Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION OF THE WATERS OF

THE ST. MARY AND MILK RIVERS

1997

Cover Photo:

Battle Creek at the International Border, March 1997.
Photo by Norm Midtlyng, U.S. Geological Survey, Helena, Montana.

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R.A. Halliday
representing Canada

and

David J. Lystrom
representing the United States

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March 1998

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

Commissioners;

In compliance with the provisions of Article VI of the Boundary Waters Treaty of 1909 and Clause VIII (c) of your order of October 4, 1921, directing the division of the waters of the St. Mary and Milk Rivers between the United States and Canada, we are transmitting herewith a report on the operations during the irrigation season ended October 31, 1997.

Respectfully submitted,

R.A. Halliday
Accredited Officer of Her Majesty

David J. Lystrom
Accredited Officer of the United States

SYNOPSIS

During the 1997 irrigation season, the natural flows of the St. Mary and Milk Rivers were 128 percent and 123 percent, respectively, of the long-term averages.

The natural flow of the St. Mary River at the International Boundary during the irrigation season, April 1 to October 31, 1997, was 917 000 cubic decametres (dam^3) (743,000 acre-feet). Under the terms of the Boundary Waters Treaty, the Canadian share was 539 000 dam^3 (437,000 acre-feet). The total flow recorded at the International Boundary during the irrigation season was 132 percent of the Canadian allotment.

The natural flow of the Milk River at the Eastern Crossing of the International Boundary from March 1 to October 31, 1997, was 174 000 dam^3 (141,000 acre-feet). Under the terms of the Treaty, the United States' allotment was 114 000 dam^3 (92,400 acre-feet). The United States received 151 percent of its allotment at Eastern Crossing, in addition to its share of St. Mary River water diverted into the Milk River by the St. Mary Canal.

The March to October natural flows of the three apportioned tributaries of the Milk River; Lodge Creek, Battle Creek, and Frenchman River; were 140 percent, 200 percent, and 239 percent, respectively, of the long-term averages.

The annual meeting of the Field Representatives was held in Medicine Hat, Alberta, on February 10, 1998. Mutual problems, future plans, and changes in computational procedures were discussed and a schedule of field operations for 1998 was adopted.

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INTRODUCTION

The apportionment of the waters of the St. Mary and Milk Rivers is governed by Article VI of the Boundary Waters Treaty of 1909 between Great Britain and the United States. The terms of the Treaty were further clarified by the 1921 Order of the International Joint Commission. A copy of the 1921 Order, including Article VI, is contained in Annex A of this report.

To comply with this Treaty, Field Representatives of the United States and Canada collected and compiled hydrometric data at 36 international gauging stations on a cooperative basis. An additional 30 gauging stations were operated independently by the United States or Canada to obtain data on diversions, reservoir contents, return flows and index runoff. Most of this additional information was used to improve the accuracy of natural-flow computations.

This report summarizes the 1997 natural-flow computations, apportionment of the natural flow, unusual occurrences during the year, and procedural modifications designed to increase the accuracy of the natural-flow computations. Summary natural-flow tables are included. Detailed natural-flow computations are included in Appendix A. Daily discharge and other related data are included in Appendix B. Appendices A and B are submitted with this report under separate cover.

In accordance with the International System of Units (SI) conversion schedule adopted by the International Joint Commission, this report uses SI units first, followed by inch-pound units in parentheses. Data in tables are shown in SI units first, followed by the respective inch-pound units (for example, Tables 1 and 1A). The format for Appendices A and B of the report is SI units only. All Canadian data are collected, computed and published in SI units. The United States' data, which are collected and computed in inch-pound units, were converted to SI units using the appropriate conversions. A summary of the conversion factors is contained in Annex B.

Mr. R.A. Halliday, as Accredited Officer of Her Majesty, was represented in the field by Mr. R.G. Boals, Chief, Environment Canada, Hydrometric Monitoring Division, Prairie and Northern Region. Mr. David J. Lystrom, United States Geological Survey, as Accredited Officer of the United States, was represented in the field by Mr. R.E. Davis, District Chief, United States Geological Survey, Helena, Montana. This report was prepared jointly by personnel of

Environment Canada, Hydrometric Monitoring Division, and the United States Geological Survey, under the supervision of Messrs. Boals and Davis.

The annual meeting of the Field Representatives was held in Medicine Hat, Alberta, on February 10, 1998. Mutual problems, future plans, and changes in computational procedures were discussed and a schedule of field operations for 1998 was adopted.

ST. MARY RIVER

During the irrigation season, April 1 to October 31, Canada's share of the natural flow of the St. Mary River at the International Boundary, as stipulated by the 1921 Order, is three-fourths of the natural flow when that flow is 666 cubic feet per second (18.86 cubic metres per second) or less. Flow in excess of that quantity is divided equally between Canada and the United States. During the non-irrigation season, November 1 to March 31, the flow is divided equally between the two countries.

To comply with the above Order, representatives of both countries make twice-monthly computations of the daily natural flow of the St. Mary River during the irrigation season. If use by the United States is in excess of its share, then a delivery of an equivalent quantity of water is normally made to Canada at the earliest opportunity. Regular interim reports of these computations are sent to all agencies involved in the water use and management of the flow of the St. Mary River. The interim reports keep these agencies informed as to the quantity of water that is available and the status of apportionment.

Tentative computations and interim reports are not made during the non-irrigation season when use by the United States is limited to storage in Lake Sherburne. The flow into Lake Sherburne is considerably less than 50 percent of the natural flow. Occasionally, water is diverted into the St. Mary Canal during the non-irrigation season, necessitating additional computations.

Lake Sherburne, the only storage reservoir within the St. Mary River basin in the United States, is used to store part of the United States' share of flow for later diversion to the Milk River. This water, which passes through Canada, is used by the United States for irrigation in the eastern portion of the Milk River basin.

Storage in Lake Sherburne (station 05AE036) was 24 400 dam^3 (19,800 acre-feet) on October 31, 1996 and increased to 42 100 dam^3 (34,100 acre-feet) on March 23, 1997, when releases began. Maximum storage was 83 400 dam^3 (67,600 acre-feet) on July 10, 1997 and storage decreased to 34 400 dam^3 (27,900 acre-feet) by the end of the irrigation season on October 31, 1997.

Water was diverted from the St. Mary River into the Milk River via the St. Mary Canal from May 5 through October 7, 1997. The total flow recorded at the gauging station on the St. Mary Canal at St. Mary Crossing (station 05AE029) was 213 000 dam^3 (173,000 acre-feet). Any seepage from the canal between the point of diversion and the crossing of the St. Mary River is assumed to return to the river and eventually become available to Canada.

The computed natural flow of the St. Mary River at the International Boundary from November 1, 1996 to October 31, 1997 was 1 010 000 dam^3 (819,000 acre-feet) of which 917 000 dam^3 (743,000 acre-feet) occurred during the irrigation season, April 1 to October 31, 1997. For the irrigation season, Canada's and the United States' shares were 539 000 dam^3 (437,000 acre-feet) and 378 000 dam^3 (306,000 acre-feet), respectively. A total discharge of 712 000 dam^3 (577,000 acre-feet) was recorded at the International Boundary, which was 132 percent of the Canadian share. The computed natural flow during the irrigation season was 128 percent of the average of the previous 94 years of record.

Deficit deliveries were recorded in 2 of the 14 division periods during the 1997 irrigation season. Deficits were refunded by the end of October.

The division of St. Mary River natural flow is summarized in Tables 1 and 1A and Figure 1, which follow. The detailed computation of the natural flow is given in Table 6 and the historical summary is given in Table 7 of Appendix A.

TABLE 1

SUMMARY OF ST. MARY RIVER DIVISION FOR 1997[1]
QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
APR 1 - APR 15	15 302	11 477	18 347	6 870	
APR 16 - APR 30	31 105	21 147	30 445	9 298	
MAY 1 - MAY 15	64 363	38 291	54 314	16 023	
MAY 16 - MAY 31	162 123	87 577	131 601	44 024	
JUNE 1 - JUNE 15	202 733	107 475	164 972	57 497	
JUNE 16 - JUNE 30	128 084	70 152	95 833	25 681	
JULY 1 - JULY 15	88 192	50 206	59 331	9 125	
JULY 16 - JULY 31	61 849	37 442	38 640	1 198	
AUG 1 - AUG 15	40 210	26 215	19 373		6 842
AUG 16 - AUG 31	35 012	24 020	31 187	7 167	
SEPT 1 - SEPT 15	21 348	15 942	16 339	397	
SEPT 16 - SEPT 30	22 806	16 996	14 880		2 116
OCT 1 - OCT 15	26 933	19 350	20 810	1 460	
OCT 16 - OCT 31	17 099	12 825	16 512	3 687	
TOTAL	917 159	539 115	712 584		

[1]This is a summary of data from Table 6, Appendix A.

