

ANNUAL REPORT • 2008

CANADA • ALBERTA • SASKATCHEWAN • MANITOBA

PRAIRIE
PROVINCES
WATER
BOARD



PRAIRIE PROVINCES WATER BOARD

ANNUAL REPORT

FOR THE YEAR ENDING MARCH 31, 2009

ISSN 0704-8726

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LETTER OF TRANSMITTAL

October 27, 2009

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 Nancy Heppner
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 ending March 31, 2009.

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 2008 - 2009.

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 and human resource challenges, are expected to persist into the foreseeable future.

During 2008 - 2009, the Board, its three Committees, and the Secretariat, engaged in a costed multi-year work planning process. This initiative, which was well received by Ministers, will guide the work of the Board and provide a solid foundation for resource allocation over a five-year period.

In June 2008, Manitoba hosted a joint meeting of PPWB Ministers with the Board. This meeting contributed directly to meeting Goal 6, "Ministers, senior managers and appropriate staff of jurisdictions are informed about PPWB activities", as stated in the Strategic Plan. Alberta agreed to host the next joint meeting, at a time to be recommended by the Board.

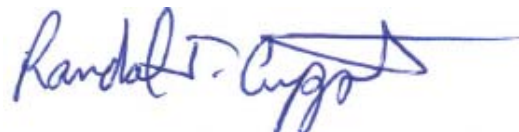
The Executive Director's position was filled through competition by Mike

Renouf in May 2008. A special thanks to Robert Harrison, Alberta member, for his assistance in the staffing process. I would like to thank both Brian Yee and Mike Renouf for acting as the Executive Director during this process.

I would also like to thank Tim Goos for acting as the Board's Environment Canada member and Chair during the staffing process for the Regional Director General, Prairie and Northern Region. This process was completed in November 2008.

During 2008, Saskatchewan's alternate member, Rob Wiebe, accepted an assignment with AAFC and Wayne Dybvig resumed his role as Saskatchewan's representative on the Board. Rob's measured and thoughtful input to the Board's discussions was greatly appreciated.

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 2008 - 2009, the work of the PPWB Secretariat and three standing committees focused on achieving the seven goals outlined in the PPWB Strategic Plan that was approved in 2006. The development of a costed Five-Year Work Plan outlines the required effort of all agencies during the year.

During 2008, agreed interprovincial apportionment of flows on all eastward flowing streams was achieved except for a small deficit (5% of median apportionable flow) on Middle Creek at the Alberta-Saskatchewan border. PPWB Board Members for Alberta and Saskatchewan government initiated discussions on how to address this deficit situation.

The Committee on Hydrology (COH) continued work, begun in 2005, on reassessing its data management and computational infrastructure necessary to determine flows. This work will facilitate the transition of computational procedures to a modern platform. Optimal Solutions Ltd, the software contractor, began work in May 2008 and presented the preliminary components of the new flow computational software at a joint meeting of the Board and COH in March 2009.

The retirement of Jim Chen, long-time PPWB Operations Engineer, resulted in a period of significant transition within the Secretariat. The challenges were met, however, by Brian Yee and Vir Khanna, with the assistance of Melissa Longman. It is expected that in 2009 - 2010, the Secretariat will once again be calculating apportionable flows on schedule.

Other COH activities included the review of the flow apportionment computational methods and the development of a prairie hydrological model that will simulate the effects of land use changes, wetland drainage, and wetland restoration on runoff. The development of the prairie model is being led by the University of Saskatchewan, in collaboration with other partners, including the Prairie Habitat Joint Venture, Ducks Unlimited Canada, Agriculture and Agri-Food Canada, Saskatchewan Watershed Authority, Manitoba Water Conservation and Alberta Environment.

Fred Martin, AAFC member on the COH, retired in 2008 and was ably replaced by Ron Woodvine.

Following its joint meeting with the Board in 2007, the Committee on Groundwater (COG) focused its efforts in 2008 on the conceptual stages of developing a groundwater schedule (Schedule F) to the *Master Agreement on Apportionment*. The COG met jointly with the Board in March 2009 to report on its progress to date and to receive direction on future steps. The COH COG also worked on a draft groundwater contingency plan.

The Committee on Water Quality (COWQ) continued work on a comprehensive review of PPWB water quality objectives, as required by the *Master Agreement on Apportionment*. At the request of the COWQ, the Board provided policy direction on issues related to the application of Drinking Water Objectives to source water. The COWQ will provide further advice on this topic in 2009 - 2010.

The development of nutrient objectives remained as a priority for the COWQ.

The Secretariat received Board approval to proceed with staffing of a Water

Quality Advisor within the Transboundary Waters Unit. The addition of this position will ensure progress on the high priority review of water quality objectives.

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 2008 - 2009, apportionment responsibilities of the Board were met through the following activities:

- reviewing and approving the hydrometric flow and meteorological networks;
- continuing work on a review of the flow computation software programs;
- monitoring apportionment of the South Saskatchewan River below the Red Deer River, North Saskatchewan River, Churchill River, Saskatchewan River, Qu'Appelle River, Assiniboine River, Battle Creek, Lodge Creek, Middle Creek, Pipestone Creek, and Cold Lake;
- conducting various studies related to the current and future hydrology of eastward flowing prairie streams, and the impact of irrigation and other water uses on stream flows; and
- monitoring the impact of interprovincial drainage projects.

Apportionment requirements were met on all streams except for a 99 dam³ delivery deficit of 5 % of the median apportionable flow for Middle Creek on the Alberta-Saskatchewan border. PPWB Board Members for Alberta and Saskatchewan discussed how to address this deficit.

Efforts continued in 2008 - 2009 on identifying the concepts and principles which would form the basis of a groundwater schedule to the *Master Agreement on Apportionment*.

In 2008, water quality objectives were adhered to an average of 94% of samples.

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

The 2009 water quality monitoring program was approved by the Board at its fall meeting, allowing changes to be made at the start of the new year.

Through reporting procedures outlined in the PPWB Interprovincial Water Quality Contingency Plan, Board members were informed of three spills on the upper Red Deer River upstream from the Glennifer reservoir, the North Saskatchewan River in Edmonton, and the South Saskatchewan River in Saskatoon. No impacts resulted to downstream jurisdictions.

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; and
- St. Mary and Milk River Water Management Initiative.

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 PPWB Ministers on June 16, 2008.

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

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, 2008 to March 31, 2009.

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 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 the Prairie Farm Rehabilitation Administration (PFRA) of Agriculture and Agri-Food Canada.

PPWB activities are equally 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 Board approves the annual budget and workplans.

Section 3 of this Annual Report lists agency representatives on the boards and committees, and reports on administration activities and financial expenditures for the fiscal year 2008 - 2009.

2. PERFORMANCE RESULTS

GOAL 1: Agreed Interprovincial Apportionment of Water Is Achieved

Monitoring Responsibilities

The 1969 *Master Agreement on Apportionment* directs "...that the Prairie Provinces Water Board shall monitor and report on the apportionment of waters set out in the provisions of the First and Second Agreements and ratified by the Master Agreement."

Section 7 of the *Master Agreement* states that Canada (Environment Canada) is responsible for monitoring at PPWB stations. Monitoring data were collected from 87 hydrometric stations and 17 meteorological stations in 2008 - 2009. The PPWB Secretariat used these data to quantify flows to monitor apportionment. Stations are plotted on the map in Appendix I.

In October 2008, the Board approved the monitoring stations lists for 2009 - 2010. The hydrometric stations remained unchanged from 2008 - 2009. Several changes occurred related to the meteorological stations, and the number of stations increased from 17 to 18.

Review of Apportionment Methods

Apportionment monitoring of an eastward flowing watercourse is generally initiated when water use increases to a level whereby the downstream jurisdiction's entitlement may be threatened.

The 1993 Committee on Hydrology (COH) report "Strategies for Apportionment Monitoring of Small Interprovincial Streams" (PPWB Report No. 122), evaluated and ranked interprovincial streams for their potential

for apportionment monitoring using the following criteria.

- the number of times an apportionment deficit has, or would 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 methods used to monitor apportionment on all basins on a ten-year rotational basis. The 2008 - 2009 Work Plan includes the development of criteria to decide which methods should be used to compute apportionable flows. The objective is to review two basins per year using these new decision criteria.

The COH also continued its review of the existing documentation of apportionment flow computational programs to ensure that Secretariat staff will be able to undertake computations in an efficient and effective manner.

The PPWB Secretariat, housed within the Transboundary Waters Unit, Environment Canada, uses approximately 50 computer programs to compute interprovincial apportionable flow. The COH is reviewing these computational programs and data management techniques. In 2006-2007, "Phase 1, Charter and Requirements Documents", was completed under

contract. From 2007 to 2009, work continued to develop new software. Optimal Solutions Ltd, the contractor, began work in May 2008, and presented the preliminary components of the new software at a joint meeting of the Board and COH in March 2009. The cost of this contract is a significant component of the 2008 - 2009 PPWB budget.

Rivers Selected for Apportionment Monitoring

The 1969 *Master Agreement on Apportionment* states that all eastward flowing streams are subject to apportionment. Currently, the Board conducts apportionment monitoring of the South Saskatchewan River below the Red Deer River, Red Deer River in Saskatchewan, the North Saskatchewan River, Churchill River, Saskatchewan River, Qu'Appelle River, Assiniboine River, Battle Creek, Lodge Creek, Middle Creek, Cold Lake, and Pipestone Creek.

Flows Reported in 2008 - 2009

All apportionment requirements were met except for Middle Creek as summarized below.

Flow reporting was done throughout 2008 – 2009. Quarterly Reports outlining apportionable flows¹, consumptive uses, and storage changes for the South Saskatchewan River basin in Alberta were computed and reported to appropriate agency staff. For Lodge and Middle Creeks, monthly flows from

¹ The apportionable flow refers to the amount of flow that downstream provinces are entitled to receive from upstream provinces under Schedules A or B of the *Master Agreement on Apportionment*. Schedule A is the binding agreement between the Provinces of Alberta and Saskatchewan. Schedule B is the binding agreement between the Provinces of Saskatchewan and Manitoba.

March to October were computed and reported to appropriate agency staff.

Recorded and apportionable flow volumes for the various rivers monitored in 2008 are summarized in table and graph form in Appendix II.

Figure 1 below illustrates the percentage of annual apportionable flow, delivered to Saskatchewan for the period from 1980 to 2008 with an average flow of 77.4%. In 2008, the total annual apportionable flow was 9,600,000 cubic decametres (dam³) for the South Saskatchewan River, at the point below its junction with the Red Deer River near the Alberta-Saskatchewan border. In comparison, the total annual recorded flow was 7,820,000 dam³ (81% of apportionable flow). Both the recorded and apportionable flow volumes were above their respective median values.

The combined daily recorded flows for the South Saskatchewan and Red Deer Rivers at the Alberta-Saskatchewan border exceeded the minimum flow criterion of 42.5 m³ / sec (1,500 cfs) during 2008.

