TECHNICAL REPORT TO THE
PPWB COMMITTEE ON HYDROLOGY

NATURAL FLOW

ASSINIBOINE RIVER

AT SASKATCHEWAN — MANITOBA BOUNDARY

PREPARED BY:

HYDROLOGY DIVISION
PRAIRIE FARM REHABILITATION ADMINISTRATION
DEPARTMENT OF REGIONAL ECONOMIC EXPANSION

SYNOPSIS

The average annual natural flow of the Assiniboine River at the Saskatchewan-Manitoba boundary is 239,000 acre-feet (295 000 dam^3). Average annual consumptive water use in the Saskatchewan portion of the basin now amounts to an estimated 6,600 acre-feet (8 140 dam^3), 2.8% of the average annual natural flow.

The present level of consumptive use (1977 level of use) in the Saskatchewan portion of the Assiniboine River basin would not have exceeded Saskatchewan's 50% share of the natural flow on an annual basis in the last 66 years (1912 to 1977). The average annual quantity of water delivered to Manitoba in excess of the 50% flow commitment is 113,000 acre-feet (139 000 dam^3).

Hydrometric stations at Theodore Reservoir and Lake of the Prairies and the gauging stations Willow Brook near Willowbrook, Assiniboine River near Kamsack, Assiniboine River near Russell and Shell River near Inglis will serve as adequate hydrometric base stations when it becomes necessary to calculate natural flows for apportionment purposes.

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INTRODUCTION

The Assiniboine River natural flow study is one of a series of natural flow studies conducted for the Prairie Provinces Water Board. Following the completion of the Prairie Provinces Water Board's study on Determination of Natural Flow of the North Saskatchewan, South Saskatchewan, Saskatchewan, Churchill, and Qu'Appelle River Basins in 1977, the members of the Board agreed to have other interprovincial basins studied to determine if apportionment of natural flow might be required at this point in time. Eighteen interprovincial basins were identified and priorities were assigned to the basins. The Board agreed that the eighteen basins would be studied in order of priority as funds and time became available.

The report on Natural Flow of the Assiniboine River at the Saskatchewan-Manitoba Boundary describes the basin geography, water use within the basin, and the derivation of historic natural flows at the Saskatchewan-Manitoba boundary. The present level of use is analyzed in conjunction with natural flows to indicate the potential for apportionment deficits now and in the foreseeable future.

BASIN GEOGRAPHY

The Assiniboine River originates in the southern region of the Porcupine Provincial Forest, approximately 34 miles (54 km) northwest of the Town of Preeceville in eastern Saskatchewan (see foldout Location Map, Figure 1, at the back of this report). The river flows in a southeasterly direction for approximately 92 miles (147 km) before joining its major tributary, the Whitesand River, near Kamsack, then continues its southeasterly course for approximately 28 miles (45 km) before crossing into Manitoba. Shellmouth Dam, located on the Assiniboine River about 22 miles (35 km) downstream of the interprovincial boundary, forms a lake 35 miles (56 km) long and backs water up into Saskatchewan. Immediately above Shellmouth Dam, the Assiniboine River joins the Shell River, then flows in a southerly direction for approximately 42 miles (68 km) where it joins the Qu'Appelle River near St. Lazare, Manitoba.

The Whitesand River, the largest tributary of the Assiniboine River in Saskatchewan, originates east of the Quill Lakes in the western portion of the basin approximately 12 miles (19 km) northeast of Foam Lake. The river flows southeast towards Springside, east to meet Yorkton Creek, and then northeast before finally turning southeast to meet the Assiniboine River near Kamsack, a total distance of about 102 miles (163 km).

The gross and effective drainage areas of the Assiniboine River basin at the Saskatchewan-Manitoba boundary are 5,660 square miles (14 660 km^2) and 2,039 square miles (5 280 km^2) respectively. These figures include 39.1 square miles (101 km^2) of gross drainage area that originates in Manitoba and contributes to flow of the Assiniboine River at the interprovincial boundary, but they do not include 793 square miles (2 053 km^2) of gross drainage area in Saskatchewan that contribute to the flow of the Assiniboine River below the interprovincial boundary. A table of gross and effective drainage areas for key points in the basin is provided with Figure 1 at the back of the report.

The Assiniboine River is classified as an intermittent stream. Snowmelt in the spring contributes to high flows which rapidly give way to a gradually diminishing base flow which persists through the summer months of most years as the groundwater contribution decreases. The median annual runoff carried by the Assiniboine River at the Saskatchewan-Manitoba boundary is 135,110 acre-feet (166 660 dam^3). The median annual flow at the interprovincial boundary was interpolated on the basis of effective drainage areas between the median annual flows for the hydrometric gauging stations Assiniboine River near Kamsack (05MD004), Assiniboine River near Russell (05ME001) and Shell River near Inglis (05MD005) provided in the PFRA Report on Median Annual Unit Runoff for the Prairie Provinces[1].

BASIN WATER USE

Six major projects are located within the effective drainage area in the Saskatchewan portion of the Assiniboine River basin:

1. Newburn Lake - SE 35-31-09 W2
   Storage Capacity at FSL - 1,287 acre-feet (1 590 dam^3)

2. Town of Kamsack Reservoir - SW 03-30-32 W1
   Storage Capacity at FSL - 908 acre-feet (1 120 dam^3)

3. Sturgis Weir - NW 20-34-04 W2
   Storage Capacity at FSL - 150 acre-feet (185 dam^3)

4. Canora Reservoir - NE 28-30-03 W2
   Storage Capacity at FSL - 250 acre-feet (308 dam^3)

5. Theodore Reservoir - NE 19-28-06 W2
   Storage Capacity at FSL - 11,600 acre-feet (14 310 dam^3)

6. Willowbrook Division - SW 11-26-06 W2

In 1952, the R.M. of Invermay constructed an earth embankment and wooden pile weir across the outlet of Newburn Lake to raise the natural full supply level of the lake by 4.0 feet (1.22 m). The increased annual evaporation losses resulting from the 87.0 acre (35.2 ha) increase in flooded area were charged against the project in April of the following year. The average annual evaporation loss from Newburn Lake caused by the increase in water levels over the period 1952 to 1977 inclusive has been 187 acre-feet (231 dam^3).

The water supply for the Town of Kamsack is obtained from a small in-channel reservoir formed by construction of a concrete weir across the Assiniboine River in 1912. Water is pumped from the reservoir to a large dugout adjacent to the river. Over the period 1912 to 1977 inclusive the average annual use from the reservoir, including evaporation, has been 202 acre-feet (249 dam^3).

The Town of Sturgis constructed a wooden pile weir across the Assiniboine River in 1951 creating a 150 acre-foot (185 dam^3) reservoir. This reservoir has never been used for water supply and the only use charged against the project has been evaporation losses, averaging 44 acre-feet (54 dam^3) annually over the period 1951 to 1977 inclusive.

The Town of Canora obtains its water supply from a 250 acre-foot (308 dam^3) reservoir formed by construction of a concrete weir on the Whitesand River in 1943. The average annual use, including evaporation, over the period 1943 to 1977 inclusive has been 216 acre-feet (266 dam^3).

Theodore Reservoir, an 11,600 acre-foot (14 310 dam^3) reservoir located on the Whitesand River approximately 40 miles (64 km) upstream of the Canora Town Dam, was completed in 1964. The only use made of the water stored in the reservoir has been in recent years when releases have been made to replenish storage in the Canora Town Reservoir. Environment Canada, Inland Waters Branch, has recorded water levels on Theodore Reservoir since 1964 (WSC Station No. 05MB009). The average annual evaporation loss from Theodore Reservoir over the period 1964 to 1977 inclusive has been 2,087 acre-feet (2 574 dam^3).

The Willowbrook Diversion consists of a concrete diversion structure in SW 11-26-06 W2 and a canal to convey Willow Brook flows eastward to the region of lakes and marshes south and west of the City of Yorkton. It was constructed in 1941 in an effort to raise water levels

in the wetland and recreation projects known as Rousay and York Lakes. Flows in excess of approximately 130 cfs (3.68 m^3/s) spill around the diversion structure and flow downstream in Willow Brook to the Whitesand River. The Willowbrook Diversion is currently being reconstructed by the Saskatchewan Department of Agriculture as part of the Yorkton Creek Flood Control Project to stabilize water levels and control flooding in the wetland area south and west of Yorkton. Streamflow records are available on Willow Brook, just upstream of the diversion structure, since 1962 (WSC Station No. 05MB005). These records were extended to 1941 using regression analysis with: Yorkton Creek near Ebenezer (05MB001), Pheasant Creek near Abernathy (05JL005) and Indianhead Creek near Indian Head (05JL002). The estimated annual depletion from the natural flow of the Assiniboine River resulting from the Willowbrook Diversion over the period 1941-1977 inclusive was 3,022 acre-feet (3 728 dam^3). None of the diverted flows were assumed to return to the Whitesand River by way of Yorkton Creek although a small return flow probably occurs in some years.

A field program was undertaken in the summer of 1979 to quantitatively estimate unlicenced water use in the Assiniboine River basin in Saskatchewan. Geology and Air Surveys Division of PFRA first identified all apparent man-made water storage projects located within the effective drainage area of the Assiniboine River basin in Saskatchewan using 1970 LIFT photography. Some 200-250 sites were identified, located on 1:250,000 scale topographic maps and then transferred to 1:50,000 scale maps. Staff from the Hydrology Division then spent a total of 23 man-days in the field examining all sites identified on the air photos as well as all licenced projects not identified on the photos (constructed since 1970). This field assessment involved quantitatively estimating the amount of use for all man-made storages and interviewing local residents to determine the period of time each project had been in operation.

Most of the water storage projects identified on the air photos were actually beaver dams or natural water impoundments. While 33 unlicenced projects were located, it proved to be very difficult in most cases to determine exactly when these dams were built. In addition, many dams, both licenced and unlicenced, had washed out and again it was very difficult to determine exactly when these structures had failed. Several licenced projects had been raised without proper authorization and in some cases the date of alteration could not be determined with certainty.

An itemized list of all water uses in the Assiniboine River basin at the Saskatchewan-Manitoba boundary is provided in Table A-1.

Table A-2 lists the minor water use from domestic projects in the effective drainage area of the Assiniboine River basin in Saskatchewan for the period 1912 to 1977 inclusive as evaluated from the field program, as well as the estimate which would have been made if no field program had been undertaken. The difference between the two figures illustrates the value of the field program and represents water use from unlicenced projects less the licensed use from washed-out licenced projects which have not been cancelled. These figures can be compared to the total water use in the basin and to the estimated natural flow of the Assiniboine River at the Saskatchewan-Manitoba boundary. This difference in estimated water use can be a significant portion of the total minor water use (over 80% in some years) but it is only a small percentage of the total basin water use (maximum of 4.4 % in 1944) and an even smaller portion of the estimated natural flow of the Assiniboine River (maximum of 0.3% in 1961).

In this particular study, the field program represented approximately 30% of the total budget of $12,500. The results obtained from the field work did not significantly affect the estimates of natural flow of the Assiniboine River at the Saskatchewan-Manitoba boundary. Even in 1961, the lowest runoff year in the study period, the difference

of 48 acre-feet (59 dam^3) in estimated domestic use represented only 4.3% of the total water use and 0.3% of the estimated natural flow of the Assiniboine River at the Saskatchewan-Manitoba boundary. For a basin with relatively limited agricultural water use such as the Saskatchewan portion of the Assiniboine River basin, it must be concluded that the increased accuracy in natural flow estimates does not warrant the associated cost of water-use field surveys.

NATURAL FLOW CALCULATIONS

Natural flows are derived by adjusting recorded flows to produce an estimate of the quantity of water which would have been recorded under natural conditions, prior to the effect of human interference or intervention. The Project Depletion Method was used to derive natural flows for the Assiniboine River natural flow study. The effect of drainage projects in the Assiniboine River basin was not considered in the computation of natural flows of the Assiniboine River.

Monthly natural flow arrays covering the period 1912 to 1977 were developed for the hydrometric gauging stations Assiniboine River near Kamsack (05MD004), Assiniboine River near Russell (05ME001) and Shell River near Inglis (05MD005). The array of natural flows for Assiniboine River at the Saskatchewan-Manitoba boundary was then derived by interpolating on the basis of effective drainage areas between monthly natural flows of the Assiniboine River near Kamsack and Russell and Shell River near Inglis.

Hydrometric records were available for the gauging stations Assiniboine River near Kamsack (05MD004) for the period 1944 to 1977, Assiniboine River near Russell (05ME001) for the period 1913 to 1932 and 1942 to 1977 and for Shell River near Inglis (05MD005) for the period 1948 to 1977. The arrays of monthly recorded flows for these three stations are shown in Appendix B, Tables B-1, B-2, and B-3. Hydrometric

records on the Assiniboine River were also available at Headingly (05MJ001) for the period 1913 to 1977 and at Brandon (05MH001) for the entire study period 1912 to 1977 except January to March, 1912.

Historic uses in the Assiniboine River basin upstream of the Kamsack gauging station were added to the recorded monthly flows to create an array of monthly natural flows of the Assiniboine River near Kamsack for the period of record. The historic use array was modified by a transfer factor to account for the time taken for flow to travel from the point of use to the Kamsack gauging station. In a similar manner, an array of monthly natural flows of the Assiniboine River near Russell was developed for the available period of record by adding to the monthly recorded flows: historic uses in the Assiniboine River basin above the Kamsack gauging station, historic uses in the Assiniboine River basin between Kamsack and the interprovincial boundary, and net depletions in natural flow caused by regulation of Shellmouth Dam, all modified by the appropriate transfer factors. Depletions to natural flow due to Shellmouth Dam were calculated on a monthly basis for the period of existance, 1969 to 1977, by adding estimated evaporation losses to net changes in storage as recorded at hydrometric station Lake of the Prairies near Shellmouth (05MD009).

Monthly recorded flows of the Assiniboine River at Headingly and at Brandon were partially naturalized for use in multiple regression analyses to estimate monthly natural flows near Kamsack and Russell for periods of missing records. An array of partially naturalized monthly flows of the Assiniboine River at Headingly was derived by adding to the monthly recorded flows: historic uses of the Assiniboine River basin at the Saskatchewan-Manitoba boundary, net depletions to natural flow caused by regulation of Shellmouth Dam, and total historic uses in the Souris River basin up to Wawanesa, Manitoba, all modified by the appropriate transfer factors. Historic water uses in the Souris River basin for the period 1912 to 1974 were previously developed for the Souris River Basin Study [2]. Uses for the period 1975 to 1977 were assumed to be equal to the average historic use for the previous five years. Partially naturalized monthly flows of the Assiniboine River at Brandon were

developed by adding to the monthly recorded flows historic uses in the Assiniboine River basin at the interprovincial boundary and net depletions to natural flow caused by regulation of Shellmouth Dam, both modified by transfer factors.

Monthly natural flows of the Assiniboine River near Kamsack (05MD004) and near Russell (05ME001) for periods of missing records were estimated by multiple regression analysis with natural or partially naturalized flow arrays of Assiniboine River near Russell (05ME001), Assiniboine River at Brandon (05MH001) and Assiniboine River near Headingly (05MJ001). Missing hydrometric records were estimated by assigning priorities to the regression equations. The highest priority was given to the regression equation that gave the best estimate based on the adjusted (to account for the degrees of freedom) Standard Error of Estimate, the adjusted Coefficient of Correlation and the intercept value of the regression equation. The regression equation that gave the best estimate of monthly streamflow based on these three parameters was assigned priority No. 1 and was used to estimate as many missing values as possible. The regression equation assigned priority No. 2 was then used to estimate values which had not been filled in by the first priority. As many as three equations were required to estimate missing values for every month. The regression results for Assiniboine River near Kamsack (05MD004) and Assiniboine River near Russell (05ME001) are presented in the supplementary tables opposite the corresponding natural flow arrays for the period 1912 to 1977 (Tables B-4 and B-5). Natural flows for the period January to March, 1912 were estimated by simply extrapolating the rising limb of the 1912 annual hydrograph for the two stations based on similar recorded hydrographs for other years.

Recorded flows of Shell River near Inglis (05MD005) were assumed to represent natural conditions as there are no major water use projects in the Shell River basin. The array of monthly recorded flows was extended to the period 1912 to 1977 using available flows in the Shell and Assiniboine River basins. Monthly flows of Shell River near Inglis were estimated for the period 1914 to 1921 using an effective drainage area ratio with recorded flows of Shell River at Asessippi

(05MD001), for the period 1922 to 1932 using an effective drainage area ratio with Shell River Four Miles South of Roblin (05MD002), and for missing monthly flows in the period 1962 to 1977 using an effective drainage area ratio with Shell River near Roblin (05MD007). All other missing monthly flows of Shell River near Inglis for the period 1912 to 1977 were estimated by graphical monthly correlations with natural flows of Assiniboine River near Russell (05ME001).

Natural flows of the Assiniboine River at the Saskatchewan-Manitoba boundary were derived on a monthly basis by interpolating between estimated natural flows at the hydrometric gauging stations Assiniboine River near Kamsack, Assiniboine River near Russell and Shell River near Inglis using the equation:

$$Q_1 = Q_2 + \frac{A_1 - A_2}{A_3 - A_2 - A_4} (Q_3 - Q_2 - Q_4)$$

$$= Q_2 + 0.432 (Q_3 - Q_2 - Q_4)$$

where:

Q_1 = Monthly mean natural flow of Assiniboine River at the Saskatchewan-Manitoba boundary,

Q_2 = Monthly mean natural flow of Assiniboine River near Kamsack,

Q_3 = Monthly mean natural flow of Assiniboine River near Russell,

Q_4 = Monthly mean natural flow of Shell River near Inglis,

A_1 = Effective drainage area of Assiniboine River at the Saskatchewan-Manitoba boundary,

A_2 = Effective drainage area of Assiniboine River near Kamsack,

A_3 = Effective drainage area of Assiniboine River near Russell,

A_4 = Effective drainage area of Shell River near Inglis.

