FORTY-EIGHTH ANNUAL REPORT

TO THE

International Joint Commission

COVERING

Calendar Year 2006

Lake Darling Dam

International Souris River Board

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INTERNATIONAL SOURIS
RIVER BOARD

CONSEIL INTERNATIONALE
DE LA RIVIERE SOURIS

October 2007

The International Joint Commission
Ottawa, Ontario and Washington, D.C.

Commissioners:

In accordance with the Directive of January 22, 2007 (replaces Directives of April 11, 2002 and May 31, 1959), we have enclosed the Forty-Eighth Annual Report covering calendar year 2006.

Respectively submitted,

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HIGHLIGHTS 2006

The 2006 Annual report represents the first time water quantity and water quality were combined into a single report. Although the International Souris River Board and the Souris River Bi-Lateral Water Quality Monitoring Group were not officially amalgamated into the ISRB until January 2007, the Board functioned in 2006 as an expanded Board with an enhanced mandate.

For the 2006 calendar year, the natural flow of the Souris River at the Sherwood Crossing was 28 090 dam^3 (22,773 acre-feet). This represents 21.3 percent of the 1959-2006 long-term mean. Net depletions in Canada were 13 700 dam^3 (11,107 acre-feet). Recorded runoff for the Souris River near Sherwood, North Dakota, was 12 600 dam^3 (10,215 acre-feet), or about 11.4 percent of the 1931-2006 long-term mean. North Dakota received 51 percent of the natural flow.

The flow of the Souris River as it enters North Dakota at Sherwood was more than 0.113 cubic metres per second (4 cubic feet per second) except during the periods of January 1 through March 24, July 6 through July 9, July 24 through August 8, August 10 through September 16, October 29 through November 15, and November 26 through December 31, 2006. During those periods when the flow was less than 0.113 cubic metre per second (4 cubic feet per second), the Province of Saskatchewan did not divert, store, or use any water above what would have occurred under conditions of water-use development prevailing in the Saskatchewan portion of the basin prior to the construction of Boundary Dam, Rafferty Dam, and Alameda Dam. Accordingly, Saskatchewan complied with the 0.113 cubic metre per second (4 cubic feet per second) provision specified in Recommendation No. 1 of the Interim Measures.

Recorded runoff for Long Creek at the Western Crossing as it enters North Dakota was 520 dam^3 (422 acre-feet), or 2.0 percent of the long-term mean since 1959. Recommendation No. 2 of the Interim Measures was met with a net gain in the North Dakota portion of the Long Creek Basin of 1 487 dam^3 (1,206 acre-feet).

Recorded runoff leaving the United States at Westhope during the period of June 1 through October 31, 2006, was 14 444 dam^3 (11,710 acre-feet). The flow was in compliance with the 0.566 cubic metre per second (20 cubic feet per second) minimum flow requirement as specified in Recommendation No. 3(a) of the Interim Measures except for eight days in June, 10 days in September, and 19 days in October.

The water quality of the Souris River in calendar year 2006 was similar to prior years. Periodic winter fish kills during previous years were not observed in 2006. Several water quality parameters remain as chronic exceedances of objectives. A Total Maximum Daily Load study on the upper Souris River in North Dakota for dissolved oxygen was initiated in 2006.

In addition to overseeing water distribution, the International Souris River Board maintains a watching brief of basin water-development projects, such as the Northwest Area Water Supply Project. As well, the Board fosters the sharing of flow forecasting and reservoir operation information amongst the interested groups in the basin.

1.0 INTERNATIONAL SOURIS RIVER BOARD

1.1 SOURIS RIVER REFERENCE (1940)

The following excerpt describes the history of the water-apportionment program that the International Souris River Board currently maintains:

In a letter on behalf of the Government of Canada dated 20 March 1959 and a letter on behalf of the Government of the United States of America dated 3 April 1959, the International Joint Commission was informed that the Interim Measures recommended in its report of 19 March 1958, in substitution for those recommended in the report dated 2 October 1940 in response to the Souris River Reference (1940), had been accepted by both Governments.

The Governments of the United States and Canada entered into an Agreement for Water Supply and Flood Control in the Souris River Basin on October 26, 1989. Pursuant to this Agreement, the Interim Measures related to the sharing of the annual flow of the Souris River from Saskatchewan into North Dakota contained in paragraph 22(1) of the Commission's 1958 Report to the Governments were modified. In light of the modifications in 1989 and pursuant to a February 28, 1992, request from the Governments of the United States and Canada, the Commission, on April 23, 1992, directed the International Souris River Board of Control to begin applying the "Interim Measures as Modified in 1992." The measures were further modified by the Governments in December 2000. The "Interim Measures as Modified in 2000" are shown in Appendix C of this report.

1.2 INTERIM MEASURES AS MODIFIED IN 2000

In December 2000, the International Joint Commission directed the Board to implement the "Interim Measures as Modified in 2000" for the 2001 calendar year and each year thereafter. The 2000 Interim Measures, shown in Appendix C, were developed to provide greater clarification of the conditions that must prevail for the determination of the share of natural flow between Saskatchewan and North Dakota at the Sherwood Crossing.

In general, the Interim Measures provide that Saskatchewan shall have the right to divert, store, and use waters that originate in the Saskatchewan portion of the Souris River Basin, provided that the annual runoff of the river into North Dakota is not thereby reduced to less than half of the runoff that would have occurred in a state of nature; that North Dakota shall have the right to divert, store, and use the waters that originate in the North Dakota portion of the basin together with the waters that cross the boundary from Saskatchewan; and that Manitoba shall have the right to use the waters that originate in the Manitoba portion of the basin and, in addition, that North Dakota must provide to Manitoba, except during periods of severe drought, a regulated flow of 0.566 cubic metre per second (20 cubic feet per second) during the months of June to October inclusive.

For the benefit of riparian users of water between the Sherwood Crossing and the upstream end of Lake Darling, the Province of Saskatchewan shall as far as practicable regulate its diversions, storage, and uses in such a manner that the flow in the Souris River channel at the Sherwood Crossing shall not be less than 0.113 cubic metre per second (4 cubic feet per second) when that level of flow would have occurred under the conditions of water-use development prevailing in the Saskatchewan portion of the drainage basin prior to the construction of Boundary Dam, Rafferty Dam, and Alameda Dam.

Under certain conditions, a portion of the North Dakota share will be in the form of evaporation from Rafferty and Alameda Reservoirs. During years when those conditions occur, the minimum flow actually passed to North Dakota will be 40 percent of the natural flow at the Sherwood Crossing.

This lesser amount is in recognition of Saskatchewan's operation of Rafferty Dam and Alameda Dam for flood control.

Except in flood years, flow releases to the United States should occur in the pattern that would have occurred in a state of nature. To the extent possible and in consideration of potential channel losses and operating efficiencies, releases from the Canadian dams will be scheduled to coincide with periods of beneficial use in North Dakota. The flow release to the United States may be delayed when the State of North Dakota determines and notifies Saskatchewan through the International Souris River Board that the release would not be of benefit to the State at that time.

The State of North Dakota shall have the right to divert, store, and use the waters that originate in the North Dakota portion of the Souris River Basin together with the waters delivered to the State of North Dakota at the Sherwood Crossing, provided that any diversion, use, or storage of Long Creek water shall not diminish the annual runoff at the Eastern Crossing of Long Creek into Saskatchewan below the annual runoff of Long Creek at the Western Crossing into North Dakota.

In periods of severe drought, when it becomes impracticable for North Dakota to deliver the regulated flow of 0.566 cubic metre per second (20 cubic feet per second), North Dakota's responsibility to Manitoba will be limited to providing such flows as the Board determines to be practicable and in accordance with the objective of making water available for human and livestock consumption as well as for household use.

1.3 BOARD OF CONTROL

At its meeting in May 1959, the International Joint Commission officially approved and signed a directive that created the International Souris River Board of Control. At that time, the Board was charged with the responsibility of ensuring compliance with the Interim Measures set out and of submitting to the Commission such reports as the Commission may require or as the Board at its discretion may desire to file.

1.4 AMALGAMATION OF THE INTERNATIONAL SOURIS-RED RIVERS ENGINEERING BOARD AND INTERNATIONAL SOURIS RIVER BOARD OF CONTROL

In 2000, the International Joint Commission directed the International Souris-Red Rivers Engineering Board to transfer its responsibilities that related to the Souris River to the International Souris River Board of Control. The Commission also changed the International Souris River Board of Control's name to the International Souris River Board.

1.5 AMALGAMATION OF THE INTERNATIONAL SOURIS RIVER BOARD AND SOURIS RIVER BI-LATERAL WATER QUALITY MONITORING GROUP

In 2006 the IJC changed the Board’s mandate. Because of the change in the mandate and the desire of the Commission to move to a more encompassing watershed approach, the Board was requested to develop a directive based on existing Commission responsibilities in the Souris River Basin that would move toward an enhanced mandate for the Board. By letter dated January 22, 2007, the International Souris River Board was officially notified by the Commission that the new directive dated January 18, 2007, replaced the previous directive dated April 11, 2002. The new directive sets out the duties of the Board as it moves toward a watershed approach in the Souris River Basin and combined the duties of the International Souris River Board and Souris River Bi-Lateral Water Quality Monitoring Group. It also increased the membership of the Board to twelve members.

The Board's duties were revised to include the following:

1. Maintain an awareness of existing and proposed developments, activities, conditions, and issues in the Souris River Basin that may have an impact on transboundary water levels, flows, water quality, and aquatic ecosystem health and inform the Commission about existing or potential transboundary issues.

2. Oversee the implementation of compliance with the Interim Measures as Modified for Apportionment of the Souris River as described in Appendix A of the Directive.

3. Assist the Commission in the review of a Joint Water Quality Monitoring Program.

4. Perform an oversight function for flood operations in cooperation with the designated entities identified in the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin.

5. Report on aquatic ecosystem health issues in the watershed and regularly inform the Commission on the state and implications of aquatic ecosystem health.

6. Carry out such other studies or activities as the Commission may, from time to time, request.

7. Prepare an annual work plan including both routine board activities and new initiatives planned to be conducted in the subsequent year.

8. The Board shall submit an annual report covering all of its activities at least three weeks in advance of the Commission's fall semi-annual meeting, and the Board shall submit other reports as the Commission may request or the Board may feel appropriate in keeping with this Directive.

9. The Board shall provide opportunities for the public to be involved in its work, including at least one public meeting in the basin each year. The Board has agreed to hold the public meeting in the spring/summer and to advertise it.

The Board has established two committees to assist with administering the conditions of its mandate. The Natural Flow Methods Committee is charged with investigating procedures and questions on the approach and methods used to determine the natural flow of the Souris River Basin. The Flow Forecasting Liaison Committee has the responsibility to ensure there is information sharing and coordination between the forecasting agencies in the basin. Membership on these committees includes all affected agencies in the basin.

1.6 BOARD MEMBERS

At the end of 2006, the members of the International Souris River Board were as follow:

Dale Frink North Dakota State Engineer Bismarck, North Dakota	Member for the United States (Co-Chair)
Col. Michael Pfenning U.S. Army Corps of Engineers St. Paul, Minnesota	Member for the United States
Gregg Wiche U.S. Geological Survey Bismarck, North Dakota	Member for the United States
Russell Boals Environment Canada Regina, Saskatchewan	Member for Canada (Co-Chair)
Robert Harrison Manitoba Water Stewardship Winnipeg, Manitoba	Member for Canada
Doug Johnson Saskatchewan Watershed Authority Moose Jaw, Saskatchewan	Acting Member for Canada

2.0 ACTIVITIES OF THE BOARD

Since the presentation of the Forty-Seventh Annual Report to the International Joint Commission, the International Souris River Board has held two meetings and has had one teleconference call. The discussions and decisions made are summarized in the following sections.

2.1 FEBRUARY 16, 2006, MEETING IN REGINA, SASKATCHEWAN

Members in attendance were:

Dale Frink	Member for the United States
Col. Michael Pfenning	Member for the United States
Gregg Wiche	Member for the United States
Russell Boals	Member for Canada
Robert Harrison	Member for Canada
Doug Johnson	Member for Canada

A summary of the natural flow computations for the period of January 1 through December 31, 2005, was presented at the February 16, 2006, meeting. The final apportionment balance for the 2005

calendar year showed that Saskatchewan was in surplus to North Dakota by 39 660 dam3 (32,152 acre-ft).

International Souris River Board members discussed the need for a procedures manual documenting the methods used to compute natural flows for the Souris River at Sherwood. Environment Canada is working with the Natural Flows Methods Committee to help the committee achieve the goals for the manual.

The Board members decided a work plan will be developed after the directive is accepted by the International Joint Commission.

The Board and the Souris River Bi-Lateral Water Quality Monitoring Group met in a combined meeting after the Board meeting. A decision was made that the Board and the Group should begin to act as one Board. The starting membership would consist of both boards. The directive should indicate that the Board will consist of 12 members, with six from Canada and six from the United States.

2.2 July 18-19 2006, MEETING IN ESTEVAN, SASKATCHEWAN

Members of ISRB in attendance were:

Russell Boals
Member for Canada

Dale Frink
Member for the United States

Doug Johnson
Member for Canada

Gregg Wiche
Member for the United States

Robert Harrison
Member for Canada

Members of SRBWQMG in attendance were:

Wayne Dybvig
Member for Canada

Gregg Wiche
Member for the United States

The International Souris River Board and the Souris River Bi-Lateral Water Quality Monitoring Group met in a combined meeting. A summary of the interim natural flow computations for the period of January 1 through May 31, 2006, was presented at the July18-19, 2006, meeting. The computed natural flow at the Sherwood Crossing for the period was 25 345 dam3 (20,547 acre-feet). The United States share on a 50/50 basis was 12 670 dam^3 (10,272 acre-ft). The United States had received 9 390 dam^3 (7,612 acre-ft) during the 5-month period resulting in a deficit of 3 280 dam^3 (2,659 acre-ft). The International Souris River Board accepted the compilation of flows and the computed apportionment balance for the period of January 1 through May 31, 2006.

Spring runoff in 2006 was well below normal in all areas of the Saskatchewan portion of the Souris River Basin due to near zero snow cover. Spring precipitation for 2006 ranged from slightly above normal near Estevan to well below normal near Weyburn, with a rainfall on April 18 accounting for the majority of runoff in the Souris River Basin.

Spring runoff in the North Dakota portion of the basin was minimal. January through June 2006 precipitation totals ranged from 68 percent of normal at Sherwood to 122 percent of normal at

Fortuna, both in the upper end of the North Dakota portion of the Souris River Basin. The lower end of the North Dakota portion of the Souris River Basin received normal precipitation. Two USGS gaging stations exceeded flood stage: Willow Creek near Willow City and the Souris River near Westhope.

