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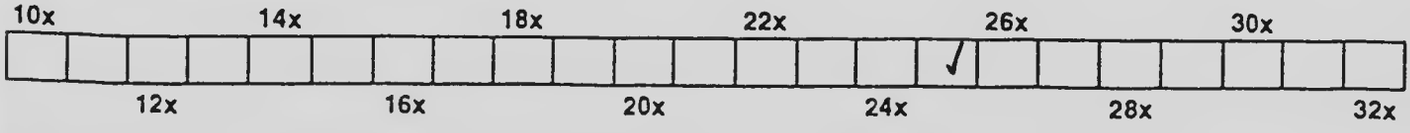

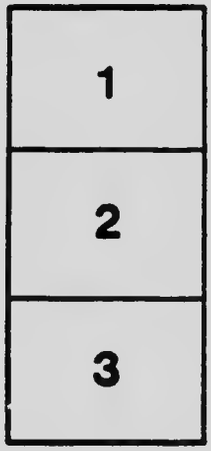

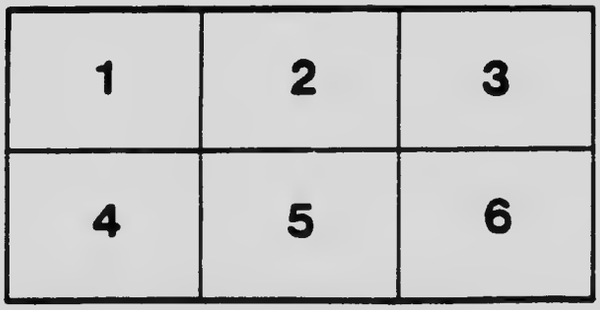

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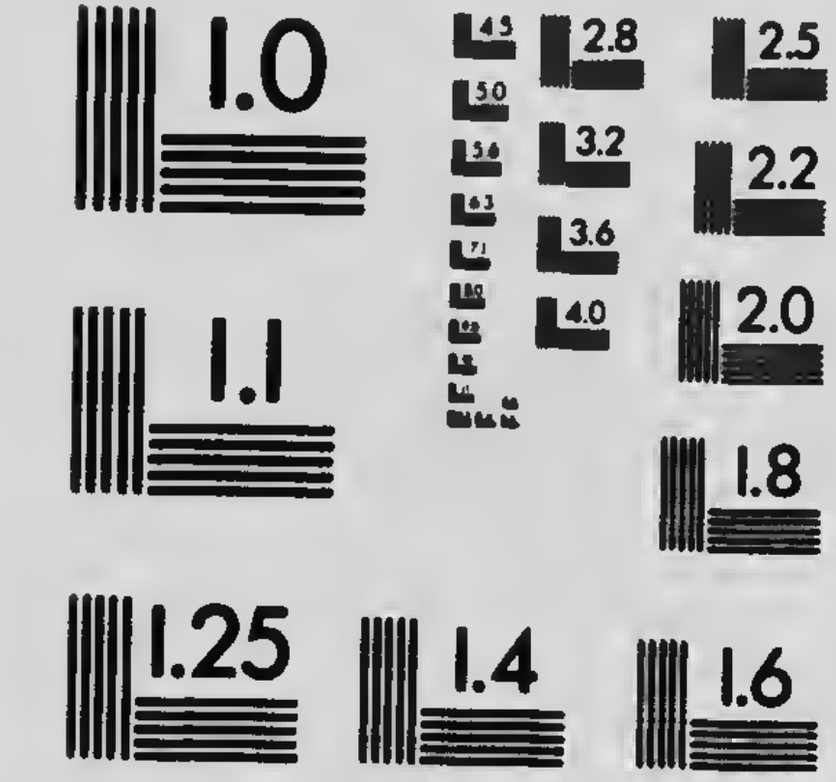

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Hon. A. MEIGHEN, Minister; W. W. CORY, Deputy Minister
DOMINION WATER POWER BRANCH
J. B. CHALLIES, C.E., Director

WATER RESOURCES PAPER No. 24

HYDROMETRIC SURVEY OF MANITOBA

FOR THE

CLIMATIC YEARS 1916-17, and 1917-18

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

64799 SLAVE FALLS, WINNIPEG RIVER. DISCHARGE, 63,500 C.F.S.

DEPARTMENT OF THE INTERIOR—CANADA
Hon. A. MEIGHEN, Minister. W W. CORY, Deputy Minister
DOMINION WATER POWER BRANCH
J. B. CHALLIES, C.E., Director

WATER RESOURCES PAPER No. 24

PROGRESS REPORT

OF THE

HYDROMETRIC SURVEY OF MANITOBA

FOR

THE CLIMATIC YEARS 1916-17, and 1917-18

BY
M. C. HENDRY, A.M.E.I.C.
Chief Engineer

Prepared under the supervision of the Director of Water Power

OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

64799—A

To His Excellency the Duke of Devonshire, K.G., P.C., G.C.M.G., G.C.V.O., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR EXCELLENCY:

The undersigned has the honour to lay before Your Excellency the Report of the Hydrometric Survey of Manitoba for the Climatic Years 1916-17 and 1917-18.

Respectfully submitted,

ARTHUR MEIGHEN,
Minister of the Interior.

DEPARTMENT OF THE INTERIOR,

May 31, 1919.

The HON. ARTHUR MEIGHEN,
Minister of the Interior.

Sir,—I have the honour to submit the report of the Hydrometric Survey of Manitoba for the climatic years 1916–17 and 1917-18, and to recommend that it be published as Water Resources Paper No. 24 of the Dominion Water Power Branch.

I have the honour to be, Sir,

Your obedient servant,

W. W. CORY,
Deputy Minister of the Interior.

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Progress Report
Of the Hydrometric Survey of Manitoba
For the Climatic Years 1916-17, 1917-18.

PART I.

INTRODUCTION.

The report herewith presented combines the results of hydrological observations in the province of Manitoba for the period January 1, 1917 to September 30, 1918.

Previous reports have contained data covering a calendar year. Since this was an arbitrary period, chosen without reference to the yearly cycle of hydrological events, it was decided to change from the calendar to the climatic year. This decision was reached at a conference of the heads of the several organizations interested. The period chosen as most representative was from October 1 to September 30. This period has been adopted by the following organizations which gather hydrological data:—

Hydrometric Survey—Manitoba
Hydrometric Survey—British Columbia
Water Power Commission—Province of Nova Scotia
Water Power Commission—Province of New Brunswick
Reclamation Service—Department of the Interior
Hydro-Electric Power Commission of Ontario.

The interval January 1, 1917, to September 30, 1917, covers the transition period, while the rest of the period covered by this report represents a full climatic year. For purposes of economy the data for these two have been combined in this report.

During the first period conditions were such as to produce a minimum run-off. This was particularly noticeable on the Winnipeg drainage area, where the lowest recorded discharges during the summer months occurred. Similar conditions were also noted on other streams. During the second period, especially the spring of 1918, very high discharges were noted on those streams draining the territory to the east of lake Winnipeg.

ORGANIZATION AND SCOPE.

Following the inception of the work undertaken by the Winnipeg River Power Survey, the Hydrometric Survey of Manitoba (formerly Hydrographic) was organised in 1912, superseding the former organization. It is a subsidiary organization of the Dominion Water Power Branch, the latter forming a subdivision of the Department of the Interior, Ottawa. The Survey is, therefore, not a Provincial but a Federal Government Organization.

The energies of the Survey are directed toward the gathering of stream flow data and making of power and storage investigations.

The field covered by the investigations of the Survey comprises the whole of Manitoba. In addition, certain investigations outside of the province have been carried on. These relate to storage questions, having a bearing on stream regulation and power development within the province. Such outside investigations have been confined almost entirely to the upper part of the Winnipeg River drainage basin.

For some time past the Survey has also been advising the Ontario Department of Public Works in the operation of the Norman Dam and regulation of the Lake of the Woods.

DISTRICTS.

For purposes of organization and for convenience of descriptions, the whole territory covered by the work of the Survey has been separated into several main divisions. These conform generally to the several drainage systems covering the province. They may be enumerated as follows:—

1—Lake of the Woods Outlets.
2—Winnipeg river and Tributaries.
3—Red River and Tributaries (excepting the Assiniboine river).
4—Assiniboine river and Tributaries.
5—Saskatchewan river and District west of Lake Winnipegosis.
6—The East Shore of Lake Winnipeg.
7—Nelson river and Tributaries.

Below are listed the stations maintained by the Survey. In the first list appear the names of these stations for which continuous records of discharge are available. In the second are listed stations at which meterings have been secured, but for which continuous records are not available. It should be pointed out that while continuous records of gauge height have in some cases been secured, for various reasons, estimates of daily discharge have not been made; the stations are, therefore, classed as miscellaneous. The third list contains the names of stations at which gauge height records only have been obtained:—

Regular Metering Stations.

Station No.	Name.	Location.	File No.
5 MH_1	Assiniboine river	Brandon	A.1.a
5 MJ_1	Assiniboine river	Headingly	A.1.c
5 ME_1	Assiniboine river	Millwood	A.1.d
5 SA_1	Brokenhead river	Sinnot	B.3.a
5 LM_1	Fairford river	Fairford	F.1.a
5 PE_1	East branch, Winnipeg river	Kenora Power House (Headrace)	L.1.a
5 PE_3	West branch, Winnipeg river	North Tunnel Island	L.1.b
5 PE_2	Western outlet, L. of Woods	Norman Traffic Bridge	L.1.e
5 PE_3	Lake of the Woods outlets	Mill "A"	L.1.f
5 PE_4	Lake of the Woods outlets	Mill "C"	L.1.g
5 PE_5	Lake of the Woods outlets	Old K.L.M. Co	L.1.e
5 RA_1	Manigtagan river	Above Wood Falls	M.1.a
5 LJ_2	Mossy river	Below Fork river	M.4.d
5 MF_1	Minnedosa river (L. Saskatchewan)	Beilbys Bridge	M.7.f
5 MF_1	Minnedosa river (L. Saskatchewan)	Middleton Bridge	M.7.h
5 MF_4	Minnedosa river (L. Saskatchewan)	Indian Bridge	N.1.e
5 UE_1	Nelson river	Four miles above Shell Rapids	O.1.a
5 LJ_5	Ochre river	Ochre river	R.1.a
5 OE_1	Rat river	Otterburne	R.4.a
5 OC_1	Red river	Emerson	R.5.b
5 OD_1	Roseau river	Baskervilles Farm	R.5.e
5 OD_4	Roseau river	Stuartburn	R.6.a
5 LC_2	Red Deer river	Hudson Bay junction	R.7.b
5 MF_3	Rolling river	C.N.R. Crossing	S.1.a
5 KL_1	Saskatchewan river	Head of Grand Rapids	S.1.d
5 KJ_1	Saskatchewan river	The Pas	S.2.a
5 OH_1	Seine river	St. Anne des Chenes	S.3.a
5 MD_1	Shell river	Asessippi	S.4.a
5 NG_1	Souris river	Wawanesa	S.4.b
5 NF_1	Souris river	Melita	S.6.a
5 LE_1	Swan river	Swan river	V.1.a
5 LJ_4	Valley river	Valley river	W.1.a
5 PH_1	Whitemouth river	Whitemouth	W.6.d
5 PF_1	Winnipeg river	Slave Falls	W.6.va.
	Winnipeg river	Seven Sisters Rapids	W.6.w
5 PE_{10}	Winnipeg river	Whitedog Falls	W.10.a
5 MF_6	Whirlpool river	Danvers	W.11.a
5 LE_2	Woody river	Bowsman	

Miscellaneous Metering Stations.

Name.	Location.	File No.
Berens river	Above Little Grand Rapids	B.1.b
Berens river	Route channel	B.1.c
Berens river	Below Night Owl Falls	B.1.d
Birdtail creek	Birtle	B.4.a
Bloodvein river	Eight miles above mouth	B.5.a
Boyne river	East of Carman	B.6.a
Boyne Channel	North of Homewood	B.6.h
Elm creek	Kenynn's Farm	E.4.a
Lake of the Woods, C.P.R. culvert	1st West Keewatin	L.1.j
Minnedosa river (Little Saskatchewan)	Minnedosa Power House	M.7.c
Minnedosa river (Little Saskatchewan)	Middleton Bridge	M.7.m
Pinawa channel	Below Control Dam	P.2.b
Pinawa channel	Tailrace, W.E. Ry. Plant	P.2.c
Pigeon river	Above Shining Falls	P.4.d
Tobacco creek	Two miles North of Roland	T.2.a

Regular Gauging Stations.

File No.	Name.	Location.
B.1.a	Berens river (Lake Winnipeg)	Berens river.
F.3.n	Family Inke	Hudson Bay Post.
L.1.a	Lake of the Woods	Kenorn Power House (Tailrace).
L.1.d	Lake of the Woods	Norman Dam.
L.1.m	Lake of the Woods	Ontario D.P.W., Lake Gauge.
L.1.p	Lake of the Woods	Automatic Gauge, Kenora.
L.1.n	Lake of the Woods	Keewatin River Gauge, Mill "A."
L.2.h	La Salle river	Sanford.
L.4.c	Lac Seul	Automatic Gauge, H.B. Post.
M.2.c	Lake Manitoba	Delta.
M.7.c	Minnedosa river (Little Saskatchewan)	Minnedosa Power House.
N.1.a	Nelson river	Norway House.
N.1.h	Nelson river	Manitou Bridge Crossing.
N.1.k	Nelson river	Kettle Bridge Crossing.
O.3.a	Otter creek	Scandinavia.
P.2.a	Pinawn channel	Above Control Dam.
P.2.h	Pinawa channel	Automatic Gauge below Control Dam.
P.2.c	Pinawa channel	W. E. Ry. Forebay and Tailrace.
P.2.h	Pinawa channel	Intake.
P.2.j	Pinawa channel	Above Sharkey's Dam.
P.2.k	Pinawa channel	Above Diversion Dam (M.H.S.).
P.2.l	Pinawn channel	Above Diversion Dam (W.E. Ry.).
P.2.m	Pinawa channel	Below Diversion Dam (W.E. Ry.).
P.2.o	Pinawa channel	Automatic Gauge, above Control Dam.
R.4.d	Red river	Redwood Bridge.
R.4.e	Red river	Morris.
R.4.f	Red river	Elm Park Bridge.
W.4.a	Lake Winnipegosis	Winnipegosis.
W.5.a	Lake Winnipeg	Winnipeg Beach.
W.6.a	Winnipeg river	Minnki.
W.6.ag	Winnipeg river	Below Twin Falls at B.M. 180A.
W.6.h	Winnipeg river	Tailrace, Point du Bois.
W.g.ba	Winnipeg river	Forebay, Point du Bois.
W.6.bb	Winnipeg river	Above Screens, Point du Bois.
W.6.d	Winnipeg river	Above Slave Falls.
W.6.da	Winnipeg river	Below Slave Falls.
W.6.r	Winnipeg river	Above Seven Sisters.
W.6.f	Winnipeg river	Foot of Seven Sisters.
W.6.s	Winnipeg river	Above Eightfoot Falls.
W.6.sa	Winnipeg river	Below Eightfoot Falls.
W.6.dh	Winnipeg river	Automatic Gauge, above Slave Falls.
W.6.g	Winnipeg river	City Tramway Bridge.
W.6.h	Winnipeg river	Foot of 1st McArthur Falls.
W.6.ae	Winnipeg river	Foot of 2nd McArthur Falls.
W.6.j	Winnipeg river	Head of Grand du Bonnet.
W.6.k	Winnipeg river	Head of Little du Bonnet.
W.6.af	Winnipeg river	Foot of Little du Bonnet.
W.6.l	Winnipeg river	Head of Whitemud Falls.
W.6.m	Winnipeg river	Head of Silver Falls.
W.6.n	Winnipeg river	Foot of Silver Falls.
W.6.o	Winnipeg river	Head of Pine Falls.
W.6.p	Winnipeg river	Foot of Pine Falls.
W.6.q	Winnipeg river	Fort Alexander.
W.8.a	Whitemud	Holmfield.

A list of gauging stations operated for a time by the Survey, but since abandoned, for which records are available, appears in Water Resources Paper No. 22 for 1916.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as "second-feet," "miner's inches" and "discharge in second-feet per square mile;" and (2) those which represent the actual quantity of water, as "run-off depth in inches", "acre-feet," "mile-feet" and "millions of cubic feet."

The units used in this series of reports are "second-feet," "second-feet per square mile," "run-off depth in inches," "acre-feet", "mile-feet" and "millions of cubic feet." They may be defined as follows:—

"Second-feet" is an abbreviation for cubic feet per second (c.f.s.). A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section, 1 foot wide and 1 foot deep, at an average velocity of 1 foot a second. It is generally used as a fundamental unit from which others are computed by the use of factors given in the following tables of equivalents.

"Second-feet per square mile" is the average number of cubic feet flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off depth in inches" is the depth to which a drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-feet" is equivalent to 43,560 cubic feet and is the quantity of water required to cover 1 acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation or power.

"Mile-foot" is equivalent to 27,878,400 cubic feet, and is the quantity of water required to cover one square mile to a depth of 1 foot, and is equal to 640 acre-feet.

"Millions of cubic feet" is a term frequently used to express quantity of storage. When the quantities are of sufficient magnitude the unit is increased to that of "Billions of cubic feet."

Certain terms not in common use may be defined as follows:—

"Control," "controlling section" and "point of control" are used to designate the cross section of the stream below the gauge which controls or regulates the height of the water surface at the gauge. The control may not be the same cross section at all stages.

"Discharge relation" is the relation of discharge to gauge height.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting velocity in feet per second into velocity in miles per hour.

[1 foot per second=0·681818 mile per hour, or very nearly ⅔ mile per hour. 1 mile per hour=1·4667 foot per second, or very nearly 1½ foot per second. In computing the table the values 0·68182 and 1·4667 were used.]

Units.	Tenths.									
	0	1	2	3	4	5	6	7	8	9
0	0·000	0·068	0·136	0·205	0·273	0·341	0·409	0·477	0·545	0·614
1	0·682	0·750	0·818	0·886	0·955	1·020	1·090	1·160	1·230	1·300
2	1·360	1·430	1·500	1·570	1·640	1·700	1·770	1·840	1·910	1·980
3	2·050	2·110	2·180	2·250	2·320	2·390	2·450	2·520	2·590	2·660
4	2·730	2·800	2·860	2·930	3·000	3·070	3·140	3·200	3·270	3·340
5	3·410	3·480	3·550	3·610	3·680	3·750	3·820	3·890	3·950	4·020
6	4·090	4·160	4·230	4·300	4·360	4·430	4·500	4·570	4·640	4·700
7	4·770	4·840	4·910	4·980	5·050	5·110	5·180	5·250	5·320	5·390
8	5·450	5·520	5·590	5·660	5·730	5·800	5·860	5·930	6·000	6·070
9	6·140	6·200	6·270	6·340	6·410	6·480	6·550	6·610	6·680	6·750

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second-feet per square mile.	Run-off in inches.				
	1 day	28 days.	29 days.	30 days.	31 days.
1	0·03710	1·041	1·079	1·116	1·153
2	0·07438	2·083	2·157	2·231	2·306
3	0·11157	3·124	3·236	3·347	3·459
4	0·14876	4·165	4·314	4·463	4·612
5	0·18595	5·207	5·393	5·578	5·764
6	0·22314	6·248	6·471	6·694	6·917
7	0·26033	7·289	7·550	7·810	8·070
8	0·29752	8·331	8·628	8·926	9·223
9	0·33471	9·372	9·707	10·041	10·376

NOTE.—For part of a month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second-feet.	Run-off in acre-feet				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	1·983	55·54	57·52	59·50	61·49
2	3·967	111·10	115·00	119·00	123·00
3	5·950	166·60	172·60	178·50	184·50
4	7·934	222·10	230·10	238·00	246·00
5	9·917	277·70	287·60	297·50	307·40
6	11·900	333·20	345·10	357·00	368·90
7	13·880	388·80	402·60	416·50	430·40
8	15·870	444·30	460·20	476·00	491·90
9	17·850	499·80	517·70	535·50	553·40

NOTE.—For part of a month multiply values for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of gallons.

Discharge in second-feet.	Run-off in millions of gallons				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0·6463	18·10	18·74	19·39	20·04
2	1·2930	36·20	37·48	38·78	40·08
3	1·9390	54·30	56·22	58·17	60·12
4	2·5850	72·40	74·96	77·56	80·16
5	3·2320	90·50	93·70	96·95	100·20
6	3·8780	108·60	112·40	116·30	120·20
7	4·5240	126·70	131·20	135·70	140·30
8	5·1710	144·80	149·90	155·10	160·30
9	5·8170	162·90	168·70	174·50	180·40

NOTE.—For part of a month multiply the value for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of cubic feet.

Discharge in second-feet.	Run-off in millions of cubic feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0·0864	2·419	2·506	2·592	2·678
2	0·1728	4·838	5·012	5·184	5·356
3	0·2592	7·257	7·518	7·776	8·034
4	0·3456	9·676	10·024	10·368	10·712
5	0·4320	12·095	12·530	12·960	13·390
6	0·5184	14·514	15·036	15·552	16·068
7	0·6048	16·933	17·542	18·144	18·746
8	0·6912	19·352	20·048	20·736	21·424
9	0·7776	21·771	22·554	23·328	24·102

NOTE.—For part of a month multiply values for one day by the number of days.