The monthly natural flows derived for the Assiniboine River at the Saskatchewan-Manitoba boundary for the period 1912 to 1977 are shown in Appendix B as Table B-7.

APPLICATION OF APPORTIONMENT PRINCIPLES

An analysis was made to determine whether Saskatchewan would have exceeded its 50% share of the natural flow of the Assiniboine River, under the terms of the 1969 Master Agreement on Apportionment, in the period 1912 to 1977 if the present level of use had been in effect. A monthly array of uses was created, assuming that all five major reservoirs and the Willowbrook Diversion Project were in existance for the entire study period and assuming constant minor uses at the present (1977) level of use. The resulting monthly array of uses (Appendix A, Table A-4) was adjusted by the transfer factor and subtracted from the natural flow at the interprovincial boundary. The result was an estimate of monthly flows which would would have been recorded at the interprovincial boundary during the period 1912 to 1977 had the present level of use been in effect.

An array of one-half the natural flow at the interprovincial boundary was then subtracted from the array of natural flows adjusted for present use. The residual monthly flows (Appendix B, Table B-8) provide a picture of the balance of flow situation for the Assiniboine River for a 66-year period of apportioned monthly streamflow. Negative values indicate periods when water use in Saskatchewan would have exceeded Saskatchewan's 50% share of the natural flow at the interprovincial boundary. Positive values indicate periods when Manitoba would have received more than its 50% share under the apportionment agreement.

Table B-8 indicates that Saskatchewan would have passed less than 50% of the natural flow of the Assiniboine River in 20 months of the 66-year study period 1912-1977 (one in February, one in July, five times in August, ten times in September and three times in October). In most years these deficits would be made up in the next one or two months and none of the years indicate a deficit in the annual balance of flow.

CONCLUSIONS

The average annual water use in the Saskatchewan portion of the Assiniboine River basin now represents 5.5% of Saskatchewan's 50% share of the average annual natural flow of the Assiniboine River at the Saskatchewan-Manitoba boundary. The results of the analysis on the application of apportionment principles (Table B-8) indicate that 20 months of deficit flows would occur during the 66-year period 1912 to 1977 and that all of these deficits would be balanced during the year. The average annual quantity of water delivered to Manitoba in excess of the 50% of natural flow commitment during the 66-year period is 112,847 acre-feet (139 197 dam^3).

Monthly hydrometric records for Assiniboine River near the Kamsack and Russell hydrometric gauging stations and Shell River near Inglis provide an adequate representation of the interprovincial flow at the Saskatchewan-Manitoba boundary. Thus, there is no requirement for a hydrometric gauging station closer to the interprovincial boundary as long as the Kamsack, Russell and Inglis stations remain active. However, major water uses in the Assiniboine River basin should continue to be recorded at hydrometric stations Theodore Reservoir near Theodore (05MB009), Willow Brook at Willowbrook (05MB005) and Lake of the Prairies near Shellmouth (05MD009).

ACKNOWLEDGEMENTS

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APPENDIX A

SASKATCHEWAN ASSINIBOINE RIVER BASIN WATER USES

Table A-1

ASSINIBOINE RIVER BASIN - SASKATCHEWAN WATER USES

LAND LOCATION	PROJECT STATUS*	YEAR CONSTRUCTED	PURPOSE*	RESERVOIR CAPACITY Ac. Ft.	IRRIGATION AREA Acs.	ESTIMATED USE Ac. Ft.	REMARKS
NE 18-26-05-2	UNAUTH.	1966	DOM.	4.0		2.0	SPILLWAY WASHED OUT IN 1976 AND NEVER REBUILT
SE 31-26-07-2	UNAUTH.	1942	DOM.	5.0		2.0	
NW 35-26-07-2	UNAUTH.	1942	DOM.	3.0		2.0	SPILLWAY WASHED OUT IN 1965 AND NEVER REBUILT
SW 18-27-05-2	UNAUTH.	1942	DOM.	2.0		1.0	
NE 32-28-31-1	UNAUTH.	1965	DOM.	2.0		1.0	
SW 05-29-32-1	UNAUTH.	1942	DOM.	3.0		2.0	SPILLWAY WASHED OUT IN 1972 AND NEVER REBUILT
SW 22-27-31-1	UNAUTH.	1942	DOM.	10.0		3.0	SPILLWAY WASHED OUT IN 1972 AND NEVER REBUILT
SW 31-28-31-1	UNAUTH.	1935	DOM.	25.0		4.0	
SW 07-29-31-1	UNAUTH.	1972	DOM.	3.0		2.0	
NE 30-28-31-1	UNAUTH.	1942	DOM.	3.0		2.0	
NW 26-29-01-2	UNAUTH.	1940	DOM.	6.0		2.0	
SW 09-30-01-2	UNAUTH.	1953	DOM.	10.0		3.0	SPILLWAY PARTIALLY WASHED OUT IN 1972
SW 09-30-01-2	UNAUTH.	1973	DOM.	4.0		3.0	
NW 08-30-01-2	UNAUTH.	1942	DOM.	10.0		3.0	PROJECT ABANDONED IN 1972
NW 19-30-01-2	UNAUTH.	1942	DOM.	3.0		2.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
NE 19-30-01-2	UNAUTH.	1938	DOM.	3.0		2.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
NW 18-30-01-2	UNAUTH.	1942	DOM.	2.0		1.0	PROJECT WASHED OUT IN 1965 AND NEVER REBUILT
NW 16-28-03-2	UNAUTH.	1964	DOM.	2.0		1.0	
SE 20-28-03-2	UNAUTH.	1973	DOM.	2.0		1.0	
SE 20-28-03-2	UNAUTH.	1942	DOM.	3.0		2.0	PROJECT WASHED OUT IN 1960 AND NEVER REBUILT
SW 19-26-03-2	UNAUTH.	1940	DOM.	6.0		3.0	
SW 19-26-03-2	UNAUTH.	1964	DOM.	2.0		1.0	
SW 15-33-05-2	UNAUTH.	1935	DOM.	2.0		1.0	
NW 13-35-07-2	UNAUTH.	1938	DOM.	5.0		3.0	
NE 05-27-08-2	UNAUTH.	1978	DOM.	8.0		4.0	
SE 20-28-08-2	UNAUTH.	1938	DOM.	6.0		3.0	
SE 32-27-08-2	UNAUTH.	1938	DOM.	5.0		2.0	PROJECT WASHED OUT IN 1965 AND NEVER REBUILT
SE 11-29-11-2	UNAUTH.	1942	DOM.	10.0		4.0	
NE 05-29-10-2	UNAUTH.	1938	DOM.	10.0		5.0	
NE 14-29-10-2	UNAUTH.	1960	DOM.	20.0		4.0	PROJECT ABANDONED IN 1972
NW 17-29-09-2	UNAUTH.	1964	DOM.	2.0		1.0	
SE 02-27-09-2	UNAUTH.	1942	DOM.	2.0		1.0	
SW 08-30-09-2	UNAUTH.	1942	DOM.	2.0		1.0	
NW 32-25-06-2	LIC.	1900	DOM.	1.0		1.0	
SE 34-29-32-1	LIC.	1925	IND.			181.0	PUMPED - CANCELLED IN 1979
NE 10-28-30-1	LIC.	1927	IND.			73.0	PUMPED - NO USE AFTER 1960
SE 25-29-04-2	LIC.	1912	IND.			120.0	PUMPED - NO USE AFTER 1960
NW 09-30-09-2	LIC.	1918	IND.			161.0	NO USE AFTER 1960
SW 15-28-07-2	LIC.	1918	IND.	68.0		68.0	NO USE AFTER 1960

* ABBREVIATIONS USED UNDER THE "PROJECT STATUS" AND "PURPOSE" COLUMNS ARE: LIC. - LICENSED; AUTH. - AUTHORIZED; UNAUTH. - UNAUTHORIZED; APPLIC. - APPLICATION FOR LICENSE; DOM. - DOMESTIC; MUN. - MUNICIPAL; IND. - INDUSTRIAL; IRR. - IRRIGATION.

** AVERAGE ANNUAL USE DURING THE LIFE OF THE PROJECT.

LAND LOCATION	PROJECT STATUS*	YEAR CONSTRUCTED	PURPOSE*	RESERVOIR CAPACITY AC. FT.	IRRIGATION AREA ACS.	ESTIMATED USE AC. FT.	REMARKS
SE 22-30-10-2	LIC.	1927	IND.			50.0	NO USE AFTER 1960
NE 09-28-03-2	LIC.	1937	DOM.	7.5		4.0	
SW 21-26-03-2	LIC.	1939	DOM.	9.4		3.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
NE 29-25-07-2	LIC.	1939	DOM.	6.5		4.0	
NE 35-27-04-2	LIC.	1940	DOM.	30.0		13.0	
NW 29-28-31-1	LIC.	1941	DOM.	2.5		2.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
SW 29-30-01-2	LIC.	1940	DOM.	5.4		2.0	
NW 18-26-03-2	LIC.	1940	DOM.	1.5		1.5	
NW 06-29-31-1	LIC.	1943	DOM.	5.9		2.0	
NW 34-29-01-2	LIC.	1942	IRR.	1.3	2	1.3	PUMPED
NE 34-29-01-2	LIC.	1942	IRR.		2	1.3	PUMPED
SE 13-29-33-1	LIC.	1942	DOM.	4.0		2.0	
SE 12-30-33-1	LIC.	1942	DOM.	9.5		3.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
SE 10-30-32-1	LIC.	1942	DOM.	3.0		2.0	
NW 02-30-32-1	LIC.	1942	DOM.	2.5		1.0	PROJECT WASHED OUT IN 1960 AND NEVER REBUILT
NW 25-29-32-1	LIC.	1942	DOM.	1.4		1.0	
NE 29-28-32-1	LIC.	1942	DOM.	6.7		2.0	PROJECT WASHED OUT IN 1965 AND NEVER REBUILT
NW 30-29-31-1	LIC.	1942	DOM.	2.1		1.0	
NW 35-28-32-1	LIC.	1942	DOM.	1.9		1.9	
SW 29-29-31-1	LIC.	1943	DOM.	6.3		2.0	
SE 03-28-32-1	LIC.	1943	DOM.	2.3		1.0	
NE 14-26-06-2	LIC.	1942	DOM.	3.0		2.0	
SE 36-31-02-2	LIC.	1942	DOM.	3.0		2.0	PROJECT WASHED OUT IN 1960 AND NEVER REBUILT
SE 20-28-32-1	LIC.	1942	DOM.	7.0		2.0	
NE 15-29-32-1	LIC.	1943	DOM.	1.7		1.0	
SE 28-28-08-2	LIC.	1943	DOM.	3.7		2.0	
NE 18-29-32-1	LIC.	1943	DOM.	3.5		3.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
NW 36-28-32-1	LIC.	1943	DOM.	5.6		2.0	PROJECT WASHED OUT IN 1965 AND NEVER REBUILT
SW 01-29-32-1	LIC.	1947	DOM.	3.6		2.0	PROJECT WASHED OUT IN 1965 AND NEVER REBUILT
SE 09-30-31-1	LIC.	1943	DOM.	1.5		1.0	PROJECT WASHED OUT IN 1965 AND NEVER REBUILT
NE 07-30-31-1	LIC.	1943	DOM.	1.5		1.0	
SW 08-29-31-1	LIC.	1944	DOM.	1.3		1.0	
SE 31-30-31-1	LIC.	1943	DOM.	7.0		2.0	
NE 25-30-33-1	LIC.	1944	DOM.	4.0		2.0	
SE 36-29-32-1	LIC.	1944	DOM.	10.0		2.0	PROJECT WASHED OUT IN 1960 AND NEVER REBUILT
NW 25-30-02-2	LIC.	1947	DOM.	8.0		3.0	
SW 07-29-30-1	LIC.	1947	DOM.	1.5		1.5	
NW 18-35-06-2	LIC.	1949	DOM.	7.0		2.0	
NW 20-34-04-2	APPLIC.	1951	MUN.	150.0		44.	**TOWN OF STURGIS
SW 20-29-31-1	LIC.	1946	DOM.	3.5		2.0	

* ABBREVIATIONS USED UNDER THE "PROJECT STATUS" AND "PURPOSE" COLUMNS ARE:
LIC. - LICENSED; AUTH. - AUTHORIZED; UNAUTH. - UNAUTHORIZED; APPLIC. - APPLICATION FOR LICENSE; DOM. - DOMESTIC; MUN. - MUNICIPAL; IND. - INDUSTRIAL; IRR. - IRRIGATION.

** AVERAGE ANNUAL USE DURING THE LIFE OF THE PROJECT.

LAND LOCATION	PROJECT STATUS*	YEAR CONSTRUCTED	PURPOSE*	RESERVOIR CAPACITY AC. FT.	IRRIGATION AREA ACS.	ESTIMATED USE AC. FT.	REMARKS
SW 19-30-32-1	LIC.	1946	DOM.	5.0		2.0	
NE 23-29-31-1	LIC.	1951	DOM.	1.4		1.0	
SE 20-31-01-2	LIC.	1947	DOM.	4.0		1.0	
SE 30-29-07-2	LIC.	1947	DOM.	6.0		2.0	
SW 06-27-32-1	LIC.	1947	DOM.	1.7		1.0	
NE 31-29-09-2	LIC.	1947	DOM.	5.0		2.0	
NW 19-29-31-1	LIC.	1949	DOM.	2.8		1.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
SW 20-29-31-1	LIC.	1953	DOM.	4.8		2.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
NW 31-29-09-2	LIC.	1963	DOM.	3.0		2.0	
SE 35-31-09-2	APPLIC.	1952	OTHER	1287.		187.	**R.M. OF INVERMAY-NEWBURN LAKE
NE 16-32-09-2	LIC.	1954	OTHER	365.0		110.0	DUCKS UNLIMITED
NE 06-29-31-1	LIC.	1954	DOM.	1.8		1.0	
SE 25-30-09-2	LIC.	1977	OTHER	1007.		286.0	DUCKS UNLIMITED
NE 19-28-06-2	LIC.	1965	MUN.	11600.		2087.	**THEODORE DAM
NE 04-30-32-1	LIC.	1965	IRR.		10	7.0	PUMPED
SE 21-29-09-2	LIC.	1964	DOM.	5.4		5.0	PROJECT WASHED OUT IN 1972 AND NEVER REBUILT
NE 30-28-31-1	LIC.	1966	DOM.	5.2		2.0	
SE 30-30-01-2	LIC.	1967	DOM.	8.5		3.0	DAM RAISED IN 1972
SE 30-30-01-2	LIC.	1972	DOM.	35.9		3.0	DAM RAISED IN 1977
NE 09-30-09-2	APPLIC.	1967	MUN.	30.8		20.0	**R.M. OF INSINGER-TOWN OF SHEHO
SE 18-26-03-2	LIC.	1967	IRR.		135	45.0	BACKFLOOD IRRIGATION
NW 27-30-32-1	LIC.	1967	MUN.	28.0		28.0	COTE INDIAN BAND-BADGERVILLE DAM
SW 35-34-05-2	APPLIC.	1972	MUN.			10.0	TOWN OF PREECEVILLE
NW 18-25-03-2	LIC.	1973	OTHER	62.7		28.0	DUCKS UNLIMITED
NW 26-29-08-2	LIC.	1974	OTHER	509.0		184.0	DUCKS UNLIMITED
NW 26-29-08-2	LIC.	1974	OTHER	12.7		5.0	DUCKS UNLIMITED
SE 12-27-07-2	LIC.	1976	OTHER	142.7		25.0	DUCKS UNLIMITED
NW 10-29-32-1	LIC.	1977	DOM.	7.6		2.0	
NW 18-30-01-2	LIC.	1945	DOM.	3.0		2.0	
NE 13-30-02-2	LIC.	1945	DOM.	3.0		2.0	
NE 34-26-03-2	LIC.	1942	DOM.	3.0		2.0	
SE 06-35-07-2	LIC.	1922	IND.			72.0	NO USE AFTER 1952
SE 23-27-02-2	LIC.	1912	IND.			72.0	NO USE AFTER 1951
SE 21-29-09-2	LIC.	1973	DOM.	2.0		1.0	
NE 30-30-01-2	LIC.	1956	DOM.	3.0		2.0	
SW 17-27-32-1	LIC.	1965	DOM.	1.0		1.0	
SE 32-29-31-1	LIC.	1945	DOM.	4.0		2.0	
SW 03-30-32-1	LIC.	1912	MUN.	908.0		202.	**TOWN OF KAMSACK
NE 28-30-03-2	LIC.	1912	MUN.	250.0		216.	**TOWN OF CANORA
SW 11-26-06-2	AUTH.	1942	MUN.			3022.	**WILLOWBROOK DIVERSION

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** AVERAGE ANNUAL USE DURING THE LIFE OF THE PROJECT.

