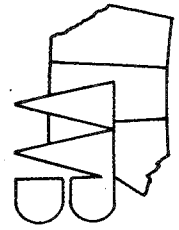
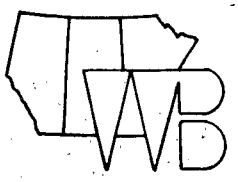
ANNUAL REPORT · 1989

CANADA ALBERTA · SASKATCHEWAN · MANITOBA



PRAIRIE PROVINCES WATER BOARD



PRAIRIE PROVINCES WATER BOARD

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ANNUAL REPORT

FOR THE YEAR ENDING MARCH 31, 1990

ISSN 0704-8726

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LETTER OF TRANSMITTAL

September 4, 1990

The Honourable R. de Cotret
Minister of the Environment
House of Commons
Room 337, West Block
Ottawa, Canada K1A 0A6

The Honourable Ralph Klein
Minister of the Environment
130 Legislative Building
Edmonton, Alberta T5K 2B6

The Honourable Don Mazankowski
Minister of Agriculture
House of Commons
Ottawa, Canada K1A 0A6

The Honourable Harold Martens
Minister Responsible for the
Saskatchewan Water Corporation
Room 30, Legislative Building
Regina, Saskatchewan S4S 0B3

The Honourable Harry J. Enns
Manitoba Natural Resources
314 Legislative Building
Winnipeg, Manitoba R3C 0V8

Gentlemen:

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, 1990.

Yours truly,

D.A. Davis

D.A. Davis, Chairman
Prairie Provinces Water Board

MESSAGE FROM THE EXECUTIVE DIRECTOR

This annual report marks the 20th anniversary of the signing of the *Master Agreement on Apportionment*. During this time, the Prairie Provinces Water Board has become recognized as a model for the management of interjurisdictional waters.

The success of the Board is particularly remarkable given the pressures of development, with the associated demands for reliable supplies of good quality water and the large variability of prairie water supplies.

During 1989/90 the Board focused much of its attention on water quality matters. In particular, the Board accepted new water quality objectives to replace the 1973 objectives and a new multimedia water quality monitoring program to replace the monitoring program used in the past. The Board also received a report on its role in interprovincial water quality management. The Board will consider the report recommendations in the next fiscal year.

In regard to water quantity, the Board made good progress in updating the monthly natural flow data base for selected hydrometric monitoring sites in the Saskatchewan-Nelson Basin. At the end of the year, natural water flow data for 14 of 21 small interprovincial basins had been updated to 1986.

In addition, the Committee on Hydrology identified ways to improve apportionment management on Lodge and Middle Creeks in southern Alberta and Saskatchewan, both subject to severe water shortages during the last few years.

Given the nature of our prairie climate, the Prairie Provinces Water Board will likely face significant water quantity and quality challenges in the future. However, I am confident that continued member cooperation, combined with a history of 20 years of successful interjurisdictional water management, will enable the Board to successfully meet its mandate.

R L Kellow

R.L. Kellow
Executive Director

INTRODUCTION

This report summarizes the activities and the progress of the Prairie Provinces Water Board (PPWB), its committees, and the Secretariat for the period April 1, 1989, to March 31, 1990.

The Board met twice during 1989/90; October 20, 1989, in Calgary, Alberta; and March 27-28, 1990, in Regina, Saskatchewan. The Board also toured the Oldman Dam project in October 1989.

A total of 15 committee meetings were held throughout the year: the Committee on Hydrology (COH) met twice; the Committee on Water Quality (COWQ) met six times; the Committee on Groundwater (COG) met twice; and the Committee on Water Quality Policy (COWQP) met five times.

HISTORY

The Prairie Provinces Water Board was formed on July 28, 1948. During the next 22 years (1948 to 1969 inclusive), the Engineering Secretary to the Board was a Prairie Farm Rehabilitation Administration (PFRA) employee. The support staff for studies and office accommodation during these years were provided by the PFRA in Regina at no charge.

On October 30, 1969, Canada and the Provinces of Manitoba, Saskatchewan and Alberta entered into an agreement to share the flow and to consider the quality of eastward flowing interprovincial streams. Under Schedule C of that *Master Agreement on Apportionment*, the Prairie Provinces Water Board was reconstituted and was given the responsibility to administer 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 Board, as shown in the organization chart in Appendix II, now operates through the Executive Director and staff, supported by three standing committees. The by-laws, rules and procedures also became effective on this date.

The employees of the Secretariat, for administrative purposes, are classified as federal public servants but receive direction entirely from the Board. The Board directly controls the operation of the Secretariat through approval of an annual budget. It currently has federal spending authority up to an annual maximum of $625,000 from funds provided under the *Canada Water Act* administered by Environment Canada. The provincial governments' share of expenditures are recovered each fiscal year.

SECRETARIAT OPERATION

The PPWB Secretariat is located in Room 201, 2050 Cornwall Street, Regina, Saskatchewan. There were five permanent employees on staff during the fiscal year. Financial, administrative and personnel services are provided through the staff of Environment Canada, Conservation and Protection, Western and Northern Region.

In 1989/90, the Secretariat hired a computations technician under contract to do drafting, water demand study updating and preparation of water quality and quantity graphs and tables for reports required by the Board.

WATER QUANTITY

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".

In fulfilling the terms of this agreement, the Water Resources Branch of Environment Canada monitors streamflow at several hydrometric sites. Data gathered are used to determine natural stream flows for apportionment purposes.

During 1989/90 the Committee on Hydrology reviewed the hydrometric network to ensure ~~changing use patterns were appropriately monitored to allow computation of natural flow~~. As of March 31, 1990 13 stations were required for computational purposes. These are plotted on the map at the end of this report.

The Committee also confirmed the continuing need for 17 Atmospheric Environment Service (AES), Environment Canada, meteorological monitoring stations in the three prairie provinces. As with the other sites, these provide information for computing natural flow at the interprovincial boundaries.

At its March 1989 meeting, the Board approved the 1990/91 list of PPWB hydrometric and meteorological monitoring stations as recommended by the COH.

Quarterly reports on natural flows, consumptive uses and storage changes for the South Saskatchewan River Basin in Alberta were prepared and distributed. The total annual recorded flow of 5 070 000 cubic decametres (dam³) in the South Saskatchewan River, at the point below its junction with the Red Deer River, represented 68 per cent of the total annual natural flow of 7 464 000 dam³. A summary of recorded and natural flow volumes for 1989 at this apportionment point is shown in table and graph form on pages 16 and 17.

From January 1 to December 31, 1989, daily recorded discharges of the South Saskatchewan River at the apportionment point were 42.5 m³/s (1,500 ft³/s) or more. These flows fulfilled the terms of the 1969 *Master Agreement on Apportionment.*

The natural flow of the Qu'Appelle River at the Saskatchewan-Manitoba boundary between April 1, 1989, and March 31, 1990, was 9640 dam³. Recorded flow, augmented by releases of 92 060 dam³ from Lake Diefenbaker, was 71 315 dam³, 740 per cent of natural flow. Recorded and natural flows covering April 1989, to March 1990, are shown on page 18.

Natural flows in the South Saskatchewan River Basin were calculated using the project depletion method while natural flows for the Qu'Appelle River Basin were determined according to the "Streamflow Synthesis and Reservoir Regulation" (SSARR) model. Both procedures have been approved by the Board.