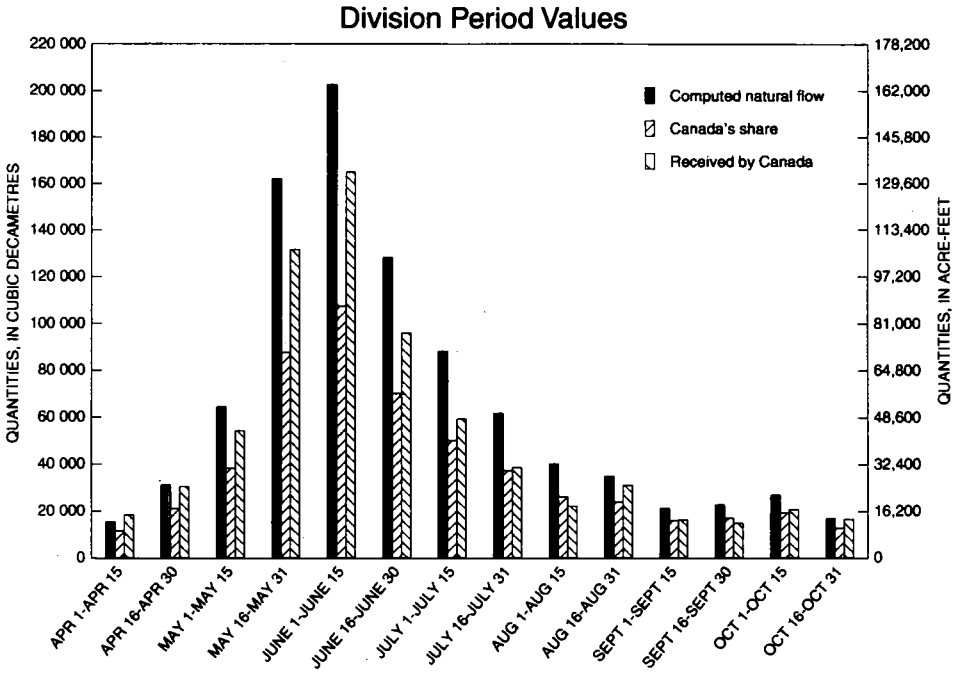
TABLE 1A

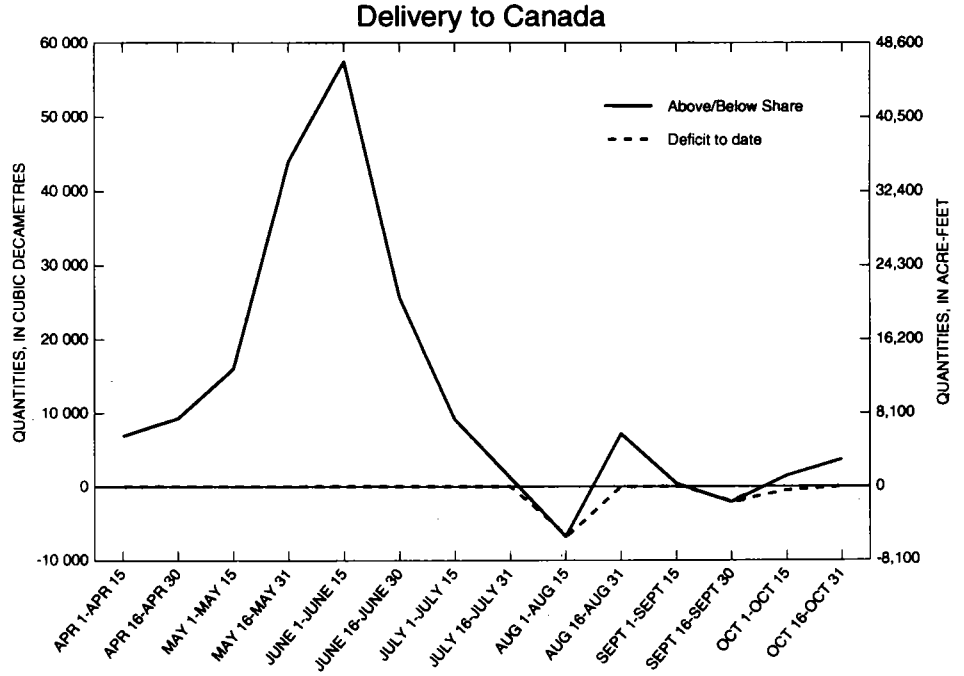
SUMMARY OF ST. MARY RIVER DIVISION FOR 1997[1]
QUANTITIES IN ACRE-FEET

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
APR 1 - APR 15	12,405	9,304	14,874	5,570	
APR 16 - APR 30	25,217	17,144	24,682	7,538	
MAY 1 - MAY 15	52,179	31,043	44,032	12,990	
MAY 16 - MAY 31	131,433	70,999	106,689	35,690	
JUNE 1 - JUNE 15	164,356	87,130	133,743	46,613	
JUNE 16 - JUNE 30	103,838	56,872	77,692	20,820	
JULY 1 - JULY 15	71,497	40,702	48,100	7,398	
JULY 16 - JULY 31	50,141	30,354	31,325	971	
AUG 1 - AUG 15	32,598	21,253	15,706		5,547
AUG 16 - AUG 31	28,384	19,473	25,283	5,810	
SEPT 1 - SEPT 15	17,307	12,924	13,246	322	
SEPT 16 - SEPT 30	18,489	13,779	12,063		1,715
OCT 1 - OCT 15	21,835	15,687	16,871	1,184	
OCT 16 - OCT 31	13,862	10,397	13,386	2,989	
TOTAL	743,541	437,061	577,692		

[1]All values are conversions of data from Table 1. Totals and shares may not add or subtract exactly as a result of rounding.

FIGURE 1
ST. MARY RIVER DIVISION, 1997





MILK RIVER

During the irrigation season, April 1 to October 31, the United States' share of the natural flow of the Milk River at the Eastern Crossing of the International Boundary, as stipulated by the 1921 Order, is three-fourths of the natural flow when that flow is 666 cubic feet per second (18.86 cubic metres per second) or less. Flows in excess of that quantity are divided equally between the United States and Canada. During the non-irrigation season, November 1 to March 31, the entire flow is divided equally between the two countries.

Prior to the mid 1970's, uses of the natural flow of the Milk River by Canada and the United States were assumed to be less than their respective shares and no formal apportionment was made. By 1977, it became apparent that the increasing numbers of sprinkler irrigation systems were capable of using all of the natural flow for long periods of time. Consequently, a more comprehensive natural-flow computation and water-division procedure was developed and has been used since 1985. The revised computation procedure includes an approximate accounting of irrigation consumptive uses in both countries, and the interbasin transfer of water in Canada. An additional refinement was made in 1988 when F.I. Morton's evapotranspiration model replaced the adjusted pan evaporation method in the natural-flow computations. During 1997, the United States' and Canada's respective estimated consumptive uses were 5 050 dam^3 (4,090 acre-feet) and 5 160 dam^3 (4,180 acre-feet). An interbasin transfer of 2 420 dam^3 (1,960 acre-feet) from Verdigris Coulee near the Mouth (station 11AA038) was credited to the Canadian consumptive use.

The computed natural flow of the Milk River at the Eastern Crossing of the International Boundary from March 1 to October 31, 1997 was 174 000 dam^3 (141,000 acre-feet). This flow was 123 percent of the average computed natural flow of the previous 85 years of record. It is important to note, however, that natural-flow computations prior to 1985 did not account for consumptive use. Consequently, natural-flow values after 1985 are not directly comparable with natural flows of previous years. The respective shares of the United States and Canada were 114 000 dam^3 (92,400 acre-feet) and 60 300 dam^3 (48,900 acre-feet). The United States received 151 percent of its allotment at Eastern Crossing, in addition to its share of St. Mary River water diverted into the Milk River by the St. Mary Canal.

Deficit deliveries were recorded in 3 of the 16 division periods during the season. All deficits were satisfactorily refunded by mid-October.

TABLE 2
SUMMARY OF MILK RIVER DIVISION FOR 1997[1]
QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	5 857	2 927	5 857	2 930	
MAR 16 - MAR 31	54 368	27 184	54 803	27 619	
APR 1 - APR 15	10 202	7 651	10 437	2 786	
APR 16 - APR 30	15 743	11 732	15 824	4 092	
MAY 1 - MAY 15	14 055	10 542	14 152	3 610	
MAY 16 - MAY 31	26 992	18 556	26 320	7 764	
JUNE 1 - JUNE 15	15 484	11 614	15 024	3 410	
JUNE 16 - JUNE 30	10 589	7 944	10 658	2 714	
JULY 1 - JULY 15	7 440	5 580	6 979	1 399	
JULY 16 - JULY 31	1 367	1 025	702		323
AUG 1 - AUG 15	444	332	0		332
AUG 16 - AUG 31	2 686	2 013	2 147	134	
SEPT 1 - SEPT 15	373	280	28		252
SEPT 16 - SEPT 30	580	435	586	151	
OCT 1 - OCT 15	4 248	3 187	4 255	1 068	
OCT 16 - OCT 31	3 403	2 548	3 399	851	
TOTAL	173 831	113 550	171 171		

[1]This is a summary of data from Table 8, Appendix A.

