

Report to

THE INTERNATIONAL JOINT COMMISSION

On

THE DIVISION OF THE WATERS OF

THE ST. MARY AND MILK RIVERS

2013



Cover Photo:

Milk River at Writing-on-Stone Provincial Park, Alberta

Photograph by Jerry Wagner-Watchel, Environment Canada, Calgary, Alberta

REPORT TO
THE INTERNATIONAL JOINT COMMISSION
ON
THE DIVISION OF THE WATERS OF
THE ST. MARY AND MILK RIVERS
FOR THE YEAR 2013

Submitted By

Dr. Max M. Ethridge

Representing the United States

And

Dr. Alain Pietroniro

Representing Canada

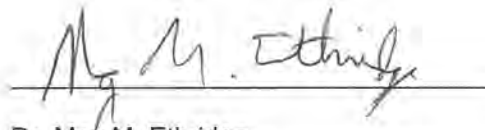
April 2014

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, 2013.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Max M. Ethridge", written over a horizontal line.

Dr. Max M. Ethridge
Accredited Officer of the United States

A handwritten signature in black ink, appearing to read "Alain Pietroniro", written over a horizontal line.

Dr. Alain Pietroniro
Accredited Officer of Her Majesty

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SYNOPSIS

During the 2013 irrigation season, the natural flow of the St. Mary River was 98 percent of the long-term average.

The natural flow of the St. Mary River at the International Boundary during the irrigation season, April 1 to October 31, 2013, was 698 400 cubic decametres (dam³) (566,200 acre-feet). Under the terms of the Boundary Waters Treaty, the Canadian allotment was 424 600 dam³ (344,200 acre-feet). The total flow recorded at the International Boundary during the irrigation season was 121 percent of the Canadian allotment.

The natural flow of the Milk River during the 2013 irrigation season was 71 percent of the long-term average.

The natural flow of the Milk River at the Eastern Crossing of the International Boundary from March 1 to October 31, 2013, was 97 590 dam³ (79,120 acre-feet). Under terms of the Treaty, the United States' allotment was 67 340 dam³ (54,590 acre-feet). The United States received 137 percent of its allotment at Eastern Crossing, in addition to its share of St. Mary River water diverted into the Milk River through the St. Mary Canal.

The March 1 to October 31, 2013 natural flows of the three apportioned tributaries of the Milk River were 59 percent of the long-term average for Lodge Creek at the International Boundary, 83 percent for Battle Creek at the International Boundary, and 125 percent for Frenchman River at the International Boundary. The total flow recorded at the International Boundary during the irrigation season for Lodge Creek, Battle Creek, and Frenchman River was 114 percent, 181 percent, and 172 percent, respectively, of the United States allotment.

The annual meeting of the Field Representatives was held in Medicine Hat, Alberta on February 12, 2014. Mutual problems, future plans, and changes in computational procedures were discussed and a schedule of field operations for 2014 was adopted.

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MAP

Map of St. Mary and Milk River Drainage Basins

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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, staff of the United States Geological Survey and Environment Canada, Water Survey Division collected, compiled, verified, and tabulated hydrometric data at 35 international gauging stations on a cooperative basis, under the direction of the Field Representatives of the United States and Canada. An additional 72 gauging stations were operated independently by the United States and Canada in the St. Mary and Milk River basins. Several of these stations were operated to obtain data on diversions, reservoir contents, return flows and index runoff which was used to improve the accuracy of natural-flow computations.

This report summarizes the year 2013 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 conversion factors. A summary of the conversion factors is contained in Annex D.

Dr. Max M. Ethridge, as the Accredited Officer of the United States, was represented in the field by Mr. John M. Kilpatrick, United States Geological Survey, Helena, Montana. Dr. Alain Pietroniro, as the Accredited Officer of Her Majesty, was represented in the field by Mr. Russell G. Boals. This report was prepared jointly by personnel of Environment Canada, Water Survey Division, and the United States Geological Survey, under the supervision of Messrs. Kilpatrick and Boals.

The annual meeting of the Field Representatives was held in Medicine Hat, Alberta on February 12, 2014. Mutual concerns, future plans, and changes in computational procedures were discussed and a schedule of field operations for 2014 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 to determine flow apportionment during the irrigation season. These 15 to 16 day periods are termed 'division periods' and serve to provide an opportunity to respond to varying use and flow conditions. For example, if use by the United States is in excess of its share during a division period, then a surplus delivery (or an amount in excess of its share in the subsequent division period) 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 5015500) was 38 920 dam³ (31,550 acre-feet) on October 31, 2012. Storage increased to 70 940 dam³ (57,510 acre-feet) on February 28, 2013, when the 2013 irrigation-season began. Maximum storage was 81 150 dam³ (65,790 acre-feet) on July 3, 2013 and storage had decreased to 19 470 dam³ (15,780 acre-feet) by the end of irrigation releases on September 25, 2013.

Water was diverted from the St. Mary River into the Milk River via the St. Mary Canal beginning on March 11, 2013 and continued through September 30, 2013. The total flow recorded at the gauging station on the St. Mary Canal at St. Mary Crossing (station 5018500) was 227 200 dam³ (184,200 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 (station 05AE027) from November 1, 2012 to October 31, 2013 was 852 600 dam³ (691,200 acre-feet) of which 698 400 dam³ (566,200 acre-feet) occurred during the irrigation season, April 1 to October 31, 2013. For the irrigation season, Canada's share was 424 600 dam³ (344,200 acre-feet) and the United States' share was 273 800 dam³ (222,000 acre-feet). During the irrigation season, a total discharge of 515 100 dam³ (417,600 acre-feet) was recorded at the International Boundary, which was 121 percent of the Canadian share. The computed natural flow during the irrigation season was 98 percent of the average of the previous 110 years of record.

A deficit delivery was recorded in 2 of the 16 division periods during the 2013 irrigation season. In accordance with the 2001 Letter of Intent respecting the St. Mary and Milk Rivers streamflow transfers (a copy is available in Annex B of this report), the United States is allowed to accumulate deficits on the St. Mary River of up to 4,000 cfs-days (9 800 dam³) (7,940 acre-feet) between March 1 and May 31 of each year. At the discretion of the United States, the deficits may be reduced to no less than 2,000 cfs-days (4 900 dam³) (3,970 acre-feet) between June 1 and July 15 of each year with surplus deliveries of St. Mary River water. The remaining deficits incurred by the United States on the St. Mary River may be offset by deficits incurred by Canada on the Milk River from June 1 through September 15. Any outstanding deficits remaining on September 15 are to be equalized by October 31 of each year.

The United States accumulated a deficit on the St. Mary River of 1 860 dam³ (1,510 acre-feet) for the April 1-15, 2013 division period. The United States, using September 16-30 surplus deliveries, eliminated the April 1-15 deficit. The 24 dam³ (19 acre-feet) deficit incurred during the October 1-15 division period was refunded with surplus flows by October 31, 2013.

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 2013*
Quantities in Cubic Decametres

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	5,309	2,655	4,846	2,191	
MAR 16 - MAR 31	10,733	5,366	8,071	2,705	
APR 1 - APR 15	21,315	15,779	13,920		1,859
APR 16 - APR 30	21,124	15,609	16,098	489	
MAY 1 - MAY 15	71,528	41,872	49,759	7,887	
MAY 16 - MAY 31	126,211	69,622	95,587	25,965	
JUNE 1 - JUNE 15	106,647	59,433	80,347	20,914	
JUNE 16 - JUNE 30	112,013	62,116	79,074	16,958	
JULY 1 - JULY 15	81,240	46,729	61,712	14,983	
JULY 16 - JULY 31	38,309	25,670	26,576	906	
AUG 1 - AUG 15	31,156	21,685	22,305	620	
AUG 16 - AUG 31	19,659	14,740	15,013	273	
SEP 1 - SEP 15	15,145	11,361	11,969	608	
SEP 16 - SEP 30	15,103	11,327	13,362	2,035	
OCT 1 - OCT 15	24,716	18,020	17,996		24
OCT 16 - OCT 31	14,238	10,680	11,428	748	
TOTAL	714,446	432,664	528,063		

* This is a summary of data from Table 6, Appendix A.

Note:

Canadian share of St. Mary River waters deficit outstanding:
as of May 31, 2013: 1 860 dam³ (1,510 acre-feet) (760 cfs-days)
as of June 15, 2013: 1 860 dam³ (1,510 acre-feet) (760 cfs-days)
as of September 15, 2013: 1 860 dam³ (1,1510 acre-feet) (760 cfs-days).

U.S.A. share of Milk River waters outstanding as of September 15, 2013: 1 860 dam³ (1,510 acre-feet) (760 cfs-days).

Allowable deficit carryovers, as per 2001 Letter of Intent respecting St. Mary-Milk Rivers streamflow transfers, are:
as of May 31, 2012: 9 800 dam³ (7,940 acre-feet) (4,000 cfs-days)
as of July 15, 2012: 4 900 dam³ (3,970 acre-feet) (2,000 cfs-days)

Any deficits outstanding as of September 15 are to be equalized by October 31 of each year.

Table 1A: Summary of St. Mary River Division for 2013*
Quantities in Acre-Feet

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	4,304	2,152	3,929	1,776	
MAR 16 - MAR 31	8,701	4,350	6,543	2,193	
APR 1 - APR 15	17,280	12,792	11,285		1,507
APR 16 - APR 30	17,125	12,654	13,051	396	
MAY 1 - MAY 15	57,988	33,946	40,340	6,394	
MAY 16 - MAY 31	102,319	56,443	77,493	21,050	
JUNE 1 - JUNE 15	86,459	48,182	65,137	16,955	
JUNE 16 - JUNE 30	90,809	50,358	64,105	13,748	
JULY 1 - JULY 15	65,861	37,883	50,030	12,147	
JULY 16 - JULY 31	31,057	20,811	21,545	734	
AUG 1 - AUG 15	25,258	17,580	18,083	503	
AUG 16 - AUG 31	15,938	11,950	12,171	221	
SEP 1 - SEP 15	12,278	9,210	9,703	493	
SEP 16 - SEP 30	12,244	9,183	10,833	1,650	
OCT 1 - OCT 15	20,037	14,609	14,589		19
OCT 16 - OCT 31	11,543	8,658	9,265	606	
TOTAL	579,202	350,761	428,101		

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

Note:

Canadian share of St. Mary River waters deficit outstanding:

as of May 31, 2013: 1,510 acre-feet (1 860 dam³) (760 cfs-days)

as of June 15, 2013: 1,510 acre-feet (1 860 dam³) (760 cfs-days)

as of September 15, 2013: 1,510 acre-feet (1 860 dam³) (760 cfs-days).

U.S.A. share of Milk River waters outstanding as of September 15, 2013: 1,510 acre-feet (1 860 dam³) (760 cfs-days).

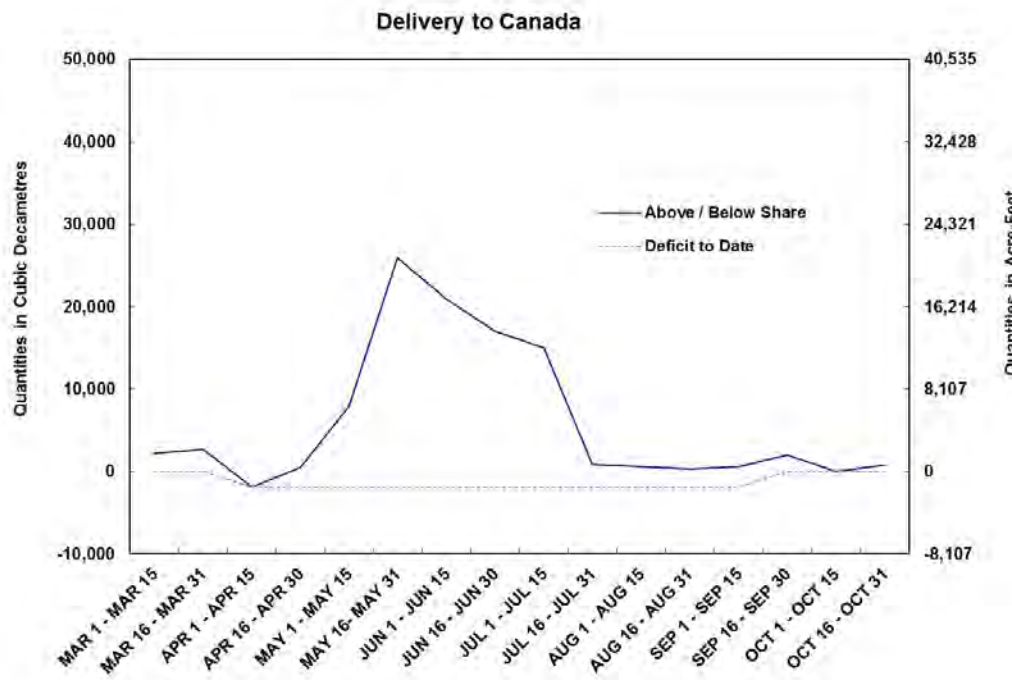
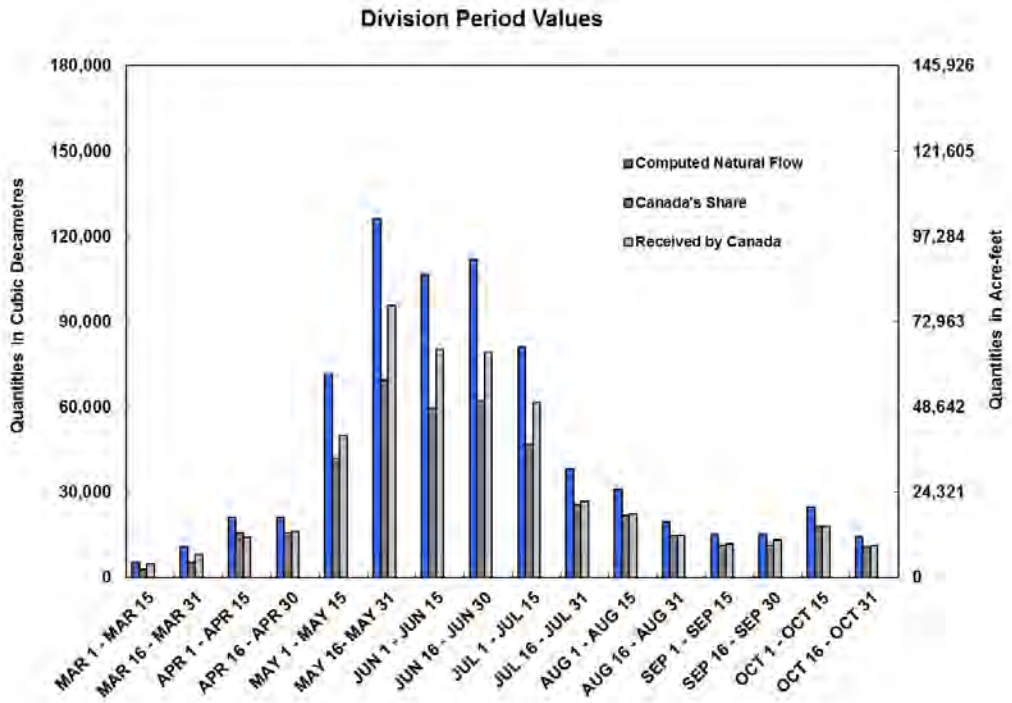
Allowable deficit carryovers, as per 2001 Letter of Intent respecting St. Mary-Milk Rivers streamflow transfers, are:

as of May 31, 2012: 7,940 acre-feet (9 800 dam³) (4,000 cfs-days)

as of July 15, 2012: 3,970 acre-feet (4 900 dam³) (2,000 cfs-days)

Any deficits outstanding as of September 15 are to be equalized by October 31 of each year.

