

Report to  
THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION AND USE MADE OF THE WATERS OF  
ST. MARY AND MILK RIVERS

by

L. B. LEOPOLD  
representing United States

and

J. D. McLEOD  
representing Canada

1961

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

Gentlemen:

In compliance with the Provisions of Clause VIII (c) of your Order of the 4th October, 1921, directing the division of the waters of 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, 1961.

Respectfully submitted,

L. B. Leopold  
Accredited Officer of the United States.

J. D. McLeod  
Accredited Officer of Her Majesty.

(date) , 1962.

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## Introduction

The field work incidental to the division and administration of the waters of the St. Mary and Milk Rivers in Alberta, Saskatchewan and Montana was conducted during the irrigation season of 1961 by representatives of the United States Geological Survey and the Water Resources Branch (Canada).

Dr. L. B. Leopold, Chief Hydraulic Engineer, United States Geological Survey, as accredited officer of the United States, was represented in the field by Mr. F. Stermitz, District Engineer, Helena, Montana. Mr. J. D. McLeod, Chief Engineer, Water Resources Branch, Department of Northern Affairs and National Resources, acting in the capacity of accredited officer of Her Majesty, was represented in the field by Mr. R. D. May, District Engineer, Calgary, Alberta.

This report has been prepared jointly by Mr. F. Stermitz and Mr. R. D. May.

The waters of the two rivers were divided between the two countries in accordance with the Order of the International Joint Commission dated at Ottawa, Canada, on the 4th day of October, 1921.

The hydrometric data upon which this report is based were collected and compiled jointly for 36 international stations. Data for another 23 stations in Canada and 8 stations in the United States were collected independently by the same engineers in their respective countries. The United States Bureau of Reclamation furnished data for 8 canal and 2 reservoir stations and the United States Bureau of Indian Affairs furnished data for one other canal station in Montana.

Summary of Division of Water  
during 1961 Irrigation Season, St. Mary River  
March to October, Eastern Tributaries

Quantities in acre-feet

Stream	Natural Flow at International Boundary	Canada			United States		
		Share	Received	Deficit (-) Surplus (+)	Share	Received	Deficit (-) Surplus (+)
St. Mary River	566,800	343,000	374,800	+31,800	223,700	191,900	-31,800
Lodge Creek	1,790	895			895	833	- 62
Battle Creek	5,650	2,820			2,820	4,460	+ 1,640
Frenchman River	18,700	9,350			9,350	9,310	- 40

Summary of Reservoir Storage  
at end of 1960 and 1961 Irrigation Seasons

Quantities in acre-feet

	F.S.L.	Dead Storage	Total Storage	
			Oct. 31, 1960	Oct. 31, 1961
Lake Sherburne	66,200	negligible	7,560	7,320
St. Mary Reservoir	320,000	35,000	119,300	236,400
Fresno Reservoir	127,200	1,860	32,690	19,650
Nelson Reservoir	66,800	18,650	45,930	18,250
Middle Creek Reservoir	18,000	2,200	11,430	3,490
Altawan Reservoir	5,800	negligible	85	69
Cypress Lake	110,300	30,500	80,480	56,600
Eastend Reservoir	1,470	negligible	532	532
Val Marie West Reservoir	3,800	negligible	301	65
Val Marie Reservoir	11,400	140	2,000	1,720

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Water Supply

St. Mary River

The total natural flow of the St. Mary River at the international boundary for the year 1 November 1960 to 31 October 1961 was 625,300 acre-feet. Of this total, 566,800 acre-feet occurred during the irrigation season 1 April to 31 October. The natural flow during the irrigation season was 96 percent of 588,300 acre-feet, the average of the previous 58 years of record. 418,700 acre-feet was delivered to Canada during the year with 374,800 being delivered during the irrigation season.

The fortieth annual international survey of snow conditions in the St. Mary River drainage basin was conducted on 2 and 3 May 1961. The survey provided advance information on the probable run-off during the irrigation season. The tabulated results of the forecasts and measured discharge at three locations are shown below.

Location	Period of Correlation	Forecast of 1961 Run-off		Measured Run-off	
		Acre-Feet	% of Average	Acre-feet	% of Average
Swiftcurrent Creek at Many Glacier	1923-60	84,400 (May to July)	(1923-60) 123	73,720 (May to July)	(1923-60) 108
Natural Flow Swiftcurrent Creek at Sherburne	1922-60	143,000 (May to Sept.)	(1922-60) 124	119,800 (May to Sept.)	(1922-60) 105
Natural Flow St. Mary River at International Boundary	1922-60	644,000 (May to Sept.)	(1922-60) 128	501,600 (May to Sept.)	(1922-60) 100

Milk River

The estimated natural flow of Milk River at its eastern crossing of the international boundary, during the period 1 March to 31 October 1961, was 36,000 acre-feet or 31 percent of 116,000 acre-feet, the average of estimated natural flows of the previous 49 years of record.

Eastern Tributaries of Milk River

The total quantity of water delivered to the United States by the eastern tributaries of Milk River during the period, 1 March to 31 October 1961, was 22,280 acre-feet or 15 percent of 144,300 acre-feet, the average of the previous 34 years. The quantities delivered to the United States by the various tributaries are listed in Table 11.

During the season a total of 13,540 acre-feet was diverted from the eastern tributaries in Canada to irrigation canals or storage. These diversions are listed in Table 9. The consumptive use by Canada was 8,530 acre-feet. Measured diversions in Montana amounted to 10,960 acre-feet. These are listed in Table 10.

Division of Water

St. Mary River

The division of the waters of the St. Mary River was carried out in accordance with the Order of the International Joint Commission dated October 4, 1921.

The daily natural flow of the St. Mary River was determined in the following manner. Daily records were obtained at United States St. Mary Canal at St. Mary Crossing, near Babb, St. Mary River at International Boundary, Lake Sherburne at Sherburne and, an Evaporation and Precipitation station near Babb, Montana.

The natural flow of the St. Mary River at the international boundary was considered to be the sum of the quantities measured at the United States St. Mary Canal at St. Mary Crossing, St. Mary River at International Boundary and, addition of storage or subtraction of release corrected for evaporation at Lake Sherburne.

A one-day time lag was applied to stored and released quantities from Lake Sherburne to synchronize the flow with flow quantities at the international boundary.

The natural flow of the St. Mary River having been determined, the division of its waters was carried out in accordance with the above order.

During the irrigation season, 1 April to 31 October, field engineers of both countries made frequent computations of the daily natural flow of the river and each country's share thereof, in order that any appropriation by the United States in excess of their share could be adjusted by a subsequent delivery to Canada of an equivalent amount at the earliest opportunity.



Regular interim reports on the progress of the division of the natural flow at the international boundary were made to interested agencies throughout the irrigation season.

During the non-irrigation season, 1 November 1960 to 31 March 1961, no interim reports were made as the only United States use during this period was storage in Lake Sherburne where the contributing drainage area is about 14 percent of the total area of the St. Mary River drainage basin in the United States.

Storage in Lake Sherburne was 7,560 acre-feet on 31 October 1960 and had increased to 22,080 acre-feet by 31 March 1961 and to 66,370 acre-feet by 30 June 1961. On 31 October 1961 the storage was 7,320 acre-feet.

The United States St. Mary Canal was operated between 3 April and 20 October and water was delivered to the North Branch of the Milk River from 5 April to 22 October.

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 discharge of 205,100 acre-feet which passed the gauging station on the United States St. Mary Canal at St. Mary Crossing between 3 April and 20 October was considered to be the quantity diverted from the St. Mary River by the United States. A total of 197,400 acre-feet was delivered to the North Branch of Milk River at Hudson Bay Divide during the season, from where it was conveyed to irrigation projects in Montana via the Milk River.

Canada diverted 412,400 acre-feet of water from the St. Mary River Reservoir in 1961 as measured at the Canadian St. Mary Canal and Magrath Irrigation District Canal gauging stations near Spring Coulee.

## Milk River

No division of the flow of Milk River at Eastern Crossing was made in 1961. Except for a few small unmeasured diversions above the eastern crossing of the international boundary, the entire natural flow of the Milk River at that point was delivered to the United States.

The United States Geological Survey began stream flow record collection in 1961 on the South Fork Milk River near Babb to assist in studying the utilization of waters in the Milk River Basin within the Blackfeet Indian Reservation.

The expressed concern and complaint within Canada has been the occasional and sometimes prolonged lack of adequate supply for stock-watering along the Milk River above the mouth of the North Milk River.

The Milk River ceased flowing at the western crossing of the international boundary on 21 August and resumed flowing on 21 September. The second annual inspection by representatives of Canada and the United States revealed no significant change in water use for irrigation and beaver activity still appears to be a factor in stream regimen. Continuation of annual inspection, preferably during the irrigation season, and the collection of sufficient data on stream flow is favored.

## Eastern Tributaries of Milk River

### Minor Diversions:

Estimates for a number of small diversions from the eastern tributaries of Milk River in Saskatchewan were provided by the Water Rights Division of the Province of Saskatchewan and are based on reports from the individual irrigators. These estimates are not used in the Battle Creek and Lodge Creek division computations in Tables 6 and 8, except as an adjustment to the totals for the season. The estimated quantities reported to date for 1961 are, however, shown in Table 9 and also detailed in the appendix to this report.

### Battle Creek

The computed natural flow of Battle Creek at the international boundary for the period 1 March to 31 October 1961 was 5,650 acre-feet, of which each country was entitled to fifty percent. The details of this division are shown in Table 6 of this report. Canada used 119 acre-feet, including an estimated 1,050 acre-feet in minor diversions as detailed in the appendix, and delivered 4,460 acre-feet to the United States.

### Frenchman River

This year a new method of computation was introduced in an attempt to account for periods of apparent "negative natural flow", which occurred frequently using the previous method of computation. The major changes made were in revisions of return flow and minor diversion computations, and this year the effect of channel losses was introduced. The introduction of channel losses was felt justified since some allowance for them, even in the form of an estimate, would probably produce natural flow figures in smaller error than those produced on the even more erroneous assumption that there are no channel losses in stored or released water.

The computed natural flow of the Frenchman River at the international boundary for the period 1 March to 31 October 1961 was 18,700 acre-feet, of which each country was entitled to fifty percent. The details of this division are shown in Table 7 of this report. Canada used 8,550 acre-feet, including 890 acre-feet in minor diversions as computed in Table 7, and delivered 9,310 acre-feet to the United States.