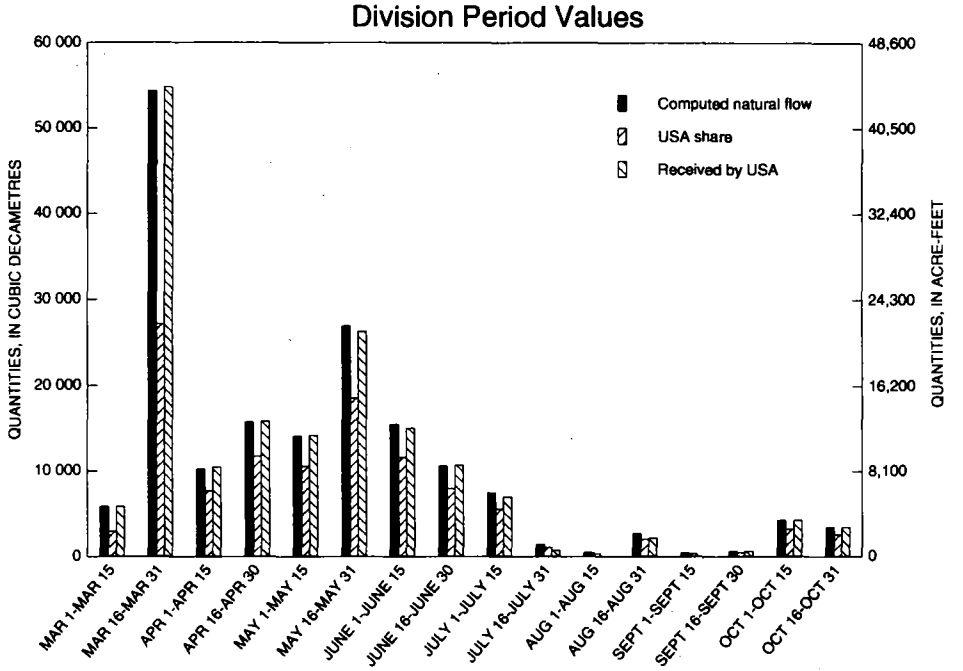
TABLE 2A

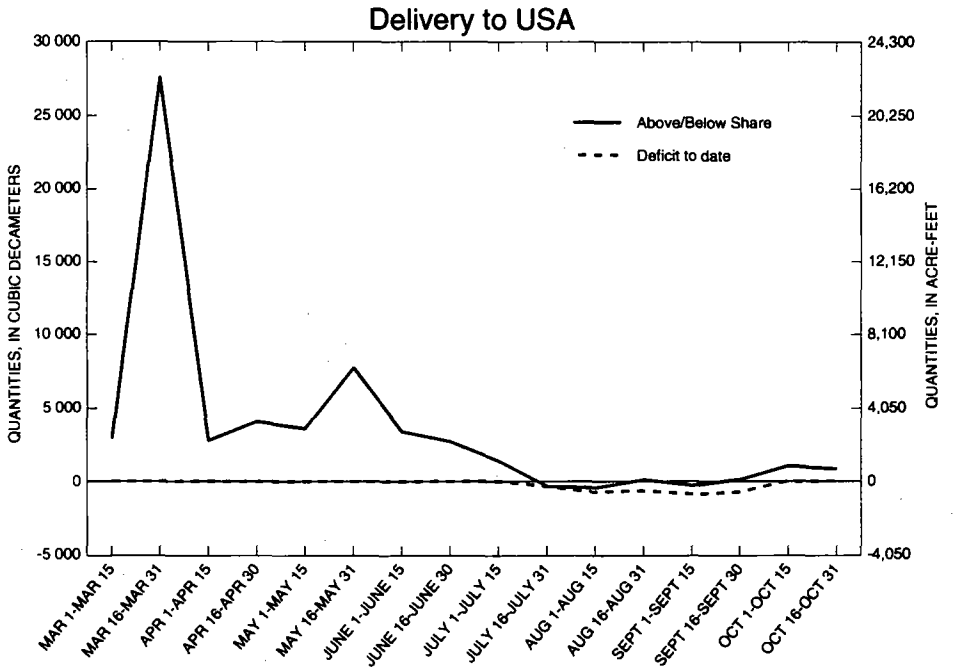
SUMMARY OF MILK RIVER DIVISION FOR 1997[1]
QUANTITIES IN ACRE-FEET

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	4,748	2,373	4,748	2,375	
MAR 16 - MAR 31	44,076	22,038	44,429	22,391	
APR 1 - APR 15	8,271	6,203	8,461	2,259	
APR 16 - APR 30	12,763	9,511	12,829	3,317	
MAY 1 - MAY 15	11,394	8,546	11,473	2,927	
MAY 16 - MAY 31	21,882	15,043	21,338	6,294	
JUNE 1 - JUNE 15	12,553	9,415	12,180	2,764	
JUNE 16 - JUNE 30	8,585	6,440	8,640	2,200	
JULY 1 - JULY 15	6,032	4,524	5,658	1,134	
JULY 16 - JULY 31	1,108	831	569		262
AUG 1 - AUG 15	360	269	0		269
AUG 16 - AUG 31	2,178	1,632	1,741	109	
SEPT 1 - SEPT 15	302	227	23		204
SEPT 16 - SEPT 30	470	353	475	122	
OCT 1 - OCT 15	3,444	2,584	3,450	866	
OCT 16 - OCT 31	2,759	2,066	2,756	690	
TOTAL	140,925	92,055	138,769		

[1]All values are conversions of data from Table 2. Totals and shares may not add or subtract exactly as a result of rounding.

FIGURE 2
MILK RIVER DIVISION, 1997





SOUTHERN TRIBUTARIES OF THE MILK RIVER

Responding to concerns expressed by Canadian water users, the International Joint Commission at its executive session on December 8, 1986, agreed in principle that the issue of utilization of the southern tributaries should be addressed in an informal, pragmatic manner. The Commission instructed the Accredited Officers to proceed with discussion to resolve Canadian concerns. To assist them in implementing the Commission's instructions, the Accredited Officers established a four-member ad hoc task force comprised of officials from the State of Montana and the Province of Alberta water management agencies and the United States and Canadian field representatives for the St. Mary-Milk River Treaty.

The task force met with United States and Canadian water users, conducted public meetings, toured water-use projects, compiled information on water availability and use, investigated ground-water supplies, and considered various options for resolving issues. The task force determined that United States water users were reluctant to participate in options that might limit their use of water and jeopardize their water claims in future adjudication of water rights. They also determined that basic Canadian water-user needs for domestic and stock-water use were being satisfied with wells and dugouts. Solutions to water-utilization problems were limited because cost of storage facilities, pumpage from the Milk River, and formal apportionment of southern tributary waters would not be cost effective.

In September 1991, the Montana Department of Natural Resources and Conservation, in response to requests from the task force and others, issued an Order to close the southern tributaries to issuance of additional water permits.

The final report was forwarded to the International Joint Commission in May 1994. At its Executive session on September 21, 1994, the Commission agreed that the task force should be terminated as recommended. The Commission also agreed not to act at that time on the three recommendations related to the adjudication process, but requested that the Accredited Officers continue to monitor the situation and report annually, or more frequently if appropriate, on such matters as complaints by Canadian ranchers and changes in the status of basin adjudication.

Communication with officials from Alberta Environment and the Montana Department of Natural Resources and Conservation in January 1998 indicated no Canadian complaints or changes in the Montana adjudication process in 1997.

Flows for March through October 1997 for the southern tributaries were as follows:

- Bear Creek near International Boundary - 1 000 dam^3 (811 acre-feet)
- Miners Coulee near International Boundary - 1 040 dam^3 (843 acre-feet)

EASTERN TRIBUTARIES OF THE MILK RIVER

The waters of the eastern tributaries of the Milk River are divided in accordance with the 1921 Order of the International Joint Commission, which stipulates under Rule III that "The natural flow of the eastern (otherwise known as the Saskatchewan or northern) tributaries of the Milk River at the points where they cross the International Boundary shall be divided equally between the two countries." This order might well be interpreted as requiring that the division of water be made on a continuing basis, however, the physical limitation due to transit time in the flow system was recognized. Further analysis showed that the minimum practical time frame for compilation of the natural flows at the International Boundary was every ten days. In 1994 the time frame was increased to twice monthly to reduce lag-time anomalies, reduce costs, and conform to St. Mary and Milk Rivers computation periods.

Prior to 1937, Canadian use along the eastern tributaries consisted of domestic projects, and the Canadian share of the natural flow was not fully used. In the late 1930's, the Government of Canada constructed three dams on the Frenchman River creating Eastend Reservoir (station 11AC055), Huff Lake (11AC063), and Newton Lake (station 11AC056) and necessitated an operational division of flow on this tributary by 1937. In 1938, dams were constructed at both ends of Cypress Lake (station 11AC037) near the Battle Creek-Frenchman River divide to allow interbasin storage and transfers of water. In the early 1950's the redevelopment of several private irrigation projects and the construction of the Vidora Irrigation Project resulted in increased use of Battle Creek water in Canada and made an operational division of the flow on this tributary necessary by 1957. In 1960, construction of Altawan reservoir (station 11AB089) and Spangler Irrigation Project (station 11AB060) on Lodge Creek made an operational division of flow on this tributary necessary by 1961.

During the period March 1 to October 31, twice-monthly computations of the natural flow of Lodge Creek, Battle Creek and the Frenchman River are made to determine each country's share. If use by Canada is in excess of its share, then a delivery of an equivalent quantity of water is made to the United States at the earliest opportunity. When mutually agreed to, the United States or Canada may request that deficit deliveries be delayed to allow for more efficient use of the water.

