2009, ending the participation of the PPWB in this project. Efforts are underway by Dr. Pomeroy to continue this project.

Partners FOR the Saskatchewan River Basin

The Ministers Meeting in June 2008 provided direction that the PPWB work cooperatively with external organizations. The PPWB proposed that a Joint Meeting with the Partners FOR the Saskatchewan River Basin would further this goal.

The Partners FOR the Saskatchewan River Basin is a multi-stakeholder group that facilitates cooperation amongst agencies and stewardship of the Saskatchewan River Basin that spans all of the Prairie Provinces. The group conducts a number of education outreach activities.

A Joint Meeting was held in October 2009 to consider how both organizations could work together. The PPWB committed to assist education efforts of the PFSRB and submitted an article on the PPWB to the PFSRB newsletter and offered to give presentations on the PPWB to PFSRB members.

3 . ADMINISTRATIVE AND FINANCIAL MANAGEMENT

As illustrated by the organization chart in Appendix V, the Board operates through its Executive Director and three Standing Committees (Committee on Hydrology, Committee on Groundwater, and Committee on Water Quality). The Board consists of senior officials engaged in the administration of water resources in each Province of Alberta, Saskatchewan, and Manitoba and senior officials from Environment Canada and Agriculture and Agri-Food Canada (Appendix VI). The Board is chaired by Environment Canada.

Secretariat support is provided to the PPWB through the Transboundary Waters Unit, Environment Canada at Room 300, 2365 Albert St., Regina, Saskatchewan. The portion of time each Secretariat staff person spends on PPWB activities is charged to the PPWB and cost-shared by the members. In addition, technical support is provided, as required, by other staff of Environment Canada and the three Prairie Provinces.

Esther Kienholtz, PPWB Secretary, retired in June 2009. Michele Williamson started on July 27, 2009 as the Senior Water Program Advisor, Transboundary Waters Unit to fill in the position of the PPWB Secretary. Joanne Sketchell started on August 31, 2009 as the new Senior Water Quality Advisor within the Transboundary Waters Unit to fill the position of Secretary to the Committee on Water Quality. With the cooperation of the Water Survey Division, Calgary Office, Vir Khanna continued his assignment with the Transboundary Waters Unit to assist in apportionment computations and improving and modernizing apportionment methods.

Five Board and fourteen Committee meetings were held throughout the year. The Board continued its practice of meeting with at least one Committee each year for the purpose of improving communication and understanding between the Board and its Standing Committees. Whenever feasible, the Board also invited executives and senior managers of the host agency to meet with the Board to foster improved internal awareness of PPWB operations and objectives. Invitations are also sent to Committee members residing in the province where the meeting is located.

PPWB

- Special Teleconference April 20, 2009 to review Regional Adaptation Collaborative proposal
- Meeting No. 91, September 8, 2009 – Conference Call
- Meeting No. 92, October 7, 2009 – Saskatoon. Joint Meeting with Partners FOR the Saskatchewan River Basin
- Meeting No. 93, March 19, 2010 – Conference Call
- Meeting No. 94, March 25, 2010 – Winnipeg. Joint Meeting with Executives from Manitoba Water Stewardship

COH

- Meeting No. 109, September 22-23, 2009 – Canmore
- Meeting No. 110, November 26, 2009 – Conference Call
- Meeting No. 111, March 2-3, 2010 – Calgary

COWQ

- Meeting No. 96, May 26-27, 2009 – Winnipeg
- Meeting No. 97, September 9, 2009 – Conference Call
- Meeting No. 98, November 22-24, 2009 – Regina

- Meeting No. 99, Parts A January 26, B February 11, C February 24, and D February 26, 2010 – Conference Calls

COG

- Meeting No. 52, May 15, 2009 – Conference Call
- Meeting No. 53, June 3, 2009 – Saskatoon
- Meeting No. 54, September 1-2 2009 – Regina
- Meeting No. 55, November 4, 2009 – Conference Call
- Meeting No. 56, December 5, 2009 – Conference Call
- Meeting No. 57, January 20, 2010 – Conference Call
- Meeting No. 58, March 11, 2010 – Conference Call

The Board approves the annual budget. The budget for 2009 - 2010 was $818,500 and final expenditures were $623,066 as shown in Appendix VII. Although good progress was made on contract work in 2009 - 2010, final expenditures were below the approved budget due to the flow modernization contract not being completed because of delays in the contracting process. Contract work to modernize flows will continue in 2010 - 2011. In addition, provincial and federal travel restrictions resulted in cancelling some workshops and face-to-face meetings, preventing the expense of planned activities.

The Board agreed at its regular meeting in March 2007 that, in the future, the Board's budget planning cycle must begin earlier in the year, with substantial discussion being held on the Board's budget during the regular October meeting. This discussion facilitated earlier input from the Board into the 2009-2010 budget process for the respective PPWB agencies.

To position the Board to better anticipate and plan for future work priorities and resource requirements, a multi-year costed work planning process was initiated in 2007 - 2008, and completed in 2008 - 2009. This approved work plan was adhered to in 2009 – 2010. The results of this meeting served to:

- guide the Board in its work over the next few years, ensuring that activities target fulfilling the Goals in the PPWB Strategic Plan and key deliverables in the PPWB Charter;

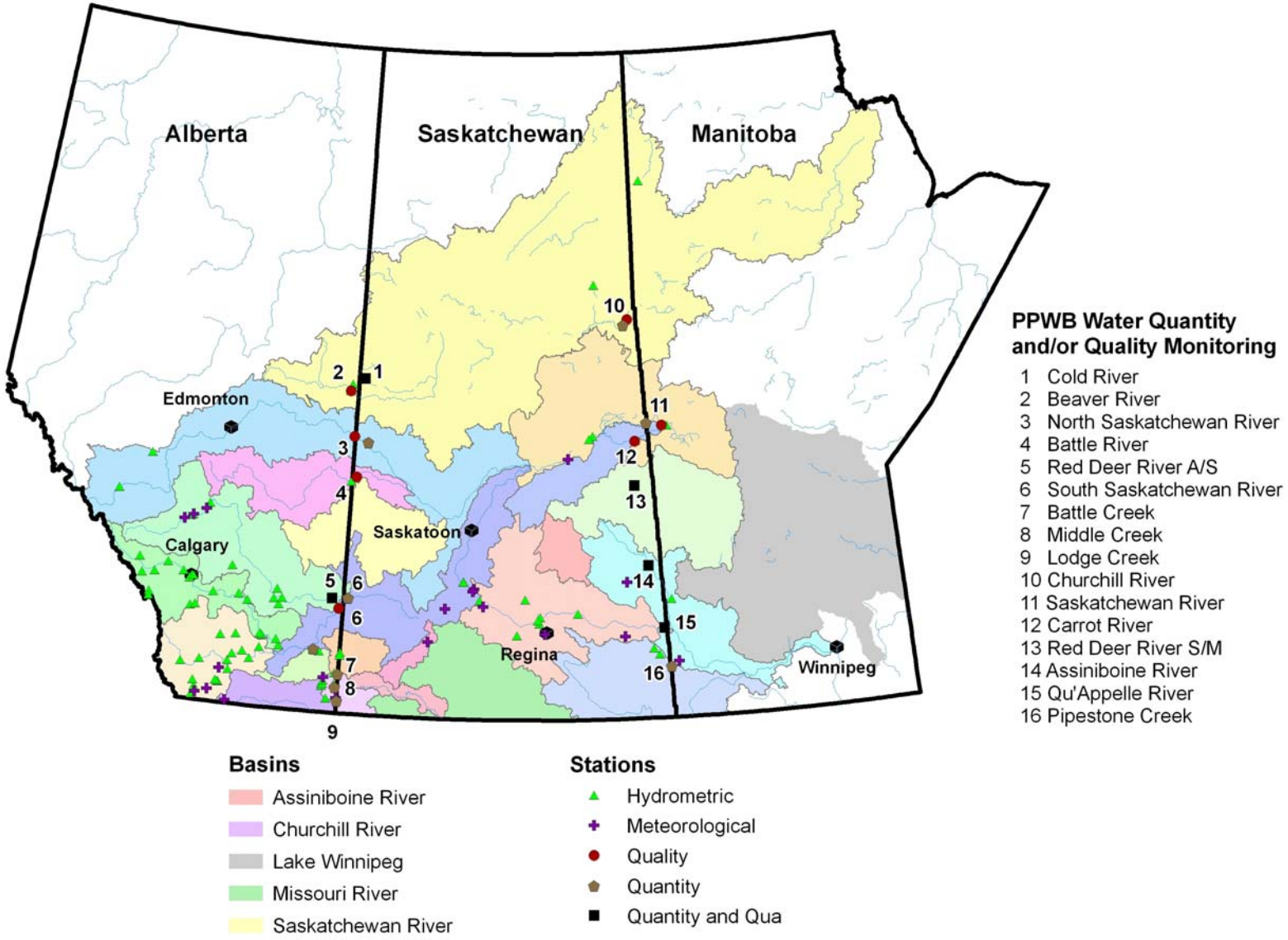
- feed into multi-year work plans for the three Standing Committees and the Secretariat;

- and provide the foundation for communication with Ministers and senior officials within each agency.

Further information on the history and administration of the PPWB can be found in Appendix VIII.