Figure 1. St. Mary River Division, 2013



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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 upstream from Eastern Crossing 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 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 inter-basin transfer of water in Canada. An additional refinement was made in 1988 when F.I. Morton's evapo-transpiration model replaced the adjusted pan evaporation method in the natural flow computations.

Data required for Morton's model is resource intensive. The equipment used to collect the data is highly specialized, less than robust, and located in a remote area. Data collected at the evapo-transpiration monitoring site near Milk River, Alberta needed frequent supplementation from the Onefour, Alberta pan evaporation site due to equipment malfunction. This coupled with the fact that the analysis program required extensive re-writing to port it from the obsolete DEC-VMS computer operating system suggested that an alternative needed to be investigated.

Data from the results of Morton's model were found to have a strong linear correlation with the Onefour, Alberta Class A evaporation pan results and therefore evapo-transpiration was estimated using the Onefour pan evaporation data as an index of Morton's model results.

The method for estimating evapo-transpiration losses has undergone another transition, moving from the Onefour, Alberta Class A pan derived method to a modified Penman application. Since 2013, a modified Penman equation has been used to estimate evaporative losses for interim and final natural flow computations for Milk River. Data for use in the modified Penman method have been collected from a weather station located near the Milk River at the Eastern Crossing of the International Boundary.

During 2013, the United States' estimated consumptive use was 5 050 dam³ (4,090 acre-feet) and Canada's estimated consumptive use was 5 160 dam³ (4,180 acre-feet). No inter-basin transfers from Verdigris Coulee near the Mouth (station 11AA038) were credited to the Canadian consumptive use.

The computed natural flow of the Milk River at the Eastern Crossing of the International Boundary (station 6135000) from March 1 to October 31, 2013 was 97 590 dam³ (79,120 acre-feet). This flow was 71 percent of the average computed natural flow of the previous 101 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-flow values of previous years. For the period March 1 to October 31, 2013, the United States' share was 67 340 dam³ (54,590 acre-feet) and Canada's share was 30 250 dam³ (24,520 acre-feet). The United States received 137 percent of its allotment at the Eastern Crossing, in addition to its share of St. Mary River water diverted into the Milk River through the St. Mary Canal.

There were 4 deficit deliveries recorded in the 16 division periods during the irrigation season on the Milk River. At present, Canada does not have facilities to store and release water into the Milk River Basin. Deficits are made up by transfer of Canada's share of St. Mary River water if excess capacity exists both in the stream and in the American St. Mary Canal, or as allowed by the 2001 Letter of Intent respecting the St. Mary and Milk Rivers streamflow transfers (a copy of which is available in Annex B of this report) whereby Canada is allowed to accumulate a deficit on the Milk River of up to 2,000 cfs-days (4 900 dam³) (3,970 acre-feet) between June 1 and September 15 of each year. The incurred deficits on the St. Mary and Milk Rivers may be offset and the outstanding deficits as of September 15 are to be equalized by October 31 of each year.

Canada accumulated a deficit on the Milk River of 1 110 dam³ (900 acre-feet) for the division periods between July 16 and September 15, 2013. Canada eliminated the deficit incurred during the division periods between July 16 and September 15, using surplus deliveries between September 16 and October 31, 2013.

The division of Milk River natural flow is summarized in Table 2 and 2A and Figure 2, which follow. The detailed computation of the natural flow is given in Table 8 and the historical summary is given in Table 9 of Appendix A.

**Table 2: Summary of Milk River Division for 2013*
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	5,847	2,924	5,848	2,924	
MAR 16 - MAR 31	14,075	7,038	14,075	7,037	
APR 1 - APR 15	10,801	8,101	10,801	2,700	
APR 16 - APR 30	6,470	4,852	6,470	1,618	
MAY 1 - MAY 15	5,665	4,249	5,665	1,416	
MAY 16 - MAY 31	14,526	10,813	13,545	2,732	
JUNE 1 - JUNE 15	19,098	13,534	18,140	4,606	
JUNE 16 - JUNE 30	5,618	4,214	5,256	1,042	
JULY 1 - JULY 15	5,242	3,932	4,581	649	
JULY 16 - JULY 31	614	460	0		552
AUG 1 - AUG 15	2,153	1,615	1,609		6
AUG 16 - AUG 31	313	235	0		503
SEP 1 - SEP 15	1,265	949	902		47
SEP 16 - SEP 30	805	604	806	202	
OCT 1 - OCT 15	2,999	2,250	3,000	750	
OCT 16 - OCT 31	2,094	1,571	2,094	523	
TOTAL	97,585	67,341	92,792		

* This is a summary of data from Table 8, Appendix A.

Note:

Division periods July 16-31 and August 16-31: "Below Share" data, received by the United States, was less than "U.S.A. Share" due to Canada's share of natural flow was less than consumptive use (Morton's values) for Canada.

U.S.A. share of Milk River waters deficit outstanding:
as of September 15, 2013: 1 100 dam³ (900 acre-feet) (454 cfs-days).

Canadian share of St. Mary River waters deficit outstanding:
as of May 31, 2013: 1 860 dam³ (1,510 acre-feet) (760 cfs-days).

Allowable deficit carryover from June 1 and September 15 as per 2001 Letter of Intent respecting St. Mary - Milk River streamflow transfers cannot be less than the outstanding deficit to Canada on St. Mary River Division as of May 31st, nor exceeding 4 900 dam³ (2,000 cfs-days) (3,970 acre-feet), whichever is less.

**Table 2A: Summary of Milk River Division for 2013*
Quantities in Acre-Feet**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	4,740	2,370	4,741	2,370	
MAR 16 - MAR 31	11,411	5,706	11,411	5,705	
APR 1 - APR 15	8,756	6,567	8,756	2,189	
APR 16 - APR 30	5,245	3,934	5,245	1,312	
MAY 1 - MAY 15	4,593	3,445	4,593	1,148	
MAY 16 - MAY 31	11,776	8,766	10,981	2,215	
JUNE 1 - JUNE 15	15,483	10,972	14,706	3,734	
JUNE 16 - JUNE 30	4,555	3,416	4,261	845	
JULY 1 - JULY 15	4,250	3,188	3,714	526	
JULY 16 - JULY 31	498	373	0		448
AUG 1 - AUG 15	1,745	1,309	1,304		5
AUG 16 - AUG 31	254	191	0		408
SEP 1 - SEP 15	1,026	769	731		38
SEP 16 - SEP 30	653	490	653	164	
OCT 1 - OCT 15	2,431	1,824	2,432	608	
OCT 16 - OCT 31	1,698	1,274	1,698	424	
TOTAL	79,112	54,593	75,226		

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

Note:

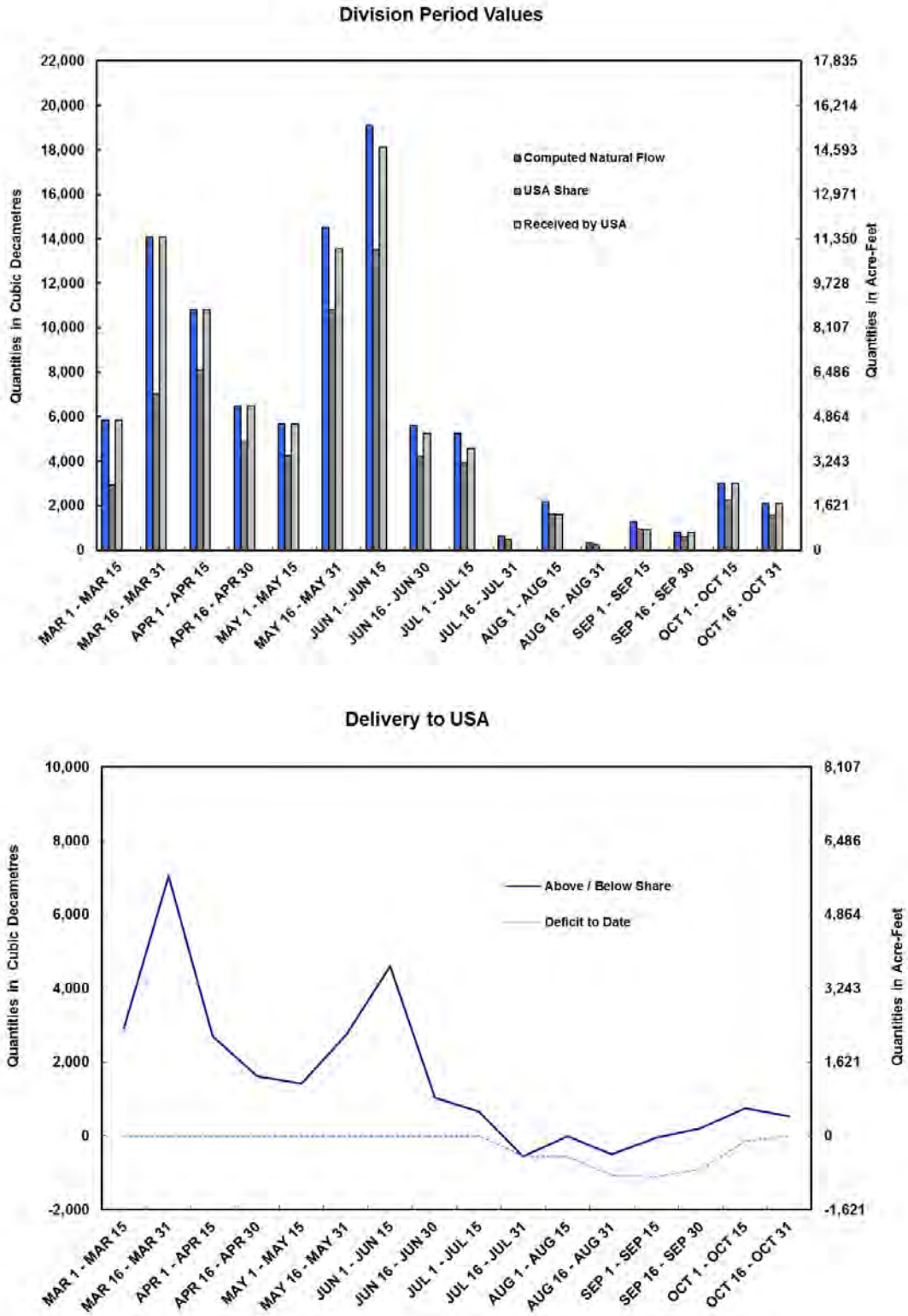
Division periods July 16-31 and August 16-31: "Below Share" data, received by the United States, was less than "U.S.A. Share" due to Canada's share of natural flow was less than consumptive use (Morton's values) for Canada.

U.S.A. share of Milk River waters deficit outstanding:
as of September 15, 2013: 900 acre-feet (1 110 dam³) (454 cfs-days).

Canadian share of St. Mary River waters deficit outstanding:
as of May 31, 2013: 1,510 acre-feet (1 860 dam³) (760 cfs-days).

Allowable deficit carryover from June 1 and September 15 as per 2001 Letter of Intent respecting St. Mary - Milk River streamflow transfers cannot be less than the outstanding deficit to Canada on St. Mary River Division as of May 31st, nor exceeding 4 900 dam³ (2,000 cfs-days) (3,970 acre-feet), whichever is less.

Figure 2. Milk River Division, 2013



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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 discussions to resolve Canadian concerns. To assist them in implementing the Commission's instructions, the Accredited Officers established a four-member ad hoc task force composed 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 and Milk Rivers.

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 the 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.

No Canadian complaints or changes in the Montana adjudication process were noted in 2013.

Flows for March through October 2013 for the southern tributaries were as follows:

- o Bear Creek near International Boundary – 2 370 dam³ (1,920 acre-feet)
- o Miners Coulee near International Boundary – 662 dam³ (537 acre-feet).

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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 daily basis; however, the physical limitation due to transit time in the flow system was recognized to be an impediment to the most beneficial use of the water if a daily apportionment were adopted. 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 (station 11AC063), and Newton Lake (station 11AC056) which 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 inter-basin 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.