ASSINIBOINE RIVER BASIN - SUMMARY OF SASKATCHEWAN WATER USES

Year	Minor Use From Domestic Projects			Total Water Use in Saskatchewan (acre-feet)	Estimated Natural Flow At Saskatchewan-Manitoba Boundary (acre-feet)
	Without Field Work (acre-feet)	With Field Work (acre-feet)	Difference (acre-feet)		
1912	1	1	0	277	358,527
1913	1	1	0	285	855,318
1914	1	1	0	316	317,342
1915	1	1	0	312	64,335
1916	1	1	0	311	249,444
1917	1	1	0	334	351,761
1918	1	1	0	542	128,354
1919	1	1	0	568	145,393
1920	1	1	0	575	397,812
1921	1	1	0	534	787,782
1922	1	1	0	644	1,192,183
1923	1	1	0	640	662,725
1924	1	1	0	656	136,044
1925	1	1	0	834	299,504
1926	1	1	0	833	155,202
1927	1	1	0	916	633,444
1928	1	1	0	946	353,118
1929	1	1	0	976	112,315
1930	1	1	0	943	95,149
1931	1	1	0	981	62,084
1932	1	1	0	945	78,274
1933	1	1	0	948	123,705
1934	1	1	0	995	106,923
1935	1	6	5	982	105,532
1936	1	6	5	984	215,213
1937	5	10	5	1,010	44,370
1938	5	25	20	959	81,555
1939	12	32	20	1,001	53,255
1940	29	54	25	1,007	24,916
1941	31	56	25	1,037	47,354
1942	52	103	51	2,494	135,806
1943	69	120	51	2,700	158,845
1944	74	125	51	1,155	32,865
1945	80	131	51	1,197	67,156
1946	84	135	51	1,197	85,439
1947	97	148	51	5,364	200,571
1948	97	148	51	6,522	324,499
1949	100	151	51	2,012	85,531
1950	100	151	51	2,637	99,661
1951	101	152	51	3,173	199,601
1952	231	282	51	2,294	142,058
1953	163	217	54	3,708	407,151
1954	289	343	54	7,777	712,150
1955	323	377	54	19,265	687,970
1956	320	374	54	18,890	580,118
1957	357	411	54	6,753	266,682
1958	389	443	54	1,900	44,532
1959	321	375	54	1,565	49,167
1960	395	453	58	4,407	219,282
1961	447	495	48	1,118	17,380
1962	350	401	51	1,507	87,230
1963	315	366	51	1,204	42,028
1964	354	408	54	2,041	46,062
1965	336	390	55	15,742	175,425
1966	378	423	45	4,835	259,640
1967	546	591	45	5,402	155,270
1968	480	525	45	2,902	49,439
1969	468	513	45	4,597	97,092
1970	424	469	45	6,558	166,863
1971	463	508	45	5,281	241,969
1972	500	581	81	5,336	325,597
1973	439	462	23	2,159	77,084
1974	648	671	23	9,267	405,177
1975	652	675	23	9,989	411,817
1976	762	785	23	12,432	424,448
1977	1,020	1,041	21	3,992	66,850

Table A-3

ASSINIBOINE RIVER BASIN AT THE SASKATCHEWAN - MANITOBA BOUNDARY

TOTAL HISTORIC WATER USE - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	VOLUME-A.F.
1912	0.2	0.2	0.2	1.4	0.3	0.4	0.3	0.3	0.4	0.4	0.2	0.2	0.4	9	277.
1913	0.2	0.2	0.2	1.4	0.4	0.3	0.2	0.3	0.5	0.4	0.3	0.2	0.4	9	285.
1914	0.2	0.3	0.2	1.4	0.3	0.4	0.4	0.5	0.6	0.3	0.3	0.2	0.4	10	316.
1915	0.2	0.2	0.3	1.4	0.5	0.3	0.3	0.6	0.4	0.4	0.3	0.3	0.4	10	312.
1916	0.2	0.2	0.2	1.5	0.4	0.3	0.5	0.6	0.3	0.4	0.3	0.2	0.4	10	311.
1917	0.2	0.3	0.3	1.4	0.5	0.3	0.6	0.5	0.5	0.5	0.3	0.3	0.5	10	334.
1918	0.2	0.3	0.3	4.9	0.7	0.3	0.4	0.4	0.6	0.5	0.3	0.3	0.7	17	542.
1919	0.3	0.3	0.3	4.9	0.7	0.4	0.6	0.6	0.5	0.4	0.3	0.3	0.8	18	568.
1920	0.3	0.3	0.3	5.0	0.7	0.3	0.6	0.6	0.6	0.3	0.3	0.3	0.8	18	575.
1921	0.3	0.3	0.3	4.9	0.7	0.3	0.4	0.5	0.3	0.3	0.3	0.3	0.7	17	534.
1922	0.3	0.3	0.3	6.0	0.8	0.5	0.6	0.4	0.5	0.4	0.3	0.3	0.9	20	644.
1923	0.3	0.3	0.3	6.1	0.9	0.3	0.4	0.6	0.5	0.5	0.3	0.3	0.9	20	640.
1924	0.3	0.3	0.3	6.0	0.9	0.4	0.5	0.5	0.6	0.4	0.3	0.3	0.9	20	656.
1925	0.5	0.6	0.5	6.3	1.2	0.6	0.8	0.9	0.8	0.6	0.6	0.5	1.2	26	834.
1926	0.5	0.6	0.5	6.4	1.2	0.8	0.7	0.8	0.7	0.6	0.5	0.5	1.2	26	833.
1927	0.6	0.7	0.6	7.2	1.1	0.7	0.7	0.9	0.7	0.7	0.7	0.6	1.3	29	916.
1928	0.6	0.7	0.6	7.3	1.2	0.7	0.7	0.9	1.0	0.8	0.7	0.6	1.3	29	946.
1929	0.6	0.7	0.6	7.3	1.2	0.8	1.0	1.1	0.9	0.8	0.7	0.6	1.3	30	976.
1930	0.6	0.7	0.6	7.2	1.2	0.7	0.8	0.9	0.9	0.8	0.7	0.6	1.3	29	943.
1931	0.6	0.7	0.6	7.3	1.3	0.9	1.0	0.9	0.9	0.8	0.7	0.6	1.4	31	981.
1932	0.6	0.7	0.6	7.2	1.2	0.7	0.9	0.7	0.9	0.8	0.7	0.6	1.3	29	945.
1933	0.6	0.7	0.6	7.2	1.1	0.7	0.9	0.9	0.9	0.8	0.7	0.6	1.3	30	948.
1934	0.6	0.7	0.6	7.3	1.2	0.8	1.1	1.1	0.9	0.8	0.7	0.6	1.4	31	995.
1935	0.6	0.7	0.6	7.4	1.2	1.2	0.8	0.9	0.9	0.8	0.7	0.6	1.4	31	982.
1936	0.6	0.7	0.6	7.4	1.2	0.7	1.0	1.1	0.9	0.8	0.7	0.6	1.4	31	984.
1937	0.6	0.7	0.6	7.4	1.2	1.1	1.1	1.1	0.9	0.8	0.7	0.6	1.4	32	1010.
1938	0.6	0.7	0.6	7.6	1.2	0.7	0.7	0.9	0.9	0.8	0.7	0.6	1.3	30	959.
1939	0.6	0.7	0.6	7.8	1.2	0.7	0.9	1.1	1.0	0.8	0.7	0.6	1.4	31	1001.
1940	0.6	0.7	0.6	8.1	1.3	0.7	0.7	1.1	0.9	0.8	0.7	0.6	1.4	31	1007.
1941	0.6	0.7	0.6	8.1	1.2	0.9	1.0	1.0	1.0	0.8	0.7	0.6	1.4	32	1037.
1942	0.6	0.7	0.6	21.2	9.2	4.3	1.1	0.7	1.0	0.9	0.7	0.6	3.4	78	2494.
1943	0.6	0.7	0.6	22.4	9.8	4.7	1.4	1.1	1.3	0.9	0.7	0.7	3.7	84	2700.
1944	0.6	0.7	0.6	9.2	1.3	1.2	1.3	1.0	1.0	0.9	0.7	0.6	1.6	36	1155.
1945	0.6	0.7	1.4	9.5	1.3	0.7	1.0	1.5	0.8	1.1	0.7	0.6	1.7	37	1197.
1946	0.6	0.7	0.7	9.6	1.6	1.1	0.8	1.3	1.1	1.0	0.7	0.7	1.7	37	1197.
1947	0.6	0.7	0.7	45.2	24.2	11.0	2.0	1.1	1.2	1.1	0.7	0.7	7.4	167	5364.
1948	0.7	0.7	0.7	54.2	30.6	14.3	1.8	1.4	1.5	1.2	0.7	0.7	9.0	203	6522.
1949	0.7	0.7	0.7	16.5	5.7	2.7	1.0	1.5	1.5	1.2	0.7	0.7	2.8	63	2012.
1950	0.7	0.7	0.7	21.8	9.1	4.5	1.0	1.5	1.4	1.0	0.8	0.7	3.6	82	2637.
1951	0.7	0.8	0.7	26.4	12.0	5.6	1.9	1.1	1.2	1.0	0.7	0.7	4.4	99	3173.
1952	0.7	0.8	0.8	18.7	6.8	3.6	1.6	1.2	1.2	1.2	0.8	0.8	3.2	71	2294.
1953	0.7	0.8	0.7	30.8	15.1	7.0	1.3	1.2	1.3	1.2	0.8	0.7	5.1	116	3708.
1954	0.7	0.8	0.8	65.6	36.7	16.7	2.4	1.4	1.2	1.3	0.8	0.8	10.7	243	7777.
1955	0.7	0.8	0.8	129.7	118.8	57.3	5.4	1.7	1.5	1.3	0.8	0.8	26.6	601	19265.
1956	0.7	0.8	0.8	129.9	114.8	54.6	5.3	1.5	1.8	1.3	0.8	0.8	26.0	588	18890.
1957	0.8	0.9	0.8	56.2	30.3	14.2	2.8	1.4	1.8	1.2	0.9	0.9	9.3	211	6753.
1958	0.8	0.9	1.4	14.8	3.9	2.5	1.6	1.4	1.3	1.1	0.9	0.9	2.6	59	1900.
1959	0.8	0.9	2.2	11.4	2.2	1.1	2.0	1.5	1.1	1.0	0.9	0.9	2.2	49	1565.
1960	0.8	0.9	0.9	37.1	16.6	8.1	2.6	1.7	1.6	1.2	0.9	0.9	6.1	137	4407.
1961	0.6	0.6	0.7	9.7	1.5	1.3	0.8	0.7	0.7	0.6	0.6	0.6	1.5	35	1118.
1962	0.6	0.6	0.6	14.8	2.0	1.4	1.2	1.0	1.0	0.8	0.6	0.6	2.1	47	1507.
1963	0.6	0.6	2.3	7.6	2.7	0.9	1.0	1.0	0.7	1.2	0.7	0.6	1.7	38	1204.
1964	0.6	0.6	0.6	13.8	10.0	2.4	1.2	1.0	1.2	1.1	0.7	0.6	2.8	64	2041.
1965	0.6	0.7	0.7	191.7	27.8	16.1	7.7	7.0	3.6	5.4	1.1	0.7	21.7	491	15742.
1966	0.6	0.7	0.7	29.6	16.1	5.4	6.1	5.7	8.1	5.4	1.1	0.7	6.7	151	4835.
1967	0.7	0.7	0.7	20.5	26.0	8.6	8.7	9.8	7.9	3.8	1.0	0.7	7.5	169	5402.
1968	0.7	1.0	1.9	13.5	1.9	5.1	4.6	6.4	7.1	3.6	1.5	0.8	4.0	90	2902.
1969	0.8	0.8	0.8	40.4	6.4	5.4	4.9	6.1	5.2	3.3	1.5	0.9	6.4	143	4597.
1970	0.7	0.8	0.8	37.2	40.0	8.1	3.3	8.7	5.0	2.0	0.9	0.8	9.1	205	6558.
1971	0.7	0.8	0.7	47.5	10.1	3.8	4.3	7.5	6.5	4.2	1.1	0.8	7.3	165	5281.
1972	0.7	0.8	0.8	46.6	7.9	6.9	5.2	6.8	6.6	4.5	1.2	0.8	7.4	166	5336.
1973	1.1	0.8	1.0	8.1	1.7	2.0	5.6	3.4	5.6	4.7	1.2	0.8	3.0	67	2159.
1974	0.8	0.9	0.9	44.6	58.3	25.1	7.9	2.2	4.7	5.0	2.0	0.9	12.8	289	9267.
1975	0.8	0.9	0.9	50.1	60.8	25.2	9.5	4.7	4.6	4.8	1.9	1.0	13.8	312	9989.
1976	0.8	0.9	0.9	88.7	23.7	46.5	17.9	8.7	9.0	6.1	2.7	1.0	17.1	387	12432.
1977	1.0	1.0	0.9	19.2	12.7	8.6	7.2	7.1	1.9	5.0	1.4	0.0	5.5	125	3992.
MIN	0.2	0.2	0.2	1.4	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.0	0.4	9	277.
MAX	1.1	1.0	2.3	191.7	118.8	57.3	17.9	9.8	9.0	6.1	2.7	1.0	26.6	601	19265.
MEAN	0.6	0.7	0.7	24.0	11.9	6.1	2.4	2.1	1.9	1.5	0.8	0.6	4.4	100	3207.