APPENDIX I

Approved PPWB Monitoring Stations for 2009 - 2010



APPENDIX II: 2009 Recorded and Apportionable Flows

APPENDIX IIA: Flows at the Alberta-Saskatchewan Border (in Cubic Decametres)

SOUTH SASKATCHEWAN RIVER – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	222 650	193 080	247 130	333 000	231 930	420 390	367670	515 630	248 330	239 820	240 600	195 500	3 455 730
CONSUMPTIVE USE	580	30	190	24 950	282 050	524 020	366530	136 440	201 780	42 800	110	-30	1 579 450
CHANGE IN RESERVOIR STORAGE	-95 880	-88 020	-82 450	-19 610	175 220	261 330	115650	32 180	-135 340	-41 260	-31 380	-90 120	320
DIVERSION FROM BASIN	0	0	0	26 350	11 300	16 610	21250	16 840	11 680	8 840	0	0	112 870
APPORTIONABLE FLOW	131 260	105 660	163 900	333 200	629 820	1 200 730	902330	750 580	339 210	222 310	257 450	116 300	5 152 750

RED DEER RIVER – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	37 472	33 376	48 825	210 626	153 878	78 227	144 737	147 131	72 084	59 409	49 274	31 914	1 066 953
CONSUMPTIVE USE	0	0	0	600	5 130	6 200	6 230	5 010	5 420	760	0	0	29 350
CHANGE IN RESERVOIR STORAGE	-17 870	-20 030	-22 350	14 350	-15 590	54 690	18 300	16 130	890	-2 850	-13 300	-29 040	-16 670
DIVERSION INTO BASIN	0	0	0	-26 350	-11 300	-16 610	-21 250	-16 840	-11 680	-8 840	0	0	-112 870
APPORTIONABLE FLOW	18 422	13 626	27 125	205 226	121 598	122 167	147 137	153 841	64 804	50 339	36 674	6 984	967 943

SOUTH SASKATCHEWAN RIVER – BELOW JUNCTION WITH RED DEER RIVER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	260 000	226 000	296 000	544 000	386 000	499 000	512 000	663 000	320 000	299 000	290 000	227 000	4 522 000
APPORTIONABLE FLOW	150 000	119 000	191 000	538 000	751 000	1 323 000	1049 000	904 000	404 000	273 000	294 000	123 000	6 119 000
SASKATCHEWAN SHARE (50%)	75 000	59 500	95 500	269 000	59 500	661 500	524 500	452 000	202 000	136 500	147 000	61 500	3 059 500
EXCESS (+) OR DEFICIT (-) DELIVERY	185 000	166 500	200 500	275 000	10 500	-162 500	-12 500	211 000	118 000	162 500	143 000	165 500	1 462 500
CUMULATIVE EXCESS OR DEFICIT	185 000	351 500	552 000	827 000	837 500	675 000	662 500	873 500	991 500	1 154 000	1 297 000	1 462 500	1 462 500

Recorded Flow is 74% of Apportionable Flow. Alberta is required to deliver 50% of Apportionable Flows. Apportionment of flow in the South Saskatchewan River is specified in Article 4, Schedule A of the *Master Agreement on Apportionment*. Apportionable flow calculations are based on the methodology described in the report entitled "South Saskatchewan River Below Red Deer River – Natural Flow", April 1985 (PPWB Report No. 45). Flows have been routed and, as a result, the values presented in the table cannot be exactly balanced on a monthly basis.

NORTH SASKATCHEWAN RIVER - ALBERTA-SASKATCHEWAN BORDER (NEAR DEER CREEK)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	280 000	263 000	308 000	518 000	513 000	483 000	543 000	486 000	360 000	347 000	326 000	250 000	4 680 000
APPORTIONABLEFLOW	38 800	47 300	80 600	333 000	434 000	784 000	1 040 000	849 000	507 000	271 000	159 000	37 100	4 580 000

Recorded Flow is 102% of Apportionable Flow. Recorded Flow exceeded the Apportionable Flow by 99 200 dam^3 in 2009 because of a net reduction in reservoir storage of 99 200 dam^3 in Lake Abraham and Brazeau Reservoir. Alberta is required to deliver 50% of Apportionable Flows.

BATTLE CREEK – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	0	58	597	1 765	672	596	490	491	294	356	0	0	5 320
APPORTIONABLE FLOW	0	58	597	1 837	811	723	601	529	301	363	0	0	5 820

Recorded Flow is 91% of Apportionable Flow. Alberta is required to deliver 75% of Apportionable Flows.

LODGE CREEK – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	0	0	1 671	1 934	38	5	0	0	0	0	0	0	3 648
APPORTIONABLE FLOW	0	2	2 126	2 221	37	0	0	0	0	0	0	0	4 386

Recorded Flow is 83% of Apportionable Flow. Alberta is required to deliver 75% of Apportionable Flows.

MIDDLE CREEK – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	0	1	20	172	24	15	5	4	2	3	0	0	245
APPORTIONABLE FLOW	0	1	29	213	24	9	5	4	2	2	0	0	288

Recorded Flow is 85% of Apportionable Flow. Alberta is required to deliver 75% of Apportionable Flows.

COLD LAKE – ALBERTA-SASKATCHEWAN BORDER (AT OUTLET OF COLD LAKE)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	17 500	17 200	18 700	25 300	37 900	47 000	69 400	57 100	41 400	29 900	23 200	17 300	402 000
APPORTIONABLE FLOW	18 100	17 600	19 200	25 800	38 500	47 600	69 900	57 600	41 900	30 300	23 600	17 700	407 800

Recorded Flow is 98.5% of Apportionable Flow. Alberta is required to deliver 68.4% of Apportionable Flows.

APPENDIX IIB: Flows at the Saskatchewan-Manitoba Border (in Cubic Decametres)

CHURCHILL RIVER – SASKATCHEWAN-MANITOBA BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
ESTIMATED FLOW	1 950 000	1 780 000	2 010 000	1 920 000	2 240 000	2 320 000	3 060 000	4 380 000	3 970 000	3 510 000	2 770 000	2 670 000	32 580 000
APPORTIONABLE FLOW	1 940 000	1 570 000	1 730 000	1 630 000	2 120 000	2 390 000	3 060 000	3 700 000	3 420 000	3 230 000	2 720 000	2 520 000	30 030 000

Estimated Flow includes Recorded Flow at Sandy Bay and estimated inflow from Sandy Bay to the Boundary. Estimated flow is 108% of Apportionable Flow. Estimated Flow exceeded the Apportionable Flow by 2 550 000 dam^3 in 2009 because of a net reduction in reservoir storage of 2 550 000 dam^3 in Reindeer Lake. Saskatchewan is required to deliver 50% of Apportionable Flows.

SASKATCHEWAN RIVER – SASKATCHEWAN-MANITOBA BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
ESTIMATED FLOW	883 000	1 150 000	994 000	1 680 000	1 400 000	1 010 000	1 080 000	1 140 000	1 100 000	990 000	1 110 000	919 000	13 500 000
APPORTIONABLE FLOW	462 000	714 000	789 000	2 100 000	1 620 000	1 200 000	1 420 000	1 550 000	1 220 000	1 080 000	1 000 000	572 000	13 727 000

For the Saskatchewan River, Estimated Flow at the Saskatchewan-Manitoba border is computed using recorded flow of the Saskatchewan River at The Pas minus 1.31 times the recorded flow of Carrot River near Turnberry. Estimated Recorded Flow is 98% of Apportionable Flow. Saskatchewan is required to deliver 50% of Apportionable Flows to Manitoba.

CARROT RIVER – SASKATCHEWAN-MANITOBA BORDER (NEAR TURNBERRY)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	3 030	1 810	1 840	42 900	83 500	47 900	56 500	68 400	40 500	23 400	26 400	7 610	404 000

QU'APPELLE RIVER – SASKATCHEWAN-MANITOBA BORDER (NEAR WELBY)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	4 840	1 840	1 960	47 100	28 700	17 000	13 200	7 020	5 740	9 040	22 800	13 600	173 000
APPORTIONABLE FLOW													139 000

Recorded Flow is 124% of Apportionable Flow. Recorded Flow exceeded Apportionable Flow by 34 120 dam3 in 2009 because of diversions of 105 000 dam3 from the South Saskatchewan River. Saskatchewan is required to deliver 50% of Apportionable Flows to Manitoba.

RED DEER RIVER – SASKATCHEWAN-MANITOBA BORDER (NEAR ERWOOD)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	1 740	669	1 490	69 000	43 300	34 400	27 900	59 800	16 500	30 700	23 000	1 740	310 000
APPORTIONABLE FLOW	1 560	600	1 240	64 600	39 300	29 600	24 200	53 100	14 600	27 500	20 500	1 550	278 000

Recorded Flow is 111% of Apportionable flow. Recorded Flow exceeded the Apportionable Flow by 32 000 dam^3 in 2009 because agricultural drainage contributed an estimated 34 000 dam^3 to the flow of the Red Deer River. Saskatchewan is required to deliver 50% of Apportionable Flows to Manitoba.

ASSINIBOINE RIVER – SASKATCHEWAN-MANITOBA BORDER (AT KAMSACK)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	1 360	1 010	1 620	98 500	42 100	13 700	3 040	8 290	8 750	1 680	3 760	1 140	185 000
APPORTIONABLE FLOW	1 360	1 030	1 610	100 000	42 400	14 300	3 660	8 980	9 070	1 870	3 750	1 100	189 130

Recorded Flows are 98% of Apportionable Flows. Saskatchewan is required to deliver 50% of Apportionable Flows to Manitoba.

PIPESTONE CREEK – SASKATCHEWAN-MANITOBA BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	496	303	373	23 100	5 630	1 080	135	78	48	196	1 070	154	33 000
APPORTIONABLE FLOW	554	363	421	23 299	4 497	848	129	161	0	209	1 169	182	31 800

Recorded Flows are 104% Apportionable Flows. Recorded Flow exceeded the Apportionable Flow in 2009 because of a reduction in reservoir storage of 397 dam^3 in Moosomin Reservoir and pumped diversions of 1 362 dam^3 from Kipling Marsh to Pipestone Lake. Saskatchewan is required to deliver 50% of Apportionable Flows to Manitoba.

NOTE: Flow numbers are rounded to significant figures, reflecting the precision of the input that were used in the calculations.