Natural flows were also calculated for the North Saskatchewan River, Battle Creek, Lodge Creek, Middle Creek, Saskatchewan River and Churchill River at the interprovincial boundaries. Monthly recorded and natural flows for the apportionment period at these six sites, as well as recorded flows at five additional boundary sites, are shown in the tables on pages 18 and 19.

The only interprovincial streams to experience an apportionment deficit were Lodge and Middle Creeks. The 1989 apportionment report, prepared by the Water Resources Branch of Environment Canada, showed that the apportionment deficits for these two creeks are 444 and 74 dam^3 respectively.

Lodge Creek's apportionment problem was detected in the spring of 1989. Alberta Environment, in May 1989, released about 200 dam^3 of water from Cressday Reservoir, but only about 45 per cent reached the Alberta-Saskatchewan boundary. Due to the low reservoir level, Alberta proposed to pump from Jaydot Reservoir to provide additional water. Alberta had arranged for pipelines to be installed to prevent loss of water, but required permission from Saskatchewan to access private property to lay the pipeline. Since Jaydot Reservoir discharges into Lodge Creek below Altawan Reservoir, there was little to be gained by requesting a release from Jaydot Reservoir. Therefore Saskatchewan indicated that it would be more beneficial to carry over supplies to 1990.

As a result of these apportionment problems, some measures were identified to improve the apportionment management of Lodge and Middle Creeks, including increasing the frequency of apportionment audits in 1990 to a monthly basis.

Alberta Environment is currently conducting a study, to be completed in 1990/91, which will develop a more accurate method for estimating minor diversions on Lodge and Middle Creeks. The study will also evaluate the usefulness of Jaydot Reservoir and develop proactive approaches to prevent the reoccurrence of apportionment deficits. The results will be used by the COH to plan further courses of action to improve apportionment management.

In addition to the apportionment monitoring activities described above, the Secretariat periodically checked the apportionment balance of the Pipestone Creek at the Saskatchewan-Manitoba boundary. This information was provided to the Saskatchewan Water Corporation and Manitoba Water Resources Branch for management purposes. From April 1, 1989, to March 31, 1990, the recorded flow on the Pipestone at the boundary was 1445 dam^3, compared to a natural flow of 680 dam^3 — an excess flow of 1105 dam^3.

COMMITTEE ON HYDROLOGY

The Committee met twice during the fiscal year: on September 20, 1989, in Calgary, Alberta and February 27, 1990 in Regina, Saskatchewan.

During its meetings, the Committee evaluated the need for updating historical natural flow data for the Red River and Winnipeg River systems. In 1990/91 the Environment Canada, Water Resources Branch, Winnipeg office, will provide the PPWB with updated natural flow data for the Red River at Emerson. The Committee agreed no further updating is required for the natural flow records of the Winnipeg River system because present use information is more useful than natural flow data on this highly regulated river.

The Committee also reviewed the existing procedures for apportionment monitoring of Lodge and Middle Creeks. The members agreed that the frequency for apportionment

reporting for these two basins should be increased to monthly for 1990.

Following a review of the 1986-88 water level records of Reindeer Lake at the Brochet hydrometric station, the Committee advised the Winnipeg office of Environment Canada, Water Resources Branch, of its concern about missing records which frequently occurred in recent years.

Another topic of discussion was the status of the proposed "Prairie Evaporation Study" currently being considered by Environment Canada's National Hydrology Research Centre (NHRC). The Committee also asked the Secretariat to write Environment Canada's Atmospheric Environment Service to express support for the NHRC research project and request AES help in carrying out the project.

In conjunction with their September 1989 meeting, the COH conducted a field tour of the Oldman Dam project and irrigation headworks in Southern Alberta. As part of the tour, the staff of the Eastern Irrigation District gave a presentation on its operations and the benefits of irrigation to the area's domestic water supply, recreation and wildlife habitat.

COMMITTEE ON GROUNDWATER

The Committee met twice during fiscal year 1989/90: on June 11-12, 1989, in Saskatoon, Saskatchewan and November 28-29, 1989, in Edmonton, Alberta. Discussions at these two meetings included:

- preparing a draft of the report "An Evaluation of Existing Groundwater Legislation, Regulation and Related Policies in the Prairie Provinces"

- reviewing progress in entering groundwater reports into the WATDOC database. Alberta and Saskatchewan reports are now in the system. Manitoba reports are currently being entered.

ANNUAL WATER USE REPORT — BOXELDER CREEK BASIN

Alberta and Saskatchewan annually collect sufficient water use data to provide an accurate estimate of total consumption in the Boxelder Creek Basin. This data is reported to the Board.

The total irrigation and municipal water use in the Alberta portion of the basin for 1989 was 371 dam^3. During the same period, the four provincial reservoirs stored 652 dam^3 and released 686 dam^3 to the Boxelder Creek system. Based on the responses of the 1989 water use survey, conducted by the Saskatchewan Water Corporation, no water was diverted for irrigation purposes in the Saskatchewan portion of the Boxelder Creek Basin.

ANNUAL REPORT ON INTERPROVINCIAL DRAINAGE PROJECTS

The Board accepted a Committee on Hydrology report "A Recommended Procedure to Deal with the Impact of Artificial Drainage on Downstream Flows" at its November 8, 1983 meeting. Board members agreed that the COH should provide reports on drainage activities at future Board meetings.

In 1989 Saskatchewan licensed nine new drainage projects with potential interprovincial implications. Manitoba and Alberta both reported no projects with the potential to affect streams crossing interprovincial boundaries.

STUDIES

Provincial Legislation Related to Groundwater

The Committee on Groundwater reviewed existing groundwater legislation, regulations and policies to determine how they deal with potential inter-provincial problems related to allocation and contamination. The Committee expects the study to be completed at the end of the next fiscal year.

Natural Flow Studies on Small Interprovincial Basins

In 1975, Board members recommended that the Secretariat define natural flow on small interprovincial river basins. Natural flow studies have since been carried out on all 21 small interprovincial basins. These basins are listed below. Those marked with a "■" were updated in 1989/90.

Antler Creek	■	Gopher Creek	■
Assiniboine River	■	Graham Creek	■
Battle River		Jackson Creek	■
Beaver River		Mackay Creek	■
Big Gully Creek		Overflowing River	■
Birch River		Pipestone Creek	■
Bosshill Creek	■	Red Deer River (Sask.)	■
Boxelder Creek	■	Stony Creek	■
Elm Creek		Swan River	■
Eyehill Creek		Woody River	■
Gainsborough Creek			

In response to a concern raised by a task force reviewing operational procedures of Moosomin Dam and problems of apportionment of Pipestone Creek flows, the Committee on Hydrology suggested conducting a study to provide a more precise estimate of historical natural flows.

In April, 1989, the Board signed a contract with the Saskatchewan Water Corporation to undertake a natural flow study of Pipestone Creek. The study is expected to be completed in fiscal year 1990/91.

Irrigation Return Flow Studies

Since 1986, a field program has been conducted by Environment Canada, Water Resources Branch, Calgary, to gather irrigation return flow data in the Eastern, Western and Bow River Irrigation Districts. Data are to be used in developing new return flow equations.

The Committee on Hydrology reviewed a report on the results of that program. This report and the document "Return Flow From Irrigation —Southern Alberta" (October 1985) were combined into the handbook "Return Flow From Irrigation Districts In South Saskatchewan River Basin" (September 1989).