Lodge Creek

Computation of the natural flow of Lodge Creek at the international boundary was initiated in 1961 and formal division in the field began in 1961.

The computed natural flow of Lodge Creek at the international boundary for the period 1 March to 31 October, 1961 was 1,790 acre-feet, of which each country was entitled to fifty percent. The details of this division are shown in Table 8 of this report. Canada used 133 acre-feet, including an estimated 120 acre-feet in minor diversions as detailed in the appendix, and delivered 833 acre-feet to the United States.

Appendix

An appendix, submitted with this report, under separate cover, contains the result of discharge measurements, summary of monthly discharge and the daily gauge height and discharge data for 55 gauging stations operated during 1961 in the St. Mary and Milk River drainage basins. Details of the Canadian minor diversions, as grouped in Table 9 of the report, are included.

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

APRIL 1961

Table 1.

1961 Day APRIL	Computed Natural Flow of St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) less (-) or than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) less (-) or than share	
				+	-		Stored	Released			+	-
1	260	195	220	25		65	40		0	40		25
2	215	161	291	130		54		76	0	-76		130
3	102	76	284	208		26		257	75	-182		208
4	201	151	155	4		50		308	354	46		4
5	293	220	134		86	73		348	507	159	86	
6	365	274	201		73	91		389	553	164	73	
7	365	274	304	30		91		518	579	61		30
8	335	251	366	115		84		639	608	-31		115
9	348	261	406	145		87		668	610	-58		145
10	395	296	399	103		99		626	622	-4		103
11	439	329	360	31		110		568	647	79		31
12	408	306	328	22		102		567	647	80		22
13	504	378	310		68	126		456	650	194	68	
14	486	364	304		60	122		463	645	182	60	
15	430	322	279		43	108		492	643	151	43	
16	416	312	251		61	104		474	639	165	61	
17	416	312	240		72	104		461	637	176	72	
18	510	382	229		153	128		345	626	281	153	
19	526	394	240		154	132		326	612	286	154	
20	550	412	347		65	138		318	521	203	65	
21	433	325	412	87		108		392	413	21		87
22	434	326	386	60		108		360	408	48		60
23	396	297	373	76		99		383	406	23		76
24	481	361	316		45	120		232	397	165	45	
25	596	447	263		184	149		59	392	333	184	
26	539	404	224		180	135		57	372	315	180	
27	547	410	366		44	137		28	209	181	44	
28	511	383	380		3	128		13	144	131	3	
29	474	356	347		9	118		13	140	127	9	
30	474	356	347		9	118		13	140	127	9	
31												
Total Sec.-ft.	12,449	9,335	9,062	(1,036)	(1,309)	3,114	40	9,849	13,196	3,387	(1,309)	(1,036)
Mean	415	311	302		9.10	104	1.33	328	440	113	9.10	
Ac.-ft.	24,692	18,516	17,974		541	6,177	79	19,535	26,174	6,718	541	

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

MAY 1961  
Table 1.

1961 Day MAY	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) or than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) or than share	
				+	-		Stored	Released			+	-
1	483	362	341		21	121	9		133	142	21	
2	516	387	366		21	129	27		123	150	21	
3	592	444	392		52	148	78		122	200	52	
4	600	450	426		24	150	50		124	174	24	
5	694	514	487		27	180	81		126	207	27	
6	732	533	582	49		199	24		126	150		49
7	729	531	620	89		198		15	124	109		89
8	775	554	628	74		221		2	149	147		74
9	822	578	590	12		244		7	239	232		12
10	966	650	678	28		316	36		252	288		28
11	1,086	710	678		32	376	80		328	408	32	
12	1,230	782	712		70	448	153		365	518	70	
13	1,270	802	791		11	468	107		372	479	11	
14	1,265	799	830	31		466	38		397	435		31
15	1,362	848	860	12		514	45		457	502		12
16	1,579	956	922		34	623	110		547	657	34	
17	1,738	1,036	1,020		16	702	112		606	718	16	
18	1,755	1,044	944		100	711	205		606	811	100	
19	1,757	1,045	890		155	712	265		602	867	155	
20	1,776	1,055	944		111	721	228		604	832	111	
21	2,048	1,191	1,100		91	857	340		608	948	91	
22	2,561	1,447	1,400		47	1,114	541		620	1,161	47	
23	3,153	1,743	1,700		43	1,410	799		654	1,453	43	
24	3,774	2,054	2,030		24	1,720	1,061		683	1,744	24	
25	4,354	2,344	2,420	76		2,010	1,242		692	1,934		76
26	4,830	2,582	2,770	188		2,248	1,358		702	2,060		188
27	5,319	2,826	3,260	434		2,493	1,353		706	2,059		434
28	5,520	2,927	3,420	493		2,593	1,400		700	2,100		493
29	5,242	2,788	3,330	542		2,454	1,208		704	1,912		542
30	5,066	2,700	3,350	650		2,366	1,014		702	1,716		650
31	5,321	2,828	3,490	662		2,493	1,129		702	1,831		662
Total Sec.-ft.	68,915	39,510	41,971	(3,340) 2,461	(879)	29,405	13,093	24	13,875	26,944	(879)	(3,340) 2,461
Mean	2,223	1,275	1,354	79.4		949	422	0.77	448	869		79.4
Ac.-ft.	136,691	78,367	83,248	4,881		58,324	25,970	48	27,521	53,443		4,881

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

JUNE 1961  
Table 1.

1961 Day JUNE	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) or than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) or than share	
				+	-		Stored	Released			+	-
1	5,009	2,672	3,260	588		2,337	1,053		696	1,749		588
2	4,777	2,555	3,080	525		2,222	1,008		689	1,697		525
3	4,601	2,467	2,970	503		2,134	944		687	1,631		503
4	4,622	2,478	2,910	432		2,144	1,025		687	1,712		432
5	4,656	2,495	2,950	455		2,161	1,017		689	1,706		455
6	4,910	2,622	3,080	458		2,288	1,141		689	1,830		458
7	5,113	2,724	3,190	466		2,389	1,229		694	1,923		466
8	5,191	2,762	3,220	458		2,429	1,277		694	1,971		458
9	4,693	2,513	3,020	507		2,180	984		689	1,673		507
10	4,288	2,311	2,710	399		1,977	891		687	1,578		399
11	3,778	2,056	2,440	384		1,722	659		679	1,338		384
12	3,687	2,010	2,300	290		1,677	714		673	1,387		290
13	3,759	2,046	2,220	174		1,713	862		677	1,539		174
14	3,530	1,932	2,360	428		1,598	481		689	1,170		428
15	3,365	1,849	2,210	361		1,516	466		689	1,155		361
16	3,592	1,963	2,080	117		1,629	827		685	1,512		117
17	3,686	2,010	2,080	70		1,676	921		685	1,606		70
18	3,809	2,071	2,150	79		1,738	974		685	1,659		79
19	3,961	2,147	2,420	273		1,814	849		692	1,541		273
20	3,532	1,933	2,730	797		1,599	106		696	802		797
21	3,628	1,981	2,730	749		1,647	200		698	898		749
22	3,484	1,909	2,620	711		1,575	168		696	864		711
23	3,169	1,751	2,380	629		1,418	97		692	789		629
24	3,044	1,689	2,040	351		1,355	321		683	1,004		351
25	2,853	1,593	1,910	317		1,260	264		679	943		317
26	2,695	1,514	1,800	286		1,181	216		679	895		286
27	2,689	1,511	1,660	149		1,178	352		677	1,029		149
28	2,532	1,433	1,570	137		1,099	285		677	962		137
29	2,336	1,335	1,540	205		1,001	121		675	796		205
30	2,217	1,275	1,550	275		942	10		677	667		275
31												
Total Sec.-ft.	113,206	61,607	73,180	11,573		51,599	19,452	10	20,584	40,026		11,573
Mean	3,774	2,054	2,439	386		1,720	648	0.33	686	1,334		386
Ac.-ft.	224,541	122,196	145,150	22,955		102,345	38,582	20	40,828	79,390		22,955

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

JULY 1961  
Table 1.

1961 Day JULY	Computed Natural Flow of St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) or than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) or than share	
				+	-		Stored	Released			+	-
1	1,735	1,034	1,650	616		701		594	679	85		616
2	1,704	1,019	1,340	321		685		309	673	364		321
3	1,750	1,042	1,010		32	708	76		664	740	32	
4	1,695	1,014	782		232	681	249		664	913	232	
5	1,616	975	678		297	641	282		656	938	297	
6	1,634	984	747		237	650	229		658	887	237	
7	1,553	943	840		103	610	51		662	713	103	
8	1,578	956	911		45	622	1		668	667	45	
9	1,537	935	955	20		602	89		671	582		20
10	1,518	926	966	40		592	119		671	552		40
11	1,523	928	977	49		595	127		673	546		49
12	1,462	898	944	46		564	153		671	518		46
13	1,407	870	900	30		537	161		668	507		30
14	1,285	809	870	61		476	251		666	415		61
15	1,265	799	850	51		466	251		666	415		51
16	1,365	849	900	51		516	201		666	465		51
17	1,399	866	890	24		533	159		668	509		24
18	1,367	850	911	61		517	212		668	456		61
19	1,295	814	890	76		481	263		668	405		76
20	1,217	775	860	85		442	309		666	357		85
21	1,148	741	850	109		407	368		666	298		109
22	1,097	715	820	105		382	385		662	277		105
23	1,109	721	820	99		388	373		662	289		99
24	1,132	733	800	67		399	330		662	332		67
25	1,051	692	774	82		359	383		660	277		82
26	1,037	685	738	53		352	359		658	299		53
27	1,003	668	678	10		335	329		654	325		10
28	915	624	653	29		291	392		654	262		29
29	907	620	628	8		287	371		650	279		8
30	884	609	597		12	275	360		647	287	12	
31	843	588	574		14	255	376		645	269	14	
Total Sec.-ft.	41,031	25,682	26,803	(2,093) 1,121	(972)	15,349	887 7,225		20,566	14,228	(972)	(2,093) 1,121
Mean	1,324	828	865	36.2		495	28.6 233		663	459		36.2
Ac.-ft.	81,384	50,940	53,163	2,223		30,444	1,759 14,331		40,792	28,221		2,223



NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

AUGUST 1961

Table 1.