Regular interim reports on the progress of the division of the natural flows of Lodge Creek, Battle Creek, and Frenchman River at the International Boundary are distributed to interested agencies during the irrigation season. Additional computations may be made to account for significant usages before October 31. Generally, no division of flow is made during winter as flow and use are low and streamflow records are impractical to obtain.

Lyons Creek is monitored by Canada, but does not have sufficient use in Canada at this time to warrant an operational division of flow. A total flow of 8 830 dam^3 (7,160 acre-feet) was recorded on Lyons Creek in 1997.

Volumes for unmeasured diversions to private irrigation projects in the Lodge Creek, Battle Creek, and Frenchman River basins in Saskatchewan were based on year-end reports provided by the Saskatchewan Water Corporation, and for the Lodge Creek and Battle Creek basins in Alberta, by Alberta Environmental Protection. These reports are compiled from reports received from operators of irrigation projects and from on-site inspections. An additional adjustment is made for domestic projects in the Battle Creek and Frenchman River basins based on the results of studies conducted by Canada on domestic use.

For Interim reports prepared at the end of each division period, estimates of minor diversions were made based on field conditions and historical usages. At mid-year and at year-end, estimates of minor diversions were updated based on usage reports received from Alberta Environmental Protection and the Saskatchewan Water Corporation. Consequently, some discrepancy exists between interim and the final division computations. Lists of reported diversions are contained in Appendix B.

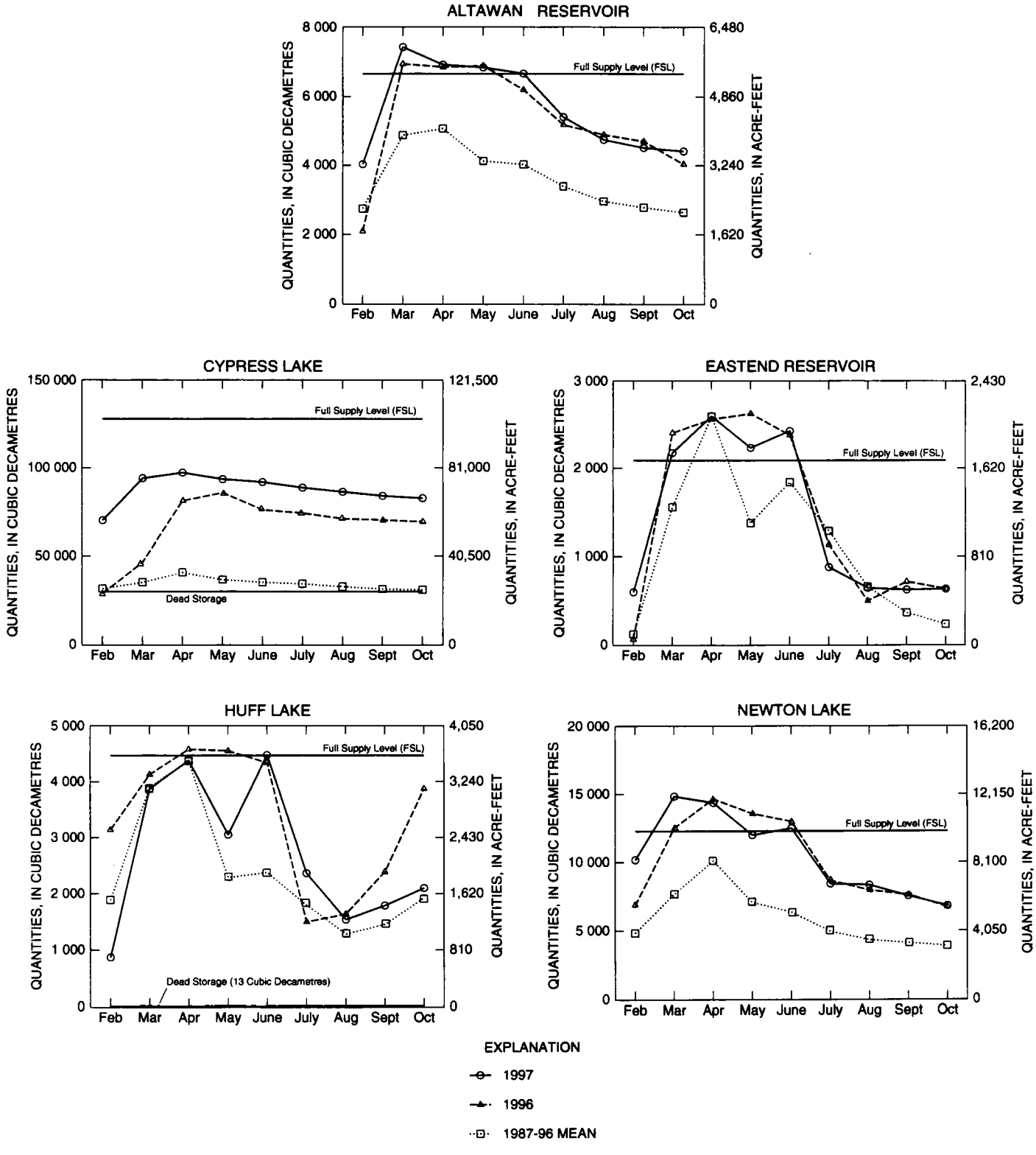
Above average runoff and normal water use by local irrigators occurred in 1997. Monthend reservoir contents for most reservoirs in the Lodge Creek, Battle Creek and Frenchman River basins were also above normal during 1997.

On the Frenchman River system, construction is planned to increase the holding capacity of Eastend Reservoir, by increasing bank height.

At the end of February, the combined usable storage of Altawan Reservoir, Cypress Lake, Eastend Reservoir, Huff Lake, and Newton Lake was 85 800 dam^3 (69,600 acre-feet), or 69 percent of the total usable storage of 124 000 dam^3 (101,000 acre-feet). By the end of April, runoff had increased the combined storage to the yearly maximum of 126 000 dam^3 (102,000 acre-feet), or 102% of the total usable storage. By the end of October, irrigation usage, evaporation, and releases from the reservoirs depleted the combined usable storage to 96 500 dam^3 (78,200 acre-feet) or 78% of the total usable storage. Further details on storage in the major Canadian reservoirs are provided in Figure 3, and in Table 16 of Appendix B.

FIGURE 3

RESERVOIRS IN LODGE, BATTLE, AND FRENCHMAN BASINS
MONTH-END CONTENTS, 1996, 1997, AND 1987-96 MEAN



LODGE CREEK

The computed natural flow of Lodge Creek at the International Boundary from March 1 to October 31, 1997, was 45 900 dam^3 (37,200 acre-feet). This volume is 140 percent of the average natural flow of the previous 47 years of record. Each country is entitled to 50 percent of the natural flow -- 22 950 dam^3 (18,600 acre-feet). A total flow of 33 500 dam^3 (27,200 acre-feet) was recorded at Lodge Creek below McRae Creek at the International Boundary (station 11AB083) from March 1 to October 31.

Deficit deliveries were recorded in 1 of the 16 division periods during the season. The deficit was completely refunded during the succeeding division period.

The division of the Lodge Creek natural flow is summarized in Tables 3 and 3A and Figure 4 which follow. The detailed computation of the natural flow is given in Table 10 and the historical summary is given in Table 11 of Appendix A.

TABLE 3

SUMMARY OF LODGE CREEK DIVISION FOR 1997[1]
QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	2	1	2	1	
MAR 16 - MAR 31	39 211	19 606	28 400	8 794	
APR 1 - APR 15	2 197	1 099	2 116	1 017	
APR 16 - APR 30	1 429	714	1 075	361	
MAY 1 - MAY 15	395	197	413	216	
MAY 16 - MAY 31	1 953	976	677		299
JUNE 1 - JUNE 15	607	303	686	383	
JUNE 16 - JUNE 30	52	26	116	90	
JULY 1 - JULY 15	15	7	18	11	
JULY 16 - JULY 31	0	0	1	1	
AUG 1 - AUG 15	0	0	0	0	
AUG 16 - AUG 31	0	0	0	0	
SEPT 1 - SEPT 15	0	0	0	0	
SEPT 16 - SEPT 30	0	0	0	0	
OCT 1 - OCT 15	0	0	0	0	
OCT 16 - OCT 31	0	0	0	0	
TOTAL	45 861	22 929	33 504		