Qu'Appelle River SSARR Modification

Because of inaccuracies in the current Qu'Appelle River natural flow SSARR model, the COH recommended that the existing model be modified to improve its accuracy and make it operational on a personal computer. Subsequently, the Board entered into a contract with the Saskatchewan Water Corporation to recalibrate the SSARR model. The study is expected to be completed in fiscal year 1990/91.

Modification of Eyehill Creek Natural Flow Computer Program

In December 1989, Environment Canada, Water Resources Branch, Calgary, completed a computer program for calculating the natural flow of Eyehill Creek at the Alberta-Saskatchewan boundary. Since this program is not adaptable to the Secretariat's equipment, the COH recommended modifying the database for use on PPWB's microcomputer. At the Board's March 1990 meeting, members agreed to enter into a contract with Environment Canada in 1990/91 to make these changes.

WATER USE

In 1982 the PPWB prepared a study of historical water uses in the prairies for the period 1951-1978. Information collected was used to establish a database containing six sectors: regional economic base, municipal and industrial, agriculture, power generation, recreation and environmental considerations.

During 1989/90 the PPWB began updating the database to 1986. This update will be completed in the next fiscal year.

The Secretariat also evaluated the water use database. The report recommendations, approved by the Board at the October 1989 meeting, will result in a more streamlined database which will be updated every five years.

SECRETARIAT ACTIVITIES

Updating of PPWB Monthly Natural Flow Estimates

The Secretariat is responsible for maintaining monthly natural flow estimates for selected hydrometric sites in the Saskatchewan-Nelson Basin.

In 1989/90, the Secretariat hired a temporary employee to assist the operations engineer in updating the monthly natural flow data to 1986 for 14 small interprovincial basins [see previous page].

Access to AES Meteorological Data

The Secretariat annually acquires computer tapes from AES containing historical meteorologic records of the prairie provinces. As of March 1990, the tapes contain information to 1988. PFRA Hydrology Division maintains these tapes for the PPWB. Meteorological data are provided to member agencies upon request.

WATER QUALITY

COMMITTEE ON WATER QUALITY POLICY

In recognition of the growing importance of water quality in the prairies, the Board established the ad hoc Committee on Water Quality Policy in 1988.

Between April and August of 1989, the Committee held four meetings and a conference call to review the mandate, responsibilities and activities of the PPWB in the area of water quality and to examine ways to develop and apply water quality objectives.

In October 1989, the Committee presented its recommendations, along with an implementation strategy, to the Board in a final report "Proposed Water Quality Strategy for the Prairie Provinces Water Board".

The Board is presently reviewing the Committee's report.

This Committee, having completed its assignment, was dissolved in October 1989.

COMMITTEE ON WATER QUALITY

The Committee on Water Quality met on June 28-29, 1989, in Calgary, Alberta, in Winnipeg, Manitoba on November 6-9, 1989, in Regina, Saskatchewan on January 17-18, 1990, by conference call on February 16, 1990, and in Winnipeg on March 5-6, 1990.

During the meetings the Committee agreed upon the goals and objectives of the PPWB water quality monitoring program.

The COWQ developed a multi-media monitoring program for 11 interjurisdictional prairie river reaches. This program, which will involve the collection and analysis of water, sediment and biota, has been accepted in concept by the Board. The program will be partially implemented in 1990/91. Full implementation will require raising of the Federal Treasury Board ceiling on PPWB expenditures and additional resource allocations under the Canada Water Act.

The Committee also developed site specific water quality objectives to replace the 1973 objectives and defined the 11 river reaches for application of the PPWB water quality objectives.

The COWQ reviewed a draft environmental impact study for the proposed Nipawin pulp mill and supplied its comments to Saskatchewan Environment and Public Safety.

ANALYTICAL METHODS TASK FORCE

In 1980, the Committee on Water Quality established the Analytical Methods Task Force to determine the comparability of water quality analytical results from federal and provincial labs used by PPWB agencies.

Since 1982, participation in the federal-provincial water quality assurance program has enabled the PPWB to determine the comparability of data analyzed by PPWB laboratories. Data from the laboratories are continually reviewed by the Task Force members to assess comparability.

Other work of the Analytical Methods Task Force during 1989/90 included releasing the results of data collected under the quality assurance program from 1982 to 1985 in a report entitled "Initial Report on Assessing the Comparability of Water Quality Data Generated by the Federal (IWD) and Provincial Laboratories on the Prairies".

To facilitate the preparation of a related second report in 1990/91, the Task Force modified computer software during 1989/90 to improve the graphic capabilities at the National Water Research Institute in Burlington.

WATER QUALITY DATABASE

The Secretariat prepared an up-to-date water quality historical database for use on the PPWB's and member agencies' computers. The database covers the period 1974 to present and is revised

continually during the year as new data becomes available.

In February 1990, the Secretariat completed the report "Interprovincial Water Quality Data at PPWB Monitoring Stations — April 1974 to December 31, 1988". This report includes graphic presentations of all PPWB water quality data for the 15 year period.

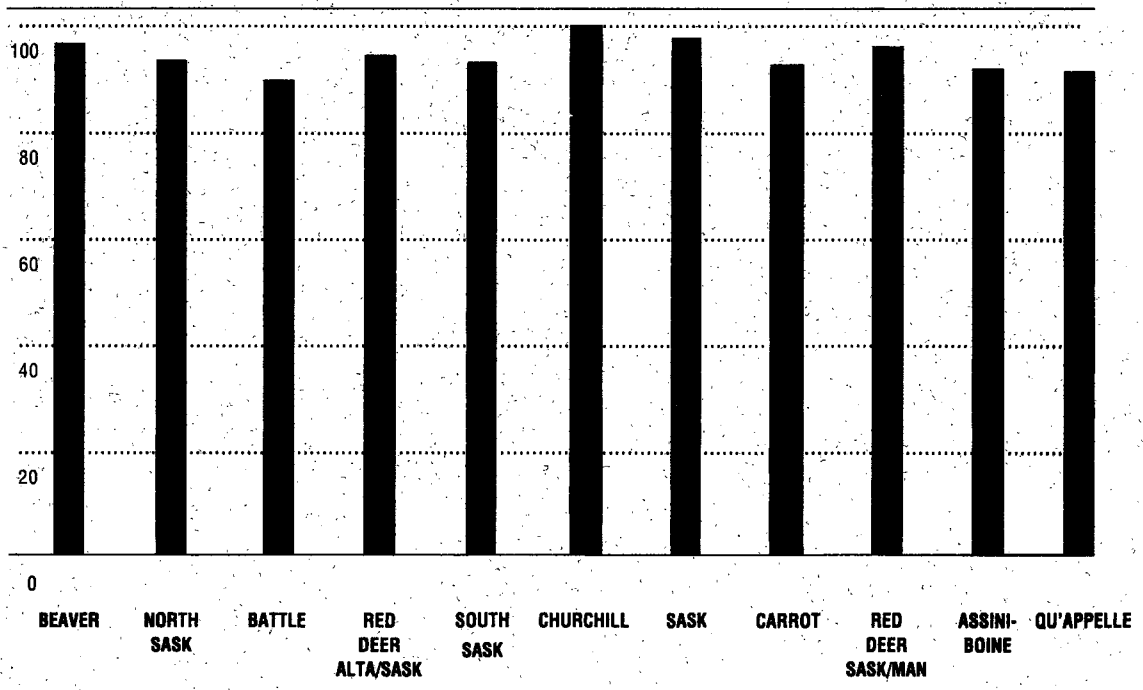
MONITORING

Monitoring is conducted to determine whether the 1973 water quality objectives and the PPWB interim objectives for the Beaver River at the Alberta-Saskatchewan boundary are being met. In March 1990 the Board decided to use new reach-specific water quality objectives. Future annual evaluations will be based on the new objectives.