Table A-4

ASSINIBOINE RIVER BASIN AT THE SASKATCHEWAN - MANITOBA BOUNDARY

TOTAL WATER USE AT THE PRESENT (1977) LEVEL OF USE - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	VOLUME-A.F.
1912	0.8	0.9	0.9	53.8	26.7	15.4	2.7	2.0	3.7	4.2	1.5	1.0	9.4	103	6833.
1913	0.8	0.9	0.9	134.9	123.7	61.5	5.7	2.5	5.1	3.8	1.6	1.1	28.5	313	20655.
1914	0.9	1.2	1.0	61.5	33.7	18.3	5.3	5.5	6.5	2.5	1.7	1.0	11.5	127	8360.
1915	0.8	0.9	1.4	17.1	5.2	1.8	1.2	6.5	3.3	3.9	1.2	1.0	3.7	40	2669.
1916	0.8	1.0	1.2	47.6	21.3	10.7	5.1	6.0	1.5	3.0	1.7	1.0	8.4	92	6081.
1917	0.8	0.9	0.9	58.3	32.9	14.8	6.2	4.2	5.1	4.3	1.8	1.0	10.9	120	7909.
1918	0.8	0.9	0.9	23.2	7.0	3.6	2.9	2.5	5.3	3.6	1.7	1.0	4.4	49	3214.
1919	0.8	0.9	0.9	24.4	7.6	4.4	5.9	5.6	4.2	3.1	1.1	0.9	5.0	55	3616.
1920	0.8	0.9	0.9	71.0	46.4	22.9	7.0	5.4	4.6	1.6	1.1	1.0	13.6	149	9857.
1921	0.9	0.9	0.9	133.6	82.9	38.8	5.2	3.4	1.3	1.2	1.0	0.9	22.5	247	16317.
1922	0.8	0.9	0.9	134.3	132.3	120.2	14.4	2.6	4.0	3.4	1.2	0.9	34.6	380	25059.
1923	0.8	1.0	0.9	134.8	84.7	39.5	4.7	4.6	4.1	3.8	1.2	0.9	23.4	257	16929.
1924	0.8	0.9	0.9	22.9	8.4	4.5	3.8	4.0	5.2	2.9	1.1	0.9	4.7	51	3401.
1925	0.8	0.9	0.9	71.9	55.7	26.4	6.7	6.0	3.9	2.1	1.0	0.9	14.8	162	10698.
1926	0.8	0.9	0.9	37.6	17.2	10.6	3.3	4.9	3.5	1.1	1.0	0.9	6.9	75	4977.
1927	0.8	0.9	0.9	133.7	100.7	48.5	4.7	4.8	1.4	1.8	1.0	0.9	25.0	274	18095.
1928	1.0	0.9	0.9	57.8	30.6	14.3	2.1	5.0	5.0	3.0	1.2	0.9	10.2	112	7392.
1929	0.8	0.9	0.9	24.8	7.5	4.7	6.2	7.4	4.5	2.7	1.1	0.9	5.2	57	3771.
1930	0.8	0.9	0.9	20.5	5.4	2.5	2.4	4.9	4.9	2.7	1.1	0.9	4.0	44	2893.
1931	0.8	0.9	0.9	19.8	6.4	5.0	6.1	3.9	3.8	3.2	1.2	0.9	4.4	48	3197.
1932	0.8	0.9	0.9	20.1	6.4	2.5	4.3	2.1	4.7	2.7	1.1	0.9	3.9	43	2865.
1933	0.8	0.9	0.9	21.9	6.1	2.9	4.9	5.0	3.7	2.9	1.1	0.9	4.3	48	3142.
1934	0.8	1.1	0.9	22.4	6.8	4.4	7.6	7.7	4.5	3.9	1.2	0.9	5.2	57	3754.
1935	0.8	0.9	0.9	16.1	2.5	1.1	2.9	4.6	5.2	3.4	1.2	0.9	3.4	37	2444.
1936	0.8	0.9	0.9	56.2	29.5	14.0	6.4	7.2	4.7	3.6	1.2	0.9	10.5	115	7616.
1937	0.8	0.9	0.9	17.2	3.5	6.5	6.7	7.4	4.4	3.5	1.2	0.9	4.5	49	3260.
1938	0.8	0.9	0.9	16.2	3.0	1.3	1.2	4.1	3.9	3.8	1.2	0.9	3.2	35	2302.
1939	0.8	0.9	0.9	17.1	2.4	1.1	5.0	6.5	5.1	3.9	1.2	0.9	3.8	42	2774.
1940	0.8	1.0	0.9	15.8	3.5	1.9	1.2	6.9	4.0	3.2	1.2	0.9	3.4	38	2497.
1941	0.8	0.9	0.9	16.2	2.3	3.6	5.9	5.3	6.0	3.8	1.2	0.9	4.0	44	2891.
1942	0.8	0.9	0.9	27.8	11.6	4.8	3.0	1.3	4.9	4.8	1.3	0.9	5.2	57	3793.
1943	0.8	0.9	0.9	29.9	11.0	6.3	4.6	4.4	5.4	3.1	1.1	1.2	5.8	64	4194.
1944	0.9	0.9	0.9	16.6	2.5	4.5	5.5	4.9	5.9	4.3	1.4	0.9	4.1	45	2975.
1945	0.8	0.9	0.9	16.3	2.3	1.1	3.7	6.7	2.0	4.1	1.2	0.9	3.4	37	2471.
1946	0.8	0.9	1.1	16.0	3.5	3.7	1.5	5.4	4.0	3.7	1.2	0.9	3.6	39	2585.
1947	0.8	0.9	0.9	52.0	26.1	11.4	6.0	4.0	4.4	4.3	1.2	0.9	9.4	103	6817.
1948	0.8	0.9	0.9	60.6	31.9	25.2	3.1	5.6	6.8	5.0	1.3	0.9	11.9	130	8610.
1949	0.8	0.9	0.9	24.0	6.7	3.9	2.5	6.4	6.7	4.4	1.2	0.9	4.9	54	3575.
1950	0.8	0.9	0.9	29.0	10.7	6.5	1.6	6.3	5.9	3.0	1.1	0.9	5.6	62	4075.
1951	0.8	0.9	0.9	32.8	12.9	6.3	5.8	3.1	3.9	2.4	1.1	0.9	6.0	66	4332.
1952	0.8	1.0	1.1	25.7	8.8	6.3	4.6	4.8	4.9	4.9	1.3	0.9	5.4	59	3917.
1953	0.8	0.9	0.9	37.6	16.0	7.3	1.6	3.7	4.4	3.5	1.5	1.0	6.6	72	4768.
1954	0.8	1.1	1.0	70.6	37.4	17.0	4.6	4.6	3.5	4.0	1.3	1.2	12.2	134	8865.
1955	0.9	0.9	0.9	134.8	119.6	59.9	7.3	6.1	5.3	4.5	1.3	0.9	28.5	313	20648.
1956	0.8	0.9	0.9	136.1	115.8	54.9	7.6	5.1	7.0	3.8	1.2	0.9	27.8	305	20202.
1957	0.8	0.9	0.9	61.8	34.2	17.0	7.8	4.0	6.6	4.1	1.3	0.9	11.7	128	8455.
1958	1.0	0.9	1.0	20.0	7.0	6.9	6.7	6.4	6.1	4.4	1.2	0.9	5.2	57	3779.
1959	0.8	1.0	1.5	16.5	5.0	1.4	6.9	5.6	3.1	2.0	1.0	0.9	3.8	42	2764.
1960	0.8	0.9	0.9	42.0	17.4	11.0	8.4	8.0	7.8	5.1	1.4	0.9	8.7	95	6313.
1961	0.8	0.9	0.9	19.4	3.1	7.4	9.4	11.4	8.3	4.3	1.2	0.9	5.7	62	4117.
1962	0.8	0.9	0.9	19.9	2.6	3.9	7.0	5.4	6.4	3.8	1.2	0.9	4.5	49	3244.
1963	0.8	0.9	0.9	17.5	16.5	2.4	2.7	5.1	5.7	5.6	1.4	0.9	5.1	56	3667.
1964	0.8	0.9	0.9	22.9	11.2	6.9	5.4	3.4	6.2	5.1	1.3	0.9	5.5	60	3988.
1965	0.8	0.9	0.9	22.0	12.5	16.4	8.0	7.3	3.9	5.6	1.4	0.9	6.7	74	4870.
1966	0.8	0.9	0.9	39.1	17.2	5.7	6.4	6.0	8.4	5.6	1.3	0.9	7.8	85	5626.
1967	0.8	0.9	0.9	28.7	26.9	8.8	8.9	10.3	8.3	4.1	1.2	0.9	8.4	93	6104.
1968	0.8	1.2	1.6	21.4	2.8	5.3	4.8	6.6	7.3	3.9	1.7	1.0	4.8	53	3511.
1969	0.8	0.9	0.9	48.0	7.2	5.5	5.0	6.3	5.4	3.4	1.6	1.0	7.1	78	5164.
1970	0.8	0.9	0.9	45.1	40.9	8.3	3.5	8.9	5.4	1.9	1.0	0.9	9.9	109	7163.
1971	0.8	0.9	0.9	41.1	9.7	4.0	4.5	7.7	7.0	4.0	1.2	0.9	6.9	76	4991.
1972	0.8	0.9	0.9	53.8	8.7	7.0	5.4	7.3	7.1	4.9	1.3	0.9	8.2	90	5955.
1973	1.2	1.0	1.1	15.8	2.5	2.1	5.7	3.6	5.7	4.8	1.3	0.9	3.8	42	2761.
1974	0.8	0.9	0.9	49.5	58.8	25.2	8.0	2.2	4.7	5.0	2.0	1.0	13.3	146	9611.
1975	0.8	0.9	0.9	54.8	61.3	25.2	9.5	4.7	4.6	4.8	1.9	1.0	14.2	156	10301.
1976	0.8	0.9	0.9	93.1	24.1	46.5	18.0	8.7	9.0	6.1	2.7	1.1	17.5	192	12726.
1977	1.0	1.0	0.9	19.2	2.8	8.4	7.2	7.1	1.9	4.9	1.4	0.0	4.7	51	3369.
MIN	0.8	0.9	0.9	15.8	2.3	1.1	1.2	1.3	1.3	1.1	1.0	0.0	3.2	35	2302.
MAX	1.2	1.2	1.6	136.1	132.3	120.2	18.0	11.4	9.0	6.1	2.7	1.2	34.6	380	25059.
MEAN	0.9	0.9	1.0	44.9	25.6	14.4	5.5	5.4	5.0	3.7	1.3	0.9	9.1	99	6603.

APPENDIX B
RECORDED AND NATURAL STREAMFLOW ARRAYS

Table B-1

ASSINIBOINE RIVER NEAR KAMSACK - 05MD004

RECORDED FLOW - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	VOLUME-A.F.
1912	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1913	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1914	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1915	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1916	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1917	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1918	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1919	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1920	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1921	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1922	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1923	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1924	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1925	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1926	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1927	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1928	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1929	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1930	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1931	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1932	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1934	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1935	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1936	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1937	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1938	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1939	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1940	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1941	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1943	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1944	-	-	-	90.4	49.2	34.0	16.7	4.1	4.9	5.9	-	-	-	-	-
1945	-	-	-	227.0	143.0	83.6	45.9	9.6	10.9	20.0	-	-	-	-	-
1946	-	-	-	486.0	111.0	41.0	22.0	9.5	8.4	13.5	-	-	-	-	-
1947	-	-	-	763.0	641.0	174.0	170.0	34.0	29.4	39.7	-	-	-	-	-
1948	-	-	-	-	2600.0	195.0	86.3	35.4	9.1	14.4	-	-	-	-	-
1949	-	-	-	-	57.6	185.0	49.5	16.7	4.8	6.2	-	-	-	-	-
1950	-	-	-	499.0	338.0	83.2	35.4	79.4	19.2	11.5	-	-	-	-	-
1951	-	-	-	722.0	1130.0	229.0	108.0	43.8	114.0	278.0	-	-	-	-	-
1952	-	-	-	1320.0	430.0	122.0	43.5	11.3	7.0	8.7	-	-	-	-	-
1953	-	-	-	583.0	572.0	746.0	2220.0	1100.0	448.0	184.0	157.0	-	-	-	-
1954	-	-	-	1100.0	2250.0	4160.0	1370.0	334.0	430.0	478.0	276.0	-	-	-	-
1955	-	-	-	3240.0	4650.0	1130.0	448.0	170.0	82.0	80.4	-	-	-	-	-
1956	-	-	-	1500.0	4410.0	1040.0	384.0	111.0	81.1	62.6	66.7	34.0	-	-	-
1957	15.2	13.3	14.2	1440.0	1600.0	193.0	63.2	38.9	38.7	5.2	8.2	11.8	287.6	148	208210.
1958	5.6	10.5	10.9	300.0	88.7	23.8	3.6	1.0	1.1	2.9	13.2	2.3	38.4	20	27773.
1959	1.8	1.0	38.6	199.0	56.4	16.8	19.8	5.4	7.5	21.9	18.7	7.0	32.8	17	23734.
1960	6.2	7.1	4.6	1900.0	682.0	330.0	130.0	5.7	1.1	0.7	6.0	7.7	254.8	131	184984.
1961	5.9	2.9	7.7	22.1	25.4	12.7	0.0	0.0	0.0	0.0	0.0	0.0	6.4	3	4630.
1962	0.0	0.0	0.2	704.0	253.0	42.5	8.8	0.1	1.9	1.7	2.9	0.0	84.2	43	60926.
1963	0.0	0.0	32.3	228.0	52.1	40.6	19.1	2.6	0.0	1.0	1.0	1.0	31.3	16	22689.
1964	1.0	1.0	1.0	176.0	188.0	28.7	10.7	12.3	26.8	24.9	25.5	9.8	42.1	22	30581.
1965	7.8	6.8	5.8	751.0	316.0	688.0	197.0	42.7	48.3	116.0	56.6	22.7	187.5	96	135779.
1966	20.2	13.4	28.6	1950.0	842.0	322.0	220.0	169.0	56.1	16.7	29.2	25.6	307.1	158	222306.
1967	17.8	14.1	9.5	423.0	1490.0	205.0	20.1	3.8	0.3	16.6	5.7	6.5	186.0	96	134693.
1968	5.2	6.1	60.4	298.0	47.4	26.6	13.2	11.7	11.1	2.6	5.3	5.0	40.8	21	29588.
1969	4.5	2.7	4.6	934.0	175.0	43.7	22.2	19.2	4.2	21.9	12.2	4.6	103.3	53	74798.
1970	2.7	2.5	2.6	739.0	973.0	218.0	131.0	27.2	1.5	33.3	69.8	27.3	186.4	96	134934.
1971	13.7	11.3	10.2	2410.0	637.0	225.0	110.0	63.9	5.5	19.7	32.4	33.3	296.0	152	214264.
1972	21.5	11.6	26.6	2270.0	2130.0	134.0	28.0	8.0	0.3	2.3	9.4	5.2	386.9	199	280893.
1973	3.0	3.1	24.7	181.0	196.0	297.0	261.0	38.2	7.6	5.9	14.1	20.1	87.9	45	63657.
1974	12.5	12.4	11.9	1680.0	2420.0	1060.0	75.7	41.2	56.9	63.7	59.8	53.7	463.3	238	335381.
1975	28.7	25.5	20.6	1590.0	3160.0	688.0	235.0	52.1	47.9	47.8	60.4	29.4	501.6	258	363142.
1976	15.3	14.2	30.8	3510.0	927.0	726.0	703.0	111.0	17.1	14.2	24.5	23.2	506.3	260	367536.
1977	14.4	13.6	17.4	351.0	153.0	25.1	5.5	4.1	5.2	12.5	16.3	15.4	52.6	27	38083.
MIN	0.0	0.0	0.2	22.1	25.4	12.7	0.0	0.0	0.0	0.0	0.0	0.0	6.4	3	4630.
MAX	28.7	25.5	60.4	3510.0	4650.0	4160.0	2220.0	1100.0	448.0	478.0	276.0	53.7	506.3	260	367536.
MEAN	9.7	8.2	17.3	1018.3	993.9	399.1	214.0	77.0	46.7	48.1	40.5	15.7	194.5	99	140884.

Table B-2

ASSINIBOINE RIVER NEAR RUSSELL - 05ME001

RECORDED FLOW - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	VOLUME-A.F.
1912	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1913	-	54.8	99.9	4810.0	4510.0	1850.0	3410.0	2550.0	1060.0	597.0	506.0	212.0	-	-	-
1914	101.0	95.9	91.0	1740.0	3650.0	1180.0	362.0	126.0	118.0	144.0	131.0	73.9	654.1	117	473534.
1915	45.0	63.0	65.0	590.0	247.0	257.0	370.0	149.0	119.0	139.0	130.0	75.0	187.5	33	135737.
1916	50.0	50.0	45.0	1440.0	841.0	1820.0	931.0	392.0	267.0	349.0	331.0	112.0	550.6	98	399689.
1917	46.2	37.8	51.8	888.0	3960.0	1100.0	1500.0	383.0	275.0	172.0	182.0	59.1	728.1	130	527094.
1918	54.8	49.6	148.0	1080.0	451.0	476.0	538.0	346.0	234.0	222.0	196.0	109.0	325.8	58	235838.
1919	83.9	75.8	69.9	969.0	705.0	401.0	989.0	289.0	268.0	299.0	172.0	94.7	369.5	66	267507.
1920	93.7	93.8	98.5	1270.0	5380.0	1300.0	431.0	196.0	167.0	184.0	252.0	131.0	804.2	144	583796.
1921	85.7	76.9	97.3	3060.0	3230.0	2680.0	3160.0	1260.0	1050.0	1460.0	1500.0	525.0	1521.1	272	1101245.
1922	288.0	184.0	193.0	6540.0	11400.0	3360.0	859.0	444.0	351.0	217.0	323.0	172.0	2036.0	364	1473986.
1923	128.0	132.0	127.0	2070.0	6610.0	2070.0	2040.0	850.0	328.0	314.0	237.0	148.0	1264.6	226	915517.
1924	89.1	81.1	97.6	770.0	915.0	580.0	338.0	484.0	290.0	324.0	227.0	144.0	362.0	65	262819.
1925	106.0	86.2	125.0	3850.0	1170.0	1090.0	741.0	274.0	182.0	207.0	146.0	92.8	670.3	120	485243.
1926	60.2	63.3	127.0	1820.0	839.0	514.0	216.0	115.0	238.0	389.0	343.0	140.0	404.6	72	292948.
1927	110.0	89.8	92.4	4200.0	4740.0	1760.0	1200.0	649.0	655.0	719.0	416.0	184.0	1238.3	221	896471.
1928	131.0	105.0	835.0	3080.0	1660.0	1080.0	1270.0	376.0	173.0	160.0	106.0	88.0	755.0	135	548102.
1929	77.8	67.5	80.3	1070.0	818.0	428.0	236.0	129.0	114.0	136.0	141.0	111.0	284.1	51	205708.
1930	72.1	57.4	98.6	952.0	506.0	372.0	237.0	118.0	101.0	119.0	115.0	76.0	235.2	42	170251.
1931	69.5	59.1	93.0	866.0	244.0	170.0	128.0	99.7	95.7	108.0	73.7	32.5	169.4	30	122643.
1932	23.0	38.1	46.6	895.0	348.0	199.0	269.0	143.0	118.0	-	-	-	-	-	-
1933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1934	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1935	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1936	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1937	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1938	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1939	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1940	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1941	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1942	-	-	-	-	-	-	245.0	234.0	217.0	-	-	-	-	-	-
1943	-	-	-	-	792.0	610.0	294.0	139.0	93.2	100.0	-	-	-	-	-
1944	-	-	-	-	236.0	174.0	114.0	54.3	83.0	84.8	-	-	-	-	-
1945	-	-	-	676.0	592.0	317.0	294.0	124.0	113.0	-	-	-	-	-	-
1946	-	-	-	1400.0	436.0	193.0	250.0	74.0	69.9	125.0	-	-	-	-	-
1947	-	-	-	-	1810.0	993.0	1240.0	265.0	259.0	264.0	-	-	-	-	-
1948	-	-	-	-	5560.0	664.0	651.0	463.0	156.0	115.0	-	-	-	-	-
1949	-	-	-	-	244.0	492.0	221.0	167.0	86.7	95.6	-	-	-	-	-
1950	-	-	-	-	1020.0	424.0	306.0	256.0	109.0	144.0	138.0	75.7	-	-	-
1951	53.1	57.9	56.7	1280.0	2020.0	518.0	334.0	232.0	349.0	472.0	358.0	141.0	491.4	88	355723.
1952	67.8	59.7	69.7	1940.0	769.0	317.0	168.0	98.0	121.0	126.0	86.5	64.3	322.2	58	233877.
1953	53.7	61.4	94.0	1220.0	992.0	1190.0	2700.0	1580.0	735.0	451.0	439.0	207.0	815.5	146	590376.
1954	135.0	109.0	110.0	1380.0	2990.0	4540.0	3280.0	595.0	692.0	841.0	794.0	311.0	1318.8	236	954752.
1955	129.0	118.0	115.0	4040.0	6060.0	2360.0	776.0	346.0	145.0	163.0	160.0	103.0	1213.4	217	878491.
1956	111.0	52.2	97.6	988.0	6610.0	2150.0	885.0	374.0	258.0	216.0	268.0	141.0	1018.9	182	739649.
1957	109.0	159.0	186.0	1690.0	3330.0	504.0	241.0	135.0	100.0	109.0	99.4	76.6	564.5	101	408671.
1958	65.3	64.9	88.5	593.0	231.0	117.0	77.1	46.9	79.9	85.3	108.0	55.3	133.9	24	96963.
1959	51.0	38.8	107.0	831.0	366.0	248.0	256.0	82.5	88.1	139.0	162.0	121.0	207.6	37	150262.
1960	87.7	62.7	99.5	2210.0	1680.0	776.0	274.0	63.6	39.9	62.1	60.2	45.3	453.8	81	329413.
1961	43.0	38.0	75.4	171.0	171.0	83.2	33.8	12.4	20.5	55.1	53.3	50.2	67.3	12	48738.
1962	34.1	20.7	79.4	987.0	728.0	149.0	68.2	58.7	67.7	62.5	76.8	74.4	200.7	36	145307.
1963	34.2	32.3	125.0	585.0	255.0	193.0	170.0	60.3	53.5	85.3	62.2	52.4	142.4	25	103068.
1964	60.1	63.2	88.3	423.0	422.0	131.0	58.6	52.3	37.7	74.3	81.8	51.9	128.6	23	93363.
1965	47.6	44.9	49.7	1250.0	823.0	1040.0	344.0	162.0	126.0	168.0	108.0	81.0	353.2	63	255692.
1966	101.0	72.2	104.0	2390.0	1860.0	637.0	594.0	264.0	121.0	86.5	106.0	81.1	535.5	96	387670.
1967	82.0	60.2	82.2	441.0	2020.0	499.0	135.0	63.8	18.0	43.1	61.5	52.1	298.9	53	216386.
1968	45.4	52.6	204.0	819.0	192.0	127.0	82.2	60.1	8.2	8.3	13.0	19.4	135.2	24	98171.
1969	21.8	26.7	32.4	498.0	592.0	71.4	70.7	74.0	65.1	62.9	136.0	157.0	151.2	27	109482.
1970	147.0	130.0	135.0	771.0	1710.0	554.0	362.0	142.0	91.1	64.6	93.6	134.0	362.9	65	262738.
1971	127.0	127.0	133.0	204.0	582.0	228.0	452.0	277.0	61.1	159.0	414.0	451.0	269.5	48	195134.
1972	444.0	476.0	473.0	486.0	2760.0	1650.0	103.0	79.8	129.0	185.0	478.0	529.0	649.9	116	471832.
1973	444.0	330.0	198.0	61.7	54.0	49.2	45.9	56.5	154.0	224.0	345.0	335.0	190.7	34	138082.
1974	316.0	314.0	721.0	923.0	2140.0	1960.0	1700.0	491.0	212.0	213.0	410.0	489.0	827.7	148	599230.
1975	474.0	471.0	461.0	346.0	1980.0	1420.0	1400.0	978.0	276.0	242.0	660.0	661.0	784.4	140	567915.
1976	651.0	531.0	252.0	1400.0	1830.0	1620.0	1530.0	776.0	266.0	260.0	331.0	301.0	812.9	145	590100.
1977	267.0	181.0	143.0	60.1	56.1	84.5	140.0	204.0	139.0	128.0	436.0	420.0	188.4	34	136378.
MIN	21.8	20.7	32.4	60.1	54.0	49.2	33.8	12.4	8.2	8.3	13.0	19.4	67.3	12	48738.
MAX	651.0	531.0	835.0	6540.0	11400.0	4540.0	3410.0	2550.0	1060.0	1460.0	1500.0	661.0	2036.0	364	1473986.
MEAN	128.6	113.3	150.3	1469.9	1929.8	904.9	698.6	330.6	211.5	225.9	256.7	167.2	560.0	100.	405679.