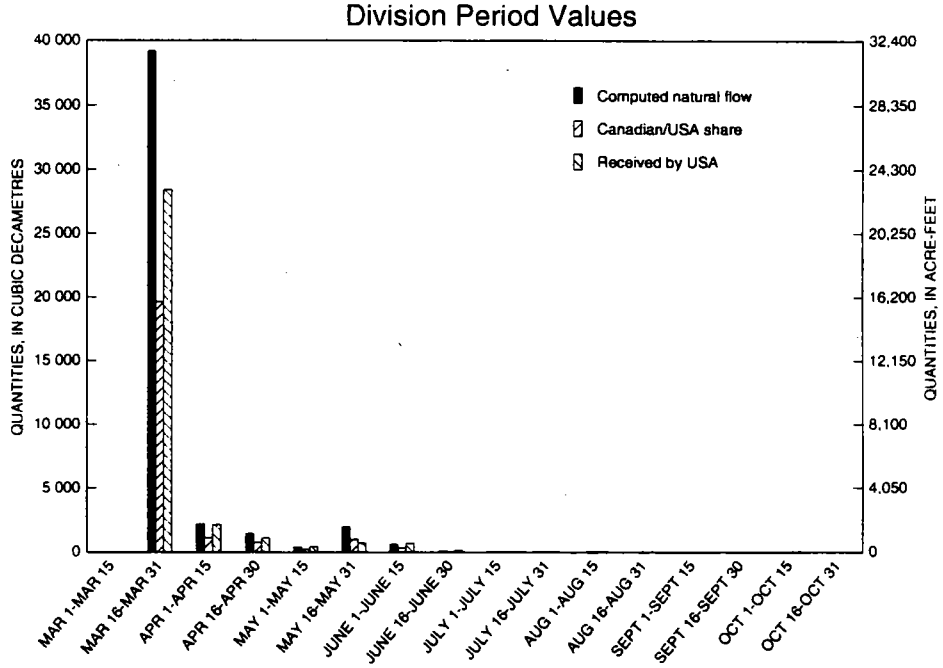
[1]This is a summary of data from Table 10, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

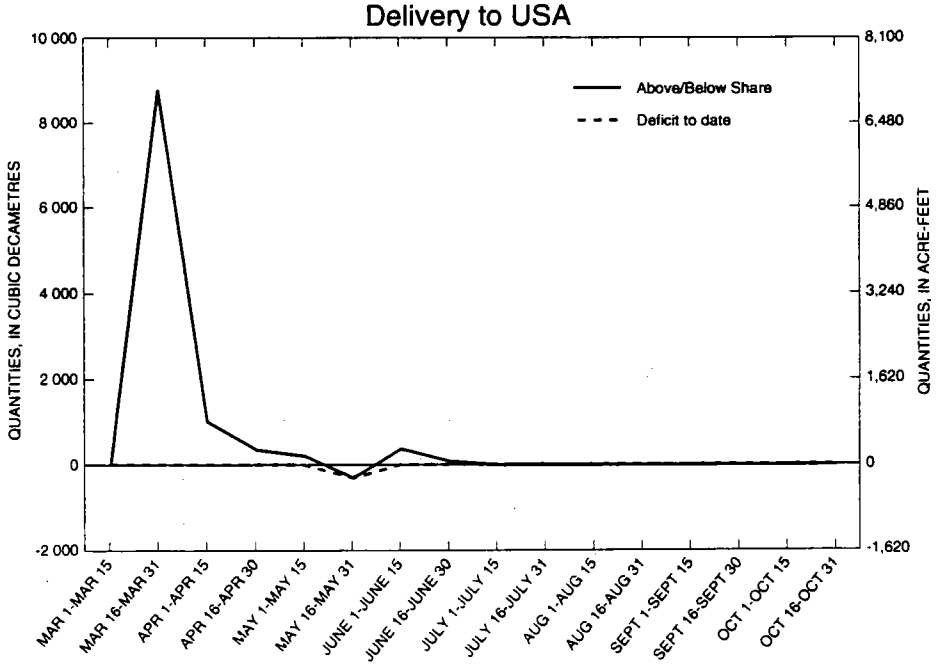
TABLE 3A
SUMMARY OF LODGE CREEK DIVISION FOR 1997[1]
QUANTITIES IN ACRE-FEET

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	2	1	2	1	
MAR 16 - MAR 31	31,788	15,895	23,024	7,129	
APR 1 - APR 15	1,781	891	1,715	824	
APR 16 - APR 30	1,158	579	872	293	
MAY 1 - MAY 15	320	160	335	175	
MAY 16 - MAY 31	1,583	791	549		242
JUNE 1 - JUNE 15	492	246	556	310	
JUNE 16 - JUNE 30	42	21	94	73	
JULY 1 - JULY 15	12	6	15	9	
JULY 16 - JULY 31	0	0	1	1	
AUG 1 - AUG 15	0	0	0	0	
AUG 16 - AUG 31	0	0	0	0	
SEPT 1 - SEPT 15	0	0	0	0	
SEPT 16 - SEPT 30	0	0	0	0	
OCT 1 - OCT 15	0	0	0	0	
OCT 16 - OCT 31	0	0	0	0	
TOTAL	37,180	18,589	27,162		

[1]All values are conversions of data from Table 3. Totals and shares may not add or subtract exactly as a result of rounding.

FIGURE 4
LODGE CREEK DIVISION, 1997





BATTLE CREEK

The computed natural flow of Battle Creek at the International Boundary from March 1 to October 31, 1997, was 63 000 dam^3 (51,100 acre-feet). This volume is 200 percent of the average natural flow of the previous 57 years of record. Each country is entitled to 50 percent of the natural flow -- 31 500 dam^3 (25,500 acre-feet). A total flow of 43 600 dam^3 (35,300 acre-feet) was recorded at Battle Creek at International Boundary (station 11AB027) from March 1 to October 31.

No deficit deliveries were recorded in the 16 division periods this season.

The division of the Battle Creek natural flow is summarized in Tables 4 and 4A and Figure 5 which follow. The detailed computation of the natural flow is given in Table 12 and the historical summary is given in Table 13 of Appendix A.

TABLE 4

SUMMARY OF BATTLE CREEK DIVISION FOR 1997[1]
QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 25	7 476	3 738	3 825	87	
MAR 26 - APR 9	38 387	19 194	27 505	8 311	
APR 10 - APR 24	7 018	3 509	4 327	818	
APR 25 - MAY 9	2 879	1 440	2 129	689	
MAY 10 - MAY 25	1 838	919	941	22	
MAY 26 - JUNE 9	3 095	1 548	2 770	1 222	
JUNE 10 - JUNE 24	806	403	638	235	
JUNE 25 - JULY 9	541	271	498	227	
JULY 10 - JULY 25	387	194	387	193	
JULY 26 - AUG 9	36	18	36	18	
AUG 10 - AUG 25	46	23	46	23	
AUG 26 - SEPT 9	91	46	91	45	
SEPT 10 - SEPT 24	13	7	10	3	
SEPT 25 - OCT 9	4	2	4	2	
OCT 10 - OCT 25	228	114	228	114	
OCT 26 - OCT 31	146	73	146	73	
TOTAL	62 991	31 499	43 581		

[1]This is a summary of data from Table 12, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

TABLE 4A

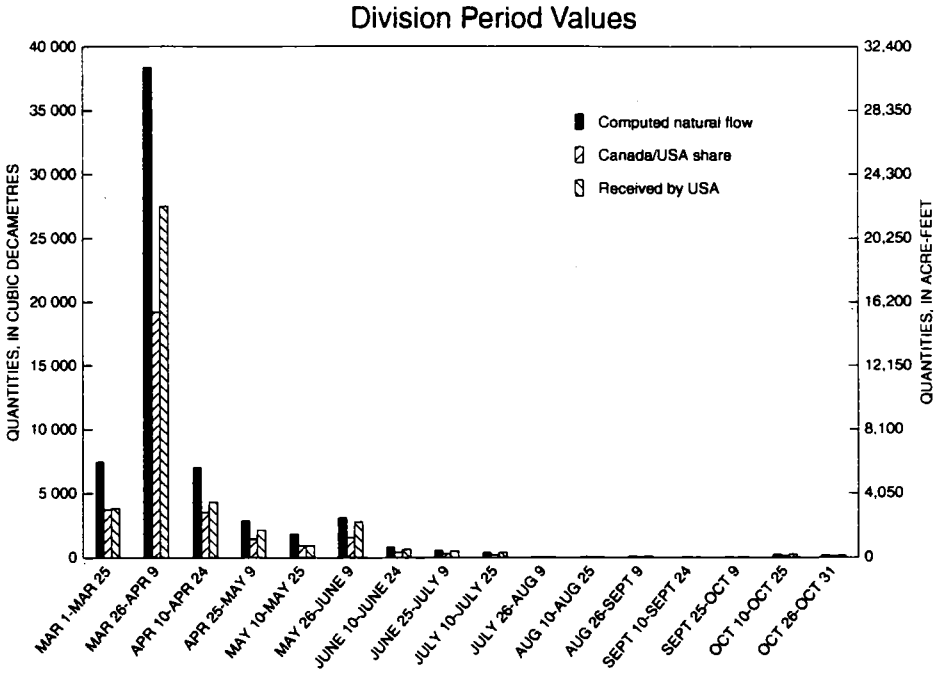
SUMMARY OF BATTLE CREEK DIVISION FOR 1997[1]