1 second-foot equals 35·71 British Columbia miner's inches, or one British Columbia miner's inch equals 1·68 cubic foot per minute.

1 second-foot equals 6·23 British imperial gallons per second; equals 538,453 gallons for one day.

1 second-foot equals 7·48 United States gallons per second; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1·131 foot or 13,572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet; equals 724 acre-feet.
1 second-foot for one hour equals about 1 acre-inch.
100 British imperial gallons per minute equals 0·268 second-foot.
100 United States gallons per minute equals 0·223 second-foot.
1,000,000 British imperial gallons per day equals 1·86 second-foot.
1,000,000 United States gallons per day equals 1·55 second-foot.
1,000,000 British imperial gallons equals 3·68 acre-feet.
1,000,000 United States gallons equals 3·07 acre-feet.
1,000,000 cubic feet equals 22·95 acre-feet.
1,000,000,000 (1 billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
1 acre-foot equals 43,560 cubic feet.
1 acre-foot equals 271,472 British imperial gallons.
1 acre-foot equals 325,850 United States gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0·0737 second-foot per year.
1 foot deep on 100 square miles equals 2·79 billions of cubic feet, equals 3,227 second-feet for 10 days, 1,076 second-feet for 30 days or 88 second-feet for one year.
1 foot equals 0·3048 metre.
1 mile equals 1·60935 kilometre.
1 mile equals 5,280 feet.
1 acre equals 0·4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2·59 square kilometres.
1 cubic foot equals 0·0283 cubic metre.
1 cubic foot of water weighs 62·43 pounds.
1 cubic meter per minute equals 0·5886 second-foot.
1 horse-power equals 550 foot-pounds per second.
1 horse-power equals 76·0 kilogram-metres per second.
1 horse-power equals 746 watts, or 0·746 kilowatt.
1 horse-power equals 1 second-foot of water falling 8·80 feet.
1⅓ horse power equals about 1 kilowatt.
To calculate water-power quickly:
second-feet X fall in feet ÷ 11 = net horse-power on water-wheel, realizing 80 per cent of theoretical power.

METHODS OF DETERMINING DISCHARGE.

There are a number of methods employed in determining the discharge for streams, each of which has its own particular advantage when employed under certain conditions.

These various methods have been discussed at length in a previous publication so are not included in the present report. Those desiring information along these lines will find the subject well covered in Water Resources Paper No. 4 of the Dominion Water Power Branch.

EXPLANATION OF DATA.

For each regular gauging station the following data, so far as available, are given:—

1. Description of Station.
2. Table of Discharge Measurements.

3. Table of Daily Discharges.
4. Table of Monthly Discharge and Run-off.

Under description of Station, the following information is given:—location and installation of the station, method of determining discharge, characteristics of channel, extent of drainage area and control of factors, if any, which might affect the discharge-relation. A statement is also made as to the accuracy and reliability of the data.

The Table of Discharge Measurements gives the date of the measurement, gauge height, and discharge in second-feet.

The Table of Daily Discharges gives the discharge corresponding to the daily observed elevation of water-surface at the station. Where observations are made more frequently than once a day, the mean of the day's readings has been used in computing discharge.

Attention is called to the fact that the zero of the gauge bears no relation to zero flow or the bottom of the river.

The measured discharge and corresponding observed gauge heights are the base data from which the discharge rating tables, daily discharges and monthly discharges are computed.

The Discharge Rating Table, which is not published in this report, gives the discharge in second-feet, corresponding to increment of one-tenth of a foot in gauge height and covers the range in stage of the river recorded during the period for which the table is applicable. At such times as the gauge height is temporarily affected by ice-cover, backwater, etc., the discharge relation is not applicable unless proper corrections to the gauge heights are known and applied.

In the table of monthly discharge, the co[illegible] headed "Maximum" gives the mean flow for the day of highest discha[illegible] it is evident that there may have been short periods when the discharge w[illegible]s higher than that given in the column. Likewise in the column of "Minimum" the quantity given is the mean flow for the day of the lowest discharge. The column headed "Mean" is the average flow in cubic feet for the month. On this mean are based the computations of run-off which have previously been defined

The drainage areas as given for each station have been obtained by planimeter determination from the latest available departmental maps.

The base data presented in this report, unless otherwise stated in the description of station, has been collected by methods commonly in practice and described in previous annual reports.

PUBLICATIONS.

The data gathered by the Survey is published by the Dominion Water Power Branch in the form of water resources papers. The data are prepared and appear as promptly as possible in printed form. These publications may be had, either on application to the Director of Water Power, Dominion Water Power Branch, Ottawa, or to the chief engineer of the Hydrometric Survey of Manitoba, Winnipeg, Manitoba, where a limited supply of the publications is held for local distribution.

Those publications dealing particularly with the stream flow and water powers in Manitoba are listed below:—

Water Resources Paper No. 3.—Report on Power and Storage Investigations, Winnipeg River, by J. T. Johnston, C.E.

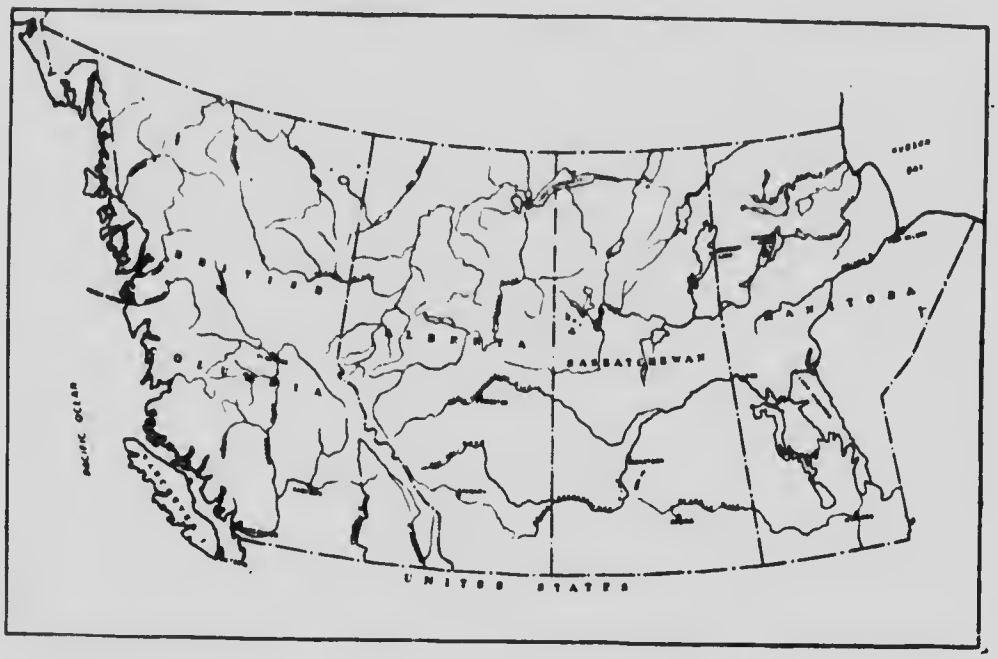
Water Resources Paper No. 4—Stream Measurement Report of the Manitoba Hydrometric Survey to the end of 1914, by M. C. Hendry, B.A.Sc.

Water Resources Paper No. 7—Report on the Manitoba Water Powers, by S. S. Scovil, B.Sc.

Water Resources Paper No. 19—Stream Measurement Report of the Manitoba Hydrometric Survey for 1915, by M. C. Hendry, B.A.Sc.

Water Resources Paper No. 22—Stream Measurement Report of the Manitoba Hydrometric Survey for 1916, by M. C. Hendry, B.A.Sc.
Water Resources Paper No. 24—Stream Measurement Report of the Hydrometric Survey of Manitoba for the Climatic Years 1916-17, and 1917-18, by M. C. Hendry, B.A.Sc.

HYDROMETRIC OR STREAM MEASUREMENT OPERATIONS IN WESTERN CANADA.



The hydrometric survey operations in the provinces of Alberta and Saskatchewan are carried on by the Reclamation Service. Information can be obtained from the Director of the Reclamation Service at Ottawa or the Commissioner of Irrigation at Calgary, Alberta.

The hydrometric survey operations in the province of Manitoba are carried on by the Dominion Water Power Branch. Information can be obtained from the Director of Water Power at Ottawa or from the Chief Engineer of the Hydrometric Survey of Manitoba at Winnipeg.

The hydrometric survey operations in the province of British Columbia are carried on by the Dominion Water Power Branch in co-operation with the provincial Water Rights Branch. Information can be obtained from the Director of Water Power at Ottawa or from the Chief Engineer of the Hydrometric Survey of British Columbia at Vancouver.

ACKNOWLEDGEMENTS.

The Survey is indebted to the officials of a number of corporations for co-operations in obtaining records and for placing the results of various observations made by members of their owa staffs, at the disposal of the Survey. The officials to whom acknowledgement is due are those of the Winnipeg Electric Railway Company, of the Winnipeg Municipal Power Plant, Point du Bois, of the Lake of the Woods Milling Company, of the Kenora Municipal Plant, of the Minnedosa Power Company and the city engineer, Brandon.

PART II.

HYDROMETRIC DATA.

At numerous stations discharges only have been published; daily gauge heights and other relevant data for any such station will be furnished on application.

LAKE OF THE WOODS OUTLETS.

The outflow from Lake of the Woods into the Winnipeg river takes place through several natural and artificial channels. The flow through all these outlets is controlled by the operation of hydraulic plants or the manipulation of dams. The outlets from the lake in order from the east are,—eastern outlet, completely controlled by the municipal power plant of Kenora; the western outlet, upon which has been built the Norman dam; the head race of mill "C" Lake of the Woods Milling Co., an artificial outlet; the head race of mill "A" belonging to the same company and also an artificial channel, and lastly, the head race of the Keewatin Lumber and Manufacturing Co.'s plant which was formed by the enlargement of an old high water channel that discharged into Mink bay which in turn drains into Darlington bay, an arm of the Winnipeg river.

Below the outlets the Winnipeg river is split up into a number of branches, the tailraces of mills "A" and "C", the outlet of Darlington bay and the western outlet forming the west branch, and the river below the eastern outlet forming the east branch. These unite below Old Fort Island to form the main river.

The manipulation and operation of the dams and plants at the various outlets renders it difficult to ascertain the discharge from Lake of the Woods. In order that correct estimates may be made it has been necessary to establish and operate a number of metering stations and to maintain gauges at various points in the district. The location of the metering stations are as follows:—

1. Eastern Outlet, above the Kenora Power House.
2. Western Outlet, Norman Traffic Bridge.
3. Head Race Mill "C".
4. Head Race Mill "A".
5. Head Race, Keewatin Lumber & Manufacturing Co.
6. C.P.R. Culvert, Outlet of Mink Bay.
7. North Tunnel Island station.

In addition to the records obtained at these regular stations, observations of the discharge at different controlling sections below the outlets have been made from time to time.

East Branch, Winnipeg River, at Kenora Power House.

Station No. 5PE1.

History.—The discharge of the east branch, or eastern outlet, Lake of the Woods, depends upon the operation of the Kenora municipal power plant. To determine the discharge under these circumstances, it was necessary to rate the power plant. At first an attempt was made to determine the discharge

directly, and to this end a station was established by Mr. S. S. Scovil, June 27, 1912, about one-half mile below the power house near Old Fort island; this proved unsatisfactory, and a station was established by A. Pirie, October 8, 1913, about one hundred and fifty feet above the power-house on the eastern outlet. This section was used to rate the power station.

Location of Section.—The metering section is located about one hundred and fifty feet above the Kenora power house on the eastern outlet of the Lake of the Woods. The Station is operated as a boat station and is used throughout the year.

Drainage Area.—The drainage area above the section is 26,400 square miles, but as there are several other outlets from the Lake of the Woods, this drainage area should not be used in computation of run-off.

Channel.—The channel is permanent, being in solid rock and boulders, is fairly uniform and free from eddies. It is straight for fifty feet above the section and one hundred feet below and fairly uniform. All the water passes through the power-house except for a small part escaping by the log shute.

Gauge.—Tailrace and headrace gauges were established at the power plant in 1907 and are the ones used in the records up to June of 1912. On June 24 and 27 of 1912 head and tailrace gauges were established by S. S. Scovil, the former being on the upstream side of the timber platform in the headrace and the latter sixty feet below the power-house. On September 13, 1913, the location of the tailrace gauge was altered by G. J. Lamb, the new location being at a point fifty-five feet north of the east end of the power-house. Since the above date all tailrace records refer to the gauge in the new location. Both of these gauges are referred to W. P. S. datum.

Discharge Measurements.—Since this station was established, discharge measurements have been made covering practically the entire range in head and load to be met with in the operation of the plant, and from this information rating curves of load discharge for various heads have been constructed.

Records Available.—Daily gauge height records are available for the head and tailrace of the plant from August 21, 1907 to September 30, 1918. Based on these gauge heights and the accompanying loads on the plant, estimates of daily discharge are vailable for the above period.

Accuracy.—Except for conditions due to very small loads, the rating may be considered good.

Discharge Measurements of East Branch, Winnipeg River, at Kenora Power House, during 1917-18.

(Drainage area 26,400 square miles.)

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
May 19.....	57·79	1,522		June 17	1,058·45	747·3	
May 22	57·89	1,601		June 17.....	1,058·43	1,383·2	
June 26.....	57·93	1,370		July 19.....	1,058·41	1,454·8	
				July 19.....	1,058·41	1,357·0	
				Aug. 29.....	1,058·69	535·1	
				Aug. 29	1,058·09	510·2	
				Sept. 28	1,058·21	1,376·0	

Daily Discharge in Second-feet, of East Branch, Winnipeg River at Kenora Power House, for part of year ending Sept. 30, 1917 and year ending Sept. 30, 1918.

(Drainage area 26,400 square miles.)

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.
1916-17.												
1				873	1,371	1,427	890	1,603	1,377	598	802	629
2				1,216	1,390	1,333	1,271	1,614	1,401	603	801	601
3				1,189	1,395	1,363	1,299	1,584	734	800	823	609
4				1,204	961	956	1,301	1,574	982	1,034	807	664
5				1,053	1,359	1,314	1,233	1,571	1,401	1,261	797	881
6				974	1,357	1,297	907	999	1,369	1,248	636	840
7				865	1,342	1,308	1,270	1,534	1,311	1,249	773	789
8				963	1,417	981	860	1,552	1,292	683	839	642
9				1,252	1,406	935	1,308	1,546	1,321	1,040	622	605
10				1,122	1,400	1,249	1,311	1,523	723	1,280	839	644
11				785	957	899	1,275	1,485	808	1,273	845	639
12				736	1,348	923	1,287	1,439	1,230	1,294	580	626
13				728	1,389	805	1,258	959	1,248	1,276	834	640
14				711	1,387	819	1,258	1,446	1,278	1,273	816	620
15				865	1,351	812	841	1,437	1,288	695	830	649
16				945	1,376	876	1,239	1,397	1,254	1,041	707	607
17				961	1,381	1,336	1,178	1,402	801	1,260	626	840
18				935	952	937	1,445	1,430	1,255	1,214	632	840
19				1,028	1,384	1,382	1,705	1,457	1,297	1,228	598	869
20				1,278	1,394	1,087	1,708	927	1,238	1,264	622	840
21				913	1,389	1,324	1,736	1,427	1,294	1,221	732	847
22				936	1,387	1,313	909	1,413	1,277	666	812	871
23				1,252	1,383	1,291	1,447	1,419	1,278	992	805	602
24				1,245	1,383	1,288	1,751	1,385	673	1,221	809	852
25				1,302	937	858	1,714	1,321	1,015	1,231	629	876
26				1,293	1 340	1,270	1,743	1,411	1,148	1,232	603	880
27				1,297	1,351	1,281	1,699	895	1,243	1,222	663	873
28				886	1,365	1,282	1,688	1,372	1,060	1,204	858	897
29				955	.....	1,247	1,073	1,389	839	666	753	863
30				989	.....	1,271	1,589	1,429	817	820	636	612
31				1,026	.....	1,204	.....	1,410	...	829	647	.....
1917-18.												
1	1,104	1,423	1,472	928	1,497	1,422	1,159	1,124	1,434	573	601	569
2	1,283	1,415	875	1,301	1,488	1,369	1,409	680	706	779	610	577
3	1,379	1,349	1,218	1,467	910	861	1,385	666	1,118	1,234	594	591
4	1,379	761	1,441	1,446	1,302	1,101	1,387	660	1,322	955	579	601
5	1,400	1,159	1,455	1,452	1,493	1,434	1,395	625	1,339	1,232	598	601
6	1,365	1,395	1,476	892	1,476	1,433	1,409	655	1,332	1,264	606	600
7	721	1,436	1,462	1,288	1,486	1,415	777	648	1,333	684	596	597
8	1,090	1,429	1,494	1,477	1,478	1,417	1,210	610	1,362	887	660	571
9	1,339	1,439	901	1,476	1,482	1,450	1,395	673	727	1,266	614	611
10	1,366	1,450	1,281	1,481	835	825	1,392	668	1,057	1,272	604	602
11	1,403	1,417	1,479	1,486	1,233	869	1,342	679	1,352	1,279	591	604
12	1,379	1,429	1,473	1,473	1,462	1,402	1,373	620	1,354	1,224	621	604
13	1,359	1,468	1,488	896	1,429	1,370	1,352	626	1,349	1,250	591	595
14	723	1,490	1,484	1,287	1,474	1,403	713	687	1,336	670	588	638
15	1,101	1,448	1,478	1,483	1,474	1,394	658	1,164	1,259	605	595	591
16	1,351	1,451	881	1,442	1,479	1,430	664	1,253	697	612	597	798
17	1,356	1,466	1,249	1,483	847	766	645	1,375	748	611	599	870
18	1,412	882	1,443	1,474	1,275	878	666	1,337	1,235	630	557	878
19	1,397	1,239	1,476	1,423	1,484	1,363	673	675	1,153	837	590	879
20	1,376	1,441	1,481	1,443	1,474	1,395	668	1,062	1,233	823	597	877
21	922	1,507	1,470	1,451	1,486	1,423	623	1,241	1,253	575	586	1,031
22	1,421	1,463	1,489	1,470	1,465	1,373	1,086	1,226	1,276	831	594	593
23	1,380	1,501	1,062	1,474	1,434	1,357	1,362	1,385	671	801	589	1,059
24	1,382	1,493	1,329	1,469	826	646	1,295	1,311	1,015	825	600	1,288
25	1,434	855	754	1,483	1,219	1,122	808	1,408	1,270	841	559	1,262
26	1,424	1,275	1,305	1,490	1,334	1,353	1,418	1,443	1,233	630	597	1,286
27	1,422	1,467	1,436	1,461	1,445	1,361	1,366	1,462	1,206	655	602	1,278
28	739	1,455	1,506	1,482	1,431	1,408	735	1,466	1,273	587	597	1,273
29	1,187	1,448	1,491	1,488	.....	810	859	1,419	691	802	594	720
30	1,434	1,438	938	1,487	.....	704	1,361	1,315	1,307	816	595	1,003
31	1,431	.....	1,217	1,494	.....	667	.....	1,399	.....	756	601	.....

Monthly Discharge, of East Branch, Winnipeg River, at Kenora Power House, for Years ending Sept. 30, 1917-18.

[Drainage area 26,400 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on Drainage area.	Total in acre-feet.
1916-17						
October	1,493	737	1,096			67,390
November	1,319	717	1,156			68,787
December	1,305	831	1,108			68,129
January	1,302	711	1,026			63,086
February	1,417	937	1,313			72,920
March	1,427	805	1,150			70,711
April	1,754	841	1,340			79,736
May	1,614	895	1,399			86,022
June	1,401	673	1,143			68,013
July	1,294	598	1,062			65,300
August	858	580	735			45,193
September	897	601	742			44,152
The year	1,754	580	1,104			799,070
1917-18						
October	1,434	721	1,273			78,274
November	1,507	761	1,363			81,104
December	1,506	754	1,323			81,348
January	1,494	892	1,398			85,960
February	1,497	826	1,347			74,809
March	1,450	646	1,201			73,847
April	1,418	623	1,086			64,621
May	1,466	620	1,019			62,656
June	1,434	671	1,155			68,727
July	1,279	573	865			53,187
August	621	557	595			36,585
September	1,288	569	802			47,722
The year	1,507	557	1,117			808,671

NOTE.—Discharge per square mile and run-off depth in inches omitted, as the outlet is one of several from the Lake of the Woods.

NORMAN TRAFFIC BRIDGE.

(LAKE OF THE WOODS OUTLETS.)

Station No. 5 PE².

History.—The station was established by S. S. Scovil on June 5, 1912, and since that date has been in continuous operation.

Location.—The station is located at the downstream side of the Norman traffic bridge, which spans the western outlet of the Lake of the Woods, about two miles west of Kenora on the highway leading from Keewatin to Kenora. All discharge measurements throughout the year are taken from this bridge.

Drainage Area.—The drainage area above this section is 26,400 square miles, but owing to the fact that there are several other outlets to the Lake of the Woods, this drainage area should not be used in computing run-off.

Channel.—The bed of the channel is composed of loose rock and boulders and not liable to shift. The entire discharge of the channel is confined within the limits of the station at all stages.

The velocities on the section are high and under certain conditions eddies are encountered on the section.