APPENDIX III

PPWB Water Quality Monitoring 2009 Parameter List

Water is collected monthly at all sites with the exception of Red Deer (Sask/Man) (6x/yr), Churchill, and Cold Rivers (4x/yr)

ALKALINITY, phenol & total
ALUMINUM, diss. & total$^{\theta}$
AMMONIA, total$^{\theta}$.
ANTIMONY, diss. & total
ARSENIC, diss.$^{\theta}$ & total
BARIUM, diss. & total$^{\theta}$
BERYLLIUM, diss. & total
BICARBONATE, calc.
BISMUTH, diss. & total
BORON, diss.$^{\theta}$ & total
CADMIUM, diss. & total$^{\theta}$
CALCIUM, diss.
CARBON, diss organic
CARBON, part. organic
CARBON, total organic, calcd.
CARBONATE, calcd.
CHLORIDE, diss$^{\theta}$
CHROMIUM, diss. & total$^{\theta}$
COBALT, diss. & total$^{\theta}$
COLIFORMS FECAL$^{\theta}$ ♦
COLOUR TRUE
COPPER, diss. & total$^{\theta}$
E. COLI ♦
FLUORIDE, diss$^{\theta}$
FREE CO_2, calcd.
GALLIUM, diss. & total
HARDNESS NON-CARB. (CALCD.)
HARDNESS TOTAL (CALCD.) CACO3
IRON, diss.$^{\theta}$ & total
LANTHANUM, diss. & total
LEAD, diss. & total$^{\theta}$
LITHIUM, diss. & total
MAGNESIUM, diss.
MANGANESE, diss.$^{\theta}$ & total
MOLYBDENUM, diss. & total
NICKEL diss. & total$^{\theta}$
NITROGEN NO_3 & NO_2, diss$^{\theta}$.
NITROGEN. part.
NITROGEN, total calcd.
NITROGEN, diss.
OXYGEN, diss.$^{\theta}$
Ph$^{\theta}$
PHOSPHOROUS ortho, diss
PHOSPHOROUS, part. calcd.
PHOSPHOROUS, total$^{\theta}$
PHOSPHOROUS, diss.
POTASSIUM, diss.
RESIDUE FIXED NONFILTRABLE
RESIDUE NONFILTRABLE
RUBIDIUM, diss. & total
SELENIUM, diss.$^{\theta}$ & total
SILVER, diss. & total
SILICA,
SODIUM ADSORPTION RATIO, calcd.$^{\theta}$
SODIUM, diss.$^{\theta}$
SODIUM PERCENTAGE, calcd.
SPECIFIC CONDUCTANCE
STRONTIUM, diss. & total
SULPHATE, diss.$^{\theta}$
TEMPERATURE WATER
THALLIUM, diss. & total
TOTAL DISSOLVED SOLIDS, calcd.$^{\theta}$
TURBIDITY
URANIUM, diss. & total$^{\theta}$
VANADIUM, diss. & total$^{\theta}$
ZINC diss. & total$^{\theta}$

ACID HERBICIDES*$^{\theta}$
NEUTRAL HERBICIDES*
ORGANOCHLORINE INSECTICIDES*

θ Parameters with PPWB site-specific objectives

* Collected from the North Saskatchewan River, South Saskatchewan River, Assiniboine, and Carrot Rivers in 2009

♦ Collected between 6 -12 X/year at all sites but the Churchill and Cold Rivers

APPENDIX IV

PPWB EXCURSION REPORT

JANUARY – DECEMBER 2009

JOANNE SKETCHELL
TRANSBOUNDARY WATERS UNIT
ENVIRONMENT CANADA
AUGUST 2010

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Introduction

The Master Agreement on Apportionment (MAA) requires that the Prairie Provinces Water Board (PPWB) monitors the quality of the aquatic environment and makes comparisons with PPWB water quality objectives. Site-specific water quality objectives have been established at 11 major interprovincial eastward flowing river reaches (Table 1). Five of these reaches are along the Alberta-Saskatchewan border and six are along the Saskatchewan-Manitoba border (Figure 1). The objectives were established as part of Schedule E of the MAA, and are set to protect various water uses including the protection of aquatic life, drinking water, recreation, agricultural uses (livestock watering and irrigation) and fish consumption.

Environment Canada collects and analyzes water quality samples from the 11 river reaches with site-specific water quality objectives. The Committee on Water Quality (COWQ) annually reviews the results of the PPWB Water Quality Monitoring Program, with emphasis on the comparisons to PPWB Water Quality Objectives. In 2009, Environment Canada undertook a total of 114 water sampling events from the 11 PPWB river sites. The monitoring program was completed in 2009 as approved by the Board, with the exception of the Saskatchewan River which was not sampled in January, April and November due to unsafe ice conditions. The Churchill River was also sampled three times *versus* the approved four sampling events due to inclement weather conditions in May 2009. In addition, although water quality objectives have not yet been developed for the Cold River water samples were collected on three separate sampling occasions from this river in 2009. It is anticipated that site-specific water quality objectives will be developed for the Cold River during the current review and development of water quality objectives for PPWB. Finally, for the Beaver River a second site down stream of the original site was sampled concurrently in 2009. Data from the two river sites was compared and the COWQ, after review of the comparative analysis selected the original or historic site as the site on the Beaver River that should be maintained as the long term monitoring site for this river. Therefore, the results from the original or historic site were used in the 2009 analysis.

Raw data for excursions were distributed to the PPWB COWQ members on August 24, 2010 for their review and internal quality control/quality assurance protocols. This report presents the 2009 adherences and excursions to the PPWB site-specific water quality objectives.

Results and Discussion

Overall Adherence to PPWB Water Quality Objectives

In 2009, the PPWB reach-specific water quality objectives were adhered to on average 95.5% of the time over a total of 2707 comparisons of water chemistry results to objectives (Figure 2). Of the 11 river reaches, only three rivers had an overall adherence rate of less than 90%. These are the Battle River on the Alberta/Saskatchewan border and the Carrot and Qu'Appelle Rivers on the Saskatchewan/Manitoba border.