The Water Quality Branch of Environment Canada continued to review monthly and quarterly data collected at 11 PPWB monitoring stations for the 98 parameters listed on page 14. The stations are shown on the map in Appendix III.
The Secretariat regularly reviewed water quality data from all PPWB monitoring stations to identify present or potential water quality concerns at the boundary. Efforts to determine baseline characteristics and detect changes in various aquatic environment components continued throughout the year.

An essential component of the monitoring program in future years will be to detect short and long-term trends in water quality at the interprovincial boundaries. The Board has approved a contract, for completion in 1990/91, to evaluate and apply various

1989 PER CENT ADHERENCE TO 1973 PPWB OBJECTIVES



trend assessment techniques to the PPWB database.

WATER QUALITY OBJECTIVES

The 1973 water quality objectives have been used to promote effective inter-provincial water quality management, protect uses in downstream jurisdictions, evaluate the quality of inter-provincial waters, and advise the Board on potential inter-provincial concerns. Parties to the Master Agreement have committed to taking all practical measures to ensure these objectives are met.

The Committee on Water Quality continually reviews the PPWB water quality monitoring program results and compares the data to the Board's water quality objectives.

A review of the 1989 water quality data for PPWB monitoring stations indicated that most objectives were generally met. The per cent adherence to PPWB objectives for all stations in 1989 is shown in the graph on the previous page.

On average, the 1973 water quality objectives were adhered to 92 per cent of the time. The PPWB station with the greatest adherence to the 1973 objectives was the Churchill River (100 per cent), followed by the Saskatchewan River at the Saskatchewan-Manitoba boundary (96 per cent) and the Red Deer River at the Saskatchewan-Manitoba boundary (96 per cent).

The minimum dissolved oxygen level of 5.0 mg/litre was maintained at most PPWB sites. The Beaver, Battle, Red Deer (Bindloss), Carrot and Assiniboine Rivers at the inter-provincial boundary periodically showed dissolved oxygen levels below this minimum level during winter.

Major ion objectives were met 100 per cent of the time at almost all sites except for the Beaver River where they were adhered to approximately 98 per cent of the time.

Dissolved manganese was adhered to 100 per cent of the time at most sites. Two notable exceptions were the Carrot River at Turnberry and the Qu'Appelle River near Welby where the objective was adhered to about 25 per cent of the time. A third exception was the Assiniboine River at Kamsack where the objective was adhered to about 33 per cent of the time.

Relatively high nutrient levels are typical of prairie streams. Consequently, while adherence to the total nitrogen objective (0.5 mg/litre) was as high as 100 per cent on the Churchill River below Wasawakasik Lake, it fell as low as nine per cent on the Assiniboine River below Kamsack and the Qu'Appelle River near Welby.

Adherence to the total phosphorus objective (0.05 mg/litre as P) ranged from 92 per cent on the Red Deer River near Bindloss to nine per cent on the Qu'Appelle River near Welby.

Persistent insecticides such as DDT, Aldrin, Dieldrin, Endrin and Heptachlor were seldom present, if at all, in any waters at the PPWB stations during the year. MCPA was detected periodically at some PPWB sites.

The herbicide 2,4-D was detected at most PPWB sites with the exception of the Churchill River site. Alpha BHC and Gamma BHC were present in many of the samples collected at the interprovincial boundaries. Picloram and atrazine were seldom detected at any of the PPWB monitoring sites.

Caution must be taken in interpreting these results, as the 1973 water quality

objectives were based on information from regions other than the prairies and are not site specific.

In recognition of this problem, and given current scientific knowledge about environmental contaminants, the Board, as already noted, approved a new set of reach specific water quality objectives to replace the 1973 objectives. The Board will use these new objectives in the next fiscal year.

INTERPROVINCIAL WATER QUALITY CONTINGENCY PLAN

In 1989 the PPWB Interprovincial Water Quality Contingency Plan continued to be effective in keeping agencies informed of spills and unusual water conditions.

Seven spills or unusual water conditions were reported to member agencies during the year. Five of these occurred on the North Saskatchewan River system. Of these five spills, two involved fuel spills within the City of Edmonton, which were contained at the sewer outfall. A third spill of approximately 43 000 litres of diesel fuel into a ditch east of Fort Saskatchewan was reported on June 21, 1989. The small amount of fuel actually reaching the river was contained by booms. The fourth spill, on January 23, 1990, involved a discharge of untreated sewage during the repair of a treatment facility at Edmonton. The fifth spill, on March 20, 1990, involved approximately 3400 litres of water and binder from the Fibreglass Canada plant at Edmonton.

On the South Saskatchewan River system, two events were reported. In November 1989, it was discovered that creosote had seeped into the Bow River at Calgary from an abandoned wood treatment facility. Intensive studies by Alberta Environment on the Bow and South Saskatchewan Rivers were conducted to determine the extent of the seepage.

Between November 27, 1989, and December 1, 1989, the Petro Canada Straddle (gas) plant near Empress discharged into the South Saskatchewan River, resulting in a slight drop in the water pH immediately below Empress.

None of these spills had any significant effect on the quality of water crossing the interprovincial boundary.

STUDIES

Battle River Study

PPWB member agencies, with design input from the Committee on Water Quality, carried out a multimedia pilot study on the Battle River during 1989/90. The study included the documentation of longitudinal and seasonal changes in quality through the collection of water, sediment and biota samples.

The objectives of the pilot study were to:

- assess the value of various media in monitoring pesticides and metal concentrations in a small, slow-moving river with soft substrate;
- select methods appropriate for monitoring these media;
- determine monitoring and analytical protocols for the future PPWB monitoring program.

A report on the pilot study will be completed next fiscal year.

SECRETARIAT ACTIVITIES

In fiscal 1989/90, the Secretariat:

- delivered a presentation and participated in the Canadian Council of Ministers of the Environment (CCME) "Workshop on Developing Water Quality Objectives", in Halifax, Nova Scotia;

- transferred the water quality database from the main-frame to the Secretariat's microcomputers;

- conducted a multimedia monitoring workshop to assist in developing a new PPWB water quality monitoring program.