1961 Day AUGUST	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) less (-) or than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) less (-) or than share	
				+	-		Stored	Released			+	-
1	793	563	551		12	230		401	643	242	12	
2	717	525	537	12		192		461	641	180		12
3	712	523	523	0		189		452	641	189		0
4	718	526	508		18	192		429	639	210	18	
5	673	503	516	13		170		482	639	157		13
6	643	482	523	41		161		517	637	120		41
7	650	488	516	28		162		509	643	134		28
8	659	494	501	7		165		500	658	158		7
9	650	488	559	71		162		573	664	91		71
10	712	523	551	28		189		503	664	161		28
11	679	506	530	24		173		513	662	149		24
12	616	462	501	39		154		545	660	115		39
13	582	436	473	37		146		547	656	109		37
14	558	418	460	42		140		558	656	98		42
15	526	394	439	45		132		571	658	87		45
16	544	408	426	18		136		546	664	118		18
17	526	394	406	12		132		542	662	120		12
18	496	372	386	14		124		548	658	110		14
19	519	389	380		9	130		519	658	139	9	
20	551	413	366		47	138		473	658	185	47	
21	484	363	347		16	121		521	658	137	16	
22	504	378	335		43	126		487	656	169	43	
23	446	334	328		6	112		538	656	118	6	
24	454	340	335		5	114		537	656	119	5	
25	465	349	341		8	116		532	656	124	8	
26	473	355	341		14	118		524	656	132	14	
27	485	364	335		29	121		506	656	150	29	
28	477	358	322		36	119		499	654	155	36	
29	399	299	328	29		100		583	654	71		29
30	400	300	328	28		100		582	654	72		28
31	435	326	328	2		109		549	656	107		2
Total Sec.-ft.	17,546	13,073	13,320	(490) 247	(243)	4,473		16,047	20,273	4,226	(243)	(490) 247
Mean	566	422	430	7.97		144		518	654	136		7.97
Ac.-ft.	34,802	25,930	26,420	490		8,872		31,829	40,211	8,382		490

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

SEPTEMBER 1961

Table 1.

1961 Day SEPTEMBER	Computed Natural Flow of St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) or than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) or than share	
				+	-		Stored	Released			+	-
1	445	334	328		6	111		539	656	117	6	
2	585	439	366		73	146		441	660	219	73	
3	567	425	360		65	142		453	660	207	65	
4	500	375	328		47	125		486	658	172	47	
5	395	296	310	14		99		571	656	85		14
6	421	316	304		12	105		539	656	117	12	
7	426	320	285		35	106		513	654	141	35	
8	437	328	279		49	109		494	652	158	49	
9	390	292	268		24	98		530	652	122	24	
10	363	272	279	7		91		572	656	84		7
11	424	318	297		21	106		529	656	127	21	
12	410	308	263		45	102		505	652	147	45	
13	384	288	235		53	96		496	645	149	53	
14	357	268	215		53	89		501	643	142	53	
15	299	224	196		28	75		538	641	103	28	
16	274	206	215	9		68		563	622	59		9
17	269	202	274	72		67		520	515	-5		72
18	395	296	285		11	99		274	384	110	11	
19	435	326	291		35	109		146	290	144	35	
20	444	333	229		104	111		68	283	215	104	
21	437	328	224		104	109		43	256	213	104	
22	440	330	263		67	110		11	188	177	67	
23	416	312	322	10		104		14	108	94		10
24	415	311	316	5		104		2	101	99		5
25	402	302	304	2		100	1		97	98		2
26	348	261	285	24		87		34	97	63		24
27	349	262	268	6		87		14	95	81		6
28	377	283	263		20	94	19		95	114	20	
29	395	296	251		45	99	48		96	144	45	
30	385	289	263		26	96	27		95	122	26	
31												
Total Sec.-ft.	12,184	9,140	8,366	(149)	(923)	3,044	95	9,396	13,119	3,818	(923)	(149)
Mean	406	305	279		25.8	101	3.17	313	437	127	25.8	
Ac.-ft.	24,167	18,129	16,594		1,535	6,038	188	18,637	26,021	7,573	1,535	

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

OCTOBER 1961

Table 1.

1961 Day OCTOBER	Computed Natural Flow of St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) or than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) or than share	
				+	-		Stored	Released			+	-
1	358	268	263		5	90	1		94	95	5	
2	330	248	257	9		82		20	93	73		9
3	315	236	257	21		79		35	93	58		21
4	326	244	257	13		82		24	93	69		13
5	340	255	251		4	85		4	93	89	4	
6	459	344	279		65	115	92		88	180	65	
7	397	298	322	24		99		15	90	75		24
8	569	427	360		67	142	119		90	209	67	
9	573	430	419		11	143	66		88	154	11	
10	490	368	446	78		122		44	88	44		78
11	512	384	453	69		128		29	88	59		69
12	593	445	460	15		148	45		88	133		15
13	646	484	501	17		162	57		88	145		17
14	556	417	508	91		139		40	88	48		91
15	670	502	537	35		168	45		88	133		35
16	796	565	628	63		231	80		88	168		63
17	953	643	791	148		310	71		91	162		148
18	1,040	687	890	203		353	60		90	150		203
19	970	652	922	270		318		41	89	48		270
20	1,244	789	870	81		455	314		60	374		81
21	1,061	697	860	163		364	201		0	201		163
22	975	654	765	111		321	210		0	210		111
23	875	604	695	91		271	180		0	180		91
24	810	572	645	73		238	165		0	165		73
25	729	531	597	66		198	132		0	132		66
26	715	524	590	66		191	125		0	125		66
27	712	523	559	36		189	153		0	153		36
28	646	484	494	10		162	152		0	152		10
29	603	452	487	35		151	116		0	116		35
30	558	418	466	48		140	92		0	92		48
31	586	440	446	6		146	140		0	140		6
Total Sec.-ft.	20,407	14,585	16,275	(1,842) 1,690	(152)	5,822	2,616	252	1,768	4,132	(152)	(1,842) 1,690
Mean	658	470	525	54.5		188	84.4	8.13	57.0	133		54.5
Ac.-ft.	40,477	28,929	32,281	3,352		11,548	5,189	500	3,507	8,196		3,352

Historical Summary  
of

TABLE 2

Natural Flow of St. Mary River at International Boundary

Year	Mean Monthly Discharge In Cubic feet per second During Irrigation Season April - October							Run-off in Acre-feet		
	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1901-02	-	-	-	-	-	618 <sup>d</sup>	477 <sup>d</sup>	-	66,111 <sup>z</sup>	66,111 <sup>z</sup>
1902-03	568	1726	5200	2924	1404	1109	917	57,965	837,816	895,781
1903-04	724	2022	2936	1903	933	420	221	96,361	555,162	651,523
1904-05	304	1215	2461	1642	847	371	772	39,128	461,855	500,983
1905-06	481	1504	2285	1826	946	628	756	51,592	511,307	562,899
1906-07	489	1931	4259	3117	1335	1214	634	124,082	785,988	910,070
1907-08	844	2485	7500	2488	834	462	431	62,436	910,631	973,067
1908-09	350	1904	5169	3000	1460	640	450	65,276	785,404	850,740
1909-10	1188	2315	2243	1175	580	553	1036	87,729	551,042	638,771
1910-11	520	2035	3470	1679	1053	1380	621	97,349	650,360	748,209
1911-12	542	2031	2347	1582	887	524	423	57,072	505,795	564,887
1912-13	749	1913	4519	2024	1162	574	448	60,604	628,735	758,339
1913-14	637	2230	2298	1450	719	584	841	50,504	530,307	588,871
1914-15	575	1644	2251	1722	969	842	739	83,970	530,287	614,257
1915-16	664	1707	4634	3463	1228	947	391	109,773	789,058	898,831
1916-17	453	2215	4104	2427	759	470	378	58,828	654,520	713,348
1917-18	661	1875	3093	1185	763	489	394	91,256	511,779	603,035
1918-19	340	1978	2116	919	498	336	186	49,684	386,325	436,009
1919-20	429	1720	3133	2355	800	572	557	61,025	579,977	641,002
1920-21	646	2664	3713	1809	755	416	499	72,117	636,167	708,284
1921-22	282	2293	3835	1578	642	420	301	64,657	565,880	630,537
1922-23	422	2286	3359	1726	788	482	560	47,191	583,204	630,375
1923-24	393	2080	3152	1534	728	397	302	51,406	520,145	571,551
1924-25	1272	3461	3512	1893	807	542	406	78,619	720,710	799,329
1925-26	670	1264	1078	818	405	751	1141	49,193	371,837	421,035
1926-27	600	2685	5434	2812	1274	1509	1143	74,838	935,423	1,010,261
1927-28	546	3695	2940	2594	921	513	863	112,116	734,376	846,492
1928-29	314	1837	2558	1272	493	291	289	66,040	427,448	493,488
1929-30	1477	2425	2489	1264	511	370	314	52,374	535,575	587,949
1930-31	224	1957	1838	726	592	464	294	38,856	374,083	412,939
1931-32	567	2497	2896	1409	595	307	240	83,750	515,819	599,569
1932-33	416	1764	4339	2167	700	492	685	67,488	643,242	710,730
1933-34	1734	3441	2929	1155	540	323	269	168,272	629,044	737,316
1934-35	392	1841	2716	1516	630	387	235	136,576	467,568	604,144
1935-36	617	2417	2150	823	420	252	162	30,004	414,845	444,849
1936-37	267	1797	3752	1409	475	298	285	34,013	500,701	534,714
1937-38	696	2611	3323	1622	510	360	322	65,262	571,753	637,245
1938-39	640	2271	1721	1069	459	292	188	59,359	402,996	462,355
1939-40	381	1860	1802	737	382	427	415	37,815	364,056	401,871
1940-41	364	1333	1429	879	359	520	635	32,842	334,846	367,688
1941-42	676	1890	2773	1824	754	526	397	94,304	535,668	629,972
1942-43	1240	1996	3722	2691	810	376	328	63,366	675,767	739,133
1943-44	197	1273	1634	809	536	424	374	36,343	313,121	354,464
1944-45	153	2000	3382	1455	457	486	421	46,471	505,676	552,147
1945-46	658	2361	2731	1500	571	495	521	76,816	535,571	612,387
1946-47	913	2729	2585	1634	657	526	1250	86,866	624,962	711,828
1947-48	621	2963	5486	1576	758	329	266	71,379	725,024	796,403
1948-49	526	2337	2272	991	471	532	404	35,419	456,637	492,056
1949-50	462	1969	4537	3159	1100	492	929	96,111	766,778	862,889
1950-51	819	3366	3431	3230	1128	1209	1390	141,366	885,233	1,026,599
1951-52	969	2408	2204	1433	839	409	264	82,832	517,093	599,925
1952-53	635	2716	5534	2519	887	438	283	62,545	786,960	849,505
1953-54	435	3237	3637	3184	1100	771	736	62,613	795,874	858,492
1954-55	267	1491	3755	2248	799	363	810	79,260	589,738	668,998
1955-56	525	2793	3631	2027	828	441	513	89,020	652,395	741,415
1956-57	275	3569	2947	1077	478	303	332	59,363	545,264	604,627
1957-58	401	2754	2347	1182	556	482	529	58,512	530,645	589,157
1958-59	702	2110	4056	2123	799	1035	979	93,513	714,693	803,206
1959-60	688	1387	3043	1604	646	374	237	95,385	482,907	578,292
1960-61	415	2223	3774	1324	566	406	658	58,502	566,754	625,256
<b>Average</b>	<b>593</b>	<b>2212</b>	<b>3271</b>	<b>1785</b>	<b>762</b>	<b>548</b>	<b>532</b>	<b>71,805</b>	<b>587,943</b>	<b>659,748</b>

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

d - 1902 data not used.

z - Partial record not included in average.