In 2008, Alberta delivered greater than 83% of the annual flow on Lodge Creek and less than 75% of flow on Middle Creek to Saskatchewan. Article 6 in Schedule A of the *Master Agreement on Apportionment* requires Alberta to deliver 75% of the annual natural flow²

² Schedule A of the *Master Agreement on Apportionment* defines natural flow as “the quantity of water which would naturally flow in any watercourse had the flow not been affected by human interference or human intervention, excluding any water which is part of the natural flow in Alberta but is not available for the use of Alberta because of the provisions of any international treaty which is binding on Alberta.” In particular, this applies to provisions under the *Boundary Waters Treaty* for U.S. diversions from the St. Mary’s River.

of the Battle, Lodge, and Middle Creeks to Saskatchewan, which in turn delivers 50% to the United States. Thus, Alberta had a delivery deficit of 99 dam³ on Middle Creek for 2008, which was approximately 5% of the median apportionable flow. Alberta and Saskatchewan members are working together to address this deficit and develop a plan of action to address future potential deficits.

apportionable outflow from Cold Lake was 591,000 dam³ and recorded outflow was 585,000 dam³ (99 % of apportionable flow).

The apportionable flow of the Qu'Appelle River was 44,800 dam³ and recorded flow was 128,000 dam³ at the Saskatchewan-Manitoba border for 2008. Flows on the Qu'Appelle River were augmented by a diversion of 147,000 dam³ from Lake Diefenbaker.

Flows in other rivers and creeks significantly exceeded apportionment requirements as shown in Appendix II.

Figure 2 below shows the annual apportionable flow from Cold Lake that was delivered to Saskatchewan for the period from 1993 to 2008 with an average flow of 96.3%. For 2008, the

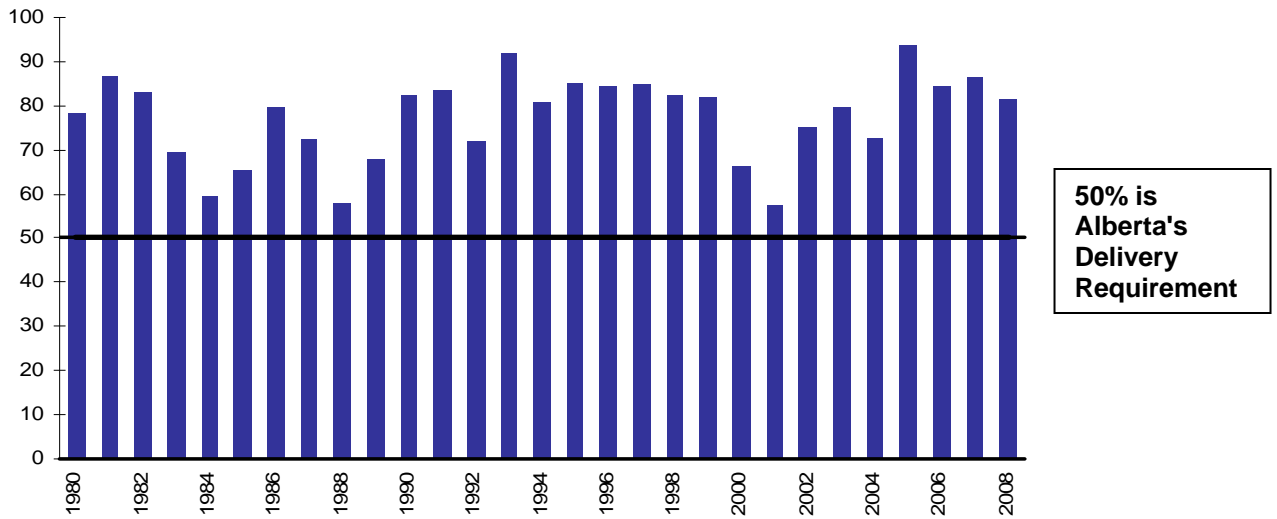


Figure 1. Percent of Apportionable Flow Delivered to Saskatchewan (South Saskatchewan River below Red Deer River)

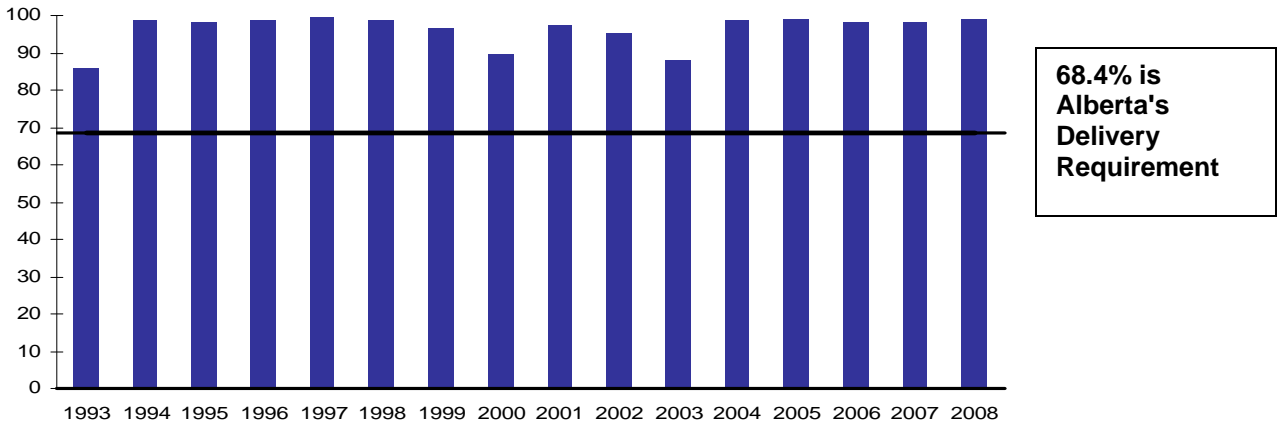


Figure 2. Percent of Apportionable Cold Lake Outflow

HYDROLOGICAL STUDIES

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. 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 10 percent of the South Saskatchewan River apportionable flow at the Alberta-Saskatchewan border.

The COH reviewed the Phase 1 report in September 2008 and will make implementation recommendations to the Board in 2009 - 2010. The timing of future work for Phase 2 will depend upon the availability of funding.

Qu'Appelle River Apportionable Flow Study

The COH discussed the need for ongoing monitoring and apportionment of the Qu'Appelle River. The Committee proposed that the current levels of monitoring and apportionment be maintained. The Secretariat documented the reasoning behind this decision in a short status report in February 2008. The COH Secretary also completed a sensitivity analysis in May 2008 to assist in the review of the Qu'Appelle Basin.

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 2008, Saskatchewan licensed five new drainage projects which drain to Manitoba. Manitoba reported no projects with the potential to affect Saskatchewan.

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 expected to respond to predicted impacts of and adaptations to climate change. A staged approach will be taken to evaluate "what if" scenarios of potential circumstances, including potential increased variability in future flows, flooding, multi-year hydrological droughts and increased future water use.

The first stage will be for the COH to develop plausible flow scenarios that are based on the range of past variability and can be used to indicate potential risks. The other stages will involve COG and COWQ and external partners in identifying climate change stressors.

GOAL 2: Interprovincial Groundwater Aquifers are Protected and Used Sustainably

Groundwater Schedule

In October 2007, the Board directed the Committee on Groundwater (COG) to focus on the development of a 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 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.

Groundwater Contingency Plan

The COG agreed in December 2008 that potential impacts on groundwater from spills could be most effectively addressed through modification to the existing PPWB Water Quality Contingency Plan. Discussions with the Committee on Water Quality and the Board will be held in 2009 - 2010 to modify the existing Water Quality

Contingency Plan and report events for both surface water and groundwater.

Reporting of Large 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) controversial 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 such projects were reported in 2008 - 2009.

No transboundary groundwater issues were brought to the attention of the PPWB in 2008 - 2009.

GOAL 3: Agreed Interprovincial Water Quality Objectives Are Achieved

Schedule E of the *Master Agreement on Apportionment* includes a list of water quality objectives that were established for a number of key watercourses at the Alberta-Saskatchewan and Saskatchewan-Manitoba borders. The PPWB water quality monitoring locations are shown in Appendix I. The PPWB water quality monitoring parameters are shown in Appendix III.

Each fall, the PPWB approves the water quality monitoring program for the upcoming year. The results of the subsequent monitoring are compared to the PPWB objectives to determine whether any excursions occurred. 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.

Water Quality Monitoring

In 2008, Environment Canada collected 120 samples from all PPWB water quality sites in accordance with the approved monitoring plan, except for the Saskatchewan River that was sampled only 10 of 12 months due to unsafe ice conditions in April and November. In addition, four water quality samples per year were obtained from Cold River to establish a baseline data set, although site specific objectives have yet to be developed for this site.

Review of Water Quality Objectives

Work proceeded in 2008 - 2009 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.

Discussions by the COWQ in 2008 focussed on asking whether Drinking Water Objectives can be applied to source water. Guidance from the Board was requested to resolve this issue. Work will continue in 2009 - 2010.

Development of Nutrient Objectives

The development of nutrient objectives is the highest priority. Progress was made in developing the background approach that will be applied to revise existing PPWB phosphorus objectives. Work will continue in 2009 - 2010.

Adherence or Excursions to Water Quality Objectives

Monitoring results are compared to the PPWB site specific objectives to determine whether any excursions to the objectives occurred. The PPWB Water Quality Excursion Report for 2008 is shown in Appendix IV. This report was recommended by the COWQ and approved by the Board on September 28, 2009. The report is summarized below.

A comparison of 2,749 water chemistry results to the PPWB objectives showed an average adherence of 94 % of samples collected in 2008 (Figure 3 below).

Most rivers showed little year to year variability in adherence rates for the past six years.

Compared with 2007, 2008 adherence rates increased for five rivers, remained at 100% for the Churchill River, and decreased in five rivers. These increases and decreases were less than 2.8 %. The Red Deer River at the Alberta - Saskatchewan border was the only river that had an improved adherence by more than 2 % because fewer phosphorus excursions occurred in 2008 than 2007. The Battle River at the Alberta – Saskatchewan border had a decreased adherence of more than 2 % because of

increased metal and fecal coliforms excursions in 2008. The reasons for these increases and decreases in adherence rates over the years will be investigated by the COWQ.

Excursions for particular water quality parameters are summarized in Figure 3 of Appendix IV. In 2008, four parameters accounted for more than 61 % of all excursions of the 14 parameters which were found to have excursions to the PPWB site specific objectives. Similar to previous years, these parameters included, in descending order of overall excursions, total phosphorus (66 % of samples where sampled phosphorus levels were compared to PPWB site specific objectives), dissolved manganese (26 %), dissolved sodium (24 %), and total dissolved solids (23 %). The reasons for these excursions is being investigated further by the COWQ but these parameters are often associated with sediment loading, and natural sources of sediments likely increased the amounts of these nutrients and ions.