Gauge.—When the station was first established, a reference point was marked on the northeast corner of the west pier of the bridge, to which water-levels

at the time of metering were referred. This was later replaced by a vertical staff guage which is referred to W.P.S. datum.

Owing to the fact that the discharge post this section depends entirely on the operation of the Norman dam, the discharge measurements and estimates of daily discharge have been referred to the gauge height at that point. The Ontario D.P.W. gauge which was located on the upper side of this dam was used for obtaining these gauge readings up to August 25, 1913. On August 26, 1913, a vertical staff gauge was installed at this point by the Manitoba Hydrometric Survey and readings have been obtained on this gauge since the latter date. This gauge is referred to W.P.S. datum.

Discharge Measurements.—A large number of discharge measurements have been obtained at this section ranging in discharge from 2,700 to 37,700 c.f.s.

Records Available.—From May 1, 1913 to September 30, 1918, a continuous record of daily gauge height has been obtained on the headrace gauge of the Norman dam.

Estimates of daily discharge over the above period are available. These estimates are based upon these gauge heights and discharge measurements which have been taken at regular intervals throughout the period.

Accuracy.—The Norman Dam which is located about 4,000 feet below the section forms the control, and the discharge is, therefore, dependent upon the manipulation of that dam. Considerable range in discharge may occur for the same gauge height recorded at the station.

Discharge Measurements of Western Outlet, Lake of the Woods, at Norman Traffic Bridge, for part year ending September, 30, 1917, and year ending September 30, 1918.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge	Remarks.
1917.	Feet.	Sec.-ft.	Logs in Dam.	1917.	Feet.	Sec.-ft.	Logs in Dam.
Jan. 2	58·41	12,313	212	Feb 26	57·63	16,411	171
Jan. 2	58·41	12,264	212	Feb 28	57·58	15,998	171
Jan. 5	58·42	12,357	212	Feb 28	57·58	15,856	171
Jan. 9	58·38	11,995	212	Mar. 3	57·51	15,525	171
Jan. 9	58·38	12,484	212	Mar. 3	57·51	15,713	171
Jan. 12	58·38	12,523	212	Mar. 6	57·46	15,868	171
Jan. 13	58·40	12,298	212	Mar. 6	57·46	15,538	171
Jan. 18	58·41	12,303	212	Mar. 7	57·43	15,236	168
Jan. 19	58·34	12,317	212	Mar. 7	57·43	15,377	168
Jan. 19	58·34	12,365	212	Mar. 8	57·39	15,961	163
Jan. 20	58·37	12,440	212	Mar. 9	57·32	16,614	156
Jan. 20	58·37	11,891	212	Mar. 9	57·27	17,278	152
Jan. 23	58·32	12,453	212	Mar. 10	57·10	17,509	144
Jan. 25	58·29	13,656	202	Mar. 10	57·02	18,378	138
Jan. 25	58·29	13,364	202	Mar. 12	56·99	18,534	133
Jan. 26	58·22	13,763	197	Mar. 12	56·90	18,750	124
Jan. 26	58·21	14,146	197	Mar. 13	56·80	18,307	115
Jan. 27	58·14	14,831	188	Mar. 14	56·81	19,508	113
Jan. 29	58·10	15,387	185	Mar. 15	56·76	19,377	110
Jan. 29	58·08	16,244	181	Mar. 16	56·70	19,329	97
Jan. 30	57·97	17,327	171	Mar. 16	56·70	19,924	95
Jan. 30	57·93	17,343	171	Mar. 17	56·64	19,282	90
Jan. 31	57·89	16,930	171	Mar. 17	56·63	19,366	86
Feb. 3	57·85	16,853	171	Mar. 19	56·53	19,011	78
Feb. 5	57·85	16,709	171	Mar. 20	56·51	19,387	71
Feb. 5	57·85	16,582	171	Mar. 20	56·50	19,379	68
Feb. 6	57·81	16,921	171	Mar. 21	56·48	19,725	60
Feb. 8	57·80	16,722	171	Mar. 21	56·46	19,438	58
Feb. 10	57·77	16,796	171	Mar. 22	56·40	19,164	54
Feb. 12	57·77	16,653	171	Mar. 22	56·40	19,435	51
Feb. 15	57·67	16,497	171	Mar. 23	56·43	19,134	42
Feb. 19	57·65	16,235	171	Mar. 24	56·38	19,229	31
Feb. 19	57·65	16,188	171	Mar. 24	56·34	19,377	28
Feb. 20	57·66	16,527	171	Mar. 27	56·32	18,912	10
Feb. 20	57·64	16·147	171	Mar. 27	56·34	19,332	6
Feb. 23	57·67	16,344	171	Mar. 29	56·34	18,813	3
Feb. 23	57·67	16,154	171	April 2	56·27	18,784	3
Feb. 24	57·63	16,221	171	April 4	56·14	18,584	3
Feb. 24	57·63	15,795	171	April 4	56·14	18,504	3
Feb. 26	57·62	15,930	171	April 10	56·00	18,131	3

Discharge Measurements of Western Outlet, Lake of the Woods, at Norman Traffic Bridge, for part year ending Sept. 30, 1917, and year ending Sept. 30, 1918. —Continued.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.	Logs in Dam.	1917-18.	Feet.	Sec.-ft.	Logs in Dam.
April 13	56·00	18,485	3	June 27	58·11	4,411	294
April 13	56·00	17,776	3	June 27	58·15	4,321	294
April 16	56·02	17,702	6	June 29	58·10	4,263	294
April 16	56·02	18,102	7	June 29	58·11	4,314	294
April 17	56·07	18·006	9	July 3	58·07	4,403	294
April 18	56·00	18,229	9	July 3	58·11	4,265	294
April 19	56·11	18,615	9	July 4	58·18	4,474	294
April 19	56·11	18,304	14	July 4	58·19	4,377	294
April 20	56·12	18,890	17	July 6	58·21	4,702	294
April 20	56·10	18,117	20	July 6	58·21	4,741	294
April 21	56·20	18,863	38	July 9	58·01	4,645	294
April 21	56·20	18,729	46	July 9	58·08	4,792	294
April 23	56·17	18,393	79	July 11	58·08	4,740	294
April 24	56·20	18,461	94	July 11	58·08	4,549	294
April 24	56·25	17,857	102	July 13	58·26	4,780	294
April 25	56·39	17,479	122	July 13	58·26	4,731	294
April 25	56·44	17,787	125	July 16	58·31	4,545	294
April 26	56·64	17,159	150	July 16	58·31	4,448	294
April 26	56·69	16,875	153	July 18	58·42	4,615	294
April 27	56·97	14,214	185	July 18	58·43	4,617	294
April 27	57·15	12,179	192	July 20	58·41	4,564	294
April 28	57·19	12,911	192	July 20	58·44	4,717	294
April 28	57·19	12,492	192	July 23	58·37	4,361	294
May 1	57·26	12,387	192	July 23	58·39	4	294
May 4	57·34	12,426	192	July 26	58·43	4	294
May 4	57·33	12,468	192	July 26	58·47	4,574	294
May 7	57·38	12,587	192	July 28	58·57	4,348	294
May 8	57·42	12,136	201	July 28	58·57	4,532	294
May 8	57·46	12,250	206	July 30	58·54	4,885	294
May 9	57·54	11,070	212	July 30	58·54	4,638	294
May 9	57·63	10,569	220	Aug. 6	58·56	4,889	294
May 10	57·69	9,237	234	Aug. 6	58·54	4,984	294
May 10	57·69	8,904	237	Aug. 8	58·38	4,951	294
May 11	57·71	9,150	237	Aug. 10	58·44	5,160	294
May 11	57·71	9,154	237	Aug. 10	58·46	5,164	294
May 14	57·80	8,611	237	Aug. 13	58·56	5,284	294
May 14	57·80	8,372	237	Aug. 13	58·57	5,187	294
May 16	57·81	9,141	237	Aug. 15	58·46	5,212	294
May 16	57·81	9,285	237	Aug. 17	58·63	5,448	294
May 21	57·83	8,717	237	Aug. 17	58·63	5,398	294
May 21	57·82	9,097	237	Aug. 20	58·39	5,394	294
May 23	57·80	8,611	237	Aug. 20	58·41	5,399	294
May 23	57·77	8,695	237	Aug. 22	58·48	5,366	294
May 25	57·87	8,924	237	Aug. 22	58·50	5,419	294
May 25	57·85	9,013	237	Aug. 24	58·20	5,011	294
May 28	57·98	8·870	237	Aug. 24	58·24	5,361	294
May 28	57·95	9,032	237	Aug. 27	58·37	5,241	294
May 30	57·49	8·689	237	Aug. 29	58·45	5,260	294
May 30	57·57	8,859	237	Aug. 29	58·45	5,358	294
June 1	57·85	8,725	237	Aug. 31	58·41	5,251	294
June 1	57·89	9,220	237	Aug. 31	58·41	5,546	294
June 4	57·77	8,982	237	Sept. 4	58·44	5,273	294
June 4	57·76	8,644	237	Sept. 4	58·44	5,268	294
June 6	57·76	9,074	237	Sept. 6	58·38	5,196	294
June 6	57·75	9,402	237	Sept. 6	58·38	5,392	294
June 7	57·71	8,768	237	Sept. 8	58·15	5,341	294
June 7	57·73	9,062	237	Sept. 8	58·18	5,201	294
June 8	57·86	9,064	237	Sept. 10	58·40	5,100	294
June 8	57·84	8,961	237	Sept. 10	58·39	4,904	294
June 9	57·83	9,436	237	Sept. 13	58·23	4,821	294
June 9	57·85	9,203	237	Sept. 13	58·22	4,918	294
June 11	57·89	9,316	237	Sept. 15	58·31	5,083	294
June 11	57·88	9,166	237	Sept. 15	58·31	4,888	294
June 12	58·15	9,613	237	Sept. 17	58·35	4,796	294
June 13	58·11	8,094	243	Sept. 17	58·35	5,091	294
June 13	58·06	8,316	245	Sept. 19	58·15	4,855	294
June 14	57·54	7,286	248	Sept. 24	58·46	4,770	294
June 14	57·54	7,300	248	Sept. 24	58·46	4,771	294
June 15	57·98	6,990	251	Sept. 26	58·30	4,641	294
June 15	57·99	7,234	251	1917-18.			
June 16	58·08	5,954	260	Oct. 2	1,058·23	4,725·2	294
June 16	58·04	5,992	260	Oct. 2	1,058·24	4,824·6	294
June 18	58·02	5,164	264	Oct. 9	1,058·20	4,329·9	294
June 18	58·01	4,730	266	Oct. 9	1,058·14	4,657·8	294
June 19	57·75	4,296	276	Oct. 11	1,057·88	4,569·4	294
June 19	57·78	4,397	276	Oct. 22	1,057·82	4,261·1	294
June 20	58·15	4,175	290	Oct. 22	1,057·78	4,253·9	294
June 20	58·18	4,369	290	Oct. 24	1,058·39	4,449·3	294
June 21	57·83	4,023	290	Oct. 24	1,058·33	4,353·4	294
June 21	57·83	4,071	290	Oct. 29	1,058·16	4,492·7	294
June 22	58·02	4,297	294	Oct. 29	1,058·16	4,507·3	294
June 22	58·05	4,254	294	Oct. 31	1,058·22	4,284·9	294
June 25	58·12	4,315	294	Oct. 31	1,058·23	4,286·7	294
June 25	58·14	4,222	294	Nov. 5	1,058·22	4,430·9	294

Discharge Measurements of Western Outlet, Lake of the Woods, at Norman Traffic Bridge, for part year ending September 30, 1917, and year ending September 30.—Concluded.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917-18.	Feet.	Sec.-ft.	Logs in Dam.	1917-18.	Feet.	Sec.-ft.	Logs in Dam.
Nov. 5	1,058·22	4,333·6	294	April 10	1,057·78	4,087·2	283
Nov. 7	1,058·29	4,688·0	294	April 16	1,057·71	4,194·1	283
Oct. 7	1,058·28	4,295·5	294	April 17	1,057·76	4,203·1	283
Nov. 13	1,058·29	4,395·0	294	April 17	1,057·75	4,058·1	283
Nov. 14	1,058·24	4,580·8	294	April 23	1,057·72	4,195·9	283
Nov. 14	1,058·24	4,434·6	294	April 23	1,057·72	4,213·6	283
Nov. 20	1,058·18	4,180·5	294	April 24	1,057·86	4,173·0	283
Nov. 20	1,058·18	4,131·9	294	April 24	1,057·87	4,174·8	283
Nov. 21	1,058·09	4,068·0	294	May 20	1,057·00	4,483·5	283
Nov. 21	1,058·04	4,301·0	294	May 20	1,057·95	4,637·9	283
Nov. 27	1,058·28	4,197·0	294	May 22	1,058·07	4,514·8	283
Nov. 27	1,058·30	4,250·3	294	May 22	1,058·05	4,511·9	283
Nov. 28	1,058·24	4,337·1	294	May 28	1,058·12	4,622·5	283
Nov. 28	1,058·24	4,434·6	294	May 28	1,058·13	4,575·7	283
Dec. 17	1,058·17	4,129·6	294	May 29	1,058·21	4,786·3	283
Dec. 17	1,058·17	4,226·8	294	May 29	1,058·20	4,686·8	283
Dec. 19	1,058·16	4,370·7	294	June 3	1,058·31	4,855·4	283
Dec. 31	1,058·18	4,325·8	294	June 3	1,058·31	4,708·3	283
Jan. 4	1,058·20	4,183·4	294	June 5	1,058·39	4,723·9	283
Jan. 4	1,058·20	4,280·7	294	June 5	1,058·40	4,578·2	283
Jan. 7	1,058·21	4,185·1	294	June 11	1,058·24	4,547·9	283
Jan. 12	1,058·23	4,130·6	294	June 11	1,058·15	4,286·7	283
Jan. 16	1,058·22	4,100·3	294	June 12	1,058·43	4,682·4	283
Jan. 16	1,058·22	4,098·1	294	June 12	1,058·45	4,883·7	283
Jan. 17	1,058·21	4,136·4	294	June 18	1,058·41	4,974·0	283
Jan. 17	1,058·21	4,331·1	294	June 18	1,058·41	4,727·8	283
Jan. 19	1,058·21	4,226·4	294	June 19	1,058·51	4,648·4	283
Jan. 19	1,058·21	4,221·5	294	June 19	1,054·49	4,693·9	283
Jan. 21	1,058·23	4,284·9	294	June 25	1,058·43	4,879·6	283
Jan. 21	1,058·23	4,138·8	294	June 25	1,059·41	4,777·1	283
Jan. 23	1,058·16	4,126·7	294	June 26	1,058·53	4,751·3	283
Jan. 23	1,058·16	4,223·8	294	June 26	1,058·54	4,752·2	283
Feb. 6	1,058·12	4,168·3	294	July 2	1,058·45	4,933·1	283
Feb. 6	1,058·12	4,119·9	294	July 2	1,058·47	4,788·9	283
Feb. 8	1,058·09	4,066·2	294	July 3	1,058·53	4,949·3	283
Feb. 8	1,058·09	4,114·6	294	July 3	1,058·53	4,799·8	283
Feb. 11	1,058·09	4,259·8	294	July 8	1,058·50	4,992·5	283
Feb. 11	1,058·09	4,163·0	294	July 10	1,058·39	4,743·3	283
Feb. 13	1,058·05	3,962·8	294	July 10	1,058·39	4,773·2	283
Feb. 13	1,058·05	4,252·8	294	July 15	1,058·39	4,704·2	283
Feb. 18	1,057·98	3,951·2	294	July 15	1,058·38	4,771·1	283
Feb. 18	1,057·98	4,047·5	294	July 17	1,058·48	4,790·9	283
Feb. 23	1,058·06	4,157·8	291	July 17	1,058·49	4,792·9	283
Feb. 26	1,057·98	5,000·3	283	July 22	1,058·36	4,914·7	283
Feb. 26	1,057·97	5,539·0	278	July 22	1,058·36	4,865·5	283
Feb. 27	1,057·96	5,777·3	267	July 25	1,058·30	4,755·5	283
Feb. 27	1,057·94	6,205·4	260	July 29	1,058·41	4,875·5	283
Feb. 28	1,057·94	6,494·0	249	July 29	1,058·44	4,732·7	283
Feb. 28	1,057·94	6,686·5	246	July 31	1,058·60	5,062·7	283
Mar. 1	1,057·87	7,721·9	232	July 31	1,058·63	4,870·2	283
Mar. 1	1,057·87	8,105·6	228	Aug 13	1,058·50	4,943·1	283
Mar. 2	1,057·88	8,204·9	228	Aug 13	1,058·52	5,046·2	283
Mar. 5	1,057·77	7,927·8	228	Aug. 14	1,058·53	4,998,9	283
Mar. 7	1,057·83	7,948·2	228	Aug. 14	1,058·54	4,753·3	283
Mar. 7	1,057·83	7,852·5	228	Aug. 19	1,058·62	5,017·3	283
Mar. 11	1,057·71	7,907·7	228	Aug 19	1,058·63	5,019·3	283
Mar. 11	1,057·71	7,621·9	228	Aug 21	1,058·59	5,159·8	283
Mar. 13	1,057·69	7,853·5	228	Aug 21	1,058·58	5,108·3	283
Mar. 13	1,051·69	7,758·3	228	Aug 26	1,058·57	5,007·1	283
Mar. 18	1,057·68	7,992·0	228	Aug 26	1,058·58	5,306·7	283
Mar. 18	1,057·68	7,612·3	228	Aug 27	1,058·78	5,200·2	283
Mar. 20	1,057·63	7,548 7	228	Aug 27	1,058·79	5,212·3	283
Mar. 20	1,057·63	7,691·1	228	Sept. 4	1,058·52	5,392·5	283
Mar. 25	1,057·61	7,355·8	228	Sept. 5	1,058·56	5,153 6	283
Mar. 25	1,057·61	7,877·9	228	Sept. 5	1,058·56	5,193·2	283
Mar. 26	1,057·57	8,338·0	217	Sept. 10	1,058·61	5,462·2	283
Mar. 26	1,057·53	8,843·8	213	Sept. 10	1,058·64	5,319·7	283
Mar. 27	1,057·30	12·092·5	196	Sept. 12	1,058·56	5,104·1	283
Mar. 27	1,057·25	12,731·5	189	Sept. 12	1,058·56	5,302·3	283
Mar. 28	1,057·16	13,858·6	176	Sept. 16	1,058 33	5,203·1	283
Mar. 28	1,057·16	14,138·9	176	Sept. 16	1,058·32	4,906·6	283
Mar. 30	1,057·61	7,593·1	228	Sept. 17	1,058·38	5,263·0	283
Apr. 1	1,057·61	7,450·7	228	Sept. 17	1,058·38	5,361·4	283
Apr. 1	1,057·61	7,545·7	228	Sept. 23	1,058·24	5·085·8	283
April 3	1,057·62	7,579·4	228	Sept. 23	1,055·26	4,992·2	283
April 3	1,057·62	7,604·4	228	Sept. 25	1,058·28	4,996·4	283
April 8	1,057·59	7,539·0	228	Sept. 25	1,058·28	5,094·3	283
April 9	1,057·69	5,619·0	269	Sept. 30	1,058·16	4,922·6	283
April 9	1,057·71	5,195·0	275	Sept. 30	1,058·18	4,925·68	283
April 10	1,057·78	4,102·5	283				

Daily Discharge in Second feet of Western Outlet, Lake of the Woods, at Norma Traffic Bridge, for part year ending Sept., 30, 1917 and year ending Sept., 30, 1918.