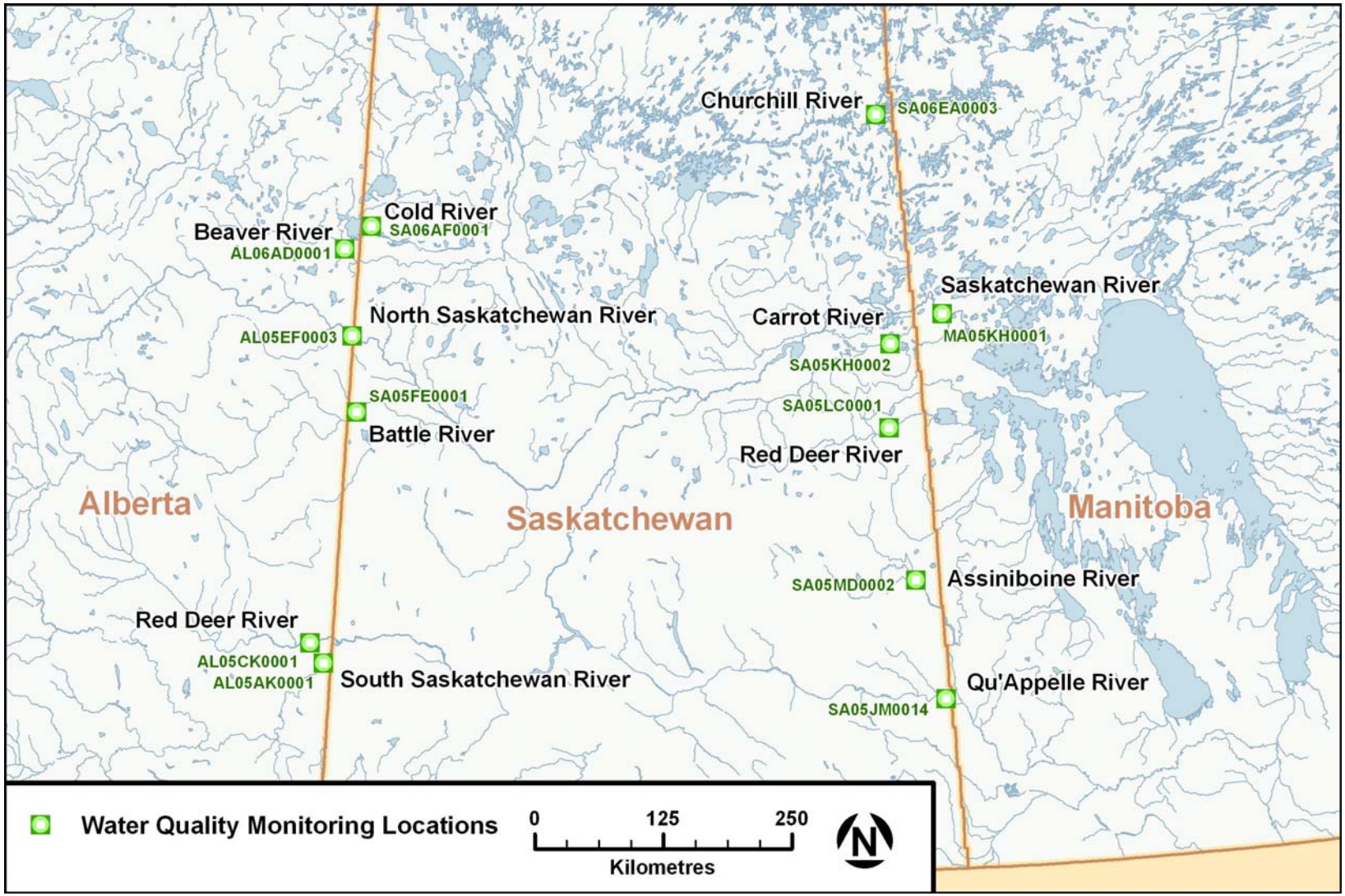


Figure 1 PPWB Water Quality Monitoring Locations

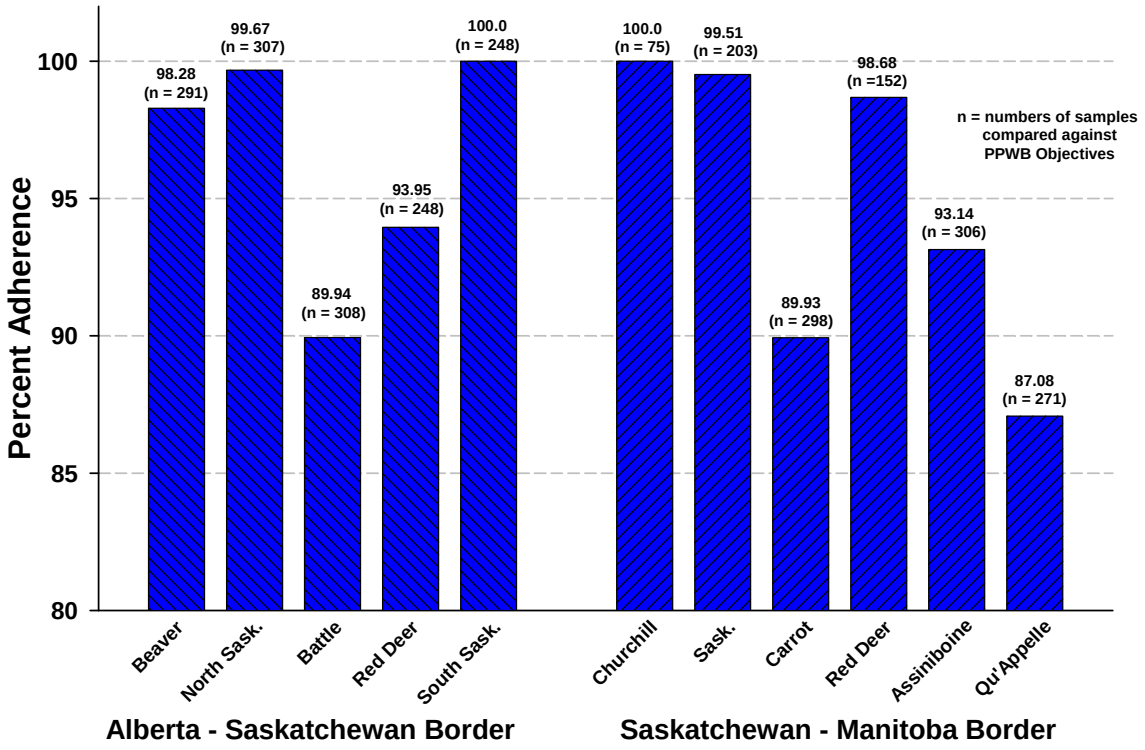


Figure 2 2009 Percent Adherence to PPWB Objectives

In comparison to previous years, four rivers showed little fluctuation in the adherence rates (ranges < 3%); five rivers showed more variability, but less than a 5% range in adherence rates (Figure 3). Two of the eleven rivers (the Red Deer River (A/S) and the Qu'Appelle River) have shown greater variability in adherence rates with ranges of 9.1 and 7.2 % respectively since 2003.

In comparison to the 2008 adherence rates, in 2009 six rivers showed greater adherence to PPWB objectives, two rivers remained the same and three rivers showed slightly lower overall adherence rates. The three rivers that showed a decrease in the adherence rates were the Beaver River, Battle River and the Qu'Appelle River. These variations in adherence rates can occur naturally and can be influenced by a number of factors including flow, sediment loading, and groundwater as well as point or non-point inputs into the river.

For the Beaver River, the adherence rate decreased by 1.7% in 2009 from 2008, due to excursions in manganese during the winter under ice conditions, and an elevated total copper level in April. The Battle River had a small decrease of 0.4% in the adherence rate from 2008 to 2009. The total number of excursions in 2008 and 2009 for the Battle River were 30 and 31 respectively. While the number of excursions did not change substantially in the Battle River between 2008 and 2009 the distribution of the excursions were different. In the Battle River in

2008, fewer sodium, iron and manganese excursions were observed, but there were also detections of copper which were not detected in 2009.

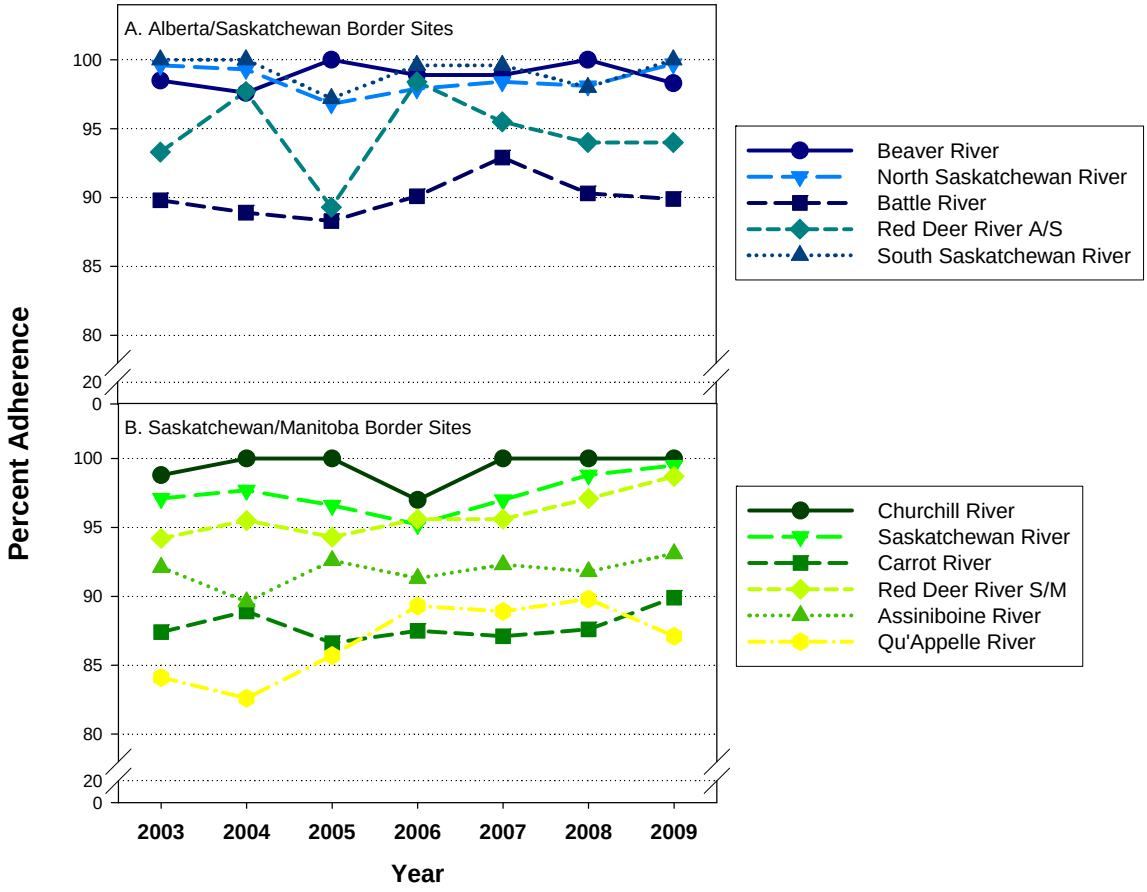


Figure 3 2003 to 2009 Percent Adherence to PPWB Water Quality Objectives for the Alberta/Saskatchewan (A) and the Saskatchewan Manitoba (B) borders

For the Qu'Appelle River, the adherence rate decreased by 2.7%, due to an excursion in copper and zinc in April and reduced dissolved oxygen levels under ice conditions in January and February. The Qu'Appelle River had excursions in each of 2008 and 2009 for manganese, sodium, sulphate and total phosphorous.

The rivers that showed an increase in the adherence rate between 2008 and 2009 included the North Saskatchewan River (1.6 %), South Saskatchewan River (2 %), Saskatchewan River (0.7 %), Carrot River (2.3%), Red Deer River (M/S) and the Assiniboine River (1.3%). For the North Saskatchewan River this increase was due to a combination of fewer metal excursions including aluminium and zinc, and no fecal coliform excursions in 2009. The South Saskatchewan River had 100% adherence in 2009, as compared to 98% in 2008. In 2008, five excursions were reported for the South Saskatchewan River including a number of metals [chromium (total), copper (total), nickel (total), zinc (total)] and a detection of fecal coliform bacteria.

Total phosphorous was the only parameter to exceed the PPWB objectives for the Saskatchewan River in 2008 and 2009. The numbers of excursions were fewer in 2009, resulting in a marginal increase in the overall adherence rate for this river.

Comparison of the monitoring results between 2008 and 2009 for the Carrot River showed that in each of these years, excursions were reported in iron, manganese, sodium, chloride, and total phosphorous. The increased adherence rate in 2009 was a result of fewer excursions in iron, chloride and sodium. The greater adherence rate for the Red Deer River on the Saskatchewan/Manitoba border was due to one fewer total phosphorous excursion in 2009. The other difference between the two years was that while manganese exceeded the PPWB objective once in 2008, this was not the case in 2009; conversely iron exceeded the dissolved iron objective once in 2009 but not in 2008.

The major change observed for the Assiniboine River in 2009 was a decrease in the number of manganese exceedances. However, winter dissolved oxygen concentrations declined in 2009 as compared to 2008. The Churchill River had 100% adherence to PPWB objectives in 2008 and 2009. The overall adherence rates and the excursions by parameter are shown in Tables 2 and 3 for the Alberta/Saskatchewan border and the Manitoba/Saskatchewan border respectively.

Parameter Specific Excursions in 2009

In 2009, a total of 16 parameters exhibited excursions to the PPWB site-specific water quality objectives (Table 4). Of these 16 parameters, four parameters contributed to 74% of the total excursions (*i.e.* number of excursions for a single parameter/total number of excursions for all parameters). These were total phosphorous (25.5%), dissolved manganese (23.4%), sodium (17.7%) and total dissolved solids (7.8%). Historically, the four parameters also contributed to just over 61% and 73% of the total excursions in 2008 and 2007 respectively.

Excursions were also calculated on a parameter by parameter basis for all 11 river reaches to quantify which parameters were exceeding the site-specific water quality objectives (*i.e.,* total number of excursions for a parameter / total number of comparisons for that parameter) (Table 4). Similar to the overall exceedance rates the same parameters had an excursion rate >15%; total phosphorous (66.7%), manganese (29%), sodium (28%) and total dissolved solids (19.3%).

When comparing the different monitoring sites, nine parameters had excursions at >15% of the sites. These were in descending order total phosphorous (83.3%), manganese (45.5%), iron and copper (each with 36.4%), sodium, (33%), total dissolved solids (25%), dissolved oxygen (22%), fecal coliforms (20%), and zinc (18.2%). Of the 16 parameters with exceedances, 50% of these had excursions at more than one site. The total phosphorous objective was exceeded at five of the six sites. Currently, total phosphorous objectives have only been established at the Saskatchewan/Manitoba border; however site-specific phosphorous objectives are anticipated to be established at all PPWB monitoring sites in 2010/11.

Protective Use Excursions in 2009

The PPWB site-specific water quality objectives were set to protect the water for different uses: protection of aquatic life, treatability of the water for drinking water, agricultural uses (irrigation and livestock watering), recreation and consumption of fish (Table 1). In this report, all uses were reviewed except the consumption of fish. Excursion analysis was not possible for rivers with fish consumption objectives as the mercury in fish and PCBs in fish data were not available at the time of writing this report. For all other water uses at least one exceedance was observed in 2009.