PPWB Water Quality Monitoring 1989 Parameter List

- ■ Aldrin
- Alkalinity, phenol.
- Alkalinity, total
- Aluminum, dissolved
- N-Alkanes
- ■ Arsenic, diss.
- Atrazine
- Barban
- ■ Barium, total
- BHC-alpha
- BHC-gamma (Lindane)
- Bicarbonate, calc.
- ■ Boron, diss.
- Bronoxynil
- ■ Cadmium, total
- ■ Calcium, diss.
- Carbon, diss., organic
- Carbon, organic, particulate
- Carbonate, calc.
- Chlordane-alpha
- Chlordane-gamma
- ● Chloride, diss.
- Chlorophyll A
- ● ■ Chromium, total
- Cobalt, total
- Coliforms, fecal
- Coliforms, total
- ■ Color, true
- ● ■ Copper, total
- ■ Cyanide, total
- ■ P,P-DDD
- ■ P,P-DDE
- ■ O,P-DDT
- ■ P,P-DDT
- Diallate
- ■ ■ Dicamba
- ■ ■ Diclofopmethyl
- ■ Dieldrin
- Endevan
- Endosulfan-alpha
- Endosulfan-beta
- ■ Endrin
- ■ Fluoride, diss.
- Free CO_2
- Hardness, non-carbonate
- ● Hardness, total, $CaCO_3$
- ■ Heptachlor
- ■ Heptachlor, expoxide
- Hexachloro-benzene
- Hydroxide, calc.
- ● ■ Iron, diss.
- ■ Lead, total
- Manganese, diss.
- ● Magnesium, diss.
- MCPA
- MCPB
- ■ Mercury, total
- P,P-methoxychlor
- Mirex
- Nickel, total
- Nitrogen, diss., NO_3+NO_2
- Nitrogen, particulate
- Nitrogen, total Ammonia as N
- ● ■ Nitrogen, total, calc.
- Nitrogen, total, diss.
- ■ Oxygen, diss., DO
- PCB, Arochlor 1242
- PCB, Arochlor 1254
- PCB, Arochlor 1260
- PCB, Arochlor total
- ● ■ pH
- ● ■ Phenolics
- Phosphorus Ortho as P
- Phosphorus, part. calc.
- ■ Phosphorus, total, diss.
- ■ Phosphorus, total as P
- ○ Picloram (Tordon)
- ● Potassium, diss.
- Residue, fixed, non-filterable
- ● ■ Residue, non-filterable
- ■ Selenium, diss.
- ● Silica, reactive
- Silvex
- ● ■ Sodium, diss.
- ● Solids, total diss., calc.
- Specific conductance
- ● Sulphate, diss.
- ■ Temperature
- ■ ■ Triallate
- ■ ■ Trifluralin
- ■ Turbidity
- Vanadium, total
- ■ Zinc, total
- 2,3,6-TBA
- 2,4-D
- 2,4-DB
- 2,4-DP
- 2,4,5-T

○ Collected at five sites only
■ 1973 PPWB Objectives
● 1979 Interim PPWB Requirements for the Beaver River
■ ■ Report only if detected

RECORDED AND NATURAL FLOWS, CONSUMPTIVE USE, DIVERSION, AND STORAGE (in Cubic Decameteres) FOR THE 1989 APPORTIONMENT PERIOD

SOUTH SASKATCHEWAN RIVER — ALBERTA-SASKATCHEWAN BOUNDARY

	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	158 000	164 000	204 000	331 000	337 000	646 000	203 000	158 000	357 000	288 000	450 000	233 000	3 529 000
CONSUMP-TIVE USE	810	400	2 590	190 630	390 930	355 420	511 960	393 890	128 840	15 090	1 070	1 190	1 992 820
CHANGE IN STORAGE	-56 250	-69 270	-48 480	-60 690	152 630	450 660	70 240	-14 450	53 170	-10 200	-33 510	-57 270	376 580
DIVERSION FROM BASIN	0	0	0	0	16 720	33 380	32 670	28 630	20 260	8 580	0	0	140 240
NATURAL FLOW ALTA.BDY.	104 720	93 750	150 130	383 940	884 230	1 473 960	814 010	586 550	625 740	316 060	428 860	174 000	6 035 950

RED DEER RIVER — ALBERTA-SASKATCHEWAN BOUNDARY

	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	38 000	31 700	36 700	281 000	196 000	167 000	182 000	220 000	184 000	86 200	73 600	44 200	1 540 400
CONSUMP-TIVE USE	0	0	0	190	2 180	3 750	5 470	4 750	2 640	1 650	0	0	20 630
CHANGE IN STORAGE	-22 920	-21 540	-21 590	33 970	7 870	21 970	7 180	5 000	17 010	8 170	-6 130	-16 960	12 030
DIVERSION INTO BASIN	0	0	0	0	-16 720	-33 380	-32 670	-28 630	-20 260	-8 580	0	0	-140 240
NATURAL FLOW ALTA.BDY.	12 940	9 600	14 360	306 820	189 460	164 180	160 090	205 170	178 310	89 630	70 400	27 450	1 428 410

SOUTH SASKATCHEWAN RIVER — BELOW JUNCTION WITH RED DEER RIVER

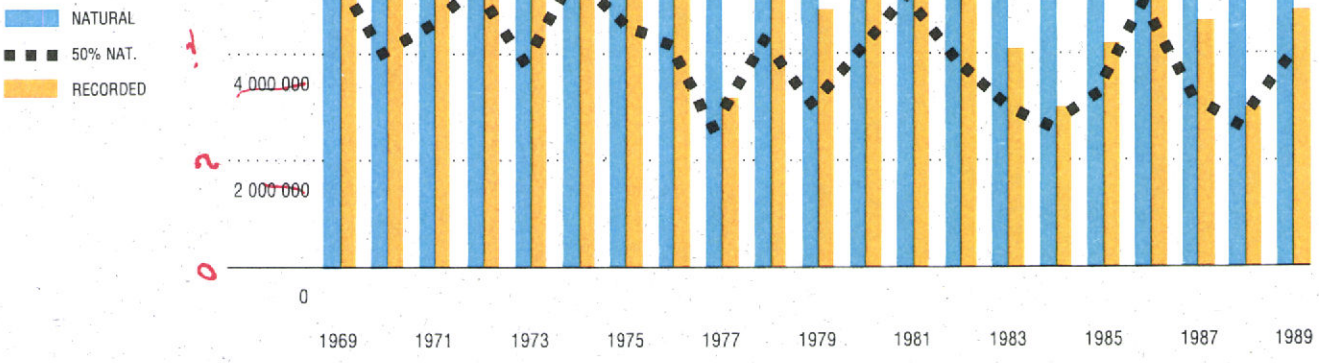
	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	196 000	196 000	241 000	612 000	533 000	813 000	385 000	378 000	541 000	374 000	524 000	277 000	5 070 000
NATURAL FLOW	118 000	103 000	164 000	691 000	1 074 000	1 638 000	974 000	792 000	804 000	406 000	499 000	201 000	7 464 000

Recorded flows for the years 1970 to 1978 inclusive are based on WSC's preliminary data.