Table B-3

SHELL RIVER NEAR INGLIS - 05MD005

RECORDED FLOW - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	ACRE-FEET
1912	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1913	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1914	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1915	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1916	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1917	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1918	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1919	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1920	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1921	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1922	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1923	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1924	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1925	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1926	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1927	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1928	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1929	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1930	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1931	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1932	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1933	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1934	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1935	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1936	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1937	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1938	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1939	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1940	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1941	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1943	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1944	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1945	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1946	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1947	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1948	-	-	-	-	1040.0	218.0	406.0	296.0	99.3	73.2	-	-	-	-	-
1949	-	-	-	183.0	105.0	166.0	86.1	82.6	44.1	40.7	45.3	-	-	-	-
1950	-	-	-	-	348.0	234.0	202.0	122.0	45.5	78.5	-	-	-	-	-
1951	-	-	-	325.0	625.0	154.0	132.0	98.6	177.0	200.0	-	-	-	-	-
1952	-	-	-	363.0	199.0	129.0	67.9	40.4	63.9	71.1	-	-	-	-	-
1953	-	-	-	230.0	319.0	372.0	687.0	186.0	195.0	160.0	189.0	-	-	-	-
1954	-	-	-	241.0	530.0	1070.0	494.0	114.0	185.0	238.0	151.0	-	-	-	-
1955	-	-	-	593.0	618.0	267.0	153.0	50.5	37.1	51.5	-	-	-	-	-
1956	-	-	-	169.0	508.0	230.0	252.0	97.2	87.2	68.8	62.3	46.9	-	-	-
1957	47.5	37.8	32.8	323.0	532.0	138.0	73.6	49.5	41.3	46.3	47.8	31.3	117.2	117	84822.
1958	14.8	13.0	26.4	142.0	77.9	55.9	35.7	20.0	41.6	56.0	63.2	24.2	47.5	47	34413.
1959	23.8	15.8	53.2	194.0	213.0	155.0	185.0	38.6	49.6	94.6	87.2	60.7	98.0	98	70914.
1960	31.9	36.5	38.4	374.0	305.0	339.0	71.8	23.0	12.1	18.7	36.1	19.9	108.4	108	78673.
1961	25.7	19.1	17.8	52.4	48.6	27.9	14.4	5.1	4.3	11.4	29.3	24.2	23.3	23	16889.
1962	29.0	35.8	36.4	82.4	86.5	46.9	11.3	13.6	16.8	29.9	31.6	-	-	-	-
1963	-	-	-	-	-	-	52.1	24.8	22.5	30.0	28.2	22.0	-	-	-
1964	19.9	19.6	19.6	175.0	144.0	45.1	21.6	17.7	16.6	26.0	19.6	0.5	43.7	44	31708.
1965	0.0	0.0	0.0	201.0	323.0	218.0	72.8	58.0	56.6	113.0	50.4	30.9	94.0	94	68050.
1966	33.5	34.3	37.7	308.0	429.0	267.0	219.0	48.9	20.3	28.5	31.4	27.9	124.2	124	89893.
1967	27.5	24.1	25.3	65.9	325.0	184.0	53.6	22.2	10.0	20.6	28.4	24.2	67.9	68	49139.
1968	23.3	24.5	48.7	161.0	79.1	44.4	35.9	38.2	32.0	32.2	33.4	23.1	47.9	48	34770.
1969	28.2	32.7	37.1	178.0	111.0	57.2	74.4	73.4	33.2	78.1	57.1	35.1	66.4	66	48073.
1970	27.7	28.7	28.5	252.0	659.0	131.0	97.7	126.0	22.0	45.4	230.0	62.5	143.3	143	103744.
1971	41.9	38.2	33.1	545.0	280.0	151.0	98.2	66.6	20.8	46.6	51.5	39.1	117.5	117	85069.
1972	40.9	37.5	38.9	398.0	566.0	122.0	94.9	35.4	23.1	31.5	32.3	20.4	120.3	120	87307.
1973	10.3	9.8	26.8	165.0	80.9	117.0	138.0	35.5	59.6	61.7	52.1	43.0	66.8	67	48332.
1974	30.8	28.1	31.9	545.0	833.0	360.0	95.6	49.3	64.8	101.0	62.2	39.6	187.3	187	135598.
1975	38.7	36.7	38.7	268.0	627.0	368.0	123.0	49.9	63.5	106.0	98.1	40.8	155.3	155	112468.
1976	37.6	44.6	39.2	650.0	251.0	872.0	330.0	67.1	33.0	35.8	29.1	17.6	199.3	199	144681.
1977	12.9	17.6	18.5	178.0	114.0	58.6	73.2	52.9	120.0	150.0	81.2	47.6	77.2	77	55872.
MIN	0.0	0.0	0.0	52.4	48.6	27.9	11.3	5.1	4.3	11.4	19.6	0.5	23.3	23	16889.
MAX	47.5	44.6	53.2	650.0	1040.0	1070.0	687.0	296.0	195.0	238.0	230.0	62.5	199.3	199	144681.
MEAN	27.3	26.8	31.4	272.7	357.8	227.5	148.4	66.8	56.6	71.5	65.1	32.5	100.3	100	72653.

ASSINIBOINE RIVER NEAR KAMSACK - 05MD004

SUMMARY OF REGRESSION RESULTS

Priority No. 1

	INTERCEPT	INDEPENDENT VARIABLES			ADJUSTED COEFFICIENT OF CORRELATION	ADJUSTED STANDARD ERROR OF ESTIMATE
		05ME001	05MH001	05MJ001		
Jan.	- 1.815096		1.169209		0.8212	0.259902
Feb.	- 1.671297		1.094092		0.8175	0.254777
Mar.	- 2.867615	0.831391	0.917767		0.7066	0.350639
Apr.	-226.27	0.774403	-0.114750	0.088683	0.9522	309.83
May	- 1.314740	1.314373			0.9775	0.136474
June	- 85.22	1.049657	-0.124733		0.9825	143.70
July	- 79.62	0.890677	-0.257562	0.114030	0.9557	136.26
Aug.	- 36.76	0.724384		-0.019300	0.9597	55.83
Sept.	- 31.65	0.581591			0.9370	36.55
Oct.	- 37.06	0.569119			0.9500	30.51
Nov.	- 12.77	0.359894			0.9702	15.13
Dec.	- 1.615054		1.121999		0.7856	0.321459

Priority No. 2

			05MH001	05MJ001		
Jan.						
Feb.						
Mar.	- 1.666069		1.112234		0.6563	0.363926
Apr.	40.63		0.272105		0.8434	510.37
May	- 1.471502		1.999010	-0.750750	0.9583	0.188931
June	67.95		0.541743	-0.231393	0.6883	558.94
July	- 19.17		0.136687		0.6261	349.36
Aug.	- 51.00		0.169070		0.6867	142.18
Sept.	- 18.13		0.134355		0.6428	80.15
Oct.	15.71		0.379733	-0.179671	0.8387	53.29
Nov.	- 15.14		0.124438		0.8335	34.50
Dec.						

Priority No. 3

			05MH001			
Jan.						
Feb.						
Mar.						
Apr.						
May	- 2.077209		1.372615		0.9475	0.208067
June	- 79.03		0.206159		0.6311	588.29
July						
Aug.						
Sept.						
Oct.	- 22.40		0.135181		0.7493	63.78
Nov.						
Dec.						

Table B-4

ASSINIBOINE RIVER NEAR KAMSACK - 05MD004

NATURAL FLOW - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	VOLUME-A.F.
1912	8.0	7.0	9.0	993.3	1409.7	867.3	273.4	236.5	398.4	461.6	213.9	57.6	411.3	144	298552.
1913	16.9	10.0	9.9	3290.2	3078.0	1420.4	2340.0	1733.4	585.1	302.9	169.4	21.3	1087.2	380	787062.
1914	7.5	7.0	14.1	1081.1	2330.8	854.4	185.1	43.9	37.3	45.1	34.5	7.9	389.3	136	281807.
1915	2.0	1.9	2.7	225.4	67.8	127.3	181.1	61.1	37.8	42.3	34.1	4.3	65.7	23	47587.
1916	3.3	2.4	2.2	1058.0	338.7	1408.8	381.2	219.2	123.8	161.8	106.5	9.3	315.8	110	229231.
1917	6.3	4.8	3.7	465.2	2594.4	751.6	990.2	218.6	128.6	61.1	52.9	7.2	445.0	156	322141.
1918	2.6	3.0	12.7	639.1	149.6	302.7	333.3	202.1	104.8	89.5	57.9	6.4	158.6	55	114833.
1919	4.1	3.3	2.9	546.3	268.9	259.7	664.5	161.0	124.5	133.3	49.2	6.4	186.2	65	134794.
1920	5.4	5.2	8.5	800.7	3881.4	971.6	263.9	90.3	65.8	67.8	78.0	11.0	524.1	183	380451.
1921	5.4	4.0	6.3	2081.8	1985.3	2334.0	2257.3	835.7	579.2	794.0	527.2	48.2	958.0	335	693570.
1922	18.3	9.2	24.5	4826.4	10413.5	2435.5	443.1	253.1	172.8	86.7	103.6	19.3	1576.5	551	1141330.
1923	10.1	7.8	10.5	1353.8	5087.7	1549.0	1174.8	507.9	159.4	141.9	72.6	29.9	849.6	297	615096.
1924	12.8	10.7	12.1	381.8	378.8	301.9	119.1	291.8	137.4	147.6	69.0	16.9	156.7	55	113784.
1925	8.2	6.2	33.9	2654.4	523.2	679.0	394.4	139.9	74.6	81.1	40.0	10.8	385.1	135	278777.
1926	4.5	3.4	10.6	1144.4	338.2	335.9	86.4	36.9	107.2	184.6	110.9	17.2	197.5	69	142965.
1927	8.0	5.7	9.3	3174.8	3286.8	1068.0	835.4	379.6	349.7	372.5	137.2	20.2	806.3	282	583766.
1928	12.7	9.0	149.0	2342.2	828.2	686.1	846.7	184.9	69.5	54.4	25.6	7.8	433.2	151	314502.
1929	4.7	5.0	7.6	614.1	327.1	240.9	108.9	49.9	35.2	40.8	38.2	7.3	123.1	43	89116.
1930	3.3	2.7	6.1	715.7	174.2	211.7	104.4	40.4	27.6	31.1	28.9	3.6	111.9	39	81027.
1931	2.7	2.6	6.9	487.2	67.1	61.5	26.2	31.2	24.5	24.9	14.0	2.9	62.2	22	45042.
1932	1.6	1.9	1.9	572.0	106.7	77.6	124.6	61.6	37.5	39.3	8.6	5.8	86.1	30	62508.
1933	3.6	3.2	4.1	779.7	184.9	491.3	101.4	0.0	4.8	47.1	9.8	6.7	135.5	47	98063.
1934	3.6	4.0	26.6	777.0	271.3	185.8	24.2	0.0	0.0	22.7	3.5	3.9	109.6	38	79375.
1935	2.5	2.8	5.3	387.9	96.7	318.9	441.6	76.5	37.3	51.5	13.3	7.1	120.3	42	87109.
1936	5.0	3.2	3.1	1484.5	885.2	344.4	77.1	0.0	2.3	15.7	1.9	4.1	234.4	82	170131.
1937	2.2	1.9	3.0	242.0	84.5	158.0	6.5	0.0	0.0	10.4	0.0	1.1	42.2	15	30536.
1938	1.5	2.0	33.5	583.8	129.1	159.4	19.9	0.0	0.0	25.9	0.0	3.4	79.4	28	57449.
1939	2.4	2.0	12.7	344.4	66.1	108.6	32.2	0.0	0.0	20.8	2.0	4.3	49.3	17	35696.
1940	0.8	0.7	1.2	118.1	32.1	82.5	0.1	0.0	0.0	15.6	0.0	2.8	20.9	7	15206.
1941	2.3	2.4	2.7	442.4	75.0	47.0	0.0	0.0	0.3	0.0	0.4	3.4	47.5	17	34420.
1942	1.1	0.6	17.3	1120.1	129.0	297.2	93.3	119.9	95.1	68.1	14.2	3.6	162.2	57	117460.
1943	3.7	2.0	4.7	1403.4	318.1	200.2	139.6	40.2	23.3	20.4	14.9	6.4	180.4	63	130597.
1944	1.4	1.7	2.3	97.6	50.1	34.9	17.8	4.8	5.7	6.5	14.2	4.6	20.0	7	14549.
1945	1.2	2.3	15.0	234.4	143.9	84.0	46.7	10.8	11.4	20.8	14.4	4.1	49.1	17	35527.
1946	2.0	2.2	30.0	493.5	112.2	41.9	22.5	10.6	9.2	14.3	44.7	7.0	65.5	23	47398.
1947	2.5	2.7	3.6	806.8	664.4	184.5	171.6	34.9	30.3	40.6	34.7	14.6	166.2	58	120326.
1948	9.6	7.2	7.3	792.7	2629.7	208.7	87.6	36.5	10.4	15.4	25.0	10.0	322.4	113	234045.
1949	5.0	1.2	1.9	781.7	62.8	187.5	50.2	17.9	6.1	7.1	26.3	7.3	95.3	33	69019.
1950	3.6	3.4	7.6	518.9	346.5	87.4	36.1	80.6	20.4	12.2	37.2	11.5	97.1	34	70318.
1951	7.0	5.3	4.4	746.5	1141.4	234.3	109.5	44.7	115.0	278.7	116.3	12.6	235.8	82	170701.
1952	4.6	3.9	4.7	1336.7	436.3	125.3	44.8	12.3	7.9	9.6	18.7	6.1	166.2	58	120671.
1953	3.3	3.8	5.3	612.0	586.4	752.6	2220.9	1101.0	449.1	184.9	157.6	23.0	512.6	179	371137.
1954	12.5	9.2	14.4	1164.5	2285.7	4176.1	1371.9	335.2	431.0	479.1	276.6	62.8	885.2	309	640871.
1955	26.5	23.1	20.6	3370.0	4768.1	1185.7	452.1	171.4	83.3	81.5	45.1	34.3	858.5	300	621537.
1956	20.2	16.7	17.8	1630.3	4523.9	1093.1	388.1	112.3	82.7	63.6	67.3	34.5	673.9	236	489245.
1957	15.7	13.9	14.8	1494.9	1629.4	206.7	65.6	40.1	40.3	6.1	8.8	12.4	296.5	104	214646.
1958	6.2	11.1	12.1	312.6	92.1	26.1	5.0	2.1	2.2	3.8	13.9	2.9	40.6	14	29359.
1959	2.4	1.6	40.6	208.1	58.2	17.6	21.5	6.6	8.4	22.6	19.4	7.6	34.5	12	24984.
1960	6.8	7.7	5.2	1935.3	697.9	337.7	132.3	7.1	2.5	1.6	6.7	8.3	260.5	91	189075.
1961	6.2	3.3	8.2	30.8	26.4	13.8	0.5	0.5	0.4	0.4	0.4	0.4	7.6	3	5505.
1962	0.3	0.3	0.5	717.9	254.5	43.6	9.7	0.8	2.7	2.2	3.3	0.3	85.9	30	62192.
1963	0.3	0.4	34.3	234.5	54.5	41.2	19.9	3.4	0.5	2.0	1.4	1.4	32.7	11	23652.
1964	1.3	1.4	1.4	188.8	197.7	30.7	11.6	13.0	27.8	25.7	25.9	10.2	44.6	16	32380.
1965	8.2	7.2	6.2	945.6	339.7	704.0	204.2	49.5	51.5	121.2	57.4	23.1	209.0	73	151280.
1966	20.6	13.8	29.0	1979.1	857.5	326.9	225.9	174.4	64.0	21.7	30.0	26.0	313.4	110	226905.
1967	18.2	14.6	10.0	442.8	1515.8	213.0	28.6	13.4	7.9	20.1	6.4	7.0	193.2	68	139859.
1968	5.7	6.9	62.1	310.6	48.8	31.5	17.5	17.9	18.0	5.9	6.5	5.6	44.4	16	32256.
1969	5.0	3.3	5.2	974.1	180.3	48.9	26.8	25.1	9.2	24.9	13.4	5.2	109.3	38	79160.
1970	3.2	3.0	3.1	775.8	1012.7	225.2	134.0	35.8	6.1	35.0	70.4	27.9	195.1	68	141255.
1971	14.2	11.8	10.7	2457.4	646.0	228.5	114.1	71.2	11.7	23.6	33.1	33.8	302.9	106	219311.
1972	22.0	12.2	27.2	2316.4	2136.7	140.7	32.9	14.5	6.6	6.5	10.2	5.8	394.0	138	285991.
1973	3.9	3.7	25.4	188.6	197.3	298.7	266.4	41.3	13.0	10.3	14.9	20.7	90.6	32	65611.
1974	13.1	13.0	12.5	1725.0	2478.2	1084.1	83.1	43.0	61.4	68.4	61.4	54.4	475.8	166	344446.
1975	29.3	26.2	21.3	1640.5	3220.7	712.2	244.0	56.5	52.2	52.3	62.0	30.1	515.1	180	372930.
1976	15.9	14.8	31.5	3600.0	948.9	772.9	720.0	119.3	25.8	20.0	26.9	24.0	523.1	183	379765.
1977	15.1	14.3	18.1	370.0	155.1	33.4	12.4	11.0	6.7	17.3	17.4	15.4	57.0	20	41264.
MIN	0.3	0.3	0.5	30.8	26.4	13.8	0.0	0.0	0.0	0.0	0.0	0.3	7.6	3	5505.
MAX	29.3	26.2	149.0	4826.4	10413.5	4176.1	2340.0	1733.4	585.1	794.0	527.2	62.8	1576.5	551	1141330.
MEAN	7.4	6.1	14.7	1099.5	1127.4	504.1	310.1	132.4	79.2	81.3	51.5	14.0	286.1	100	207290.