Of the parameters with protection of aquatic life objectives, eight parameters exceeded water quality objectives including seven metals; cadmium (total), chromium (total), copper (total), lead (total), nickel (total), selenium (total), and zinc (total). The other parameter that did not meet the protection of aquatic life objective was dissolved oxygen on the Assiniboine and Qu'Appelle Rivers. The dissolved oxygen levels for each of these rivers were low in January and February under ice conditions. For the Assiniboine River, dissolved oxygen levels were 4.7 and 5.23 mg/L for January and February respectively. Similarly, for the Qu'Appelle River, the dissolved oxygen levels were 5.62 and 5.63 mg/L in January and February. Despite these lower dissolved oxygen levels no fish kills or adverse effects to aquatic life were reported for these rivers in 2009.

Five parameters for which objectives are set for the protection of irrigation and/or livestock watering had excursions in 2009: manganese, chloride, sodium, sulphate and fecal coliforms. For recreational water use, excursions occurred for total phosphorous and fecal coliform in 2009. Fecal coliform bacteria exceeded the irrigation/livestock objective twice on the Battle River and once on the Red Deer River (A/S) in 2009. Total phosphorous objectives were exceeded in five of the six rivers on the Saskatchewan/Manitoba border with a total phosphorous objective.

For the protection of drinking water, objectives have been established at the PPWB river sites. Of these objectives total dissolved solids, sulphate, manganese and iron were the four parameters that had exceedances in 2009. These four parameters can be elevated naturally due to background water chemistry conditions and groundwater inputs but can also be influenced by anthropogenic activities in the watershed.

Conclusion

In 2009, the 11 PPWB river reaches with site-specific water quality objectives met these objectives over 95 % of time. The objectives are set to protect a variety of different water uses.

Adherence rates were over 90 % for eight of the rivers, with slightly lower adherence rates for the Battle River, Carrot River, and the Qu'Appelle River. Generally, each of the 11 rivers showed little variation in their adherence rates in 2009 as compared to the previous six years. The Red Deer River (A/S) and the Qu'Appelle River have had the greatest fluctuations in adherence rates to water quality objectives over the same last seven-year period.

The water quality parameters that most frequently exceeded site-specific water quality objectives were total phosphorous, dissolved manganese, sodium and total dissolved solids. These parameters and all other water quality objectives which can be influenced by numerous factors (*e.g.* flow, natural background concentrations) are being reviewed by the COWQ as part of a Water Quality Objectives comprehensive review.

Table 1 Summary of PPWB Water Quality Objectives by River Reach

PPWB SITE SPECIFIC OBJECTIVES: MASTER AGREEMENT SCHEDULE E

LOCATION		ALBERTA / SASKATCHEWAN BORDER				
SITE		BEAVER RIVER	NORTH SASK. RIVER	BATTLE RIVER	RED DEER RIVER A/S	SOUTH SASK. RIVER
PPWB REPORT SITE NUMBER		2	3	4	5	6
METALS	**UNITS**					
ALUMINUM (total)	mg/L	---	5	5	---	---
ARSENIC (diss)	mg/L	0.05	0.05	0.05	0.05	0.05
BARIUM (total)	mg/L	1	1	1	1	1
BORON (diss)	mg/L	5	5	5	5	5
CADMIUM (total)	mg/L	0.001	0.001	0.001	0.001	0.001
CHROMIUM (total)	mg/L	0.011	0.011	0.011	0.011	0.011
COBALT	mg/L	---	0.05	0.05	1	1
COPPER (total)	mg/L	0.004	0.004	0.004	0.004	0.01
CYANIDE (free)	mg/L	0.005	0.005	0.005	0.005	0.005
IRON (diss)	mg/L	1	0.3	0.3	0.3	1
LEAD (total)	mg/L	0.007	0.007	0.007	0.007	0.02
MANGANESE (diss)	mg/L	0.2	0.05	0.05	0.05	0.05
MERCURY (total)	ug/L	---	---	---	---	---
NICKEL (total)	mg/L	0.1	0.1	0.1	0.025	0.025
SELENIUM (diss)	mg/L	0.001	0.001	0.001	0.001	0.002
SILVER (total)	mg/L	0.0001	---	---	---	---
URANIUM	mg/L	0.02	0.02	0.02	---	---
VANADIUM (TOTAL)	mg/L	---	0.1	0.1	0.1	0.1
ZINC (total)	mg/L	0.03	0.03	0.03	0.03	0.05
NUTRIENTS						
AMMONIA (total)	mg/L	APPENDIX 1	APPENDIX 1	APPENDIX 1	APPENDIX 1	APPENDIX 1
NO2+NO3 (as N)	mg/L	10	10	10	10	10
PHOSPHORUS (total)	mg/L	---	---	---	---	---
MAJOR IONS						
CHLORIDE (diss.)	mg/L	100	100	100	---	---
FLUORIDE (diss)	mg/L	1.5	1.5	1.5	1.5	1.5
SODIUM (diss)	mg/L	100	100	100	---	---
SULPHATE (diss)	mg/L	500	500	500	500	500
TOTAL DISS. SOLIDS	mg/L	---	500	500	500	500
BIOTA						
FECAL COLIFORM	NO/dL	100/100ml	100/100ml	100/100ml	100/100ml	100/100ml
PHYSICALS						
pH	pH Units	6.5-9.0	6.5-9.0	6.5-9.0	---	---
OXYGEN (diss)	mg/L	OW 6.0	6.5	OW 6.0	---	---
SAR	mg/L	---	---	---	3	3
PESTICIDES/CONTAMINANTS						
LINDANE	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001
2,4-D	mg/L	0.004	0.004	0.004	0.004	0.004
2,4,5-TP	mg/L	0.01	0.01	0.01	0.01	0.01
CHLORINE	mg/L	0.002	0.002	0.002	---	---
CHLOROPHENOLS (total)	mg/L	0.001	0.001	0.001	0.001	0.001
PCP	mg/L	0.0005	0.0005	0.0005	---	---
MERCURY IN FISH	ug/g TISSUE	0.5	0.5	0.5	0.5	0.5
PCB IN FISH	ug/g TISSUE	2	2	2	2	2
RADIOACTIVE						
CESIUM-137	Bq/L	---	---	---	---	---
IODINE-131	Bq/L	---	---	---	---	---
RADIUM-226	Bq/L	---	---	---	---	---
STRONTIUM-90	Bq/L	---	---	---	---	---
TRITIUM	Bq/L	---	---	---	---	---

Protection of Aquatic Life
Treatability
Irrigation/Livestock
Recreation
Fish Consumption

Notes:
= --- No PPWB Objectives
OW = Open Water Objectives

Table 1 Summary of PPWB Water Quality Objectives by River Reach (continued)

PPWB SITE SPECIFIC OBJECTIVES: MASTER AGREEMENT SCHEDULE E

LOCATION		SASKATCHEWAN / MANITOBA BORDER					
SITE		CHURCHILL RIVER	SASK. RIVER	CARROT RIVER	RED DEER RIVER S/M	ASSINIBOINE RIVER	QU'APPELLE RIVER
PPWB REPORT SITE NUMBER		7	8	9	10	11	12
METALS	**UNITS**						
ALUMINUM (total)	mg/L	---	---	---	---	---	---
ARSENIC (diss)	mg/L	0.05	0.05	0.05	0.05	0.05	0.05
BARIUM (total)	mg/L	1	1	1	1	1	1
BORON (diss)	mg/L	5	0.5	2	5	2	2
CADMIUM (total)	mg/L	0.00058	0.001	0.001	0.00058	0.001	0.001
CHROMIUM (total)	mg/L	0.011	0.011	0.011	0.011	0.011	0.011
COBALT	mg/L	---	---	---	---	---	---
COPPER (total)	mg/L	0.0057	0.01	0.01	0.01	0.01	0.01
CYANIDE (free)	mg/L	0.005	0.005	0.005	0.005	0.005	0.005
IRON (diss)	mg/L	0.3	0.3	0.3	0.3	0.3	0.3
LEAD (total)	mg/L	0.011	0.0061	0.015	0.0118	0.02	0.02
MANGANESE (diss)	mg/L	0.05	0.05	0.05	0.05	0.05	0.05
MERCURY (total)	ug/L	---	---	---	---	---	0.006
NICKEL (total)	mg/L	0.025	0.1	0.1	0.1	0.1	0.1
SELENIUM (diss)	mg/L	0.01	0.01	0.01	0.01	0.01	0.01
SILVER (total)	mg/L	---	---	---	---	---	---
URANIUM	mg/L	0.02	0.02	0.02	0.02	0.02	0.02
VANADIUM (TOTAL)	mg/L	---	---	---	---	---	---
ZINC (total)	mg/L	0.047	0.047	0.047	0.047	0.047	0.047
NUTRIENTS							
AMMONIA (total)	mg/L	APPENDIX 1	APPENDIX 1	APPENDIX 1	APPENDIX 1	APPENDIX 1	APPENDIX 1
NO2+NO3 (as N)	mg/L	10	10	10	10	10	10
PHOSPHORUS (total)	mg/L	0.05	0.05	0.05	0.05	0.05	---
MAJOR IONS							
CHLORIDE (diss.)	mg/L	250	68	100	100	100	100
FLUORIDE (diss)	mg/L	1.5	1	1	1	1	1
SODIUM (diss)	mg/L	300	100	100	100	100	100
SULPHATE (diss)	mg/L	500	250	500	500	500	500
TOTAL DISS. SOLIDS	mg/L	---	---	---	---	---	---
BIOTA							
FECAL COLIFORM	NO/dL	200/100ml	200/100ml	200/100ml	200/100ml	200/100ml	100/100ml
PHYSICALS							
pH	pH Units	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
OXYGEN (diss)	mg/L	6.5	6.5	OW 6.5	6	6	6
SAR	mg/L	---	---	---	---	---	---
PESTICIDES/CONTAMINANTS							
LINDANE	mg/L	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
2,4-D	mg/L	0.004	0.004	0.004	0.004	0.004	0.004
2,4,5-TP	mg/L	0.01	0.01	0.01	0.01	0.01	0.01
CHLORINE	mg/L	0.002	0.002	0.002	0.002	0.002	0.002
CHLOROPHENOLS (total)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001
PCP	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
MERCURY IN FISH	ug/g TISSUE	0.2	0.2	0.5	0.5	0.5	0.5
PCB IN FISH	ug/g TISSUE	2	2	2	2	2	2
RADIOACTIVE							
CESIUM-137	Bq/L	50	50	50	50	50	50
IODINE-131	Bq/L	10	10	10	10	10	10
RADIUM-226	Bq/L	1	1	1	1	1	1
STRONTIUM-90	Bq/L	10	10	10	10	10	10
TRITIUM	Bq/L	40000	40000	40000	40000	40000	40000