It should be noted that phosphorus excursions only occurred on the Saskatchewan-Manitoba border because PPWB site specific objectives are only available for five out of the six rivers on this border. Phosphorus levels are monitored on rivers on the Alberta-Saskatchewan border, but excursion rates cannot be quantified because PPWB objectives are not available. Likewise, PPWB objectives for total dissolved solids are only available for four out of the five rivers on the Alberta-Saskatchewan border so reported excursions only involve rivers on this border. A few other parameters also have reported excursions for a few sites only

because PPWB objectives have not been developed as of yet.

The COWQ will be developing additional PPWB site specific objectives in their upcoming review of the objectives. Indeed, nutrient objectives have been identified as a high priority by the COWQ because of the high excursion rates of phosphorus, the lack of PPWB objectives on the Alberta-Saskatchewan border, and the large influence of nutrients on water quality issues such as Lake Winnipeg.

Eleven out of the 14 parameters had excursions in more than fifteen percent of river sites, accounting for 91 % of the excursions. These excursions were found in various rivers for different parameters. Some parameters such as manganese and sodium had widespread excursions rather than being localized in a few rivers.

Excursion rates for metals, major ions and physical parameters did not differ much between rivers sampled at the Alberta – Saskatchewan vs. Saskatchewan – Manitoba borders. An average of 5.5 % of samples from the Alberta - Saskatchewan rivers had at least one metal excursion as compared to 6.9% from the Saskatchewan - Manitoba rivers. An average of 9.2% and 12.5 % of samples had at least one ion excursion from Alberta - Saskatchewan and Saskatchewan - Manitoba rivers respectively. Neither border had any excursions in physical parameters.

The metering problem for dissolved oxygen was corrected. No excursions were found for dissolved oxygen.

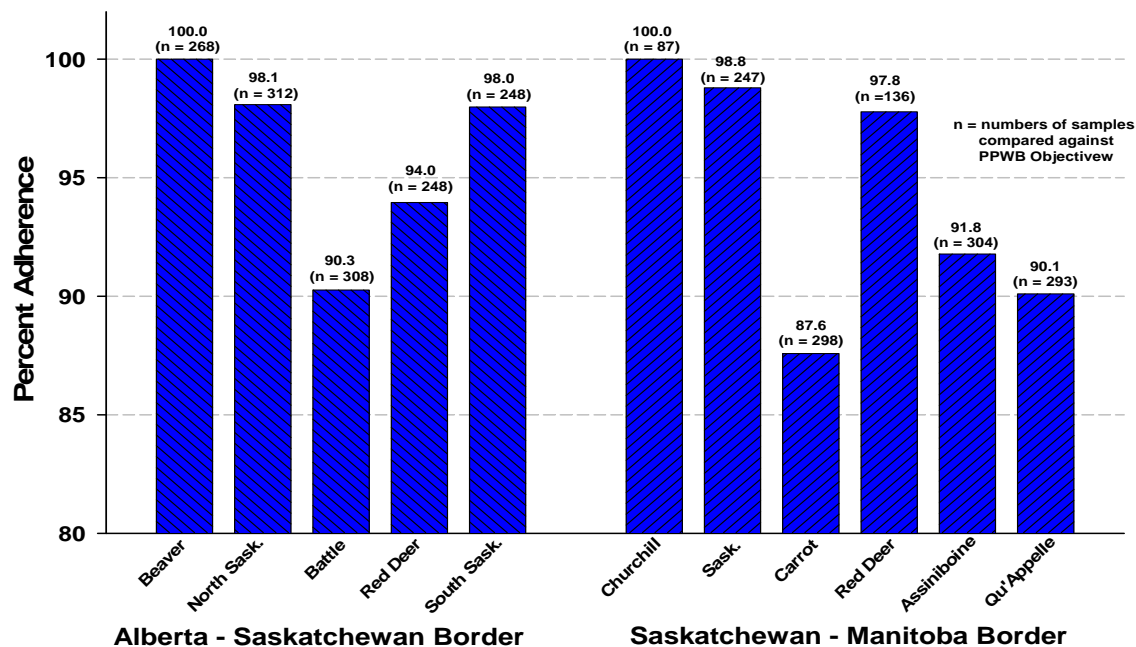


Figure 3. 2008 Percent Adherences to PPWB Objectives

In 2008, excursions were found for all of the water uses for which PPWB site specific objectives are set to protect. The only exception is that mercury and PCBs were not sampled so excursion frequencies could not be determined. The most sensitive type of objective was used for each basin to provide rigorous protection to the aquatic environment.

For rivers with Drinking Water Objectives, excursions were observed for manganese and total dissolved solids. For rivers with Recreational Objectives, excursions were observed for fecal coliforms and phosphorus. For rivers with Irrigation/Livestock Objectives, excursions were found for aluminum, chloride, sodium, fecal coliforms, and sulphate. For rivers with Fisheries Objectives, excursions were observed for chromium, copper, lead, and nickel. Many of these metal, nutrient and major ions are affected by a large number of factors and are associated with sediment

loading that arise from natural or other sources. The COWQ will investigate the causes of excursions further in its upcoming trend analysis.

In conclusion, water quality continues to be protected for many uses identified by the PPWB site specific objectives. Most rivers had relatively similar excursion rates although the Battle, Carrot, and Qu'Appelle Rivers tend to have lower adherence rates than other rivers. Some parameters, such as phosphorus, are more likely to exceed PPWB Objectives. Some excursions may have occurred due to natural sources of variation. Future activities of the PPWB COWQ such as trend analysis of water quality parameters, an assessment of historical background concentrations, and a review of PPWB objectives will improve the assessment of these data and provide a better understanding of how and why excursions occur.

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

PPWB Contingency Plan

The PPWB Interprovincial Water Quality Contingency Plan is an effective method of informing Board agencies of spills or unusual water quality conditions in interprovincial streams. The plan was updated in October 2005 with member agencies reporting any spills or unusual water quality conditions with the potential to affect downstream water quality or create possible media coverage. A spill notification form was developed for use by provincial agencies.

Three spills were reported in 2008, including:

- an oil spill that occurred on June 16, 2008 on the Red Deer River upstream from Glennifer Reservoir;
- a light naptha spill that occurred July 2, 2008 on the North Saskatchewan River in the City of Edmonton; and
- a waste water sewage spill that occurred July 19, 2008 on the South Saskatchewan River in Saskatoon.

None of the above spills were thought to affect water quality in downstream jurisdictions.

GOAL 5: Conflicts over Interjurisdictional Water Issues are Avoided

During the year, the PPWB discussed issues related to several existing or proposed projects of interest to different jurisdictions.

Lake Winnipeg Nutrient Issues

Concern over nutrient loading in Lake Winnipeg has risen in recent years, with reports of increased frequency, duration, and intensity of algal blooms. Managing nutrients within the lake's watershed, comprising four provinces and two states, poses a complex challenge. Provincial and federal agencies have responded to the challenge through the initiation of interagency, multidisciplinary research programs.

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 PPWB Chair or Executive Director represented the Board at meetings of the Committee held in June and December 2008 and in February 2009.

The Board was also informed about activities conducted in relation to the federally funded Lake Winnipeg Basin Initiative, approved on February 14, 2008 by the Treasury Board. The Executive Director attended a water quality modelling workshop in February 2009, supported by the Lake Winnipeg Basin Initiative and the International Joint Commission (IJC).

Manitoba/Saskatchewan Drainage Issues

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 to better understanding and resolving bilateral drainage issues was agreed upon. Board members will continue to be updated on progress made by Manitoba and 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 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.

The Terms of Reference for the Task Force does not include Alberta's sharing of water with Saskatchewan negotiations 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*.

GOAL 6: Jurisdictions Are Informed About PPWB Activities

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 housed on Environment Canada's website at <http://www.pnr-rpn.ec.gc.ca/water/fa01/index.en.html>

On June 16, 2008, at the invitation of Minister John Melnick, Ministers met with the Board in Winnipeg. Ministers requested that the date of the next meeting be at the recommendation of the Board. Alberta offered to host the

next joint meeting of Ministers with the Board.

In 2008 - 2009, 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 fall meeting in Winnipeg. This approach to increasing awareness of senior officials within PPWB agencies will continue in 2009 - 2010 and beyond. 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*.

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

Prairie Hydrological Model Study

The Board is one of several partners which have committed to support 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 PPWB Executive Director is a member of the Science Advisory Committee. Initial PPWB funding will continue until March 2009.

A Progress Report was provided to the Science Advisory Committee in December 2008 that outlined the work

carried out during 2008. The work in 2008 focused on completing a wetland module and incorporating it into the Cold Regions Hydrological Modelling Platform – Prairie Hydrological Model. The wetland module was evaluated for the Smith Creek Research Basin in east central Saskatchewan.

During 2008, the Provinces of Manitoba and Saskatchewan provided financial support to obtain LiDAR imagery for the basin. Study partners are in the process of seeking funding to extend the study for another year thereby allowing the LiDAR imagery to be incorporated into the model along with spring run-off data for 2008.

3 . ADMINISTRATIVE AND FINANCIAL MANAGEMENT

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 – PFRA (Appendix V). As illustrated by the organization chart in Appendix VI, the Board operates through its Executive Director and three Standing Committees (Committee on Hydrology, Committee on Groundwater, and Committee on Water Quality). The Board is chaired by Environment Canada. Fiscal year 2008 - 2009 was a year with considerable change in the membership of the Board and Committees as members either retired or assumed new positions. The Secretariat prepared and distributed several updated versions of the PPWB Directory to members and alternates as a result.

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.

Jim Chen, long-time Operations Engineer, retired and was replaced by Brian Yee. With the cooperation of the Water Survey Division, Calgary Office, Vir Khanna accepted an assignment with the Transboundary Waters Unit to assist in the transition. A process to staff the PPWB Secretary's position began late in 2008-09 due to the planned retirement of Esther Kienholz in 2009. As well, approval was given to

initiate a staffing process for a Water Quality Advisor within the Transboundary Waters Unit, who would fill the position of Secretary to the Committee on Water Quality.

Six Board and ten 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

- Meeting No. 85, April 15, 2008 – Conference Call
- Special Meeting No. 86, May 15-16, 2008 - Edmonton
- Meeting No. 87, October 16, 2008 – Conference Call
- Meeting No. 88, Nov. 12-13, 2008 – Winnipeg (jointly with COWQ)
- Meeting No. 89, February 4, 2009 – Conference Call
- Meeting No. 90, March 4-5, 2009 – Edmonton (jointly with COH and COG)

COH

- Meeting No. 104, June 27, 2008 – Conference Call
- Meeting No. 105, July 23, 2008 – Conference Call
- Meeting No. 106, September 9-10, 2008 - Winnipeg
- Meeting No. 107, January 5, 2009 – Conference Call
- Meeting No. 108, March 3-4, 2009 - Edmonton

COG

- Meeting No. 46, May 8, 2008 - Edmonton
- Meeting No. 47, July 2, 2008 – Conference Call
- Meeting No. 48, January 13-15, 2009 – Winnipeg
- Meeting No. 49, March 6, 2009 - Edmonton

COWQ

- Meeting No. 90, June 5, 2008 – Conference Call
- Meeting No. 91, June 20, 2008 – Conference Call
- Meeting No. 92, September 23, 2008 – Conference Call
- Meeting No. 93, March 23, 2009 – Conference Call

The Board approves the annual budget. The budget for 2008 - 2009 was \$593,700; final expenditures were \$538,150 as shown in Appendix VII. Although good progress was made on contract work in 2008 - 2009, final expenditures were below the approved budget due to contracts not being completed. Contract work will continue in 2009 - 2010.