Spring runoff in the Souris River Basin in Manitoba was below average due to below normal soil moisture and snow cover.

2.3 SEPTEMBER 19, 2006, TELECONFERENCE CALL

Members in attendance were:

Members of ISRB in attendance were:

Russell Boals Member for Canada	Dale Frink Member for the United States
Robert Harrison Member for Canada	Gregg Wiche Member for the United States

Members of SRBWQMG in attendance were:

Richard Zitta Member for Canada	Gregg Wiche Member for the United States

The International Souris River Board and the Souris River Bi-Lateral Water Quality Monitoring Group met in a combined meeting.

The purpose of the teleconference call was to review the flow conditions and discuss the apportionment balance of the Souris River for the period of January 1 through August 31, 2006. The 3 280 dam^3 (2,659 acre-ft) deficit to North Dakota on May 31, 2006, decreased to a 2 990 dam^3 (2,424-acre-foot) deficit to North Dakota by August 31, 2006. Discussions between Saskatchewan and North Dakota resulted in a release being planned from Saskatchewan reservoirs to make up the 2 990 dam^3 (2,424 acre-ft) deficit to the United States.

An increase of 1 910 dam^3 (1,548 acre-feet) occurred between Long Creek at the Western Crossing and Long Creek at the Eastern Crossing. Thus, the flow apportionment was met.

3.0 MONITORING

3.1 INSPECTIONS OF THE BASIN

During the year, the staff of the Water Survey Division of Environment Canada, Saskatchewan Watershed Authority, the North Dakota State Water Commission, and the U.S. Geological Survey carried out frequent field inspections of the Souris River Basin.

3.2 GAUGING STATIONS

A list of the gauging stations being operated in the Souris River Basin is given in Table 1. In addition, the U.S. Geological Survey operated three miscellaneous streamflow-measurement sites in the vicinity of the Eaton Irrigation Project near Towner, North Dakota.

The station numbers and the locations of the hydrometric stations measuring streamflow are shown in Part I of Table 1. The gauging station numbers and the locations of the hydrometric stations located on lakes and reservoirs in the basin are shown in Part II of Table 1.

Table 1. Streamflow, water-level, and water quality stations in the Souris River Basin.

Part I--Streamflow

Index number	Stream	Location	State or province	Operated by
05NA003 (05113360)	Long Creek[1]	at Western Crossing	Saskatchewan	Environment Canada
05NA004	Long Creek	near Maxim	Saskatchewan	Saskatchewan Watershed Authority
05NA005	Gibson Creek	near Radville	Saskatchewan	Environment Canada
05NB001	Long Creek	near Estevan	Saskatchewan	Environment Canada
05NB011	Yellowgrass Ditch	near Yellowgrass	Saskatchewan	Environment Canada
05NB014	Jewel Creek	near Goodwater	Saskatchewan	Environment Canada
05NB017	Souris River	near Halbrite	Saskatchewan	Environment Canada
05NB018	Tatagwa Lake Drain	near Weyburn	Saskatchewan	Environment Canada
05NB021 (05113800)	Short Creek[1]	near Roche Percee	Saskatchewan	Environment Canada
05NB031	Souris River	near Bechard[2]	Saskatchewan	Saskatchewan Watershed Authority
05NB033	Moseley Creek	near Halbrite	Saskatchewan	Environment Canada
05NB034	Roughbark Creek	near Goodwater	Saskatchewan	Environment Canada
05NB035	Cooke Creek	near Goodwater	Saskatchewan	Environment Canada
05NB036	Souris River	below Rafferty Reservoir	Saskatchewan	Environment Canada
05NB038	Boundary Reservoir Diversion Canal	near Estevan	Saskatchewan	Environment Canada
05NB039	Tributary	near Outram	Saskatchewan	Environment Canada
05NB040	Souris River	near Ralph	Saskatchewan	Environment Canada
05NB041	Roughbark Creek	above Rafferty Reservoir	Saskatchewan	Environment Canada
05NC001	Moose Mountain Creek	below Moose Mountain Lake	Saskatchewan	Saskatchewan Watershed Authority
05ND004	Moose Mountain Creek	near Oxbow	Saskatchewan	Environment Canada
05ND010	Moose Mountain Creek	above Alameda Reservoir	Saskatchewan	Environment Canada
05ND011	Shepherd Creek	near Alameda	Saskatchewan	Environment Canada
05NE003	Pipestone Creek	above Moosomin Reservoir	Saskatchewan	Environment Canada
05NF001	Souris River	at Melita	Manitoba	Environment Canada
05NF002	Antler River	near Melita	Manitoba	Environment Canada
05NF006	Lightning Creek	near Carnduff	Saskatchewan	Environment Canada
05NF007	Gainsborough Creek	near Lyleton	Manitoba	Environment Canada
05NF008	Graham Creek	near Melita	Manitoba	Environment Canada
05NF010	Antler River	near Wauchope	Saskatchewan	Environment Canada
05NG001	Souris River	at Wawanesa	Manitoba	Environment Canada
05NG003	Pipestone Creek	near Pipestone	Manitoba	Environment Canada
05NG007	Plum Creek	near Souris	Manitoba	Environment Canada
05NG012	Elgin Creek	near Souris	Manitoba	Environment Canada
05NG020	Medora Creek	near Napinka	Manitoba	Environment Canada
05NG021	Souris River	at Souris	Manitoba	Environment Canada
05NG024	Pipestone Creek	near Sask. Boundary	Manitoba	Environment Canada

05113520	Long Creek Tributary	near Crosby	North Dakota	U.S. Geological Survey
05113600 (05NB027)	Long Creek[1 3]	near Noonan	North Dakota	U.S. Geological Survey
05114000 (05ND007)	Souris River[1 3]	near Sherwood	North Dakota	U.S. Geological Survey
05116000	Souris River[3]	near Foxholm	North Dakota	U.S. Geological Survey
05116100	Souris River Tributary	near Burlington	North Dakota	U.S. Geological Survey
05116135	Tasker Coulee Tributary	near Kenaston	North Dakota	U.S. Geological Survey
05116500	Des Lacs River[3]	at Foxholm	North Dakota	U.S. Geological Survey
05117500	Souris River[3]	above Minot	North Dakota	U.S. Geological Survey
05119410	Bonnes Coulee	near Velva	North Dakota	U.S. Geological Survey
05120000	Souris River[3]	near Verendrye	North Dakota	U.S. Geological Survey
05120180	Wintering River Tributary	near Kongsberg	North Dakota	U.S. Geological Survey
05120500	Wintering River[3]	near Karlsruhe	North Dakota	U.S. Geological Survey
05122000	Souris River[3]	near Bantry	North Dakota	U.S. Geological Survey
05123300	Oak Creek Tributary	near Bottineau	North Dakota	U.S. Geological Survey
05123400	Willow Creek[3]	near Willow City	North Dakota	U.S. Geological Survey
05123510	Deep River[3]	near Upham	North Dakota	U.S. Geological Survey
05124000 (05NF012)	Souris River[1 3]	near Westhope	North Dakota	U.S. Geological Survey

Table 1. Streamflow, water-level, and water quality stations in the Souris River Basin.

Part II--Water Level

Index number	Stream	Location	State or province	Operated by
05113750	East Branch Short Creek Reservoir	near Columbus	North Dakota	U.S. Geological Survey
05115500	Lake Darling	near Foxholm	North Dakota	U.S. Geological Survey
LGNN8	Souris River	at Logan	North Dakota	U.S. Corps of Engineers U.S. N. Weather Service
SWRN8	Souris River	at Sawyer	North Dakota	U.S. Corps of Engineers U.S. N. Weather Service
TOWN8	Souris River	at Towner	North Dakota	U.S. Corps of Engineers U.S. N. Weather Service
VLVN8	Souris River	at Velva	North Dakota	U.S. Corps of Engineers U.S. N. Weather Service
	Upper Souris Refuge	Dams 87 and 96	North Dakota	U.S. Fish and Wildlife
	Des Lacs Refuge	Units 1 - 8 inclusive	North Dakota	U.S. Fish and Wildlife
	J. Clark Salyer Refuge	Dams 320, 326, 332, 341, and 357	North Dakota	U.S. Fish and Wildlife
05NA006	Larsen Reservoir	near Radville	Saskatchewan	Environment Canada
05NB012	Boundary Reservoir	near Estevan	Saskatchewan	Saskatchewan Watershed Authority
05NB016	Roughbark Reservoir	near Weyburn	Saskatchewan	Environment Canada
05NB020	Nickle Lake	near Weyburn	Saskatchewan	Environment Canada
05NB032	Rafferty Reservoir	near Estevan	Saskatchewan	Environment Canada
05NC002	Moose Mountain Lake	near Corning	Saskatchewan	Environment Canada

05ND008	White Bear (Carlyle) Lake	near Carlyle	Saskatchewan	Saskatchewan Watershed Authority
05ND009	Kenosee Lake	near Carlyle	Saskatchewan	Saskatchewan Watershed Authority.
05ND012	Alameda Reservoir	near Alameda	Saskatchewan	Environment Canada
05NE002	Moosomin Lake	near Moosomin	Saskatchewan	Environment Canada
05NF804	Metigoshe Lake	near Metigoshe	Manitoba	Province of Manitoba
05NF805	Sharpe Lake	near Deloraine	Manitoba	Province of Manitoba
05NG023	Whitewater Lake	near Boissevain	Manitoba	Environment Canada
05NG801	Plum Lake	above Deleau Dam	Manitoba	Province of Manitoba
05NG803	Elgin Reservoir	near Elgin	Manitoba	Province of Manitoba
05NG806	Souris River	above Hartney Dam	Manitoba	Province of Manitoba
05NG807	Souris River	above Napinka Dam	Manitoba	Province of Manitoba
05NG809	Plum Lake	near Findlay	Manitoba	Province of Manitoba
05NG813	Oak Lake	at Oak Lake Resort	Manitoba	Province of Manitoba
05NG814	Deloraine Reservoir	near Deloraine	Manitoba	Province of Manitoba

Table 1. Streamflow, water-level, and water quality stations in the Souris River Basin.

Part III--Water Quality

Index number	Stream	Location	State or province	Operated by
05114000 (05ND007)	Souris River[1 3]	near Sherwood	North Dakota	U.S. Geological Survey
05115500	Lake Darling	near Foxholm	North Dakota	U.S. Geological Survey
05116000	Souris River[3]	near Foxholm	North Dakota	U.S. Geological Survey
05116500 (380021)	Des Lacs River[3]	at Foxholm	North Dakota	U.S. Geological Survey/ N.D. Dept. of Health
05117500 (380161)	Souris River[3]	above Minot	North Dakota	U.S. Geological Survey/ N.D. Dept. of Health
05120000 (380095)	Souris River[3]	near Verendrye	North Dakota	U.S. Geological Survey/ N.D. Dept. of Health
05122000	Souris River[3]	near Bantry	North Dakota	U.S. Geological Survey
05123400	Willow Creek[3]	near Willow City	North Dakota	U.S. Geological Survey
05123510	Deep River[3]	near Upham	North Dakota	U.S. Geological Survey
	J. Clark Salyer Refuge	Pool 357	North Dakota	U.S. Fish and Wildlife
05124000 (05NF012)	Souris River[1 3]	near Westhope (QA)	North Dakota	U.S. Geological Survey

1 International gauging station
2 Formerly published as Souris River below Lewvan
3 Operated jointly for hydrometric and water-quality monitoring

4.0 TRANSBOUNDARY WATER QUALITY OBJECTIVES AND MONITORING

4.1 OVERVIEW OF WATER QUALITY

The quality of the Souris River at the international boundary has been monitored by the International Souris River Board (formerly by the Souris River Bi-Lateral Water Quality Monitoring Group) since 1990.

Water quality objectives are established at the two border crossings. When water quality objectives are not achieved such conditions are referred to as "exceedances." A summary of water quality exceedances for 2006 is reported in Appendix E. Historical data are also included.

The principle water quality concerns in the Souris River Basin relate to elevated concentrations of total dissolved solids (TDS), depleted dissolved oxygen and high levels of nutrients especially phosphorus.

Exceedances of specific water quality objectives at the Saskatchewan/North Dakota boundary include phosphorus, sodium, sulfate, iron, TDS, dissolved oxygen and pH. These results are relatively consistent with prior year's data.

Total phosphorus exceeds the objective in 71 percent of the samples. The maximum concentration was recorded at 1.4 mg/L, which is 14 times the objective. TDS also exceeded the objective in 71 percent of the samples. Sodium and sulfate represent major constituents in the mineral composition at the site and exceed objectives 86 percent and 57 percent respectively.

Dissolved oxygen ranged from 3.4 mg/L to 14.5 mg/L. A concentration of less than 5.0 mg/L is an exceedance and this occurred in 57 percent of the sampling dates.

Exceedances of specific water quality objectives at the North Dakota/Manitoba boundary include fecal coliform bacteria, nitrates, nitites, phosphorus, sodium, sulfate, iron, TDS, total suspended solids, dissolved oxygen and pH.

Total phosphorus, total suspended solids and iron exceeded the objective on 100 percent of the sampling dates. TDS exceeds the objective in 45 percent of samples. Sodium and sulfate represent major constituents in the mineral composition at the site and exceed the objectives by 91 percent and 45 percent respectively. Dissolved oxygen range from 11.69 mg/L to 4.5 mg/L with an exceedance rate of 37.5 percent. Fecal coliform bacteria exceeded the objective 18.2 percent or two of 11 sampling dates.

There were no exceedances of trace metals at either site during 2006.

4.2 CHANGES TO POLLUTION SOURCES IN 2006

There were no major changes to pollution sources in 2006. The most prevalent source of pollution is nonpoint source from agriculture. Agriculture dominates the land use of the Souris River Basin, therefore, it can be surmised that contributions of phosphorus and nitrogen are substantial from these sources. Major point sources of pollution from the cities of Estevan and Minot have been reduced by advanced wastewater treatment. Smaller cities continue to discharge effluent intermittently.

Future threats to water quality and aquatic ecosystem health include energy development, water appropriations that reduce flows, and reservoir operating plans.

4.3 TREND ANALYSIS REPORT

The 1991 Bi-Lateral agreement on water quality objectives for the Souris River stipulates that the "Monitoring Task Force will compile a background document synthesizing all historic water quality data for each of the Souris River Basin International Water Quality Objectives." This document utilized an agreed upon trend analysis methodology to establish the background water quality at the two transboundary locations for water objectives.