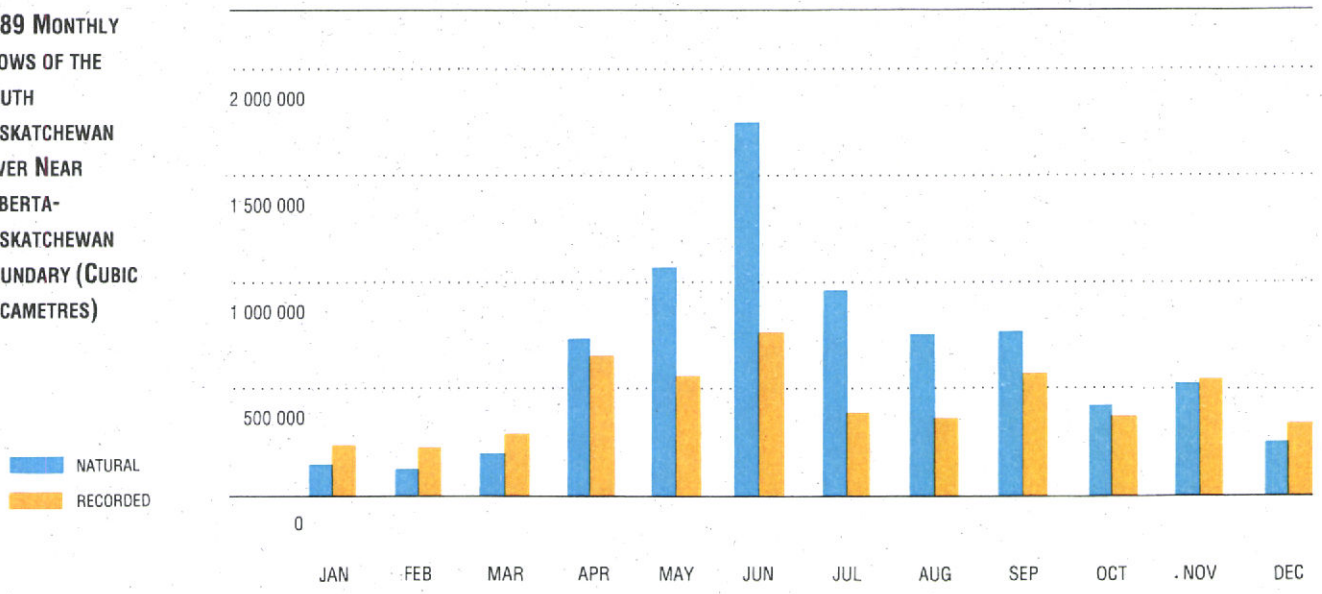
Natural flows for the South Saskatchewan and Red Deer Rivers have been calculated using WSC's preliminary data and using the methodology described in "Natural Flow Report, South Saskatchewan River Below Red Deer River" March 1974 (PPWB Report No. 45).

Quantities shown in table have been routed to Alberta boundary.

Annual Flows of the South Saskatchewan River Near Alberta – Saskatchewan Boundary (Cubic Decametres)



1989 Monthly Flows of the South Saskatchewan River Near Alberta-Saskatchewan Boundary (Cubic Decametres)



RECORDED AND NATURAL FLOWS — SUMMARY SELECTED STREAMS CROSSING THE SASKATCHEWAN-MANITOBA BOUNDARY (in Cubic Decametres) FOR THE 1989 APPORTIONMENT PERIOD

Churchill River — Saskatchewan-Manitoba Boundary (At Sandy Bay)

	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	TOTALS
RECORDED FLOW	1 440 000	1 730 000	1 460 000	1 810 000	1 750 000	1 590 000	1 760 000	1 670 000	1 880 000	1 940 000	1 630 000	1 970 000	20 630 000
NATURAL FLOW	1 230 000	2 040 000	2 290 000	2 480 000	2 520 000	2 050 000	2 040 000	1 550 000	1 660 000	1 660 000	1 330 000	1 530 000	22 380 000

Saskatchewan River — Saskatchewan-Manitoba Boundary

ESTIMATED FLOW	879 000	1 420 000	1 030 000	1 020 000	1 220 000	1 410 000	1 000 000	601 000	694 000	782 000	859 000	1 220 000	12 135 000
APPORTIONMENT FLOW	1 410 000	1 920 000	1 580 000	1 410 000	1 420 000	1 700 000	1 250 000	611 000	404 000	457 000	485 000	600 000	13 247 000

Qu'Appelle River — Saskatchewan-Manitoba Boundary (Near Welby)

RECORDED FLOW	5 940	1 600	952	795	318	850	14 700	17 200	10 300	6 740	4 640	7 280	71 315
NATURAL FLOW	0	0	0	91	0	0	0	0	0	0	0	9 549	9 640

Carrot River — Saskatchewan-Manitoba Boundary (Near Turnberry)

RECORDED FLOW	33 300	47 500	19 500	21 800	12 600	47 100	13 600	10 500	5 200	2 330	2 170	3 700	219 300

Red Deer River — Saskatchewan Boundary (Near Erwood)

RECORDED FLOW	19 100	20 100	11 900	18 100	6 450	13 300	6 270	7 180	2 750	1 700	1 310	2 000	110 160

Assiniboine River — Saskatchewan-Manitoba Boundary (At Kamsack)

RECORDED FLOW	6 610	2 690	2 440	1 660	104	234	167	1 170	733	759	440	572	17 579

RECORDED AND NATURAL FLOWS — SUMMARY SELECTED STREAMS CROSSING THE ALBERTA-SASKATCHEWAN BOUNDARY (In Cubic Decametres) FOR THE 1989 APPORTIONMENT PERIOD

NORTH SASKATCHEWAN RIVER — ALBERTA-SASKATCHEWAN BOUNDARY (NEAR DEER CREEK)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
RECORDED FLOW	213 000	188 000	226 000	627 000	842 000	625 000	892 000	1 300 000	887 000	535 000	481 000	348 000	7 164 000
NATURAL FLOW	18 700	30 300	48 700	473 000	737 000	972 000	1 350 000	1 690 000	1 020 000	489 000	322 000	135 000	7 286 000

BATTLE CREEK — ALBERTA-SASKATCHEWAN BOUNDARY

RECORDED FLOW	-	64	391	1 088	1 224	1 216	235	209	269	304	-	-	5 000
NATURAL FLOW	-	64	391	1 094	1 249	1 311	291	221	311	304	-	-	5 236

LODGE CREEK — ALBERTA-SASKATCHEWAN BOUNDARY

RECORDED FLOW	-	-	374	1 560	227	243	3	1	1	3	-	-	2 412
NATURAL FLOW	-	-	700	2 319	267	452	13	50	3	-	-	-	3 804

MIDDLE CREEK — ALBERTA-SASKATCHEWAN BOUNDARY

RECORDED FLOW	-	2	37	174	59	72	20	9	9	5	-	-	387
NATURAL FLOW	-	3	52	231	76	202	25	16	4	1	-	-	610

BEAVER RIVER — ALBERTA-SASKATCHEWAN BOUNDARY (AT COLD LAKE RESERVE)

RECORDED FLOW	5 960	4 100	5 290	24 600	32 200	49 400	29 100	12 700	18 900	21 000	9 050	6 760	219 060

BATTLE RIVER — ALBERTA-SASKATCHEWAN BOUNDARY

RECORDED FLOW	1 750	1 080	1 010	39 700	38 900	19 900	14 700	5 360	3 590	3 100	2 570	2 870	134 530

APPENDIX I

STATEMENT OF EXPENDITURES AND FINAL CLAIM

PRAIRIE PROVINCES WATER BOARD
STATEMENT OF EXPENDITURES AND FINAL CLAIM

FINANCIAL YEAR 1989/90

For expenditures in accordance with the Prairie Provinces Water Board Agreement dated October 30, 1969.
(See Section 10, Schedule C and Section 15 of the By-Laws)

ITEMS	BUDGET FOR 89/90	EXPENDITURES
Salaries:		
(01) Permanent Staff	$248,000	$247,609
(02) Temporary Staff	6,000	4,120
(03) Overtime/Other Pay	0	1,063
TOTAL SALARIES	$254,000	$252,792
O & M:		
(04) Travel	$ 15,700	$ 15,685
(06) Postage	1,000	1,168
(07) Telecommunications	4,000	5,647
(10) Printing	11,700	5,674
(11) Professional Services	57,000	53,771
(12) Training	4,000	565
(13) Temporary Help	3,000	844
(14) Personal Services	32,000	30,080
(15) Other Services	15,300	18,197
(16) Rentals	32,000	31,426
(17) Equipment Repair	3,000	1,793
(20) Purchased Materials	6,000	5,122
(21) Parts & Consumables	1,500	6,305
(23) Equipment Acquisition	7,000	14,997
TOTAL O & M	$193,200	$191,274
TOTAL SALARIES AND O & M	$447,200	$444,066
FRINGE BENEFITS *	$ 22,300	$ 22,285
TOTAL EXPENDITURES	$469,500	$466,351
Less Credits:		
Revenue from Sale of Books		$ 250
TOTAL		$466,101

** 9% of Permanent Salaries*

Each province's share (one-sixth of the total amount of $466,101) is $77,683.