[Drainage area 26,400 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1				11,992	16,615	15,758	18,750	12,268	8,812	4,137	4,628	5,040
2				11,994	16,604	15,725	18,548	12,299	8,748	4,162	4,629	5,038
3				11,997	16,602	15,694	18,535	12,325	8,747	4,174	4,668	5,029
4				12,016	16,572	15,677	18,419	12,348	8,950	4,221	4,675	5,046
5				12,027	16,451	15,394	18,467	12,380	9,010	4,281	4,690	5,023
6				12,011	16,482	15,351	18,429	12,402	9,134	4,354	4,791	5,051
7				12,008	16,464	15,314	18,392	12,549	9,002	4,341	4,802	5,040
8				11,946	16,469	16,002	18,366	12,052	9,026	4,332	4,811	5,050
9				11,943	16,431	16,887	18,019	10,731	9,204	4,442	4,846	4,976
10				12,030	16,498	17,740	18,021	8,922	9,130	4,436	4,842	4,699
11				11,945	16,447	17,836	18,016	8,925	9,217	4,437	4,852	4,690
12				12,033	16,388	18,431	18,023	8,924	9,386	4,434	4,869	4,685
13				12,026	16,345	18,906	18,020	8,927	8,130	4,422	4,990	4,670
14				12,019	16,334	19,345	17,993	8,777	7,115	4,412	5,006	4,705
15				12,013	16,287	19,327	17,965	8,920	6,873	4,416	5,016	4,722
16				12,007	16,247	19,309	17,875	9,094	5,729	4,391	5,024	4,736
17				12,029	16,232	19,236	17,991	9,019	5,214	4,396	5,034	4,858
18				12,014	16,208	19,300	18,101	9,033	4,739	4,388	5,065	4,834
19				12,016	16,114	19,027	18,239	8,997	4,118	4,370	5,074	4,814
20				12,012	16,104	19,182	18,270	8,959	4,090	4,387	5,158	4,799
21				12,005	16,080	19,163	18,162	8,616	3,967	4,382	5,145	4,763
22				12,067	16,077	19,157	18,116	8,620	4,070	4,376	5,136	4,752
23				12,261	16,065	19,131	17,897	8,617	4,064	4,355	5,127	4,731
24				12,721	16,046	19,135	17,970	8,681	4,062	4,361	5,115	4,561
25				13,225	16,041	19,123	17,840	8,697	4,128	4,348	5,117	4,543
26				13,870	15,794	19,083	16,972	8,614	4,133	4,358	5,108	4,527
27				14,546	15,827	18,991	13,057	8,758	4,182	4,285	5,070	4,557
28				14,993	15,787	18,977	12,639	8,798	4,140	4,242	5,064	4,560
29				15,508	.....	18,937	12,497	8,696	4,135	4,342	5,066	4,575
30				16,758	.....	18,867	12,329	8,694	4,149	4,589	5,061	4,606
31				16,623	.....	18,820		8,689	.....	4,606	5,049	.....
1917-18												
1	4,705	4,355	4,302	4,165	4,055	7,870	7,498	4,196	4,447	5,097	4,780	5,140
2	4,712	4,325	4,294	4,160	4,059	7,867	7,494	4,166	4,477	4,774	4,779	5,161
3	4,709	4,340	4,293	4,154	4,066	7,875	7,491	4,174	4,508	4,777	4,783	5,174
4	4,711	4,361	4,297	4,146	4,072	7,869	7,497	4,177	4,512	4,781	4,789	5,179
5	4,679	4,388	4,296	4,150	4,074	7,872	7,489	4,200	4,518	4,775	4,799	5,185
6	4,667	4,405	4,300	4,144	4,063	7,870	7,482	4,236	4,517	4,773	4,794	5,176
7	4,657	4,387	4,299	4,146	4,064	7,868	7,487	4,244	4,521	4,779	4,798	5,166
8	4,493	4,428	4,298	4,118	4,051	7,848	6,495	4,268	4,524	4,780	4,794	5,161
9	4,512	4,418	4,277	4,126	4,058	7,835	5,322	4,254	4,524	4,778	4,799	5,112
10	4,492	4,411	4,194	4,118	4,051	7,817	4,076	4,273	4,579	4,780	4,797	5,112
11	4,483	4,408	4,197	4,108	4,051	7,771	4,050	4,277	4,587	4,772	4,813	5,102
12	4,475	4,391	4,199	4,120	4,054	7,773	4,054	4,301	4,579	4,773	4,822	5,099
13	4,457	4,396	4,196	4,115	4,036	7,768	4,055	4,333	4,588	4,776	4,826	5,095
14	4,389	4,394	4,202	4,101	4,018	7,760	4,063	4,330	4,592	4,777	4,834	5,086
15	4,395	4,381	4,199	4,098	3,904	7,747	4,087	4,341	4,588	4,780	4,840	5,088
16	4,394	4,356	4,175	4,098	3,911	7,738	4,100	4,348	4,594	4,784	4,851	5,051
17	4,384	4,341	4,276	4,090	3,956	7,695	4,109	4,348	4,605	4,780	4,863	5,039
18	4,379	4,304	4,269	4,091	3,834	7,659	4,119	4,362	4,614	4,782	4,892	5,053
19	4,371	4,121	4,272	4,084	3,881	7,632	4,113	4,375	4,617	4,783	4,925	5,027
20	4,370	4,093	4,271	4,077	3,915	7,629	4,120	4,385	4,619	4,774	4,943	5,031
21	4,336	4,072	4,271	4,054	3,960	7,618	4,122	4,396	4,624	4,774	4,944	5,017
22	4,317	4,080	4,275	4,055	3,983	7,597	4,150	4,398	4,624	4,781	4,951	5,002
23	4,314	4,184	4,233	4,064	4,003	7,597	4,147	4,398	4,626	4,778	4,973	4,948
24	4,311	4,088	4,332	4,057	4,030	7,590	4,155	4,401	4,709	4,779	4,983	4,943
25	4,137	4,101	4,339	4,056	4,698	7,540	4,156	4,447	4,717	4,773	5,022	4,936
26	4,316	4,254	4,334	4,052	5,327	8,497	4,155	4,419	4,715	4,778	5,080	4,928
27	4,321	4,227	4,331	4,057	5,886	12,385	4,161	4,425	4,711	4,778	5,099	4,927
28	4,322	4,281	4,336	4,047	6,499	13,993	4,160	4,430	4,720	4,772	5,103	4,903
29	4,367	4,277	4,330	4,044	.....	10,797	4,181	4,436	4,718	4,778	5,125	4,881
30	4,362	4,278	4,331	4,041	.....	7,518	4,188	4,445	4,716	4,773	5,126	4,880
31	4,360	.....	4,274	4,046	.....	7,516	.....	4,454	.....	4,771	5,132	.....

Monthly Discharge of Western Outlet, Lake of the Woods, at Norman Traffic Bridge for years ending September 30, 1917-18.

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum	Minimum.	Mean.	Per square mile.	Depth in inches on Drainage area.	Total in acre-feet.
1916-17						
October	26,330	14,228	22,103			1,359,060
November	19,298	11,321	17,123			1,018,889
December	18,400	11,990	14,182			872,017
January	16,758	11,943	12,731			782,798
February	16,615	15,787	16,272			903,701
March	19,345	15,314	18,027			1,108,437
April	18,750	12,329	17,397			1,035,193
May	12,999	8,614	9,785			601,656
June	9,386	3,967	6,513			387,551
July	4,696	4,137	4,360			268,086
August	5,158	4,628	4,953			304,548
September	5,051	4,527	4,789			284,965
The year	26,330	3,967	12,331			8,925,116
1917-18						
October	4,712	4,311	4,454			273,866
November	4,428	4,072	4,295			255,570
December	4,339	4,175	4,274			262,798
January	4,165	4,041	4,096			251,853
February	6,499	3,834	4,234			235,144
March	13,993	7,516	8,207			504,629
April	7,498	4,050	5,026			299,068
May	4,454	4,166	4,330			266,241
June	4,729	4,447	4,600			273,719
July	5,097	4,771	4,787			294,341
August	5,132	4,779	4,905			301,597
September	5,185	4,880	5,053			300,674
The year	13,993	3,831	4,831			3,519,204

NOTE.—Discharge per square mile and run-off depth in inches omitted, as the outlet is one of several from the Lake of the Woods.

MILL "A" HEADRACE, KEEWATIN.

(LAKE OF THE WOODS OUTLETS).

Station No. 5 PE₃.

History.—The station was established by S. S. Scovil on December 23, 1912, and has been in continuous operation since that date. This channel has formed one of the outlets of the Lake of the Woods since the erection of Mill "A" in 1887.

Location of Section.—The section is located in the headrace of Mill "A" Lake of the Woods Milling Co., Keewatin. At first it was on the downstream side of the bridge across the channel midway between the head gates and the intake racks. On December 10, 1913, the station was changed to a position just above the intake racks of the power house of Mill 'A".

Drainage Area.—The drainage area above this section is 26,400 square miles, but owing to the fact that there are several other outlets to the Lake of the Woods, this drainage area should not be used in computing run-off.

Channel.—The entrance to the racks is uniform and this section is well situated to avoid eddies of entrance, the stream line being perpendicular to the section.

Gauge.—During the continuance of the station in its original location, all measurements were referred to a vertical staff gauge on the Keewatin Traffic Bridge, recording lake gauge. When the station was established at the intake

racks, a point was established near the right bank of the channel at the section, and from this point which was referred to W.P.S. datum, minus readings were taken and discharge measurements referred to the readings obtained.

On October 1, 1914, a vertical staff gauge was established on the metering section and since that time all discharge measurements are referred to this gauge.

Discharge Measurements.—Since this station was established, discharge measurements have been obtained over a range in head and load to obtain a rating on the plant, and from this rating and daily records of head and load the daily discharge is deduced. Discharge measurements are obtained periodically at this station to act as a check on the above rating.

Records Available.—Intermittent records of gauge readings in the forebay and tailrace of the mill during the years from 1896 to 1912 are available.

Records of daily discharge through the plant based on forebay and tailrace gauge readings and loads on the mills are available from February 14, 1913 to September 30, 1918.

Accuracy.—The records are quite reliable owing to conditions controlling the discharge, *i.e.*, gate openings head, etc., being easily observed.

Discharge Measurements of Mill "A," Flume No. 1, at Headraee, Lake of the Woods Milling Co. during 1917-18.

Date.	Gauge Height.	Discharge.	Date.	Gauge Height.	Discharge.
1917	Feet.	Sec.-ft.	1918.	Feet.	Sec.-ft.
Jan. 15	58·64	273	Feb. 7	1,057·80	151·9
Jan. 15	58·64	266	Feb. 7	1,057·80	156·8
Jan. 15	58,64	288	Feb. 15	1,057·76	154·4
Mar. 26	56·485	308	Feb. 15	1,057·76	154·8
Mar. 26	56·485	295	Feb. 21	1,057·76	171·0
Oct. 10	1,058·18	273·7	Feb. 21	1,057·76	174·2
Oct. 10	1,058·18	241·8	June 24	1,058·01	247·3
Dec. 11	1,057·54	297·8	June 24	1,058·01	220·6
Dec. 11	1,057·54	297·2	July 13	1,058·67	182·7
Dec. 11	1,057·54	293·9	July 13	1,058·66	163·4
1918.			July 30	1,058·69	191·9
Jan. 14	1,057·79	293·7	July 30	1,058·69	174·3
Jan. 14	1,057·79	294·8	Aug. 24	1,058·85	110·6
Feb. 7	1,057·80	147·1	Aug. 24	1,058·85	107·0

Discharge Measurements of Mill "A," Flume No. 2, at Headraee, Lake of the Woods Milling Co., during 1917-18.

Date.	Gauge Height.	Discharge.	Date.	Gauge Height.	Discharge.
1917.	Feet.	Sec.-ft.	1917.	Feet.	Sec.-ft.
Jan. 22	58·24	769	Aug. 21	58·42	716
Jan. 22	58·24	814	Aug. 21	58·40	710
Feb. 17	57·73	803	Aug. 28	58·06	749
Feb. 17	57·73	824	Aug. 28	58·05	752
Feb. 22	57·64	824	Sept. 12	58·18	677
Feb. 22	57·66	740	Sept. 12	58·18	699
Mar. 26	56·59	968	Sept. 18	58·69	706
Mar. 26	56·46	979	Oct. 4	1,057·76	746·6
Mar. 30	56·50	1,042	Oct. 23	1,058·09	783·0
Mar. 30	56·50	1,046	Oct. 23	1,058·09	810·6
April 3	56·03	1,134	Dec. 7	1,057·64	829·1
April 3	55·93	1,134	Dec. 20	1,057·62	843·6
April 11	55·83	1,159			
April 11	55·83	1,172	1918.		
May 2	56·98	920	Jan. 5	1,057·69	858·6
May 2	56·98	889	Jan. 5	1,057·69	863·9
May 15	57·50	801	Jan. 29	1,057·70	842·3
May 15	57·50	748	Jan. 29	1,057·70	837·1
June 5	57·57	725	Mar. 12	1,057·28	859·5
June 5	57·55	723	Mar. 12	1,057·28	864·7
July 5	58·03	676	June 21	1,057·69	770·1
July 10	58·03	704	June 21	1,057·69	743·1
July 10	58·03	693	Sept. 11	1,058·13	671·2
Aug. 7	58·29	688	Sept. 11	1,058·09	702·9
Aug. 7	58·29	699			

Estimated Daily Discharge in Second-feet at Keewatin Mills, for Year 1917.

Day.	January.		February.		March.		April.		May.		June.	
	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"
1	80	198	278	786	1,161	917	149	211	1,301	786	867	716
2	311	767	278	806	1,135	879	1,288	984	1,183	893	901	756
3	731	726	272	806	1,172	1,012	1,311	984	1,295	825	78	160
4	920	797	123	223	148	230	1,337	984	1,203	844	899	736
5	919	777	309	710	1,156	873	1,339	984	1,191	864	909	736
6	887	736	309	729	1,058	870	1,337	984	113	170	504	457
7	146	268	289	739	1,027	889	1,339	984	1,163	873	183	...
8	1,006	672	304	729	1,037	870	106	203	1,170	901	169	.....
9	885	807	326	796	1,047	889	1,389	997	1,199	815	171	.....
10	566	828	297	729	1,118	1,025	1,287	997	1,085	788	85	....
11	241	777	201	245	148	213	1,402	997	1,152	748	208	...
12	265	746	289	828	1,196	1,011	1,345	997	1,101	767	219	220
13	237	471	295	796	1,175	1,011	1,398	997	110	198	225	220
14	112	281	287	739	1,237	984	1,345	997	1,062	736	113	307
15	238	281	739	729	1,235	984	123	177	1,019	756	308	284
16	236	318	1,010	825	1,234	981	1,397	1,023	985	736	166	220
17	251	624	1,072	854	1,285	984	1,310	984	1,030	736	88	161
18	614	736	185	245	117	2[illegible]	1,337	997	1,016	716	481	695
19	1,044	756	1,025	789	1,313	984	1,329	997	1,039	709	561	716
20	1,017	756	1,141	900	1,264	984	1,278	997	118	198	550	695
21	123	208	986	870	1,260	984	1,336	997	1,003	716	543	695
22	961	787	1,042	908	1,275	981	126	183	879	726	568	787
23	891	746	1,087	970	1,275	981	1,301	997	972	716	935	716
24	960	736	1,123	917	1,275	984	1,318	997	1,019	705	90	163
25	994	709	157	211	163	228	1,388	997	993	705	741	736
26	980	748	1,305	998	1,269	984	1,309	997	1,015	736	866	716
27	994	738	1,133	917	1,261	981	1,301	997	108	159	868	695
28	114	170	1,182	957	1,260	984	1,255	841	795	632	869	726
29	254	325	.....	.....	1,281	981	125	193	913	716	884	716
30	286	515	.....	.....	1,266	984	1,293	903	1,005	756	811	685
31	270	767	.....	.....	1,293	984	.....	.....	950	736	.....	.....

	July.		August.		September.		October.		November.		December.	
1	79	139	785	732	808	167	837	783	1,052	858	1,092	1,061
2	84	139	841	695	80	167	846	807	1,012	858	124	167
3	702	139	842	235	819	167	868	818	1,047	848	1,083	899
4	796	198	753	167	782	167	877	787	112	192	1,088	940
5	826	198	118	167	863	579	869	807	1,027	960	1,138	971
6	844	167	717	167	776	638	816	732	1,092	838	1,174	991
7	767	167	766	167	805	680	85	233	1,070	838	702	1,104
8	86	167	807	167	775	570	887	875	1,079	838	695	1,062
9	746	167	842	167	92	167	846	807	1,078	889	144	194
10	822	167	796	167	803	383	846	767	1,066	848	1,099	1,062
11	811	167	796	167	766	659	904	838	133	194	1,068	960
12	804	167	129	167	739	701	853	787	1,125	869	1,087	1,019
13	836	167	238	167	763	732	885	763	1,041	828	690	899
14	806	167	712	167	741	659	121	155	933	838	726	797
15	82	167	722	167	833	690	892	858	1,097	807	236	920
16	757	167	734	167	79	150	914	787	1,038	991	123	237
17	812	167	834	167	78	659	874	787	1,056	848	988	991
18	830	167	823	167	841	680	880	846	108	163	1,066	950
19	838	167	84	167	834	767	886	818	1,079	1,005	1,054	869
20	771	167	720	167	746	680	887	818	1,082	940	1,066	858
21	816	167	743	167	800	722	112	167	1,085	848	1,095	869
22	82	167	792	167	862	711	949	889	1,075	930	1,101	909
23	699	701	821	167	87	167	954	787	1,061	930	123	139
24	763	701	837	163	775	669	925	869	1,069	1,118	1,103	930
25	796	701	841	167	737	775	1,019	879	121	163	143	163
26	795	732	80	167	830	718	1,011	858	1,081	930	1,114	787
27	830	680	758	167	787	701	914	930	1,041	787	1,085	889
28	773	670	818	163	825	680	109	194	1,085	879	1,050	869
29	76	167	752	167	854	756	1,028	960	1,080	848	276	169
30	663	753	827	167	86	163	944	889	1,088	909	163	311
31	747	732	819	167	.....	.....	1,087	848	.....	.....	640	311

Estimated Daily Discharge in Second-feet, at Keewatin Mills, for January to September, 1918.

Day.	January.		February.		March		April.		May		June		July.		August		September	
	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"	Mill "A"	Mill "C"
1	933	317	1,011	889	1,076	869	1,084	773	953	746	901	767	72	167	690	186	103	167
2	937	848	1,057	889	1,002	876	1,024	787	1,043	756	81	167	68	754	697	190	100	159
3	1,064	807	195	1,104	130	160	1,028	756	1,015	756	881	756		709	233	190	167	159
4	1,081	848	927	1,166	904	972	1,040	858	1,012	746	926	797	107	708	107	190	200	511
5	976	889	855	1,176	1,006	807	1,028	818	112	163	931	756	161	689	737	190	168	627
6	95	216	898	1,134	1,068	787	1,047	856	1,003	716	1,061	777	165	648	746	186	205	669
7	1,100	879	944	1,077	1,088	889	88	160	1,035	756	1,017	797	50	167	712	186	205	659
8	1,047	920	894	990	1,108	869	1,173	917	931	716	994	807	167	649	662	190	96	173
9	1,020	879	937	880	1,134	886	1,025	128	924	787	85	186	178	680	707	190	585	173
10	1,108	889	131	163	128	190	1,018	131	976	736	865	701	217	669	679	190	785	173
11	1,068	899	1,004	1,240	1,193	981	1,006	880	953	695	1,012	736	214	680	113	190	776	722
12	1,025	920	964	1,007	1,044	838	1,062	879	81	163	884	752	184	649	198	186	782	669
13	158	232	988	1,061	1,068	889	1,061	919	1,006	736	985	742	183	617	180	190	813	752
14	1,113	971	954	1,173	1,089	866	84	188	948	767	951	752	70	179	152	190	852	752
15	1,097	940	964	1,177	1,061	927	972	886	978	756	946	701	206	680	166	190	103	159
16	1,087	920	942	1,172	1,048	869	1,028	897	901	756	73	198	203	669	185	190	518	441
17	1,100	1,005	141	188	138	202	1,010	876	940	787	859	701	197	659	143	190	859	722
18	1,074	960	974	1,187	1,149	937	1,039	807	1,037	756	862	649	193	711	94	190	835	732
19	1,112	889	991	1,133	1,075	838	1,043	899	132	188	879	669	193	680	146	525	867	736
20	111	167	1,015	1,175	1,068	838	1,016	889	973	777	857	669	193	659	146	557	867	722
21	1,112	889	988	1,147	1,099	828	149	194	943	736	868	654	62	150	142	680	861	742
22	1,071	889	898	1,104	1,070	948	977	816	1,000	767	883	638	243	722	167	568	94	134
23	1,092	899	893	909	1,070	848	1,021	837	1,000	787	79	150	201	617	206	147	995	767
24	1,091	797	131	194	125	190	1,022	838	928	746	857	669	187		173	150	909	818
25	1,126	1,033	1,013	1,084	1,218	927	1,070	869	932	726	877	701	193	Logs in Head-race.	94	150	917	807
26	1,061	1,132	991	907	1,131	837	1,084	866	89	147	851	659	188		183	153	905	767
27	121	167	989	910	1,183	917	1,047	837	973	787	255	669	148		157	210	876	767
28	1,077	991	987	869	1,185	927	132	163	978	807	252	763	81	153	143	210	869	807
29	1,018	1,033			1,225	873	976	778	973	726	244	763	198	150	151	460	94	175
30	1,075	1,019			1,129	758	980	767	895	705	72	167	193	150	153	617	923	777
31	1,078	971			129	190			926	705			155	150	150	554		

Mill "C" Headrace, Keewatin.

(Lake of the Woods outlets)

Station No. 5 PE$_4$.

History.—The station was established by S. S. Scovil on July 17, 1912 and since that time has been in continuous operation.

Location of Section.—The metering section is located, five feet upstream from the racks in the headrace of Mill "C" of the Lake of the Woods Milling Company at Keewatin, Ont.

Drainage Area.—The drainage area above the section is 26,400 square miles' but owing to the fact that there are several outlets to the Lake of the Woods, this drainage area should not be used in computing run-off.

Channel.—The channel is a rectangular rock cut having a normal depth of twelve feet.

Gauge.—A vertical staff gauge is located on the east side of the channel, ten feet upstream from the racks. This gauge is referred to W. P. S. datum.

Discharge Measurements.—Since this station was established, discharge measurements have been obtained over a sufficient range of head and load to obtain a rating of the plant, and from this rating and the records of daily head and load, daily discharges are deduced.

Records Available.—Records of daily discharge through the plant based on forebay and tailrace gauge readings and loads on the mill are available from July 17, 1912 to September 30, 1918.

Accuracy.—The records are quite reliable owing to conditions controlling the discharge, i.e., gate opening, head, etc., being easily observed.

Discharge Measurements of Headrace Mill "C", Lake of the Woods Milling Co., Keewatin, during 1917-18.