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 will facilitate earlier input from the Board into the 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 work planning process was initiated in 2007 - 2008, and completed in 2008 - 2009. A special meeting of the Board was held May 15-16, 2008 which will move this process forward. The results of this meeting served to:

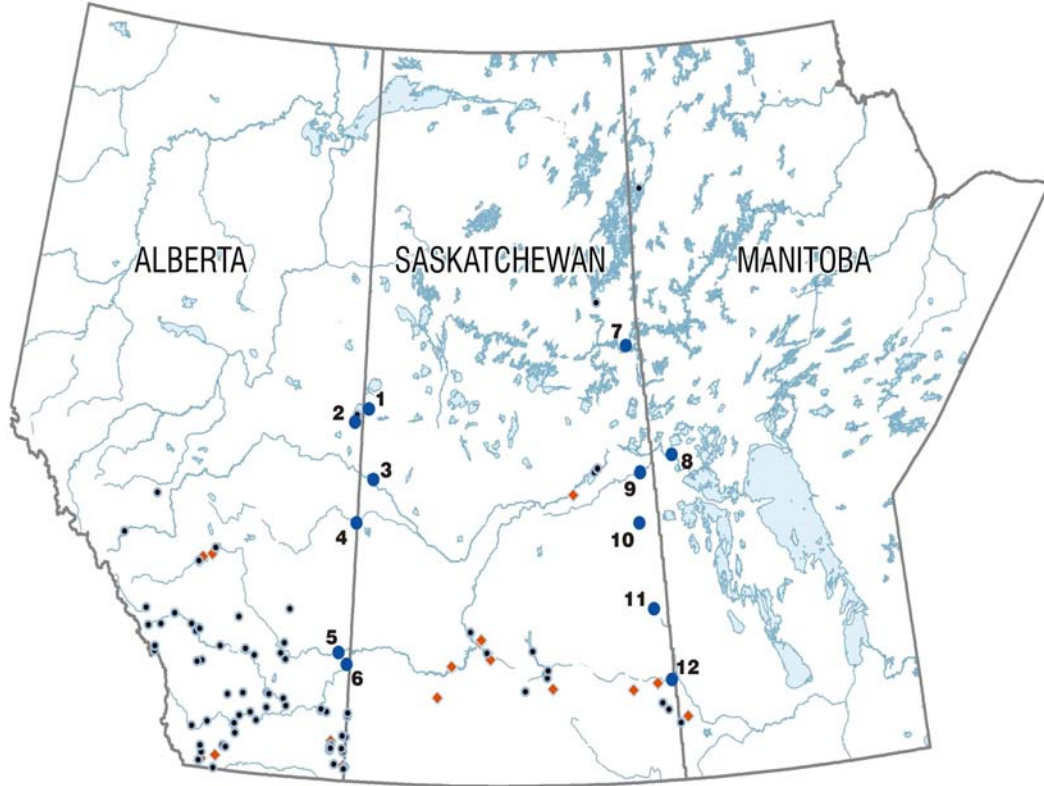
- guide the Board in its work over the next few years;
- feed into multi-year work plans for the three Standing Committees and the Secretariat;
- and provided the foundation for communication with Ministers and senior officials within each agency.

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

APPENDIX I

Approved Monitoring Stations List for 2008 - 2009

PPWB Monitoring Locations Map



● PPWB Water Quantity and Quality Monitoring Locations

- | | | |
|----------------------------|--------------------------------|--------------------------------|
| 1 Cold River | 5 Red Deer River (Alta./Sask.) | 9 Carrot River |
| 2 Beaver River | 6 South Saskatchewan River | 10 Red Deer River (Sask./Man.) |
| 3 North Saskatchewan River | 7 Churchill River | 11 Assiniboine River |
| 4 Battle River | 8 Saskatchewan River | 12 Qu'Appelle River |

● Hydrometric Sites used for apportionment monitoring

◆ Meteorological Sites used for apportionment monitoring

APPENDIX II: 2008 Recorded and Apportionable Flows

2008 Recorded and Apportionable Flows, Consumptive Use, Diversion and Storage (in Cubic Decametres)

SOUTH SASKATCHEWAN RIVER – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED DISCHARGE	198 000	192 000	264 000	218 000	657 000	2 030 000	755 000	308 000	322 000	314 000	271 000	193 000	5 720 000
CONSUMPTIVE USE	620	470	490	26 600	239 000	213 000	434 000	296 000	152 000	25 000	470	540	1 390 000
CHANGE IN RESERVOIR STORAGE	-82 800	-86 400	-70 900	-64 900	440 000	448 000	70 500	-86 500	-43 300	-35 360	-46 900	-76 900	-364 000
DIVERSION FROM BASIN	0	0	0	1 670	13 200	33 000	19 500	15 900	13 800	10 600	0	0	108 000
APPORTIONABLE FLOW	119 000	105 000	188 000	162 000	1 290 000	2 710 000	1 320 000	547 000	458 000	336 000	227 000	119 000	7 570 000

RED DEER RIVER – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED DISCHARGE	39 400	42 400	54 900	102 000	414 000	715 000	268 000	137 000	125 000	102 000	62 100	37 800	2 100 000
CONSUMPTIVE USE	0	0	0	-60	3 900	4 620	8 070	7 570	5 420	400	0	0	29 900
CHANGE IN RESERVOIR STORAGE	-21 800	-21 500	-17 400	50	11 000	42 500	17 900	16 100	860	90	-2 600	-18 200	7 140
DIVERSION INTO BASIN	0	0	0	-1 670	-13 200	-33 000	-19 500	-15 900	-13 770	-10 600	0	0	-108 000
APPORTIONABLE FLOW	18 300	20 200	37 400	96 800	422 000	713 000	280 000	148 000	116 000	96 400	61 500	21 700	2 030 000

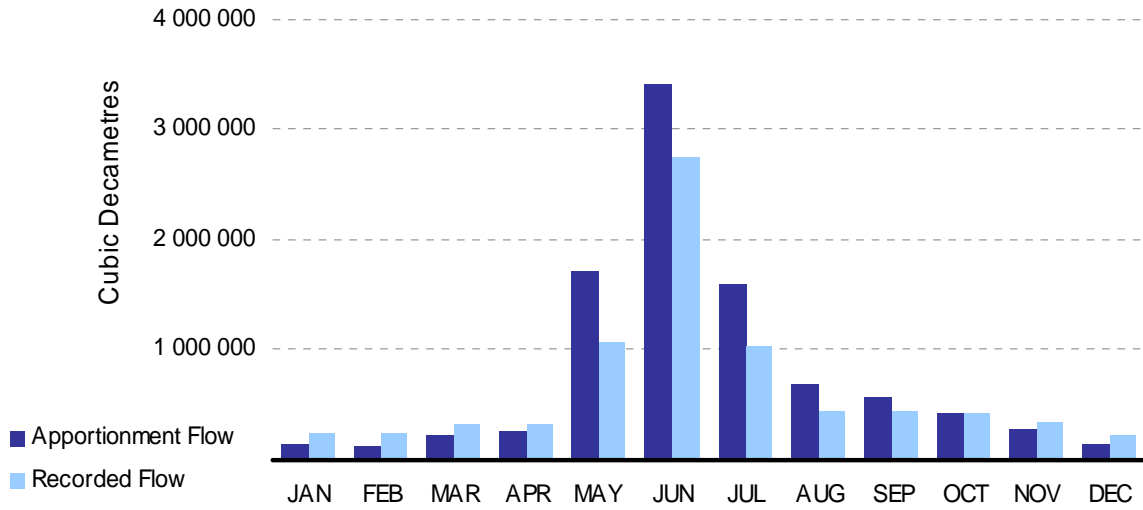
SOUTH SASKATCHEWAN RIVER – BELOW JUNCTION WITH RED DEER RIVER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED DISCHARGE	237 000	235 000	319 000	320 000	1 070 000	2 740 000	1 020 000	445 000	447 000	416 000	333 000	231 000	7 820 000
APPORTIONABLE FLOW	137 000	125 000	225 000	259 000	1 710 000	3 420 000	1 600 000	695 000	574 000	432 000	289 000	140 000	9 600 000
50 % OF APPORTIONABLE FLOW	68 500	62 500	112 500	129 500	854 000	1 710 000	800 000	347 500	287 000	216 000	144 500	70 000	4 800 000
EXCESS (+) OR DEFICIT (-) DELIVERY	168 500	172 500	206 500	190 500	217 000	1 030 000	220 000	97 500	160 000	200 000	188 500	161 000	3 020 000
CUMULATIVE EXCESS OR DEFICIT	168 500	341 000	547 500	738 000	955 000	1 990 000	2 213 000	2 310 500	2 470 500	2 670 500	2 859 000	3 020 000	3 020 000

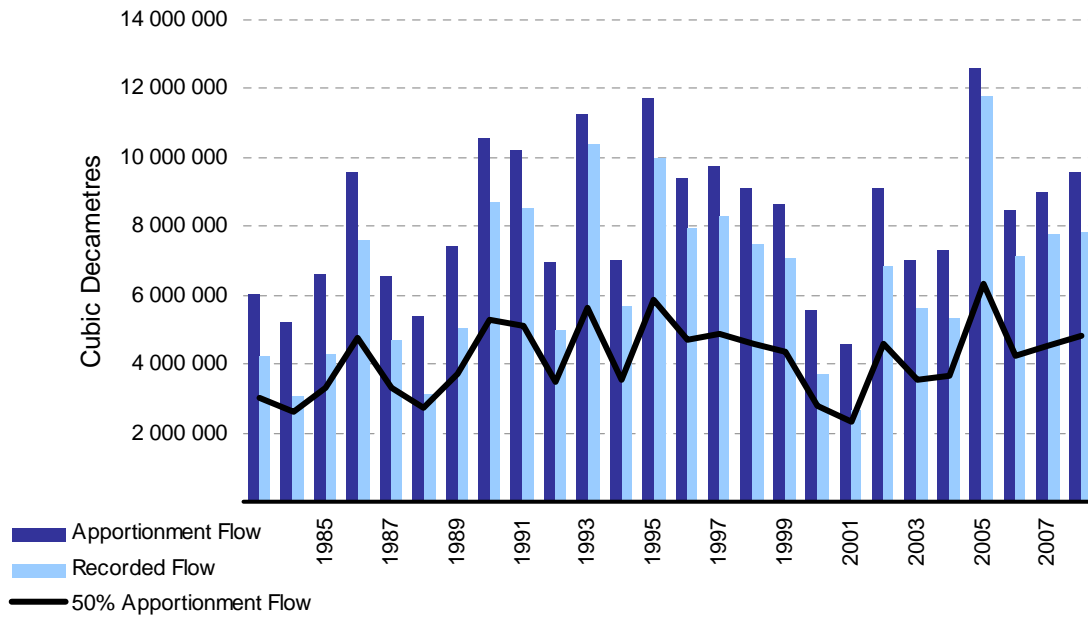
NOTES:

All data are rounded to significant figures. 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.