FINAL CLAIM **$ 77,683**

APPENDIX II

BOARD/COMMITTEE MEMBERSHIP

PPWB MEMBERS

CHAIRMAN	D.A. Davis (March/90)	Director General Inland Waters Directorate Conservation and Protection Environment Canada
CHAIRMAN	L. Goulet (Nov/85- March/90)	Assistant Deputy Minister Conservation and Protection Environment Canada
	H.M. Hill	Director General Prairie Farm Rehabilitation Administration Agriculture Canada
	P.G Melnychuk	Assistant Deputy Minister Water Resources Management Service Alberta Environment
	D.L. MacLeod	Vice President Resource Management Saskatchewan Water Corporation
	L.J. Whitney (Jan/90)	Executive Director Water Resources Branch Manitoba Natural Resources
	D.V. Doyle (March/88 - Jan/90)	Assistant Deputy Minister Manitoba Natural Resources
SECRETARY	G.W. Dunn	Water Quality Specialist Prairie Provinces Water Board

PPWB Alternate Members

R.A. Halliday (March/90)	Director Western and Northern Region Inland Waters Directorate Conservation and Protection Environment Canada
D.A. Davis (March/88- March/90)	Director General Inland Waters Directorate Environment Canada
A.F. Lukey	Director Engineering Service Prairie Farm Rehabilitation Administration Agriculture Canada
K.R. Smith	Assistant Deputy Minister Environmental Protection Services Alberta Environment
W. Dybvig	Chief Planner Saskatchewan Water Corporation
V.M. Austford (Jan/90)	Deputy Director Water Resources Branch Manitoba Natural Resources
L.J. Whitney (March/88 - Jan/90)	Director Water Management Branch Manitoba Natural Resources

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 natural flow; forecasting; network design; collection, processing and transmission of data; basin studies and other items of interprovincial interest involving hydrology.

Approved: October 17, 1972
PPWB Minute 7-11

MEMBERS

CHAIRMAN	R.L. Kellow	Executive Director Prairie Provinces Water Board
	G.H. Morton	Water Resources Branch Environment Canada
	F.R.J. Martin	Prairie Farm Rehabilitation Administration Agriculture Canada
	A.M. Mustapha	Water Resources Management Services Alberta Environment
	V.M. Austford	Water Resources Branch Manitoba Department of Natural Resources
	A.B. Banga	Resource Management Saskatchewan Water Corporation
	R.F. Hopkinson	Atmospheric Environment Service Environment Canada
SECRETARY	A.J. Chen	Operations Engineer Prairie Provinces Water Board

COMMITTEE ON WATER QUALITY POLICY

TERMS OF REFERENCE

While the Master Agreement on Apportionment identifies water quality matters within the mandate of the Board, it does not provide the degree of specificity accorded to water quantity apportionment.

In order to rationalize its water quality responsibilities, the Board at its April 19, 1988 meeting agreed to establish a fixed term advisory committee with the objective of articulating a water quality strategy for the Board.

The Committee will make recommendations to the Board with respect to water quality matters including:

a) the mandate of the Board with respect to water quality matters and the specific roles and responsibilities which are appropriate under that mandate.
b) policies the Board should consider to carry out the proposed mandate for water quality management.
c) approaches (strategies) to implement the recommended policies within the context of the Master Agreement and present and future water issues within the watercourses under the jurisdiction of the PPWB.

MEMBERS

CHAIRMAN	R.L. Kellow	Executive Director Prairie Provinces Water Board
	F.J. Schulte	Environmental Assessment Division Alberta Environment
	N.B. Brandson	Environmental Management Services Manitoba Environment and Workplace Safety and Health
	B.T. Abrahamson	Planning Engineering Service Prairie Farm Rehabilitation Administration Agriculture Canada
	D.A. Fast	Water Quality Branch Saskatchewan Environment and Public Safety
	V.E. Niemela	Water Quality Branch Environment Canada
SECRETARY	G.W. Dunn	Water Quality Specialist Prairie Provinces Water Board

COMMITTEE ON WATER QUALITY

TERMS OF REFERENCE

At the request of and under the direction of the Prairie Provinces Water Board, the Committee on Water Quality shall investigate, oversee, review, report and recommend on matters pertaining to water quality of interprovincial and interjurisdictional basins.

Carrying out the above responsibilities may include such things as natural quality assessment; quality forecasting; network design; processing and dissemination of data; determination of implications of proposed projects that may significantly alter the water quality of interprovincial streams; consideration of special problems; establishment of procedures for emergency situations; and other items of interprovincial interest involving water quality.

Approved: October 17, 1972
PPWB Minute 7-33

MEMBERS

CHAIRMAN	R.L. Kellow	Executive Director Prairie Provinces Water Board
	W.D. Gummer	Water Quality Branch Environment Canada
	M. Morelli	Environmental Management Division Manitoba Department of Environment and Workplace Safety and Health
	K. Weagle (Feb. '90)	Water Quality Management Section Saskatchewan Environment and Public Safety
	R.G. Ruggles (June '86- Feb.'90)	Water Pollution Control Branch Saskatchewan Environment and Public Safety
	J.B. Kemper	Environmental Quality Monitoring Alberta Environment
	E.W. Allison	Prairie Farm Rehabilitation Administration Agriculture Canada
SECRETARY	G.W. Dunn	Water Quality Specialist Prairie Provinces Water Board

COMMITTEE ON GROUNDWATER

TERMS OF REFERENCE

Recognizing the interrelationship 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.