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 Security Agency, and by Alberta Environment and Sustainable Resource Development for the Lodge Creek and Battle Creek basins located in Alberta. Lists of reported diversions are contained in Appendix B.

Lyons Creek (station 11AB075) is monitored by Canada, but does not have sufficient use in Canada at this time to warrant an operational division of flow. Total flow from March to October of 3 610 dam³ (2,930 acre-feet) was recorded on Lyons Creek for the year 2013.

The major reservoirs in the Lodge Creek, Battle Creek, and Frenchman River basins were at or near full storage by the end of April 2013. The Altawan Reservoir in Lodge Creek basin achieved a seasonal maximum storage of 7 010 dam³ (5,680 acre-feet) by the end of April, full storage capacity. In the Battle Creek basin, Cypress Lake was at 119 700 dam³ (97,040 acre-feet) storage by the end of April, 93 per cent of full storage capacity. In the Frenchman River basin, the Eastend Reservoir was at full storage by the end of April. Huff Lake and Newton Lake were near full storage by the end of April.

Net reservoir evaporation computations in the eastern tributaries of the Milk River were made using a modified Penman equation.

The Lodge Creek, Battle Creek, and Frenchman River basins received water for irrigation during the 2013 season. In the Lodge Creek basin, water was received for irrigation on the Spangler Project during May and June with a total flow of 1 490 dam³ (1,210 acre-feet) diverted down the Spangler Ditch. In the Battle Creek basin, the Vidora, Richardson, and McKinnon projects irrigated during division periods in May. Gaff Ditch was operated mainly from the end of March through to the beginning of June. The Nashlyn Project received water in the March to early May division periods for the spring backflood irrigators. In the Frenchman River basin, the Eastend, Newton, and Huff Lake Projects irrigated from approximately mid-May to mid-June.

The Lodge Creek basin incurred a 204 dam³ (165 acre-feet) year-end deficit for the 2013 irrigation season. In the early part of the irrigation season a deficit was incurred due to storage in Middle

Creek and Altawan Reservoirs. The accumulated deficit was reduced by surplus flows in May and a release from Altawan Reservoir in June. The natural flow was negligible on Lodge Creek after mid-July.

The Battle Creek basin finished the 2013 irrigation season with no year-end deficit. There were no deficits in any of the 16 division periods during the irrigation season.

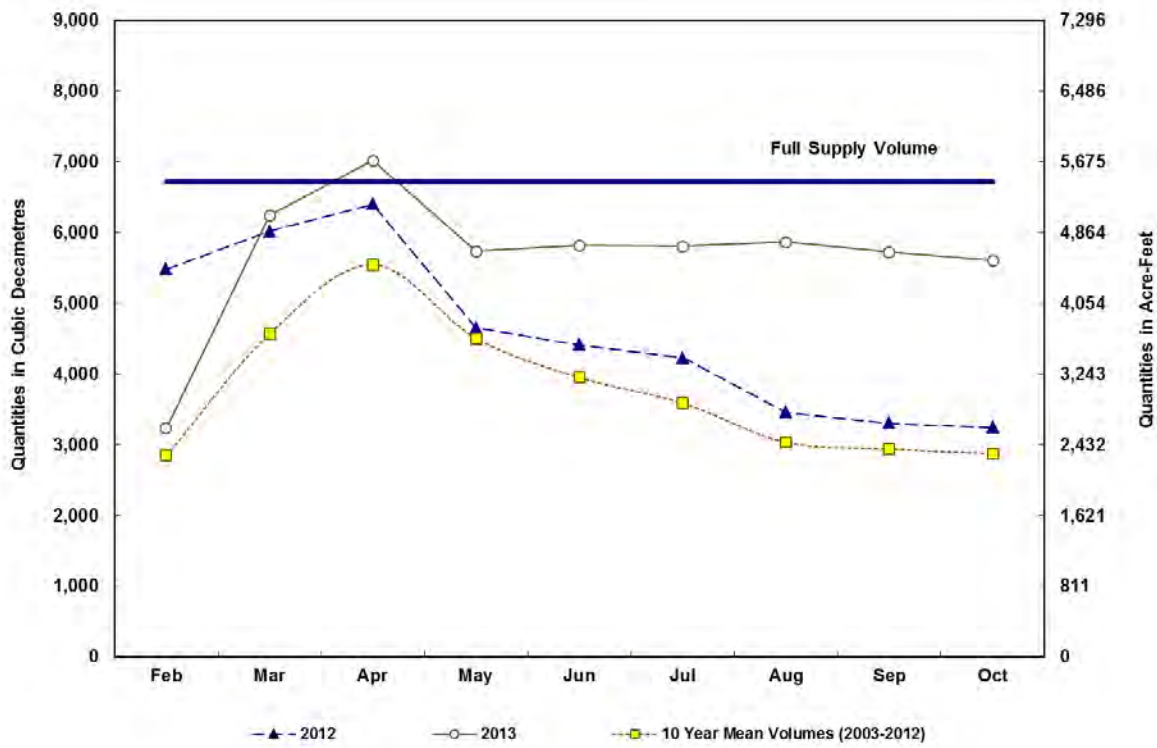
The Frenchman River basin finished the 2013 irrigation season with no year-end deficit.

Diversions to Cypress Lake from Battle Creek and from Frenchman River were restricted this year due to Agri-Environment Services Branch (AESB - formerly PFRA) rehabilitation of Cypress Lake. AESB set a temporary full supply, lowering original full supply by approximately 0.6 m (2 feet). Initial investigation shows that a relatively major repair needs to be made on the east embankment of Cypress Lake. Due to diversions being restricted during the irrigation season, there were surplus deliveries of 10 330 dam³ (8,380 acre-feet) on Battle Creek and 35 060 dam³ (28,420 acre-feet) on Frenchman River.

Figures 3a to 3e show month-end and mean contents of major reservoirs in Lodge Creek, Battle Creek, and Frenchman River basins.

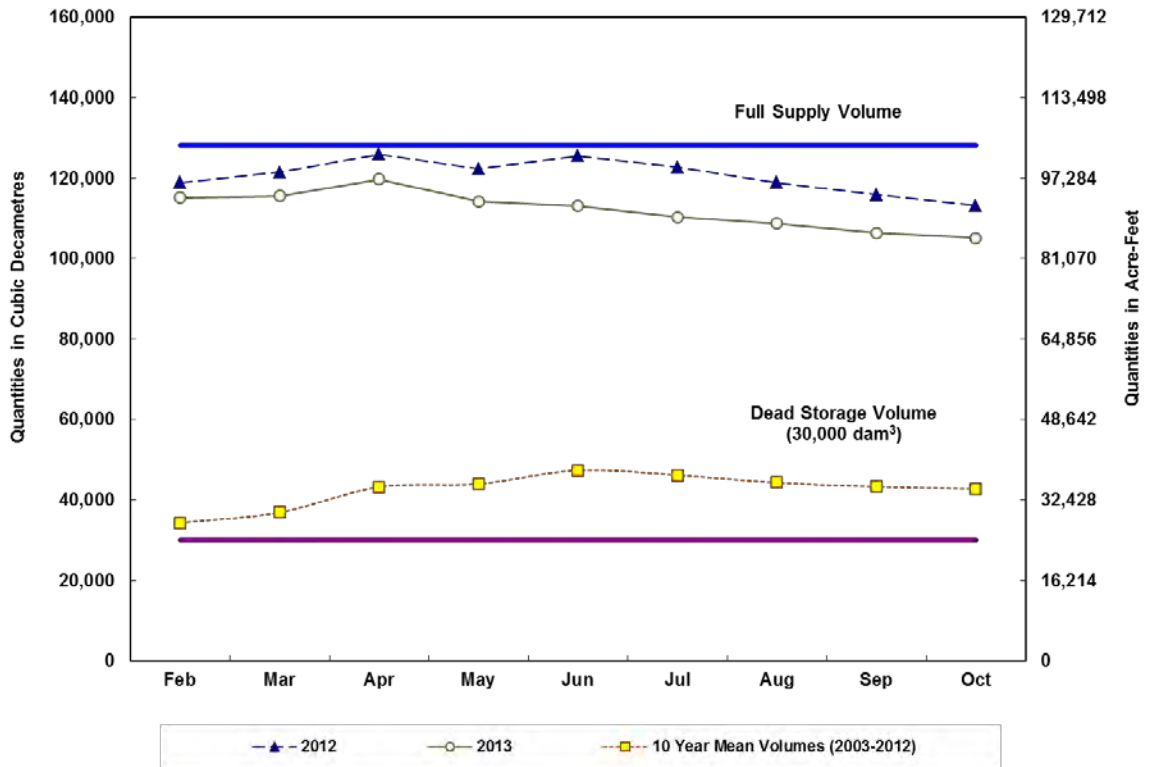
**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2012, 2013, and 2003-2012 Mean**

Figure 3a. Altawan Reservoir



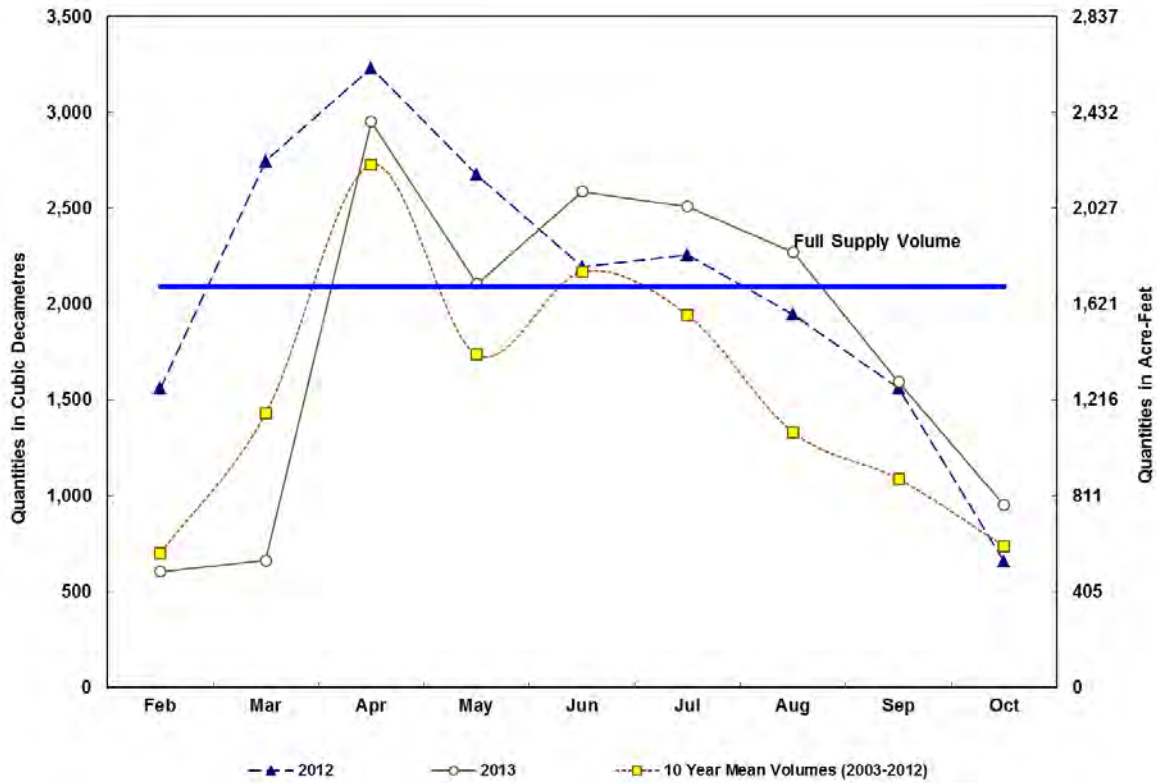
**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2012, 2013, and 2003-2012 Mean**

Figure 3b. Cypress Lake



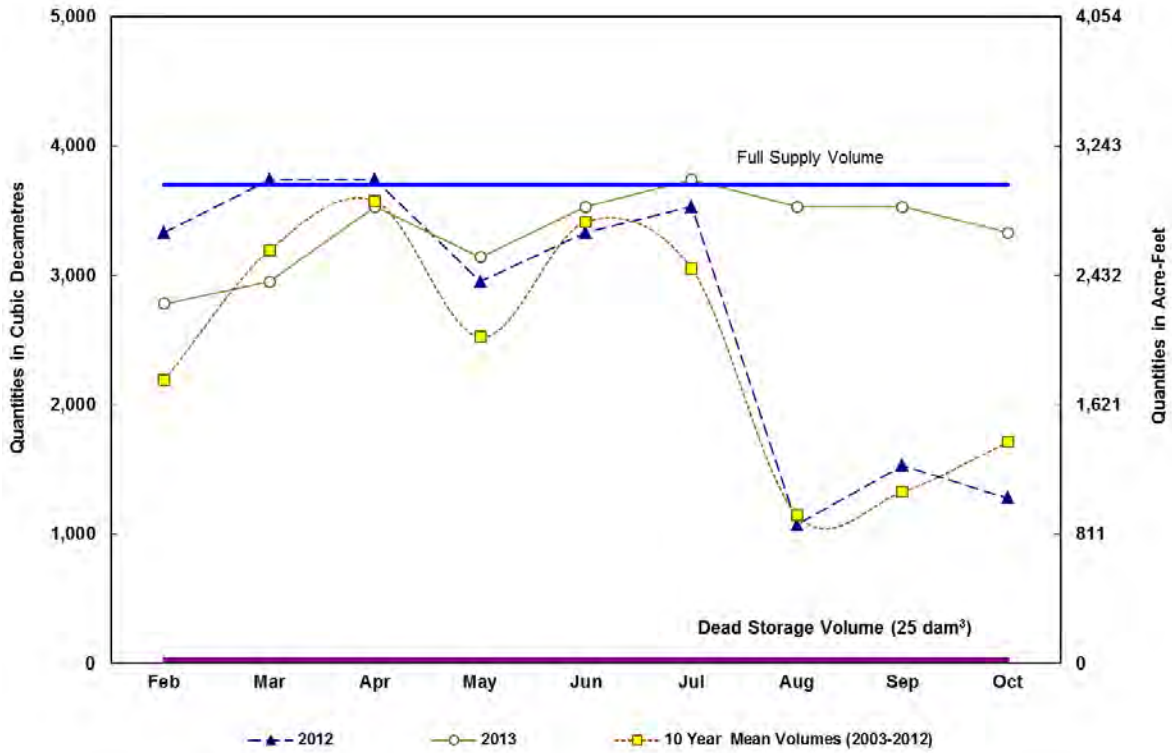
**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2012, 2013, and 2003-2012 Mean**