NOTE: Shaded area denotes natural flow data derived by regression analysis.

ASSINIBOINE RIVER NEAR RUSSELL - 05ME001

SUMMARY OF REGRESSION RESULTS

Priority No. 1

	INTERCEPT	INDEPENDENT VARIABLES		ADJUSTED COEFFICIENT OF CORRELATION	ADJUSTED STANDARD ERROR OF ESTIMATE
		05MH001	05MJ001		
Jan.	37.49		0.119650	0.5855	37.62
Feb.	40.17	0.060089	0.064650	0.5311	30.81
Mar.	0.971230	0.431828		0.5462	0.182987
Apr.	0.637030	1.407526	-0.648441	0.8433	0.182218
May	0.113764	1.643117	-0.742948	0.9644	0.130758
June	0.348841	1.806388	-0.984998	0.9147	0.178013
July	0.742702	1.816239	-1.130420	0.8885	0.213361
Aug.	0.709136	1.641765	-0.969954	0.8750	0.211216
Sept.	- 0.241593	0.908008		0.6733	0.373663
Oct.	126.43	1.038130	-0.525620	0.8564	127.09
Nov.	32.13	1.010923	-0.427114	0.8761	117.87
Dec.	40.88	0.614574	-0.225424	0.8171	55.34

Priority No. 2

		05MH001	05MJ001		
Jan.	38.74	0.189920		0.5770	37.90
Feb.	44.07	0.144576		0.5350	30.37
Mar.	0.920842		0.405045	0.4794	0.191706
Apr.	0.037580	0.899747		0.8231	0.190499
May	- 0.485492	1.027655		0.9484	0.155347
June	- 0.166937	0.910910		0.8889	0.199891
July	- 0.112284	0.881935		0.8483	0.243868
Aug.	- 0.096374	0.860929		0.8356	0.237419
Sept.	- 0.085513		0.756631	0.4449	0.452590
Oct.	22.04	0.355683		0.7339	165.55
Nov.	- 26.40	0.497596		0.8258	137.07
Dec.	23.10	0.318085		0.7751	59.98

Table B-5

ASSINIBOINE RIVER NEAR RUSSELL - 05ME001

NATURAL FLOW - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	VOLUME-A.F.
1912	60.0	70.0	80.0	1684.5	2675.3	1474.6	668.3	484.0	848.5	1295.5	889.3	347.6	882.2	172	640402.
1913	97.4	55.0	100.1	4811.3	4510.5	1850.3	3410.2	2550.3	1060.5	597.4	506.3	212.2	1655.4	323	1198443.
1914	101.2	96.2	91.2	1741.4	3650.4	1180.4	362.4	126.5	118.6	144.3	131.3	74.1	654.5	128	473849.
1915	45.2	63.2	65.3	591.4	247.5	257.3	370.3	149.6	119.4	139.4	130.3	75.3	187.9	37	136048.
1916	50.2	50.2	45.2	1441.4	841.4	1820.3	931.5	392.6	267.3	349.4	331.3	112.2	551.0	108	400000.
1917	46.4	38.1	52.1	889.3	3960.5	1100.3	1500.5	383.5	275.5	172.5	182.3	59.4	728.5	142	527428.
1918	55.0	49.9	148.3	1084.7	451.9	476.3	538.4	346.4	234.6	222.5	196.3	109.3	326.5	64	236379.
1919	84.2	76.1	70.2	973.7	705.9	401.3	989.6	289.6	268.5	299.4	172.3	95.0	370.3	72	268074.
1920	94.0	94.1	98.8	1274.8	5380.9	1300.3	431.6	196.6	167.6	184.3	252.3	131.3	805.0	157	584370.
1921	86.0	77.2	97.6	3064.8	3230.9	2680.3	3160.4	1260.5	1050.3	1460.3	1500.3	525.3	1521.9	297	1101778.
1922	288.3	184.3	193.3	6545.8	11401.0	3360.5	859.6	444.4	351.5	217.4	323.3	172.3	2036.9	397	1474629.
1923	128.3	132.3	127.3	2075.9	6611.1	2070.3	2040.4	850.6	328.5	314.5	237.3	148.3	1265.5	247	916156.
1924	89.4	81.4	97.9	775.8	916.1	580.4	338.5	484.5	290.6	324.4	227.3	144.3	362.9	71	263474.
1925	106.5	86.8	125.5	3856.1	1171.4	1090.6	741.8	274.9	182.8	207.6	146.6	93.3	671.4	131	486076.
1926	60.7	63.9	127.5	1826.1	840.4	514.8	216.7	115.8	238.8	389.6	343.5	140.5	405.8	79	293781.
1927	110.6	90.5	93.0	4207.0	4741.4	1760.7	1200.7	649.9	655.7	719.7	416.7	184.6	1239.5	242	897385.
1928	131.6	105.7	835.6	3087.1	1661.4	1080.7	1270.7	376.9	174.0	160.8	106.7	88.6	756.3	148	549048.
1929	78.4	68.2	80.9	1077.0	819.4	428.7	237.0	130.1	114.9	136.8	141.7	111.6	285.5	56	206684.
1930	72.7	58.1	99.2	959.0	507.4	372.7	237.7	118.9	101.9	119.8	115.7	76.6	236.5	46	171194.
1931	70.1	59.8	93.6	873.1	245.6	170.9	129.0	100.6	96.6	108.8	74.4	33.1	170.8	33	123624.
1932	23.6	38.8	47.2	902.0	349.5	199.7	269.9	143.7	118.9	181.1	109.0	79.5	204.8	40	148650.
1933	55.8	54.9	72.0	1291.3	571.0	797.5	392.7	85.2	61.1	203.7	114.0	77.7	314.1	61	227414.
1934	62.9	63.2	148.3	1376.1	782.7	295.1	178.0	44.9	40.9	136.1	78.6	67.8	272.7	53	197409.
1935	50.8	53.8	79.5	580.3	358.5	520.4	871.9	212.4	136.0	205.3	120.5	84.9	273.9	53	198317.
1936	63.6	58.3	64.2	2675.7	1856.4	584.0	319.7	121.2	54.9	114.4	59.7	75.2	502.7	98	364908.
1937	49.7	51.9	63.7	496.8	328.2	256.5	66.3	27.9	20.7	101.6	46.2	33.9	128.4	25	92960.
1938	48.9	52.5	162.2	1065.4	454.0	233.1	164.5	137.4	42.2	147.3	69.6	56.1	219.3	43	158802.
1939	55.0	53.0	111.2	532.4	267.8	150.8	279.5	94.5	40.9	132.4	71.1	65.9	154.9	30	112136.
1940	44.7	46.3	44.5	168.4	155.7	92.9	74.0	54.0	29.3	119.3	73.5	57.8	80.1	16	58144.
1941	50.1	53.5	60.6	698.5	285.6	118.2	41.2	31.2	50.0	12.3	52.9	47.8	124.6	24	90195.
1942	45.4	48.5	125.6	1579.9	410.9	499.6	246.2	234.7	217.9	245.1	83.9	54.0	315.1	61	228125.
1943	62.5	56.2	76.0	2102.3	802.3	614.8	295.5	140.1	94.5	101.0	82.4	69.2	373.5	73	270415.
1944	54.0	54.7	57.6	381.2	237.6	175.2	115.3	55.3	84.0	85.7	64.7	65.1	118.9	23	86337.
1945	49.4	55.8	118.9	685.2	593.6	317.7	295.0	125.5	113.8	157.0	133.4	47.9	224.9	44	162787.
1946	57.4	55.4	155.4	1409.3	437.9	194.1	250.8	75.3	71.0	126.0	256.7	73.4	262.9	51	190313.
1947	53.4	56.5	68.5	1718.9	1835.0	1004.4	1242.3	266.1	260.2	265.1	178.1	123.9	591.5	115	428257.
1948	88.4	73.8	89.9	1779.0	5591.6	678.8	653.2	464.3	157.5	116.3	126.8	74.9	830.2	162	602654.
1949	81.4	54.9	53.6	906.0	250.1	494.8	222.1	168.4	88.2	96.8	124.0	56.0	215.6	42	156108.
1950	61.7	58.5	91.4	956.0	1029.6	428.6	307.2	257.4	110.4	145.0	138.8	76.4	306.0	60	221517.
1951	53.8	58.7	57.4	1305.4	2032.6	523.8	336.0	233.1	350.2	473.0	358.8	141.7	495.7	97	358896.
1952	68.5	60.5	70.5	1958.1	776.3	320.6	169.6	99.2	122.2	127.2	87.3	65.1	325.3	63	236171.
1953	54.4	62.2	94.7	1249.7	1007.7	1197.2	2701.4	1581.2	736.3	452.2	439.8	207.7	820.6	160	594083.
1954	135.7	109.8	110.8	1443.2	3027.9	4557.4	3282.9	596.4	693.2	842.3	794.9	311.8	1329.5	259	962527.
1955	129.7	118.8	115.8	4165.0	6179.6	2419.5	783.0	347.6	146.5	164.3	160.8	103.8	1240.0	242	897755.
1956	111.7	53.0	98.4	1113.2	6725.7	2206.8	891.9	375.5	259.8	217.3	268.9	141.8	1044.9	204	758538.
1957	109.8	159.9	186.8	1744.2	3361.4	518.7	244.2	136.4	101.8	110.2	100.3	77.5	573.8	112	415424.
1958	66.1	65.8	89.9	607.3	235.3	119.6	78.7	48.3	81.2	86.4	108.9	56.2	136.6	27	98863.
1959	51.8	39.7	109.2	842.1	368.6	249.1	257.9	84.0	89.3	140.0	162.9	121.9	209.7	41	151826.
1960	88.5	63.6	100.4	2245.7	1697.4	784.3	276.8	65.3	41.5	63.3	61.1	46.2	459.8	90	333821.
1961	43.6	38.6	76.1	180.4	172.8	84.5	34.6	13.1	21.2	55.7	53.9	50.8	68.9	13	49856.
1962	34.7	21.3	80.0	1001.3	730.5	150.3	69.4	59.7	68.7	63.3	77.4	75.0	202.8	40	146814.
1963	34.8	32.9	127.2	592.4	257.9	193.9	171.0	61.3	54.2	86.5	62.9	53.0	144.0	28	104272.
1964	60.7	63.8	88.9	436.3	432.2	133.7	59.8	53.3	38.9	75.4	82.5	52.5	131.4	26	95404.
1965	48.2	45.6	50.4	1434.7	857.2	1056.0	352.0	169.0	129.7	173.3	109.3	81.7	374.9	73	271434.
1966	101.6	72.9	104.7	2418.6	1876.7	642.7	600.0	269.7	129.0	92.0	107.2	81.8	542.2	106	392504.
1967	82.7	60.9	82.9	460.8	2045.8	508.3	143.6	73.6	26.0	47.0	62.6	52.8	306.4	60	221788.
1968	46.1	53.6	205.9	832.1	194.4	131.9	86.8	66.5	15.3	12.0	14.5	20.2	139.2	27	101074.
1969	57.8	65.5	62.7	1505.4	386.3	109.0	127.4	149.2	52.6	115.8	110.0	65.6	233.0	45	168701.
1970	60.8	59.1	78.1	1359.5	1940.1	428.1	325.0	71.2	44.8	143.3	223.2	121.1	406.2	79	294057.
1971	90.7	67.7	68.5	3479.3	983.3	510.0	259.1	107.4	15.9	59.5	121.1	122.5	488.0	95	353272.
1972	41.9	10.2	66.7	3582.3	3204.0	415.5	111.3	35.4	28.1	24.1	10.3	3.8	627.0	122	455182.
1973	6.7	27.3	173.0	390.9	339.4	490.1	354.2	87.8	104.3	83.8	105.9	101.5	189.1	37	136936.
1974	94.9	85.2	200.8	3681.0	3711.3	1628.4	184.0	112.6	152.9	144.4	117.3	135.7	854.4	167	618582.
1975	107.4	138.6	97.4	2444.0	4154.7	1199.7	360.4	239.7	168.7	208.7	214.9	159.3	794.1	155	574928.
1976	148.9	139.9	170.9	5355.5	1422.0	1654.4	923.3	215.1	26.3	24.7	76.0	102.0	848.7	166	616140.
1977	13.2	82.0	184.6	674.3	409.2	87.7	112.7	55.9	209.8	189.5	119.4	420.0	213.6	42	154647.
MIN	6.7	10.2	44.5	168.4	155.7	84.5	34.6	13.1	15.3	12.0	10.3	3.8	68.9	13	49856.
MAX	288.3	184.3	835.6	6545.8	11401.0	4557.4	3410.2	2550.3	1060.5	1460.3	1500.3	525.3	2036.9	397	1474629.
MEAN	73.6	68.1	111.6	1676.5	1813.6	817.4	594.2	270.8	191.6	220.2	191.2	109.0	512.5	100	371326.

NOTE: Shaded area denotes natural flow data derived by regression analysis.