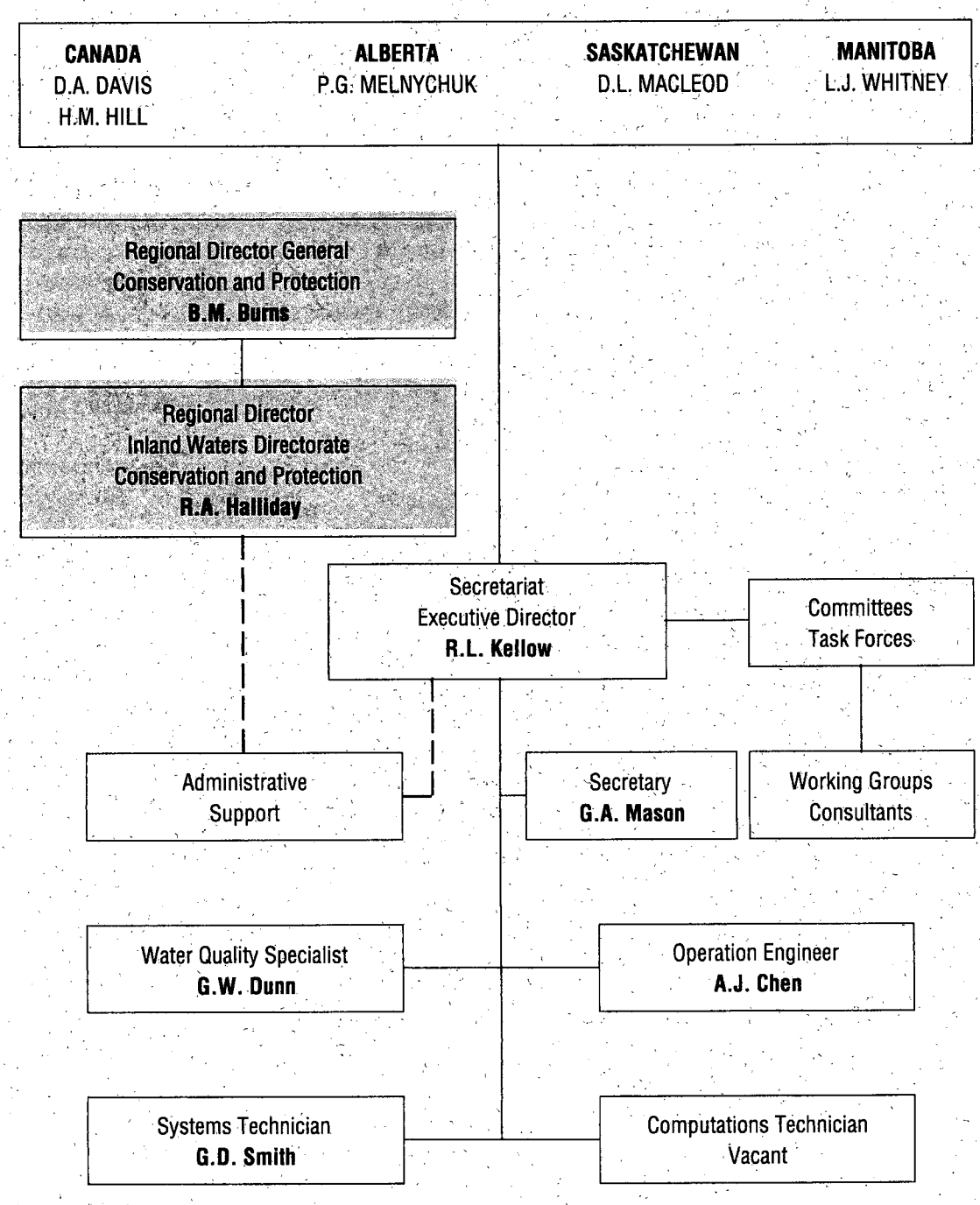
Approved: November 18-19, 1981
PPWB Minute 26-25

MEMBERS

CHAIRMAN	R.L. Kellow	Executive Director Prairie Provinces Water Board
	D. McNaughton	Groundwater Division National Hydrology Research Institute Environment Canada
	J. Lebedin	Geology and Air Surveys Division Prairie Farm Rehabilitation Administration Agriculture Canada
	H.A. Kerr	Groundwater Protection Branch Alberta Environment
	N. Shaheen	Resource Management Saskatchewan Water Corporation
	L. Gray	Water Resources Branch Manitoba Department of Natural Resources
SECRETARY	A.J. Chen	Operations Engineer Prairie Provinces Water Board

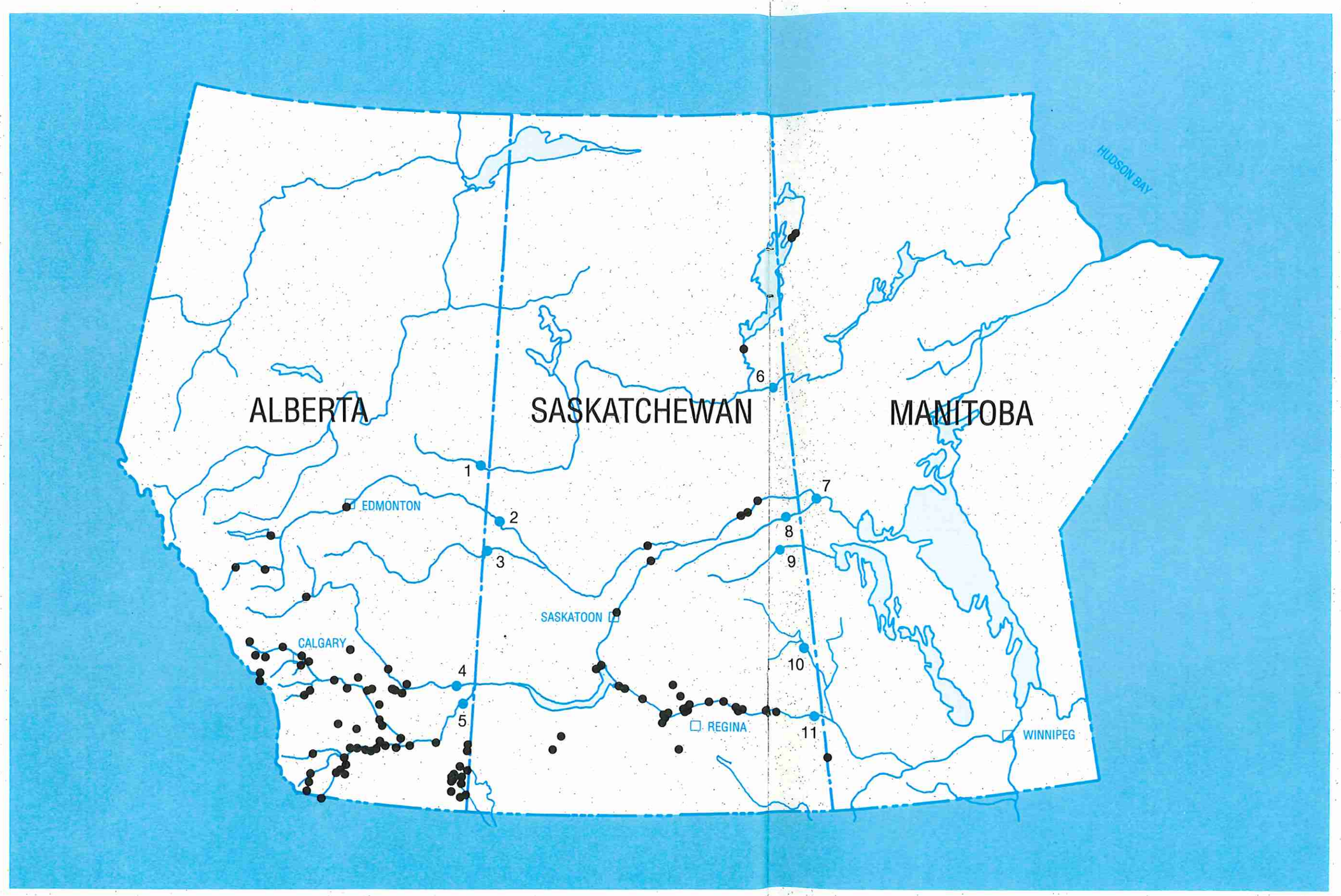
Organizational Chart

Prairie Provinces Water Board



APPENDIX III

PPWB MONITORING LOCATIONS MAP



PPWB Monitoring Locations Map

- PPWB Water Quantity and Quality Monitoring Locations
  1. Beaver River
  2. North Saskatchewan River
  3. Battle River
  4. Red Deer River (Alta/Sask)
  5. South Sask. River
  6. Churchill River
  7. Saskatchewan River
  8. Carrot River
  9. Red Deer River (Sask/Man.)
  10. Assiniboine River
  11. Qu'Appelle River
- Hydrometric sites used in apportionment monitoring

Notes