Date.	Gauge Height	Discharge	Date	Gauge Height	Discharge
1917	Feet	Sec.-ft.	1917	Feet	Sec.-ft.
Jan. 11	1,058·70	794	Dec. 26	1,058·09	944·6
Jan. 11	1,058·69	780	Dec. 28	1,058·14	958·3
Feb. 2	1,058·51	836	1918		
Feb. 2	1,058·51	856	Jan. 8	1,058·20	857·3
Feb. 17	1,058·25	881	Jan. 8	1,058·20	862·1
Feb. 17	1,058·25	891	Jan. 24	1,058·17	922·1
Mar. 5	1,058·03	968	Jan. 24	1,058·17	931·6
Mar. 5	1,058·03	973	Jan. 30	1,058·13	1,052·1
Mar. 28	1,057·57	979	Jan. 30	1,058·13	1,080·5
Mar. 28	1,057·57	971	Feb. 12	1,058·03	1,235·3
May 2	1,057·72	878	Feb. 12	1,058·03	1,178·9
May 2	1,057·72	877	Feb. 14	1,057·96	1,317·9
June 15	1,058·18	295	Feb. 14	1,057·96	1,389·3
July 24	1,058·63	722	Feb. 19	1,057·96	1,358·5
July 31	1,058·46	745	Feb. 19	1,057·96	1,349·6
July 31	1,058·48	747	Mar. 19	1,057·75	881·1
Sept. 11	1,058·43	706	Mar. 19	1,057·76	876·7
Sept. 11	1,058·43	703	April 18	1,057·76	895·1
Sept. 18	1,058·45	657	April 18	1,057·76	858·3
Sept. 18	1,058·42	675	June 20	1,058·65	686·5
Oct. 6	1,058·67	812·6	June 20	1,058·65	671·4
Oct. 6	1,058·68	779·0	July 11	1,058·54	665·8
Dec. 10	1,058·15	1,108·4	July 11	1,058·53	675·1
Dec. 10	1,058·15	1,096·3	Aug. 31	1,058·75	679·7
Dec. 10	1,058·17	1,045·2	Aug. 31	1,058·75	681·1
Dec. 14	1,058·19	909·5	Sept. 19	1,058·20	809·2
Dec. 14	1,058·19	890·7	Sept. 19	1,058·20	818·7

Keewatin Lumber and Manufacturing Co's. Headrace, Keewatin.

(Lake of the Woods Outlets).

Station No. 5 PE₅.

History.—The station was established by S. C. O'Grady on December 13, 1913, and has been in operation continuously since that date.

The channel forms one of the outlets of the Lake of the Woods. It was used or created in connection with the above company's mill, the discharge being controlled by the headgates. This mill was burned in 1903 and after this date the gates fell into disrepair and leakage occurred. It was to ascertain the amount of this leakage that the station was established.

On April 5, and 6, 1917, the outlet was blocked up to permit of the enlargement of the tunnel connecting Mink bay and Darlington bay. Following this work the leakage was very much reduced. To date no attempt has been made to again open up the channel.

Location of Section.—The metering section is on the upstream side of the bridge crossing the channel, 300 feet above the old power house and east of the h[illegible]dgates of the Keewatin Lumber & Milling Company's plant.

Drainage Area.—The drainage area above the section is 26,400 square miles, but as there are several other outlets from the Lake of the Woods, this drainage area should not be used in the computation of run-off.

Channel.—The bed of the channel is fairly permanent, being composed o clay and rock.

Gauge.—When this station was established a point was located on th floor of the bridge, from which minus readings were taken coincident with th discharge measurements. On October 5, 1916 a vertical staff gauge was installe on the upstream side of the centre pile of the bridge.

All daily discharges at this station are referred to the lake gauge located on the Keewatin traffic bridge.

Discharge Measurements.—Since this station was established, discharg measurements have been made at frequent intervals. As the control formed by the old head works is fairly permanent, the discharge depends largely on the lak stage.

Records Available.—Records of daily discharge based on gauge readings obtained on the Lake gauge and actual discharge measurements are available from May 1, 1913 to September 30, 1917.

Accuracy.—No discharge curve has been plotted for the station, and the daily discharges are based on discharge measurements and may be considered of high accuracy.

Discharge Measurements at Headrace, old K.L. & M. Co's Mill at 2nd Bridge during 1917.

Date	Gauge Height.	Discharge	Remarks	Date.	Gauge Height.	Discharge.	Remarks.
	Feet	Sec.-ft	Lake Gauge.		Feet	Sec.-ft.	Lake Gauge.
Jan 8	54·02	172·1	58·70	Feb 9	53·94	166·1	58·42
Jan 8	54·02	171·4	58·70	Mar. 26	53·36	138·4	57·68
Feb 9	53·94	153·0	58·42	Mar. 26	53·36	140·9	57·68

Daily Discharge in Second-feet of Headrace K.L. & M. Co.'s Mill at 2nd. Bridge for part year ending Sept. 30, 1917.

Day.	Oct	Nov	Dec	Jan	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
				140	171	224	130	5	5	5	5	5
				138	172	211	130	5	5	5	5	5
				136	170	212	130	5	5	5	5	5
4				137	172	225	135	5	5	5	5	5
5				137	170	207	50	5	5	5	5	5
				136	160	201	50	5	5	5	5	5
				138	158	200	5	5	5	5	5	5
				136	158	201	5	5	5	5	5	5
				137	157	197	5	5	5	5	5	5
				136	156	187	5	5	5	5	5	5
11				137	157	193	5	5	5	5	5	5
12				136	155	182	5	5	5	5	5	5
13				136	144	178	5	5	5	5	5	5
14				138	140	174	5	5	5	5	5	5
15				138	135	174	5	5	5	5	5	5
16				139	128	173	5	5	5	5	5	5
17				136	132	165	5	5	5	5	5	5
18				136	142	175	5	5	5	5	5	5
19				134	132	156	5	5	5	5	5	5
20				135	125	160	5	5	5	5	5	5
21				134	124	153	5	5	5	5	5	5
22				135	123	144	5	5	5	5	5	5
23				132	128	140	5	5	5	5	5	5
24				133	124	138	5	5	5	5	5	5
25				132	131	156	5	5	5	5	5	5
26				132	123	134	5	5	5	5	5	5
27				132	122	134	5	5	5	5	5	5
28				133	114	129	5	5	5	5	5	5
29				133		128	5	5	5	5	5	5
30				131		123	5	5	5	5	5	5
31				130		123	5	5	5	5	5	...

Monthly Discharge of Headrace, Old K. L. & M. Co.'s Mill at 2nd Bridge for year ending Sept. 30, 1917.

(Drainage area, 26,400 square miles.)

Month	Discharge in Second Feet			Run-Off.		
	Maximum	Minimum	Mean	Per square mile	Depth in inches on Drainage area	Total in acre-feet
1916-17						
October	197	151	172			10,576
November	178	144	157			9,344
December	142	135	140			8,547
January	140	140	145			8,301
February	172	114	144			7,997
March	225	125	171			10,514
April	140	5	25			1,484
May	5	5	5			307
June	5	5	5			298
July	5	5	5			307
August	5	5	5			307
September	5	5				298
The year	225	5	80			57,904

NOTE.—Discharge per square mile and run off depth in inches omitted, as the outlet is one of several from the Lake of the Woods.

NORTH TUNNEL ISLAND.

(LAKE OF THE WOODS OUTLETS.)

Station No. 5 PE.

History.—The station was established by S. S. Scovil on June 28, 1912, and since that date has been in continuous operation.

Location.—The metering station is located on the west branch of the Winnipeg river, on the north side of Tunnel island and about one mile below the Keewatin River bridge. The station is operated as a boat station throughout the year.

Drainage Area.—The drainage area above this section is 26,400 square miles, though all of the water coming from this basin does not pass the section, as part of it goes through the east branch of the Winnipeg. These two branches, the east and west, join a short distance below the section.

Channel.—The discharge is confined to the channel for all stages. The bed and banks of the river are of solid rock or large boulders and of a very permanent nature. The current is regular across the section. The velocities are high.

Gauge.—A vertical staff gauge is secured to a pile on the west side at the south end of the Keewatin River bridge. All discharge measurements are referred to this gauge.

A vertical staff gauge read during the metering is located on the north side, about thirty feet above the meter section.

Both of these gauges are referred to W.P.S. datum.

Discharge Measurements.—A large number of discharge measurements have been made at this section over a range in stage of 14.12 feet, corresponding to a range in discharge of 3,300 to 41,900 c.f.s.

Records Available.—A continuous record of daily gauge height has been obtained on the gauge at Keewatin River bridge from June 28, 1912 to September 30, 1918.

Based on these gauge readings and the frequent discharge measurements which have been obtained at the station, estimates of daily discharge for the above period are available.

Accuracy.—Part of the water flowing past this section enters the river through the Lake of the Woods Milling Co's. plants which discharge into Darlington bay, and part of the water is discharged through the Norman dam on the western outlet of the Lake of the Woods. On account of the conditions governing the discharges at these outlets and also on account of the ponding effect of Darlington bay, considerable difficulty is experienced in arriving at the daily discharge by means of a discharge curve alone.

Owing to the close supervision exercised at this station, and the short intervals at which discharge measurements are taken, the records may be considered of high accuracy.

Discharge Measurements of West Branch, Winnipeg River at North Tunnel Island, during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.	Gauge at Sec.	1917.	Feet.	Sec.-ft.	Gauge at Sec.
Jan. 3	37·78	13,427	37·57	Sept. 20	33·86	6,383	33·81
Jan. 3	37·78	13,574	37·57	Sept. 20	33·86	6,429	33·82
Jan. 17	37·62	13,455	37·42	Sept. 22	33·86	6,255	33·81
Feb 14	39·24	17,519	39·17	Sept. 22	33·86	6,426	33·81
Feb 14	39·24	16,948	39·17	Sept. 28	33·88	6,259	33·83
Feb. 16	39·34	17,981	39·25	Sept. 28	33·90	6,393	33·85
Feb 16	39·34	17,773	39·25	Sept. 29	33·92	6,466	33·86
Mar. 2	39·35	18,106	39·29	Sept. 29	33·92	6,399	33·88
Mar. 2	39·35	17,851	39·30	Oct. 5	1,034·06	6,556·7	1,034·00
Mar. 31	40·37	20,616	40·28	Oct. 5	1,034·06	6,341·0	1,034·60
April 5	40·47	20,322	40·17	Oct 12	1,034·08	6,131·7	1,034·03
April 5	40·47	20,268	40·17	Oct. 12	1,034·07	6,390·8	1,034·03
April 7	40·41	20,202	40·12	Oct. 13	1,034·04	6,291·9	1,033·98
April 7	40·41	20,096	40·12	Oct. 13	1,034·02	6,245·6	1,033·96
April 12	40·35	20,112	40·00	Oct. 26	1,034·15	6,532·3	1,034·10
April 12	40·35	20,079	40·03	Oct. 26	1,034·15	6,562·6	1,034·10
April 14	40·35	19,782	40·05	Nov. 1	1,034·15	6,488·7	1,034·08
April 14	40·35	20,025	40·03	Nov. 2	1,034·13	6,389·2	1,034·08
May 3	38·63	14,627	38·47	Nov. 2	1,034·13	6,410·9	1,034·08
May 3	38·63	14,626	38·47	Nov. 9	1,034·13	6,354·6	1,034·08
May 5	38·61	14,757	38·43	Nov. 9	1,034·13	6,315·7	1,034·08
May 12	37·31	11,140	37·21	Nov. 10	1,034·16	6,534·4	1,034·09
May 12	37·31	10,704	37·21	Nov. 10	1,034·16	6,664·2	1,034·09
May 17	36·93	10,544	36·81	Nov. 16	1,034·13	6,231·5	1,034·09
May 17	36·93	10,697	36·84	Nov. 16	1,034·13	6,339·5	1,034·08
May 18	36·90	10,862	36·77	Nov. 17	1,034·15	6,062·7	1,034·11
May 18	36·90	10,910	36·77	Nov. 22	1,034·14	6,315·7	1,034·08
May 26	36·63	10,396	36·53	Nov. 22	1,034·14	6,265·7	1,034·08
May 26	36·63	10,302	36·53	Nov. 23	1,034·13	6,265·3	1,034·08
June 2	36·57	10,699	36·45	Nov. 23	1,034·13	6,229·2	1,034·08
June 2	36·57	10,369	36·45	Nov. 29	1,034·04	6,080·1	1,033·99
June 28	33·94	5,531	33·87	Nov. 29	1,034·04	6,252·5	1,033·99
June 28	33·94	5,662	33·88	1918.			
June 30	33·77	5·979	33·72	Feb. 9	1,034·10	5,954·1	1,034·04
June 30	33·78	5·980	33·74	Feb. 9	1,034·10	5,910·0	1,034·04
July 7	33·45	5·276	33·42	Mar. 14	1,036·06	9,488·4	1,035·94
July 7	33·45	5,361	33·42	Mar. 14	1,036·06	9,766·1	1,035·94
July 14	33·50	5,410	33·46	Mar. 15	1,036·07	9,691·4	1,035·95
July 14	33·50	5,326	33·46	Mar. 15	1,036·07	9,750·9	1,035·95
July 19	33·43	5,353	33·38	Mar. 22	1,036·03	9,645·9	1,035·92
July 19	33·43	5,311	33·38	Mar. 22	1,036·03	9,696·0	1,035·92
July 21	33·37	5,343	33·33	Mar. 23	1,036·02	9,564·8	1,035·90
July 21	33·37	5,470	33·33	Mar. 23	1,036·02	9,287·6	1,035·90
July 27	33·75	5,630	33·70	April 5	1,036·13	9,050·5	1,036·02
July 27	33·75	5,800	33·70	April 5	1,036·13	9,372·2	1,036·01
Aug. 9	33·65	5,995	33·61	April 12	1,034·68	6,178·5	1,034·62
Aug 9	33·65	5,887	33·61	April 12	1,034·67	6,174·3	1,034·61
Aug 11	33·68	5,744	33·63	April 13	1,034·62	6,207·2	1,034·56
Aug 11	33·68	5,787	33·63	April 13	1,034·62	6,029·0	1,034·55
Aug. 16	33·67	5,989	33·62	April 19	1,034·12	6,131·4	1,034·03
Aug 16	33·67	6,014	33·62	April 19	1,034·12	6,211·0	1,034·00
Aug 18	33·63	6,158	33·58	April 20	1,034·03	6,247·2	1,033·97
Aug. 18	33·63	6,073	33·58	April 20	1,034·03	6,161·0	1,033·97
Aug. 25	33·67	6,167	33·62	May 25	1,034·11	6,382·2	1,034·01
Aug 25	33·67	6,380	33·62	May 25	1,034·12	6,274·0	1,034·01
Sept. 1	33·62	5,904	33·58	May 30	1,034·14	6,500·0	1,034·05
Sept. 1	33·63	6,158	33·58	May 30	1,034·13	6,396·6	1,034·05
Sept. 7	33·87	6,808	33·80	June 6	1,034·25	6,382·6	1,034·15
Sept. 7	33·87	6,679	33·80	June 6	1,034·25	6,568·5	1,034·15
Sept. 14	33·81	6,408	33·74	June 8	1,034·24	6,587·9	1,034·15
Sept. 14	33·81	6,579	33·74	June 8	1,034·24	6,655·5	1,034·15

Discharge Measurements of West Branch, Winnipeg River at North Tunnel Island, during 1917-18—Concluded.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1918.	Feet.	Sec.-ft.	Gauge at Sec.	1918	Feet.	Sec.-ft.	Gauge at Sec.
June 13	1,034·[illegible]	6,461·4	1,034·07	Aug. 10	1,033·25	5,769·9	1,033·17
June 13	[illegible]	[illegible]810·7	1,034·08	Aug. 10	1,033·25	5,754·7	1,033·17
June 14	1,034·18	6,566·9	1,034·09	Aug. 15	1,033·02	5,195·9	1,032·93
June 14	1,034·18	[illegible]	1,034·10	Aug. 15	1,033·02	5,112·7	1,032·93
June 22	1,034·15	[illegible]	1,034·05	Aug. 16	1,033·02	5,071·2	1,032·93
June 22	[illegible]	6,304·1	1,034·05	Aug. 16	1,033·02	5,320·6	1,032·93
June 27	1,0[illegible]	5,[illegible]	1,033·92	Aug. 22	1,033·27	5,824·8	1,033·18
June 27	1,0[illegible]	5,875·	1,033·92	Aug. 22	1,033·27	5,826·8	1,033·18
June 28	[illegible]	5,947·7	1,033·90	Aug. 23	1,033·21	5,610·0	1,033·12
June 29	1,033·98	[illegible]	1,033·90	Aug. 23	1,033·21	5,526·4	1,033·12
July 4	1,033·72	5,681·0	1,033·66	Aug. 28	1,033·08	5,251·9	1,033·00
July 4	1,033·72	5,640·2	1,033·67	Aug. 28	1,033·08	5,043·5	1,033·00
July 6	1,033·80	5,775·1	1,033·70	Aug. 30	1,033·25	6,079·7	1,033·16
July 6	1,033·80	5,903·5	1,033·70	Aug. 30	1,033·25	6,073·8	1,033·16
July 12	1,033·75	5,732·0	1,033·65	Sept. 6	1,033·32	6,176·9	1,033·22
July 12	1,033·75	5,711·4	1,033·65	Sept. 6	1,033·32	6,092·9	1,033·22
July 18	1,033·56	5,514·2	1,033·47	Sept. 7	1,033·34	5,969·1	1,033·23
July 18	1,033·56	5,599·0	1,033·47	Sept. 7	1,033·34	6,053·2	1,033·23
July 20	1,033·57	5,728·4	1,033·48	Sept. 13	1,033·62	6,714·2	1,033·52
July 20	1,033·57	5,601·2	1,033·48	Sept. 13	1,033·62	6,671·7	1,033·52
July 26	1,033·29	5,082·6	1,033·21	Sept. 14	1,033·68	6,811·8	1,033·57
July 26	1,333·29	5,122·7	1,033·20	Sept. 14	1,033·68	6,769·3	1,033·57
July 27	1,033·[illegible]	4,898·3	1,033·12	Sept. 20	1,033·89	6,652·3	1,033·79
July 27	1,033·20	5,065·8	1,033·12	Sept. 20	1,033·89	6,695·2	1,033·79
Aug. 1	1,033·22	5,578·4	1,033·17	Sept. 21	1,033·89	6,740·6	1,033·80
Aug. 1	1,033·23	5,623·0	1,033·18	Sept. 21	1,033·89	6,912·4	1,033·80
Aug. 2	1,033·28	5,498·6	1,033·19	Sept. 26	1,034·07	6,785·4	1,033·98
Aug. 2	1,033·28	5,845·0	1,033·19	Sept. 26	1,034·07	6,612·5	1,033·98
Aug. 9	1,033·23	5,819·9	1,033·19				

Daily Gauge Height and Discharge of West Branch Winnipeg River at North Tunnel Island, for part Year ending Sept., 30, 1917.

[Drainage area, 26,400 square miles.]

Day.	October.		November.		December.		January.		February.		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height.	Discharge	Gauge. Height	Discharge.
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1	...	...	...	...	...	...	37·65	12,410	39·15	17,850	39·36	18,060
2	...	...	...	...	...	...	37·65	13,210	39·21	17,860	39·37	17,950
3	...	...	...	...	...	...	37·78	13,590	39·22	17,850	39·37	18,090
4	...	...	...	...	...	...	37·89	13,870	39·17	17,090	39·16	16,280
5	...	...	...	...	...	...	37·92	13,860	39·15	17,640	39·12	17,630
6	...	...	...	...	...	...	37·92	13,770	39·22	17,680	39·25	17,480
7	...	...	...	...	...	...	38·80	12,560	39·23	17,630	39·28	17,430
8	...	...	...	...	...	...	37·75	13,760	39·23	17,660	39·32	18,110
9	...	...	...	...	...	...	37·89	13,770	39·25	17,710	39·44	19,020
10	...	...	...	...	...	...	37·92	13,560	39·28	17,680	39·67	20,070
11	...	...	...	...	...	...	37·81	13,100	39·14	17,050	39·71	18,390
12	...	...	...	...	...	...	37·71	13,180	39·09	17,660	39·74	20,820
13	...	...	...	...	...	...	37·67	12,870	39·20	17,580	40·00	21,270
14	...	...	...	...	...	...	37·56	12,550	39·24	17,500	40·12	21,740
15	...	...	...	...	...	...	37·54	12,670	39·24	17,890	40 18	21,720
16	...	...	...	...	...	...	37·57	12,700	39·28	18,210	40·30	21,700
17	...	...	...	...	...	...	37·61	13,040	39·29	18,290	40·36	21,670
18	...	...	...	...	...	...	37·72	13,500	39·20	16,780	40·23	19,830
19	...	...	...	...	...	...	37·82	13,950	39·19	18,060	40·21	21,480
20	...	...	...	...	...	...	37·87	13,920	39·33	18,270	40·41	41,590
21	...	...	...	...	...	...	37·69	12,470	39·35	18,060	40·49	21,560
22	...	...	...	...	...	...	37·63	13,950	39·93	18,150	40·54	21,560
23	...	...	...	...	...	...	37·81	14,030	39·41	18,250	40·50	21,530
24	...	...	...	...	...	...	37·89	14,550	39·44	18,210	40·51	21,570
25	...	...	...	...	...	...	38·03	15,060	39·22	16,540	40·34	19,670
26	...	...	...	...	...	...	38·17	15,730	39·17	18,220	40·28	21,470
27	...	...	...	...	...	...	38·34	16,410	39·32	18,000	40·45	21,370
28	...	...	...	...	...	...	38·37	15,410	39·35	18,040	40·46	21,350
29	...	...	...	...	...	...	38·42	16,220	.....	.....	40·49	21,330
30	...	...	...	...	...	...	38·73	17,690	.....	.....	40·47	21,240
31	...	...	...	...	...	...	39·01	17,790	.....	.....	40·44	21,220

Daily Gauge Height and Discharge of West Branch Winnipeg River at North Tunnel Island, for part Year ending Sept., 30, 1917—Concluded.