Figure 3c. Eastend Reservoir



**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2012, 2013, and 2003-2012 Mean**

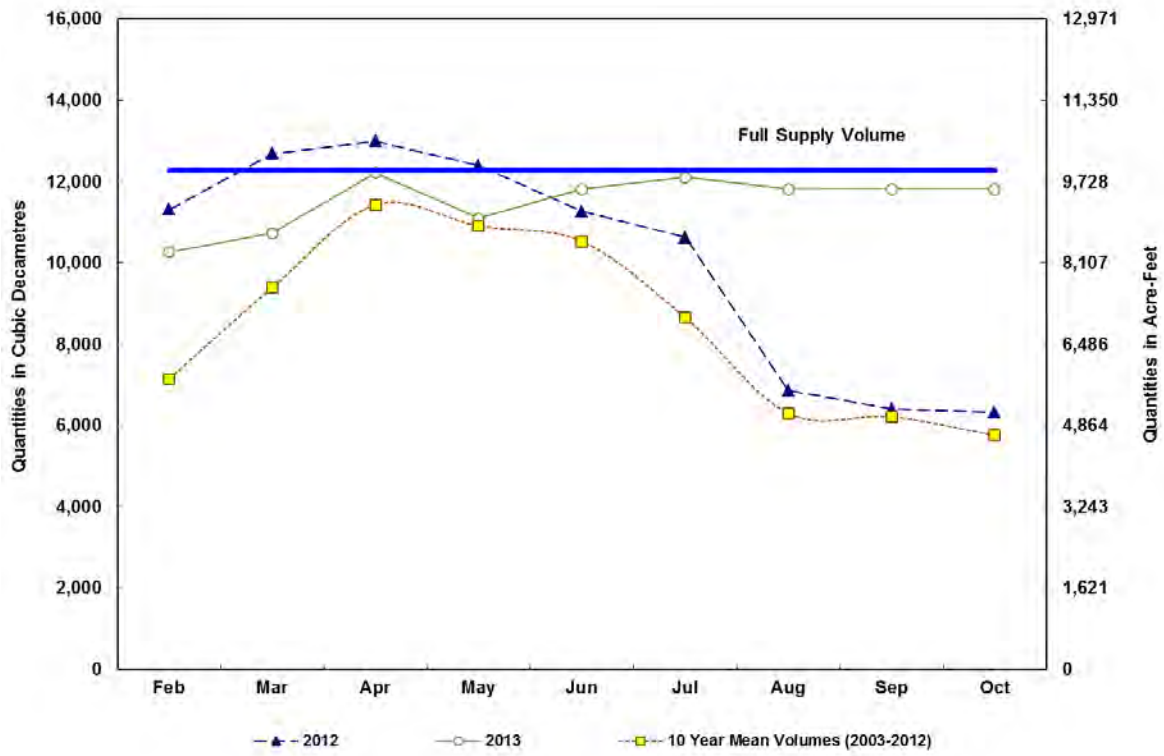
Figure 3d. Huff Lake



Huff Lake stage-storage table was revised in 2004, increasing the dead storage and decreasing the full supply storage volumes from previous years.

**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2012, 2013, and 2003-2012 Mean**

Figure 3e. Newton Lake



LODGE CREEK

The computed natural flow of Lodge Creek at the International Boundary from March 1 to October 31, 2013 was 17 050 dam³ (13,820 acre-feet). This volume is 59 percent of the average natural flow of the previous 63 years of record. Each country is entitled to 50 percent of the natural flow, or 8 530 dam³ (6,920 acre-feet) for the irrigation season. A total flow of 9 750 dam³ (7,900 acre-feet) was recorded at Lodge Creek below McRae Creek at the International Boundary (station 11AB083) from March 1 to October 31. This volume was 114 percent of the United States allotment.

Deficit deliveries were recorded for 6 of the 16 division periods during the irrigation season. An outstanding deficit of 204 dam³ (165 acre-feet) remained at the end of October 2013.

The division of the Lodge Creek natural flow is summarized in Tables 3A and 3B and in 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, both in Appendix A.

Revised Natural Flow of Lodge Creek at the International Boundary for 2011

In 2011, high spring runoff volumes filled Middle Creek Reservoir and overflowed via the flood spillway, an event that has not occurred since 1997, and previously in 1996 and 1964. The Eastern Tributaries Technical Working Group was tasked by the Field Representatives to undertake a field survey to determine whether overflow via the flood spillway would return to Lodge Creek or become stored water.

In 2012, a study was conducted and the findings and recommendations were presented to the Field Representatives. The study showed that overflow via the Middle Creek Reservoir flood spillway would not return to Lodge Creek and thereby would become stored water. The Field Representatives approved the proposed revised procedure for the determination of net depletion at the Middle Creek Reservoir. The revised procedure has been used to update the 2011 Lodge Creek apportionment computations to accommodate water leaving Middle Creek Reservoir via the flood spillway. The updated 2011 flow volumes (dam³) are presented in the following table, showing original and revised apportionment data. Refer to Annex F for more complete 2011 data.

Table 3: Revised Natural Flow of Lodge Creek at the International Boundary 2011

	Net Depletion in Canada	Lodge Creek at International Boundary	Natural Flow of Lodge Creek	U.S.A. Share of Natural Flow	Excess flow to U.S.A.	Deficit to Date
Original Data Total (dam ³)	9,620	79,853	89,493	44,747	35,106	-21
Revised Data Total (dam ³)	17,111	79,853	96,984	48,493	31,360	-21

**Table 3A: Summary of Lodge Creek Division for 2013*
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	0	0	0	0	
MAR 16 - MAR 31	5,022	2,511	3,370	859	
APR 1 - APR 15	6,578	3,289	2,108		1,181
APR 16 - APR 30	1,519	759	865	106	
MAY 1 - MAY 15	890	445	624	179	
MAY 16 - MAY 31	206	103	251	148	
JUNE 1 - JUNE 15	1,895	947	2,269	1,322	
JUNE 16 - JUNE 30	498	249	236		13
JULY 1 - JULY 15	191	96	27		69
JULY 16 - JULY 31	32	16	4		12
AUG 1 - AUG 15	165	82	0		82
AUG 16 - AUG 31	0	0	0	0	
SEP 1 - SEP 15	56	28	0		28
SEP 16 - SEP 30	0	0	0	0	
OCT 1 - OCT 15	0	0	0	0	
OCT 16 - OCT 31	0	0	0	0	
TOTAL	17,051	8,525	9,754		

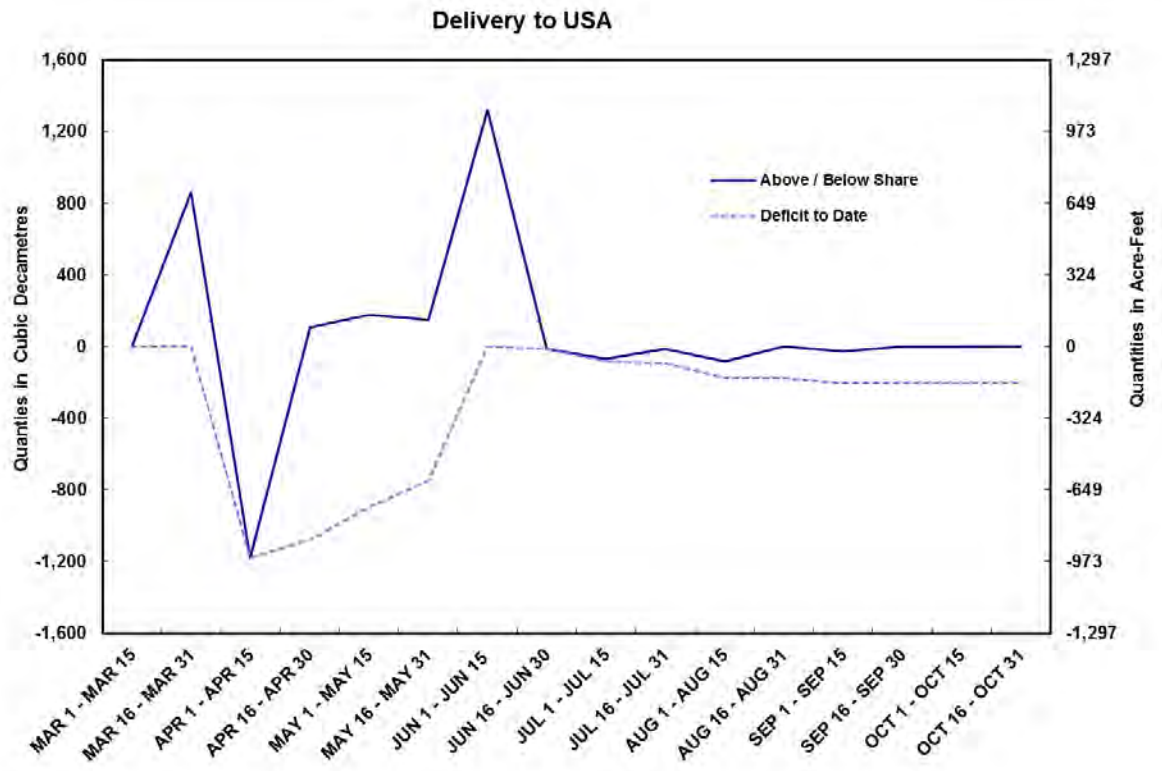
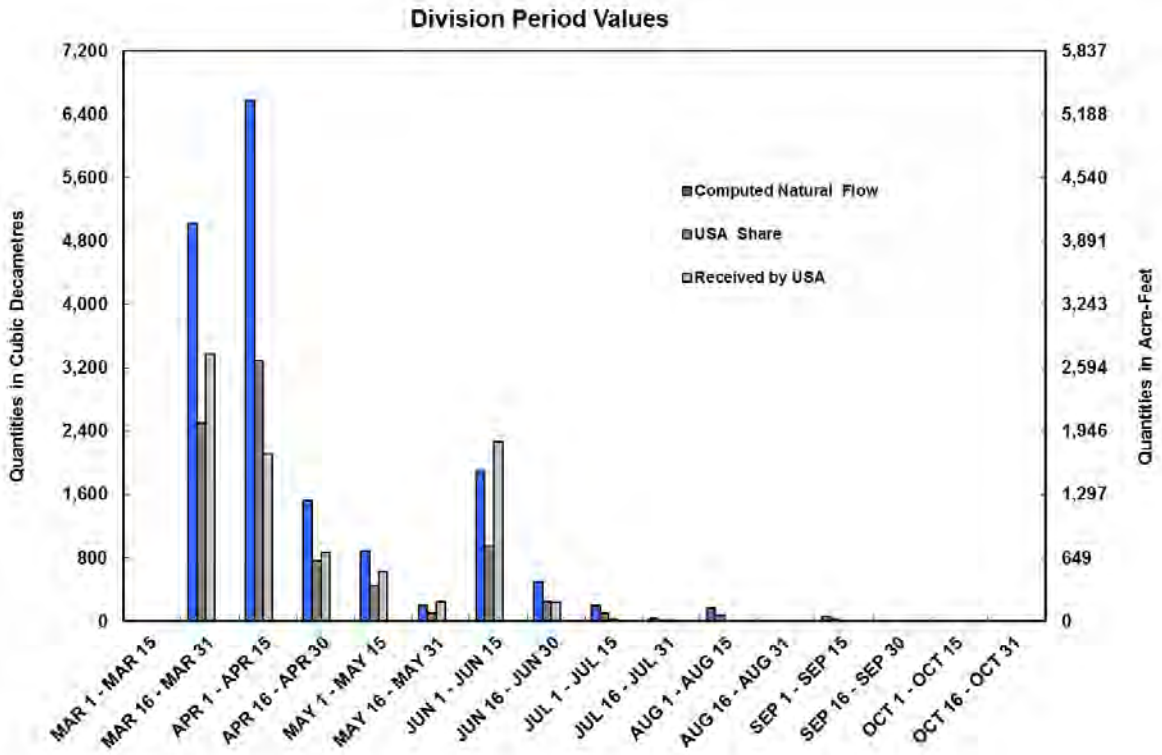
* This is a summary of data from Table 10, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

Table 3B: Summary of Lodge Creek Division for 2013*
Quantities in Acre-Feet

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	0	0	0	0	
MAR 16 - MAR 31	4,071	2,036	2,732	696	
APR 1 - APR 15	5,333	2,666	1,709		957
APR 16 - APR 30	1,231	615	701	86	
MAY 1 - MAY 15	722	361	506	145	
MAY 16 - MAY 31	167	84	203	120	
JUNE 1 - JUNE 15	1,536	768	1,839	1,072	
JUNE 16 - JUNE 30	404	202	191		11
JULY 1 - JULY 15	155	78	22		56
JULY 16 - JULY 31	26	13	3		10
AUG 1 - AUG 15	134	66	0		66
AUG 16 - AUG 31	0	0	0	0	
SEP 1 - SEP 15	45	23	0		23
SEP 16 - SEP 30	0	0	0	0	
OCT 1 - OCT 15	0	0	0	0	
OCT 16 - OCT 31	0	0	0	0	
TOTAL	13,824	6,912	7,908		

* 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, 2013



BATTLE CREEK

The computed natural flow of Battle Creek at the International Boundary from March 1 to October 31, 2013 was 25 430 dam³ (20,620 acre-feet). This volume is 83 percent of the average natural flow of the previous 73 years of record. Each country is entitled to 50 percent of the natural flow or 12 715 dam³ (10,310 acre-feet) for the irrigation season. A total flow volume of 23 050 dam³ (18,690 acre-feet) was recorded at Battle Creek at International Boundary (station 11AB027) from March 1 to October 31, 2013. This volume was 181 percent of the United States allotment.