2008 Monthly Flow South Saskatchewan River Below Red Deer River



Annual Flows of the South Saskatchewan River Below Red Deer River



2008 Recorded and Apportionable Flows at the Saskatchewan-Manitoba Border (in Cubic Decametres)*

CHURCHILL RIVER – SASKATCHEWAN-MANITOBA BORDER (AT SANDY BAY)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	1 980 000	1 830 000	1 930 000	1 910 000	2 400 000	2 950 000	2 670 000	1 900 000	1 730 000	1 860 000	1 920 000	1 940 000	25 000 000
APPORTIONABLE FLOW	2 022 000	1 744 000	1 760 000	1 705 000	2 041 000	2 610 000	2 811 000	2 384 000	2 145 000	2 019 000	1 874 000	1 864 000	24 980 000

Note: Recorded Flow is 101% of Apportionable Flow. Recorded Flow exceeded the apportionable flow by 289 320 dam³ in 2008 because of a net reduction in reservoir storage of 289 324 dam³ in Reindeer Lake

SASKATCHEWAN RIVER – SASKATCHEWAN-MANITOBA BORDER**

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
ESTIMATED FLOW **	1 027 000	1 117 000	1 304 000	1 498 000	1 860 000	2 403 000	2 348 000	1 665 000	1 148 000	1 153 000	1 019 000	681 100	17 220 000
APPORTIONABLE FLOW	536 100	542 200	978 400	1 749 000	2 288 000	3 804 000	2 893 000	1 705 000	1 120 000	1 509 000	925 100	350 700	18 400 000

CARROT RIVER – SASKATCHEWAN-MANITOBA BORDER (NEAR TURNBERRY)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	9 390	3 780	6 440	87 100	263 000	85 700	47 700	33 400	10 200	9 550	9 940	5 480	569 000

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

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	6 940	5 080	6 470	27 000	17 000	11 300	9 520	5 790	6 040	7 580	13 700	11 400	128 000
APPORTIONABLE FLOW	-	-	-	-	-	-	-	-	-	-	-	-	44 800

Note: Recorded Flow is 285% of Apportionable Flow. Recorded flow exceeded the apportionable flow by 82 016 dam³ in 2008 because of diversions of 147 350 dam³ from the South Saskatchewan River.

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

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	5 180	4 430	6 270	147 000	87 800	49 000	39 500	16 900	2 840	3 990	4 260	3 000	370 000
APPORTIONABLE FLOW	5 120	4 370	6 070	148 000	87 100	47 000	38 100	16 400	2 740	3 920	4 180	2 950	366 000

Note: Recorded flow exceeded the apportionable flow by 38 786 dam³ in 2008 because agricultural drainage contributed an estimated 40 500 dam³ to the flow of the Red Deer River.

ASSINIBOINE RIVER – SASKATCHEWAN-MANITOBA BORDER (AT KAMSACK)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	2 750	1 800	1 640	106 000	37 200	16 800	22 600	17 200	1 080	952	3 190	1 730	212 000
APPORTIONABLE FLOW	2 790	1 770	1 670	107 000	37 800	17 300	22 900	18 100	1 560	1 280	3 270	1 810	218 000

Note: Informal apportionment was done at Kamsack rather than the interprovincial border.

PIPESTONE CREEK – SASKATCHEWAN-MANITOBA BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	50	70	257	7 280	2 020	5 330	974	1 430	558	195	502	939	19 600
APPORTIONABLE FLOW	129	621	521	7 330	2 370	5 310	803	1 250	460	241	0	977	20 000

*Apportionment period for streams crossing the Saskatchewan-Manitoba border was changed from water year to calendar year.

** 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.

Apportionable flow is the volume of flow subject to apportionment.

2008 Recorded and Apportionment Flows at the Alberta-Saskatchewan Border (in Cubic Decametres)

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

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	290 000	248 000	330 000	440 000	999 000	1 630 000	949 000	598 000	454 000	412 000	378 000	273 000	7 000 000
APPORTIONABLE FLOW	35 500	48 700	83 300	191 000	1 170 000	1 990 000	1 390 000	876 000	513 000	324 000	206 000	79 800	6 910 000

Note: Recorded Flow is 101% of Apportionable Flow. Recorded flow exceeded the apportionable flow by 95 150 dam³ in 2008 because of a net reduction in reservoir storage of 95 150 dam³ in Lake Abraham and Brazeau Reservoir

BATTLE CREEK – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	0	49	267	2 430	1 720	1 670	671	1 390	1 090	470	0	0	9 750
APPORTIONABLE FLOW	0	49	262	2 440	1 740	1 660	667	771	736	470	0	0	8 790

Note: Recorded Flow is 111% of Apportionable Flow. Recorded flow exceeded the apportionable flow by 958 dam³ in 2008 because of a net reduction in reservoir storage of 958 dam³ in Reesor Reservoir

LODGE CREEK – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	0	0	2	257	1 770	1 200	31	0	0	0	0	0	3 260
APPORTIONABLE FLOW	0	0	4	427	2 007	1 190	2	0	0	0	0	0	3 630

MIDDLE CREEK – ALBERTA-SASKATCHEWAN BORDER

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	0	0	2	47	238	87	6	5	5	3	0	0	392
APPORTIONABLE FLOW	0	0	10	150	380	95	6	5	4	1	0	0	652

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	48 900	45 400	42 000	40 700	77 800	89 000	77 500	55 900	36 900	28 400	21 900	20 300	585 000
APPORTIONABLE FLOW	50 000	45 900	42 500	41 200	78 400	89 600	78 100	56 500	37 400	28 900	22 400	20 800	591 000

APPENDIX III

PPWB Water Quality Monitoring 2008 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^θ
AMMONIA, diss.^θ
ANTIMONY, diss. & total
ARSENIC, diss.^θ & total
BARIUM, diss. & total^θ
BERYLLIUM, diss. & total
BICARBONATE, calc.
BISMUTH, diss. & total
BORON, diss.^θ & total
CADMIUM, diss. & total^θ
CALCIUM, diss.
CARBON, diss organic
CARBON, part. organic
CARBON, total organic, calcd.
CARBONATE, calcd.
CHLORIDE, diss.^θ
CHROMIUM, diss. & total^θ
COBALT, diss. & total^θ
COLIFORMS FECAL^θ ♦
COLOUR TRUE
COPPER, diss. & total^θ
E. COLI ♦
FLUORIDE, diss.^θ
FREE CO₂, calcd.
GALLIUM, diss. & total
HARDNESS NON-CARB. (CALCD.)
HARDNESS TOTAL (CALCD.) CaCO₃
IRON, diss.^θ & total
LANTHANUM, diss. & total
LEAD, diss. & total^θ
LITHIUM, diss. & total
MAGNESIUM, diss.
MANGANESE, diss.^θ & total
MOLYBDENUM, diss. & total
NICKEL diss. & total^θ
NITROGEN NO₃ & NO₂, diss.^θ
NITROGEN. part.
NITROGEN, total calcd.

NITROGEN, diss.
OXYGEN, diss.^θ
Ph^θ
PHOSPHOROUS ortho, diss
PHOSPHOROUS, part. calcd.
PHOSPHOROUS, total^θ
PHOSPHOROUS, diss.
POTASSIUM, diss.
RESIDUE FIXED NONFILTRABLE
RESIDUE NONFILTRABLE
RUBIDIUM, diss. & total
SELENIUM, diss.^θ & total
SILVER, diss. & total
SILICA,
SODIUM ADSORPTION RATIO, calcd.^θ
SODIUM, diss.^θ
SODIUM PERCENTAGE, calcd.
SPECIFIC CONDUCTANCE
STRONTIUM, diss. & total
SULPHATE, diss.^θ
TEMPERATURE WATER
THALLIUM, diss. & total
TOTAL DISSOLVED SOLIDS, calcd.^θ
TURBIDITY
URANIUM, diss. & total^θ
VANADIUM, diss. & total^θ
ZINC diss. & total^θ

ACID HERBICIDES*^θ
NEUTRAL HERBICIDES*
ORGANOCHLORINE INSECTICIDES*

^θ Parameters with PPWB site specific objectives

* Collected from the Battle, Red Deer (Alta/Sask), Assiniboine, and Carrot Rivers in 2007

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

APPENDIX IV

PPWB EXCURSION REPORT

JANUARY – DECEMBER 2008

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APPROVED BY PPWB BOARD, SEPTEMBER 28, 2009
RECOMMENDED BY PPWB COWQ SEPTEMBER 6, 2009

PREPARED BY: MICHELE WILLIAMSON
TRANSBOUNDARY WATERS UNIT
ENVIRONMENT CANADA
SEPTEMBER 2009

The *Master Agreement on Apportionment (MAA)* requires that water is sampled and various water chemistry parameters are measured to indicate water quality conditions in the 11 Prairie Provinces Water Board (PPWB) eastward-flowing rivers along the Alberta/Saskatchewan (A/S) and Saskatchewan/Manitoba (S/M) borders. To ensure water quality is protected, the *MAA* requires that these water samples are compared annually to Water Quality Objectives for each of the 11 PPWB river sites. The use of Objectives is approved within the *MAA* to indicate acceptable water conditions for upstream and downstream jurisdictions and the government of Canada (see Appendix 1). The PPWB approved different types of Objectives and chose the most sensitive use for each site specific Objective that indicates whether drinking water, recreation, irrigation/ livestock, fisheries, or fish consumption is protected. In essence, these Objectives set levels of different water physical chemical parameters such as metals, nutrients, major ions, fecal coliforms, physical characteristics, pesticides, mercury, PCBs and PCPs. If measured concentrations meet (*i.e.*, adhered to) the PPWB Objectives, then water quality is likely protected. Conversely, if sampled concentrations do not meet the Objective (*i.e.*, excursion to) then water quality is at potential risk of not being protected for specific uses depending upon which type of Objective was used (*eg.* fisheries).

This report presents the 2008 numbers of adherences and excursions to the PPWB Objectives. Raw data for excursions were distributed to the PPWB Committee of Water Quality (COWQ) members on August 19, 2009 for their review, abiding with PPWB quality control/quality assurance protocols. The report presents sampling details, percent adherences, and explores some patterns of excursions of PPWB site specific Water Quality Objectives.