	April.		May.		June.		July.		August.		September.	
1	40·36	19,240	38·68	14,360	36·54	10,400	33·35	4,360	33·79	6,150	33·63	6,020
2	40·29	20,950	38·65	14,380	36·55	10,410	33·31	4,390	33·84	6,170	33·48	5,290
3	40·48	20,960	38·65	14,450	36·33	8,990	33·27	5,020	33·81	5,750	33·46	6,050
4	40·48	20,870	38·63	14,400	36·22	10,590	33·36	5,220	33·70	5,600	33·57	6,000
5	40·47	20,840	38·61	14,440	36·43	10,660	33·43	5,310	33·50	4,980	33·71	6,470
6	40·46	20,800	38·34	12,690	36·46	10,100	33·47	5,370	33·53	5,680	33·84	6,470
7	40·45	20,720	38·27	14,590	36·21	9,100	33·46	5,280	38·60	5,740	33·88	6,530
8	40·21	18,680	38·42	14,130	36·11	9,200	33·32	4,590	33·68	5,790	33·88	6,400
9	40·13	20,419	38·18	12,750	36·05	9,380	33·25	5,360	33·67	5,860	33·68	5,240
10	40·27	20,310	37·77	10,800	35·95	9,220	33·40	5,430	38·68	5,810	33·58	5,890
11	40·32	20,420	37·47	10,830	35·95	9·430	33·50	5,420	33·64	5,820	33·74	6,120
12	40·33	20,370	37·31	10,800	35·93	9,830	33·52	5,410	38·47	5,170	33·79	6,130
13	40·33	20,420	36·99	9,240	35·62	8,580	33·52	5,430	33·43	5,400	33·80	6,170
14	40·34	20,340	36·88	10,580	35·37	7,540	33·51	5,390	33·48	5,890	33·81	6,110
15	40·11	18,270	36·95	10 700	35·14	7,470	33·34	4,670	33·59	5,910	33·81	6,250
16	40·06	20,300	36·94	10,820	34·85	6,120	33·24	5,320	33·65	5,930	33·62	4,970
17	40·27	20,320	36·93	10,790	34·45	5,470	33·37	5,380	33·66	6,010	33·56	6,280
18	40·35	20,440	36·92	10,770	34·37	5,920	33·41	5,390	33·64	6,060	33·80	6,360
19	40·44	20,570	36·90	10,750	34·33	5,400	33·42	5,380	33·52	5,330	33·87	6,420
20	40·48	20,550	36·62	9,280	34·27	5,340	33·41	5,330	33·45	6,050	33·89	6,230
21	40·48	20,500	36·52	10,340	34·19	5,210	33·39	5,370	33·54	6,060	33·89	6,290
22	40·28	18,430	36·68	10,230	34·05	5,430	33·22	4,630	33·60	6,100	33·89	6,330
23	40·21	20,200	36·70	10,310	33·96	5,720	33·23	5,760	33·67	6,120	33·70	4,990
24	40·38	20,290	36·69	10,410	33·75	4,320	33·46	5,830	33·72	6,120	33·58	6,010
25	40·31	20,230	36·68	10,400	33·68	5,610	33·60	5,850	33·69	6,130	33·76	6,060
26	40·08	19,280	36·66	10,370	33·88	5,720	33·75	5,890	33·54	5,360	33·87	6,080
27	39·73	15,360	36·43	9,030	33·91	5,750	33·76	5,800	33·51	6,000	33·90	6,050
28	39·19	14,740	36·33	10,230	33·89	5,740	33·79	5,690	33·63	6,050	33·91	6,070
29	38·80	12,820	36·53	10,330	33·86	5,740	33·61	4,590	33·66	5,990	33·91	6,190
30	38·60	14,500	36·54	10,460	33·79	5,650	33·51	6,010	33·65	6,060	33·70	4,860
31			36·53	10,380			33·72	6,090	33·65	6,070		

Daily Gauge Height and Discharge of West Branch, Winnipeg River at North Tunnel Island, for Year ending Sept., 30, 1918.

[Drainage area, 26,400 square miles.]

Day.	October.		November.		December.		January.		February.		March.	
	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height	Discharge.
	Feet.	Sec.-ft.	Feet.	Sec.-ft	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1	33·62	6,330	34·14	6,280	34·13	6,460	33·70	5,420	34·09	5,960	35·18	9,720
2	33·89	6,370	34·14	6,200	33·84	4,590	33·78	5,950	31·09	6,010	35·53	9,750
3	33·94	6,400	34·13	6,240	33·72	6,280	33·92	6,030	33·95	5,370	35·43	8,170
4	34·02	6,380	33·87	4,670	34·01	6,330	33·95	6,080	33·88	6,170	35·43	9,810
5	34·02	6,360	33·77	6,380	34·09	6,410	33·99	6,020	34·02	6,110	35·77	9,690
6	34·02	6,220	34·03	6,340	34·12	6,470	33·78	4,490	34·08	6,100	35·85	9,730
7	33·83	4,080	34·11	6,300	34·11	6,110	33·73	6,130	34·09	6,030	35·93	9,850
8	33·67	6,260	34·12	6,350	31·05	6,090	33·93	6,030	34·10	5,940	35·98	9,830
9	33·90	6,170	34·13	6,390	33·85	4,620	33·96	6,030	31·10	5,880	35·99	9,860
10	33·98	6,110	31·13	6,330	33·74	6,360	34·00	6,120	33·82	4,350	35·80	8,140
11	34·04	6,230	33·94	4,740	34·04	6,230	34·03	6,080	33·75	6,300	35·66	9,950
12	34·07	6,120	33·85	6,390	34·09	6,310	34·04	6,070	33·98	6,030	35·92	9,660
13	34·07	6,110	34·06	6,270	34·02	5,790	33·79	4,510	34·04	6,090	35·98	9,730
14	33·79	4,670	34·14	6,170	33·91	5,250	33·83	6,190	34·07	6,150	36·03	9,720
15	33·71	6,150	34·14	6,290	33·86	5,360	33·95	6,140	34·09	6,050	36·06	9,740
16	33·93	6,100	34·11	6,390	33·67	4,540	34·03	6,110	34·10	6,030	36·06	9,700
17	34·01	6,050	34·13	6,250	33·66	6,260	34·06	6,200	33·84	4,290	35·77	8,040
18	34·10	6,110	33·90	4,580	33·89	6,290	34·07	6,130	33·76	6,000	35·66	9,750
19	34·11	6,080	33·78	6,210	33·98	6,200	34·07	6,090	33·99	6,010	33·92	9,550
20	34·11	6,080	34·00	6,120	34·01	6,200	33·78	4,360	34·03	6,110	35·99	9,540
21	33·85	4,260	34·09	6,010	34·02	6,240	33·72	6,060	34·05	6,100	36·03	9,550
22	33·80	6,160	34·12	6,090	34·03	6,290	33·97	6,020	34·06	5,990	36·03	9,620
23	34·00	6,060	34·13	6,180	33·82	4,500	34·02	6,060	34·06	5,810	36·03	9,520
24	34·02	6,110	34·14	6,280	33·72	6,370	34·05	5,950	33·81	4,360	35·75	7,910
25	34·07	6,220	33·87	4,390	33,65	4,650	34·08	6,220	33·77	6,800	35·67	9,690
26	34·13	6,190	33·71	6,270	33·63	6,240	34·09	6.250	34·18	7,230	36·20	10,470
27	34·13	6,170	33·94	6,060	33·90	6,310	33·82	4,350	34·51	7,790	36·97	14,490
28	33·90	4,630	34·01	6,250	33·99	6,260	33·75	6,120	34·77	8,360	37·71	16,110
29	33·82	6,360	34·04	6,210	33·68	4,780	33·98	6,100			37·66	12,900
30	34·03	6,200	34·10	6,280	33·52	4,810	34·06	6,140			36·85	9,410
31	34·11	6,300			33·51	5,230	34·09	6,100			36·22	7,840

NOTE.—Gauge heights are referred to Keewatin River bridge gauge: 1,000·00 should be added to gauge heights to reduce to W.P.S. datum

Daily Gauge Height and Discharge of West Branch, Winnipeg River at North Tunnel Island, for Year ending Sept., 30, 1918—Concluded.

	April.		May.		June.		July.		August.		September.	
1	36·03	9,330	33·03	5,900	34·18	6,120	33·56	5,340	33·22	5,660	33·18	5,410
2	36·15	9,310	33·89	5,970	33·89	4,730	33·54	5,600	33·30	5,670	33·12	5,420
3	36·18	9,280	33·84	5,950	33·81	6,150	33·69	5,580	33·26	5,120	33·10	5,500
4	36·17	9,400	33·79	5,940	34·11	6,240	33·76	5,600	33·11	5,090	33·13	5,890
5	36·15	9,360	33·51	4,480	34·19	6,210	33·77	5,630	33·09	5,730	33·20	5,980
6	36·13	9,390	33·45	5,960	34·26	6·360	33·78	5·590	33·17	5·730	33·32	6,050
7	35·91	7,740	33·68	6,040	34·22	6,340	33·62	5,000	33·26	5,730	33·33	6,030
8	35·75	8,590	33·70	5,920	34·22	6,330	33·54	5,600	33·26	5,560	33·23	5,430
9	35·54	6,480	33·71	5,970	33·95	4,800	33·70	5,640	33·24	5,700	33·22	5,870
10	34·81	5,230	33·72	5,990	33 80	6,150	33·73	5,670	33·22	5,670	33·30	6,070
11	34·65	5,950	33·72	5,930	34·04	6·340	33·77	5,670	33·06	5,120	33·39	6,600
12	34·67	6,000	33·48	4,550	34·14	6,220	33·78	5,610	33·04	5,210	33·56	6,550
13	34·61	6,040	33·42	6,080	34·17	6,240	33·78	5,580	33·04	5,200	33·63	6,690
14	34·24	4,340	33·62	6,050	34·17	0,300	33·63	5,030	33·04	5,180	33·66	6,690
15	34·07	5,950	33·61	6,080	31·18	6,240	33·53	5,670	33·02	5,200	33·50	5,350
16	34·21	6,030	33·73	6,010	34·04	4,870	33·59	5,660	33·01	5,230	33·39	6,040
17	34·19	6,000	33·80	6,080	33·87	6,170	33·58	5,640	32·99	5,200	33·70	6,620
18	34·17	5,970	33·88	6,160	34·05	6,130	33·56	5,690	32·92	5,180	33·79	6,620
19	34·09	6,060	33·86	4,700	34·08	6,170	33·55	5,660	32·99	5,600	33·85	6,630
20	34·00	6,030	33·55	6,140	34·09	6,150	33·55	5,630	33·17	5,650	33·88	6,620
21	33·78	4,470	33·79	6,080	34·16	6,150	33·42	4,990	33·25	5,770	33·90	6,620
22	33·76	5,950	33·92	6,170	34·14	6,150	33·40	5,750	33·26	5,690	33·69	5,230
21	34·04	6,010	33·98	6,190	33·87	4,860	33·48	5,600	33·19	5,330	33·63	6,710
24	34·06	0,020	33·99	6,080	33·79	6,240	33·34	4,970	33·14	5,310	33·94	6,670
25	34·06	6,100	34·07	0,110	33·98	6,300	33·28	4,970	33·10	5,270	34·03	6,660
26	34·07	6,110	33·94	4,660	34·03	6,230	33·25	4·970	33·08	5,420	34·06	6,600
27	34·07	6,050	33·87	6,190	34·02	5,640	33·20	4,930	33·07	5,470	34·08	6,570
28	33·84	4,460	34·09	6,220	33·96	5,740	33·19	5,010	33·07	5,460	34·09	6,570
29	33·74	5,940	34·14	6,140	33·97	5,730	33·20	5,130	33·12	5,740	33·88	5,150
30	38·96	5,940	34·14	6,050	38·78	4,960	33·19	5,120	33·25	5,900	33·75	6,580
31			34·14	6,090			33·20	5,080	33·27	5,840		

NOTE.—Gauge heights are referred to Keewatin River Bridge gauge: 1,000·00 s. [illegible] be added to gauge heights to reduce to W.P.S. datum.

Monthly Discharge of West Branch, Winnipeg River at North Tunnel Island, for years ending September 30, 1917-18.

[Drainage area 26,400 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on Drainage area.	Total in area-feet.
1916–17.						
October	28,880	15,500	24,217			1,489,045
November	21,640	15,060	19,140			1,138,909
December	20,710	12,490	15,881			976,485
January	17,790	12,410	14,037			863,101
February	18,290	16,540	17,765			986,618
March	2[illegible],740	16 280	20,135			1,238,053
April	20,960	12,820	19,404			1,154,619
May	14,590	9,030	11,421			702,250
June	10,660	4,320	7,471			444,555
July	6,090	4,360	5 321			327,176
August	6,170	4,980	5,845			359,395
September	6,530	4,860	6,011			357,679
The year	28,880	4,320	13,865			10,035,418
1917–18.						
October	6,400	4,620	6,010			369,540
November	6,390	4,390	6,030			358,810
December	6,470	4,500	5,800			356,628
January	6,250	4,350	5,858			360,194
February	8,360	4,290	6,053			336,167
March	16,110	7,840	9,917			609,773
April	9,400	4,340	6,651			395,762
May	6,220	4,480	5,867			360,748
June	6,360	4,730	5,942			353,574
July	5,750	4,930	5,407			332,463
August	5,900	5,090	5,473			336,829
September	6,710	5,150	0,181			367,795
The year	16,110	4,290	6,269			4,538,549

NOTE.—Discharge per square mile and run-off depth in inches omitted, as the outlet is one of several from the Lake of the Woods.

Combined Discharge in Second-Feet of Winnipeg River below Lake of the Woods Outlets, for part year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area 26,400 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1				13,283	19,221	19,487	20,170	15,963	11,777	4,958	6,952	6,649
2				14,426	19,250	19,283	22,221	15,994	11,811	4,993	6,971	5,891
3				14,779	19,245	19,453	22,259	16,034	9,724	5,820	6,573	6,659
4				15,074	18,051	17,236	22,171	15,974	11,572	6,254	6,407	6,664
5				14,913	18,999	18,944	22,073	16,011	12,061	6,571	5,777	7,351
6				14,744	19,037	18,777	21,707	13,689	11,469	6,618	6,316	7,310
7				13,425	18,972	18,738	21,990	16,124	10,531	6,529	6,513	7,319
8				14,723	19,077	19,091	19,540	15,682	10,492	5,273	6,629	7,042
9				15,022	19,116	19,955	21,718	14,296	10,701	6,400	6,482	5,845
10				14,682	19,080	21,319	21,621	12,323	9,943	6,710	6,649	6,534
11				13,885	18,007	19,289	21,695	12,315	10,238	6,693	6,665	6,759
12				13,916	19,008	21,743	21,657	12,239	11,060	6,704	5,750	6,756
13				13,598	18,969	22,075	21,678	10,199	9,828	6,706	6,234	6,810
14				13,261	18,887	22,550	21,598	12,026	8,818	6,663	6,706	6,730
15				13,535	19,241	22,532	19,111	12,137	8,758	5,365	6,740	6,899
16				13,645	19,586	22,576	21,539	12,217	7,374	6,361	6,637	5,577
17				14,001	19,671	23,006	21,498	12,192	6,271	6,640	6,666	7,120
18				14,435	17,732	20,767	21,885	12,200	7,175	6,604	6,692	7,200
19				14,978	19,444	22,862	22,275	12,207	6,697	6,608	5,928	7,289
20				15,198	19,664	22,677	22,258	10,207	6,578	6,594	6,672	7,070
21				13,413	19,449	22,884	22,236	11,767	6,504	6,591	6,792	7,137
22				14,886	19,537	22,873	19,339	11,673	6,707	5,296	6,912	7,201
23				15,282	19,633	22,821	21,647	11,729	6,998	6,752	6,925	5,592
24				15,795	19,593	22,858	22,044	11,795	4,993	7,051	6,929	6,862
25				16,362	17,477	20,528	21,944	11,721	6,625	7,081	6,759	6,936
26				17,023	19,560	22,740	21,023	11,781	6,868	7,122	5,963	6,960
27				17,707	19,361	22,651	17,059	9,925	6,993	7,022	6,663	6,923
28				16,296	19,405	22,632	16,428	11,902	6,800	6,894	6,908	6,967
29				17,175	.....	22,577	13,893	11,719	6,579	5,256	6,743	7,053
30				18,679	.....	22,511	16,089	11,889	6,467	6,830	6,696	5,472
31				18,816	.....	22,424	.....	11,790	.....	6,919	6,717	.....
1917-18												
1	7,434	7,703	7,932	6,348	7,457	11,142	10,489	7,024	7,554	5,913	6,261	5,979
2	7,653	7,615	5,465	7,251	7,498	11,119	10,719	6,650	5,436	6,379	6,280	5,997
3	7,779	7,589	7,498	7,497	6,280	9,031	10,665	6,616	7,268	6,814	5,804	6,091
4	7,759	5,431	7,771	7,526	7,472	10,911	10,787	6,600	7,562	6,555	5,669	6,491
5	7,760	7,539	7,865	7,472	7,603	11,124	10,755	5,105	7,549	6,862	6,328	6,581
6	7,585	7,735	7,946	5,382	7,576	11,163	10,799	6,615	7,692	6,854	6,336	6,650
7	5,701	7,736	7,572	7,418	7,576	11,265	8,517	6,688	7,673	5,684	6,326	6,627
8	7,350	7,779	7,554	7,567	7,418	11,247	9,800	6,560	7,692	6,487	6,250	6,001
9	7,509	7,829	5,521	7,506	7,362	11,310	7,875	6,643	5,527	5,906	6,314	6,481
10	7,476	7,780	7,641	7,601	5,185	8,965	6,622	6,658	7,207	6,942	6,274	6,672
11	7,633	6,157	7,709	7,566	7,533	10,819	7,292	6,609	7,692	6,949	5,711	7,204
12	7,499	7,819	7,783	7,543	7,492	11,062	7,373	5,170	7,574	6,834	5,831	7,154
13	7,469	7,738	7,278	5,406	7,	11,100	7,392	6,706	7,589	6,830	5,791	7,285
14	5,393	7,660	6,734	7,477	7,624	11,123	5,053	6,737	7,636	5,700	5,768	7,328
15	7,251	7,738	6,838	7,623	7,524	11,134	6,608	7,244	7,499	6,275	5,795	5,941
16	7,451	7,841	5,421	7,552	7,509	11,130	6,694	7,263	5,567	6,272	5,827	6,838
17	7,406	7,716	7,509	7,683	5,137	8,806	6,645	7,455	6,918	6,251	5,799	7,490
18	7,522	5,462	7,733	7,604	7,275	10,628	6,636	7,497	7,365	6,320	5,737	7,498
19	7,477	7,449	7,670	7,513	7,494	10,913	6,733	5,375	7,323	6,497	6,190	7,509
20	7,456	7,561	7,681	5,803	7,584	10,935	6,698	7,202	7,383	6,453	6,247	7,497
21	5,542	7,517	7,710	7,511	7,586	10,973	5,093	7,321	7,403	5,565	6,356	7,651
22	7,581	7,553	7,779	7,490	7,455	10,993	7,036	7,396	7,426	6,581	6,284	5,823
23	7,440	7,681	5,562	7,534	7,244	10,877	7,372	7,575	5,531	6,401	5,919	7,769
21	7,492	7,773	7,699	7,419	5,186	8,556	7,315	7,391	7,255	5,795	5,910	7,958
25	7,654	5,245	5,404	7,703	8,019	10,812	6,908	7,518	7,570	5,811	5,829	7,922
26	7,614	7,545	7,545	7,740	8,564	11,823	7,528	6,103	7,463	5,600	6,017	7,886
27	7,592	7,527	7,746	5,811	9,235	15,851	7,416	7,652	6,846	5,585	6,072	7,848
28	5,369	7,705	7,766	7,602	9,791	17,518	5,195	7,686	7,013	5,597	6,057	7,843
29	7,547	7,658	6,271	7,588	.....	13,710	6,799	7,559	6,421	5,932	6,334	5,870
30	7,634	7,718	5,748	7,627	.....	10,114	7,301	7,365	6,267	5,936	6,495	7,583
31	7,731	.....	6,447	7,594	.....	8,507	.....	7,489	.....	5,836	6,441	.....

NOTE.—Total Discharge from Lake of the Woods.

Combined Monthly Discharge of Winnipeg River below Lake of the Woods outlets for year ending September 30, 1917.