There were no deficit deliveries recorded for any of the 16 division periods during the irrigation season to the end of October 2013.

The division of the Battle Creek natural flow is summarized in Tables 4 and 4A and in 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, both in Appendix A.

**Table 4: Summary of Battle Creek Division for 2013*
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 25	1,510	755	1,214	459	
MAR 26 - APR 9	6,236	3,118	5,296	2,178	
APR 10 - APR 24	3,598	1,799	2,200	401	
APR 25 - MAY 9	2,245	1,123	1,756	633	
MAY 10 - MAY 25	1,429	715	1,846	1,131	
MAY 26 - JUNE 9	2,026	1,013	2,264	1,251	
JUNE 10 - JUNE 24	2,770	1,385	2,765	1,380	
JUNE 25 - JULY 9	1,196	598	1,196	598	
JULY 10 - JULY 25	973	487	1,067	580	
JULY 26 - AUG 9	667	334	667	333	
AUG 10 - AUG 25	530	265	530	265	
AUG 26 - SEP 9	224	112	224	112	
SEP 10 - SEP 24	541	271	541	270	
SEP 25 - OCT 9	546	273	546	273	
OCT 10 - OCT 25	625	313	625	312	
OCT 26 - OCT 31	312	156	312	156	
TOTAL	25,428	12,717	23,049		

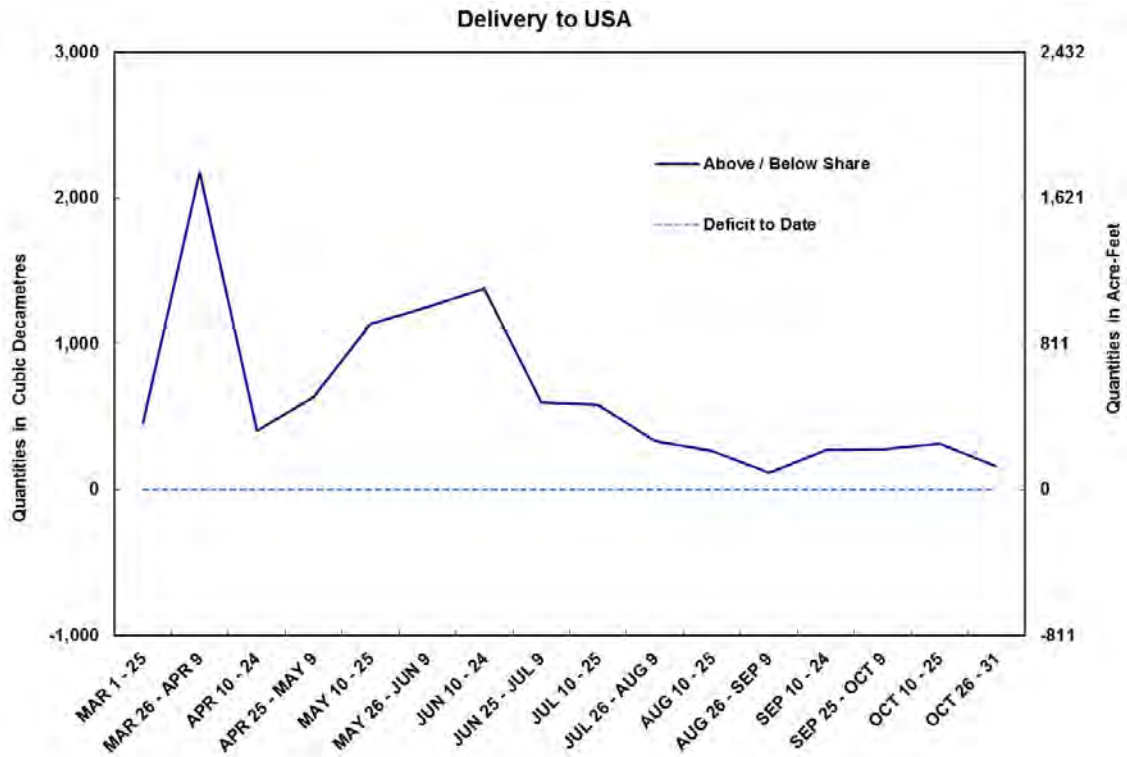
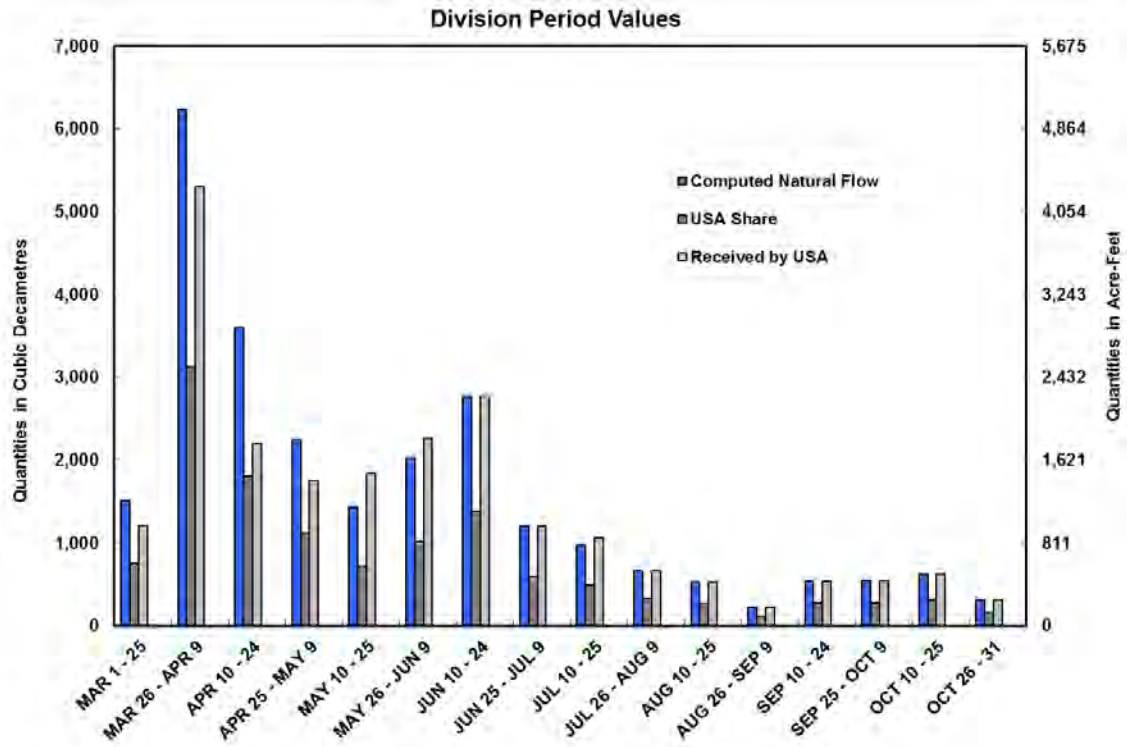
* This is a summary of data from Table 12, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

**Table 4A: Summary of Battle Creek Division for 2013*
Quantities in Acre-Feet**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 – MAR 25	1,224	612	984	372	
MAR 26 – APR 9	5,056	2,528	4,293	1,766	
APR 10 - APR 24	2,917	1,458	1,784	325	
APR 25 – MAY 9	1,820	910	1,424	513	
MAY 10 - MAY 25	1,158	580	1,497	917	
MAY 26 - JUNE 9	1,642	821	1,835	1,014	
JUNE 10 - JUNE 24	2,246	1,123	2,242	1,119	
JUNE 25 - JULY 9	970	485	970	485	
JULY 10 - JULY 25	789	395	865	470	
JULY 26 - AUG 9	541	271	541	270	
AUG 10 – AUG 25	430	215	430	215	
AUG 26 - SEP 9	182	91	182	91	
SEP 10 - SEP 24	439	220	439	219	
SEP 25 - OCT 9	443	221	443	221	
OCT 10 - OCT 25	507	254	507	253	
OCT 26 - OCT 31	253	126	253	126	
TOTAL	20,614	10,310	18,686		

* 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, 2013



FRENCHMAN RIVER

The computed natural flow of the Frenchman River at the International Boundary from March 1 to October 31, 2013 was 96 990 dam³ (78,630 acre-feet). This volume of natural flow is 125 percent of the average natural flow of the previous 73 years of record. Each country is entitled to 50 percent of the natural flow, or 48 495 dam³ (39,315 acre-feet) for the irrigation season. A total flow of 83 560 dam³ (67,740 acre-feet) was recorded at Frenchman River at International Boundary (station 11AC041) from March 1 to October 31. This volume was 172 percent of the United States allotment.

A deficit delivery was recorded in 1 of the 16 division periods during the irrigation season. There was no outstanding deficit at the end of October 2013.

The division of the Frenchman River natural flow is summarized in Tables 5 and 5A and in 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, both in Appendix A.

**Table 5: Summary of Frenchman River Division for 2013*
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	726	363	338		25
MAR 16 - MAR 31	956	478	919	441	
APR 1 - APR 15	16,815	8,408	11,285	2,877	
APR 16 - APR 30	14,617	7,308	15,775	8,467	
MAY 1 - MAY 15	15,210	7,605	13,062	5,457	
MAY 16 - MAY 31	3,842	1,921	3,013	1,092	
JUNE 1 - JUNE 15	14,055	7,028	9,807	2,779	
JUNE 16 - JUNE 30	10,475	5,238	10,159	4,921	
JULY 1 - JULY 15	8,154	4,077	7,301	3,224	
JULY 16 - JULY 31	2,880	1,440	2,556	1,116	
AUG 1 - AUG 15	1,946	973	1,638	665	
AUG 16 - AUG 31	1,099	549	948	399	
SEP 1 - SEP 15	1,841	921	1,841	920	
SEP 16 - SEP 30	2,005	1,002	2,173	1,171	
OCT 1 - OCT 15	1,190	595	1,433	838	
OCT 16 - OCT 31	1,180	590	1,311	721	
TOTAL	96,992	48,496	83,559		

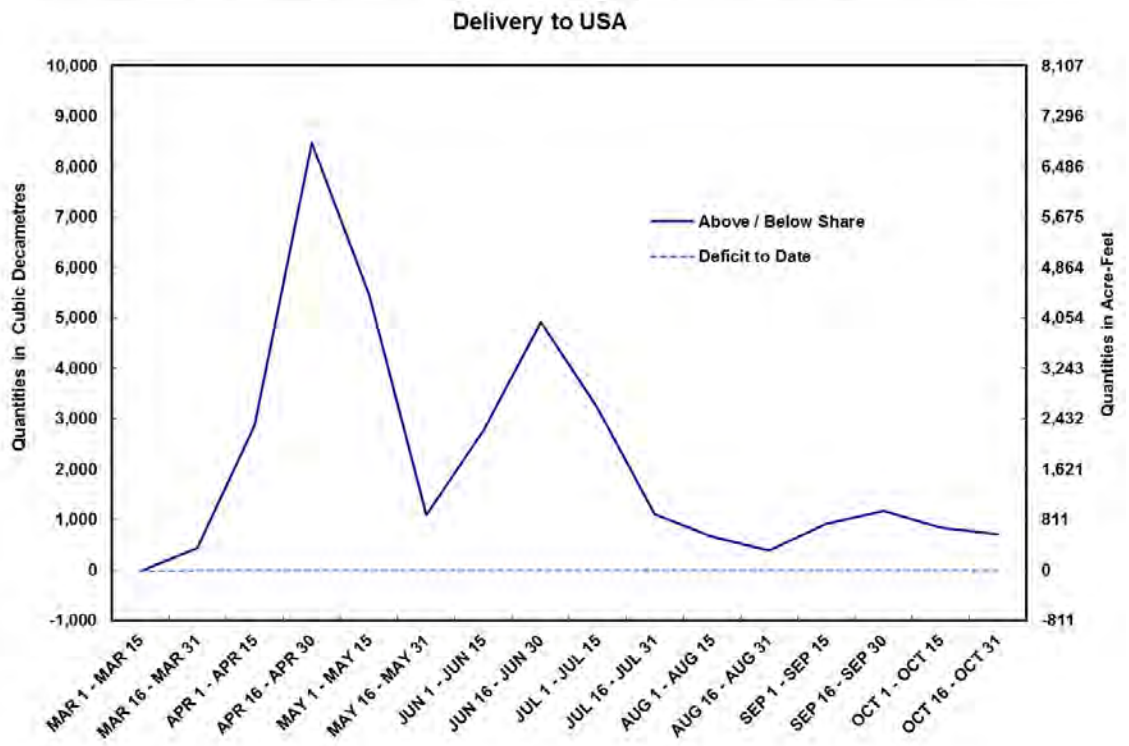
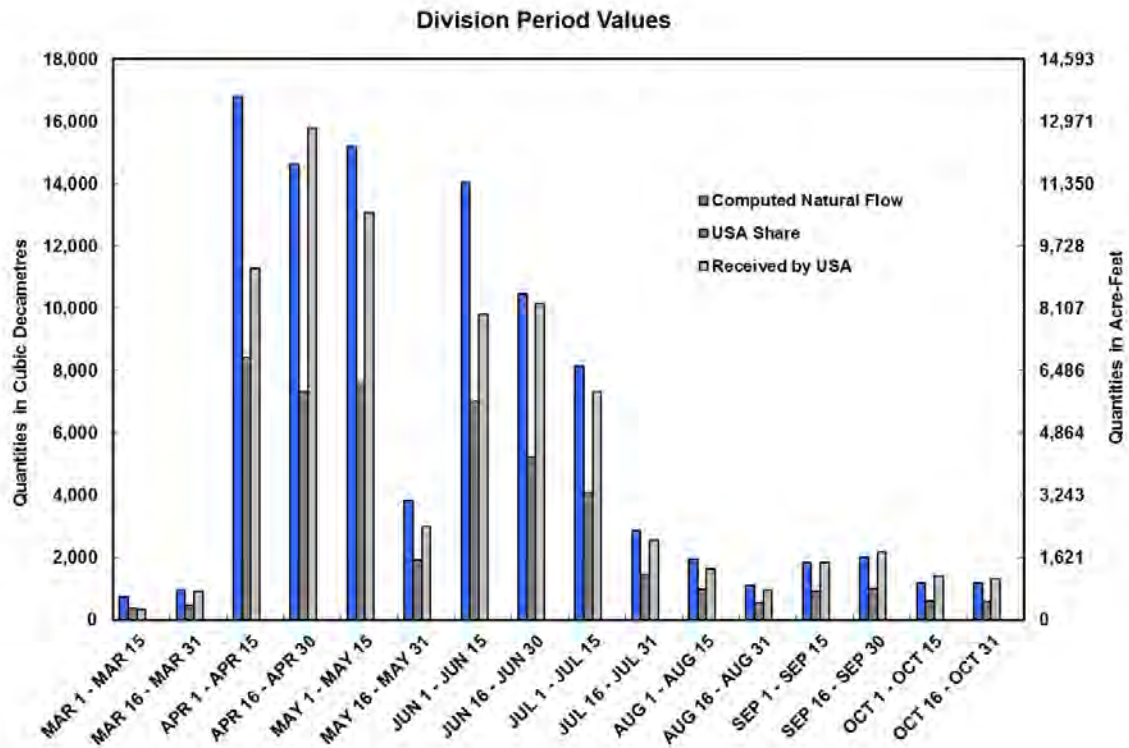
* This is a summary of data from Table 14, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