The Trend Analysis Report used a parametric time series model that detected trends in historic constituent concentration data. The trend analysis detected complex nonmonotonic trends in concentrations in the presence of complex interannual and seasonal variability in daily discharge. The methodology used was compatible with changes in monitoring frequency and timing.

The Trend Analysis Report contained a stand-alone appendix with all of the details, as well as a mini users manual for the time series program. Trend analysis was broken up into a 10-year segment, and two 5-year segments. The report was finalized in 2000 by the Souris River Bi-Lateral Water Quality Monitoring Group and the Monitoring Task Force. The group discussed possible reasons for the increasing and decreasing trends and agreed that further trend analysis would be conducted on the sulfate data and other Major Ions data. USGS made slight changes to the model in 2003.

4.4 MONITORING PLAN CHANGES

The Monitoring Plan for the two boundary sites was changed in 1999 from a minimum of nine site visits per year to a minimum of eight site visits per year. The Monitoring Plan calls for three samples from March to June, three samples from July to October, and two samples from November to February. The revised Monitoring Plan was implemented in calendar year 1999. Monitoring for pesticides was discontinued at the Sherwood site in 1999.

The frequency of monitoring and list of parameters has been modified in response to changing conditions and/or need for additional information is necessary.

Rafferty Dam, Lake Alameda, and Lake Darling are monitored for various water quality parameters. Monitoring of reservoirs upstream of the Saskatchewan/ North Dakota boundary help in interpreting water quality results.

4.5 SEDIMENT TOXICITY TESTING

Pollutants entrained in or attached to sediment represent an unassessed component of water quality at the two boundary sites.

The ISRB will continue to evaluate the various sediment toxicity testing protocols and, eventually, select an appropriate method and conduct tests at some point in the future when resources become available.

4.6 REVISION OF PHOSPHORUS OBJECTIVES

Phosphorus is an essential element for plant growth; however, high concentrations frequently result in algae blooms and excessive plant growth. The ISRB will not change the numeric objective of 0.10 mg/L for total phosphorus at the present time for several reasons, although this objective is frequently exceeded at both boundary sites.

While it is recognized that the existing objective may be inappropriate, sufficient scientific understanding is not available at the present time to recommend a more appropriate, scientifically-sound objective. However, considerable work is underway in both the United States and Canada to ensure that this additional understanding is acquired in the near future. The trend analysis indicates that phosphorus has not increased significantly in recent years that would warrant immediate management intervention. There was no significant change in phosphorus between 1977 and 1997 at the North Dakota-Saskatchewan boundary, and there was a significant increase between 1977 and 1992 at the North Dakota-Manitoba boundary followed by a significant decrease in concentration between 1992 and 1997.

Phosphorus concentrations tend to be high in prairie soils. Under pre-settlement conditions, phosphorus could enter surface water by erosion, transported plant material, and animal activities. Human activities and hydrologic modifications exacerbate phosphorus loadings, which increases primary productivity. This process, called eutrophication, has likely been accelerated in the Souris River. Common sources of phosphorus enrichment are municipal effluent, non-point contributions from agriculture, livestock, and hydrologic modifications. Substantial progress has been made in reducing phosphorus loading from Minot and Estevan by incorporating advanced wastewater treatment. Implementation of Best Management Practices on agricultural land, and installing animal waste systems has reduced loadings from these activities.

Dams frequently have a substantial additive effect on phosphorus loading. Large reservoirs that are recently constructed, and have hypolimnic releases, generally contribute high phosphorus loads. Low head dams can contribute to extremely high phosphorus loadings. These reservoirs are often created by inundation of nutrient-rich prairie soils, go anoxic during the winter period, thus releasing additional phosphorus from bottom sediments, and attract large populations of waterfowl during migration that also contribute large nutrient loadings to the system. The fall waterfowl population frequently moves out of the lower Souris River just prior to ice-up. The organic load from waterfowl does not have sufficient time to become assimilated and, therefore, causes an oxygen demand that is not satisfied until the following open water period. Also, decaying vegetation in the off channel area contributes to anoxic conditions. Phosphorus release from the waterfowl contributions, decaying vegetation, and internal loading from the sediments result in significantly higher phosphorus concentrations than if the system was aerobic. Downstream loading at the border is very high, because spring runoff occurs prior to ice-out, thereby purging these shallow ponds.

The phosphorus objective was reviewed as directed by the Souris River Bi-Lateral Water Quality Monitoring Group. It was noted that phosphorus frequently exceeds the objective criterion at both border sites. Phosphorus tends to be quite high in concentration in prairie streams and differentiating between cultural practices and baseline phosphorus concentrations remain largely unknown. It was decided that, since many initiatives, both in the U.S. and Canada, are moving forward on nutrient management, that it would be doubtful whether the Task Force could shed new information on this issue. The Task Force agreed that it should let the science develop and retrieve that information when it is available to see if changes in phosphorus objectives would be appropriate. The Task Force mentioned that the loading issue of phosphorus to Lake Darling would be important information;

however, until a nutrient budget on Lake Darling is completed, the most appropriate course of action is to maintain the nutrient objective status quo.

4.7 WINTER ANOXIA AND TOTAL MAXIMUM DAILY LOAD

During February 1999, a fish kill was observed in the Souris River in North Dakota. A subsequent investigation determined that low dissolved oxygen concentrations prevailed from Highway 9 in Saskatchewan to Dam No. 47 in North Dakota. Follow-up monitoring for dissolved oxygen during March 1999 indicated a dissolved oxygen concentration remained relatively unchanged from February. The factors contributing to the low oxygen levels were not determined; however, they could include, but are not limited to, sediment oxygen demand, macrophyte decomposition, organic enrichment, ground water, photosynthesis suppression, low flows, or dams.

It was generally felt that the winter anoxia was a result of heavy snow conditions and extremely cold temperatures. The Department of Health and Environment Canada agreed to monitor in February 2002, at five sites along the Souris River. No fish kills were reported in the winter of 2002.

There was, however, a fish kill reported in the United States in February 2003, below Lake Darling. This isolated case of winter kill was observed at a water control structure, Dam 41. Many fish were observed dead in the small pool below the structure. Possible explanations of the fish kill may be associated with fish being trapped in the shallow pool while it froze to the bottom or poor water quality due to feedlot runoff from an adjacent beef cattle operation. Unfortunately it was impossible at that time to pinpoint what caused the small isolated fish kill.

Dissolved oxygen (DO) samples taken below the dam at Lake Darling were extremely poor with levels of 0.20 ppm and below. There is no doubt that fish were not able to survive, considering that 0.50 ppm and below usually is the benchmark where fish kill is imminent. Results found from the DO surveys in Lake Darling indicated that dissolved oxygen readings were definitely adequate to maintain the fishery. In most cases, readings at 4 metres usually hovered at 6.0 ppm or better, while one-metre readings ranged from 5.6 to 9.4 ppm. There were no reports of a fish kill in the Souris River upstream in Canada.

It was agreed to keep a watch on DO conditions and North Dakota Department of Health and Environment Canada will attempt to collect DO and ammonia samples if low flow conditions prevail during future winters.

The upper portion of the Souris River was listed as impaired in 2004. This designation means this reach of the river needs a total maximum daily load (TMDL) study. The impairment for aquatic life is dissolved oxygen, and the impairment for recreation is fecal coliform bacteria. The study reach is 43.4 miles downstream from the border to Lake Darling. The lower portion of the Souris River in Saskatchewan from Glen Ewen to the border is also included. A literature review, selection of sampling sites, and plan development was completed in 2006.

5.0 WATER-DEVELOPMENT ACTIVITIES IN 2006

5.1 NORTHWEST AREA WATER SUPPLY PROJECT

The Garrison Diversion Municipal, Rural, and Industrial (MRI) water-supply program, passed by the United States Congress on May 12, 1986, as part of the Garrison Diversion Reformation Act of 1986, authorized the appropriation of federal funds for the planning and construction of water-supply

facilities throughout North Dakota. An agreement between the North Dakota State Water Commission and the Garrison Conservancy District in 1986 provided a method through which the agencies can request funding for MRI water-system projects from the Secretary of the Interior. On the basis of this agreement, the Northwest Area Water Supply (NAWS) study was initiated in November 1987.

The NAWS project has been designed to supply a reliable source of treated water to cities, communities, and rural water systems in 10 counties in northwestern North Dakota. The project has an estimated cost of 170 million dollars.

The water supply for the project is Lake Sakakawea, located in the Missouri River system. The maximum annual use authorized under the State of North Dakota water permit is 18 502 dam^3 (15,000 acre-feet).

Canada is concerned that the NAWS project could permit the interbasin transfer of non-native biota. The St. Mary's–Milk project in Montana and Alberta diverts untreated water from the Hudson Bay Basin to the Missouri River Basin. NAWS, however, would be the first project to divert water across the continental divide in North Dakota.

The Environmental Assessment for NAWS was completed with a "Finding of No Significant Impact (FONSI)" and Canada was notified on June 4, 2001. Subsequently, Canada and Manitoba made an Administrative Appeal to the Bureau of Reclamation to carry out a full Environmental Impact Statement. On September 10, 2001, Canada was informed that the appeal was rejected.

The project was started with groundbreaking in Minot on April 5, 2002. Work began at Minot and proceeded toward Lake Sakakawea.

The Province of Manitoba filed suit in U.S. District Court to require the completion of an Environmental Impact Statement (EIS) for the NAWS project. The Bureau of Reclamation, through the Department of Justice and the State of North Dakota defended the case. The court required the project undergo further environmental review and required court approval of new construction contracts.

On April 15, 2005, the Court allowed the construction to continue on the pipeline between Lake Sakakawea and Minot. The majority of the 45 miles of this line had been completed by December, 2006. The remaining project features between Lake Sakakawea and Minot will not begin construction until the completion of the EIS process.

On March 6, 2006, the Bureau issued a Notice of Intent to initiate an environmental impact statement for the NAWS Project to evaluate alternative treatment methods and measures to minimize the risk of transferring non-native biota from the Missouri River Basin to the Hudson Bay Basin. The Bureau is currently evaluating a range of treatment options, including those suggested by Manitoba, and developing corresponding cost estimates. Bureau anticipates that it will release a draft EIS in 2007 for public review and comment.

On March 24, 2006, the Court allowed additional construction of the Minot High Service Pump Station, the pipeline from the High Service Pump Station to the northern part of the City of Minot, and the pipeline to Berthold to proceed. It was determined that this construction would not affect treatment decisions. Design work on these projects was completed in 2006 in preparation to award contracts in 2007.

5.2 WATER APPROPRIATIONS

5.2.1 Background

In 1995, the International Souris River Board adopted a new method for reporting minor project diversions for the purpose of determining apportionment. The new method uses a common set of criteria and ensures that the same criteria will be used in both Saskatchewan and North Dakota. It also involves taking the project lists generated by the Natural Flow Methods Committee and adding newly constructed projects or subtracting cancelled projects each year. The projects that met the criteria in 1993 are the benchmark for all future reporting.

5.2.2 Saskatchewan

In 1993, there were 137 minor projects in the Saskatchewan portion of the Souris River basin that met the new criteria. These projects had an annual diversion of 5 099 dam^3 (4,134 acre-feet). On December 31, 2006, there were 140 minor projects in the Saskatchewan portion of the basin with an annual diversion of 4 903 dam^3 (3,975 acre-feet).

5.2.3 North Dakota

In 1993, there were 12 minor projects in the North Dakota portion of the Souris River Basin upstream of Sherwood that met the new criteria. The projects had an annual diversion of 1 257 dam^3 (1,019 acre-feet). On December 31, 2006, there were 11 minor projects in the North Dakota portion of the Long and Short Creek Basins. The annual diversions totaled 1 316 dam^3 (1,067 acre-feet).

The diversion from East Branch Short Creek near Columbus, North Dakota, was estimated by correcting for precipitation, evaporation and seepage, and the storage change. The diversion in 2006 was 432 dam^3 (350 acre-feet). The diversion from the reservoir was added to the minor project diversions for the Long and Short Creek Basins to obtain the total diversion of 1 748 dam^3 (1,417 acre-feet) by the United States.

6.0 HYDROLOGIC CONDITIONS IN 2006

Spring runoff in 2006 was well below normal in all areas of the Saskatchewan portion of the Souris River Basin as a result of near zero or well below normal winter snowfall. Rainfall on April 18 accounted for the majority of the runoff in the Souris River Basin.

Spring runoff in the North Dakota portion of the basin was minimal. January through June 2006 precipitation totals ranged from 68 percent of normal at Sherwood to 122 percent of normal at Fortuna, both in the upper end of the North Dakota portion of the Souris River Basin. The lower end of the North Dakota portion of the Souris River Basin received normal precipitation. Two USGS gaging stations exceeded flood stage: Willow Creek near Willow City and the Souris River near Westhope.

Spring runoff in the Souris River Basin in Manitoba was below average as a result of below normal soil moisture and snow cover. Hot, dry weather in late June and early July resulted in lower flows in the Souris River, however the flows were adequate to meet an increased demand for water.

On December 31, 2006, Rafferty Reservoir was at an elevation of 548.79 (1800.5 feet) which was 0.65 metre (2.1 feet) lower than at the beginning of the year. The inflow to Rafferty Reservoir was 820 dam^3 (665 acre-feet), and the calculated diversion for 2006 was minus 2 690 dam^3 (2,181 acre-

feet). Rafferty Reservoir transferred 2 770 dam^3 (2,246 acre-feet) water to Boundary Reservoir via the pipeline.

Releases were made from Alameda Reservoir from early April through the end of October 2006. The main-stem inflow to Alameda Reservoir (Moose Mountain Creek Above Alameda Reservoir) was 8 520 dam3 (6,907 acre-feet), and the calculated diversion for 2006 was 5 240 dam^3 (4,248 acre-feet). Alameda Reservoir was at an elevation of 560.78 metres (1,839.83 feet), or -0.19 metres (-0.62 foot) less than at the beginning of the year.

Boundary Reservoir received an inflow of 2 010 dam^3 (1,630 acre-feet) from Long Creek. The calculated diversion for 2006 was 2 340 dam^3 (1,897 acre-feet). Boundary Reservoir was at an elevation of 558.543 metres (1,832.49 feet) on December 31, 2006, or 2.29 metres (7.50 feet) below Full Supply Level.

On December 31, 2006, the estimated storage in the five major reservoirs in Saskatchewan (Boundary, Rafferty, Alameda, Nickle Lake, and Moose Mountain Lake) was 521 088 dam3 (422,447 acre-feet) as compared to storage of 564 100 dam^3 (457,316 acre-feet) on December 31, 2005. Figure 1 shows the storage contents of several reservoirs in the Canadian portion of the Souris River Basin for 2005 and 2006.