[Drainage area, 26,400 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Depth Per square mile.	Depth in inches on Drainage area.	Total in acre-feet.
1916-17.						
October	30,289	16,237	25,313	0·959	1·106	1,556,436
November	22,912	15,777	20,927	0·769	0·858	1,207,756
December	21,960	13,363	16,989	0·644	0·742	1,044,612
January	18,816	13,261	15,063	0·570	0·657	926,188
February	19,671	17,477	19,081	0·723	0·753	1,059,705
March	23,006	17,236	21,286	0·806	0·929	1,308,825
April	22,275	13,893	20,744	0·786	0·877	1,234,354
May	16,124	9·925	12,820	0·485	0·559	788,271
June	12,061	4,993	8,614	0·326	0·364	512,569
July	7,122	4,958	6,383	0·242	0·279	392,476
August	6,971	5,750	6,580	0·249	0·287	404,588
September	7,351	5,472	6,753	0·256	0·286	401,832
The Year	30 289	4,958	14,970	0,567	7·697	10,835,211

NOTE.—Total Discharge from the Lake of the Woods.

Combined Monthly Discharge of Winnipeg River below Lake of the Woods outlets for year ending September 30, 1918.

[Drainage area, 24,600 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.		Rainfall.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on Drainage area.	Total in acre-feet.	Inches.
1917-18.							
October	7,779	5,369	7,283	0·276	0·318	447,814	3·13
November	7,841	5,245	7,393	0·280	0·312	439,914	0·93
December	7,946	5,404	7,124	0·270	0·311	438,038	0·78
January	7,740	5,382	7,257	0·275	0·317	446,216	1·21
February	9,791	5,137	7,460	0·280	0·292	410,975	0·77
March	17,518	8,507	11,118	0·421	0·485	683,619	0·71
April	10,799	5,053	7,737	0·293	0·327	460,383	1·32
May	7,686	5,105	6,886	0·261	0·301	423,404	2·19
June	7,692	5,436	7,097	0·269	0·300	422,301	3·25
July	6,949	5,565	6,271	0·238	0·274	385,589	2·80
August	6,495	5,669	6,073	0·230	0·265	373,414	.....
September	7,958	5,283	6,982	0·264	0·295	415,458	.....
The year	17,518	5,053	7,386	0·280	3,801	5,347,220	.....

NOTE.—Total discharge from the Lake of the Woods.

WINNIPEG RIVER AND TRIBUTARIES.

WINNIPEG RIVER.

Winnipeg River, Whitedog Falls, North and South Channels.

Station No. 5 PE_{10}

History.—On May 18, 1914, a metering section was established on the south channel of the Winnipeg river at Whitedog falls by S. C. O'Grady. This station was operated as a boat station until July 1915, when a cable station was installed approximately one hundred feet upstream from the old section. Since that time this station has been in operation.

On May 24, 1914, a cable carrier station was established on the north channel at these falls by S. C. O'Grady and it has been in operation since that date.

Location of Sections.—The Winnipeg river is divided into two channels at a point thirteen miles below the town of Minaki, Ontario, and it is on these channels that the Whitedog falls are located. The falls consist of a series of pitches extending over a stretch of three miles of the river. On the north channel the metering section is located about two hundred feet downstream from the head of the channel and within twenty-five feet of the head of the first pitch.

The metering section on the south Channel is located about one mile below the head of the channel and nine hundred feet above the crest of the second pitch of the falls.

There is no ice interference at either of these stations during the winter months, and discharge measurements may be made at all seasons of the year without any change in location of the section.

Drainage Area.—The drainage area above these sections is 27,200 square miles.

Channel.—The south channel is approximately four hundred feet wide. The bed of the channel is rock and not liable to shifting, the control for the section being the crest of the falls, nine hundred feet below. The banks are of rock and of sufficient height to confine the discharge to the channel at all stages. The channel is straight and free from eddies under nearly all conditions.

The north channel has a width of approximately forty-five feet. The head and banks of the channel are of rock and free from likelihood of shifting, the control being twenty feet below. The channel is straight above and below the section for a sufficient distance to insure freedom from eddies.

Gauge.—The gauge at the south channel section is a rock-bolted vertical staff gauge, located on the left bank one hundred feet below the section, reading direct to W.P.S. datum. On June 17, 1916, on account of high water conditions a temporary staff gauge was placed two hundred feet below the section on the right bank and referred to W.P.S. datum. On July 26, 1917, a rock-bolted staff gauge was installed on the left side of this channel, about seventy-five feet upstream from the metering section. This gauge is referred to W.P.S. datum and is direct reading.

On the north channel, a rock bolted vertical staff gauge was located on the right bank, about one hundred feet above the section. This gauge was also referred to W.P.S. datum and was used up till July 20, 1918. On July 20, 1918, a vertical staff gauge was bolted to the rock on the south side of the channel, opposite the location of the old gauge. This gauge reads direct to W.P.S. datum and has been in use since the above date.

On account of the impossibility of obtaining readers for the above gauges, the daily records were obtained from gauge readings at Minaki. The gauge at this point is a vertical staff gauge secured to the crib work at the east end of the Grand Trunk Pacific Railway bridge at Minaki. The gauge is referred to W.P.S. datum.

In August of 1915, a Gurley printed record water stage register, was installed on the island opposite the head of the south channel and since that date daily records have been obtained from same.

Discharge Measurements.—Discharge measurements covering a range in stage of 1031.80 to 1039.31, have been taken at frequent intervals since the installation of the station.

Records Available.—From September 14, 1913 to December 5, 1914, and from May 18, to August 15, 1915, continuous record of daily gauge height has been obtained. From the latter date to September 30, 1918 records on the automatic gauge at Whitedog have been obtained.

Based on these gauge readings, estimates of daily discharge for the above periods are available, Estimates of monthly-mean discharge based on gauge heights and actual measurements are also available.

Combined and separate records of discharge for the two channels are available covering the above periods.

Accuracy.—The discharge curves for each channel are well defined between gauge heights 1032.0 and 1039·25. Above and below these limits the curves are only fairly well defined.

Discharge Measurements of Winnipeg River at South Channel Whitedog Falls, during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec. feet.	Auto. Gauge.	1918.	Feet.	Sec.-feet.	Auto. Gauge.
June 1	1,028·77	11,675	1,033·66	May 15	1,026·50	6,627·8	1,032·12
July 7	1,026·38	6,447	1,031·96	July 10	1,026·58	6·792·9	1,032·12
July 26	1,026·50	6,762	1,032·00	Sept. 26	1,026·58	6,998·7	1,032·11
Aug. 17	1,026·48	6,757	1,032·00				

Daily Gauge Height and Discharge of Winnipeg River at South Channel, Whitedo Falls, for part year ending September 30, 1917.

[Drainage area, 27,200 square miles.]

Day.	October		November.		December.		January.		February.		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Dis charg
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-f
1							34·50	14,300	34·88	15,675	35·35	18,3
2							34·51	14,325	34·97	16,025	35,53	18,2
3							34·52	14,375	35·09	16,475	35·51	18,1
4							34·52	14,375	35·18	16,825	35·49	18,0
5							34·51	14,325	35·27	17,175	35·47	17,9
6							34·51	14,325	35·28	17,225	35·46	17,9
7							34·51	14,325	35·32	17,375	35·46	17,9
8							34·50	14,300	35·33	17,425	35·48	18,0
9							34·51	14,325	35·32	17,375	35·50	18,1
10							34·50	14,300	35·31	17,350	35·52	18,1
11							34·50	14,300	35·31	17,350	35·54	18,2
12							34·50	14,300	35·32	17,375	35·56	18,3
13							34·49	14,275	35·32	17,375	35·61	18,5
14							34·49	14,275	35·34	17,450	35·64	18,6
15							34·48	14,225	35·37	17,575	35·70	18,9
16							34·47	14,200	35·40	17,700	35·74	19,1
17							34·45	14,125	35·43	17,825	35·79	19,3
18							34·44	14,100	35·45	17,900	35·83	19,4
19							34·42	14,025	35·36	17,550	35·89	19,7
20							34·43	14,050	35·48	18,025	35·93	19,9
21							34·43	14,050	35·50	18,100	35·96	20,0
22							34·45	14,125	35·52	18,175	35·99	20,1
23							34·48	14,225	35·54	18,275	36·02	20,2
24							34·50	14,300	35·55	18,300	36·03	20,3
25							34·51	14,450	35·57	18,375	36·06	20,4
26							34·59	14,625	35·58	18,425	36·08	20,5
27							34·61	14,800	35·58	18,425	36·09	20,5
28							34·67	14,900	35·56	18,350	36·08	20,5
29							34·69	14,975	.....	.....	36·05	20,4
30							34·73	15,125	.....	.....	36·03	20,3
31							34·81	15,425	.....	.....	36·00	20,2

	April.		May.		June.		July.		August.		September.	
1	35·98	20,100	35·28	17,225	33·66	11,475	32·12	6,940	32·07	6,800	31·96	6,5
2	35·96	20,025	35·20	16,900	33·63	11,375	32·04	6,730	32·08	6,820	31·94	6,4
3	35·96	20,025	35·14	16,675	33·64	11,425	32·01	6,650	32·12	6,940	31·92	6,4
4	35·95	19,975	35·08	16,450	33·60	11,300	31·97	6,560	32·16	7,050	31·91	6,4
5	35·94	19,925	35·02	16,225	33·57	11,200	31·96	6,530	32·14	6,990	31·90	6,3
6	35·92	19,850	34·97	16,025	33·57	11,200	31·96	6,530	32·12	6,940	31·95	6,5
7	35·90	19,750	34·91	15,800	33·56	11,150	31·95	6,510	32·09	6,850	31·97	6,5
8	35·86	19,600	34·85	15,575	33·54	11,100	31·91	6,410	32·06	6,770	31·98	6,5
9	35·84	19,500	34·77	15,275	33·52	11,025	31·88	6,330	32·03	6,700	31·99	6,6
10	35·84	19,500	34·70	15,025	33·49	10,950	31·88	6,330	32·03	6,700	31·97	6,5
11	35·83	19,475	34·65	14,850	33·48	10,900	31·90	6,390	32·02	6,680	31·96	6,5
12	35·82	19,425	34·59	14,625	33·47	10,875	31·91	6,410	32·02	6,680	31·98	6,5
13	35·82	19,425	34·53	14,400	33·42	10,725	31·91	6,410	32·01	6,650	31·99	6,6
14	35·81	19,375	34·48	14,225	33·34	10,475	31·91	6,410	31·99	6,610	32·00	6,6
15	35·81	19,375	34·31	13·625	33·31	10,375	31·92	6,440	31·98	6,580	32·00	6,6
16	35·84	19,500	34·19	13,225	33·23	10,125	31·89	6,370	31·99	6,610	32·00	6,6
17	35·85	19,550	34·12	13,090	33·12	9,800	31·86	6,290	31·99	6,610	32·00	6,6
18	35·85	19,550	34·07	12,825	32·96	9,320	31·86	6,290	31·99	6,610	31·98	6,5
19	35·86	19,600	34·02	12,650	32·85	9,000	31·87	6,310	31·96	6,530	31·99	6,5
20	35·87	19,625	33·95	12,425	32·76	8,730	31·87	6,310	31·95	6,510	32·00	6,6
21	35·88	19,675	33·84	12,050	32·63	8,360	31·87	6,310	31·94	6,490	32·02	6,6
22	35·88	19,675	33·92	12,325	32·57	8,190	31·83	6,220	31·93	6,460	32·06	6,7
23	35·85	19,550	33·90	12,250	32·50	7,990	31·82	6,200	31·90	6,390	32·06	6,7
24	35·84	19,500	33·87	12,150	32·43	7,790	31·80	6,150	31·93	6,460	32·05	6,7
25	35·81	19,375	33·83	12,025	32·35	7,570	31·89	6,370	31·96	6,530	32·04	6,7
26	35·77	19,225	33·80	11·925	32·27	7,330	32·00	6,630	31·96	6,530	32·04	6,7
27	35·74	19,100	33·76	11,800	32·26	7,310	32·06	6,770	31·95	6,510	32·07	6,8
28	35·70	18,925	33·75	11,775	32·22	7,200	32·12	6,940	31·94	6,490	32·07	6,8
29	35·66	18,750	33·75	11,775	32·21	7,180	32·12	6,940	31·96	6,530	32·04	6,7
30	35·63	18,625	33·73	11,700	32·21	7,180	32·08	6,820	31·99	6,610	32·06	6,7
31			33·72	11,675	.....	.....	32·06	6,770	31·98	6,580	.....	.....

NOTES.—1000·00 should be added to gauge heights to reduce to station datum.
From January 1 to May 31 the gauge heights are deduced from Manaki gauge heights.

Daily Gauge Height and Discharge of Winnipeg River at South Channel, Whitedog Falls, for year ending Sept. 30, 1918.

[Drainage area, 27,200 square miles.]

Day.	October.		November		December		January.		February		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1	32·05	6,760	32·19	7,125	32·17	7,070	32·21	7,180	32·10	6,890	32·26	7,320
2	32·00	6,630	32·21	7,180	32·17	7,070	32·21	7,180	32·09	6,865	32·26	7,320
3	32·05	6,760	32·23	7,235	32·17	7,070	32·20	7,150	32·09	6,865	32·27	7,345
4	32·07	6,810	32·26	7,320	32·17	7,070	32·19	7,125	32·10	6,890	32·27	7,345
5	32·10	6,890	32·20	7,150	32·16	7,045	32·20	7,150	32·10	6,890	32·28	7,375
6	32·11	6,915	32·18	7,100	32·16	7,045	32·21	7,180	32·11	6,915	32·28	7,375
7	32·05	6,760	32·19	7,125	32·16	7,045	32·20	7,150	32·12	6,940	32·28	7,375
8	32·09	6,865	32·20	7,150	32·16	7,045	32·20	7,150	32·13	6,970	32·29	7,400
9	32·07	6,810	32·20	7,150	32·16	7,045	32·19	7,125	32·13	6,970	32·29	7,400
10	32·09	6,865	32·21	7,180	32·15	7,020	32·18	7,100	32·14	6,995	32·30	7,430
11	32·04	6,735	32·23	7,235	32·15	7,020	32·17	7,070	32·15	7,020	32·33	7,515
12	32·10	6,890	32·22	7,205	32·15	7,020	32·15	7,020	32·15	7,020	32·36	7,600
13	32·14	6,995	32·21	7,180	32·15	7,020	32·13	6,970	32·16	7,045	32·38	7,710
14	32·13	6,970	32·22	7,205	32·15	7,020	32·12	6,940	32·17	7,070	32·39	7,760
15	32·10	6,890	32·23	7,235	32·15	7,020	32·12	6,940	32·17	7,070	32·58	8,245
16	32·09	6,865	32·22	7,205	32·23	7,235	32·11	6,915	32·17	7,070	32·68	8,500
17	32·11	6,915	32·24	7,260	32·23	7,235	32·11	6,915	32·17	7,070	32·76	8,735
18	32·12	6,940	32·21	7,180	32·23	7,235	32·11	6,915	32·18	7,100	32·81	8,880
19	32·17	7,070	32·18	7,100	32·22	7,205	32·10	6,890	32·18	7,100	32·88	9,080
20	32·19	7,125	32·16	7,045	32·22	7,205	32·09	6,865	32·18	7,100	33·01	9,470
21	32·21	7,180	32·20	7,150	32·21	7,180	32·09	6,865	32·20	7,150	33·07	9,650
22	32·15	7,020	32·20	7,150	32·20	7,150	32·09	6,865	32·21	7,180	33·15	9,890
23	32·16	7,045	32·20	7,150	32·19	7,125	32·09	6,865	32·22	7,205	33·18	9,980
24	32·16	7,045	32·20	7,150	32·18	7,100	32·08	6,840	32·22	7,205	33·31	10,380
25	32·17	7,070	32·23	7,235	32·18	7,100	32·08	6,840	32·23	7,235	33·36	10,535
26	32·20	7,150	32·21	7,180	32·18	7,100	32·09	6,865	32·23	7,235	33·41	10,690
27	32·21	7,235	32·17	7,070	32·19	7,125	32·09	6,865	32·23	7,235	33·46	10,845
28	32·24	7,260	32·17	7,070	32·20	7,150	32·09	6,865	32·24	7,260	33·53	11,065
29	32·19	7,125	32·17	7,070	32·21	7,180	32·08	6,840			33·63	11,385
30	32·16	7,045	32·17	7,070	32·22	7,205	32·08	6,840			33·69	11,580
31	32·18	7,100			32·22	7,205	32·08	6,840			33·76	11,800

Day.	April.		May.		June.		July		August.		September.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1	33·75	11,770	32·38	7,655	32·52	8,055	32·32	7,485	31·84	6,245	31·68	5,875
2	33·71	11,640	32·35	7,570	32·53	8,075	32·24	7,260	31·84	6,245	31·68	5,875
3	33·67	11,515	32·31	7,460	32·50	7,990	32·22	7,205	31·85	6,270	31·66	5,830
4	33·63	11,385	32·27	7,345	32·47	7,905	32·20	7,125	31·79	6,125	31·66	5,830
5	33·57	11,195	32·24	7,260	32·48	7,935	32·15	7,020	31·78	6,105	31·66	5,830
6	33·55	11,130	32·22	7,205	32·42	7,765	32·17	7,070	31·77	6,080	31·67	5,855
7	33·55	11,130	32·21	7,180	32·44	7,820	32·18	7,100	31·77	6,080	31·69	5,900
8	33·50	10,970	32·18	7,100	32·44	7,820	32·16	7,045	31·78	6,105	31·69	5,900
9	33·38	10,600	32·15	7,020	32·44	7,820	32·12	6,940	31·97	6,125	31·69	5,900
10	33·35	10,505	32·13	6,970	32·41	7,740	32·12	6,940	31·76	6,060	31·70	5,920
11	33·32	10,410	32·09	6,865	32·30	7,430	32·12	6,940	31·75	6,035	31·72	5,965
12	33·22	10,100	32·08	6,840	32·36	7,600	32·14	6,995	31·79	6,125	31·75	6,035
13	33·10	9,740	32·06	6,785	32·37	6,625	32·19	7,125	31·76	6,060	31·76	6,060
14	32·90	9,140	32·06	6,785	32·39	7,680	32·19	7,125	31·74	6,010	31·80	6,150
15	32·81	8,880	32·02	6,680	32·42	7,765	32·14	6,995	31·72	5,965	31·81	6,175
16	32·74	8,675	32·04	6,735	32·44	7,820	32·11	6,915	31·70	5,920	31·84	6,245
17	32·54	8,385	32·04	6,735	32·44	7,820	32·09	6,865	31·70	5,920	31·84	6,245
18	32·62	8,330	32·08	6,840	32·41	7,740	32·09	6,865	31·68	5,875	31·88	6,340
19	32·60	8,270	32·11	6,915	32·42	7,765	32·06	6,785	31·66	5,830	31·90	6,390
20	32·58	8,215	32·08	6,840	32·40	7,710	32·06	6,785	31·66	5,830	31·94	6,485
21	32·57	8,185	32·11	6,915	32·38	7,655	32·03	6,710	31·70	5,920	31·99	6,605
22	32·55	8,130	32·13	6,970	32·42	7,765	32·00	6,630	31·72	5,965	32·02	6,680
23	32·54	8,100	32·19	7,125	32·41	7,740	32·00	6,630	31·72	5,965	32·03	6,710
24	32·52	8,045	32·28	7,375	32·37	7,625	31·96	6,535	31·74	6,010	32·02	6,680
25	32·52	8,045	32·41	7,740	32·34	7,540	31·96	6,535	31·70	5,920	32·04	6,735
26	32·50	7,990	32·50	7,990	32·38	7,655	31·95	6,510	31·70	5,920	32·09	6,865
27	32·49	7,960	32·50	7,990	32·40	7,710	31·96	6,535	31·72	5,965	32·11	6,915
28	32·46	7,880	32·50	7,990	32·38	7,655	31·94	6,485	31·67	5,855	32·13	6,970
29	32·44	7,820	32·51	8,200	32·37	7,625	31·90	6,390	31·67	5,855	32·16	7,045
30	32·41	7,740	32·53	8,075	32·35	7,570	31·90	6,390	31·66	5,830	32·13	6,970
31			32·54	8,100			31·88	6,340	31·67	5,855		

NOTE.—1,000·00 should be added to gauge heights to reduce to W.P.S. datum.

Monthly Discharge of Winnipeg River at South Channel, Whitedog Falls, for years ending September, 30, 1917-18.

[Drainage area, 27,200 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17						
October	25,950	18,100	24,227			1,489,660
November	19,420	16,480	17,972			1,069,408
December	19,210	15,350	17,281			1,062,567
January	15,425	14,025	14,392			884,929
February	18,425	15,675	17,553			974,844
March	20,579	17,950	19,192			1,180,070
April	20,100	18,625	19,518			1,161,401
May	17,225	11,675	13,822			849,881
June	11,475	7,180	9,621			572,489
July	6,940	6,150	6,493			399,238
August	7,050	6,390	6,652			409,015
September	6,700	6,390	6,622			394,036
The year	25,950	6,150	14,431			10,445,085
1917-18.						
October	7,260	6,630	6,959			427,892
November	7,320	7,045	7,162			426,168
December	7,235	7,020	7,108			437,054
January	7,180	6,840	6,978			429,060
February	7,260	6,865	7,056			391,870
March	11,800	7,320	8,877			545,825
April	11,770	7,710	9,396			559,100
May	8,100	6,680	7,260			446,401
June	8,075	7,430	7,747			460,978
July	7,485	6,340	6,848			421,067
August	6,270	5,830	6,002			369,049
September	7,045	5,830	6,299			374,817
The year	11,800	5,830	7,306			5,289,303

NOTE.—Discharge per square mile and run-off depth in inches omitted, as the channel is one of two of the river at this point.