**Table 5A: Summary of Frenchman River Division for 2013*
Quantities in Acre-Feet**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	589	294	274		20
MAR 16 - MAR 31	775	388	745	358	
APR 1 - APR 15	13,632	6,816	9,149	2,332	
APR 16 - APR 30	11,850	5,925	12,789	6,864	
MAY 1 - MAY 15	12,331	6,165	10,589	4,424	
MAY 16 - MAY 31	3,115	1,557	2,443	885	
JUNE 1 - JUNE 15	11,394	5,697	7,951	2,253	
JUNE 16 - JUNE 30	8,492	4,246	8,236	3,989	
JULY 1 - JULY 15	6,610	3,305	5,919	2,614	
JULY 16 - JULY 31	2,335	1,167	2,072	905	
AUG 1 - AUG 15	1,578	789	1,328	539	
AUG 16 - AUG 31	891	445	769	323	
SEP 1 - SEP 15	1,492	746	1,492	746	
SEP 16 - SEP 30	1,625	812	1,762	949	
OCT 1 - OCT 15	965	482	1,162	679	
OCT 16 - OCT 31	957	478	1,063	585	
TOTAL	78,631	39,316	67,741		

* 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, 2013



ANNEX A

1921 Order of the International Joint Commission
Respecting the St. Mary-Milk Rivers

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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.

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ANNEX B

Letter of Intent Respecting the St. Mary - Milk Rivers
Streamflow Transfers

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**LETTER OF INTENT
TO BETTER UTILIZE THE WATERS OF THE ST. MARY AND MILK RIVERS**

Whereas Article VI of the Boundary Waters Treaty of 1909 states that the St. Mary and Milk Rivers and their tributaries are to be treated as one for the purposes of irrigation and power;

And whereas, the Boundary Waters Treaty of 1909 and the International Joint Commission Order of 1921 authorizes the Reclamation and Irrigation Officers of the United States and Canada (currently designated as the Accredited Officers of the United States and Canada) to make the greatest beneficial use of the waters of the St. Mary and Milk Rivers;

And whereas, Canada finds it beneficial to use more than its share of the Milk River in the June-September period each year to supply water to Canadian Milk River irrigators;

And whereas, the United States finds it beneficial to use more than its share of the St. Mary River in the March-May period each year to supply water to United States Milk River irrigators;

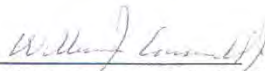
It is therefore ordered and directed by said Accredited Officers or their designates that the United States be allowed to accumulate a deficit on the St. Mary River of up to 4,000 cfs-days (9 800 dam³) between March 1 and May 31 of each year which, at the discretion of the United States, may be reduced to no less than 2,000 cfs-days (4 900 dam³) between June 1 and July 15 of each year with surplus deliveries of St. Mary River water, and that Canada be allowed to accumulate a deficit on the Milk River of up to 2,000 cfs-days (4 900 dam³) between June 1 and September 15 of each year. The incurred deficits on the St. Mary and Milk Rivers can be offsetting and the outstanding deficits as of September 15 will be equalized by October 31 of each year under administration by Field Representatives of the Accredited Officers. Detailed accounting procedures for the computation of deficit and surplus deliveries under this Letter Of Intent are outlined in Appendix A, "Procedures for the Computation of Deficit and Surplus Deliveries to Better Utilize Waters of the St. Mary and Milk Rivers".

In signing this letter, the parties recognize this agreement is within the 1921 Order of the International Joint Commission. Additionally, the parties recognize that this Letter of Intent and Appendix A will form part of the St. Mary - Milk River Procedural Manual.

Termination of this Letter Of Intent will be allowed upon request by either the United States or Canada notifying the other party in writing two months prior to the commencement of the irrigation season (April 1st as specified by the 1921 Order).



Tim Goos
Accredited Officer of Her Majesty
Dated this 8th day of February, 2001



William J. Carswell, Jr. for the
Accredited Officer of the United States
Dated this 8th day of February, 2001

**PROCEDURES FOR THE COMPUTATION OF DEFICIT AND SURPLUS DELIVERIES
TO BETTER UTILIZE WATERS OF THE ST. MARY AND MILK RIVERS**

ST. MARY RIVER

As of January 2001, the accounting procedures for the computation of deficit and surplus deliveries during March 1 through September 15 of each year on the St. Mary River are:

1. During March 1 through May 31 of each year, deficit deliveries from the United States to Canada at the end of each division period will carry over from one division period to another for the year, are cumulative for the year, and are allowed up to a cumulative total of 4,000 cfs-days (9 800 dam³). Deficit deliveries greater than the allowed cumulative total of 4,000 cfs-days (9 800 dam³) are to be refunded in the subsequent division period. Surplus deliveries at the end of a division period are not cumulative, cannot be used to reduce the accumulated deficit from previous division periods to below the allowed total deficit of 4,000 cfs-days (9 800 dam³), and cannot be used as a credit to make up future deficits. Exceptions to these procedures for this period are allowed only if agreed upon in writing by the Field Representative for Canada.
2. During June 1 through July 15 of each year, the United States, at its discretion, may reduce the deficit accumulated in the March 1 through May 31 period to 2,000 cfs-days (4 900 dam³) by making surplus deliveries of St. Mary River water. The remaining deficit is not refundable until after September 15 of that year unless agreed upon in writing by the Field Representative for Canada.
3. During June 1 through September 15 of each year, deficit deliveries from the United States to Canada at the end of each division are not to be incurred. However, if deficits are incurred, they are to be refunded by surplus deliveries in the subsequent division period or at a time agreed upon by both parties. Surplus deliveries do not carry over from one division period to another, are not cumulative, and cannot be used as a credit to make up future deficits.
4. On September 15 of each year, outstanding deficits are to be determined using the best available data, even though those data may be provisional. Any outstanding deficits as of September 15 are to be equalized by October 31 of each year. Deficit deliveries accumulated by Canada on the Milk River can be used to offset deficit deliveries accumulated by the United States on the St. Mary River.
5. The United States Bureau of Reclamation shall contact Canada (Environment Canada), the United States (U.S. Geological Survey), Montana (Montana Department of Natural Resources and Conservation), and Alberta (Alberta Environment) when they plan to begin deficit deliveries during the March 1 through May 31 period and when they plan to make surplus deliveries to reduce the accumulated deficits to 2,000 cfs-days (4 900 dam³) during June 1 through July 15. On or about July 1, and again by September 15 of each year, the parties shall participate in a conference call or meeting to discuss refund of remaining deficit deliveries.

MILK RIVER

As of January 2001, the accounting procedures for the computation of deficit and surplus deliveries during March 1 through September 15 of each year on the Milk River are:

1. During March 1 through May 31 of each year, deficit deliveries from Canada to the United States at the end of each division period are not to be incurred. However, if deficits are incurred, they are to be refunded by surplus deliveries in the subsequent division period or at a time agreed upon by both parties. Surplus deliveries do not carry over from one division period to another, are not cumulative, and cannot be used as a credit to make up future deficits.
2. During June 1 through September 15 of each year, deficit deliveries from Canada to the United States at the end of each division period will carry over from one division period to another for the year, are cumulative for the year, and are allowed up to a cumulative total of 2,000 cfs-days (4 900 dam³). Deficit deliveries greater than the allowed total of 2,000 cfs-days (4 900 dam³) are to be refunded in the subsequent division period. Surplus deliveries at the end of a division period cannot be used to reduce the deficit accumulated during the June 1 through September 15 period to below the lesser of the allowed total deficit of 2,000 cfs-days (4 900 dam³) or the outstanding United States' deficit accumulated on the St. Mary River in the March 1 through May 31 period, and cannot be used as credits to make up future deficits. The remaining deficit is not refundable until after September 15 of that year unless agreed upon in writing by the Field Representative for the United States.
3. On September 15 of each year, outstanding deficits are to be determined using the best available data, even though those data may be provisional. Any outstanding deficits as of September 15 are to be equalized by October 31 of each year. Deficit deliveries accumulated by Canada on the Milk River can be used to offset deficit deliveries accumulated by the United States on the St. Mary River.
4. Canada (Environment Canada), the United States (U.S. Bureau of Reclamation and U.S. Geological Survey), Alberta (Alberta Environment) and Montana (Montana Department of Natural Resources and Conservation) shall participate in a conference call or meeting on or about July 1, and again by September 15 of each year to decide on the approach to be used to reconcile outstanding deficit deliveries.

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ANNEX C

Letter of Intent Respecting the Eastern Tributaries of the Milk River
Streamflow Transfers

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LETTER OF INTENT
TO
BETTER UTILIZE THE WATERS OF THE EASTERN TRIBUTARIES OF THE
MILK RIVER

Whereas, the Boundary Waters Treaty of 1909 and the International Joint Commission Order of 1921 authorize the Accredited Officers of the United States and Canada to make the greatest beneficial use of the waters of the St. Mary and Milk Rivers, and the Eastern Tributaries of the Milk River;

And, whereas the Order of 1921 identifies an equal-sharing arrangement as the basis for apportionment on the Eastern Tributaries;

And, whereas apportionment procedures have been developed and accepted identifying the manner in which the equal-sharing arrangement is to be met;

And whereas, Canada and the United States have identified that beneficial use of the respective shares of the waters of both countries may be improved by providing for increased flexibility in the application of the accepted procedures;

It is therefore ordered and directed by the Accredited Officers that:

1. Acceptable means by which to provide increased flexibility and benefit may include:

For all formally apportioned Eastern Tributaries

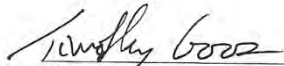
- a. Management of deficit deliveries to allow for prolonged periods of deficit storage in Canadian reservoirs in the Province of Saskatchewan, interim partial deficit discharge, and release rates coordinated with downstream Montana needs and uses where such operations would provide mutually determined and incidental benefits.

For the Frenchman River Tributary

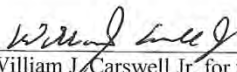
- b. Notwithstanding that reasonable water-management operations will be made by Canada to balance outstanding deficits, residual season-end deficits of less than 300 dam³ (240 acre-feet) shall be allowed and forgiven if live-channel flow at the international boundary is anticipated to continue beyond the apportionment season.

For the Lodge/Middle Creek Tributary

- c. Notwithstanding that reasonable water-management operations will be made by Canada to balance outstanding deficits, small deficits on the order of 200 dam³ (160 acre-feet) which arise in the latter apportionment season shall be concluded by mutual agreement, giving due consideration to factors including, but not limited to, available Canadian storage in Saskatchewan reservoirs, existing channel conditions, and beneficial use of the deficit volume. Where it is concluded that a specified deficit volume cannot reasonably and beneficially be offset by a release from Canadian storage, the deficit volume shall be allowed and forgiven.
2. Mutual agreement for the extent and application of Clause 1 above shall be determined by designates of Montana Department of Natural Resources and Conservation (DNRC) and the Saskatchewan Watershed Authority. The intended actions determined by mutual agreement shall be communicated to the Field Representatives for the United States and Canada for approval.
3. Normally accepted calculations of deficit and surplus flows shall continue to determine the apportionment balance.
4. All apportionment balances within the general limits stated in Clause 1 shall be considered resolved at the end of the apportionment season and resulting deficits shall not be carried forward to the next apportionment season.
5. In the event operations arising from Clause 1 cannot be agreed upon between the Montana DNRC and the Saskatchewan Watershed Authority, the original terms of the procedures shall be the default position. Such default may be initiated by request of the Montana DNRC or the Saskatchewan Watershed Authority to the Field Representatives for the United States and Canada.
6. Environment Canada and the U.S. Geological Survey will provide apportionment information to all parties in a timely manner. A list of the parties is included as Annex A and will be updated annually, or more often as required.
7. Termination of this Letter of Intent will be allowed upon request by either the United States or Canada notifying the other party in writing by February 1 of the year of intended termination.