TABLE 2

Historical Summary  
of United States Share of  
Natural Flow of St. Mary River at International Boundary

TABLE 3

Mean Monthly Discharge In Cubic feet per second During Irrigation Season April - October								Run-off in Acre-feet		
Year	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1901-02	-	-	-	-	-	156 d	119 d	-	16,637 z	16,637 z
1902-03	170	696	2433	1306	535	388	295	28,983	352,098	381,081
1903-04	221	844	1301	784	302	105	55.2	48,180	218,938	267,118
1904-05	79.4	442	1064	654	268	92.4	241	19,564	172,185	191,749
1905-06	144	586	976	746	306	174	221	25,796	191,286	217,082
1906-07	122	801	1962	1392	500	440	174	62,041	326,525	388,566
1907-08	302	1076	3583	1077	256	115	120	31,218	393,572	424,790
1908-09	88	785	2418	1333	563	174	112	32,638	331,192	363,830
1909-10	430	991	954	421	150	150	351	43,865	208,947	252,812
1910-11	130	851	1568	672	360	523	170	48,674	258,357	307,031
1911-12	139	849	1006	624	280	131	106	29,546	190,175	219,721
1912-13	244	789	2092	845	414	150	112	34,802	280,792	315,594
1913-14	192	940	982	548	197	154	253	29,282	198,764	228,046
1914-15	167	655	958	694	318	256	205	41,985	197,290	239,275
1915-16	172	686	2150	1565	447	314	97.8	54,886	328,788	383,674
1916-17	116	949	1885	1047	215	117	94.6	29,414	267,802	297,216
1917-18	191	782	1380	426	218	122	98.4	45,628	194,448	240,076
1918-19	90.7	822	891	295	125	84.0	46.5	24,842	142,621	167,463
1919-20	116	699	1400	1011	241	146	142	36,512	227,566	258,078
1920-21	180	1165	1690	738	219	104	126	36,059	255,689	291,748
1921-22	75.8	980	1750	622	170	105	75.0	32,328	228,434	260,762
1922-23	109	976	1513	696	232	122	146	23,596	229,533	253,479
1923-24	98.7	878	1409	600	200	99.0	75.5	25,703	203,399	229,102
1924-25	470	1564	1589	779	238	136	102	39,310	295,509	334,819
1925-26	226	465	372	251	101	214	410	24,599	123,780	148,379
1926-27	208	1176	2550	1239	470	588	405	37,419	401,387	438,806
1927-28	152	1681	1303	1130	296	130	282	56,058	302,731	358,789
1928-29	78.5	752	1112	469	124	72.8	72.2	33,020	162,343	195,363
1929-30	572	1046	1078	465	128	92.5	78.8	26,187	209,274	235,461
1930-31	56.1	813	752	233	168	116	73.5	19,428	134,186	153,614
1931-32	153	1082	1281	537	151	76.8	59.9	41,875	202,453	244,328
1932-33	116	715	2003	918	220	123	223	33,744	261,031	294,775
1933-34	710	1554	1298	411	139	80.5	67.3	84,136	257,770	341,906
1934-35	103	754	1191	591	171	96.7	58.9	68,288	179,546	247,834
1935-36	191	1042	910	250	105	62.9	40.5	15,002	157,613	172,615
1936-37	66.8	734	1709	538	121	74.5	71.3	17,006	200,099	217,105
1937-38	225	1139	1495	644	129	90.1	80.5	32,631	230,229	262,860
1938-39	202	969	694	368	115	72.9	47.0	29,680	149,764	179,444
1939-40	95.9	764	734	208	95.5	109	104	18,907	127,835	146,742
1940-41	93.4	500	548	281	89.7	133	167	16,421	109,876	126,297
1941-42	215	778	1219	746	221	134	99.6	47,152	206,753	253,905
1942-43	465	831	1694	1179	251	94.0	82.1	31,683	278,134	309,817
1943-44	49.2	475	650	254	136	106	93.4	18,172	106,824	124,996
1944-45	38.3	841	1524	561	115	123	105	23,235	200,071	223,306
1945-46	211	1014	1199	583	149	124	135	38,408	206,912	245,320
1946-47	305	1198	1126	650	176	136	458	43,433	245,873	289,306
1947-48	201	1315	2576	621	223	82.1	66.6	35,690	306,970	342,660
1948-49	148	1002	969	329	118	143	101	17,709	170,269	187,978
1949-50	116	827	2102	1413	383	127	325	48,056	320,765	368,821
1950-51	251	1516	1549	1448	397	438	528	70,683	372,351	443,034
1951-52	348	1037	935	550	260	102	66.1	41,416	200,079	241,495
1952-53	218	1191	2600	1093	281	109	70.7	31,272	336,248	367,520
1953-54	111	1462	1652	1425	383	227	214	31,309	332,634	363,943
1954-55	66.9	590	1711	957	245	90.6	265	39,630	237,646	277,276
1955-56	153	1230	1649	847	250	111	130	44,510	264,855	309,365
1956-57	70.2	1618	1306	372	120	75.8	82.9	29,682	221,248	250,930
1957-58	100	1215	1257	424	143	128	132	29,256	206,065	235,321
1958-59	201	888	1861	897	237	351	325	46,756	287,954	334,710
1959-60	191	529	1358	635	183	93.6	59.3	47,693	184,278	231,971
1960-61	104	949	1720	495	144	101	188	29,251	223,748	252,999
<b>Average</b>	184	941	1468	727	234	156	156	35,903	234,132	270,035

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

d - 1902 data not used.

z - Partial record not included in average.

Historical Summary  
of Canadian Share of  
Natural Flow of St. Mary River at International Boundary

TABLE 4

Year	Mean Monthly Discharge In Cubic feet per second During Irrigation Season April - October							Run-off in Acre-feet		
	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year, Nov.-Oct.
	1901-02	-	-	-	-	-	462 <sup>d</sup>	358 <sup>d</sup>	-	49,474 <sup>z</sup>
1902-03	398	1030	2767	1618	869	721	622	28,982	485,718	514,700
1903-04	504	1178	1635	1118	631	315	166	48,181	336,224	384,405
1904-05	225	773	1397	988	580	278	531	19,564	289,670	309,234
1905-06	336	919	1309	1079	640	454	535	25,796	320,021	345,817
1906-07	366	1130	2296	1726	834	774	457	62,041	459,463	521,504
1907-08	542	1410	3917	1411	578	346	361	31,218	517,059	548,277
1908-09	262	1119	2752	1667	897	466	338	32,638	454,272	486,910
1909-10	757	1325	1288	754	430	403	685	43,864	342,095	385,959
1910-11	390	1185	1902	1006	694	857	452	48,675	392,503	441,178
1911-12	403	1182	1340	958	608	393	317	29,546	315,620	345,166
1912-13	506	1123	2426	1179	748	424	336	34,802	407,942	442,744
1913-14	444	1282	1316	882	522	430	587	29,282	331,543	360,825
1914-15	408	989	1292	1028	652	586	534	41,985	332,997	374,982
1915-16	492	1020	2484	1899	781	633	294	54,887	460,270	515,157
1916-17	337	1266	2219	1380	545	352	284	29,414	386,717	416,131
1917-18	470	1094	1713	759	545	367	295	45,628	317,332	362,960
1918-19	249	1156	1225	625	374	252	140	24,842	243,703	268,545
1919-20	313	1021	1733	1344	559	426	415	30,513	352,411	382,924
1920-21	466	1499	2023	1071	535	312	373	36,058	330,477	416,535
1921-22	206	1313	2085	956	472	315	226	32,329	337,446	369,775
1922-23	313	1310	1846	1030	556	360	414	23,595	353,371	376,966
1923-24	295	1202	1743	934	529	298	226	25,703	316,746	342,449
1924-25	802	1898	1923	1113	569	406	305	39,309	425,201	464,510
1925-26	444	799	706	568	304	537	731	24,599	248,057	272,656
1926-27	392	1509	2884	1573	804	921	738	37,419	534,036	571,455
1927-28	394	2014	1637	1464	625	333	581	56,058	431,645	487,703
1928-29	236	1035	1446	803	368	218	217	33,020	265,105	298,125
1929-30	906	1380	1411	799	383	278	235	26,187	326,301	352,488
1930-31	168	1144	1086	563	424	348	221	19,428	239,897	259,325
1931-32	415	1415	1615	872	444	230	180	41,875	313,367	355,242
1932-33	300	1049	2336	1251	546	369	462	33,744	382,211	415,955
1933-34	1024	1887	1631	744	401	242	201	84,136	371,274	455,410
1934-35	290	1087	1525	925	459	290	177	68,288	288,022	356,310
1935-36	426	1376	1243	574	315	189	122	15,002	257,232	272,234
1936-37	200	1063	2043	871	354	224	214	17,007	300,603	317,610
1937-38	471	1473	1828	978	380	270	241	32,631	341,754	374,385
1938-39	438	1302	1027	701	344	219	141	29,679	253,232	282,911
1939-40	285	1096	1068	530	287	319	311	18,908	236,221	255,129
1940-41	271	833	881	598	269	387	468	16,421	224,969	241,390
1941-42	461	1112	1553	1079	533	392	297	47,152	328,915	376,067
1942-43	775	1165	2028	1512	559	282	246	31,683	397,632	429,315
1943-44	148	798	984	555	400	318	280	18,171	211,297	229,468
1944-45	115	1158	1858	894	342	363	316	23,236	305,605	328,841
1945-46	446	1347	1532	917	422	371	386	38,408	328,659	367,067
1946-47	607	1531	1459	984	481	390	791	43,433	379,089	422,522
1947-48	420	1649	2910	955	535	247	200	35,689	418,054	453,743
1948-49	378	1335	1303	662	353	390	303	17,710	286,368	304,078
1949-50	346	1143	2435	1746	717	364	604	48,055	446,013	494,068
1950-51	568	1850	1882	1782	731	771	862	70,683	512,882	583,565
1951-52	621	1371	1269	883	578	307	198	41,416	317,014	358,430
1952-53	417	1525	2934	1426	606	328	212	31,273	450,712	481,985
1953-54	325	1775	1985	1759	717	544	522	31,309	463,240	494,549
1954-55	200	901	2044	1291	554	272	545	39,630	352,094	391,724
1955-56	372	1563	1982	1180	578	330	383	44,510	387,538	432,048
1956-57	205	1951	1640	705	358	227	249	29,681	324,016	353,697
1957-58	300	1539	1590	758	413	354	397	29,256	324,581	353,837
1958-59	501	1222	2195	1231	562	684	654	46,757	426,738	473,495
1959-60	496	858	1691	969	463	281	178	47,692	298,629	346,321
1960-61	311	1275	2054	828	422	305	470	29,251	343,007	372,258
<b>Average</b>	<b>409</b>	<b>1271</b>	<b>1802</b>	<b>1059</b>	<b>528</b>	<b>392</b>	<b>377</b>	<b>35,903</b>	<b>353,810</b>	<b>389,713</b>