Water Quality Sampling

Environment Canada staff collected 120 water quality samples from the 11 PPWB sites. River sites were sampled at the approved monitoring frequency except that unsafe ice conditions prevented sampling the Saskatchewan River in April and November. For Cold River, which does not have site specific PPWB objectives, an additional four water quality samples were collected in 2008. For Beaver River, both the old and new sites were sampled to allow comparisons of the two sites for two years. Data from the original site were used in the 2008 analyses to allow comparisons with historic data. The COWQ will review the data from the two sites and decide whether to continue sampling the original site or to change to the new site.

Overall Adherence to PPWB Water Quality Objectives

In 2008, the PPWB Objectives were adhered to for 94% of 2,749 comparisons of water chemistry samples to Water Quality Objectives (Figure 1). Only the Carrot and Qu'Appelle Rivers had percent adherence less than 90%. High adherence rates were also found from 2003 to 2008 (Figure 2). Percent adherences varied little across years for eight of the rivers (ranges < 3%), whereas ranges were 6%, 9.1% and 7.5 % for the Battle, Red Deer A/S and Qu'Appelle Rivers respectively. These high percent adherences over the years tentatively suggest that water quality conditions continue to remain acceptable for many parameters.

Percent adherences to PPWB objectives increased in five rivers and decreased in five rivers for 2008 relative to the percent adherences reported in 2007. One river, the Churchill, continued to remain at 100% adherence with no reported excursions. These increased or decreased adherence rates are, however, fairly small and can vary naturally from year to year and be influenced by a large number of factors. Although further analysis is required to quantify trends and verify the causes of excursions, some observations and potential explanations are made in differences in excursions for various parameters on particular rivers.

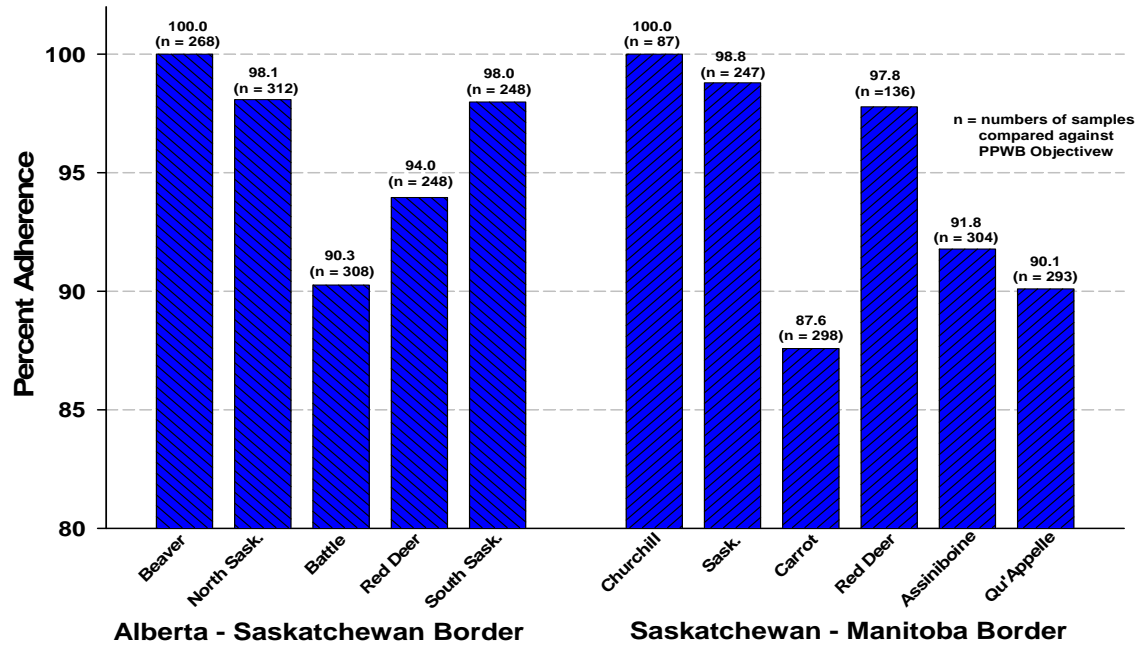


Figure 1. 2008 Percent Adherences to PPWB Objectives for A/S and S/M Borders

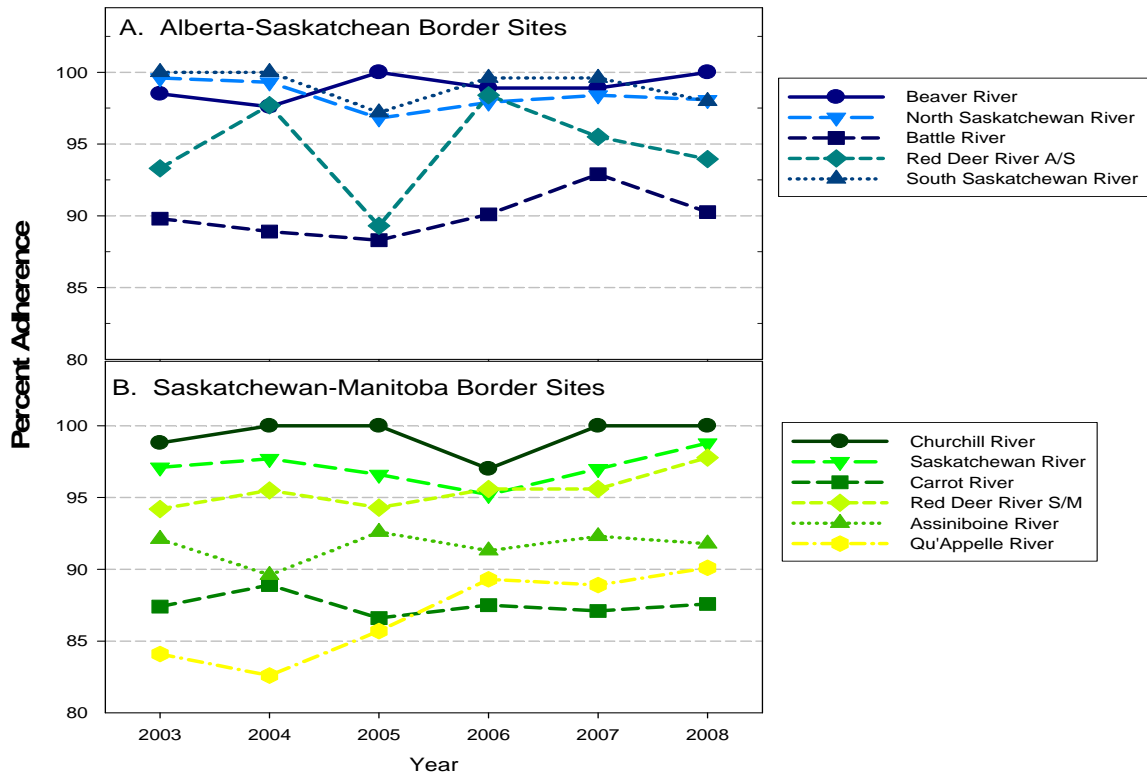


Figure 2. 2003-2008 Percent Adherences to PPWB Objectives for A/S (A) and S/M (B) Borders

Some rivers had slightly higher increases in adherence rates than others in 2008; 0.5% for Carrot, 0.9% for Qu'Appelle, 1.1% for Beaver, 1.8% for Saskatchewan, and 2.8% for Red Deer S/M. The Red Deer S/M River had two total phosphorus excursions (April and June 2008) as compared to five out of six samples in 2007. The Red Deer S/M River also had one excursion for manganese in 2008 and one for fecal coliform bacteria in 2007. The Saskatchewan River only had three total phosphorus excursions in 2008 that were collected in May, September and October. In 2007, the river had five total phosphorus and one dissolved oxygen excursions. The decrease in total phosphorus excursions may be associated with less sediment loading in 2008 or other factors.

For the Qu'Appelle River, 30 and 29 excursions from PPWB Objectives were reported in 2007 and 2008 respectively, increasing percent adherence by 1.2% in 2008. In 2008, a total of five excursions were reported for manganese, 11 for total phosphorus, 12 for dissolved sodium, and one for sulphate, as compared to six for manganese, 12 for total phosphorus, ten for dissolved sodium, and two for fecal coliform bacteria in 2007. The excursions observed for the Qu'Appelle involves a number of parameters that may be associated with sediment loading or other factors such as ground water effects or waste water discharges.

Decreases in percent adherences from 2007 to 2008 varied slightly among rivers; 0.3% for North Saskatchewan, 0.5% for Assiniboine, 1.5% for Red Deer A/S, 1.6% for South Saskatchewan and 2.6% for Battle. The South Saskatchewan River had five parameters that showed excursions from the PPWB Objectives in 2008 (fecal coliform bacteria, chromium, copper, nickel, and zinc) compared to only one fecal coliform bacteria excursion in 2007. All of the 2008 excursions were found in one sample taken in June that had high levels of turbidity. This high turbidity is, however, not uncommon as June represents the peak in snow melt runoff from the mountains and large sediment loading typically occurs in large rivers such as the South Saskatchewan River that receive runoff inputs from a large land area. The Red Deer A/S had greater numbers of metal and biota excursions in 2008; one chromium, four copper, two lead, two nickel, three zinc and three fecal coliforms compared to seven copper, two lead, and two zinc in 2007. These large numbers of metal and fecal coliforms excursions for both the South Saskatchewan and the Red Deer rivers were likely associated with elevated concentrations of sediments in the water column as these excursions occurred during recorded high flow events. Decreases in percent adherences for other rivers were negligible.

The COWQ will conduct trend analysis in the next few years to ascertain the statistical significance of this annual variation in adherence overall and within each of the river reaches.

2008 Excursions of Water Quality Parameters

Although overall percent adherence was high, excursions occurred in 2008 in all rivers except for the Beaver and Churchill (see Appendix 2 for specific numbers of excursions and samples taken for each water quality parameter and river). Parameter specific patterns were explored to understand whether differences existed between borders and particular water quality parameters. The excursions for the different Water Quality Objectives are also considered.

Excursion Differences for Specific Parameters

Excursions were found in 2008 for 14 parameters, although percent excursions differed among water quality parameters across all rivers (Figure 3). Excursions were quantified for both the numbers of overall samples and river border sites that were compared to PPWB Objectives.