Recorded runoff for the year for the Souris River near Sherwood was 12 600 dam^3 (10,215 acre-feet), or about 11.4 percent of the 1931-2006 long-term mean. The artificially drained areas of Yellow Grass Ditch and Tatagwa Lake contributed 1 190 dam^3 (965 acre-feet) during 2006. Figure 2 provides a schematic representation of recorded runoff above Sherwood, North Dakota.

On December 31, 2006, the level of Lake Darling was 485.96 metres (1,594.36 feet). The 2006 year-end storage in Lake Darling was 103 683 dam^3 (84,056 acre-feet), or approximately 18 125 dam^3 (14,694 acre-feet) less than on December 31, 2005. The 2006 year-end storage in the J. Clark Salyer Refuge pools was 10 577 dam^3 (8,575 acre-feet), or 27 848 dam^3 (22, 576 acre-feet) less than on December 31, 2005. The combined year-end storage in Lake Darling and the J. Clark Salyer Refuge pools was 114 260 dam^3 (92,631 acre-feet), well above the 66 600 dam^3 (54,000 acre-feet) "severe drought" criterion. Figure 3 shows the storage contents of the main-stem reservoirs in the United States.

Recorded runoff for the year for the Souris River at Westhope was 156 130 dam^3 (126,575 acre-feet) or some 143 530 dam^3 (116,360 acre-feet) more than entered North Dakota at the Sherwood Crossing. The annual runoff for the Souris River near Westhope was 64 percent of the 1929-2006 long-term mean.

Figure 4 shows the monthly releases from Boundary, Rafferty, Alameda, and Lake Darling Reservoirs.

7.0 SUMMARY OF FLOWS AND DIVERSIONS

7.1 SOURIS RIVER NEAR SHERWOOD

The natural runoff near Sherwood for 2006 was 28 090 dam^3 (22,773 acre-feet). Depletions in Canada totaled 14 890 dam^3 (12,071 acre-feet). The additional water received from the Yellow Grass Ditch and Tatagwa Lake Drain Basins was 1 190 dam^3 (965 acre-feet). Total depletions in Canada were 13 700 dam^3 (11,107 acre-feet) more than the additional water received from the Yellow Grass Ditch and Tatagwa Lake Drain Basins. The total volume of water released from Boundary, Rafferty, and Alameda Reservoirs in Canada in 2006 was 6 558 dam^3 (5,317 acre-feet), representing 52 percent

of the recorded flow at Sherwood, or 23 percent of the computed natural runoff at Sherwood. A schematic representation of the 2006 flow volumes in the Souris River Basin above Sherwood is shown in Figure 2 and the summary of the natural flow computations is provided in Appendix A.

The flow of the Souris River at Sherwood was more than 0.113 cubic metres per second (4 cubic feet per second) except during the periods of January 1 through March 24, July 6 through July 9, July 24 through August 8, August 10 through September 16, October 29 through November 15, and November 26 through December 31, 2006. During those periods when the flow was less than 0.113 cubic metre per second (4 cubic feet per second), the Province of Saskatchewan did not divert, store, or use any water above what would have occurred under conditions of water-use development prevailing in the Saskatchewan portion of the basin prior to the construction of Boundary Dam, Rafferty Dam, and Alameda Dam. Accordingly, Saskatchewan complied with the 0.113 cubic metre per second (4 cubic feet per second) provision specified in Recommendation No. 1 of the Interim Measures.

7.2 LONG CREEK AND SHORT CREEK

Recorded runoff for Long Creek at the Western Crossing as it enters North Dakota was 520 dam^3 (422 acre-feet), or 2.0 percent of the long-term mean since 1959. Recommendation No. 2 of the Interim Measures was met with the increase of runoff on Long Creek between the Western and Eastern Crossings of 1 487 dam^3 (1,206 acre-feet).

Short Creek, which rises in North Dakota, contributed 2 590 dam^3 (2,100 acre-feet) to runoff in the Souris River above Sherwood.

7.3 SOURIS RIVER NEAR WESTHOPE

Recorded flow near Westhope during the period of June 1 through October 31, 2006, was 14 444 dam^3 (11,710 acre-feet). Except for eight days in June, 10 days in September, and 19 days in October, the flow was in compliance with the 0.566 cubic metre per second (20 cubic feet per second) minimum flow requirement as specified in Recommendation No. 3(a) of the Interim Measures for the entire period. From June to August the United States Fish and Wildlife Service released water from Dam 357 in order to drawdown Pool 357, and maintain a 20 cubic feet per second (0.57 cubic decametres per second) or greater release to Manitoba. By early September Pool 357 was almost dewatered. It was discovered that the concrete spillway with electric fish barrier at Dam 357 was constructed at an elevation that is 3.5 feet (1.07 metres) higher than the invert elevation of the water control structure, making it virtually impossible to completely dewater Pool 357. Water was released from Dam 341 to meet the 20 cubic feet per second (0.57 cubic decametres per second) minimum flow requirement. With Pool 357 in a very low condition, and with a minimal flow gradient, the discharges were highly influenced by wind direction. Discharges would increase with a southerly wind, and diminish or stop with a north wind. This resulted in releases from Dam 341 being increased to over 40 cubic feet per second (1.13 cubic decametres per second), to meet the minimum flow requirement.

Figure 5 illustrates the recorded flows at Westhope and at Wawanesa near the mouth of the Souris River in Manitoba.

8.0 WORKPLAN SUMMARY FOR 2007

The International Souris River Board was created by the International Joint Commission in April 2000 when it combined the Souris River basin responsibilities previously assigned to the Commission

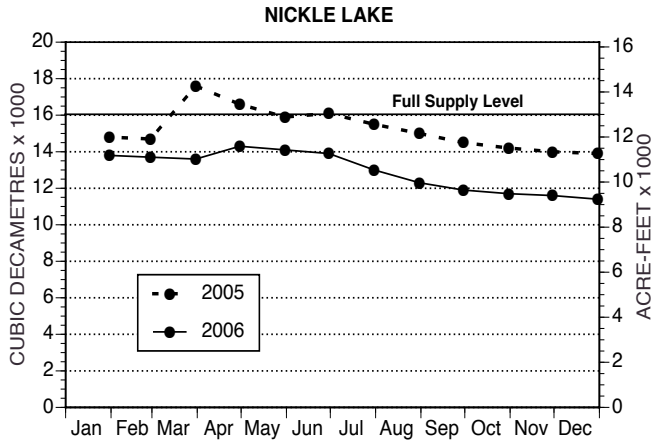
in two separate references by the governments of Canada and the United States. The two references were the International Souris River Board of Control Reference (1959) and the Souris-Red Rivers Engineering Board Reference (1948).

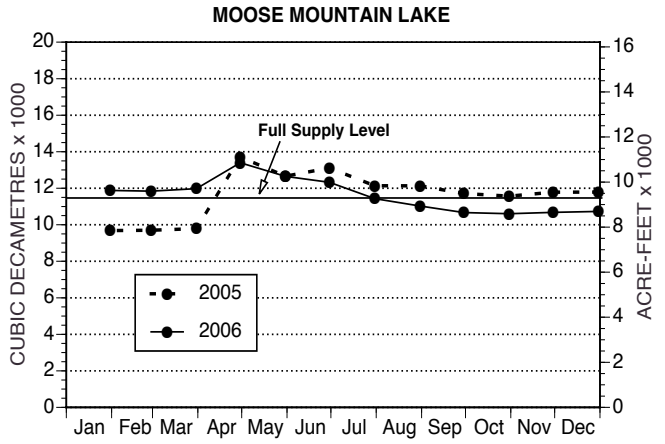
On June 9, 2005, the Board's mandate was changed further through an exchange of diplomatic notes, assigning water quality functions and the oversight for flood forecasting and operations to the Board. The consolidation of water quantity, water quality, and the oversight for flood forecasting and operations is a step in the evolution of the Board as it moves towards an integrated approach to transboundary water issues in the Souris River basin.

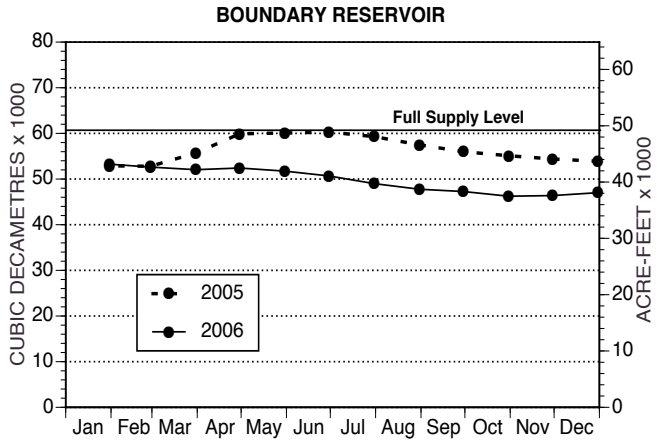
The Board determined that a work plan would be beneficial in helping the Board identify resource requirements and deliver on results. There was discussion on whether the workplan should include all activities or just special projects. The Board agreed that the workplan should include costs related to normal Board activities such as meetings, the annual report, and special projects. The three-year work plan for the International Red River Board was provided as an example.

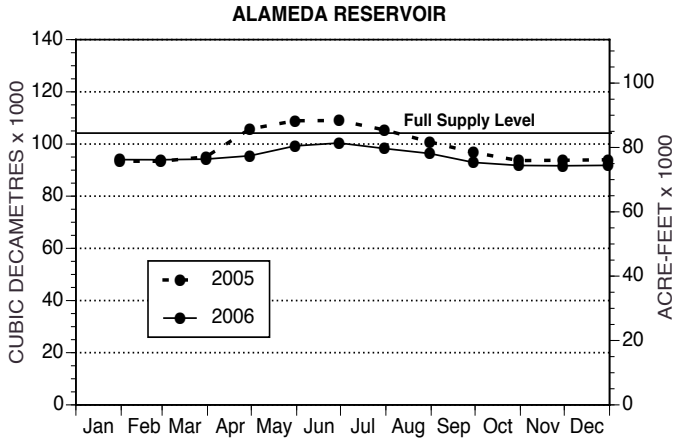
Figure 1

MONTH END CONTENTS OF RESERVOIRS IN CANADA FOR THE YEARS 2005 AND 2006









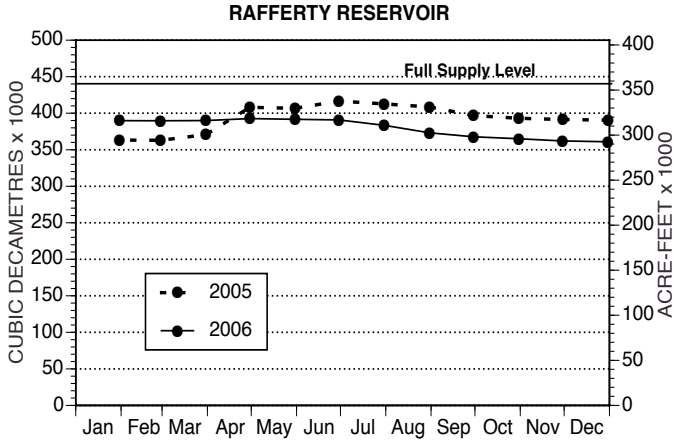


Figure 2

SCHEMATIC REPRESENTATION OF 2006 FLOWS IN THE SOURIS RIVER BASIN ABOVE SHERWOOD, NORTH DAKOTA, U.S.A.