Table B-6

SHELL RIVER NEAR INGLIS - 05MD005

NATURAL FLOW - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	ACRE-FEET
1912	29.9	27.0	26.0	269.2	520.0	572.2	234.0	190.8	389.9	589.3	389.8	119.8	279.8	209	203146.
1913	42.3	25.0	40.0	769.8	892.0	710.5	874.0	961.5	544.5	271.2	221.8	80.8	455.1	340	329482.
1914	43.9	38.0	38.5	278.6	755.0	278.0	104.0	52.5	56.2	68.5	62.7	36.3	151.7	113	109862.
1915	16.3	10.3	17.2	133.0	98.8	105.0	125.0	55.7	63.1	97.5	70.2	30.0	68.7	51	49751.
1916	40.0	30.0	25.0	667.0	362.0	401.0	271.0	88.2	102.0	164.0	125.0	60.0	194.1	145	140898.
1917	29.2	29.1	34.3	118.0	726.0	480.0	648.0	148.0	112.0	68.4	88.0	36.9	211.4	158	153063.
1918	34.7	37.8	70.4	277.0	176.0	229.0	376.0	205.0	130.0	112.0	75.4	56.9	148.9	111	107824.
1919	51.5	42.4	30.5	311.0	369.0	166.0	386.0	133.0	163.0	137.0	73.3	40.6	159.3	119	115362.
1920	39.4	35.7	43.0	342.0	1400.0	509.0	178.0	86.8	70.8	60.5	66.8	50.3	241.2	180	175123.
1921	29.6	32.3	36.8	283.0	470.0	816.0	587.0	419.0	245.0	246.0	289.0	152.0	301.5	225	218275.
1922	80.9	59.4	74.7	963.0	2004.0	553.0	252.0	139.0	135.0	103.0	137.0	86.8	384.3	287	278193.
1923	77.0	54.2	54.9	401.0	1124.0	657.0	364.0	185.0	96.5	110.0	101.0	57.3	274.9	206	198983.
1924	27.1	6.8	9.8	74.0	360.0	299.0	165.0	340.0	154.0	188.0	112.0	61.6	150.4	113	109217.
1925	52.0	54.6	83.6	813.0	359.0	517.0	377.0	140.0	102.0	121.0	114.0	57.6	232.3	174	168208.
1926	46.6	46.3	69.3	635.0	315.0	237.0	100.0	88.2	129.0	228.0	159.0	69.7	176.8	132	127968.
1927	45.1	43.6	47.3	371.0	986.0	489.0	387.0	213.0	195.0	174.0	182.5	172.1	277.0	207	200539.
1928	53.9	40.0	265.0	494.1	411.0	369.0	310.0	178.0	95.5	93.9	46.7	40.0	200.1	150	145239.
1929	37.5	29.0	35.5	172.5	242.0	175.0	98.2	52.9	46.1	58.3	62.0	48.0	88.3	66	63916.
1930	34.3	25.8	41.0	153.6	169.0	169.0	102.0	63.4	59.2	56.1	50.6	35.5	80.1	60	57986.
1931	33.4	26.3	39.5	139.9	89.2	69.6	60.2	38.2	53.3	49.4	32.5	17.6	54.1	40	39169.
1932	14.8	18.6	24.4	144.5	115.0	76.6	146.0	56.2	57.5	82.2	47.5	37.1	68.5	51	49724.
1933	28.3	24.8	32.8	206.6	170.0	310.4	147.0	33.8	32.9	92.0	50.0	36.5	97.1	73	70302.
1934	29.0	27.5	53.9	220.1	219.0	116.9	72.0	17.9	21.1	62.2	34.0	32.6	75.7	57	54779.
1935	26.6	24.2	34.9	93.1	110.0	203.6	294.0	86.4	75.3	93.8	52.5	39.4	94.9	71	68729.
1936	31.1	25.8	30.1	427.1	442.0	229.0	122.0	46.4	29.3	52.8	25.6	35.5	124.7	93	90516.
1937	26.1	23.4	30.1	79.8	107.0	102.2	27.0	11.6	15.5	47.0	19.7	18.3	42.3	32	30647.
1938	25.9	23.8	55.9	170.6	139.0	92.6	68.0	49.5	22.0	66.9	30.2	28.0	64.5	48	46726.
1939	28.0	23.9	44.0	85.4	82.0	60.5	105.0	36.2	21.1	60.4	30.7	32.0	51.0	38	36924.
1940	24.2	21.4	20.5	27.2	53.0	37.6	30.0	21.0	14.0	54.5	32.0	28.9	30.4	23	22095.
1941	26.2	24.1	29.2	112.0	85.0	47.8	11.0	12.7	26.5	8.0	22.7	24.5	35.7	27	25863.
1942	24.3	22.1	48.0	252.5	123.0	196.3	95.0	88.4	106.3	112.0	36.1	27.0	94.3	70	68238.
1943	30.7	24.8	34.0	335.7	222.0	216.0	111.0	52.8	42.1	45.8	71.5	33.5	103.2	77	74732.
1944	27.8	24.5	28.1	61.3	79.0	67.2	43.0	20.8	36.6	38.8	27.5	31.8	40.5	30	29428.
1945	25.9	24.8	46.1	109.8	173.0	122.0	111.0	47.3	52.1	72.1	85.7	24.6	74.7	56	54114.
1946	28.9	24.7	55.9	225.6	135.0	74.5	96.0	28.4	36.9	57.2	112.3	35.0	75.9	57	54940.
1947	27.4	25.1	31.7	274.7	439.0	385.7	357.0	100.3	128.3	120.3	77.5	53.2	169.0	126	122350.
1948	39.4	31.0	38.1	284.5	1040.0	218.0	406.0	296.0	99.3	73.2	54.9	35.5	219.6	164	159420.
1949	37.0	24.0	26.8	183.0	105.0	166.0	86.1	82.6	44.1	40.7	45.3	28.0	72.4	54	52396.
1950	30.2	25.8	38.5	153.1	348.0	234.0	202.0	122.0	45.5	78.5	60.7	35.5	115.1	86	83340.
1951	27.5	26.0	28.0	325.0	625.0	154.0	132.0	98.6	177.0	200.0	157.1	58.0	168.1	126	121712.
1952	33.0	26.4	32.0	363.0	199.0	129.0	67.9	40.4	63.9	71.1	38.2	31.0	91.0	68	66040.
1953	28.8	27.1	39.8	230.0	319.0	372.0	687.0	186.0	195.0	160.0	189.0	78.5	210.4	157	152352.
1954	55.0	42.0	44.2	241.0	530.0	1070.0	494.0	114.0	185.0	238.0	151.0	109.8	273.2	204	197794.
1955	53.2	44.6	45.4	593.0	618.0	267.0	153.0	50.5	37.1	51.5	70.4	45.4	169.3	127	122580.
1956	47.4	45.0	40.5	169.0	508.0	230.0	252.0	97.2	87.2	68.8	62.3	46.9	138.4	103	100452.
1957	47.5	37.8	32.8	323.0	532.0	138.0	73.6	49.5	41.3	46.3	47.8	31.3	117.2	88	84822.
1958	14.8	13.0	26.4	142.0	77.9	55.9	35.7	20.0	41.6	56.0	63.2	24.2	47.5	36	34413.
1959	23.8	15.8	53.2	194.0	213.0	155.0	185.0	38.6	49.6	94.6	87.2	60.7	98.0	73	70914.
1960	31.9	36.5	38.4	374.0	305.0	339.0	71.8	23.0	12.1	18.7	36.1	19.9	108.4	81	78673.
1961	25.7	19.1	17.8	52.4	48.6	27.9	14.4	5.1	4.3	11.4	29.3	24.2	23.3	17	16889.
1962	29.0	35.8	36.4	82.4	86.5	46.9	11.3	13.6	16.8	29.9	31.6	36.9	38.0	28	27540.
1963	21.0	18.9	26.2	173.0	131.0	82.0	52.1	24.8	22.5	30.0	28.2	22.0	52.7	39	38123.
1964	19.9	19.6	19.6	175.0	144.0	45.1	21.6	17.7	16.6	26.0	19.6	0.5	43.7	33	31707.
1965	0.0	0.0	0.0	201.0	323.0	218.0	72.8	58.0	56.6	113.0	50.4	30.9	94.0	70	68050.
1966	33.5	34.3	37.7	308.0	429.0	267.0	219.0	48.9	20.3	28.5	31.4	27.9	124.2	93	89893.
1967	27.5	24.1	25.3	65.9	325.0	184.0	53.6	22.2	10.0	20.6	28.4	24.2	67.9	51	49139.
1968	23.3	24.5	48.7	161.0	79.1	44.4	35.9	38.2	32.0	32.2	33.4	23.1	47.9	36	34770.
1969	28.2	32.7	37.1	178.0	111.0	57.2	74.4	73.4	33.2	78.1	57.1	35.1	66.4	50	48073.
1970	27.7	28.7	28.5	252.0	659.0	131.0	97.7	126.0	22.0	45.4	230.0	62.5	143.3	107	103744.
1971	41.9	38.2	33.1	545.0	280.0	151.0	98.2	66.6	20.8	46.6	51.5	39.1	117.5	88	85069.
1972	40.9	37.5	38.9	398.0	566.0	122.0	94.9	35.4	23.1	31.5	32.3	20.4	120.3	90	87307.
1973	10.3	9.8	26.8	165.0	80.9	117.0	138.0	35.5	59.6	61.7	52.1	43.0	66.8	50	48332.
1974	30.8	28.1	31.9	545.0	833.0	360.0	95.6	49.3	64.8	101.0	62.2	39.6	187.3	140	135598.
1975	38.7	36.7	38.7	268.0	627.0	368.0	123.0	49.9	63.5	106.0	98.1	40.8	155.3	116	112468.
1976	37.6	44.6	39.2	650.0	251.0	872.0	330.0	67.1	33.0	35.8	29.1	17.6	199.3	149	144681.
1977	12.9	17.6	18.5	178.0	114.0	58.6	73.2	52.9	120.0	150.0	81.2	47.6	77.2	58	55872.
MIN	0.0	0.0	0.0	27.2	48.6	27.9	11.0	5.1	4.3	8.0	19.6	0.5	23.3	17	16889.
MAX	80.9	59.4	265.0	963.0	2004.0	1070.0	874.0	961.5	544.5	589.3	389.8	172.1	455.1	340	329482.
MEAN	33.2	29.1	40.5	279.8	379.2	255.2	186.1	98.3	81.2	94.0	79.1	45.0	133.7	99	96886.

NOTE: Shaded area denotes natural flow data derived by regression analysis.

Table B-7

ASSINIBOINE RIVER AT THE SASKATCHEWAN - MANITOBA BOUNDARY

NATURAL FLOW - CFS

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	ACRE-FEET
1912	17.6	22.6	28.5	1175.8	1732.1	882.5	343.0	261.0	424.4	567.4	337.4	131.2	493.9	150	358527.
1913	33.4	18.6	31.6	3615.1	3311.7	1420.4	2424.9	1733.4	585.1	313.0	219.2	68.9	1153.8	350	835318.
1914	29.0	29.1	30.8	1246.1	2574.9	875.1	216.8	56.9	48.2	58.4	49.2	20.8	438.3	133	317342.
1915	13.7	24.0	22.3	326.2	102.8	138.1	208.8	75.3	45.8	42.3	45.3	22.0	88.9	27	64335.
1916	6.3	10.1	10.0	1058.0	399.5	1413.4	501.9	256.1	141.8	172.0	149.6	27.9	343.6	104	249444.
1917	11.0	6.6	9.8	597.6	2871.2	751.6	990.2	225.9	143.7	79.7	70.8	13.8	485.9	147	351761.
1918	10.3	6.9	40.9	712.0	204.2	302.7	333.3	202.1	104.8	98.6	85.1	26.3	177.3	54	128354.
1919	16.5	16.5	18.8	596.6	298.3	259.7	664.5	161.0	124.5	145.9	70.8	27.2	200.8	61	145393.
1920	26.6	28.2	29.0	857.9	3924.4	971.6	263.9	98.7	79.2	92.1	124.5	41.3	548.0	166	397812.
1921	27.4	21.7	29.8	2384.4	2320.6	2334.0	2394.0	838.2	677.0	975.8	823.0	188.8	1088.1	330	787782.
1922	100.1	59.3	65.2	5153.5	10413.5	2596.3	514.2	275.7	191.7	98.7	139.4	47.9	1646.7	499	1192183.
1923	27.9	38.2	37.2	1492.7	5260.4	1549.0	1391.7	576.1	190.8	169.0	100.2	56.3	915.4	278	662725.
1924	34.2	38.4	44.9	520.2	455.5	301.9	142.6	291.8	137.4	147.6	89.1	45.3	187.4	57	136044.
1925	28.2	17.4	37.4	2822.5	648.2	679.0	394.4	139.9	77.3	83.5	40.0	21.6	413.7	125	299504.
1926	8.6	9.5	31.2	1164.6	419.1	335.9	99.5	36.9	108.3	184.6	142.7	40.4	214.4	65	155202.
1927	32.9	23.5	25.1	3460.7	3489.4	1156.1	835.4	404.4	397.7	447.4	179.1	20.2	875.0	265	633444.
1928	40.8	33.5	331.3	2450.6	1010.8	697.1	896.0	191.0	73.4	59.8	40.5	25.5	486.4	148	353118.
1929	20.4	19.8	24.0	739.7	435.3	246.4	121.9	61.7	49.7	57.1	56.1	31.7	155.1	47	112315.
1930	18.5	15.5	28.7	754.5	245.2	211.7	117.9	47.0	34.2	45.2	44.5	19.8	131.4	40	95149.
1931	17.4	16.0	27.3	593.6	105.7	78.7	44.6	44.7	32.6	39.8	26.1	8.4	85.8	26	62084.
1932	4.7	9.8	11.0	652.2	162.0	97.3	124.6	72.8	47.8	65.1	31.5	21.7	107.8	33	78274.
1933	13.9	14.8	19.3	911.6	278.3	491.3	163.8	22.2	14.9	75.0	33.2	21.6	170.9	52	123705.
1934	16.7	17.7	55.9	940.9	397.7	185.8	59.5	11.7	8.6	44.8	21.3	17.5	147.7	45	106923.
1935	11.9	14.4	22.3	430.8	162.4	318.9	500.5	97.9	47.5	77.4	36.9	23.7	145.8	44	105532.
1936	16.9	15.9	16.5	1814.9	1114.0	349.0	129.2	32.4	12.4	35.5	15.8	19.5	296.5	90	215213.
1937	11.4	13.4	16.2	317.7	143.6	158.0	20.7	7.0	2.3	29.5	11.4	7.4	61.3	19	44370.
1938	10.8	13.6	65.0	718.3	209.5	159.4	53.0	38.0	8.7	49.5	17.0	14.1	112.7	34	81555.
1939	13.0	13.7	36.3	388.8	117.9	108.6	93.8	25.2	8.6	42.9	18.6	17.1	73.6	22	53255.
1940	9.3	11.2	11.1	128.1	62.6	82.5	19.0	14.3	6.6	36.9	18.0	14.1	34.3	10	24916.
1941	11.7	14.1	15.1	504.7	129.3	57.1	13.0	8.0	10.3	1.8	13.3	12.0	65.4	20	47354.
1942	9.8	11.8	43.4	1209.7	197.7	299.9	118.3	131.3	102.3	96.2	28.7	13.7	187.6	57	135806.
1943	15.8	14.7	20.8	1560.5	431.5	277.4	159.0	60.6	35.9	35.4	14.9	19.1	219.4	67	158845.
1944	12.1	14.1	14.1	193.8	97.0	66.5	41.3	17.7	23.7	24.0	24.1	17.0	45.3	14	32865.
1945	10.8	14.7	40.0	381.8	263.5	132.3	106.1	39.9	33.2	48.5	28.8	12.4	92.8	28	67156.
1946	13.5	14.5	60.1	792.0	194.7	75.5	79.7	26.3	20.0	37.9	87.8	20.6	118.0	36	85439.
1947	12.7	15.1	18.0	1082.4	980.8	372.2	480.2	91.5	74.2	85.7	63.2	38.9	277.0	84	200571.
1948	26.6	22.6	26.6	1096.2	3460.8	317.7	156.6	93.5	31.1	27.4	45.3	22.7	447.0	136	324499.
1949	22.0	14.0	12.7	781.7	98.3	248.6	87.3	47.3	22.5	28.3	48.9	16.3	118.1	36	85531.
1950	15.6	16.1	27.2	641.7	491.4	133.7	66.0	104.3	39.6	35.7	54.9	24.2	137.7	42	99661.
1951	15.3	17.1	15.2	847.7	1256.5	292.9	150.4	83.5	140.2	278.7	153.2	43.4	275.7	84	199601.
1952	18.0	17.0	19.3	1448.4	497.2	154.0	69.4	32.4	29.7	29.7	31.8	18.2	195.7	59	142058.
1953	13.0	17.3	26.8	788.3	630.7	784.0	2220.9	1228.2	489.0	231.3	197.9	68.9	562.4	171	407151.
1954	42.0	34.5	36.9	1180.8	2377.5	4176.1	1984.6	398.8	464.4	533.2	435.4	123.0	983.7	298	712150.
1955	48.1	45.2	42.1	3457.4	5111.2	1603.7	529.0	225.8	94.6	95.0	64.7	44.7	950.3	288	687970.
1956	39.3	16.7	35.1	1630.3	5256.3	1475.2	497.0	184.1	121.6	100.3	127.5	60.6	799.1	242	580118.
1957	35.9	60.7	75.0	1494.9	2148.3	281.9	111.0	60.3	49.0	31.1	27.7	27.0	368.4	112	266682.
1958	25.7	29.2	34.3	378.6	120.3	42.3	21.4	13.4	18.3	15.3	27.6	15.5	61.5	19	44532.
1959	13.5	11.3	47.2	398.4	100.3	50.7	43.7	23.4	21.9	32.5	43.7	30.8	67.9	21	49167.
1960	28.3	16.1	29.8	1935.3	998.2	384.2	163.7	22.3	14.1	20.2	14.6	16.1	302.1	92	219282.
1961	11.3	10.3	29.9	72.8	68.7	32.3	9.0	3.8	7.6	19.4	10.9	11.7	24.0	7	17380.
1962	2.6	0.3	19.2	804.8	422.9	69.5	30.6	20.4	24.0	15.7	21.7	16.7	120.5	37	87230.
1963	6.1	6.3	63.2	314.4	85.8	71.8	62.7	17.7	14.0	25.6	15.8	14.2	58.1	18	42028.
1964	18.4	19.9	30.8	220.2	236.8	55.7	23.1	22.8	27.8	35.9	41.9	28.3	63.5	19	46062.
1965	25.5	23.8	25.3	1070.2	423.8	761.9	236.6	76.1	60.9	121.2	58.0	35.1	242.3	73	175425.
1966	41.1	24.5	45.4	2035.9	1112.7	348.0	292.9	194.4	83.4	39.8	49.8	38.1	358.6	109	259640.
1967	34.2	24.2	30.6	442.8	1604.4	261.1	55.2	29.8	11.4	22.8	18.4	16.4	214.5	65	155270.
1968	13.1	16.5	103.2	466.5	77.5	55.7	32.0	22.4	18.0	5.9	6.5	5.6	68.1	21	49439.
1969	15.6	16.0	14.0	1126.9	221.4	50.2	38.1	47.0	13.6	30.5	30.5	16.2	134.1	41	97092.
1970	16.1	14.9	23.2	919.3	1128.8	256.3	174.4	35.8	13.3	62.2	70.4	41.2	230.5	70	166863.
1971	29.2	19.4	21.4	2663.6	670.8	285.0	134.3	71.2	11.7	23.6	48.9	55.2	334.2	101	241969.
1972	22.0	12.2	27.5	2691.7	2353.5	206.8	32.9	14.5	6.6	6.5	10.2	5.8	448.5	136	325597.
1973	3.9	9.7	77.6	204.7	223.8	330.9	266.4	46.0	26.7	15.4	31.7	37.0	106.5	32	77084.
1974	35.1	32.1	80.1	2335.1	2651.2	1163.8	85.4	51.8	73.0	68.4	61.4	72.4	559.7	170	405177.
1975	46.4	58.9	37.5	1872.1	3353.4	763.9	244.0	114.1	75.1	74.1	85.7	68.3	568.8	173	411817.
1976	57.2	49.6	74.8	4078.0	1044.9	777.0	720.0	131.7	25.8	20.0	35.6	50.1	584.7	177	424448.
1977	15.1	36.0	82.1	424.6	215.6	33.4	24.1	11.0	42.7	26.9	26.4	169.8	92.3	28	66850.
MIN	2.6	0.3	9.8	72.8	62.6	32.3	9.0	3.8	2.3	1.8	6.5	5.6	24.0	7	17380.
MAX	100.1	60.7	331.3	5153.5	10413.5	4176.1	2424.9	1733.4	677.0	975.8	823.0	188.8	1646.7	499	1192183.
MEAN	22.0	20.8	39.1	1235.9	1266.8	544.0	357.9	153.1	93.9	102.1	78.7	35.9	329.8	100	238899.