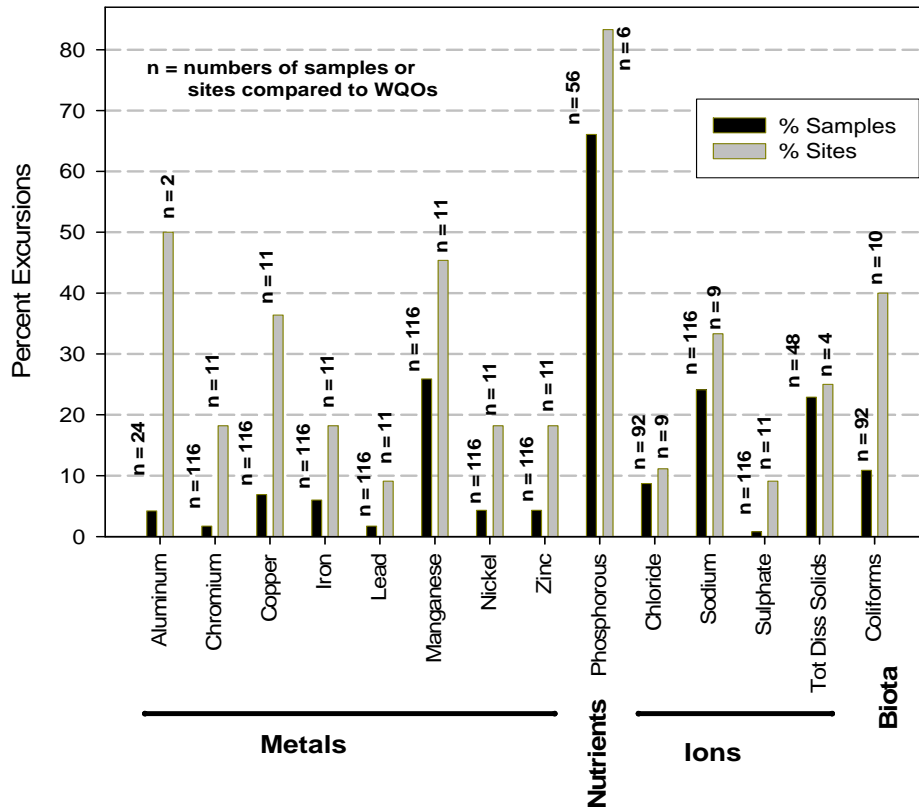


Figure 3. Percent Excursions of Samples and Sites for Parameters in 2008.

Four parameters had a noticeable percentage (i.e., > 15%) of samples with excursions (66.1% for total phosphorus, 25.9% for dissolved manganese, 24.1% for dissolved sodium, and 22.9% for total dissolved solids). These four parameters accounted for 61.3% of the variation among excursions in samples (i.e., sum of number of sample excursions for each of these four parameters divided by the total number of sample excursions for all parameters).

Eleven parameters had a noticeable number of excursions from PPWB Objectives for many of the rivers (> 15% of sites had excursions); 83.3% of sites had excursions for total phosphorus, 50% for total aluminum, 45.4% for dissolved manganese, 40% for fecal coliforms, 36.4% for total copper, 33.3% for dissolved sodium, 25% for total dissolved solids, and 18.2% for total chromium, dissolved iron, total nickel and total zinc). These eleven parameters accounted for 91.2% of the variation among excursions in sites (i.e., sum of numbers of sites that had excursions for each parameter divided by the total number of sites that had excursions).

All of the four parameters with noticeable numbers of sample excursions also had noticeable numbers of site excursions, suggesting that excursions of these parameters are more likely to occur than other parameters and are widespread. For both sample and site excursions, total phosphorus had the highest numbers, then manganese, sodium and finally total dissolved solids. Also, these four parameters have had excursions in other reporting years. Nonetheless, some of these excursions likely occurred naturally due to high background concentrations in some Prairie rivers. For example, dissolved sodium and total dissolved solids excursions in the Battle River may partly reflect geology and groundwater influence. Similarly, high levels of

salinity have been found in other waterbodies in parts of the mid to lower Battle River basin and elsewhere in east-central southeast Alberta.

Unlike previous years, no excursions were found in 2008 for dissolved oxygen. Oxygen levels are also higher in the Carrot River than previous years. The previous excursions were influenced by a problem with oxygen meters which has now been resolved. The new dissolved oxygen meters measure oxygen concentrations more reliably than the old meters.

Some biases are introduced by only having site specific PPWB objectives on one border or in a limited number of sites. For example, total phosphorus had a high number of excursions for (55% of samples and four out of five rivers from the S/M border). PPWB Objectives for phosphorus are only available for the five rivers along the S/M border, increasing percent excursions for this border only. Total aluminum and total dissolved solids have PPWB objectives for only two and four sites, respectively, on the A/S border.

Borders did not differ much for excursions of metals, major ions and physical parameters. An average of 5.5% of samples from the A/S rivers had at least one metal excursion as compared to 6.9% from the S/M rivers. An average of 9.2% and 12.5% of samples had at least one ion excursion from A/S and S/M rivers respectively. Neither border had any excursions in physical parameters.

Excursion Differences for Types of Water Quality Objectives

The PPWB Objectives are based on different types of Water Quality Objectives that have different protection goals for various water uses. The most sensitive use was selected for each site specific Objective. The relationship between excursions and the types of uses protected will be considered by the COWQ in their on-going review of the PPWB Objectives. PPWB Objectives differ among parameters and rivers (see Appendix 1). For rivers with Drinking Water Objectives, excursions were observed for manganese and total dissolved solids. For rivers with Recreational Objectives, excursions were observed for fecal coliforms and phosphorus. For rivers with Irrigation/Livestock Objectives, excursions were found for aluminum, chloride, sodium, fecal coliforms, and sulphate. For rivers with Fisheries Objectives, excursions were observed for chromium, copper, lead, and nickel. Excursion analysis was not possible for rivers with Fish Consumption Objectives as mercury, mercury in fish and PCBs in fish data are either not available or the sampled rivers did not have Objectives for these variables.

Conclusions

Water quality continues to be protected for many uses identified by the PPWB Water Quality Objectives. Most rivers had relatively similar excursion rates although the Battle, Carrot, and Qu'Appelle tend to have lower adherence rates than other rivers. Some parameters such as phosphorus are more likely to exceed PPWB Objectives. Some excursions may have occurred due to natural sources of variation. Future activities of the PPWB COWQ such as trend analysis of water quality parameters, an assessment of historical background concentrations, and a review of PPWB objectives will improve the assessment of these data and provide a better understanding of why excursions occur.

APPENDIX 1: PPWB Objectives: Master Agreement Schedule E

1 of 2

PARAMETERS	UNITS	ALBERTA / SASKATCHEWAN BORDER				
		BEAVER	NORTH SASK.	BATTLE	RED DEER A/S	SOUTH SASK.
METALS						
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
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 3	APPENDIX 3	APPENDIX 3	APPENDIX 3	APPENDIX 3
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 (muscle tissue)	ug/g	0.5	0.5	0.5	0.5	0.5
PCB IN FISH (muscle tissue)	ug/g	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	---	---	---	---	---

Fisheries
Drinking
Irrigation/Livestock
Recreation
Consumption of Fish

**Notes: - - - no PPWB Objectives
OW = Open Water Objectives**

APPENDIX 1: PPWB Objectives: Master Agreement Schedule E

PARAMETERS	SASKATCHEWAN / MANITOBA BORDER					
	CHURCHILL	SASK.	CARROT	RED DEER S/M	ASSINIBOINE	QU'APPELLE
METALS	UNITS					
ALUMINIUM (total)	mg/L	---	---	---	---	---
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	0.00058	0.001	0.001	0.00058	0.001
CHROMIUM (total)	mg/L	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
CYANIDE (free)	mg/L	0.005	0.005	0.005	0.005	0.005
IRON (diss)	mg/L	0.3	0.3	0.3	0.3	0.3
LEAD (total)	mg/L	0.011	0.0061	0.015	0.0118	0.02
MANGANESE (diss)	mg/L	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
SELENIUM (diss)	mg/L	0.01	0.01	0.01	0.01	0.01
URANIUM	mg/L	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
NUTRIENTS						
AMMONIA (total)	mg/L	APPENDIX 3	APPENDIX 3	APPENDIX 3	APPENDIX 3	APPENDIX 3
NO2+NO3 (as N)	mg/L	10	10	10	10	10
PHOSPHORUS (total)	mg/L	0.05	0.05	0.05	0.05	---
MAJOR IONS						
CHLORIDE (diss.)	mg/L	250	68	100	100	100
FLUORIDE (diss)	mg/L	1.5	1	1	1	1
SODIUM (diss)	mg/L	300	100	100	100	100
SULPHATE (diss)	mg/L	500	250	500	500	500
TOTAL DISS. SOLIDS	mg/L	---	---	---	---	---
BIOTA						
FECAL COLIFORM	NO/dL	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
OXYGEN (diss)	mg/L	6.5	6.5	OW 6.5	6	6
SAR	mg/L	---	---	---	---	---
PESTICIDES/CONTAMINANTS						
LINDANE	mg/L	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
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	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	0.0005	0.0005
MERCURY IN FISH (muscle tissue)	ug/g	0.2	0.2	0.5	0.5	0.5
PCB IN FISH (muscle tissue)	ug/g	2	2	2	2	2
RADIOACTIVE						
CESIUM-137	Bq/L	50	50	50	50	50
IODINE-131	Bq/L	10	10	10	10	10
RADIUM-226	Bq/L	1	1	1	1	1
STRONTIUM-90	Bq/L	10	10	10	10	10
TRITIUM	Bq/L	40000	40000	40000	40000	40000

Fisheries
Drinking
Irrigation/Livestock
Recreation
Consumption of Fish

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

APPENDIX 2: Numbers of 2008 PPWB Excursions: A/S Border 1 of 2

PARAMETERS		BEAVER	NORTH SASK.	BATTLE	RED DEER A/S	SOUTH SASK.
		number of excursions (number of comparisons with PPWB WQ)				
METALS	UNITS					
ALUMINUM (total)	mg/L	---	1 (12)	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	0	0
CHROMIUM (total)	mg/L	0	0	0	1 (12)	1 (12)
COBALT	mg/L	---	0	0	0	0
COPPER (total)	mg/L	0	2 (12)	1 (12)	4 (12)	1 (12)
CYANIDE (free)	mg/L	ND	ND	ND	ND	ND
IRON (diss)	mg/L	0	0	0	0	0
LEAD (total)	mg/L	0	0	0	2 (12)	0
MANGANESE (diss)	mg/L	0	0	3 (12)	0	0
MERCURY (total)	ug/L	---	---	---	---	---
NICKEL (total)	mg/L	0	0	0	2 (12)	1 (12)
SELENIUM (diss)	mg/L	0	0	0	0	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	1 (12)	0	3 (12)	1 (12)
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	11 (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	2 (12)	4 (12)	3 (12)	1 (8)
PHYSICALS						
pH	pH	0	0	0	---	---
OXYGEN (diss)	mg/L	0 *	0	0 * (8)	---	---
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 (muscle)	ug/g	ND	ND	ND	ND	ND
PCB IN FISH (muscle)	ug/g	ND	ND	ND	ND	ND
Total Number of Comparisons		268	312	308	248	248
Total Number of Excursions		0	6	30	15	5
Total Percent Adherence		100	98.08	90.26	93.95	97.98

Notes: Excursions were flagged by yellow highlighting. -- = no PPWB objective. ND = no data to compare to objective (PPWB monitoring plan for 2008 did not include these parameters). * low dissolved oxygen conditions under ice cover. Radioactive parameters are not presented as no samples were collected.