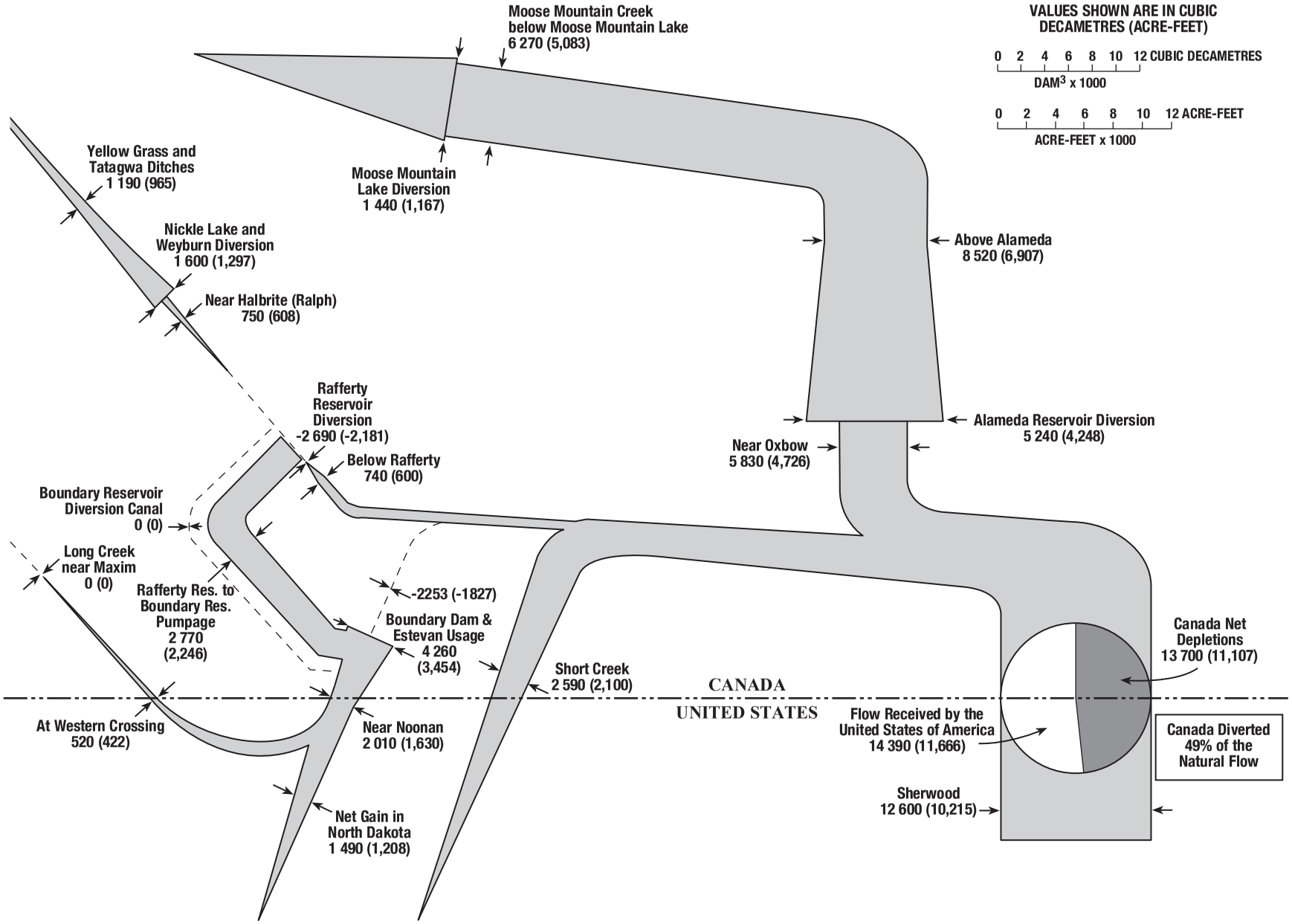
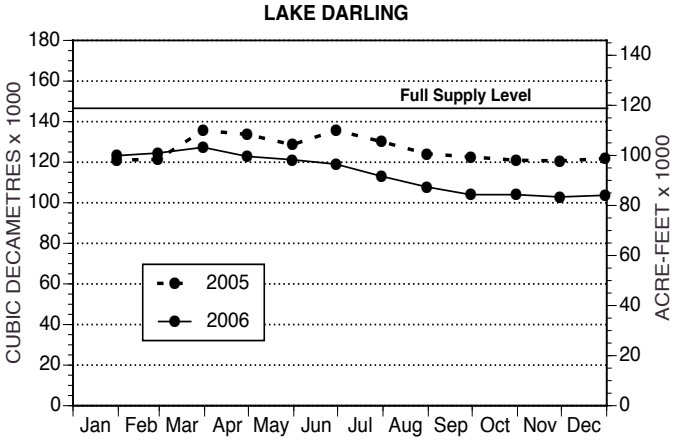
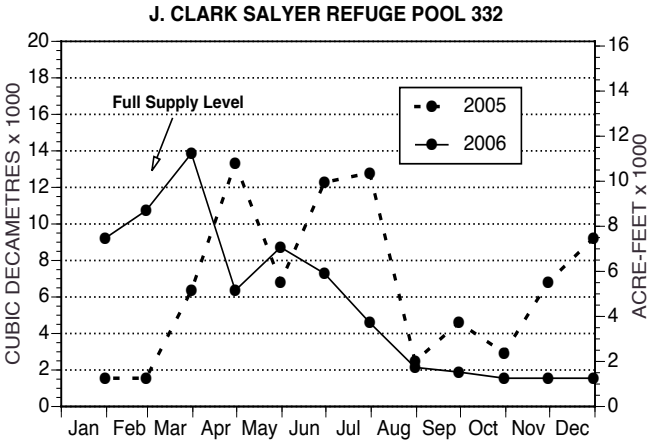
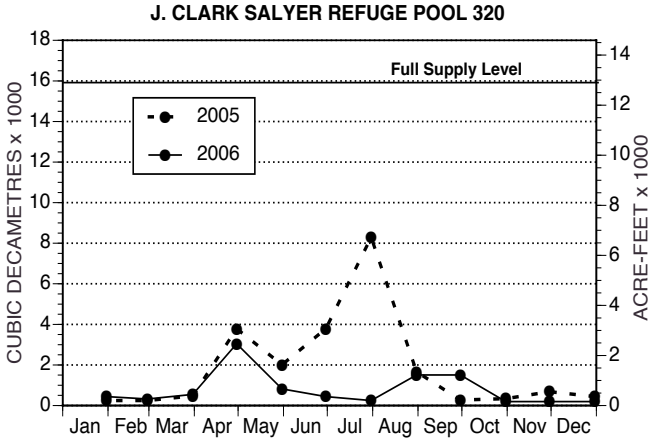


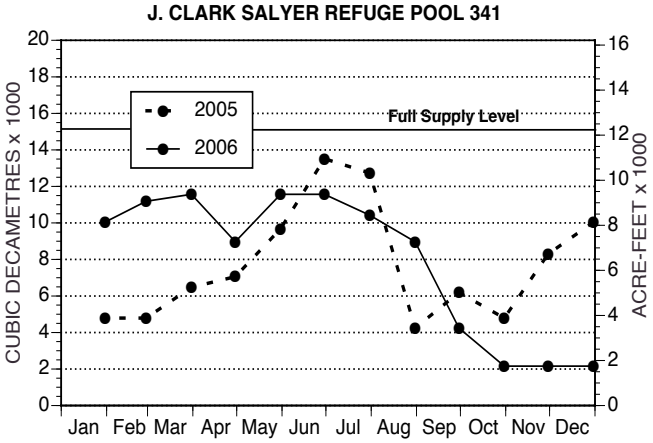
Figure 3

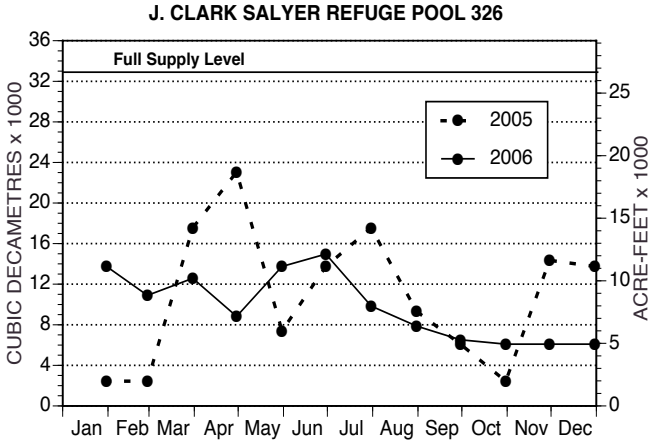
MONTH END CONTENTS OF RESERVOIRS IN USA FOR THE YEARS 2005 AND 2006











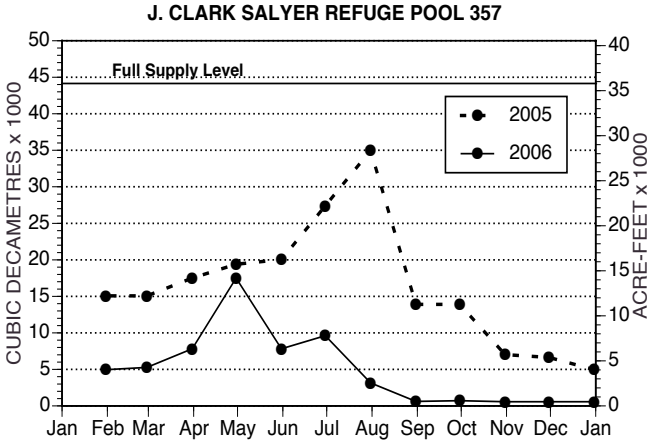


Figure 4

MONTHLY RESERVOIR RELEASES FOR THE YEAR 2006

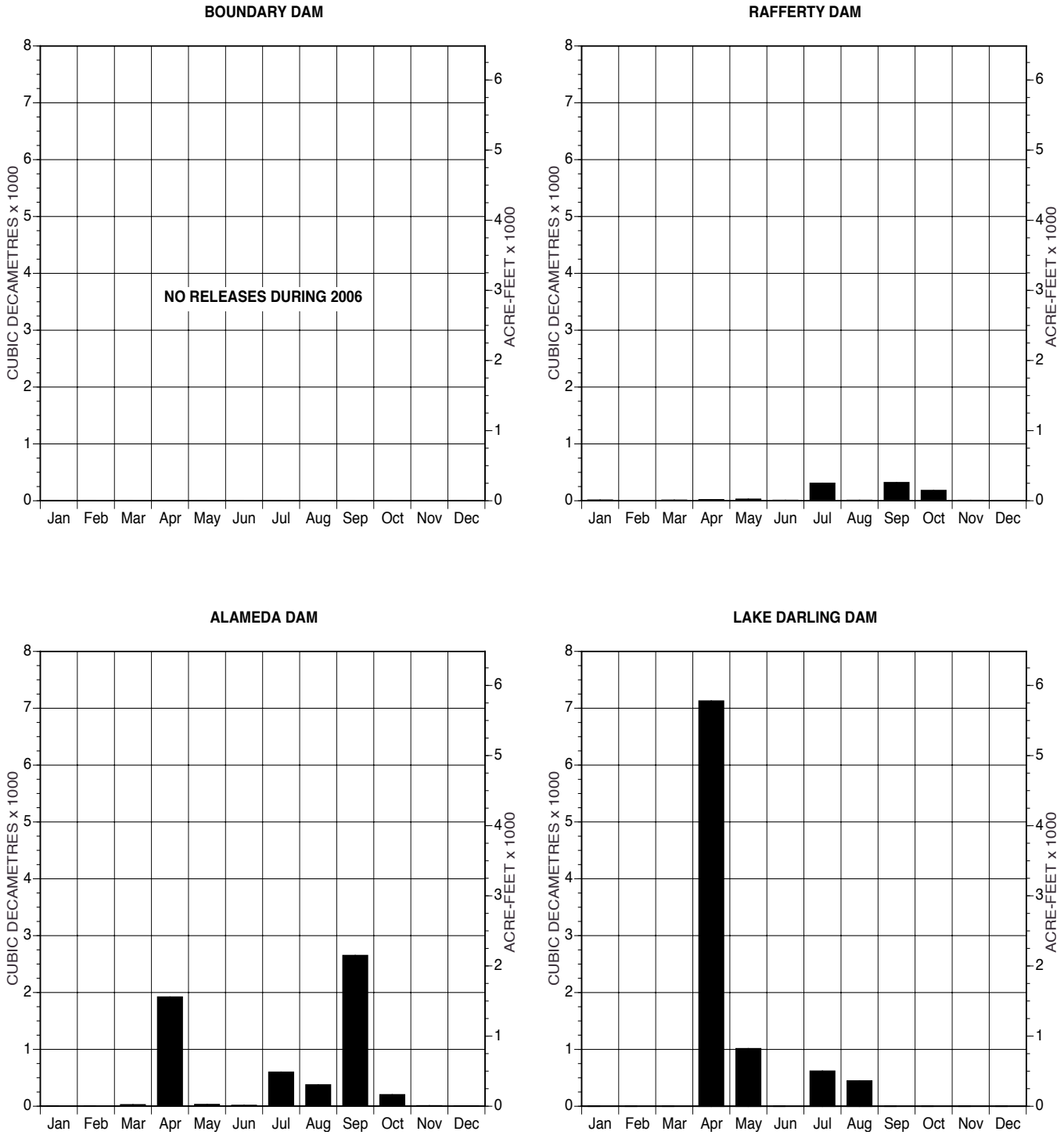
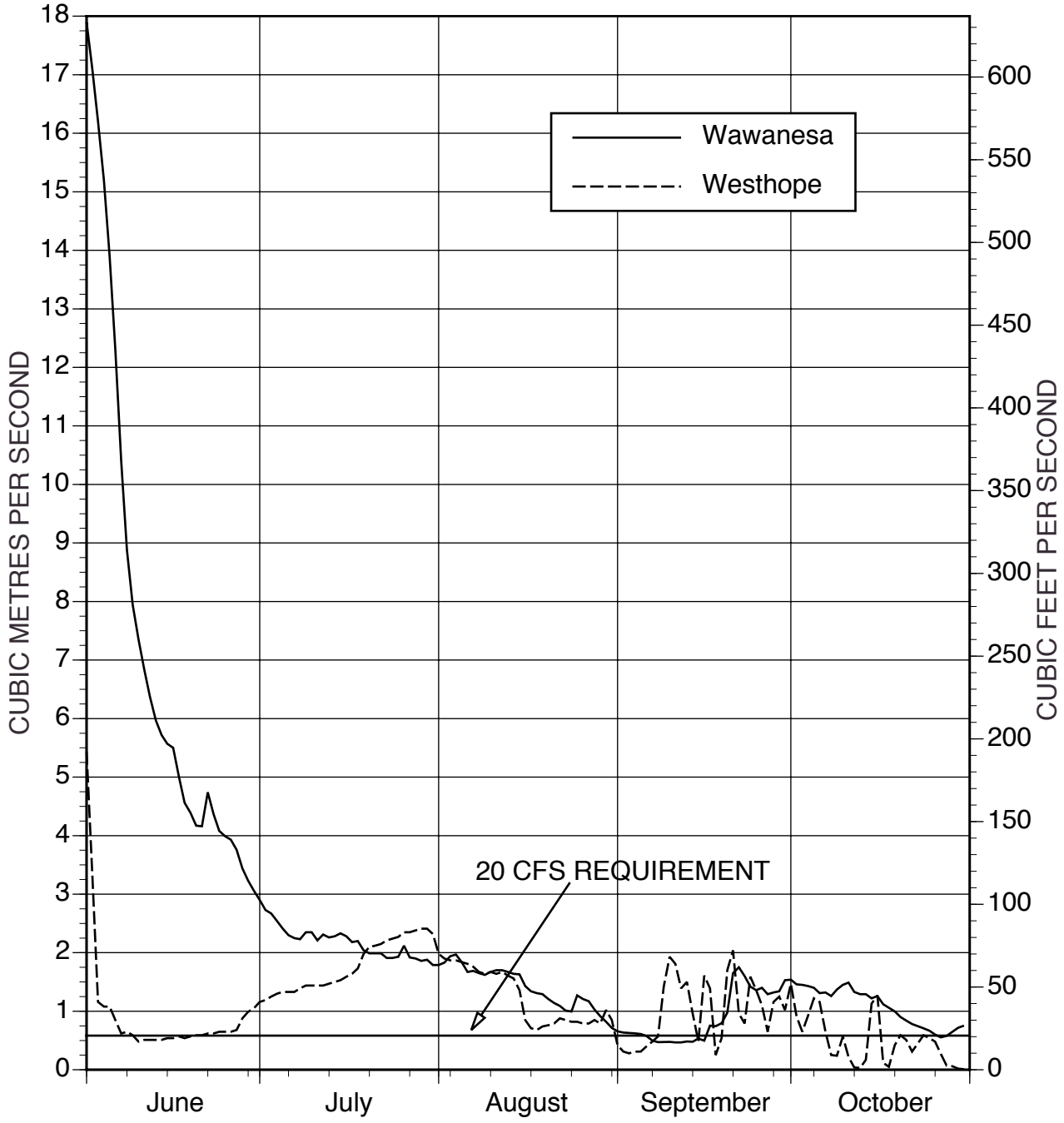