Table B-8

ASSINIBOINE RIVER BASIN BALANCE OF FLOW TABLE FOR APPORTIONMENT AT THE PRESENT (1977) LEVEL OF USE - CFS

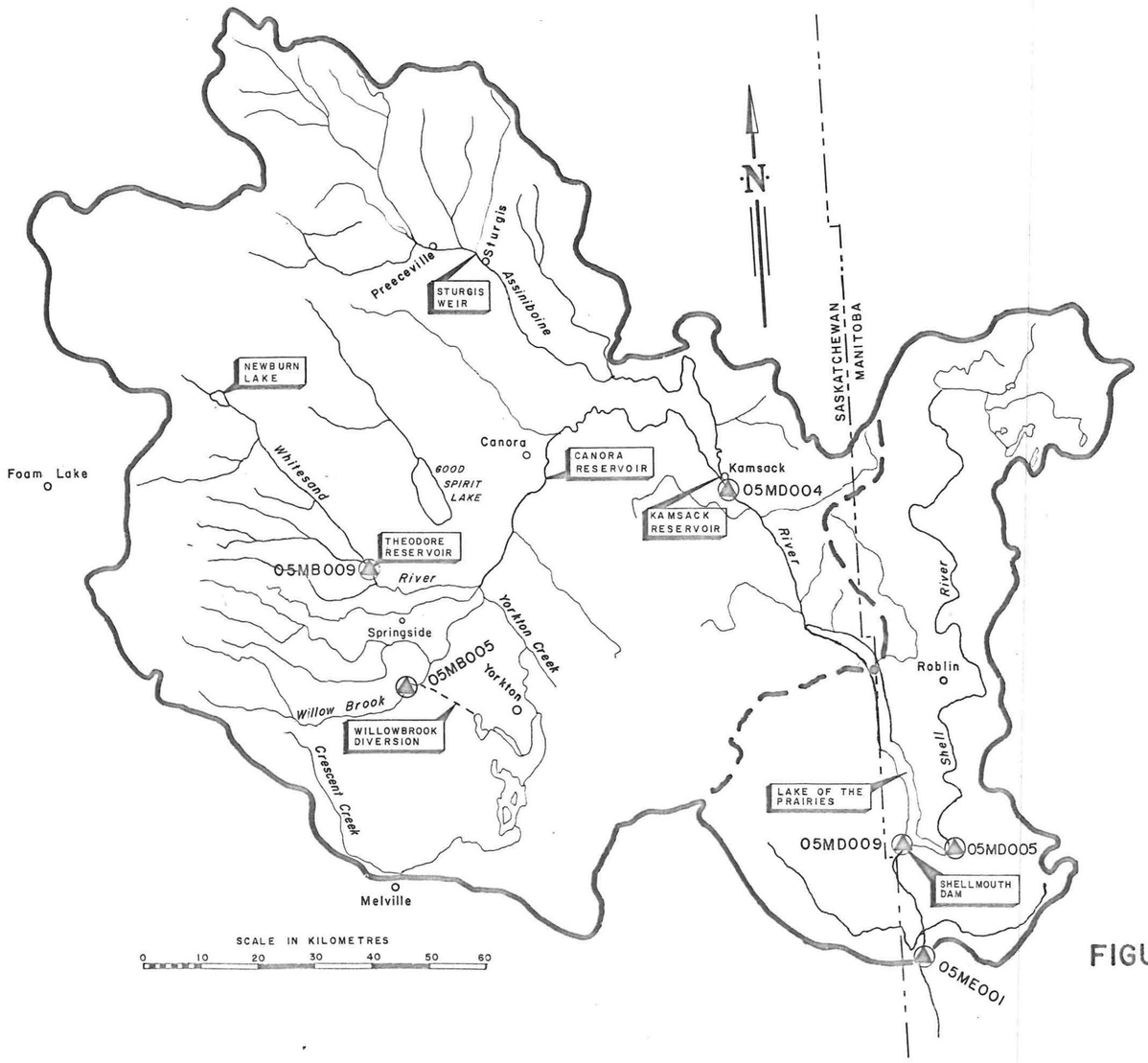
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	MEAN	%	ACRE-FEET
1912	8.0	10.4	13.3	534.0	839.3	425.9	168.8	128.5	208.5	279.5	167.2	64.7	237.5	152	172430.
1913	15.8	8.4	14.9	1672.6	1532.2	648.7	1206.7	864.2	287.5	152.7	108.0	33.4	548.4	352	397004.
1914	13.7	13.4	14.5	561.5	1253.8	419.3	103.1	23.0	17.6	26.7	22.9	9.4	207.6	133	150310.
1915	6.0	11.1	9.8	146.0	46.2	67.2	103.2	31.2	19.6	17.2	21.4	10.1	40.7	26	29498.
1916	2.3	4.1	3.8	481.4	178.4	696.0	245.9	122.0	69.3	83.0	73.1	12.9	163.4	105	118641.
1917	4.7	2.4	4.0	240.5	1402.7	361.0	488.9	108.7	66.7	35.6	33.6	5.9	232.0	149	167971.
1918	4.3	2.5	19.5	332.8	95.1	147.8	163.7	98.6	47.1	45.7	40.9	12.2	84.2	54	60963.
1919	7.4	7.3	8.5	273.9	141.5	125.5	326.3	74.9	58.0	69.9	34.2	12.6	95.4	61	69080.
1920	12.5	13.2	13.5	357.9	1915.9	462.9	124.9	44.0	35.0	44.5	61.1	19.7	260.4	167	189049.
1921	12.8	9.9	14.0	1058.7	1077.4	1128.2	1191.8	415.7	337.2	486.6	410.5	93.5	521.5	335	377573.
1922	49.2	28.7	31.7	2442.4	5074.5	1178.0	242.7	135.3	91.8	45.9	68.5	23.0	788.8	506	571032.
1923	13.1	18.1	17.7	611.5	2545.5	735.0	691.1	283.4	91.3	80.7	48.9	27.2	434.3	279	314433.
1924	16.2	18.3	21.5	237.2	219.4	146.5	67.5	141.9	63.5	70.9	43.4	21.7	89.0	57	64621.
1925	13.3	7.8	17.8	1339.3	268.4	313.1	190.5	64.0	34.7	39.7	18.9	9.8	192.1	123	139054.
1926	3.5	3.8	14.7	544.7	192.4	157.4	46.5	13.6	50.6	91.2	70.4	19.3	100.3	64	72624.
1927	15.6	10.8	11.6	1596.7	1644.0	529.6	413.0	197.4	197.4	221.9	88.5	9.2	412.5	265	298627.
1928	19.4	15.8	164.7	1167.5	474.8	334.3	445.9	90.5	31.7	26.9	19.1	11.8	233.0	150	169167.
1929	9.3	9.0	11.1	345.0	210.1	118.5	54.7	23.5	20.3	25.9	27.0	14.9	72.4	46	52386.
1930	8.4	6.8	13.4	356.7	117.2	103.3	56.5	18.6	12.2	19.9	21.2	9.0	61.7	40	44682.
1931	7.9	7.1	12.7	276.9	46.5	34.4	16.2	18.4	12.5	16.7	11.9	3.2	38.5	25	27845.
1932	1.5	4.0	4.6	306.0	74.5	46.1	58.0	34.3	19.2	29.8	14.6	9.9	50.0	32	36272.
1933	6.1	6.5	8.7	433.9	133.0	242.8	77.0	6.1	3.8	34.6	15.5	9.9	81.1	52	58711.
1934	7.5	7.7	27.0	448.0	192.1	88.6	22.2	-1.9	-0.2	18.5	9.4	7.8	68.7	44	49707.
1935	5.1	6.3	10.2	199.3	78.7	158.4	247.4	44.3	18.5	35.3	17.3	10.9	69.5	45	50322.
1936	7.6	7.0	7.3	851.3	527.5	160.5	58.2	9.0	1.5	14.1	6.7	8.8	137.7	88	99991.
1937	4.9	5.8	7.2	141.6	68.4	72.4	3.6	-3.9	-3.3	11.3	4.5	2.8	26.1	17	18925.
1938	4.6	5.9	31.6	342.9	101.7	78.4	25.3	14.9	0.5	20.9	7.3	6.1	53.1	34	38475.
1939	5.7	5.9	17.2	177.3	56.5	53.2	41.8	6.1	-0.9	17.6	8.1	7.6	32.9	21	23853.
1940	3.8	4.6	4.6	48.2	27.8	39.3	8.3	0.2	-0.7	15.2	7.8	6.1	13.7	9	9961.
1941	5.0	6.1	6.6	236.2	62.3	24.9	0.6	-1.3	-0.8	-2.9	5.4	5.1	28.7	18	20786.
1942	4.0	5.0	20.8	577.1	87.2	145.1	56.2	64.4	46.2	43.3	13.1	5.9	88.6	57	64110.
1943	7.1	6.4	9.5	750.3	204.8	132.5	74.9	25.9	12.5	14.6	6.3	8.4	103.9	67	75229.
1944	5.2	6.1	6.1	80.3	46.0	28.7	15.2	3.9	6.0	7.7	10.7	7.6	18.5	12	13458.
1945	4.6	6.4	19.1	174.7	129.5	65.1	49.4	13.3	14.6	20.2	13.2	5.3	43.0	28	31106.
1946	5.9	6.3	28.9	380.0	93.8	34.0	38.4	7.7	6.0	15.2	42.7	9.4	55.4	36	40134.
1947	5.5	6.6	8.0	489.2	464.2	174.7	234.1	41.7	32.7	38.5	30.4	18.5	129.1	83	93469.
1948	12.5	10.4	12.4	487.5	1698.5	133.7	75.1	41.2	8.7	8.7	21.4	10.4	211.6	136	153639.
1949	10.2	6.1	5.4	366.9	42.5	120.4	41.2	17.2	4.6	9.7	23.2	7.2	54.1	35	39191.
1950	7.0	7.1	12.7	291.9	235.0	60.3	31.4	45.8	13.9	14.8	26.3	11.2	63.2	41	45756.
1951	6.8	7.6	6.7	391.0	615.3	140.1	69.4	38.6	66.1	137.0	75.5	20.8	131.9	85	95468.
1952	8.1	7.4	8.6	698.5	239.8	70.7	30.1	11.4	10.0	10.0	14.6	8.2	92.4	59	67112.
1953	5.6	7.7	12.5	356.6	299.3	384.7	1108.8	610.4	240.1	112.1	97.5	33.5	274.6	176	198807.
1954	20.1	16.2	17.5	519.8	1151.3	2071.1	987.7	194.8	228.7	262.6	216.4	60.3	479.6	308	347210.
1955	23.2	21.7	20.1	1593:9	2436.0	742.0	257.2	106.8	42.0	43.0	31.1	21.4	446.6	287	323336.
1956	18.8	7.4	16.6	679.1	2512.4	682.7	240.9	87.0	53.8	46.4	62.6	29.4	371.7	239	269857.
1957	17.1	29.4	36.6	685.7	1039.9	123.9	47.7	26.1	18.0	11.4	12.6	12.6	172.5	111	124886.
1958	11.9	13.6	16.1	169.3	53.2	14.2	4.0	0.3	3.0	3.3	12.6	6.8	25.5	16	18487.
1959	5.9	4.7	22.2	182.7	45.2	23.9	14.9	6.1	7.9	14.2	20.8	14.5	30.1	19	21819.
1960	13.3	7.1	14.0	925.7	481.7	181.1	73.5	3.2	-0.7	5.0	5.9	7.1	142.3	91	103328.
1961	4.8	4.2	14.0	17.0	31.2	8.8	-4.9	-9.6	-4.5	5.4	4.2	4.9	6.3	4	4573.
1962	0.5	-0.8	8.6	382.5	208.8	30.9	8.3	4.8	5.6	4.1	9.7	7.4	55.8	36	40371.
1963	2.2	2.2	30.7	139.7	26.4	33.5	28.6	3.8	1.3	7.2	6.6	6.2	24.0	15	17347.
1964	8.4	9.0	14.5	87.2	107.2	20.9	6.1	8.0	7.6	12.8	19.6	13.2	26.2	17	19043.
1965	11.9	11.0	11.7	513.1	199.4	364.5	110.4	30.7	26.5	54.9	27.6	16.6	114.4	73	82843.
1966	19.7	11.3	21.8	978.9	539.1	168.3	140.1	91.3	33.3	14.3	23.6	18.1	171.5	110	124195.
1967	16.3	11.2	14.4	192.7	775.3	121.7	18.7	4.6	-2.6	7.3	8.0	7.2	98.8	63	71531.
1968	5.7	7.1	50.0	211.9	35.9	22.6	11.2	4.6	1.7	-1.0	1.6	1.8	29.2	19	21209.
1969	7.0	7.1	6.1	515.4	103.5	19.6	14.1	17.2	1.4	11.8	13.6	7.1	59.9	38	43377.
1970	7.2	6.5	10.7	414.6	523.5	119.9	83.7	9.0	1.3	29.2	34.2	19.7	105.3	68	76269.
1971	13.7	8.8	9.8	1290.7	325.6	138.4	62.7	27.9	-1.2	7.8	23.2	26.7	160.2	103	115995.
1972	10.2	5.2	12.8	1292.0	1168.0	96.4	11.1	0.0	-3.8	-1.6	3.8	2.0	216.1	139	156843.
1973	0.7	3.9	37.7	86.5	109.4	163.3	127.5	19.4	7.6	2.9	14.6	17.6	49.4	32	35780.
1974	16.7	15.1	39.1	1118.1	1266.8	556.7	34.7	23.7	31.8	29.2	28.7	35.2	266.6	171	192977.
1975	22.3	28.5	17.8	881.2	1615.5	356.7	112.5	52.4	33.0	32.3	41.0	33.2	270.2	173	195608.
1976	27.7	23.9	36.5	1946.0	498.4	342.0	342.1	57.1	3.9	3.9	15.0	24.0	274.8	176	199498.
1977	6.6	17.0	40.1	193.1	105.0	8.3	4.9	-1.6	19.4	8.5	11.8	84.9	41.5	27	30058.
MIN	0.5	-0.8	3.8	17.0	26.4	8.3	-4.9	-9.6	-4.5	-2.9	1.6	1.8	6.3	4	4573.
MAX	49.2	29.4	164.7	2442.4	5074.5	2071.1	1206.7	864.2	337.2	486.6	410.5	93.5	788.8	506	571032.
MEAN	10.1	9.4	18.6	573.1	607.8	257.6	173.5	71.1	41.9	47.3	38.0	17.0	155.8	99	112847.

NOTE: See report section entitled, "Application of Apportionment Principles," for information on the derivation of this table. Positive values indicate the quantity of water passed on to Manitoba in excess of Saskatchewan's 50% share of natural flow. Negative values indicate a deficit in supplying Manitoba's 50% share of natural flow.

DRAINAGE AREAS

ASSINIBOINE RIVER DRAINAGE BASIN

	GROSS		EFFECTIVE	
	sq.mi.	sq.km.	sq.mi.	sq.km.
GAUGING STATIONS				
ne River near Kamsack No. 05MD004	4997	12942	1669	4332
ne River near Russell No. 05ME001	7445	19282	2955	7653
er near Inglis No. 05MD005	771	1196	431	1996
CT SITES				
ake	550	1425	24	62
amsack Reservoir	4997	12942	1669	4332
eir	744	1926	441	1142
servoir	3373	8736	773	2002
Reservoir	939	2432	211	547
ok Diversion	174	451	38	98
ARY TO SASKATCHEWAN-MANITOBA BOUNDARY				
ne River at the Interprovincial	5660	14660	2039	5280



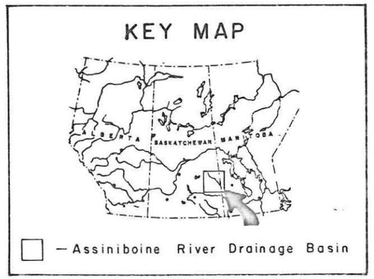


FIGURE I LOCATION MAP OF THE ASSINIBOINE RIVER BASIN