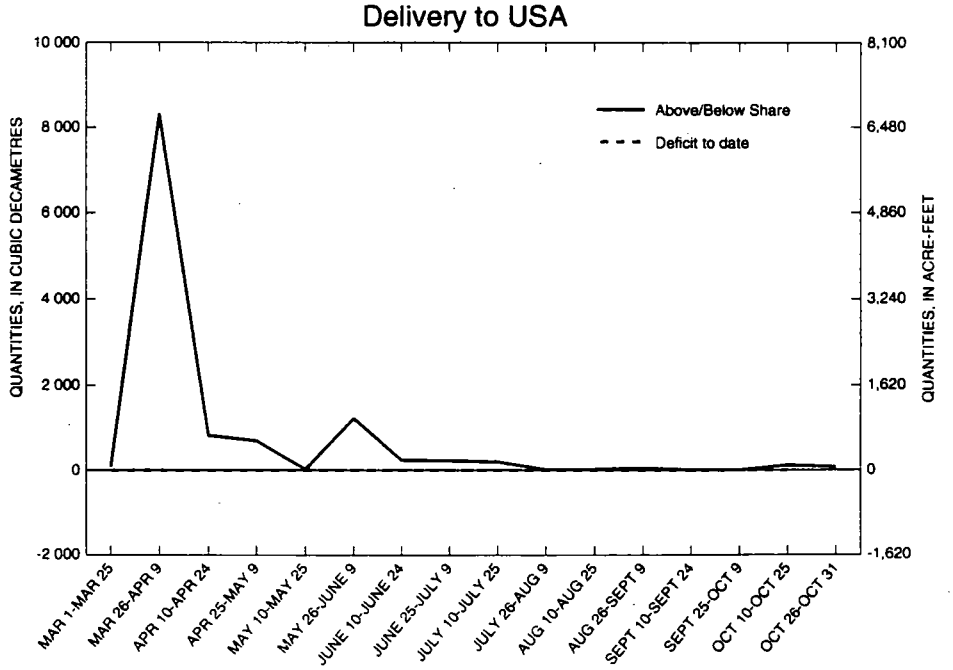
QUANTITIES IN ACRE-FEET

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 25	6,061	3,030	3,101	71	
MAR 26 - APR 9	31,120	15,561	22,298	6,738	
APR 10 - APR 24	5,690	2,845	3,508	663	
APR 25 - MAY 9	2,334	1,167	1,726	559	
MAY 10 - MAY 25	1,490	745	763	18	
MAY 26 - JUNE 9	2,509	1,255	2,246	991	
JUNE 10 - JUNE 24	653	327	517	191	
JUNE 25 - JULY 9	439	220	404	184	
JULY 10 - JULY 25	314	157	314	156	
JULY 26 - AUG 9	29	15	29	15	
AUG 10 - AUG 25	37	19	37	19	
AUG 26 - SEPT 9	74	37	74	36	
SEPT 10 - SEPT 24	11	6	8	2	
SEPT 25 - OCT 9	3	2	3	2	
OCT 10 - OCT 25	185	92	185	92	
OCT 26 - OCT 31	118	59	118	59	
TOTAL	51,067	25,536	35,331		

[1]All values are conversions of data from Table 4. Totals and shares may not add or subtract exactly as a result of rounding.

FIGURE 5
BATTLE CREEK DIVISION, 1997





FRENCHMAN RIVER

The computed natural flow of the Frenchman River at the International Boundary from March 1 to October 31, 1997, was 192 000 dam^3 (156,000 acre-feet). This volume is 239 percent of the average natural flow of the previous 57 years of record. Each country is entitled to 50 percent of the natural flow -- 96 000 dam^3 (77,800 acre-feet). A total flow of 167 000 dam^3 (135,000 acre-feet) was recorded at Frenchman River at International Boundary (station 11AC041) from March 1 to October 31.

Deficit deliveries were recorded in 8 of the 16 division periods during the season. A late-season release from Newton Lake failed to prevent a deficit of 182 dam^3 (148 acre-feet) at the end of October.

The division of the Frenchman River natural flow is summarized in Tables 5 and 5A and Figure 6 which follow. The detailed computation of the natural flow is given in Table 14 and the historical summary is given in Table 15 of Appendix A.

TABLE 5

SUMMARY OF FRENCHMAN RIVER DIVISION FOR 1997[1]
QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	523	261	92		169
MAR 16 - MAR 31	121 284	60 642	112 861	52 219	
APR 1 - APR 15	37 046	18 523	29 771	11 248	
APR 16 - APR 30	10 721	5 360	9 810	4 450	
MAY 1 - MAY 15	3 516	1 758	3 023	1 265	
MAY 16 - MAY 31	4 087	2 044	2 053	9	
JUNE 1 - JUNE 15	9 020	4 510	4 609	99	
JUNE 16 - JUNE 30	2 184	1 092	2 114	1 022	
JULY 1 - JULY 15	855	427	232		195
JULY 16 - JULY 31	831	415	1 397	982	
AUG 1 - AUG 15	1 106	553	538		15
AUG 16 - AUG 31	423	212	53		159
SEPT 1 - SEPT 15	73	37	10		27
SEPT 16 - SEPT 30	5	3	5	2	
OCT 1 - OCT 15	64	32	4		28
OCT 16 - OCT 31	240	120	165	45	
TOTAL	191 980	95 989	166 737		

[1]This is a summary of data from Table 14, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

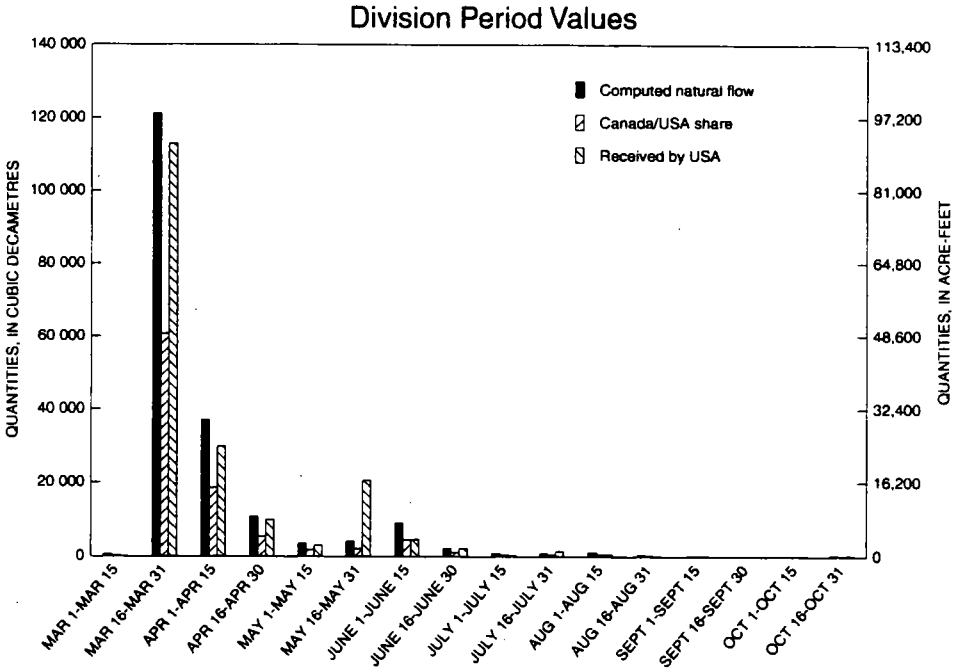
TABLE 5A

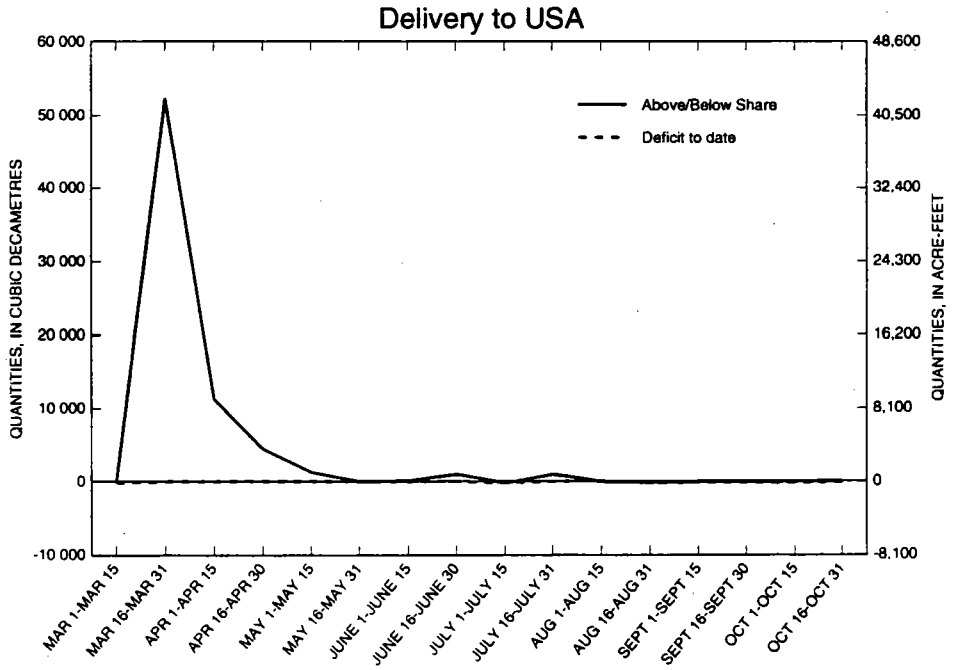
SUMMARY OF FRENCHMAN RIVER DIVISION FOR 1997[1]
QUANTITIES IN ACRE-FEET

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	COMPUTED NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	424	212	75		137
MAR 16 - MAR 31	98,325	49,163	91,497	42,334	
APR 1 - APR 15	30,033	15,017	24,135	9,119	
APR 16 - APR 30	8,692	4,345	7,953	3,608	
MAY 1 - MAY 15	2,850	1,425	2,451	1,026	
MAY 16 - MAY 31	3,313	1,657	1,664	7	
JUNE 1 - JUNE 15	7,313	3,656	3,737	80	
JUNE 16 - JUNE 30	1,771	885	1,714	829	
JULY 1 - JULY 15	693	346	188		158
JULY 16 - JULY 31	674	336	1,133	796	
AUG 1 - AUG 15	897	448	436		12
AUG 16 - AUG 31	343	172	43		129
SEPT 1 - SEPT 15	59	30	8		22
SEPT 16 - SEPT 30	4	2	4	2	
OCT 1 - OCT 15	52	26	3		23
OCT 16 - OCT 31	195	97	134	36	
TOTAL	155,638	77,818	135,174		

[1]All values are conversions of data from Table 5. Totals and shares may not add or subtract exactly as a result of rounding.