This table contains revisions to formerly reported data.  
 Natural flow records computed on basis of Lake Sherburne storage and release records  
 as published in the original reports to the International Joint Commission.

<sup>d</sup> - 1902 data not used.  
<sup>z</sup> - Partial record not included in average.

DIVISION OF FLOW OF ST. MARY RIVER  
1961

Water Available to Canada at Spring Coulee from St. Mary River  
(Acre-feet)

Month	St. Mary River Int. Boundary	Rolph Creek Kimball	Lee Creek Cardston	Total Avail- able at Spring Coulee
April	17,974	254	1,300	19,528
May	83,248	974	7,890	92,112
June	145,150	109	5,040	150,299
July	53,163	33	1,500	54,696
August	26,420	30	648	27,098
September	16,594	158	1,200	17,952
October	32,281	149	1,450	33,880
Total	374,830	1,707	19,028	395,565

DISPOSITION OF CANADIAN SHARE

Water Used in St. Mary and Milk Rivers Development  
(Acre-feet)

Month	Canada's Share Natural Flow: Int. Boundary	Canadian St. Mary Canal: Spring Coulee	Magrath I.D. Canal: Spring Coulee	Total Diverted to S.M.R.D.
April	18,516	0	6	6
May	78,367	40,110	540	40,650
June	122,196	140,300	3,440	143,740
July	50,940	87,730	3,400	91,130
August	25,930	53,810	2,080	55,890
September	18,129	58,010	1,200	59,210
October	28,929	21,180	567	21,747
Total	343,007	401,140	11,233	412,373

Storage in St. Mary Reservoir March 31, Elev. 3598.37 = 170,600 acre-feet  
October 31, Elev. 3609.52 = 236,400 acre-feet

DIVISION OF FLOWS OF ST. MARY AND MILK RIVERS  
1961

Water Available to the United States in Milk River at Eastern Crossing  
including Diversion from St. Mary River  
(Acre-feet)

Month	United States Share Nat. Flow	St. Mary River Basin			Total Available for Diversion	Diverted to Milk River Basin	Unused	Milk River Basin Measured Flow at Eastern Crossing*
		Lake Sherburne Stored	Rlsd.					
April	6,177	79	19,535	25,633	26,174	-541	26,780	
May	58,324	25,970	48	32,402	27,521	4,881	35,660	
June	102,345	38,582	20	63,783	40,828	22,955	42,250	
July	30,444	1,759	14,331	43,016	40,792	2,224	37,270	
Aug.	8,872	0	31,829	40,701	40,211	490	36,340	
Sept.	6,038	188	18,637	24,487	26,021	-1,534	30,610	
Oct.	11,548	5,189	500	6,859	3,507	3,352	7,760	
Total	223,748	71,767	84,900	236,881	205,054	31,827	216,670	

\* Represents natural flow of Milk River and diversion from St. Mary River Basin.

Lake Sherburne quantities are corrected for evaporation.

Storage in Lake Sherburne on March 31 = 22,080 acre-feet.  
October 31 = 7,320 acre-feet.

Storage in Fresno Reservoir on March 31 = 34,140 acre-feet.  
October 31 = 19,650 acre-feet.



MAJOR DIVERSIONS FROM MILK RIVER  
IN THE UNITED STATES  
1961

(Acre-feet)

DIVERSION	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
Fort Belknap Canal	0	0	15,280	15,700	17,970	8,870	6,600	0	0	64,420
Paradise Canal	0	0	6,620	6,060	7,030	5,310	2,850	0	0	27,870
Harlem Canal	0	0	4,130	3,490	5,160	3,610	2,460	0	0	18,850
Harlem No. 2	0	0	1,090	791	1,770	1,170	264	0	0	5,085
Agency Canal	0	3,470	7,710	5,290	6,330	3,710	2,040	0	0	28,550
Dodson North	0	0	5,840	4,960	8,810	5,180	2,800	0	0	27,590
Dodson South	536	1,480	7,510	15,620	13,810	14,910	12,900	3,370	0	70,136
Vandalia Canal	0	0	7,540	10,300	9,150	8,140	4,550	2,740	0	42,420
Wiota Pumping Plant	0	1,060	1,950	2,090	1,440	1,250	207	2,100	0	10,097
<b>Totals</b>	<b>536</b>	<b>6,010</b>	<b>57,670</b>	<b>64,301</b>	<b>71,470</b>	<b>52,150</b>	<b>34,671</b>	<b>8,210</b>	<b>0</b>	<b>295,018</b>

Storage in Nelson Reservoir on March 31, 39,550  
on October 31, 18,250

DETERMINATION OF NATURAL FLOW OF BATTLE CREEK  
AT INTERNATIONAL BOUNDARY  
1961

Diversion to Cypress Lake  
Quantities in c.f.s. days

Period at International Boundary	West Inflow Canal	West Inflow Canal Drain	Diversion to Cypress Lake	West Outflow Canal	Net Diversion to Cypress Lake
Feb.23 - Mar. 4	0	0	0	0	0
Mar. 5 - Mar.14	0	0	0	0	0
Mar.15 - Mar.25	210	22	188	3	185
Mar.26 - Apr. 4	71	3	68	0	68
Apr. 5 - Apr.14	0	1	-1	1	-2
Apr.15 - Apr.24	0	0	0	46	-46
Apr.25 - May 4	0	0	0	193	-193
May 5 - May 14	0	0	0	403	-403
May 15 - May 25	0	0	0	463	-463
May 26 - June 4	0	0	0	603	-603
June 5 - June 14	0	0	0	555	-555
June 15 - June 24	0	0	0	356	-356
June 25 - July 4	0	0	0	58	-58
July 5 - July 14	0	0	0	389	-389
July 15 - July 25	0	0	0	791	-791
July 26 - Aug. 4	0	0	0	453	-453
Aug. 5 - Aug.14	0	0	0	34	-34
Aug.15 - Aug.25	0	0	0	8	-8
Aug.26 - Sept.4	0	0	0	5	-5
Sept. 5 - Sept.14	0	0	0	10	-10
Sept.15 - Sept.24	0	0	0	8	-8
Sept.25 - Oct. 4	0	0	0	5	-5
Oct. 5 - Oct.14	0	0	0	21	-21
Oct.15 - Oct.25	0	0	0	92	-92
Oct.26 - Oct.31	0	0	0	2	-2
Total	281	26	255	4,499	-4,244
Acre-feet	557	52	506	8,924	-8,418

DETERMINATION OF NATURAL FLOW OF BATTLE CREEK  
AT INTERNATIONAL BOUNDARY  
1961

Diversion to Irrigated Lands  
Quantities in c.f.s. days

Period at International Boundary	Stirling & Nash Ditch	McKinnon Ditch	Richardson Ditch	Vidora Ditch	Total Diverted	Return Flow	Net Diversion to Irrigated Land
Feb. 23 - Mar. 4	0	0	0	0	0	0	0
Mar. 5 - Mar. 14	0	0	0	0	0	0	0
Mar. 15 - Mar. 25	92	0	0	0	92	18	74
Mar. 26 - Apr. 4	107	0	0	0	107	21	86
Apr. 5 - Apr. 14	127	0	0	0	127	25	102
Apr. 15 - Apr. 24	79	14	0	0	93	19	74
Apr. 25 - May 4	144	84	0	0	228	46	182
May 5 - May 14	175	69	3	156	403	81	322
May 15 - May 25	66	78	200	244	588	118	470
May 26 - June 4	0	161	270	179	610	122	488
June 5 - June 14	0	185	84	224	493	99	394
June 15 - June 24	0	68	38	184	290	58	232
June 25 - July 4	0	4	1	37	42	8	34
July 5 - July 14	0	140	172	68	380	76	304
July 15 - July 25	0	212	252	352	816	163	653
July 26 - Aug. 4	0	221	124	64	409	82	327
Aug. 5 - Aug. 14	0	10	0	0	10	2	8
Aug. 15 - Aug. 25	0	0	0	0	0	0	0
Aug. 26 - Sept. 4	0	0	0	0	0	0	0
Sept. 5 - Sept. 14	0	0	0	0	0	0	0
Sept. 15 - Sept. 24	0	0	0	0	0	0	0
Sept. 25 - Oct. 4	0	0	0	0	0	0	0
Oct. 5 - Oct. 14	0	6	0	0	6	1	5
Oct. 15 - Oct. 25	6	2	0	16	24	5	19
Oct. 26 - Oct. 31	1	0	0	0	1	0	1
Total	797	1,254	1,144	1,524	4,719	944	3,775
Acre-feet	1,581	2,487	2,269	3,023	9,360	1,872	7,488

Return flow assumed to be 20 per cent of diverted quantities.