APPENDIX 2 cont'd: Numbers of 2008 PPWB Excursions: S/M Border 2 of 2

PARAMETERS		CHURCHILL	SASK.	CARROT	RED DEER S/M	ASSINIBOINE	QU'APPELLE
		number of excursions (number of comparisons with PPWB WQ)					
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	0
CYANIDE (free)	mg/L	ND	ND	ND	ND	ND	ND
IRON (diss)	mg/L	0	0	5 (12)	0	2 (12)	0
LEAD (total)	mg/L	0	0	0	0	0	0
MANGANESE (diss)	mg/L	0	0	10 (12)	1 (6)	11 (12)	5 (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	0
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	3 (10)	9 (12)	2 (6)	12 (12)	11 (12)
MAJOR IONS							
CHLORIDE (diss.)	mg/L	0	0	8 (12)	0	0	0
FLUORIDE (diss)	mg/L	0	0	0	0	0	0
SODIUM (diss)	mg/L	0	0	5 (12)	0	0	12 (12)
SULPHATE (diss)	mg/L	0	0	0	0	0	1 (12)
TOTAL DISS. SOLIDS	mg/L	---	---	---	---	---	---
BIOTA					0		
FECAL COLIFORM	NO/dL	ND	0	0	0	0	0
PHYSICALS							
pH	pH	0	0	0	0	0	0
OXYGEN (diss)	mg/L	0	0	0	0	0	0
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	mg/L	ND	ND	ND	ND	ND	ND
PCP	mg/L	ND	ND	ND	ND	ND	ND
MERCURY IN FISH	ug/g	ND	ND	ND	ND	ND	ND
PCB IN FISH (muscle)	ug/g	ND	ND	ND	ND	ND	ND
Total Number of Comparisons		87	247	298	136	304	293
Total Number of Excursions		0	3	37	3	25	29
Total Percent Adherence		100	98.79	87.58	97.78	91.78	90.10

Notes: Excursions were flagged by yellow highlighting. -- = no PPWB objective. ND = no data to compare to objective (PPWB monitoring plan for 2008 did not include these parameters). * low dissolved oxygen conditions under ice cover. Radioactive parameters are not presented as no samples were collected.

APPENDIX V

Board / Committee Membership 2008 - 2009

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 MEMBERS

A/CHAIR	T. Goos (Apr – Nov/08)	A/Regional Director General Prairie and Northern Region Environment Canada
CHAIR	R. Cripps (Nov/08 – Mar/09)	Regional Director General Prairie and Northern Region Environment Canada
	J. Merchant (Apr - May/08)	A/Director General Prairie Farm Rehabilitation Administration Agriculture and Agri-Food Canada
	S. Nelson (May – Sept/08)	A/Director General Prairie Farm Rehabilitation Administration Agriculture and Agri-Food Canada
	B. Harron (Sept/08 - Feb/09)	A/Director General Prairie Farm Rehabilitation Administration Agriculture and Agri-Food Canada
	B. Grace (Feb - Mar/09)	A/Director General Prairie Farm Rehabilitation Administration 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
(Oct/08 – Mar/09) Operations Division
Saskatchewan Watershed Authority

EXECUTIVE M. Renouf Transboundary Waters Unit
DIRECTOR Environment Canada

SECRETARY E. Kienholz Transboundary Waters Unit
Environment Canada

PPWB ALTERNATE MEMBERS

T. Goos A/Director
(Nov/08 – Mar/09) Strategic Integration and Partnerships
Environment Canada

C. Straub Manager, Water Supply Infrastructure Development
Prairie Farm Rehabilitation Administration
Agriculture and Agri-Food Canada

S. Figliuzzi Section Head
Transboundary Water Policy Branch
Alberta Environment

R. Wiebe A/Director
(Apr – Oct/08) Regional Operations
Saskatchewan Watershed Authority

D. Williamson Assistant Deputy Minister
Ecological Services Division
Manitoba Water Stewardship

COMMITTEE ON HYDROLOGY

Terms of Reference

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

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

PPWB Minute 7-11 (Oct. 17, 1972)

MEMBERS

CHAIR	M. Renouf	Executive Director Prairie Provinces Water Board
	R.G. Boals	Water Survey Division Environment Canada
	F.R.J. Martin (Apr – June/08)	Prairie Farm Rehabilitation Administration Agriculture and Agri-Food Canada
	R. Woodvine (June/08 – Mar/09)	Prairie Farm Rehabilitation Administration Agriculture and Agri-Food Canada
	S. Figliuzzi	Environmental Strategies 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	A.J. Chen (Apr – June/08)	Transboundary Waters Unit Environment Canada
	B. Yee (June/08 – Mar/09)	Transboundary Waters Unit Environment Canada

COMMITTEE ON WATER QUALITY

Terms of Reference

Under the direction of the Prairie Provinces Water Board, the Committee on Water Quality shall investigate, oversee, review, report, recommend and advise the Board on matters pertaining to the water quality 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 recommend remedial or preventative measures for avoiding and resolving water quality issues.

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 committee shall also assist the Committee on Groundwater in the development of interprovincial groundwater programs by identifying water quality monitoring needs for interprovincial groundwater aquifers.

PPWB Minute 47-54 (Oct. 17, 1991)

MEMBERS

CHAIR	M. Renouf	Executive Director Prairie Provinces Water Board
	D.B. Donald	Prairie and Northern Water Quality Monitoring Environment Canada
	N. Armstrong (May /07- Mar/08)	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 Water Quality Unit
Prairie Farm Rehabilitation Administration
Agriculture and Agri-Food Canada

SECRETARY N.E. Glozier Prairie and Northern Water Quality Monitoring
Environment Canada

COMMITTEE ON GROUNDWATER

Terms of Reference

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 will 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.

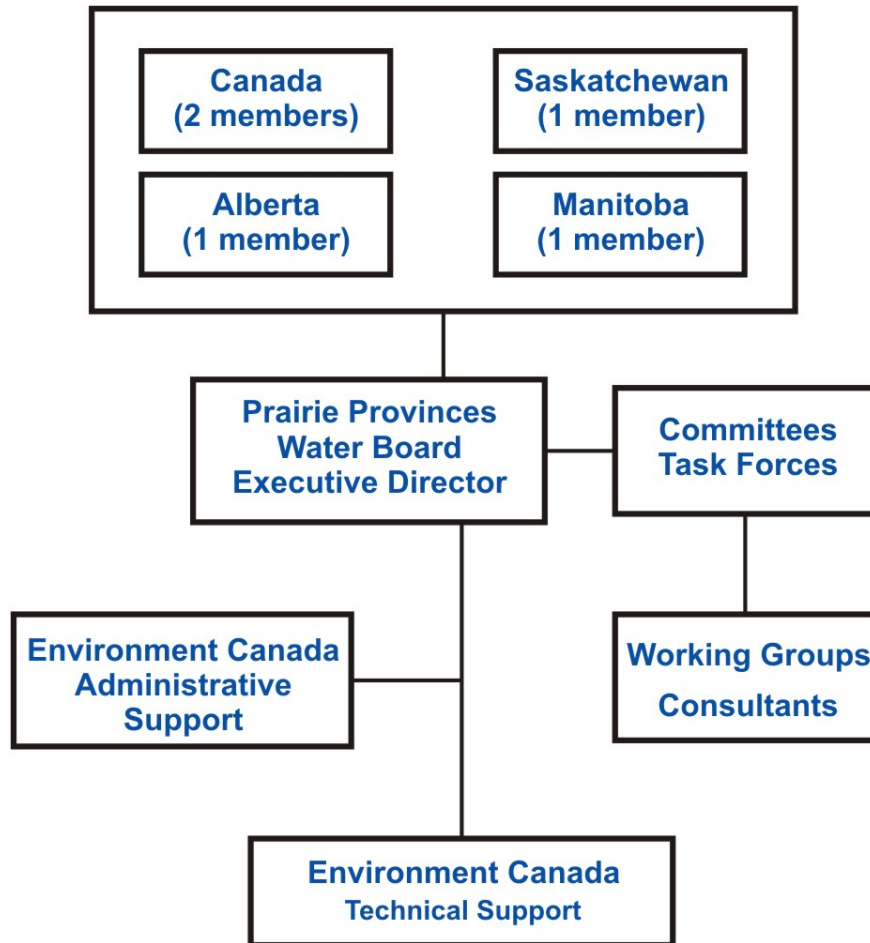
PPWB Minute 26-25 (Nov. 18-19, 1981)

MEMBERS

CHAIR	M. Renouf	Executive Director Prairie Provinces Water Board
	G. van der Kamp	Groundwater Hydrology Water Science and Technology Directorate Environment Canada
	A. Cowen	Prairie Farm Rehabilitation Administration Agriculture and Agri-Food Canada
	R. George (Mar – Aug/08)	Groundwater Policy Business Unit Alberta Environment
	H. von Hauff (Aug/08- Mar/09)	Water Policy Branch Alberta Environment
	N. Shaheen	Groundwater Management Saskatchewan Watershed Authority
	R. Betcher	Groundwater Management Section Water Sciences and Management Branch Manitoba Water Stewardship
SECRETARY	A.J. Chen (Apr – June/08)	Transboundary Waters Unit Environment Canada
	B. Yee (June/08 – Mar/09)	Transboundary Waters Unit Environment Canada

APPENDIX VI

PPWB Organizational Chart



APPENDIX VII

Statement of Final Expenditures 2008 - 2009

Budget Approved Minute 85-12	APPROVED BUDGET 2008 - 2009	FINAL EXPENDITURES MARCH 31, 2009
SALARIES:		
BASE SALARIES	\$269,300	\$280,245.00
OVERTIME/OTHER	\$0	\$0.00
EMPLOYEE BENEFITS (AT 20%)	\$53,900	\$56,049.11
Total Salaries	\$323,200	\$336,294.11
OPERATING EXPENSES:		
TRAVEL	\$15,000	\$35,578.00
POSTAGE	\$1,000	\$83.00
TELECOMMUNICATIONS	\$7,500	\$8,371.00
PRINTING	\$4,000	\$193.00
PROFESSIONAL SERVICES *	\$185,000	\$106,746.00
TRAINING		\$978.00
TEMPORARY HELP	\$40,000	\$0.00
OTHER SERVICES	\$6,500	\$5,722.00
RENTALS	\$2,000	\$0.00
EQUIPMENT REPAIR	\$0	\$549.00
SUPPLIES	\$6,500	\$1,687.00
EQUIPMENT PURCHASES	\$2,500	\$1,943.98
MISCELLANEOUS	\$500	\$5.00
PAYMENT TO NON PROFIT ORGANIZATIONS**	\$4,500	\$40,000.00
Sub-total operating	\$270,500.00	\$201,855.98
TOTAL	\$593,700.00	\$538,150.09

Professional Services:*

Optimal Solutions \$102,746
 Beacon For Change \$ 4,000

Prairie Hydrological Model Study Dr. Pomeroy with U of S**

Carry forward to be used for contract with Optimal Solutions Ltd.

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 establishing 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 budget being provided by Canada (Environment Canada) and one-sixth by each of the three provinces.



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>