Protection of Aquatic Life
Treatability
irrigation/Livestock
Recreation
Fish Consumption

Notes:
= --- No PPWB Objectives
OW = Open Water Objectives

Table 2 Summary of PPWB Excursions for the Alberta-Saskatchewan Border 2009

PPWB EXCURSION SUMMARY 2009

LOCATION		ALBERTA / SASKATCHEWAN BORDER				
SITE		BEAVER RIVER	NORTH SASK. RIVER	BATTLE RIVER	RED DEER RIVER A/S	SOUTH SASK. RIVER
PPWB REPORT SITE NUMBER		2	3	4	5	6
		number excursions (number of tests)				
METALS	**UNITS**					
ALUMINUM (total)	mg/L	---	0	0	---	---
ARSENIC (diss)	mg/L	0	0	0	0	0
BARIUM (total)	mg/L	0	0	0	0	0
BORON (diss)	mg/L	0	0	0	0	0
CADMIUM (total)	mg/L	0	0	0	1 (12)	0
CHROMIUM (total)	mg/L	0	0	0	2 (12)	0
COBALT	mg/L	---	0	0	0	0
COPPER (total)	mg/L	1 (12)	1 (12)	0	3 (12)	0
CYANIDE (free)	mg/L	ND	ND	ND	ND	ND
IRON (diss)	mg/L	0	0	2 (12)	1 (12)	0
LEAD (total)	mg/L	0	0	0	2 (12)	0
MANGANESE (diss)	mg/L	4 (12)	0	4 (12)	0	0
MERCURY (total)	ug/L	---	---	---	---	---
NICKEL (total)	mg/L	0	0	0	2 (12)	0
SELENIUM (diss)	mg/L	0	0	0	1 (12)	0
SILVER (total)	mg/L	0	---	---	---	---
URANIUM	mg/L	0	0	0	---	---
VANADIUM (TOTAL)	mg/L	---	0	0	0	0
ZINC (total)	mg/L	0	0	0	2 (12)	0
NUTRIENTS						
AMMONIA (total)	mg/L	0	0	0	0	0
NO2+NO3 (as N)	mg/L	0	0	0	0	0
PHOSPHORUS (total)	mg/L	---	---	---	---	---
MAJOR IONS						
CHLORIDE (diss.)	mg/L	0	0	0	---	---
FLUORIDE (diss)	mg/L	0	0	0	0	0
SODIUM (diss)	mg/L	0	0	12 (12)	---	---
SULPHATE (diss)	mg/L	0	0	0	0	0
TOTAL DISS. SOLIDS	mg/L	---	0	11 (12)	0	0
BIOTA						
FECAL COLIFORM	NO/dL	0	0	2 (12)	1 (8)	0
PHYSICALS						
pH	pH Units	0	0	0	---	---
OXYGEN (diss)	mg/L	0 (* 4 under ice)	0	0 (*4 under ice)	---	---
SAR	mg/L	---	---	---	0	0
PESTICIDES/CONTAMINANTS						
LINDANE	mg/L	ND	ND	0	0	ND
2,4-D	mg/L	ND	ND	0	0	ND
2,4,5-TP	mg/L	ND	ND	0	0	ND
CHLORINE	mg/L	ND	ND	ND	---	---
CHLOROPHENOLS (total)	mg/L	ND	ND	ND	ND	ND
PCP	mg/L	ND	ND	ND	---	---
MERCURY IN FISH	ug/g MUSCLE TISSUE	ND	ND	ND	ND	ND
PCB IN FISH	ug/g MUSCLE TISSUE	ND	ND	ND	ND	ND
RADIOACTIVE						
CESIUM-137	Bq/L	---	---	---	---	---
IODINE-131	Bq/L	---	---	---	---	---
RADIUM-226	Bq/L	---	---	---	---	---
STRONTIUM-90	Bq/L	---	---	---	---	---
TRITIUM	Bq/L	---	---	---	---	---
No. Excursion Comparisons		**291**	**307**	**308**	**248**	**248**
Total No. Excursions Observed		**5**	**1**	**31**	**15**	**0**
Sampling Frequency (no./year)		**12**	**12**	**12**	**12**	**12**
Overall Adherence Rate		**98.28**	**99.67**	**89.94**	**93.95**	**100**

"---" = no objective

ND = no data to compare to objective; PPWB approved monitoring plan for 2009 did not include these parameters

*** Low Dissolved Oxygen conditions recorded under ice cover**

[+] Fecal Coliform and/or Pesticide sampling frequency reduced to 8X per year during open water.

Table 3 Summary of PPWB Excursions for the Saskatchewan- Manitoba Border 2009

PPWB EXCURSION SUMMARY 2009

LOCATION		SASKATCHEWAN / MANITOBA BORDER					
SITE		CHURCHILL RIVER	SASK. RIVER	CARROT RIVER	RED DEER RIVER S/M	ASSINIBOINE RIVER	QU'APPELLE RIVER
PPWB REPORT SITE NUMBER		7	8	9	10	11	12
		number exursions (number of tests)					
METALS	**UNITS**						
ALUMINUM (total)	mg/L	---	---	---	---	---	---
ARSENIC (diss)	mg/L	0	0	0	0	0	0
BARIUM (total)	mg/L	0	0	0	0	0	0
BORON (diss)	mg/L	0	0	0	0	0	0
CADMIUM (total)	mg/L	0	0	0	0	0	0
CHROMIUM (total)	mg/L	0	0	0	0	0	0
COBALT	mg/L	---	---	---	---	---	---
COPPER (total)	mg/L	0	0	0	0	0	1 (12)
CYANIDE (free)	mg/L	ND	ND	ND	ND	ND	ND
IRON (diss)	mg/L	0	0	2 (12)	1 (6)	0	0
LEAD (total)	mg/L	0	0	0	0	0	0
MANGANESE (diss)	mg/L	0	0	10 (12)	0	7 (12)	8 (12)
MERCURY (total)	ug/L	---	---	---	---	---	ND
NICKEL (total)	mg/L	0	0	0	0	0	0
SELENIUM (diss)	mg/L	0	0	0	0	0	0
SILVER (total)	mg/L	---	---	---	---	---	---
URANIUM	mg/L	0	0	0	0	0	0
VANADIUM (TOTAL)	mg/L	---	---	---	---	---	---
ZINC (total)	mg/L	0	0	0	0	0	1(12)
NUTRIENTS							
AMMONIA (total)	mg/L	0	0	0	0	0	0
NO2+NO3 (as N)	mg/L	0	0	0	0	0	0
PHOSPHORUS (total)	mg/L	0	1 (9)	10 (12)	1 (6)	12 (12)	12 (12)
MAJOR IONS							
CHLORIDE (diss.)	mg/L	0	0	5 (12)	0	0	0
FLUORIDE (diss)	mg/L	0	0	0	0	0	0
SODIUM (diss)	mg/L	0	0	3 (12)	0	0	10 (12)
SULPHATE (diss)	mg/L	0	0	0	0	0	1 (12)
TOTAL DISS. SOLIDS	mg/L	---	---	---	---	---	---
BIOTA							
FECAL COLIFORM	NO/dL	ND	0	0	0	0	0
PHYSICALS							
pH	pH Units	0	0	0	0	0	0
OXYGEN (diss)	mg/L	0	0	(* + 3 under ice)	0	2 (12)	2 (12)
SAR	mg/L	---	---	---	---	---	---
PESTICIDES/CONTAMINANTS							
LINDANE	mg/L	ND	ND	0	ND	0	ND
2,4-D	mg/L	ND	ND	0	ND	0	ND
2,4,5-TP	mg/L	ND	ND	0	ND	0	ND
CHLORINE	mg/L	ND	ND	ND	ND	ND	ND
CHLOROPHENOLS (total)	mg/L	ND	ND	ND	ND	ND	ND
PCP	mg/L	ND	ND	ND	ND	ND	ND
MERCURY IN FISH	ug/g TISSUE	ND	ND	ND	ND	ND	ND
PCB IN FISH	ug/g TISSUE	ND	ND	ND	ND	ND	ND
RADIOACTIVE							
CESIUM-137	Bq/L	ND	ND	ND	ND	ND	ND
IODINE-131	Bq/L	ND	ND	ND	ND	ND	ND
RADIUM-226	Bq/L	ND	ND	ND	ND	ND	ND
STRONTIUM-90	Bq/L	ND	ND	ND	ND	ND	ND
TRITIUM	Bq/L	ND	ND	ND	ND	ND	ND
No. Excursion Comparisons		**75**	**203**	**298**	**152**	**306**	**271**
Total No. Excursions Observed		**0**	**1**	**30**	**2**	**21**	**35**
Sampling Frequency (no./year)		**3**	**9**	**12**	**6**	**12**	**12**
Overall Adherence Rate		**100.0**	**99.51**	**89.93**	**98.68**	**93.14**	**87.08**

"---" = no objective
ND = no data to compare to objective; PPWB approved monitoring plan for 2007 did not include these parameters
*** Low Dissloved Oxygen conditions recorded under ice cover**
+ Fecal Coliform and/or Pesticide sampling frequency reduced to 8X per year during open water.