DETERMINATION OF NATURAL FLOW OF BATTLE CREEK  
AT INTERNATIONAL BOUNDARY  
1961

Quantities in c.f.s. days

Period at International Boundary	Net Diversion to Cypress Lake	Net Diversion to Irrigated Land	Total Used by Canada	Battle Creek		United States	
				Flow at Int'l Boundary	Natural Flow	Share	Received in Excess of Share
Feb.23 - Mar. 4	0	0	0	0	0	0	0
Mar. 5 - Mar.14	0	0	0	238	238	119	119
Mar.15 - Mar.25	185	74	259	1,024	1,283	642	382
Mar.26 - Apr. 4	68	86	154	116	270	135	-19
Apr. 5 - Apr.14	-2	102	100	83	183	92	-9
Apr.15 - Apr.24	-46	74	28	38	66	33	5
Apr.25 - May 4	-193	182	-11	48	37	18	30
May 5 - May 14	-403	322	-81	90	9	4	86
May 15 - May 25	-463	470	7	109	116	58	51
May 26 - June 4	-603	488	-115	208	93	46	162
June 5 - June 14	-555	394	-161	64	(-97) 0	0	64
June 15 - June 24	-356	232	-124	149	25	12	137
June 25 - July 4	-58	34	-24	10	(-14) 0	0	10
July 5 - July 14	-389	304	-85	0	(-85) 0	0	0
July 15 - July 25	-791	653	-138	0	(-138) 0	0	0
July 26 - Aug. 4	-453	327	-126	58	(-68) 0	0	58
Aug. 5 - Aug.14	-34	8	-26	16	(-10) 0	0	16
Aug.15 - Aug.25	-8	0	-8	0	(-8) 0	0	0
Aug.26 - Sept.4	-5	0	-5	0	(-5) 0	0	0
Sept. 5 - Sept.14	-10	0	-10	0	(-10) 0	0	0
Sept.15 - Sept.24	-8	0	-8	0	(-8) 0	0	0
Sept.25 - Oct. 4	-5	0	-5	0	(-5) 0	0	0
Oct. 5 - Oct.14	-21	5	-16	0	(-16) 0	0	0
Oct.15 - Oct.25	-92	19	-73	0	(-73) 0	0	0
Oct.26 - Oct.31	-2	1	-1	0	(-1) 0	0	0
Total	-4,244	3,775	-469	2,251	2,320	1,159	1,092
Acre-feet	-8,418	7,488	-930	4,465	4,602	2,299	2,166
Estimated acre-feet total of minor diversions detailed in appendix to this report.				1,049	1,049		
				119	5,651		

DETERMINATION OF NATURAL FLOW OF  
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY  
1961

Table 7  
Page 1

Cypress Lake Storage and Diversion  
Quantities in c.f.s.--days

Period at International Boundary	Belanger Creek Diversion to Cypress Lake	Cypress Lake East Outflow Canal	Net Belanger Creek Diversion	Cypress Lake Natural Overflow  computed	Gross Depletion at Cypress Lake	Adjustment for Channel Losses to International Boundary  computed	Net Depletion at Cypress Lake
Mar. 1 - 10	0	5 <sup>e</sup>	-5	0	-5	-5	0
Mar. 11 - 20	0	10	-10	0	-10	-10	0
Mar. 21 - 31	202	37	+165	0	+165	+78	+87
Apr. 1 - 10	234	97	+137	0	+137	+69	+68
Apr. 11 - 20	79	63	+16	0	+16	+16	0
Apr. 21 - 30	72	58	+14	0	+14	+14	0
May 1 - 10	39	437	-398	0	-398	-121	-277
May 11 - 20	12	802	-790	0	-790	-279	-511
May 21 - 31	0	163	-163	0	-163	-95	-68
June 1 - 10	0	79	-79	0	-79	-66	-13
June 11 - 20	0	30	-30	0	-30	-30	0
June 21 - 30	0	238	-238	0	-238	-145	-93
July 1 - 10	18	592	-574	0	-574	-307	-267
July 11 - 20	3	299	-296	0	-296	-173	-123
July 21 - 31	0	19	-19	0	-19	-19	0
Aug. 1 - 10	0	222	-222	0	-222	-138	-84
Aug. 11 - 20	0	59	-59	0	-59	-59	0
Aug. 21 - 31	0	0	0	0	0	0	0
Sept. 1 - 10	0	61	-61	0	-61	-60	-1
Sept. 11 - 20	0	38	-38	0	-38	-38	0
Sept. 21 - 30	0	0	0	0	0	0	0
Oct. 1 - 10	0	0	0	0	0	0	0
Oct. 11 - 20	0	0	0	0	0	0	0
Oct. 21 - 31	0	1	-1	0	-1	-1	0
Total	659	3,310	-2,651	0	-2,651	-1,369	-1,282
Acre-feet	1,307	6,565	-5,258	0	-5,258	-2,715	-2,543

DETERMINATION OF NATURAL FLOW OF  
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY  
1961

Table 7  
Page 2

East End Reservoir Storage and Diversion  
Quantities in c.f.s.-days

Period at International Boundary	East End Reservoir		East End Canal	Return Flow from East End District  computed	Gross Depletion at East End	Adjustment for Channel Losses to International Boundary  computed	Net Depletion at East End
	Stored	Released					
Mar. 1 - 10	2		0	0	+2	+2	0
Mar. 11 - 20	2		0	0	+2	+2	0
Mar. 21 - 31	14		0	0	+14	+14	0
Apr. 1 - 10	398		0	0	+398	+85	+313
Apr. 11 - 20	368		0	0	+368	+98	+270
Apr. 21 - 30		494	104	21	-411	-104	-307
May 1 - 10	363		135	27	+471	+113	+358
May 11 - 20	90		198	40	+248	+100	+148
May 21 - 31		113	330	66	+151	+79	+72
June 1 - 10		211	424	85	+128	+70	+58
June 11 - 20		269	417	83	+65	+56	+9
June 21 - 30	167		131	26	+272	+139	+133
July 1 - 10	471		23	5	+489	+226	+263
July 11 - 20		57	353	71	+225	+120	+105
July 21 - 31		451	512	102	-41	-41	0
Aug. 1 - 10		78	296	59	+159	+94	+65
Aug. 11 - 20		88	87	17	-18	-18	0
Aug. 21 - 31		99	0	0	-99	-73	-26
Sept. 1 - 10	95		0	0	+95	+68	+27
Sept. 11 - 20	120		0	0	+120	+68	+52
Sept. 21 - 30	34		0	0	+34	+34	0
Oct. 1 - 10		45	0	0	-45	-45	0
Oct. 11 - 20		5	0	0	-5	-5	0
Oct. 21 - 31	6		0	0	+6	+6	0
Total	2,130	1,910	3,010	602	+2,628	+1,088	+1,540
Acre-feet	4,225	3,788	5,970	1,194	+5,213	+2,158	+3,055

Return flow assumed to be 20 per cent of diverted quantities.

DETERMINATION OF NATURAL FLOW OF  
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY  
1961

Val Marie Storage  
Quantities in c.f.s.-days

Period at International Boundary	Val Marie West Reservoir		Val Marie Reservoir		Total Change in Reservoir Contents at Val Marie	
	Stored	Released	Stored	Released	Stored	Released
Mar. 1 - 10	16		253		269	
Mar. 11 - 20	42		532		574	
Mar. 21 - 31	91		1,976		2,067	
Apr. 1 - 10	587			57	530	
Apr. 11 - 20	165			216		51
Apr. 21 - 30	574			375	199	
May 1 - 10	208			324		116
May 11 - 20	126		342		468	
May 21 - 31		290		256		546
June 1 - 10		293		621		914
June 11 - 20		183		411		594
June 21 - 30	48			276		228
July 1 - 10		6		245		251
July 11 - 20		349		126		475
July 21 - 31		478	17			461
Aug. 1 - 10		182	18			164
Aug. 11 - 20		35		63		98
Aug. 21 - 31		5		6		11
Sept. 1 - 10	1			20		19
Sept. 11 - 20	1			17		16
Sept. 21 - 30		2		32		34
Oct. 1 - 10		3		173		176
Oct. 11 - 20		1		92		93
Oct. 21 - 31	16			23		7
Total	1,875	1,827	3,138	3,333	4,107	4,254
Acre-feet	3,719	3,624	6,224	6,611	8,146	8,438

DETERMINATION OF NATURAL FLOW OF  
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY  
1961

Table 7  
Page 4

Diversion to Irrigated Lands  
Quantities in c.f.s.-days

Period at International Boundary	Val Marie West Gravity Canal	Val Marie West Pumping Canal	Val Marie Main Canal	Electric Pumps	Total Canal Diversion at Val Marie	Return Flow from Val Marie Projects computed	Gross Depletion at Val Marie	Adjustment for Channel Losses to International Boundary computed	Net Depletion at Val Marie
Mar. 1 - 10	0	0	0	0	0	0	+269	+30	+239
Mar. 11 - 20	0	0	0	0	0	0	+574	+42	+532
Mar. 21 - 31	0	0	0	0	0	0	+2,067	+104	+1,963
Apr. 1 - 10	0	0	0	0	0	0	+530	+51	+479
Apr. 11 - 20	0	0	0	0	0	0	-51	-22	-29
Apr. 21 - 30	0	0	0	0	0	0	+199	+30	+169
May 1 - 10	0	0	0	0	0	0	-116	-30	-86
May 11 - 20	1	38	0	22	61	12	+517	+70	+447
May 21 - 31	270	244	352	41	907	181	+180	+38	+142
June 1 - 10	200	217	667	30	1,114	223	-23	-20	-3
June 11 - 20	140	200	547	32	919	184	+141	+39	+102
June 21 - 30	20	3	285	5	313	63	+22	+20	+2
July 1 - 10	0	0	210	15	225	45	-71	-28	-43
July 11 - 20	190	110	112	20	432	86	-129	-37	-92
July 21 - 31	275	227	59	17	578	116	+1	+1	0
Aug. 1 - 10	20	192	72	13	297	59	+74	+29	+45
Aug. 11 - 20	0	17	22	6	45	9	-62	-27	-35
Aug. 21 - 31	0	0	1	0	1	0	-10	-10	0
Sept. 1 - 10	0	0	0	0	0	0	-19	-19	0
Sept. 11 - 20	0	0	0	0	0	0	-16	-16	0
Sept. 21 - 30	0	0	0	0	0	0	-34	-21	-13
Oct. 1 - 10	0	0	0	0	0	0	-176	-29	-147
Oct. 11 - 20	0	0	0	0	0	0	-93	-24	-69
Oct. 21 - 31	0	0	0	0	0	0	-7	-7	0
Total	1,116	1,248	2,327	201	4,892	978	+3,767	+164	+3,603
Acre-feet	2,214	2,475	4,616	399	9,703	1,940	+7,472	+325	+7,146

Return flow assumed to be 20 per cent of diverted quantities.