FIGURE 6
FRENCHMAN RIVER DIVISION, 1997





ANNEX A

1921 ORDER OF THE INTERNATIONAL JOINT COMMISSION RESPECTING THE ST. MARY-MILK RIVERS

INTERNATIONAL JOINT COMMISSION

ORDER

IN THE MATTER OF THE MEASUREMENT AND APPORTIONMENT OF THE WATERS OF THE ST. MARY AND MILK RIVERS AND THEIR TRIBUTARIES IN THE STATE OF MONTANA AND THE PROVINCES OF ALBERTA AND SASKATCHEWAN.

Whereas by Article VI of the Treaty entered into between the United States of America and His Majesty, the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India, signed at Washington on the 11th of January 1909, it is provided as follows:

> The High Contracting Parties agree that the St. Mary and Milk Rivers and their tributaries (in the State of Montana and the Provinces of Alberta and Saskatchewan) are to be treated as one stream for the purposes of irrigation and power, and the waters thereof shall be apportioned equally between the two countries, but in making such equal apportionment more than half may be taken from one river and less than half from the other by either country so as to afford a more beneficial use to each. It is further agreed that in the division of such waters during the irrigation season, between the 1st of April and 31st of October, inclusive, annually, the United States is entitled to a prior appropriation of 500 cubic feet per second of the waters of the Milk River, or so much of such amount as constitutes three-fourths of its natural flow, and that Canada is entitled to a prior appropriation of 500 cubic feet per second of the flow of St. Mary River, or so much of such amount as constitutes three-fourths of its natural flow.
>
> The channel of the Milk River in Canada may be used at the convenience of the United States for the conveyance, while passing through Canadian territory, of waters diverted from the St. Mary River. The provisions of Article II of this treaty shall apply to any injury resulting to property in Canada from the conveyance of such waters through the Milk River.

> The measurement and apportionment of the water to be used by each country shall from time to time be made jointly by the properly constituted reclamation officers of the United States and the properly constituted irrigation officers of His Majesty under the direction of the International Joint Commission.

And whereas, the said Reclamation and Irrigation Officers have been unable to agree as to the manner in which the waters mentioned in the said Article VI should be measured and apportioned;

And whereas, before giving directions as to the measurement and apportionment of the said waters, the International Joint Commission deemed it proper to hear such representations and suggestions thereon as the Governments of the United States and Canada, the Provinces of Alberta and Saskatchewan, and the State of Montana, and as corporations and persons interested might see fit to make, and for such purposes sittings of the Commission were held at the following times and places: At the city of St. Paul, in the State of Minnesota, on the 24th, 25th, 26th, 27th, and 28th days of May, 1915; at the city of Detroit, in the State of Michigan, on the 15th, 16th, and 17th days of May, 1917; at the city of Ottawa, in the Province of Ontario, on the 3rd, 4th, and 5th days of May, 1920; at the village of Chinook, in the State of Montana, on the 15th day of September 1921; and at the city of Lethbridge, in the Province of Alberta, on the 17th day of September, 1921, when counsel and representatives of the said Governments, corporations, and persons appeared and presented their views;

And whereas, pending final decision as to the proper method of measuring and apportioning said waters, interim orders with reference thereto have been made by the International Joint Commission from time to time, the last of such orders bearing the date of 5th day of April, 1921;

And whereas the members of the International Joint Commission have unanimously determined that the said Reclamation and Irrigation Officers should be guided in the measurement and apportionment of said waters by the directions and instructions hereinafter set forth;

IT IS THEREFORE ORDERED AND DIRECTED by the Commission in pursuance of the powers conferred by the said Article VI of the said Treaty that the Reclamation and Irrigation Officers of the United States and Canada shall, until this order is varied, modified, or withdrawn by the Commission, make jointly the measurement and apportionment of the water to be used by the United States and Canada in accordance with the following rules:

St. Mary River

I. (a) During the irrigation season when the natural flow of the St. Mary River at the point where it crosses the international boundary is six hundred and sixty-six (666) cubic feet per second or less Canada shall be entitled to three-fourths and the United States to one-fourth of such flow.

(b) During the irrigation season when the natural flow of the St. Mary River at the point where it crosses the international boundary is more than six hundred and sixty-six (666) cubic feet per second Canada shall be entitled to a prior appropriation of five hundred (500) cubic feet per second, and the excess over six hundred and sixty-six (666) cubic feet per second shall be divided equally between the two countries.

(c) During the non-irrigation season the natural flow of the St. Mary River at the point where it crosses the international boundary shall be divided equally between the two countries.

Milk River

II. (a) During the irrigation season when the natural flow of the Milk River at the point where it crosses the international boundary for the last time (commonly and hereafter called the Eastern Crossing) is six hundred and sixty-six (666) cubic feet per second or less, the United States shall be entitled to three-fourths and Canada to one-fourth of such natural flow.

(b) During the irrigation season when the natural flow of the Milk River at the Eastern Crossing is more than six hundred and sixty-six (666) cubic feet per second the United States shall be entitled to a prior appropriation of five hundred (500) cubic feet per second and the excess over six hundred and sixty-six (666) cubic feet per second shall be divided equally between the two countries.

(c) During the non-irrigation season the natural flow of the Milk River at the Eastern Crossing shall be divided equally between the two countries.

Eastern Tributaries of Milk River

III. The natural flow of the eastern (otherwise known as the Saskatchewan or northern) tributaries of the Milk River at the points where they cross the international boundary shall be divided equally between the two countries.

Waters not naturally crossing the boundary

IV. Each country shall be apportioned such waters of the said rivers and of any tributaries thereof as rise in that country but do not naturally flow across the international boundary.

V. For the purpose of carrying out the apportionment directed in Paragraphs I, II, and III hereof the said Reclamation and Irrigation Officers shall jointly take steps:

(a) To ascertain and keep a daily record of the natural flow of the St. Mary River at the international boundary, of the Milk River at the Eastern Crossing, and of the eastern tributaries of the Milk River at the international boundary by measurement in each case:

(1) At the gauging station at the international boundary;

(2) At all places where any of the waters which would naturally flow across the international boundary at that particular point are diverted in either country prior to such crossing;

(3) At all places where any of the waters which would naturally flow across the international boundary at that particular point are stored, or the natural flow thereof increased or decreased prior to such crossing;

(b) To fix the amount of water to which each country is entitled in each case by applying the directions contained in paragraphs 1, 2, and 3 hereof to the total amount of the natural flow so ascertained in each case.

(c) To communicate the amount so fixed to all parties interested, so that the apportionment of the said waters may be fully carried out by both countries in accordance with the said directions.

VI. Each country may receive its share of the said waters as so fixed at such point or points as it may desire. A gauging station shall be established and maintained by the Reclamation or Irrigation Officers of the country in which any diversion, storage, increase or decrease of the natural flow shall be made at every point where such diversion, storage, increase, or decrease takes place.

VII. International gauging stations shall be maintained at the following points:

St. Mary River near international boundary; the north branch of Milk River near international boundary; the south branch of Milk River near international boundary; Milk River at Eastern Crossing; Lodge Creek, Battle Creek, and Frenchman River, near international boundary; and gauging stations shall be established and maintained at such other points as the Commission may from time to time approve.

VIII. The said Reclamation and Irrigation Officers are hereby further authorized and directed:

(a) To make such additional measurements and to take such further and other steps as may be necessary or advisable in order to insure the apportionment of the said waters in accordance with the directions herein set forth.

(b) To operate the irrigation works of either country in such a manner as to facilitate the use by the other country of its share of the said waters and subject hereto to secure to the two countries the greatest beneficial use thereof.

(c) To report to the Commission the measurements made at all international and other gauging stations established pursuant to this order.

IX. In the event of any disagreement in respect to any matter or thing to be done under this order the said Reclamation and Irrigation Officers shall report to the Commission, setting forth fully the points of difference and the facts relating thereto.

X. The said order of the Commission dated the 6th day of April 1921, is hereby withdrawn, except with respect to the report to be furnished to the Commission thereunder.

Dated at Ottawa, Canada, this 4th day of October, 1921.

O. GARDNER,
C.A. MAGRATH,
C.D. CLARK,
HENRY A. POWELL,
W.H. HEARST,
MARK A. SMITH.

ANNEX B

Conversion Factors

FACTORS FOR CONVERSION BETWEEN INCH-POUND UNITS AND INTERNATIONAL SYSTEM (SI) UNITS

Since 1975, the Report to the International Joint Commission on the Division of the Waters of the St. Mary and Milk Rivers has used dual units (SI and inch-pound).