Tim Goos
Accredited Officer of Her Majesty
Dated this 23 day of August, 2007



William J. Carswell Jr. for the
Accredited Officer of the United States
Dated this 11 day of September, 2007

CONTACT LIST REGARDING

LETTER OF INTENT –

TO BETTER UTILIZE THE WATERS OF THE EASTERN TRIBUTARIES OF THE MILK RIVER

<u>Name</u>	<u>Organization</u>	<u>Email/Fax</u>	<u>Phone</u>
Carmen delaChevrotiere	ESRD	carmen.delaChevrotiere@gov.ab.ca	(780) 427-0710
Russell Boals (F.R)	EC (ret.)	boals.russ@gmail.com	(306) 780-5338
Jerry Wagner-Watchel	EC	jerry.wagner-watchel@ec.gc.ca	(403) 292-5678
Dave Helfrick	EC	dave.helfrick@ec.gc.ca	(306) 780-5346
Larry Dolan	Montana	ldolan@mt.gov	(406) 444-6627
Ira Blakley	AESB	ira.blakley@agr.gc.ca	(306) 299-2041
Ron Magee	AESB	ron.magee@agr.gc.ca	(306) 298-2050
Larry Verpy	AESB	larry.verpy@agr.gc.ca	(306) 295-3268
Rob Wiebe	AESB	robert.wiebe@agr.gc.ca	(306) 778-5025
Kevin Wingert	WSA	kevin.wingert@wsask.ca	(306) 778-8335
Gord Hagen	WSA	gord.hagen@wsask.ca	(306) 778-8266
John Kilpatrick (F.R.)	USGS	jmkilpat@usgs.gov	(406) 457-5902
Norm Midtlyng	USGS	nmidtlyn@usgs.gov	(406) 457-5948

Legend

ESRD	Alberta Environment and Sustainable Resource Development (formerly
EC	Environment Canada
Montana DNRC	Montana Department of Natural Resources and Conservation
AESB	Agri-Environment Services Branch
WSA	Water Security Agency (formerly Saskatchewan Watershed Authority)
USGS	United States Geological Survey
F.R.	Field Representative

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ANNEX D
Conversion Factors

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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 for volume 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

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ANNEX E

List of Gauging Stations

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INTERNATIONAL GAUGING STATIONS OPERATED JOINTLY
BY
THE UNITED STATES AND CANADA
ST. MARY AND MILK RIVER BASINS
2013

Stations listed in downstream order

Map Index	Station Name
<u>ST. MARY RIVER BASIN</u>	
5015500	Lake Sherburne at Sherburne, Montana
5018000	St. Mary Canal at St. Mary Crossing near Babb, Montana
05AE027	St. Mary River at International Boundary
<u>MILK RIVER BASIN</u>	
6133500	N. Fork Milk River above St. Mary Canal near Browning, Montana
11AA001	North Milk River near International Boundary
11AA025	Milk River at Western Crossing of International Boundary
11AA005	Milk River at Milk River, Alberta
11AA031	Milk River at Eastern Crossing of International Boundary
<u>LODGE CREEK TRIBUTARY BASIN</u>	
11AB089	Altawan Reservoir near Govenlock
11AB060	Spangler Ditch near Govenlock
11AB009	Middle Creek near Saskatchewan Boundary
11AB001	Middle Creek below Middle Creek Reservoir
11AB108	Middle Creek near Govenlock
11AB008	Middle Creek above Lodge Creek
11AB083	Lodge Creek below McRae Creek at International Boundary
<u>BATTLE CREEK TRIBUTARY BASIN</u>	
11AB102	Gaff Ditch near Merryflat
11AB078	Cypress Lake West Inflow Canal
11AB085	Cypress Lake West Inflow Canal Drain
11AB077	Cypress Lake West Outflow Canal
11AB084	Vidora Ditch near Consul
11AB058	Richardson Ditch near Consul
11AB044	McKinnon Ditch near Consul
11AB018	Nashlyn Canal near Consul
11AB027	Battle Creek at International Boundary
<u>FRENCHMAN RIVER TRIBUTARY BASIN</u>	
11AC064	Belanger Creek Diversion to Cypress Lake
11AC037	Cypress Lake
11AC060	Cypress Lake East Outflow Canal
11AC052	Eastend Canal near Eastend
11AC055	Eastend Reservoir
11AC063	Huff Lake
11AC066	Huff Lake Pumping Canal
11AC065	Huff Lake Gravity Canal
11AC056	Newton Lake
11AC054	Newton Lake Main Canal
11AC041	Frenchman River at International Boundary

GAUGING STATIONS OPERATED INDEPENDENTLY
BY EITHER
THE UNITED STATES OR CANADA
ST. MARY AND MILK RIVER BASINS
2013

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

**Station not operated in 2013

Map Index	Station Name	Operated by
<u>ST. MARY RIVER BASIN</u>		
5013900**	Grinnell Cr at Grinnell Glacier near Many Glacier, Montana	U.S.A.
5014300*	Swiftcurrent Creek above Swiftcurrent Lake, at Many Glacier, Montana	U.S.A.
5014500*	Swiftcurrent Creek at Many Glacier, Montana	U.S.A.
5017500*	St. Mary River near Babb, Montana	U.S.A.
5018000*	St. Mary Canal at intake, near Babb, Montana	U.S.A.
05AE043*	St. Mary River at Highway 501, near Kimball, Alberta	Canada
05AE005*	Rolph Creek near Kimball, Alberta	Canada
05AE002*	Lee Creek at Cardston, Alberta	Canada
05AE025*	St. Mary Reservoir near Spring Coulee, Alberta	Canada
05AE026*	Canadian St. Mary Canal near Spring Coulee, Alberta	Canada
05AE021*	MacGrath Irrigation District Canal near Spring Coulee, Alberta	Canada
<u>MILK RIVER BASIN</u>		
6132200**	South Fork Milk River near Babb, Montana	U.S.A.
11AA028*	Bear Creek near International Boundary	Canada
11AA029*	Miners Coulee near International Boundary	Canada
11AA038*	Verdigris Coulee near the Mouth	Canada
6137400**	Big Sandy Creek at reservation boundary, near Rocky Boy, Montana	U.S.A.
FRR*	Fresno Reservoir	U.S.A.
6139500*	Big Sandy Creek near Havre, Montana	U.S.A.
6140500*	Milk River at Havre, Montana	U.S.A.
6142400*	Clear Creek near Chinook, Montana	U.S.A.
FTBELKMT*	Fort Belknap Main Diversion Canal	U.S.A.
ALFVALMT*	Alfalfa Valley Diversion Canal	U.S.A.
ZURICHMT*	Zurich Main Diversion Canal	U.S.A.
PARDISMT*	Paradise Main Diversion Canal	U.S.A.
6151500*	Battle Creek near Chinook, Montana	U.S.A.
HARLEMMT*	Harlem Main Pump Diversion	U.S.A.
HSCM*	Harlem Secondary Pump Diversion	U.S.A.
6154100*	Milk River at Harlem, Montana	U.S.A.
FBCM*	BIA – Fort Belknap Main Diversion Canal	U.S.A.
6154400*	Peoples Creek near Hays, Montana	U.S.A.
6154410*	Little Peoples Creek near Hays, Montana	U.S.A.
6154550*	Peoples Creek below Kuhn Coulee, near Dodson, Montana	U.S.A.
DODM*	Dodson North Canal	U.S.A.
DSCM*	Dodson South Canal	U.S.A.
6155030*	Milk River near Dodson, Montana	U.S.A.
DPCM*	Dodson Pump Diversion	U.S.A.
6155900*	Milk River at Cree Crossing, near Saco, Montana	U.S.A.
NELFDRMT*	Nelson Reservoir Feeder Canal	U.S.A.
NELR*	Nelson Reservoir	U.S.A.
NSCM*	Nelson South Canal	U.S.A.
NNCM*	Nelson North Canal	U.S.A.
6164510*	Milk River at Juneburg Bridge, near Saco, Montana	U.S.A.
6166000*	Beaver Creek below Guston Coulee, near Saco, Montana	U.S.A.
BCHM*	Beaver Creek near Hinsdale, Montana	U.S.A.
GLASGOMT*	Glasgow Main Diversion Canal	U.S.A.
6172310*	Milk River at Tampico, Montana	U.S.A.
6174500*	Milk River at Nashua, Montana	U.S.A.

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
6151500*	Battle Creek near Chinook, Montana	U.S.A.

FRENCHMAN RIVER TRIBUTARY BASIN

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

6169500*	Rock Creek below Horse Creek near International Boundary	U.S.A.
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SAGE CREEK TRIBUTARY BASIN

11AA026*	Sage Creek at Q Ranch near Wildhorse	Canada
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ANNEX F

Natural Flow of Lodge Creek
at the International Boundary

Revised Procedure for the Year 2011

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Table 10: NATURAL FLOW OF LODGE CREEK AT THE INTERNATIONAL BOUNDARY FOR THE YEAR 2011 (REVISED)

	1	2	3	4	5	6	7	8	9	10		
Period Upper Lodge Area	Michel Reservoir Depletion	Greasewood Reservoir Depletion	Massy Reservoir Depletion	Minor Diversions (Upper Lodge Incl. Bare Cr.)	Total Depletion Upper Lodge Reservoirs	Channel Loss to International Boundary	Net Depletion Upper Lodge	Bare Creek Reservoir Depletion	Channel Loss to International Boundary	Net Depletion Bare Creek		
	Observed	Observed	Observed	Reported	1+2+3+4	7.34 dam ³ /day +% of remainder	5 - 6	Observed	7.34 dam ³ /day +% of remainder	8 - 9		
Feb 25-Mar 11	8	6	2	0	16	6	16	0	-7	6	-7	0
Mar 12 - 27	10	17	4	0	31	6	31	0	8	6	8	0
Mar 28-Apr 11	7	23	30	0	60	9	60	0	18	9	18	0
Apr 12 - 26	22	-10	35	0	47	9	47	0	450	9	141	309
Apr 27-May 11	-8	-12	-25	0	-45	15	-45	0	-218	15	-126	-92
May 12 - 27	-16	-54	4	0	-66	15	-66	0	-22	15	-22	0
May 28-Jun 11	-13	3	-8	0	-18	24	-18	0	-49	24	-49	0
Jun 12 - 26	6	-26	-3	0	-23	24	-23	0	-14	24	-14	0
Jun 27-Jul 11	5	-30	18	0	-7	24	-7	0	4	24	4	0
Jul 12 - 27	27	-10	2	0	19	24	19	0	53	24	53	0
Jul 28-Aug 11	3	2	3	0	8	24	8	0	21	24	21	0
Aug 12 - 27	-3	1	-2	0	-4	24	-4	0	-14	24	-14	0
Aug 28-Sep 11	14	4	-85	0	-67	15	-67	0	-140	15	-115	-25
Sep 12 - 26	3	3	-13	0	-7	15	-7	0	-2	15	-2	0
Sep 27-Oct 11	-1	3	3	0	5	9	5	0	-1	9	-1	0
Oct 12 - 27	-2	2	-1	0	-1	9	-1	0	-9	9	-9	0
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Total	62	-78	-36	0	-52	-52	0	78	-114	192		

All values are derived from data as published in Appendix B.

All quantities in cubic decametres. Totals may not add or subtract exactly as a result of rounding.

Table 10 (continued): NATURAL FLOW OF LODGE CREEK AT THE INTERNATIONAL BOUNDARY FOR THE YEAR 2011 (REVISED)

Period Cressday and Mitchell Reservoir Area	11	12	13	14	15	16	17	18	19	20	21	
	Cressday Reservoir Depletion	Channel Loss to Inter- national Boundary	Net Depletion Cressday	Mitchell Reservoir Depletion	Minor Diversions	Total Depletion Mitchell Reservoir	Channel Loss to Inter- national Boundary	Net Depletion Mitchell	Period Jaydot Reservoir Area	Jaydot Reservoir Depletion	Channel Loss to Inter- national Boundary	Net Depletion Jaydot
	Observed	4.92 dam ³ /day +% of remainder	11 - 12	Observed	Reported	14 + 15	4.92 dam ³ /day +% of remainder	16 - 17	Observed	2.42 dam ³ /day +% of remainder	19 - 20	
Feb 26-Mar 12	-6	4 -6	0	-7	0	-7	4 -7	0	Feb 27-Mar 13	0	2 0	0
Mar 13 - 28	0	4 0	0	-1	0	-1	4 -1	0	Mar 14 - 29	0	2 0	0
Mar 29-Apr 12	42	6 42	0	-74	0	-74	6 -74	-42	Mar 30-Apr 13	0	3 0	0
Apr 13 - 27	399	6 93	306	682	0	682	6 110	378	Apr 14 - 28	0	3 0	0
Apr 28-May 12	-152	10 -82	-70	-171	0	-171	10 -84	-87	Apr 29-May 13	0	5 0	0
May 13 - 28	80	10 79	1	-49	0	-49	10 -49	0	May 14 - 29	0	5 0	0
May 29-Jun 12	-35	16 -35	0	-133	0	-133	16 -83	-50	May 30-Jun 13	0	8 0	0
Jun 13 - 27	-14	16 -14	0	-13	0	-13	16 -13	0	Jun 14 - 28	0	8 0	0
Jun 28-Jul 12	2	16 2	0	0	0	0	16 0	0	Jun 29-Jul 13	0	8 0	0
Jul 13 - 28	-27	16 -27	0	-4	0	-4	16 -4	0	Jul 14 - 29	0	8 0	0
Jul 29-Aug 12	0	16 0	0	-3	0	-3	16 -3	0	Jul 30-Aug 13	0	8 0	0
Aug 13 - 28	-2	16 -2	0	-9	0	-9	16 -9	0	Aug 14 - 29	0	8 0	0
Aug 29-Sep 12	18	10 18	0	16	0	16	10 16	0	Aug 30-Sep 13	0	5 0	0
Sep 13 - 27	10	10 10	0	0	0	0	10 0	0	Sep 14 - 28	0	5 0	0
Sep 28-Oct 12	-3	6 -3	0	-1	0	-1	6 -1	0	Sep 29-Oct 13	0	3 0	0
Oct 13 - 28	-3	6 -3	0	-30	0	-30	6 -30	0	Oct 14 - 29	0	3 0	0
Total	309	73	236	203	0	203	-231	199		0	0	0

All values are derived from data as published in Appendix B.
All quantities in cubic decametres. Totals may not add or subtract exactly as a result of rounding.