DETERMINATION OF NATURAL FLOW OF  
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY  
1961

Table 7  
Page 5

Quantities in c.f.s.-days

Period at International Boundary	Net Depletion in Canada	Frenchman River at International Boundary	Apparent Natural Flow of Frenchman River at International Boundary	Adjustment for Minor Diversions in Canada computed	Frenchman River at International Boundary		
					Natural Flow	United States Share	Received in Excess of Share by U.S.A.
Mar. 1 - 10	+239	70	309	16	325	162	-92
Mar. 11 - 20	+532	1,652	2,184	109	2,293	1,147	+505
Mar. 21 - 31	+2,050	1,536	3,586	179	3,765	1,883	-347
Apr. 1 - 10	+860	90	950	48	998	499	-409
Apr. 11 - 20	+241	164	405	20	425	212	-48
Apr. 21 - 30	-138	316	178	9	187	94	+222
May 1 - 10	-5	241	236	12	248	124	+117
May 11 - 20	+84	142	226	11	237	118	+24
May 21 - 31	+146	107	253	13	266	133	-26
June 1 - 10	+42	123	165	8	173	86	+37
June 11 - 20	+111	133	244	12	256	128	+5
June 21 - 30	+42	60	102	5	107	54	+6
July 1 - 10	-47	22	(-25) 0	0	0	0	+22
July 11 - 20	-110	4	(-106) 0	0	0	0	+4
July 21 - 31	0	0	0	0	0	0	0
Aug. 1 - 10	+26	36	62	3	65	32	+4
Aug. 11 - 20	-35	0	(-35) 0	0	0	0	0
Aug. 21 - 31	-26	0	(-26) 0	0	0	0	0
Sept. 1 - 10	+26	0	26	1	27	14	-14
Sept. 11 - 20	+52	0	52	3	55	28	-28
Sept. 21 - 30	-13	0	(-13) 0	0	0	0	0
Oct. 1 - 10	-147	0	(-147) 0	0	0	0	0
Oct. 11 - 20	-69	0	(-69) 0	0	0	0	0
Oct. 21 - 31	0	0	0	0	0	0	0
Total	+3,861	4,696	(8557) 8,978	449	9,427	4,714	-18
Acres-feet	+7,658	9,314	17,808	890	18,698	9,349	-36

Table 8

DETERMINATION OF THE NATURAL FLOW OF  
LODGE CREEK  
AT INTERNATIONAL BOUNDARY  
1961

Quantities in c.f.s. days

Period at International Boundary	Middle Creek near Alberta Boundary	Middle Creek near Battle Creek	Walburger Coulee below Diversions	Middle Creek Reservoir and Bedford Slough Areas		Lodge Creek at Alberta Boundary	Lodge Creek below Spangler Project	Stored or Diverted at Spangler Project	Lodge Creek at International Boundary	Measured Flows below Major Projects in Canada	Natural Run-off from Project Areas in Canada		Natural Flow of Lodge Creek at International Boundary		United States				
				Releases	Storage						Comp.	Use	Comp.	Use	Share		Received in Excess of Share		
															Net	Comp.	Use	Comp.	Use
Mar. 1 - Mar.10	0	3	0	3	-3	0	0	0	0	3	-2	0	-5	0	-2	0	+2	0	
Mar.11 - Mar.20	17	18	4	22	-5	168	0	+168	138	18	+72	72	+373	373	+186	186	-48	-48	
Mar.21 - Mar.31	9	20	0	20	-11	278	0	+278	22	20	+1	1	+290	290	+145	145	-123	-123	
Apr. 1 - Apr.10	4	10	0	10	-6	5	0	+5	2	10	-5	0	-4	0	-2	0	+4	+2	
Apr.11 - Apr.20	4	8	1	9	-5	1	0	+1	0	8	-5	0	-9	0	-4	0	+4	0	
Apr.21 - Apr.30	4	120	0	120	-116	0	0	0	194	120	+44	44	+122	122	+61	61	+133	133	
May 1 - May 10	4	11	0	11	-7	0	0	0	32	11	+13	13	+38	38	+19	19	+13	+13	
May 11 - May 20	5	13	127	140	-135	109	0	+109	17	13	+2	2	-7	0	-4	0	+21	+17	
May 21 - May 31	4	9	0	9	-5	1	0	+1	1	9	-5	0	-8	0	-4	0	+5	+1	
June 1 - June 10	4	6	0	6	-2	0	0	0	14	6	+5	5	+17	17	+8	9	+6	+5	
June 11 - June 20	4	6	0	6	-2	0	0	0	0	6	-4	0	-6	0	-3	0	+3	0	
June 21 - June 30	3	7	116	123	-120	58	0	+58	0	7	-4	0	-66	0	-33	0	+33	0	
July 1 - July 10	2	5	102	107	-105	76	0	+76	0	5	-3	0	-32	0	-16	0	+16	0	
July 10 - July 20	1	5	78	83	-82	56	0	+56	0	5	-3	0	-29	0	-14	0	+14	0	
July 21 - July 31	1	32	43	75	-74	47	0	+47	0	32	-19	0	-46	0	-23	0	+23	0	
Aug. 1 - Aug.10	1	196	0	196	-195	0	0	0	0	196	-118	0	-313	0	-156	0	+156	0	
Aug.11 - Aug.20	1	11	0	11	-10	0	0	0	0	11	-7	0	-17	0	-8	0	+8	0	
Aug.21 - Aug.31	1	13	0	13	-12	0	0	0	0	13	-8	0	-20	0	-10	0	+10	0	
Sept. 1 - Sept.10	1	9	0	9	-8	0	0	0	0	9	-5	0	-13	0	-6	0	+6	0	
Sept.11 - Sept.20	1	7	0	7	-6	0	0	0	0	7	-4	0	-10	0	-5	0	+5	0	
Sept.21 - Sept.30	2	6	0	6	-4	0	0	0	0	6	-4	0	-8	0	-4	0	+4	0	
Oct. 1 - Oct.10	1	6	0	6	-5	0	0	0	0	6	-4	0	-9	0	-4	0	+4	0	
Oct.11 - Oct.20	2	6	0	6	-4	0	0	0	0	6	-4	0	-8	0	-4	0	+4	0	
Oct.21 - Oct.31	2	7	0	7	-5	0	0	0	0	7	-4	0	-9	0	-4	0	+4	0	
Total	78	534	471	1,005	-927	799	0	+799	420	534	-71	137	+221	840	+113	420	+307	0	
Acre-feet	155	1,059	934	1,993	-1,838	1,585	0	+1,585	833	1,059		272	1,666		833			0	
Estimated acre-feet total of minor diversions detailed in appendix to this report														120					
														1,786					

DIVERSIONS FROM THE EASTERN TRIBUTARIES  
OF MILK RIVER IN CANADA  
1961

Quantities in Acre-feet

Battle Creek Tributary Basin

Net Diversion to Cypress Lake			-8,418
Total Diversion to Irrigation	9,360		
Estimated Return Flow from Irrigated Lands	<u>1,872</u>		7,488
Total of 37 Minor Diversions Detailed in Appendix			<u>1,049</u>
Total Used by Canada			119

(Battle Creek at International Boundary = 4,465 acre-feet)

4465  
4584

Frenchman River Tributary Basin

Net Depletion at Cypress Lake			-2,543
Stored in Eastend Reservoir	4,225		
Released from Eastend Reservoir		<u>3,788</u>	437
Eastend Canal	5,970		
Adjustment for Channel Losses to International Boundary		<u>2,158</u>	3,812
Stored in Val Marie Reservoirs		8,146	
Released from Val Marie Reservoirs		<u>8,438</u>	-292
Total Canal Diversion at Val Marie	9,703		
Adjustment for Channel Losses to International Boundary		<u>325</u>	9,378
Estimated Return Flow from Irrigated Lands			-3,134
Adjustment for Minor Diversions in Canada			<u>890</u>
Total Used by Canada			8,548

Total of 63 Minor Diversions in Frenchman Basin as provided by the Water Rights Division of the Province of Saskatchewan Detailed in Appendix = 1,373<sup>a</sup> acre-feet.

9314  
17862

- a - Excluding 863 acre-feet of diversions from War Lodge, Oxarat and Sucker Creeks which did not affect Frenchman River.

(Frenchman River at International Boundary = 9,314 acre-feet)

Lodge Creek Tributary Basin

Middle Creek near Alberta Boundary	155		
Middle Creek near Battle Creek		1,059	
Walburger Coulee below Diversions		<u>934<sup>b</sup></u>	-1,838
Total of 5 Minor Diversions Detailed in Appendix			120 <sup>c</sup>
Lodge Creek at Alberta Boundary	1,585		
Lodge Creek below Spangler Project		<u>0</u>	<u>1,585</u>
Total Used by Canada			-133

- b - Released from Middle Creek Reservoir via Bedford Slough.

- c - 635 acre-feet diverted by Mitchell Ranching Co. is diverted above Middle Creek near Battle Creek gauging station and therefore this diversion is not included in total of 5 minor diversions above as it is already charged to Canada.

833  
700

(Lodge Creek below McRae Coulee at International Boundary = 833 acre-feet)

MEASURED DIVERSIONS FROM THE EASTERN TRIBUTARIES  
OF MILK RIVER IN THE UNITED STATES

1961

(Quantities in Acre-feet)

Irrigator	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total	
				<u>Lodge Creek</u>						
North Chinook Canal	172	178	80	0	0	0	0	0	430	
				<u>Battle Creek</u>						
Matheson Canal	-	-	-	-	-	-	-	-	0	
Pumping	-	-	-	-	-	-	-	-	a2,760	
				<u>Frenchman River</u>						
Frenchman Canal	484	1,170	1,550	1,880	1,780	907	0	0	7,770	
Total	-	-	-	-	-	-	-	-	10,960	

$\frac{2,760 \times 7.5}{100} = 2070$  1962

a - Estimated use by pumping from Battle Creek to land under the Matheson Canal.