Table 4 Summary of PPWB 2009 Excursions by Parameter. ***(Parameters and sites with % excursions > 15 are highlighted in grey. Blank cells are parameters with no excursions in 2009).***

PPWB EXCURSION SUMMARY 2009: by Parameter

		EXCURSION SUMMARY			SITE SUMMARY	
Parameters	**Protective Uses**	TOTAL NUMBER EXCURSIONS (# SAMPLES)	% EXCURSIONS		NUMBER SITES WITH EXCURSIONS (# SITES)	% SITES WITH EXCURSIONS
METALS						
ALUMINUM (total)						
ARSENIC (diss)						
BARIUM (total)						
BORON (diss)						
CADMIUM (total)	**Protection of Aquatic Life**	**1 (114)**	**0.9**		**1 (11)**	**9.1**
CHROMIUM (total)	**Protection of Aquatic Life**	**2 (114)**	**1.8**		**1 (11)**	**9.1**
COBALT						
COPPER (total)	**Protection of Aquatic Life**	**6 (114)**	**5.3**		**4 (11)**	**36.4**
CYANIDE (free)						
IRON (diss)	**Treatability**	**6 (114)**	**5.3**		**4 (11)**	**36.4**
LEAD (total)	**Protection of Aquatic Life**	**2 (114)**	**1.8**		**1 (11)**	**9.1**
MANGANESE (diss)	**Treatability/Irr/Livestock**	**33 (114)**	**29.0**		**5 (11)**	**45.5**
MERCURY (total)						
NICKEL (total)	**Protection of Aquatic Life**	**2 (114)**	**1.8**		**1 (11)**	**9.1**
SELENIUM (diss)	**Protection of Aquatic Life**	**1 (114)**	**0.9**		**1 (11)**	**9.1**
SILVER (total)						
URANIUM						
VANADIUM (TOTAL)						
ZINC (total)	**Protection of Aquatic Life**	**3 (114)**	**2.6**		**2 (11)**	**18.2**
NUTRIENTS						
AMMONIA (total)						
NO2+NO3 (as N)						
PHOSPHORUS (total)	**Recreation**	**36 (54)**	**66.7**		**5 (6)**	**83.3**
MAJOR IONS						
CHLORIDE (diss.)	**Irrigation/Livestock**	**5 (90)**	**5.6**		**1 (9)**	**11.1**
FLUORIDE (diss)						
SODIUM (diss)	**Irrigation/Livestock**	**25 (90)**	**27.8**		**3 (9)**	**33.3**
SULPHATE (diss)	**Treatability/Irr/Livestock**	**1 (90)**	**1.1**		**1 (11)**	**9.1**
TOTAL DISS. SOLIDS	**Treatability**	**11 (57)**	**19.3**		**1 (4)**	**25.0**
BIOTA						
FECAL COLIFORM	**Irrigation/Livestock/Recreation**	**3 (85)**	**3.5**		**2 (10)**	**20.0**
PHYSICALS						
pH						
OXYGEN (diss)	**Protection of Aquatic Life**	**4 (75)**	**5.3**		**2 (9)**	**22.2**
SAR						
PESTICIDES/ CONTAMINANTS						
LINDANE						
2,4-D						
2,4,5-TP						
CHLORINE		*na*	*na*		*na*	*na*
CHLOROPHENOLS (total)		*na*	*na*		*na*	*na*
PCP		*na*	*na*		*na*	*na*
MERCURY IN FISH		*na*	*na*		*na*	*na*
PCB IN FISH		*na*	*na*		*na*	*na*
RADIOACTIVE						
CESIUM-137		*na*	*na*		*na*	*na*
IODINE-131		*na*	*na*		*na*	*na*
RADIUM-226		*na*	*na*		*na*	*na*
STRONTIUM-90		*na*	*na*		*na*	*na*
TRITIUM		*na*	*na*		*na*	*na*

Appendix 1

Total Ammonia Objectives Based on Temperature and pH

The toxicity of ammonia relates primarily to the un-ionized form (NH3). The concentration of un-ionized ammonia present in water increases with pH and temperature. The values below represent total ammonia-nitrogen concentrations (at various temperatures and pH levels) above which accompanying NH3 concentrations may be harmful to aquatic life.

Total Ammonia (mg/L) (NH3 + NH4+)

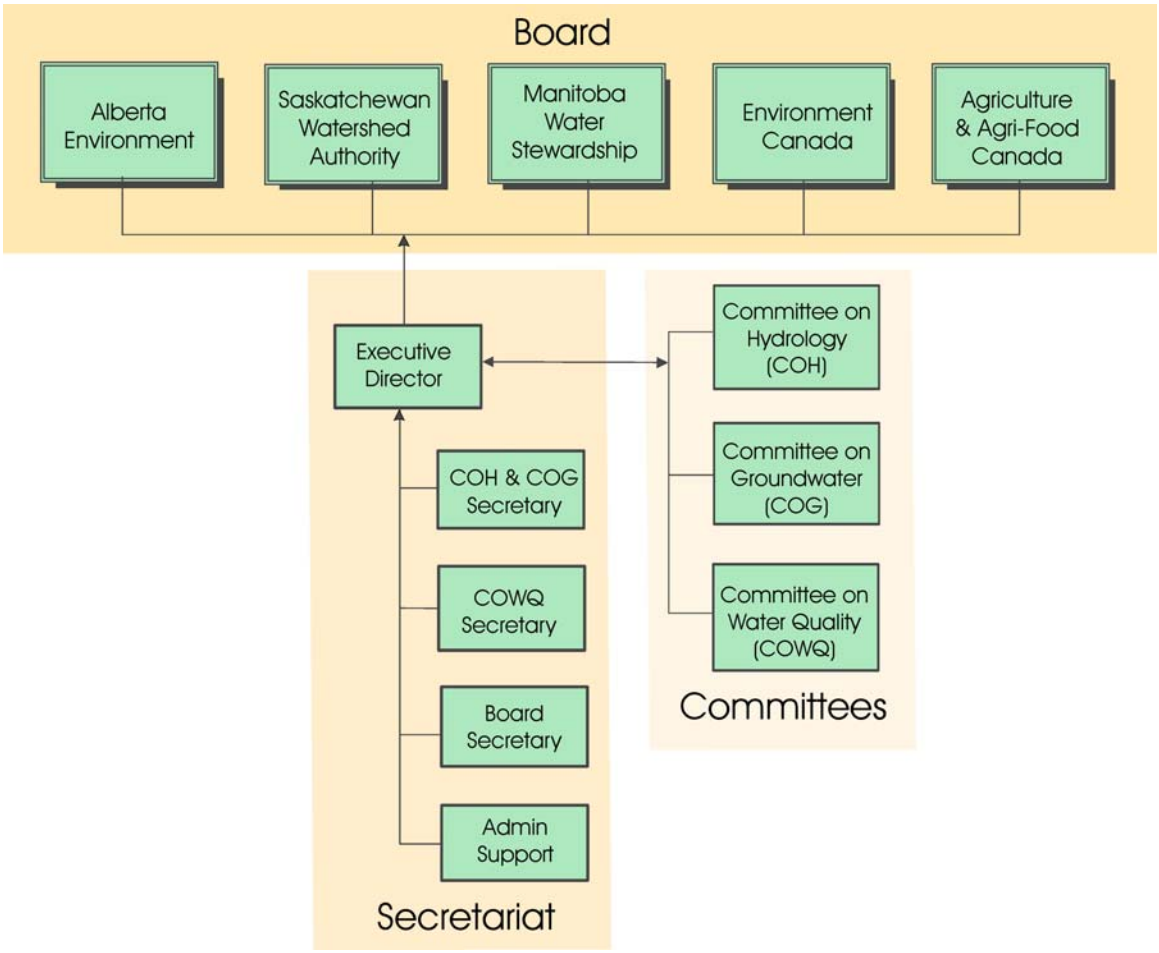
(Maximum levels expressed as N at various pH/temperature conditions)

Toxicity of Ammonia under varying Temperature and pH Conditions Water Temperature (°C) / pH (pH units)							
	0°	**5°**	**10°**	**15°**	**20°**	**25°**	**30°**
6.50	2.06	1.97	1.81	1.81	1.22	0.85	0.60
6.75	2.06	1.97	1.81	1.81	1.22	0.85	0.61
7.00	2.06	1.97	1.81	1.81	1.22	0.85	0.61
7.25	2.06	1.97	1.81	1.81	1.23	0.86	0.61
7.50	2.06	1.97	1.81	1.81	1.23	0.87	0.62
7.75	1.89	1.81	1.73	1.64	1.15	0.81	0.58
8.00	1.26	1.18	1.13	1.09	0.76	0.54	0.39
8.25	0.72	0.67	0.64	0.62	0.44	0.32	0.23
8.50	0.40	0.39	0.37	0.37	0.26	0.19	0.15
8.75	0.23	0.22	0.21	0.22	0.16	0.12	0.09
9.00	0.13	0.13	0.13	0.13	0.11	0.08	0.06

** Excerpt from the "Surface Water Quality Objectives", Water Quality Branch Saskatchewan Environment and Public Safety, November, 1988 (WQ 110)

APPENDIX V

PPWB Organizational Chart



APPENDIX VI

Board / Committee Membership 2009 - 2010

PRAIRIE PROVINCES WATER BOARD

Manitoba, Saskatchewan, Alberta and Canada agree to establish and there is hereby established a Board to be known as the Prairie Provinces Water Board to consist of five members to be appointed as follows:

(a) two members to be appointed by the Governor General in Council, one of whom shall be Chairman of the Board, on the recommendation of the Minister of Energy, Mines and Resources,

(b) one member to be appointed by the Lieutenant Governor in Council of each of the Provinces of Manitoba, Saskatchewan and Alberta.

Schedule C, Section 1
Master Agreement on Apportionment

PPWB BOARD MEMBERS

CHAIR

R. Cripps	Regional Director General Prairie and Northern Region Environment Canada

REGULAR BOARD MEMBERS

David Phillips (Jan to May/10)	Director General Agri-Environmental Adaptation and Practice Change Agri-Environment Services Branch Agriculture and Agri-Food Canada
Rick Butts (July/09- Jan/10)	Director General Agri-Environmental Knowledge, Innovation and Technology Agri-Environment Services Branch Agriculture and Agri-Food Canada
R. P. Harrison	Director Transboundary Water Policy Branch Alberta Environment
S.D. Topping	Executive Director Regulatory and Operational Services Division Manitoba Water Stewardship
W.L. Dybvig	Vice President Operations Division Saskatchewan Watershed Authority

SECRETARIAT

EXECUTIVE DIRECTOR	M. Renouf	Transboundary Waters Unit Environment Canada
SECRETARY	M. Williamson (Jul/09 – current)	Transboundary Waters Unit Environment Canada
	E. Kienholz (Apr – Jul/09)	Transboundary Waters Unit Environment Canada

PPWB ALTERNATE BOARD MEMBERS

C. Hrenchuk (Mar/10 – Jan/11)	A/Director Strategic Integration and Partnerships Environment Canada
Rick Butts (Jan to May/10)	Director General Agri-Environmental Knowledge, Innovation and Technology Agri-Environment Services Branch Agriculture and Agri-Food Canada
Dave Phillips (July/09- Jan/10)	Director General Agri-Environmental Adaptation and Practice Change Agri-Environment Services Branch Agriculture and Agri-Food Canada
S. Figliuzzi	Section Head Transboundary Water Policy Branch Alberta Environment
D. Williamson	Assistant Deputy Minister Ecological Services Division Manitoba Water Stewardship

COMMITTEE ON HYDROLOGY

Terms of Reference: Mandate

At the request of, and under the direction of the PPWB, the Committee on Hydrology (COH) shall investigate, oversee, review, report and recommend on matters pertaining to hydrology of interprovincial or interjurisdictional basins.