Figure 5

SOURIS RIVER NEAR WESTHOPE
AND
SOURIS RIVER NEAR WAWANESA

June 1, 2006 to October 31, 2006



Map of the Souris River Drainage Basin

INTERNATIONAL JOINT COMMISSION • COMMISSION MIXTE INTERNATIONALE 1909

SASKATCHEWAN
MANITOBA
MONTANA
NORTH DAKOTA
Regina
Weyburn
Estevan
Brandon
Bottineau
Minot
Williston
Sidney
Rugby
Devils Lake
Moose Mountain Provincial Park
Spruce Woods Provincial Park
Turtle Mountain Provincial Park
Riding Mountain National Park
Lostwood NWR
Des Lacs NWR
Upper Souris NWR
J. Clark Salyer NWR
Lake Sakakawea
SAKIMAY I.R. 74
COWESSESS I.R. 73
KAHKEWISTAHAW I.R. 72
OCHAPOWACE I.R. 71
ASSINIBOINE I.R. 76
PIAPOT I.R. 75
OCEAN MAN I.R. 69
PHEASANT RUMP NAKOTA BAND I.R. 68
WHITE BEAR I.R. 70
KEESEEKOOWENIN 61
ROLLING RIVER 67
BIRDTAIL CREEK 57
SIOUX VALLEY DAKOTA NATION
CANUPAWAKPA DAKOTA
SWAN LAKE 7
TURTLE MOUNTAIN INDIAN RESERVATION
SPIRIT LAKE INDIAN RESERVATION
FORT PECK INDIAN RESERVATION
FORT BERTHOLD INDIAN RESERVATION
05NE003
05NE002
05NB031
05NC002
05NC001
05ND009
05ND008
05NG024
05NG008
05NG809
05NG801
05NG007
05NG021
05NG012
05NG001
05NG003
05NG806
05NG803
05NB018
05NB020
05NB040
05NB016
05NB033
05NB017
05NB041
05NB034
05NA005
05NA006
05NB014
05NB035
05ND010
05NF010
05NG807
05NG020
05NG023
05ND011
05NF803
05ND012
05ND004
05NF006
05NG014
05NA004
05NB039
05NB038
05NB036
05NB032
05NB001
05NB012
05NB021
05NF805
05NF804
05NF007
05NF002
5123000
5124000
5123990
DAM #357
5114000
5113750
5113600
05NA003
5113520
5123900
DAM #341
DAM #332
DAM #326
DAM #320
5123510
5123400
5122000
POOL D-1
POOL D-2
POOL D-3/3A
POOL D-4/4A
POOL D-5
POOL D-6
POOL D-7
POOL D-8
5116135
5115500
DAM87
DAM96
5116000
5116500
5116100
5117500
TOWN8
LGNN8
5120000
5120500
SWRN8
5119410
VLVN8
5120180
Lake Sakakawea
Lake Darling
Lake Metigoshe
Whitewater Lake
Pelican Lake
Devils Lake
Boundary Dam Reservoir
Rafferty Reservoir
Alameda Reservoir
Oxbow Reservoir
Souris River
Pipestone Creek
Moose Mountain Creek
Antler River
Souris River
Des Lacs River
Des Lacs Lake
Middle Des Lacs Lake
Upper Des Lacs Lake
Lower Des Lacs Lake
Kenoseal Lake
Lake Darling
Lake Sakakawea
Lake Metigoshe
Whitewater Lake
Pelican Lake
Devils Lake
Lumsden
Edenwold
Indian Head
Marieval
Spy Hill
Foxwarren
St Lazare
Birtle
Solsgirth
Shoal Lake
Eiphinstone
Erickson
McCreary
Plumas
Langruth
Eden
Arden
Neepawa
Gladstone
Bethany
Minnedosa
Basswood
Beulah
Decker
McAuley
Cardale
Hamiota
Rapid City
Miniota
Rivers
Lenore
Chater
Carberry
Alexander
Virden
Oak Lake
Treherne
Holland
Glenboro
Wawanesa
Baldur
Mariapolis
La Riviere
Pilot Mound
Neelin
Clearwater
Killarney
Boissevain
Minto
Ninette
Cartwright
Hansboro
Sarles
Hannah
Saint John
Rolla
Calvin
Rock Lake
Munich
Egeland
Calio
Bisbee
Mylo
Perth
Cando
Starkweather
Maza
Wolford
Knox
York
Leeds
Churchs Ferry
Brinsmade
Minnewaukan
Esmond
Maddock
Oberon
Sheyenne
New Rockford
Hamberg
Fessenden
Harvey
Martin
Anamoose
Drake
Balta
Rolette
Willow City
Barton
Towner
Granville
Surrey
Karlsruhe
Velva
Voltaire
Bergen
Balfour
Kief
Butte
Ruso
Benedict
Max
Garrison
Douglas
Ryder
Makoti
Plaza
New Town
Parshall
Stanley
Palermo
Ross
White Earth
Tioga
Ray
Epping
Wheelock
Spring Brook
Williston
Froid
Brockton
Culbertson
Bainville
Andes
Enid
Sidney
Alexander
Rawson
Arnegard
Watford City
Dagmar
Reserve
Antelope
Grenora
Hanks
Alamo
Wildrose
Powers Lake
Donnybrook
Carpio
Berthold
Burlington
Des Lacs
Minot
Surrey
Sawyer
Kenmare
Upham
Lansford
Grano
Mohall
Maxbass
Newburg
Russell
Kramer
Gardena
Overly
Dunseith
Westhope
Landa
Souris
Antler
Sherwood
Loraine
Tolley
Glenburn
Bantry
Deering
Carrington
Gaines borough
Pierson
Waskada
Goodlands
Lyleton
Melita
Napinka
Deloraine
Medora
Tilston
Broomhill
Lauder
Sinclair
Reston
Pipestone
Deleau
Hartney
Virden
Alexander
Oak Lake
Carlyle
Mandan
Wauchope
Redvers
Antler
Storthoaks
Auburn
Lampman
Steelman
Frobisher
Alameda
Oxbow
Glen Ewen
Carnduff
Carievale
Gainsborough
Hirsch
Bienfait
Torquay
Outram
Oungre
Bromhead
Tribune
Gladmar
Lake Alma
Minton
Beaubier
Sybouts
Daleview
Outlook
Raymond
Dooley
Westby
Redstone
Plentywood
Fortuna
Noonan
Larson
Crosby
Ambrose
Columbus
North Portal
Portal
Lignite
Bowbells
Kipling
Windthorst
Peebles
Montmartre
Wapella
Moosomin
Fleming
Kirkella
Elkhorn
Welwyn
Rocanville
Broadview
Grenfell
Wolseley
Kronau
Davin
Vibank
Odessa
Kendal
Rouleau
Wilcox
Riceton
Milestone
Lewvan
Coffax
Osage
Tyvan
Francis
Sedley
Lang
Truax
Dummer
Parry
Edgeworth
Bures
Pangman
Amulet
Ogema
Moreland
Yellow Grass
Talmage
McTaggart
Trossachs
Griffin
Stoughton
Forget
Kisbey
Arcola
Mair
Parkman
Cromer
Scarth
Carberry
Ceylon
Fodville
Neptune
Maxim
Macoun
Midale
Halbrite
Benson
Browning
Huntoon
Fillmore
Creelman
Handsworth
Corning
Vandura
Kelso
Wawota
Fairlight
Maryfield
Cedoux
Coffax
Lang
Milestone
Gladmar
Lake Alma
Minton
Beaubier
Sybouts
Daleview
Outlook
Raymond
Dooley
Westby
Redstone
Plentywood
Antelope
Reserve
Dagmar
Froid
Brockton
Culbertson
Bainville
Andes
Enid
Sidney
Alexander
Rawson
Arnegard
Watford City
Epping
Wheelock
Spring Brook
Williston
Ray
Tioga
White Earth
Stanley
Palermo
Ross
New Town
Parshall
Plaza
Makoti
Ryder
Douglas
Max
Benedict
Ruso
Garrison
Butte
Kief
Balfour
Bergen
Voltaire
Velva
Karlsruhe
Granville

APPENDIX A

Determination of Natural Flow of Souris River at International Boundary (Sherwood)

DETERMINATION OF NATURAL FLOW OF SOURIS RIVER AT INTERNATIONAL BOUNDARY (SHERWOOD)

All Quantities Reported In Cubic Decametres (dam3)

FOR THE PERIOD: JANUARY 1 TO DECEMBER 31, 2006

LONG CREEK BASIN

LARSEN RESERVOIR				BOUNDARY RESERVOIR								
				INFLOW	OUTFLOW							
1	2	3	4	5 *	6	7	8	9	10	11	12 *	13
STORAGE CHANGE	EVAPORATION	DIVERSION	TOWN OF RADVILLE PUMPAGE	LONG CREEK AT EASTERN CROSSING	LONG CREEK NEAR ESTEVAN	ESTEVAN PIPELINE	DIVERSION CANAL	TOTAL (OUTFLOW)	DIVERSION	MINOR PROJECT DIVERSION	U.S.A. DIVERSION BETWEEN WESTERN & EASTERN CROSSING	**TOTAL DIVERSION LONG CREEK**
-150	190	40 (1+2)	30	2010 / 2770 PIPELINE	220	2220	0	2440 (6+7+8)	2340 (5-9)	840	340	3590 **(3+4+10+11+12)**

UPPER SOURIS RIVER BASIN - ABOVE ESTEVAN

NICKLE LAKE RESERVOIR					ROUGHBARK RESERVOIR			RAFFERTY RESERVOIR				
14	15	16	17	18	19	20	21	22	23	24	25	26
STORAGE CHANGE	EVAPORATION	CITY OF WEYBURN PUMPAGE	DIVERSION	CITY OF WEYBURN RETURN FLOW	STORAGE CHANGE	EVAPORATION	DIVERSION	INFLOW	OUTFLOW	DIVERSION	MINOR PROJECT DIVERSION	**TOTAL DIVERSION UPPER SOURIS RIVER**
-2500	2720	2080	2300 (14+15+16)	700	-340	390	50 (19+20)	820	740 / 2770 PIPELINE	-2690 (22-23)	1560	520 **(17-18+21+24+25)**

LOWER SOURIS RIVER--ESTEVAN TO SHERWOOD

27	28 *	29	30
CITY OF ESTEVAN NET PUMPAGE	SHORT CREEK DIVERSIONS IN U.S.A.	MINOR PROJECT DIVERSION	**TOTAL DIVERSION LOWER SOURIS RIVER**
1920	1450	1070	4440 **(27+28+29)**

MOOSE MOUNTAIN CREEK BASIN

MOOSE MOUNTAIN LAKE			ALAMEDA RESERVOIR				
31	32	33	34	35	36	37	38
STORAGE CHANGE	EVAPORATION	DIVERSION	STORAGE CHANGE	EVAPORATION	DIVERSION	MINOR PROJECT DIVERSIONS	**TOTAL DIVERSIONS MOOSE MOUNTAIN CREEK BASIN**
-1100	2540	1440 (31+32)	-2200	7440	5240 (34+35)	1450	8130 **(33+36+37)**

NON-CONTRIBUTORY BASINS

39	40	41
YELLOW GRASS DITCH	TATAGWA LAKE DRAIN	**TOTAL ADDITIONS**
1140	50	1190 (39+40)

SUMMARY OF NATURAL FLOW

42	43 *	44	45	46	47
TOTAL DIVERSION SOURIS RIVER BASIN	RECORDED FLOW AT SHERWOOD	NATURAL FLOW AT SHERWOOD	U..S.A. SHARE	FLOW RECEIVED BY U.S.A.	**SURPLUS (+) OR DEFICIT (-) TO U.S.A.**
16680 (13+26+30+38)	12600	28090 (42+43-41)	40% OF 44: 14050 (50% OF 44)	14390 (12+28+43)	(46-45) 40% SHARE / (46-45) 50% SHARE **+340**

RECOMMENDATION - SECTION 2
ANNUAL FLOW OF LONG CREEK

48	49 *	50
RECORDED FLOW AT WESTERN CROSSING	RECORDED FLOW AT EASTERN CROSSING	**SURPLUS (+) OR DEFICIT (-) FROM U.S.A.**
520	2010	**+1490** (49-48)

*** DATA CONTRIBUTED BY U.S.G.S.**

APPENDIX B

Equivalents of Measurements

EQUIVALENTS OF MEASUREMENTS

The following is a list of equivalents of measurement that have been agreed to for use in reports of the International Souris River Board.

1 centimetre equals 0.39370 inch
1 metre equals 3.2808 feet
1 kilometre equals 0.62137 mile

1 hectare equals 10 000 square metres
1 hectare equals 2.4710 acres
1 square kilometre equals 0.38610 square mile

1 cubic metre per second equals 35.315 cubic feet per second

The metric (SI) unit that replaces the British acre-foot unit is the cubic decametre (dam^3), which is the volume contained in a cube 10 m x 10 m x 10 m or 1 000 cubic metres.

1 cubic decametre equals 0.81070 acre-feet
1 cubic metre per second flowing for 1 day equals 86.4 cubic decametres
1 cubic foot per second flowing for 1 day equals 1.9835 acre-feet

APPENDIX C

Interim Measures as Modified in 2000

INTERIM MEASURES AS MODIFIED IN 2000

APPENDIX A TO THE DIRECTIVE TO THE INTERNATIONAL SOURIS RIVER BOARD

1. The Province of Saskatchewan shall have the right to divert, store, and use waters which originate in the Saskatchewan portion of the Souris River basin, provided that such diversion, storage, and use shall not diminish the annual flow of the river at the Sherwood Crossing more than 50 percent of that which would have occurred in a state of nature, as calculated by the International Souris River Board. For the purpose of these calculations, any reference to "annual" and "year" is intended to mean the period January 1 through December 31.

   For the benefit of riparian users of water between the Sherwood Crossing and the upstream end of Lake Darling, the Province of Saskatchewan shall, so far as is practicable, regulate its diversions, storage, and uses in such a manner that the flow in the Souris River channel at the Sherwood Crossing shall not be less than 0.113 cubic metre per second (4 cubic feet per second) when that much flow would have occurred under the conditions of water use development prevailing in the Saskatchewan portion of the Souris River basin prior to construction of the Boundary Dam, Rafferty Dam, and Alameda Dam.