Measured Run-off of Eastern Tributaries of Milk River  
at International Boundary for period March to October, 1961  
(Quantities in Acre-feet)

STREAM	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Lodge Creek	318	388	99	28	0	0	0	0	833
Woodpile Coulee	426	1	0	0	0	0	0	0	427
Battle Creek	2,730	355	600	699	1	147	0	0	4,530
Lyons Coulee	725	0	0	0	0	0	0	0	725
East Br. Battle Cr.	411	0	0	0	0	0	0	0	411
Whitewater Creek	3,950	21	11	306	2	0	0	6	4,300
Frenchman River	6,460	1,130	972	628	51	72	0	0	9,310
Merachern Creek	2	0	0	0	0	0	0	0	2
Horse Creek	48	0	0	3	0	0	0	0	51
Lock Creek	834	420	307	80	13	0	0	40	1,690
<b>Total</b>	<b>15,900</b>	<b>2,320</b>	<b>1,990</b>	<b>1,740</b>	<b>67</b>	<b>219</b>	<b>0</b>	<b>46</b>	<b>22,280</b>

GAUGING STATIONS OPERATED JOINTLY BY  
CANADA AND UNITED STATES  
IN ST. MARY AND MILK RIVER DRAINAGE BASINS

- 1961 -

Map Index	Stream and Location	Remarks
<u>St. Mary River Basin</u>		
5AE <sub>27</sub>	St. Mary River at International Boundary	Int. <sup>a</sup>
5AE <sub>0.5</sub>	Swiftcurrent Creek at Many Glacier, Montana	Int. <sup>a</sup>
5AE <sub>0.9</sub>	Lake Sherburne at Sherburne, Montana	Int.R <sup>a</sup>
5AE <sub>0.6</sub>	Swiftcurrent Creek at Sherburne, Montana	Int. <sup>a</sup>
5AE <sub>0.2</sub>	St. Mary Canal at St. Mary Crossing, near Babb, Montana (United States St. Mary Canal at St. Mary Crossing)	Int. <sup>a</sup>
5AE <sub>0.3</sub>	St. Mary Canal at Hudson Bay Divide, near Browning, Mont. (United States St. Mary Canal at Hudson Bay Divide)	Int. <sup>a</sup>
<u>Milk River Basin</u>		
11AA <sub>5</sub>	Milk River at Milk River, Alberta	Int. <sup>a</sup>
11AA <sub>0.2</sub>	Milk River at Eastern Crossing of International Boundary	Int. <sup>a</sup>
11AA <sub>0.3</sub>	North Fork Milk River above St. Mary Canal, near Browning, Montana (formerly as below but North Branch of) (North Fork of Milk River above Outlet of United States St. Mary Canal)	Int. <sup>a</sup>
11AA <sub>1</sub>	North Milk River near International Boundary (formerly North Branch of)	Int. <sup>a</sup>
11AA <sub>25</sub>	Milk River at Western Crossing of International Boundary (formerly South Branch of Milk River)	Int. <sup>a</sup>
11AD <sub>0.1</sub>	Whitewater Creek near International Boundary	Int. <sup>a</sup>
<u>Lodge Creek Tributary Basin</u>		
11AB <sub>83</sub>	Lodge Creek below McRae Coulee at International Boundary	Int. <sup>a</sup>
<u>Battle Creek Tributary Basin</u>		
11AB <sub>76</sub>	Battle Creek above Cypress Lake West Inflow Canal, Saskatchewan	Int. <sup>a</sup>
11AB <sub>27</sub>	Battle Creek at International Boundary	Int. <sup>a</sup>

Map Index	Stream and Location	Remarks
<u>Battle Creek Tributary Basin</u>		
11AB <sub>0.1</sub>	Woodpile Coulee near International Boundary	Int. <sup>a</sup>
11AB <sub>0.3</sub>	East Fork Battle Creek near International Boundary (formerly East Branch of Battle Creek near International Boundary)	Int. <sup>a</sup>
11AB <sub>75</sub>	Lyons Coulee at International Boundary	Int. <sup>a</sup>
11AB <sub>78</sub>	Cypress Lake West Inflow Canal	Int. <sup>a</sup>
11AB <sub>77</sub>	Cypress Lake West Outflow Canal	Int. <sup>a</sup>
<u>Frenchman River Tributary Basin</u>		
11AC <sub>37</sub>	Cypress Lake, Saskatchewan	Int.R <sup>a</sup>
11AC <sub>64</sub>	Belanger Creek Diversion to Cypress Lake	Int. <sup>a</sup>
11AC <sub>60</sub>	Cypress Lake East Outflow Canal	Int. <sup>a</sup>
11AC <sub>18</sub>	Frenchman River above Eastend Reservoir	Int. <sup>a</sup>
11AC <sub>55</sub>	Eastend Reservoir at Eastend, Saskatchewan	Int.R <sup>a</sup>
11AC <sub>52</sub>	Eastend Canal at Eastend, Saskatchewan	Int. <sup>a</sup>
11AC <sub>1</sub>	Frenchman River below Eastend Reservoir	Int. <sup>a</sup>
11AC <sub>63</sub>	Val Marie West Reservoir, Saskatchewan	Int.R <sup>a</sup>
11AC <sub>65</sub>	Val Marie West Gravity Canal	Int. <sup>a</sup>
11AC <sub>56</sub>	Val Marie Reservoir, Saskatchewan	Int.R <sup>a</sup>
11AC <sub>54</sub>	Val Marie Main Canal	Int. <sup>a</sup>
11AC <sub>41</sub>	Frenchman River at International Boundary	Int. <sup>a</sup>
<u>Rock Creek Tributary Basin</u>		
11AE <sub>0.2</sub>	Rock Creek at International Boundary	Int. <sup>a</sup>
11AE <sub>0.6</sub>	Rock Creek below Horse Creek near International Boundary	Int. <sup>a</sup>
11AE <sub>0.3</sub>	Horse Creek at International Boundary	Int. <sup>a</sup>
11AE <sub>0.4</sub>	McEachern Creek at International Boundary	Int. <sup>a</sup>

GAUGING STATIONS OPERATED INDEPENDENTLY  
BY CANADA OR UNITED STATES  
IN ST. MARY AND MILK RIVER DRAINAGE BASINS  
- 1961 -

Map Index	Stream and Location	Remarks
<u>St. Mary River Basin</u>		
139	Grinnell Creek at Grinnell Glacier near Many Glacier, Montana	U.S. <sup>c</sup>
140	Grinnell Creek near Many Glacier, Montana	U.S. <sup>c</sup>
175	St. Mary River near Babb, Montana	U.S. <sup>c</sup>
135	St. Mary Lake near St. Mary, Montana	U.S. <sup>c</sup>
5AE <sub>6</sub>	St. Mary River near Lethbridge, Alberta	Canada <sup>c</sup>
5AE <sub>5</sub>	Rolph Creek near Kimball, Alberta	Canada <sup>a</sup>
5AE <sub>2</sub>	Lee Creek at Cardston, Alberta	Canada <sup>a</sup>
5AE <sub>25</sub>	St. Mary Reservoir near Spring Coulee, Alberta	Canada R <sup>a</sup>
5AE <sub>26</sub>	Canadian St. Mary Canal near Spring Coulee, Alberta	Canada <sup>a</sup>
5AF <sub>28</sub>	Canadian St. Mary Canal at Drop No. 1	Canada <sup>c</sup>
5AE <sub>21</sub>	Magrath Irrigation District Canal near Spring Coulee, Alberta	Canada <sup>a</sup>
<u>Milk River Basin</u>		
<u>Lodge Creek Tributary Basin</u>		
11AB <sub>82</sub>	Lodge Creek at Alberta Boundary	Canada <sup>a</sup>
11AB <sub>88</sub>	Lodge Creek below Spangler Project	Canada <sup>a</sup>
11AB <sub>86</sub>	Walburger Coulee below Diversions	Canada <sup>a</sup>
11AB <sub>9</sub>	Middle Creek near Alberta Boundary	Canada <sup>a</sup>
11AB <sub>87</sub>	Middle Creek near Battle Creek	Canada <sup>a</sup>
11AB <sub>80</sub>	Middle Creek Reservoir	Canada R <sup>a</sup>
11AB <sub>89</sub>	Altawan Reservoir near Govenlock, Saskatchewan	Canada R <sup>a</sup>
11AB <sub>60</sub>	Spangler Ditch near Govenlock, Saskatchewan	Canada <sup>a</sup>
1322	South Fork of Milk River near Babb, Montana	U.S. <sup>c</sup>
1460	North Chinook Canal near Havre, Montana	U.S. <sup>b</sup>



Map Index	Stream and Location	Remarks
<u>Battle Creek Tributary Basin</u>		
11AB <sub>81</sub>	Battle Creek at Ranger Station	Canada <sup>c</sup>
11AB <sub>85</sub>	Cypress Lake West Inflow Canal Drain	Canada <sup>a</sup>
11AB <sub>84</sub>	Vidora Ditch near Consul, Saskatchewan	Canada <sup>a</sup>
11AB <sub>58</sub>	Richardson Ditch near Consul, Saskatchewan	Canada <sup>a</sup>
11AB <sub>44</sub>	McKinnon Ditch near Consul, Saskatchewan	Canada <sup>a</sup>
11AB <sub>18</sub>	Stirling and Nash Ditch near Consul, Saskatchewan	Canada <sup>a</sup>
1525	Matheson Canal near Chinook, Montana	U.S. <sup>b</sup>
<u>Frenchman River Tributary Basin</u>		
11AC <sub>51</sub>	Frenchman River below Val Marie, Saskatchewan	Canada <sup>c</sup>
11AC <sub>66</sub>	Val Marie West Pumping Canal, Saskatchewan	Canada <sup>a</sup>
1645	Frenchman Canal near Saco, Montana	U.S. <sup>b</sup>

- 
- Int. - International Gauging Station
  - Int.R - International Station on Reservoir
  - U.S. - Denotes operation by United States Geological Survey.
  - Canada - Denotes operation by Water Resources Branch, Canada.
  - a - Monthly and daily discharge data and stream measurements contained in Appendix.
  - b - Monthly Discharge data only tabulated in this report.
  - c - Data not included in this report or appendix.