The two inch-pound units that were used in previous reports were cfs-days and acre-feet.

1 cfs-day = 86,400 cubic feet

1 acre-foot = 43,560 cubic feet

1 cfs-day = 1.9835 acre-feet

The SI unit replacing the inch-pound units is the cubic decametre (dam^3).

1 dam^3 = 1 000 cubic metres

1 cubic metre = 35.315 cubic feet

1 dam^3 = 35,315 cubic feet

1 acre-foot = 1.2335 dam^3

1 cfs-day = 2.4466 dam^3

1 dam^3 = 0.8107 acre-feet

ANNEX C

List of Gauging Stations

INTERNATIONAL GAUGING STATIONS OPERATED JOINTLY BY THE UNITED STATES AND CANADA ST. MARY AND MILK RIVER BASINS 1997

Map Index	Station Name
	ST. MARY RIVER BASIN
05AE027	St. Mary River at International Boundary
05AE029	St. Mary Canal at St. Mary Crossing near Babb, Montana
05AE036	Lake Sherburne at Sherburne, Montana
	MILK RIVER BASIN
11AA001	North Milk River near International Boundary
11AA005	Milk River at Milk River, Alberta
11AA025	Milk River at Western Crossing of International Boundary
11AA031	Milk River at Eastern Crossing of International Boundary
11AA032	N. Fork Milk River above St. Mary Canal near Browning, Montana
11AA038	Verdigris Coulee near the Mouth
	LODGE CREEK TRIBUTARY BASIN
11AB008	Middle Creek above Lodge Creek
11AB001	Middle Creek below Middle Creek Reservoir
11AB108	Middle Creek near Govenlock
11AB009	Middle Creek near Saskatchewan Boundary
11AB060	Spangler Ditch near Govenlock
11AB083	Lodge Creek below McRae Creek at International Boundary
11AB089	Altawan Reservoir near Govenlock

BATTLE CREEK TRIBUTARY BASIN

11AB018	Nashlyn Canal near Consul
11AB027	Battle Creek at International Boundary
11AB044	McKinnon Ditch near Consul
11AB058	Richardson Ditch near Consul
11AB077	Cypress Lake West Outflow Canal
11AB078	Cypress Lake West Inflow Canal
11AB084	Vidora Ditch near Consul
11AB085	Cypress Lake West Inflow Canal Drain
11AB102	Gaff Ditch near Merryflat

FRENCHMAN RIVER TRIBUTARY BASIN

11AC037	Cypress Lake
11AC041	Frenchman River at International Boundary
11AC052	Eastend Canal near Eastend
11AC054	Newton Lake Main Canal
11AC055	Eastend Reservoir
11AC056	Newton Lake
11AC060	Cypress Lake East Outflow Canal
11AC063	Huff Lake
11AC064	Belanger Creek Diversion to Cypress Lake
11AC065	Huff Lake Gravity Canal
11AC066	Huff Lake Pumping Canal

GAUGING STATIONS OPERATED INDEPENDENTLY BY EITHER THE UNITED STATES OR CANADA ST. MARY AND MILK RIVER BASINS 1997

*Data for these stations are not included in this report or appendices

Map Index	Station Name	Operated by
	ST. MARY RIVER BASIN	
5-0145*	Swiftcurrent Creek at Many Glacier, Montana	U.S.A.
5-0160*	Swiftcurrent Creek at Sherburne, Montana	U.S.A.
5-0175*	St. Mary River near Babb, Montana	U.S.A.
	MILK RIVER BASIN	
6-1322*	South Fork Milk River near Babb, Montana	U.S.A.
11AA028*	Bear Creek near International Boundary	Canada
11AA029*	Miners Coulee near International Boundary	Canada
	LODGE CREEK TRIBUTARY BASIN	
11AB082*	Lodge Creek at Alberta Boundary	Canada
11AB091	Michel Reservoir near Elkwater	Canada
11AB092	Greasewood Reservoir near Elkwater	Canada
11AB094	Bare Creek Reservoir near Elkwater	Canada
11AB097	Cressday Reservoir near Cressday	Canada
11AB098	Jaydot Reservoir near Jaydot	Canada
11AB099	Mitchell Reservoir near Elkwater	Canada
11AB103	Squaw Coulee near Willow Creek	Canada
11AB104	Massy Reservoir near Elkwater	Canada
11AB114	Middle Creek Reservoir Bedford Outlet	Canada
11AB115	Middle Creek Reservoir Flood Spillway	Canada

BATTLE CREEK TRIBUTARY BASIN

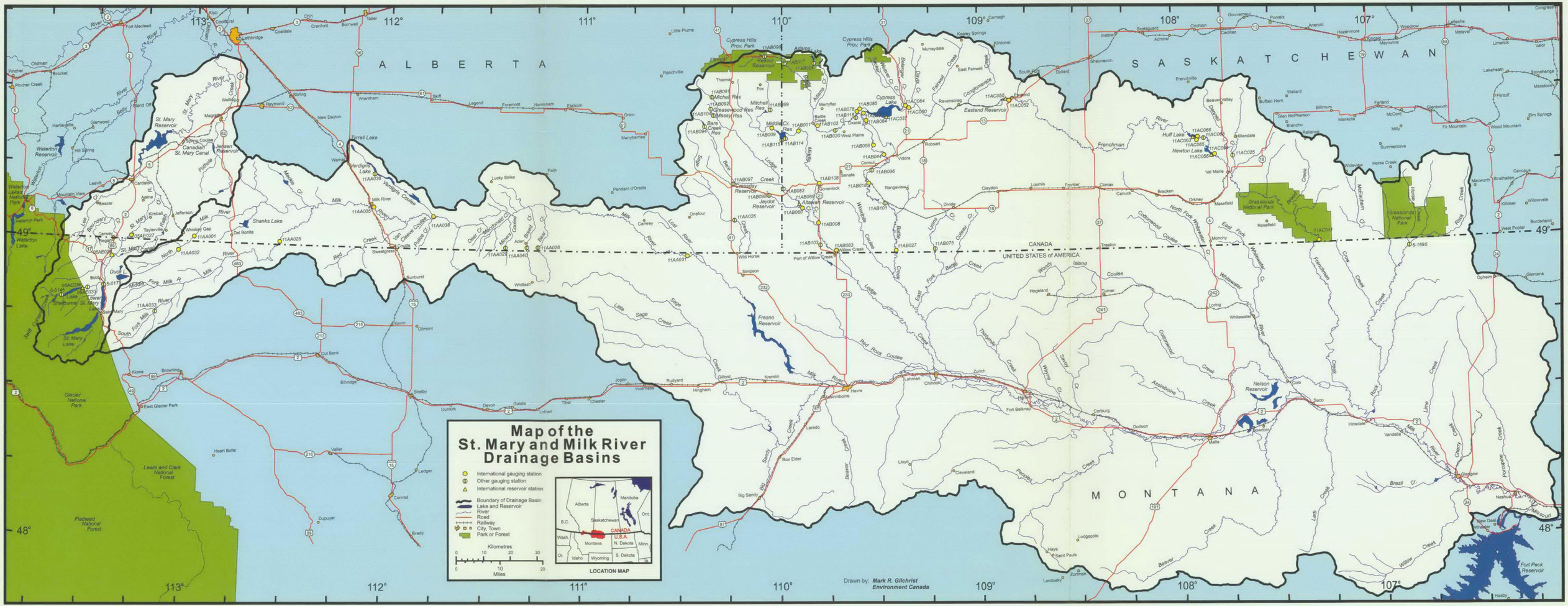
11AB020*	Shepherd Ditch near Consul	Canada
11AB075	Lyons Creek at International Boundary	Canada
11AB090	Reesor Reservoir near Elkwater	Canada
11AB095*	Adams Lake	Canada
11AB096*	Battle Creek near Consul	Canada
11AB101*	Battle Creek below Nashlyn Project	Canada
11AB117*	Battle Creek at Alberta Boundary	Canada
11AB118*	Battle Creek below Wilson's Weir	Canada

FRENCHMAN RIVER TRIBUTARY BASIN

11AC001*	Frenchman River below Eastend Reservoir	Canada
11AC025*	Denniel Creek near Val Marie	Canada
11AC062*	Frenchman River below Newton Lake	Canada
11AC068*	Val Marie Pump No. 1	Canada

ROCK CREEK TRIBUTARY BASIN

6-1695*	Rock Creek below Horse Creek near International Boundary	U.S.A.


Map of the
St. Mary and Milk River
Drainage Basins
International gauging station
Other gauging station
International reservoir station
Boundary of Drainage Basin
Lake and Reservoir
River
Road
Railway
City, Town
Park or Forest
Kilometres
0 10 20 30
0 10 20
Miles
LOCATION MAP
Alberta
Saskatchewan
Manitoba
Ont.
B.C.
Wash.
Montana
N. Dakota
Minn.
Or.
Idaho
Wyoming
S. Dakota
CANADA
U.S.A.
ALBERTA
SASKATCHEWAN
MONTANA
CANADA
UNITED STATES of AMERICA
Drawn by: Mark R. Gilchrist
Environment Canada

Report to the International Joint Commission on the division and use of the waters of the St. Mary and Milk Rivers...

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