   Under certain conditions, a portion of the North Dakota share will be in the form of evaporation from Rafferty and Alameda Reservoirs. During years when these conditions occur, the minimum amount of flow actually passed to North Dakota will be 40 percent of the annual natural flow volume at the Sherwood Crossing. This lesser amount is in recognition of Saskatchewan's operation of Rafferty Dam and Alameda Dam for flood control in North Dakota and of evaporation as a result of the project.

   a. Saskatchewan will deliver a minimum of 50 percent of the annual natural flow volume at the Sherwood Crossing in every year except in those years when the conditions given in (i) or (ii) below apply. In those years, Saskatchewan will deliver a minimum of 40 percent of the annual natural flow volume at the Sherwood Crossing.

      i. The annual natural flow volume at Sherwood Crossing is greater than 50 000 cubic decametres (40,500 acre-feet) and the current year June 1 elevation of Lake Darling is greater than 486.095 metres (1594.8 feet); or

      ii. The annual natural flow volume at Sherwood Crossing is greater than 50 000 cubic decametres (40,500 acre-feet) and the current year June 1 elevation of Lake Darling is greater than 485.79 metres (1593.8 feet), and since the last occurrence of a Lake Darling June 1 elevation of greater than 486.095 metres (1594.8 feet) the elevation of Lake Darling has not been less than 485.79 metres (1593.8 feet) on June 1.

   b. Notwithstanding the annual division of flows that is described in (a), in each year Saskatchewan will, so far as is practicable as determined by the Board, deliver to North Dakota prior to June 1, 50 percent of the first 50 000 cubic decametres (40,500 acre-feet) of natural flow which occurs during the period January 1 to May 31. The intent of this division of flow is to ensure that North Dakota receives 50 percent of the rate and volume of flow that would have occurred in a state of

nature to try to meet existing senior water rights.

c. Lake Darling Reservoir and the Canadian reservoirs will be operated (insofar as is compatible with the Projects' purposes and consistent with past practices) to ensure that the pool elevations, which determine conditions for sharing evaporation losses, are not artificially altered. The triggering elevation of 485.79 metres (1593.8 feet) for Lake Darling Reservoir is based on existing water uses in North Dakota, including refuges operated by the U.S. Fish and Wildlife Service. Each year, operating plans for the refuges on the Souris River will be presented to the Board. Barring unforeseen circumstances, operations will follow said plans during each given year. Lake Darling Reservoir will not be drawn down for the sole purpose of reaching the elevation of 485.79 metres (1593.8 feet) on June 1.

   Releases will not be made by Saskatchewan Watershed Authority from the Canadian reservoirs for the sole purpose of raising the elevation of Lake Darling Reservoir above 486.095 metres (1594.8 feet) on June 1.

d. Flow releases to the United States should occur (except in flood years) in the pattern which would have occurred in a state of nature. To the extent possible and in consideration of potential channel losses and operating efficiencies, releases from the Canadian dams will be scheduled to coincide with periods of beneficial use in North Dakota. Normally, the period of beneficial use in North Dakota coincides with the timing of the natural hydrograph, and that timing should be a guide to releases of the United States portion of the natural flow.

e. A determination of the annual apportionment balance shall be made by the Board on or about October 1 of each year. Any shortfall that exists as of that date shall be delivered by Saskatchewan prior to December 31.

f. The flow release to the United States may be delayed when the State of North Dakota determines and notifies Saskatchewan through the Board that the release would not be of benefit to the State at that time. The delayed release may be retained for use in Saskatchewan, notwithstanding the 0.113 cubic metre per second (4 cubic feet per second) minimum flow limit, unless it is called for by the State of North Dakota through the Board before October 1 of each year. The delayed release shall be measured at the point of release and the delivery at Sherwood Crossing shall not be less than the delayed release minus the conveyance losses that would have occurred under natural conditions between the point of release and the Sherwood Crossing. Prior to these releases being made, consultations shall occur between the Saskatchewan Watershed Authority, the U.S. Fish and Wildlife Service, and the State of North Dakota. All releases will be within the specified target flows at the control points.

2. Except as otherwise provided herein with respect to delivery of water to the Province of Manitoba, the State of North Dakota shall have the right to divert, store, and use the waters which originate in the North Dakota portion of the Souris River basin together with the waters delivered to the State of North Dakota at the Sherwood Crossing under Recommendation (1) above; provided, that any diversion, use, or storage of Long Creek water shall not diminish the annual flow at the eastern crossing of Long Creek into Saskatchewan below the annual flow of said Creek at the western crossing into North Dakota.

3. (a) In addition to the waters of the Souris River basin which originate in the Province of Manitoba, that Province shall have the right, except during periods of severe drought, to receive for its own use and the State of North Dakota shall deliver from any available source during the months of June, July, August, September, and October of each year, six thousand and sixty-nine (6,069) acre-feet of water at the Westhope Crossing regulated so far as practicable at the rate of twenty (20) cubic feet per second except as set forth hereinafter: provided, that in delivering such water to Manitoba no account shall be taken of water crossing the boundary at a rate in excess of the said 20 cubic feet per second.

   (b) In periods of severe drought when it becomes impracticable for the State of North Dakota to provide the foregoing regulated flows, the responsibility of the State of North Dakota in this connection shall be limited to the provision of such flows as may be practicable, in the opinion of the said Board of Control, in accordance with the objective of making water available for human and livestock consumption and for household use. It is understood that in the circumstances contemplated in this paragraph the State of North Dakota will give the earliest possible advice to the International Souris River Board of Control with respect to the onset of severe drought conditions.

4. In event of disagreement between the two sections of the International Souris River Board of Control, the matters in controversy shall be referred to the Commission for decision.

5. The interim measures for which provision is herein made shall remain in effect until the adoption of permanent measures in accordance with the requirements of questions (1) and (2) of the Reference of January 15, 1940, unless before that time these interim measures are qualified or modified by the Commission.

APPENDIX D

Board Directive from January 18, 2007

DIRECTIVE TO THE INTERNATIONAL SOURIS RIVER BOARD

The International Souris River Board was created by the International Joint Commission in April 2000 when it amalgamated the Souris River basin responsibilities previously assigned to the Commission in two separate references by the governments of Canada and the United States. The two references were the International Souris River Board of Control Reference (1959) and the Souris-Red Rivers Engineering Board Reference (1948). The International Souris River Board's mandate changed further through an exchange of diplomatic notes on June 9, 2005 assigning water quality functions and the oversight for flood forecasting and operations as described in Section 4 below. The consolidation of water quantity, water quality, and the oversight for flood forecasting and operations is a step in the evolution of the International Souris River Board as it moves towards an integrated approach to transboundary water issues in the Souris River basin.

This directive replaces the April 11, 2002 Directive to the International Souris River Board and sets out the mandate under which the Board will operate.

1. Pursuant to the Boundary Waters Treaty of 1909 and related agreements, responsibilities have been conferred on the Commission to ensure compliance with apportionment measures for the waters of the Souris River, to investigate and report on water requirements and uses as they impact the transboundary waters of the Souris River basin, and to assist in the implementation and review of the Joint Water Quality Monitoring Program pursuant to the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin.

2. The apportionment measures derive from the approvals given by the governments of Canada and the United States, by letters of March 20, 1959 and April 3, 1959 respectively, to the recommendations made by the Commission in paragraph 22 of its report to the governments of March 19, 1958. Subsequently, with the signing of the Canada-United States Agreement for Water Supply and Flood Control in the Souris River basin on October 26, 1989 (hereafter referred to as the 1989 Agreement), the Interim Measures for apportionment of the Souris River at the Saskatchewan-North Dakota boundary were revised as described in Annex B of the 1989 Agreement. By letters of February 28, 1992, the Commission was requested to monitor compliance with the measures as modified in the 1989 Agreement. By letters of December 20 and 22, 2000, the governments amended Annex B of the 1989 Agreement. The attached Appendix A is a consolidation of the apportionment measures against which the Commission is to monitor compliance.

3. By letters of January 12, 1948, the governments requested the Commission to undertake investigations of water requirements and uses arising out of existing dams and other works or projects in the mid-continent portion of the Canada-United States boundary, including the Souris River basin, and to make advisory recommendations.

4. By exchange of diplomatic notes between the governments of Canada and the United States dated January 14 and June 9, 2005, the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin was formally revised to include a reference pursuant to Article IX of the Boundary Waters Treaty which assigned water quality responsibilities contained in the 1989 Agreement to the Commission. The Commission was requested to assist with the implementation and review of the Joint Water Quality Monitoring Program. On October 21, 2005 at the October 2005 Commission's meeting with governments, the U.S. State Department read a statement into the Commission's formal record that the U.S. State Department is of the opinion the Commission has the authority and has obtained the notification it needs from the U.S. State Department to proceed with carrying out the flood related responsibilities for the Souris River. On April 6, 2006 at the April 2006 Commission's meeting with governments, the Department of Foreign Affairs and International Trade indicated that the Board should be assigned these responsibilities. It is recognized that Article X of the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River basin designates the entities responsible for operation and maintenance of the improvements mentioned in the 1989 Agreement and that the operations will be in accordance with the Operating Plan shown in Annex A of the 1989 Agreement. The Department of Army is the entity designated responsible for flood operations within the United States. The Government of Saskatchewan is the Canadian entity designated responsible for flood operations within the Canadian Province of Saskatchewan.

5. The Board's mandate is to support the Commission's initiative to explore and encourage the development of local and regional capacity with the objective of preventing and resolving transboundary disputes regarding the waters and aquatic ecosystem of the Souris River and its tributaries and aquifers. This would be accomplished through the application of best available science and knowledge of the aquatic ecosystem of the basin and an awareness of the needs, expectations and capabilities of residents of the Souris River basin. The Board's mandate will be accomplished by performing the tasks identified in Clause 6 below.

6. The Board's duties shall be to:

   (i) Maintain an awareness of existing and proposed developments, activities, conditions, and issues in the Souris River basin that may have an impact on transboundary water levels, flows, water quality, and aquatic ecosystem health and inform the Commission about existing or potential transboundary issues.

   (ii) Oversee the implementation of compliance with the Interim Measures As Modified For Apportionment of the Souris River as described in Appendix A of this document by:
      - identifying an adequate hydro-climatic monitoring network to support the determination of natural flow and apportionment balance,
      - encouraging the appropriate authorities to establish and maintain hydro-climatic monitoring and information collection networks and reporting

systems to ensure suitable information is available as required for the determination of natural flow and apportionment balance,

- informing the Commission, in a timely manner, of critical water supply or flow conditions in the basin,
- encouraging appropriate authorities to take steps to ensure that apportionment measures are met, and
- preparing an annual report and submitting it to the Commission.

(iii) Assist the Commission in the review of a Joint Water Quality Monitoring Program (referred to hereafter as "the Program") by:

- developing recommendations on the Program and the setting of water quality objectives,
- exchanging data provided by the Program on a regular basis,
- collating, interpreting, and analyzing the data provided by the Program,
- reviewing the Program and the water quality objectives at least every five years and developing recommendations, as appropriate, to the Commission to improve the Program and the objectives, and
- preparing an annual report containing:
  - a summary of the principal activities of the Board during the year with respect to the Program,
  - a summary of the principal activities affecting water quality in the Souris River Basin during the year,
  - a summary of the collated, interpreted, and analyzed data provided by the Program,
  - a summary of the water quality of the Souris River at the two locations at which it crosses the International Boundary,
  - a section summarizing any definitive changes in the monitored parameters and the possible causes of such changes,
  - a section discussing the water quality objectives for the Souris River at the Saskatchewan/North Dakota boundary and at the North Dakota/Manitoba boundary as established and revised pursuant to the 1989 Agreement,
  - a section summarizing other significant water quality changes and the possible causes of such changes, and
  - recommendations on new water quality objectives or on how existing water quality objectives can be met, including suggestions on water quality as it relates to water quantity during periods of low flow, in the event that the annual report indicates that the water quality objectives have not been attained as a result of activities pursued under the 1989 Agreement.

(iv) Perform an oversight function for flood operations in cooperation with the designated entities identified in the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin by:

- ensuring mechanisms are in place for coordination of data exchange, flood forecasts and communications related to flood conditions and operations;
- determining whether the operations under the 1989 Agreement should proceed based on the Flood Operation or Non-Flood Operation of the Operating Plan, which is Annex A to the 1989 Agreement, using its criteria and informing designated agencies of this determination;
- reporting to the Commission on any issues related to flood operations and management; and
- providing the Commission and the designated entities under the 1989 Agreement recommendations on how flood operations and coordination activities could be improved.

(v) Report on aquatic ecosystem health issues in the watershed, regularly informing the Commission on the state and implications of aquatic ecosystem health, and encourage the appropriative authorities to establish and maintain water quality and other monitoring and information collection networks and reporting systems to ensure suitable information is available as required for the determination of the health of the aquatic ecosystem.

(vi) Carry out such other studies or activities as the Commission may, from time to time, request.

(vii) Prepare an annual work plan including both routine board activities and new initiatives planned to be conducted in the subsequent year. The work plan shall be submitted annually to IJC for review.

7. The Board shall provide opportunities for the public to be involved in its work, including at least one public meeting in the basin each year.

8. The Board shall coordinate and collaborate with other agencies and institutions both within and outside the Souris River basin as may be needed or desirable, and facilitate the timely dissemination of pertinent information within the basin. The Board shall keep the Commission informed of these activities.

9. The Board shall have an equal number of members from each country. The Commission shall normally appoint each member for a three-year term. Appointments may be renewed for additional terms. Members shall act in their personal and professional capacity, and not as representatives of their countries, agencies or institutions. The Commission shall appoint Canadian and United States co-chairs of the Board and will strive to appoint chairs with complementary expertise that encompasses a broad spectrum of basin issues.

10. The co-chairs of the Board shall be responsible for maintaining proper liaison between the Board and the Commission, and among the Board members.

11. The co-chairs shall ensure that members of the Board are informed of all instructions, inquiries, and authorizations received from the Commission and also of activities undertaken by or on behalf of the Board, progress made, and any developments affecting such progress.

12. The co-chairs may appoint secretaries of the Board who, under the general supervision of the co-chairs, shall carry out such duties as are assigned by the co-chairs or the Board as a whole.

13. The Board may establish such committees and working groups as may be required to fulfill its responsibilities in a knowledgeable and effective manner. The Commission shall be kept informed of the duties and composition of any committee or working group.

14. Unless other arrangements are made with the Commission, members of the Board, committees, or working groups shall make their own arrangements for reimbursement of necessary expenditures for travel or other related expenses.

15. The Board shall inform the Commission in advance of plans for any meetings, or other means of involving the public in Board deliberations, and shall report to the Commission, in a timely manner, on these and any other presentations or representations made to the Board.

16. The Board shall conduct its public outreach activities in accordance with the Commission's public information policies and shall maintain files in accordance with the Commission policy on segregation of documents.

17. Prior to their release, the Board shall provide the text of media releases and other public information materials to the Secretaries of the Commission for review by the Commission's Public Information Officers.

18. The Board shall submit an annual report covering all of its activities, including the annual report regarding the Program and the work plan, as described in Section 6 above, to the Commission, at least three weeks in advance of the Commission's fall semi-annual meeting, and the Board shall submit other reports as the Commission may request or the Board may feel appropriate in keeping with this Directive. Reports shall be submitted in a format suitable for public release and electronic copies shall be provided to each of the Commission's section offices.