The committee may consider such things as natural flow; forecasting; network design; collection, processing and transmission of data; basin studies and other items of interprovincial interest involving hydrology.

The COH will engage the Committee on Groundwater and the Committee on Water Quality on items of mutual interest or when the expertise of those committees will assist the COH.

PPWB Board Minute 92-65 (Oct. 7, 2009)

CHAIR	M. Renouf	Executive Director Prairie Provinces Water Board
MEMBERS	R.G. Boals	Water Survey Division Environment Canada
	R. Woodvine	Agri-Environment Services Branch Agriculture and Agri-Food Canada
	S. Figliuzzi	Transboundary Water Policy Branch Alberta Environment
	R.W. Harrison	Water Science and Management Branch Manitoba Water Stewardship
	D. Johnson	Basin Operations Saskatchewan Watershed Authority
	N. Taylor	Meteorological Service of Canada Environment Canada
SECRETARY	B. Yee	Transboundary Waters Unit Environment Canada

COMMITTEE ON WATER QUALITY

Terms of Reference: Mandate

Under the direction of the Prairie Provinces Water Board (PPWB), the Committee on Water Quality (COWQ) shall investigate, oversee, review, report, recommend and advise the Board on matters pertaining to the water quality and aquatic ecosystem integrity of interprovincial waters.

The responsibilities of the committee shall include directing, planning, and coordinating a water quality monitoring and trend assessment program by identifying monitoring requirements and overseeing transboundary monitoring and synoptic surveys. The committee shall promote an ecosystem approach to water quality management and the protection and enhancement of interprovincial waters by ensuring the compatibility of water quality guidelines, objectives, sampling and analytical protocols, monitoring approaches, quality assurance and data bases. It shall interpret data and identify, investigate and define existing and potential interprovincial water quality problems through the application of PPWB Water Quality Objectives, trend assessment and other approaches. The committee shall inform the Board and member agencies, through the PPWB contingency plan, of any spills or unusual water quality conditions that have the potential to adversely affect interprovincial streams. It shall assess the implications of these problems and may recommend remedial or preventative measures for avoiding and resolving water quality issues and if required, additional synoptic water quality monitoring.

The committee shall foster awareness and understanding of the importance of effective water quality management, encourage the use of "state of the art" procedures for evaluating water quality and identify research needs pertinent to water quality management on the prairies. The committee shall facilitate effective water quality management practices through integration of agency initiatives and the promotion of joint planning on interprovincial streams.

The COWQ will engage the Committee on Hydrology and the Committee on Groundwater on items of mutual interest or when the expertise of those committees will assist COWQ.

PPWB Board Minute 92-65 (Oct. 7, 2009)

CHAIR	M. Renouf	Executive Director Prairie Provinces Water Board
MEMBERS	D.B. Donald	Prairie and Northern Water Quality Monitoring Environment Canada
	N. Armstrong	Water Science and Management Branch Manitoba Water Stewardship
	T. Hanley	Watershed Monitoring and Assessment Saskatchewan Watershed Authority
	R. Casey	Environmental Assurance Alberta Environment
	B. Schutzman	Agri-Environment Services Branch Agriculture and Agri-Food Canada
SECRETARY	J. Sketchell Aug./09 – Current	Transboundary Waters Unit Environment Canada

COMMITTEE ON GROUNDWATER

Terms of Reference: Mandate

Recognizing the inter-relationship between surface and groundwater, the Committee on Groundwater shall, at the request of, and under the direction of the Prairie Provinces Water Board, investigate, oversee, review, report, and recommend on matters pertaining to quantity and quality of groundwater at or near interprovincial boundaries.

Responsibilities of the committee may include: exchange of information; compilation and interpretation of existing data; recommendations on groundwater information and monitoring requirements; determination of implications of proposed projects which may impact the quantity and/or quality of waters at interprovincial boundaries; and other items of interjurisdictional interest involving groundwater.

The COG will engage the Committee on Hydrology and the Committee on Water Quality on items of mutual interest or when the expertise of those committees will assist the COG.

PPWB Board Minute 92-65 (Oct. 7, 2009)

CHAIR	M. Renouf	Executive Director Prairie Provinces Water Board
MEMBERS	G. van der Kamp	Groundwater Hydrology Water Science and Technology Directorate Environment Canada
	A. Cowen	Agri-Environment Services Branch Agriculture and Agri-Food Canada
	R. George (June 09 – current)	Groundwater Policy Business Unit Alberta Environment
	N. Shaheen	Groundwater Management Saskatchewan Watershed Authority
	R. Betcher	Groundwater Management Section Water Sciences and Management Branch Manitoba Water Stewardship
SECRETARY	B. Yee	Transboundary Waters Unit Environment Canada

APPENDIX VII

Statement of Final Expenditures 2009 - 2010

	Budget 2009 - 2010	Expended March 31 2010
Salary Component		
Person Years	3.875	4.383
Total Salary & Benefits	$397,200	$443,563
O&M Component		
Contracts		
Goal 1		
Cont. Improvement	$40,000	
Modernization	$100,000	$61,140
Goal 2		
Cont. Improvement		$7,000
Goal 3		
Core Activities	$75,000	$0
Cont. Improvement	$100,000	$0
Goal 6		
Modernization		$5,850
Goal 7		
Cont. Improvement	$10,000	$0
Modernization	$20,000	$0
Sub-total contracts	$345,000	$73,990
Operating Expenses	$76,300	$105,513
Total O&M	$421,300	$179,503
Grand Total	$818,500	$623,066

Notes:

1. Relocation expenses to staff the Senior Water Program Advisor and Senior Water Quality Advisor positions were much lower than budgeted.
2. The Goal 1 Modernization cost is for the contract with Optimal Solutions that began in FY 2008-09.

APPENDIX VIII

History of the PPWB

The Prairie Provinces Water Board was formed on July 28, 1948 when Canada and the Provinces of Alberta, Saskatchewan, and Manitoba signed the Prairie Provinces Water Board Agreement. This Agreement established a Board to recommend the best use of interprovincial waters, and to recommend allocations between provinces.

From 1948 to 1969, the Engineering Secretary to the Board was a Prairie Farm Rehabilitation Administration employee. The support staff for studies and office accommodation during these years was provided by the PFRA in Regina at no charge.

After some twenty years, changes in regional water management philosophies resulted in a need to modify the role of the Board. Consequently, the four governments entered into the *Master Agreement on Apportionment* on October 30, 1969. This Agreement provided an apportionment formula for eastward flowing interprovincial streams, gave recognition to the problem of water quality, and reconstituted the Prairie Provinces Water Board.

The *Master Agreement on Apportionment* has five schedules which form part of the Agreement. These Schedules are:

1. Schedule A. An apportionment agreement between Alberta and Saskatchewan.

2. Schedule B. An apportionment agreement between Saskatchewan and Manitoba.

3. Schedule C. The Prairie Provinces Water Board Agreement describes the composition, functions and duties of the Board.

4. Schedule D. A list of Orders-in-Council for allocations of interprovincial waters made before 1969.

5. Schedule E. A Water Quality Agreement describes the role of the PPWB in interprovincial water quality management and established PPWB Water Quality Objectives for 11 interprovincial river reaches. This Schedule became part of the Master Agreement in 1992.

Under Schedule C, the Prairie Provinces Water Board was reconstituted and was given the responsibility of administering the agreement. Schedule C also provided for the necessary board staff, accommodation, and supplies to be jointly financed by the four participating governments. Following the reconstitution of the PPWB, the members also agreed to the establishment of a semi-autonomous Board Secretariat.

The PPWB's change in administration policy was implemented when an Executive Director was appointed on July 1, 1972. The by-laws, rules, and procedures also became effective on this date.

On April 2, 1992, the *Master Agreement on Apportionment* was amended to include a water quality agreement that

became Schedule E to the Master Agreement. The agreement sets water quality objectives at 11 interprovincial river reaches and commits each of the Parties to take reasonable and practical measures to maintain or improve existing water quality.

At the Board's March 1995 meeting, the Board agreed that full time Secretariat staff was no longer necessary and that functional support would be provided by staff of Environment Canada. The process of disbanding the PPWB Secretariat and integrating its functions into Environment Canada was completed during 1995-1996. The portion of time each Environment Canada staff person spends on PPWB activities is charged to the PPWB and cost-shared by the members. The Board now operates through its Executive Director, supported by three standing committees – the Committee on Hydrology, the Committee on Groundwater, and the Committee on Water Quality.

The Board approves an annual budget with one-half the operating budget being provided by Canada and one-sixth by each of the three provinces. The Government of Canada is responsible to conduct and pay for the costs of water quantity and quality monitoring.

In 2008, a costed multi-year Work Plan was approved by the Board to identify activities and projected budgets for 2008 – 2013. Activities in this Work Plan are directed to achieving the seven goals that were identified in the 2006 Strategic Plan that fulfill the vision, mission and key deliverables that are outlined in the 2006 Charter.

In February 2009, the Master Agreement on Apportionment, By-laws, and Rules and Procedures were published in an updated document that included all changes made to date.

Prairie Provinces Water Board
2365 Albert Street, Room 300
Regina, Saskatchewan
S4P 4K1

PPWB Web Site address:
http://www.pnr-rpn.ec.gc.ca/water/fa01/index.en.html