Table 10 (continued): NATURAL FLOW OF LODGE CREEK AT THE INTERNATIONAL BOUNDARY FOR THE YEAR 2011 (REVISED)

Period Middle Creek Reservoir Area	22	23	24	25	26		27
	Middle Creek Reservoir Inflow	Irrigation Return Middle Creek Below Middle Creek Reservoir	Minor Diversions (Middle Cr.)	Gross Depletion	Channel Loss to International Boundary 4.92 dam ³ /day + % of remainder		Net Depletion Middle Creek
	Observed	Observed	Reported	22-23-24-25+26			27 - 28
Feb 26-Mar 12	7	0	0	7	4	7	0
Mar 13 - 28	13	0	0	13	4	13	0
Mar 29-Apr 12	52	0	0	52	6	52	0
Apr 13 - 27	4346	0	24	4370	6	332	4038
Apr 28-May 12	9154	0	0	9154	10	982	8172
May 13 - 28	2635	0	0	2635	10	334	2301
May 29-Jun 12	3398	0	0	3398	16	606	2792
Jun 13 - 27	537	0	0	537	16	148	389
Jun 28-Jul 12	81	0	0	81	16	75	6
Jul 13 - 28	55	0	0	55	16	55	0
Jul 29-Aug 12	31	0	0	31	16	31	0
Aug 13 - 28	21	68	0	-47	16	-47	0
Aug 29-Sep 12	18	43	0	-25	10	-25	0
Sep 13 - 27	18	12	0	6	10	6	0
Sep 28-Oct 12	15	0	0	15	6	15	0
Oct 13 - 28	17	0	0	17	6	17	0
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Total	20398	123	24	20299	2600		17699

Note: Middle Creek Below Middle Creek Reservoir recorded 1111 dam³ in periods 4-7 that was considered natural flow from local runoff rather than diversion from the reservoir. Zero flow was used for periods 4-7.

All values are derived from data as published in Appendix B.

All quantities in cubic decametres. Totals may not add or subtract exactly as a result of rounding.

Table 10 (continued): NATURAL FLOW OF LODGE CREEK AT THE INTERNATIONAL BOUNDARY FOR THE YEAR 2011 (REVISED)

	28			29			30			31			32			333			34		
Period Middle Creek Near Govenlock	Middle Creek Near Govenlock	Channel Loss to Middle Cr Above Lodge Creek	Channel Loss to Middle Cr Above Lodge Creek	Period To Middle Creek Above Lodge Creek	Apparent Flow At Middle Creek Above Lodge Creek	Measured Flow At Middle Creek Above Lodge Creek	Water Use Stokke - Buchanan Projects	Channel Loss to International Boundary	Channel Loss to International Boundary	Channel Loss to International Boundary	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	Net Depletion Stokke - Buchanan	
	Observed	1.21 dam ³ /day +% of remainder	1.21 dam ³ /day +% of remainder		30 - 31	Observed	32 - 33	1.21 dam ³ /day +% of remainder	1.21 dam ³ /day +% of remainder	34 - 35	34 - 35	34 - 35	34 - 35	34 - 35	34 - 35	34 - 35	34 - 35	34 - 35	34 - 35	34 - 35	
Feb 27-Mar 13	2	1	2	Feb 28-Mar 14	0	0	0	1	0	0	0	0									
Mar 14 - 29	18	1	18	Mar 15 - 30	0	0	0	1	0	0	0	0									
Mar 30-Apr 13	301	2	24	Mar 31-Apr 14	277	436	-159	2	-21	-138	-138	-138									
Apr 14 - 28	2284	2	63	Apr 15 - 29	2221	3092	-871	2	-35	-836	-836	-836									
Apr 29-May 13	1134	3	52	Apr 30-May 14	1082	1010	72	3	20	53	53	53									
May 14 - 29	446	3	32	May 15 - 30	414	450	-36	3	-20	-16	-16	-16									
May 30-Jun 13	1784	4	89	May 31-Jun 14	1695	2382	-687	4	-45	-642	-642	-642									
Jun 14 - 28	842	4	51	Jun 15 - 29	791	1037	-246	4	-27	-219	-219	-219									
Jun 29-Jul 13	160	4	24	Jun 30-Jul 14	136	273	-137	4	-23	-114	-114	-114									
Jul 14 - 29	28	4	20	Jul 15 - 30	8	12	-4	4	-4	0	0	0									
Jul 30-Aug 13	1	4	1	Jul 31-Aug 14	0	2	-2	4	-2	0	0	0									
Aug 14 - 29	0	4	0	Aug 15 - 30	0	0	0	4	0	0	0	0									
Aug 30-Sep 13	0	3	0	Aug 31-Sep 14	0	0	0	3	0	0	0	0									
Sep 14 - 28	0	3	0	Sep 15 - 29	0	0	0	3	0	0	0	0									
Sep 29-Oct 13	6	2	6	Sep 30-Oct 14	0	0	0	2	0	0	0	0									
Oct 14 - 29	14	2	14	Oct 15 - 30	0	0	0	2	0	0	0	0									
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Total	7020	395			6625	8694	-2069		-157		-1912										

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 All quantities in cubic decametres. Totals may not add or subtract exactly as a result of rounding.

Table 10 (continued): NATURAL FLOW OF LODGE CREEK AT THE INTERNATIONAL BOUNDARY FOR THE YEAR 2011 (REVISED)

	35	36	37	38	39	40	41	42	
Period	Altawan Reservoir Depletion	Spangler Ditch	Return Flow From Spangler Ditch -Squaw Coulee	Return Flow From Bedford -Walburger Coulee	Minor Diversions	Gross Depletion	Channel Loss to International Boundary	Net Depletion Altawan	
Altawan Reservoir Area	Observed	Observed	Observed	Observed	Reported	37+38-39-40+41	2.42 dam ³ /day +% of remainder	42 - 43	
Feb 27-Mar 13	44	0	0	0	0	44	2	36	8
Mar 14 - 29	-22	0	0	0	0	-22	2	-22	0
Mar 30-Apr 13	785	0	0	0	5	790	3	59	731
Apr 14 - 28	632	0	0	0	60	692	3	56	636
Apr 29-May 13	-716	0	0	0	0	-716	5	-70	-646
May 14 - 29	90	1	0	0	0	91	5	41	50
May 30-Jun 13	-234	1	0	0	2	-231	8	-52	-179
Jun 14 - 28	-1	0	0	0	14	13	8	13	0
Jun 29-Jul 13	90	0	0	0	0	90	8	41	49
Jul 14 - 29	-2	0	0	0	0	-2	8	-2	0
Jul 30-Aug 13	-34	40	0	0	0	6	8	6	0
Aug 14 - 29	-577	515	0	0	0	-62	8	-41	-21
Aug 30-Sep 13	71	0	0	0	0	71	5	38	33
Sep 14 - 28	76	0	0	0	0	76	5	38	38
Sep 29-Oct 13	-15	0	0	0	0	-15	3	-15	0
Oct 14 - 29	-37	0	0	0	0	-37	3	-37	0
Total	150	557	0	0	80	787	90	698	

Note: Squaw Coulee recorded 488 dam³ in periods 3- 8 that was considered natural flow from local runoff rather than return flow from Spangler Ditch. Zero flow was used for periods 3- 8.

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All quantities in cubic decametres. Totals may not add or subtract exactly as a result of rounding.

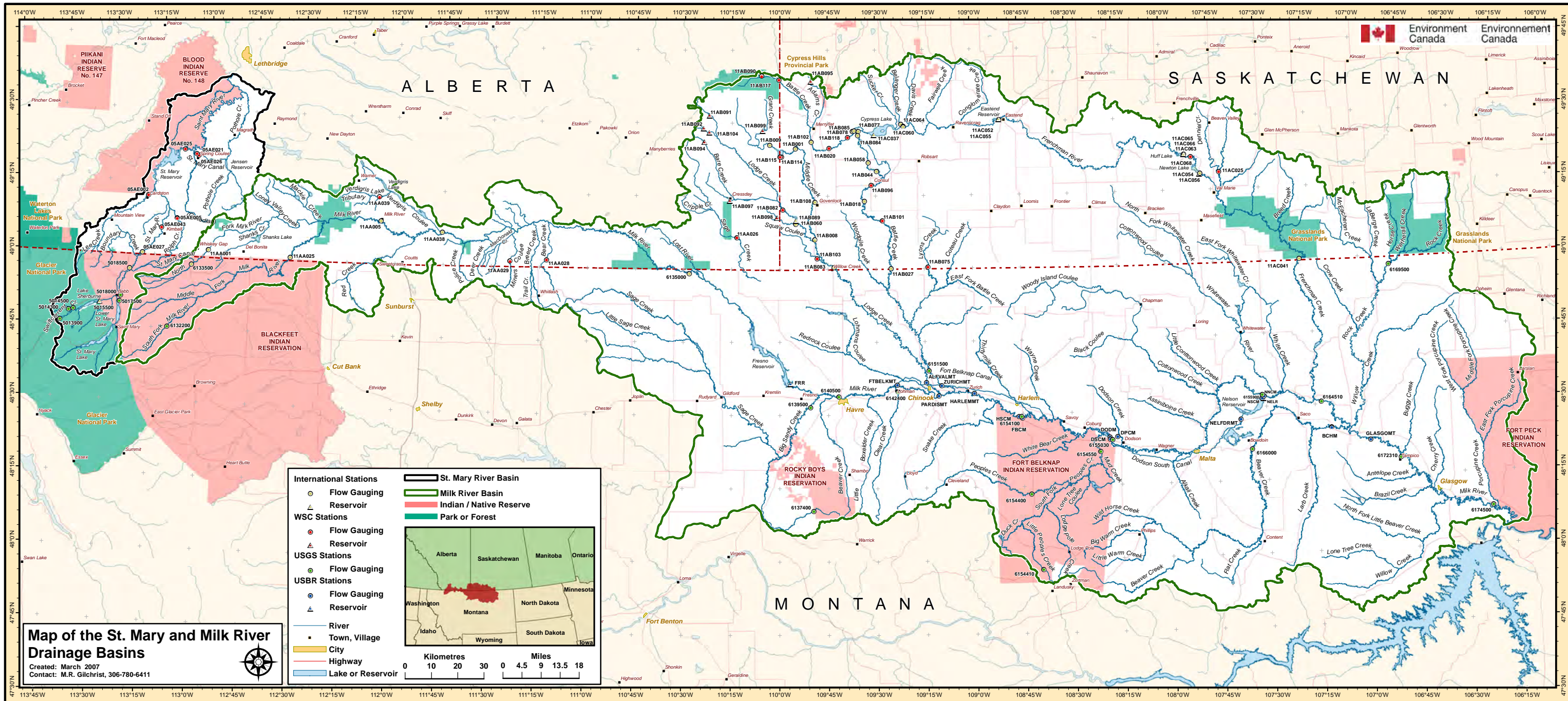
Table 10 (continued): NATURAL FLOW OF LODGE CREEK AT THE INTERNATIONAL BOUNDARY FOR THE YEAR 2011 (REVISED)

	43	44	45	46	47	48
Period At International Boundary	Net Depletion In Canada	Lodge Creek At International Boundary	Natural Flow Of Lodge Creek	U.S.A. Share Of Natural Flow	Excess Flow To U.S.A.	Deficit(-) To Date
	7 + 10 + 13 + 18 +21 + 29 + 36 + 44	Observed	45+ 46	50% of 47	46 - 48	Sum of 49
Mar 1 - 15	8	0	8	4	-4	-4
Mar 16 - 31	0	0	0	0	0	-4
Apr 1 - 15	551	10005	10556	5278	4727	0
Apr 16 - 30	4831	29879	34710	17355	12524	0
May 1 - 15	7329	13475	20804	10402	3073	0
May 16 - 31	2335	8474	10809	5405	3069	0
Jun 1 - 15	1921	15113	17034	8517	6596	0
Jun 16 - 30	170	2166	2336	1168	998	0
Jul 1 - 15	-58	524	466	233	291	0
Jul 16 - 31	0	203	203	102	101	0
Aug 1 - 15	0	8	8	4	4	0
Aug 16 - 31	-21	2	0	0	2	0
Sep 1 - 15	8	1	9	4	-3	-3
Sep 16 - 30	38	1	39	19	-18	-21
Oct 1 - 15	0	1	1	1	0	-21
Oct 16 - 31	0	1	1	1	0	-21
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Total	17111	79853	96984	48493	31360	-21

74

All values are derived from data as published in Appendix B.
 All quantities in cubic decametres.
 Totals may not add or subtract exactly as a result of rounding.

Approved by: Russell Beals For Canada
John M. Kipatuck For the United States



International Stations

- Flow Gauging
- △ Reservoir

WSC Stations

- Flow Gauging
- △ Reservoir

USGS Stations

- Flow Gauging

USBR Stations

- Flow Gauging
- △ Reservoir

Legend:

- River
- Town, Village
- City
- Highway
- Lake or Reservoir
- St. Mary River Basin
- Milk River Basin
- Indian / Native Reserve
- Park or Forest

Scale:

Kilometres: 0 10 20 30
 Miles: 0 4.5 9 13.5 18

Map of the St. Mary and Milk River Drainage Basins
 Created: March 2007
 Contact: M.R. Gilchrist, 306-780-6411