19. Reports, including annual reports, minutes and correspondence of the Board shall, normally, remain privileged and be available only to the Commission and to members of the Board and its committees until their release has been authorized by the Commission. The Board shall provide minutes of Board meetings to the Commission within 45 days of the close of the meeting in keeping with the Commission's April 2002 Policy Concerning Public Access to Minutes of Meetings. The minutes will subsequently be put on the Commission's web site.

20. If, in the opinion of the Board or of any member, any instruction, directive, or authorization received from the Commission lacks clarity or precision, the matter shall be referred promptly to the Commission for appropriate action.

21. The Board shall operate by consensus. In the event of any disagreement among the members of the Board which they are unable to resolve, the Board shall refer the matter forthwith to the Commission for decision.

22. The Commission may amend existing instructions or issue new instructions to the Board at any time.

Signed this 18th day of January, 2007

Elizabeth C. Bourget

Elizabeth Bourget
Secretary
United States Section

Murray Clamen
Secretary
Canadian Section

APPENDIX E

Water Quality Data for Sherwood and Westhope

ANNUAL WATER QUALITY OBJECTIVES SUMMARY
SOURIS RIVER – NORTH DAKOTA/SASKATCHEWAN BOUNDARY 2006
STATION 05114000 SHERWOOD USGS

WATER QUALITY PARAMETERS	WATER QUALITY OBJECTIVE	UNITS	HISTORIC DATA Median(max-min)#samples	ANNUAL DATA Median(max-min)#samples	%EXCEEDANCE
Biological Parameters					
Fecal Coliform	200/100 ml	#/100 ml	30(8300-<1)196	NDA	0
Inorganic Parameters					
Ammonia (un-ionized as NH3)	****	mg/L	0.002(0.056-<0.001)62	NDA	0
Chloride	100	mg/L	47(220-4)291	60(81-25)7	0
Fluoride	1.5	mg/L	0.2(1.8-<0.1)291	0.3(0.34-0.18)7	0
NO_2 + NO_3(as N)dissolved	1.0	mg/L	0.04(1.4-<0.01)253	0.05(0.54-<0.06)7	0
Phosphorus(total P)	0.10	mg/L	0.18(1.9-0.02)330	0.81(1.4-0.05)7	71
Sodium	100	mg/L	120(470-14)289	310(379-89)7	86
Sulfate	450	mg/L	226(1000-45)291	551(693-246)7	57
Arsenic (total)	0.05	mg/L	0.003(0.028-.001)126	.01(0.028-<0.001)7	0
Barium(total)	1.0	mg/L	<0.1(0.3-<0.1)125	0.1(0.10-0.06)7	0
Boron(total)	0.50	mg/L	0.21(3.5-0.04)123	0.2(0.26-0.1)7	0
Beryllium(total)	0.10	mg/L	<0.010(0.04-<0.001)125	<0.001(<0.001-<0.001)7	0
Cadmium(total)	***27	µg/L	<1(.42-<.04)123	0.06(0.08-<0.02)7	0
Chromium(total)	50	µg/L	<1(30-<0.8)123	1.4(2-<0.3)7	0
Cobalt(total)	.05	mg/L	<0.002(0.002-<0.001)123	<0.001(0.002-<0.001)7	0
Copper(total)	***30	µg/L	3(19-<1)124	5(8-2)7	0
Iron(total)	0.3	mg/L	0.57(10.0-0.02)133	1.3(2.8-0.2)7	71

***based on hardness of 300 mg/L
****unionized ammonia is calculated using temperature and pH
NDA: No Data Available
NC: Not Calculated

ANNUAL WATER QUALITY OBJECTIVES SUMMARY
SOURIS RIVER – NORTH DAKOTA/SASKATCHEWAN BOUNDARY 2006
STATION 05114000 SHERWOOD USGS

WATER QUALITY PARAMETER	WATER QUALITY OBJECTIVE	UNITS	HISTORIC DATA Median(max-min)#samples	ANNUAL DATA Median(max-min)#samples	%EXCEEDANCE
Lead(total)	***13	µg/L	0.2(7-<1)124	1(1.8-.14)7	0
Mercury	0.5 ug/g in fish flesh	µg/g	NDA	NDA	NDA
Molybdenum(total)	0.01	mg/L	0.002(0.045-<0.001)125	0.004(0.005-0.002)7	0
Nickel(total)	***220	µg/L	4(17-1)179	6(8-3)7	0
Selenium(total)	0.005	mg/L	<0.001(0.003-<0.001)125	<0.001(<0.001-<0.001)7	0
Zinc(total)	30	µg/L	4(620-<2)177	7(13-2)7	0
Miscellaneous					
Total Dissolved Solids	1000	mg/L	740(2540-170)358	1578(1704-767)7	71
Total Suspended Solids	the lesser of 10 mg/L or 10% over ambient	mg/L	NDA	NDA	NDA
pH (range)	8.5-6.5	standard units	8.1(9.1-6.9)407	8.4(8.7-7.4)7	28
Dissolved Oxygen (conc.)	>5.0	mg/L	8.0(19.4-0.0)394	6.3(14.5-3.4)7	57
Aesthetics		visual	NDA	NDA	NDA
Oil and Grease		visual	NDA	NDA	NDA

*** based on a hardness of 300 mg/L
NDA: No Data Available
NC: Not Calculated

ANNUAL WATER QUALITY OBJECTIVES SUMMARY
SOURIS RIVER – NORTH DAKOTA/SASKATCHEWAN BOUNDARY 2006
STATION 05114000 SHERWOOD USGS

WATER QUALITY PARAMETER	WATER QUALITY OBJECTIVE	UNITS	HISTORIC DATA Median(max-min)#samples	ANNUAL DATA Median(max-min)#samples	%EXCEEDANCE
Organic Parameters					
Atrazine	2	µg/L	<0.05(0.03-<0.001)12	NDA	NDA
Bromoxynil	5	µg/L	NDA	NDA	NDA
Carbaryl	90	µg/L	<0.003(<0.003)10	NDA	NDA
Chlordane	0.0043	µg/L	<0.10(0.10-<0.10)40	NDA	NDA
DDT	0.001	µg/L	<0.01(0.02-<0.01)40	NDA	NDA
Dieldrin	0.0019	µg/L	<0.01(0.03-<0.01)40	NDA	NDA
Dicamba	IN DEVELOPMENT	µg/L	<0.01(<0.01)3	NDA	NDA
Diclofop-methyl	IN DEVELOPMENT	µg/L	NDA	NDA	NDA
Heptachlor	0.0038	µg/L	<0.01(0.15-<0.01)40	NDA	NDA
MCPA	0.20	µg/L	NDA	NDA	NDA
Parathion	0.04	µg/L	<0.01(<0.01)40	NDA	NDA
Picloram	0.05	µg/L	<0.01(<0.01)3	NDA	NDA
Phenols(total)	1.0	µg/L	1(19-<1)183	<16(<16-<16)7	0
Polychlorinated biphenyl (total)	0.001	µg/L	<0.1(0.3-<0.1)39	NDA	NDA
Triallate	0.57	µg/L	<0.001(0.035-<0.001)10	NDA	NDA
Trifluralin	0.10	µg/L	<0.002(0.084-<0.002)10	NDA	NDA
2,4-D	4.0	µg/L	0.02(0.24-<0.01)26	NDA	NDA

NDA: No Data Available

ANNUAL WATER QUALITY OBJECTIVES SUMMARY
SOURIS RIVER – NORTH DAKOTA/MANITOBA BOUNDARY 2006 (Jan 1- Dec 31)
00US05NF0001 WESTHOPE

WATER QUALITY PARAMETERS	WATER QUALITY OBJECTIVE	UNITS	HISTORIC DATA Median(max-min)#samples	ANNUAL DATA Median(max-min)#samples	%EXCEEDANCE
Biological Parameters					
Fecal Coliform	200/100 ml	#/100 ml	<10(2300-<2)370	25(825-<10)11	18.2
Inorganic Parameters					
Ammonia (un-ionized as NH3)	****	mg/L	0.003(0.433-0)158	0.005(0.175-0.0)7	0
Chloride	100	mg/L	27.35(136-1.2)508	32.1(62.7-13.6)11	0
Fluoride	1.5	mg/L	0.21(0.98-<0.01)558	0.19(0.3-0.13)11	0
NO_2 + NO_3(as N)dissolved from 1990	1.0	mg/L	<0.01(1.11-<0.01)142	0.027(1.11-<0.01)11	9
Phosphorus(total P) from 1990	0.10	mg/L	0.315(1.87-0.091)139	0.343(0.515-0.13)11	100
Sodium	100	mg/L	111(843-6.4)755	164(293-45.6)11	91
Sulfate	450	mg/L	180(1220-4.8)755	347(533-136)11	45
Arsenic (total)	0.05	mg/L	0.00393(0.0281-0.0005)324	0.0055(0.0204-0.00269)11	0
Barium(total)	1.0	mg/L	0.1(0.37-<0.04)229	0.115(0.227-0.0489)11	0
Boron(total)	0.50	mg/L	0.235(2.08-<0.002)321	0.197(0.279-0.0773)11	0
Beryllium(total)	0.10	mg/L	<0.0005(<0.0005-0.000004)110	0.000033(0.000088-0.00001)11	0
Cadmium(total)	***27	µg/L	<1(5-0.009)262	0.041(0.081-0.026)11	0
Chromium(total)	50	µg/L	<1(2.2-<0.015)112	0.782(2.2-0.33)11	0
Cobalt(total)	.05	mg/L	<0.001(0.009-0.0002)232	0.000799(0.00195-0.000436)11	0
Copper(total)	***30	µg/L	2(38-0.6)260	2.89(4.47-2.25)11	0
Iron(total)	0.3	mg/L	0.07(2.64-0.007)288	0.836(2.64-0.377)11	100

***based on hardness of 300 mg/L
****unionized ammonia is calculated using temperature and pH
NDA: No Data Available

ANNUAL WATER QUALITY OBJECTIVES SUMMARY
SOURIS RIVER – NORTH DAKOTA/MANITOBA BOUNDARY 2006 (Jan 1-Dec 31)
00US05NF0001 WESTHOPE

WATER QUALITY PARAMETER	WATER QUALITY OBJECTIVE	UNITS	HISTORIC DATA Median(max-min)#samples	ANNUAL DATA Median(max-min)#samples	%EXCEEDANCE
Lead(total)	***13	µg/L	1.5(6.7-0.098)261	0.505(1.67-0.281)11	0
Mercury	0.5 ug/g in fish flesh	µg/g	<0.02(0.11-<0.01)159	NDA	NDA
Molybdenum(total)	0.01	mg/L	0.002365(0.011-0.0006)110	0.00239(0.00948-0.0018)11	0
Nickel(total)	***220	µg/L	3.15(15-1.6)261	4.9(8.13-3.13)11	0
Selenium(total)	0.005	mg/L	0.00037(0.002-0.00005)319	0.00032(0.00061-0.00022)11	0
Zinc(total)	30	µg/L	2.54(32-0.5)254	3.94(10.7-2.05)11	0
Miscellaneous					
Total Dissolved Solids	1000	mg/L	736(3003.154-129)229	837.73(1449.124-385.947)11	45
Total Suspended Solids	the lesser of 10 mg/L or 10% over ambient	mg/L	16(300-<1)537	34.4(102-14.8)11	100
pH (range)	8.5-6.5	standard units	8.3(9.85-6.8)421	8.465(9.85-7.75)8	37.5
Dissolved Oxygen (conc.)	>5.0	mg/L	8.3(21.6-0)431	5.22(11.69-4.59)8	37.5
Aesthetics		visual	NDA	NDA	NDA
Oil and Grease		visual	NDA	NDA	NDA

*** based on a hardness of 300 mg/L
NDA: No Data Available

ANNUAL WATER QUALITY OBJECTIVES SUMMARY
SOURIS RIVER – NORTH DAKOTA/MANITOBA BOUNDARY 2006 (Jan 1-Dec 31)
00US05NF0001 WESTHOPE

WATER QUALITY PARAMETER	WATER QUALITY OBJECTIVE	UNITS	HISTORIC DATA Median(max-min)#samples	ANNUAL DATA Median(max-min)#samples	%EXCEEDANCE
Organic Parameters					
Atrazine	2	µg/L	<0.05(2.4-<0.003)115	0.00908(0.0205-<0.00576)4	0
Bromoxynil	5	µg/L	<0.03(0.202-<0.00099)88	0.00377(0.0104-<0.00099)4	0
Carbaryl	90	µg/L	NDA	NDA	NDA
a-Chlordane	0.0043	µg/L	<0.003(0.003-<0.00014)204	<0.00037(<0.00037-<0.00037)1	0
g-Chlordane	0.0043	ug/L	<0.002(<0.002-<0.00004)205	<0.00019(<0.00019-<0.00019)1	0
o,p-DDT	0.001	µg/L	<1(<4-<0.00004)206	<0.00035(<0.00035-<0.00035)1	0
Dieldrin	0.0019	µg/L	<0.002(0.002-0.00018)243	<0.00066(<0.00066-<0.00066)1	0
Dicamba	IN DEVELOPMENT	µg/L	<0.03(0.0451-<0.00073)125	0.005875(0.0214-0.00073)4	NDA
Diclofop-methyl	IN DEVELOPMENT	µg/L	<0.05(<0.05-<0.0034)103	<0.0423(<0.0423-<0.0423)4	NDA
Heptachlor	0.0038	µg/L	<0.001(0.004-<0.00014)241	<0.00035(<0.00035-<0.00035)1	0
MCPA	0.20	µg/L	<0.2(0.7-<0.00058)250	<0.00058(0.111-<0.00058)4	0
Parathion	0.04	µg/L	<0.0155(<0.088-<0.0155)25	NDA	NDA
Picloram	0.05	µg/L	<0.05(<0.2-<0.00033)189	<0.00066(<0.00066-<0.00066)4	0
Phenols(total)	1.0	µg/L	4.0(32-<1)157	NDA	NDA
Polychlorinated biphenyl (total)	0.001	µg/L	<0.0102(<0.0102-<0.0033)15	NDA	NDA
Triallate	0.57	µg/L	<0.01(0.072-0.0013)107	<0.00414(<0.00414-<0.00414)4	0
Trifluralin	0.10	µg/L	<0.005(0.01-0.0044)111	<0.00515(<0.00515-<0.00515)4	0
2,4-D	4.0	µg/L	<0.03(0.587-<0.00047)254	0.07485(0.133-0.0277)4	0

NDA: No Data Available