Discharge Measurements of Winnipeg River, at North Channel, Whitedog Falls, during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.	Auto- Gauge.	1918.	Feet.	Sec.-ft.	Auto. Gauge.
May 31	1,033·49	466	1,033·66	May 15	1,031·59	162·0	1,032·02
July 6	1,031·57	175	1,031·95	July 10	1,031·66	191·7	1,032·12
Jul, 4	1,031·26	141	1,031·80	Sept. 26	1,031·71	172·5	1,032·11
Aug. 13	1,031·54	189	1,032·01				

Daily Gauge Height and Discharge of Winnipeg River, at North Channel, Whitedog Falls, for part of Year ending September 30, 1917.

[Drainage area, 27,200 square miles.]

Day.	October.		November.		December.		January.		February.		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1							34·50	641	34·88	731	35·55	914
2							34·51	643	34·97	757	35·53	908
3							31·52	646	35·09	787	35·51	903
4							34·52	646	35·18	831	35·49	897
5							31·51	643	35·27	816	35·47	892
6							31·51	643	35·28	838	35·16	889
7							31·51	641	35·32	850	35·46	889
8							34·50	641	35·33	852	35·48	894
9							31·51	643	35·32	850	35·50	900
10							34·50	641	35·31	847	35·52	906
11							34·50	641	35·31	847	35·51	911
12							34·50	641	35·32	850	35·56	937
13							34·49	639	35·32	850	35·61	931
14							31·49	639	38·34	855	35·64	939
15							34·48	636	35·37	864	35·70	956
16							34·47	631	35·10	872	35·74	968
17							34·45	630	35·43	880	35·79	983
18							34·41	627	35·45	886	35·83	995
19							34·42	623	35·36	863	35·89	1,013
20							34·43	625	35·48	891	35·93	1,026
21							34·43	625	35·50	900	35·96	1,035
22							34·45	636	35·52	906	35·99	1,045
23							34·48	636	35·54	911	36·02	1,054
24							34·50	64'	35·55	914	36·03	1,058
25							34·54	650	35·57	920	36·06	1,067
26							34·59	662	35·58	922	36·08	1,074
27							34·64	675	35·58	922	36·09	1,077
28							34·67	682	35·56	917	36·08	1,074
29							34·69	687			36·05	1,064
30							34·73	697			36·03	1,058
31							34·81	716			36·00	1,048

	April.		May.		June.		July.		August.		September.	
1	35·98	1,042	35·28	838	33·66	451	32·12	188	32·07	183	31·96	172
2	35·96	1,035	35·20	816	33·63	445	32·04	180	32·08	184	31·94	170
3	35·96	1,035	35·34	800	33·64	447	32·03	177	32·12	188	31·92	168
4	35·95	1,032	35·08	785	33·60	438	31·97	171	32·16	193	31·91	167
5	35·94	1,029	35·02	769	33·57	431	31·96	172	32·14	191	31·90	166
6	35·92	1,022	34·97	757	33·57	431	31·96	172	32·12	188	31·95	171
7	35·90	1,016	34·91	741	33·57	429	31·95	171	32·09	185	31·97	173
8	35·86	1,004	34·85	727	33·54	425	31·91	167	32·06	182	31·98	174
9	35·84	998	34·77	707	33·52	420	31·88	164	32·03	179	31·99	175
10	35·84	998	34·70	689	38·49	414	31·88	164	32·03	179	31·97	173
11	35·83	995	34·65	677	33·48	412	31·90	166	32·02	178	31·96	172
12	35·82	992	34·59	663	33·47	410	31·91	167	32·02	178	31·98	174
13	35·82	992	34·53	648	33·42	400	31·91	167	32·01	177	31·99	175
14	35·81	989	34·48	636	33·34	384	31·91	167	31·99	175	32·00	176
15	35·81	989	34·31	597	33·31	378	31·92	168	31·98	174	32·00	176
16	35·84	998	34·19	570	33·23	361	31·89	165	31·99	175	32·00	176
17	35·85	1,001	34·12	554	33·12	342	31·86	162	31·99	175	32·00	176
18	35·85	1,001	34·07	542	32·96	312	31·86	162	31·99	175	31·98	174
19	35·86	1,004	34·02	531	32·85	294	31·87	163	31·96	172	31·99	175
20	35·87	1,007	33·95	515	32·76	280	37·87	163	31·95	171	32·00	176
21	35·88	1,010	33·84	491	32·63	259	31·87	163	31·94	170	32·02	178
22	35·88	1,010	33·92	508	32·57	248	31·83	159	31·93	169	32·06	182
23	35·85	1,001	33·90	504	32·50	238	31·82	158	31·90	166	32·06	182
24	35·84	998	33·87	497	32·43	228	31·80	156	31·93	169	32·05	181
25	35·81	989	33·83	489	32·35	217	31·89	165	31·96	172	32·04	180
26	35·77	977	33·80	482	32·27	206	32·00	176	31·96	172	32·04	180
27	35·74	968	33·76	473	32·26	205	32·06	182	31·95	171	32·07	183
28	35·70	956	33·75	471	32·22	200	32·12	188	31·94	170	32·07	183
29	35·66	945	33·75	471	32·21	199	32·12	188	31·96	172	32·04	180
30	35·63	936	33·73	467	32·21	199	32·08	184	31·99	175	32·06	182
31			33·72	464			32·06	182	31·98	174		

NOTE.—From January 1 to May 31, the gauge heights are deduced from Minaki gauge heights. 1,000·00 should be added to gauge heights to reduce to station datum.

Daily Gauge Height and Discharge of Winnipeg River, North Channel, Whitedog Falls, for Year ending September 30, 1918.

[Drainage area, 27,200 square miles.]

Day	October		November		December		January		February		March	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet	Sec.-ft.	Feet.	Sec.-ft.	Feet	Sec.-ft.	Feet.	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
1	32·05	181	32·19	197	32·17	194	32·21	199	32·10	186	32·26	205
2	32·00	176	32·21	199	32·17	194	32·21	199	32·09	185	32·26	205
3	32·05	181	32·23	202	32·17	194	32·20	198	32·09	185	32·27	206
4	32·07	183	32·26	205	32·17	194	32·19	197	32·10	186	32·27	206
5	32·10	186	32·20	198	32·16	193	32·20	198	32·10	186	32·28	208
6	32·11	187	32·18	196	32·16	193	32·21	199	32·11	187	32·28	208
7	32·05	181	32·19	197	32·16	193	32·20	198	32·12	188	32·28	208
8	32·09	185	32·20	198	32·16	193	32·20	198	32·13	190	32·29	209
9	32·07	183	32·20	198	32·16	193	32·19	197	32·13	190	32·29	209
10	32·09	185	32·21	199	32·15	192	32·18	196	32·14	191	32·30	210
11	32·01	180	32·23	202	32·15	192	32·17	194	32·15	192	32·33	214
12	32·10	186	32·22	200	32·15	192	32·15	192	32·15	192	32·36	218
13	32·14	191	32·21	199	32·15	192	32·13	190	32·16	193	32·41	225
14	32·13	190	32·22	200	32·15	192	32·12	188	32·17	194	32·49	237
15	22·10	186	32·23	202	32·15	192	32·12	188	32·17	194	32·58	251
16	32·09	185	32·22	200	32·23	202	32·11	187	32·17	194	32·68	267
17	32·11	187	32·24	203	32·23	202	32·11	187	32·17	194	32·76	280
18	32·12	188	32·21	199	32·23	202	32·11	187	32·18	196	32·81	288
19	32·17	194	32·18	196	32·22	200	32·10	186	32·18	196	32·88	299
20	32·19	197	32·16	193	32·22	200	32·09	185	32·18	196	33·01	322
21	32·21	199	32·20	198	32·21	199	32·09	185	32·20	198	33·07	333
22	32·15	192	32·20	198	32·20	198	32·09	185	32·21	199	33·15	347
23	32·16	193	32·20	198	32·19	197	32·09	185	32·22	200	33·18	352
24	32·16	193	32·20	198	32·18	196	32·08	184	32·22	200	33·31	378
25	32·17	194	32·23	202	32·18	196	32·08	184	32·23	202	33·36	388
26	32·20	198	32·21	199	32·18	196	32·09	185	32·23	202	33·43	398
27	32·23	202	32·17	191	32·19	197	32·09	185	32·21	202	33·46	408
28	32·24	203	32·17	194	32·20	198	32·09	185	32·24	203	33·53	423
29	32·19	197	32·17	194	32·21	199	32·08	184			33·61	445
30	32·16	193	32·17	194	32·22	200	32·08	184			33·69	458
31	32·18	196			32·22	200	32·08	184			33·76	473

	April		May.		June		July		August.		September	
1	33·75	471	32·38	221	32·52	241	32·32	213	31·84	160	31·68	148
2	33·71	462	32·35	217	32·53	243	32·24	203	31·84	160	31·68	148
3	33·67	453	32·31	211	32·50	238	32·22	200	31·85	161	31·66	146
4	33·63	445	32·27	206	32·47	234	32·19	197	31·79	15	31·66	146
5	33·57	431	32·24	203	32·48	235	32·15	192	31·78	155	31·66	146
6	33·55	427	32·22	200	32·42	227	32·17	194	31·77	154	31·67	147
7	33·55	427	32·21	199	32·44	230	32·18	196	31·77	154	31·69	149
8	33·50	416	32·18	196	32·44	230	32·16	193	31·78	155	31·69	149
9	33·38	392	32·15	192	32·44	230	32·12	188	31·79	155	31·69	149
10	33·35	386	32·13	190	32·41	225	32·12	188	31·76	154	31·[illegible]	150
11	33·32	380	32·09	185	32 30	210	32·12	188	31·75	153	[illegible]	[illegible]
12	33·22	360	32·08	184	32·36	218	32·14	191	31·79	155	[illegible]	[illegible]
13	33·10	338	32·06	182	32·37	220	32·19	197	31·76	154	[illegible]	[illegible]
14	32·90	302	32·06	182	32·39	223	32·19	197	31·74	152	[illegible]	[illegible]
15	32·81	288	32·02	178	32·42	227	32·14	191	31·72	151	[illegible]	[illegible]
16	32·74	276	32·04	180	32·44	230	32·11	187	31·70	150	[illegible]	[illegible]
17	32·64	260	32·04	180	32·44	230	32·09	185	31·70	150	[illegible]	[illegible]
18	32·62	257	32·08	184	32·41	225	32·09	185	31·68	148	[illegible]	[illegible]
19	32·60	254	32·11	187	32·42	227	32·06	182	31·66	146	[illegible]	[illegible]
20	32·58	251	32·08	184	32·40	224	32·06	182	31·66	146	[illegible]	[illegible]
21	32·57	249	32·11	187	32·38	221	32·03	179	31·70	150	[illegible]	[illegible]
22	32·55	246	32·13	190	32·42	227	32·00	176	31·72	151	[illegible]	[illegible]
23	32·54	244	32·19	197	32·41	225	32·00	176	31·72	151	[illegible]	[illegible]
24	32·52	241	32·28	208	32·37	220	31·96	172	31·74	152	[illegible]	[illegible]
25	32·52	241	32·41	225	32·34	216	31·96	172	31·70	150	[illegible]	[illegible]
26	32·50	238	32·50	238	32·38	221	31·95	171	31·70	150	[illegible]	[illegible]
27	32·49	237	32·50	238	32·40	224	31·96	172	31·72	151	[illegible]	[illegible]
28	32·46	232	32·50	238	32·38	221	31·94	170	31·67	147	[illegible]	[illegible]
29	32·44	230	32·51	240	32·37	220	31·90	166	31·67	147	[illegible]	[illegible]
30	32·41	225	32·53	243	32·35	217	31·90	166	31·67	147	[illegible]	[illegible]
31			32·54	244			31·88	164	31·67	147		

NOTE.—1,000·00 should be added to gauge heights to reduce to W.P.S. datum.

Monthly Discharge of Winnipeg River at North Channel, Whiteday Falls, for years ending September 30, 1917-18.

[Drainage area 27,200 square miles.]

Month	Discharge in Second-Feet				Run Off	
	Maximum	Minimum	Mean	Per square mile	Depth in inches on Drainage area	Total in acre-feet
1916-17						
October	1,518	900	1,371			84,423
November	992	787	891			53,018
December	977	711	843			51,834
January	716	623	647			39,782
February	922	734	862			47,873
March	1,077	889	977			60,073
April	1,042	946	999			59,445
May	848	464	609			37,446
June	451	199	337			20,053
July	188	156	170			10,451
August	193	166	177			10,883
September	184	166	176			10,473
The year	1,518	156	671			485,666
1917-18						
October	203	176	189			11,621
November	205	193	198			11,782
December	202	192	196			12,052
January	199	184	190			11,683
February	203	185	194			10,774
March	473	205	293			18,016
April	471	224	322			19,160
May	244	178	204			12,541
June	243	210	226			13,448
July	213	164	185			11,375
August	161	146	152			9,346
September	193	146	163			9,699
The year	473	146	209			151,309

NOTE.—Discharge per square mile and run-off depth in inches omitted, as the channel is one of two of the river at this point.

Daily Gauge Height and Discharge of Winnipeg River at North and South Channels, Whitedog Falls, for part year ending September 30, 1917.

[Drainage area 27,200 square miles.]

Day.	October.		November.		December.		January.		February.		March.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height	Discharge	Gauge Height.	Discharge	Gauge Height	Discharge
	Feet.	Sec.-ft.	Feet.	Sec.-ft	Feet.	Sec.-ft.	Feet	Sec.-ft	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1							31·50	14,940	34·88	16,425	35·55	19,225
2							34·51	11,975	34·37	16,775	35·53	19,125
3							34·52	15,025	35·09	17,275	35·51	19,050
4							34·52	15,025	35·18	17,650	35·49	18,950
5							34·51	14,975	35·27	18,025	35·47	18,875
6							31·51	14,975	35·28	18,050	35·46	18,825
7							34·51	14,975	35·32	18,225	35·46	18,825
8							34·50	14,940	35·33	18,275	35·48	18,925
9							34·51	14,975	35·32	18,225	35·50	19,000
10							34·50	14,940	35·31	18,175	35·52	19,100
11							34·50	14,940	35·31	18,175	35·54	19,175
12							34·50	14,940	35·32	18,225	35·56	19,250
13							34·49	14,900	35·32	18,225	35·61	19,475
14							34·49	14,900	35·34	18,300	35·64	19,625
15							34·48	14,875	35·37	18,450	35·70	19,875
16							34·47	14,825	35·40	18,575	35·74	20,050
17							34·45	14,750	35·43	18,700	35·79	20,275
18							34·44	14,725	35·45	18,775	35·83	20,475
19							34·42	14,650	35·36	18,400	35·89	20,725
20							34·43	14,675	35·48	18,925	35·93	20,925
21							31·43	14,675	35·50	19,000	35·96	21,050
22							34·45	14,675	35·52	19,100	35·99	21,200
23							34·48	14,875	35·54	19,175	36·02	21,250
23							34·48	14,875	35·54	19,175	36·02	21,325
24							34·50	14,940	35·55	19,225	36·03	21,375
25							34·54	15,100	35·57	19,300	36·06	21,525
26							34·59	15,275	35·58	19,350	36·08	21,600
27							34·64	15,475	35·58	19,350	36·09	21,650
28							34·67	15,600	35·56	19,250	36·08	21,600
29							34·69	15,675			36·05	21,475
30							34·73	15,825			36·03	21,375
31							34·81	16,150			36·00	21,250

	April.		May.		June.		July.		August.		September.	
1	35·98	21,150	35·28	18,050	33·66	11,925	32·12	7,130	32·07	6,990	31·96	6,700
2	35·96	21,050	35·20	17,725	33·63	11,825	32·04	6,910	32·08	7,020	31·94	6,660
3	35·96	21,050	35·14	17,475	33·64	11,875	32·01	6,830	32·12	7,130	31·92	6,610
4	35·95	21,000	35·08	17,225	33·60	11,725	31·97	6,730	32·16	7,240	31·91	6,580
5	35·94	20,975	35·02	16,975	33·57	11,625	31·96	6,700	32·14	7,180	31·90	6,550
6	35·92	20,875	34·97	16,775	33·57	11,625	31·96	6,700	32·12	7,130	31·05	6,680
7	35·90	26,775	34·91	16,550	33·56	11,600	31·95	6,680	32·09	7,050	31·97	6,730
8	35·86	20,600	34·85	16,300	33·54	11,525	31·91	6,580	32·06	6,970	31·98	6,760
9	35·84	20,500	34·77	15,975	33·52	11,450	31·88	6,510	32·03	6,890	31·99	6,780
10	35·84	20,500	34·70	15,900	33·49	11,350	31·88	6,510	32·03	6,890	31·97	6,730
11	35·83	20,475	34·65	15,525	33·48	11,325	31·90	6,550	32·02	6,860	31·96	6,700
12	35·82	20,425	34·59	15,275	33·47	11,300	31·91	6,580	32·02	6,860	31·98	6,760
13	35·82	20,425	34·53	15,050	33·42	11,125	31·91	6,580	32·01	6,830	31·99	6,780
14	35·81	20,375	34·48	14,875	33·34	10,850	31·91	6,580	31·99	6,780	32·00	6,810
15	35·81	20,375	34·31	14,250	33·31	10,750	31·92	6,600	31·98	6,760	32·00	6,810
16	35·84	20,500	34·10	13,800	33·23	10,500	31·89	6,530	31·99	6,780	32·00	6,810
17	35·85	20,550	34·12	13,550	33·12	10,150	31·86	6,460	31·99	6,780	32·00	6,810
18	35·85	20,550	34·07	13,350	32·96	9,640	31·86	6,460	31·99	6,780	31·98	6,760
19	35·86	20,600	34·02	13,175	32·85	9,300	31·87	6,480	31·96	6,700	31·99	6,780
20	35·87	20,650	33·95	12,925	32·76	9,020	31·87	6,480	31·95	6,680	32·00	6,810
21	35·88	20,700	33·84	12,550	32·63	8,620	31·87	6,480	31·94	6,660	32·02	6,860
22	35·88	20,700	33·92	12,825	32·57	8,430	31·83	6,380	31·93	6,630	32·06	6,970
23	35·85	20,550	33·90	12,750	32·50	8,220	31·82	6,350	31·90	6,550	32·06	6,970
24	35·84	20,500	33·87	12,650	32·43	8,010	31·80	6,310	31·93	6,630	32·05	6,940
25	35·81	20,375	33·83	12,525	32·35	7,780	31·89	6,530	31,96	6,700	32·04	6,910
26	35·77	20,200	33·80	12,400	32·27	7,550	32·00	6,810	31·96	6,700	32·04	6,910
27	35·74	20,050	33·76	12,275	32·26	7,520	32·06	6,970	31·95	6,680	32·07	6,990
28	35·70	19,875	33·75	12,250	32·22	7,400	32·12	7,130	31·94	6,660	32·07	6,990
29	35·66	19,700	33·75	12,250	32·21	7,370	32·12	7,130	31·96	6,700	32·04	6,910
30	35·63	19,575	33·73	12,175	32·21	7,370	32·08	7,020	31·99	6,780	32·06	6,970
31			33·72	12,150			32·06	6,970	31·98	6,760		

NOTE.—From January 1 to May 31 the gauge heights are deduced from Minaki gauge heights: 1,000 should be added to gauge heights to reduce to station datum.

Daily Gauge Height and Discharge of Winnipeg River, North and South Channels, Whitedog Falls for year ending September 30, 1918.

[Drainage area, 27,200 square miles.]

Day.	October.		November.		December.		January.		February.		March.	
	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height.	Discharge	Gauge Height.	Discharge.
1	32·05	6,940	32·19	7,320	32·17	7,265	32·21	7,375	32·10	7,075	32·26	7,520
2	32·00	6,805	32·21	7,375	32·17	7,265	32·21	7,375	32·09	7,050	32·26	7,520
3	32·05	6,940	32·23	7,430	32·17	7,265	32·20	7,345	32·09	7,050	32·27	7,550
4	32·07	6,995	32·26	7,520	32·17	7,265	32·19	7,320	32·10	7,075	32·27	7,550
5	32·10	7,075	32·29	7,345	32·16	7,235	32·20	7,345	32·10	7,075	32·28	7,575
6	32·11	7,100	32·18	7,290	32·16	7,235	32·21	7,375	32·11	7,100	32·28	7,575
7	32·05	6,940	32·19	7,320	32·16	7,235	32·20	7,345	32·12	7,130	32·28	7,575
8	32·09	7,050	32·20	7,345	32·16	7,235	32·20	7,345	32·13	7,155	32·29	7,605
9	32·07	6,995	32·20	7,315	32·16	7,235	32·19	7,320	32·13	7,155	32·29	7,605
10	32·09	7,050	32·21	7,375	32·15	7,210	32·18	7,290	32·14	7,185	32·30	7,635
11	32·04	6,915	32·23	7,430	32·15	7,210	32·17	7,265	32·15	7,210	32·33	7,720
12	32·10	7,075	32·22	7,405	32·15	7,210	32·15	7,210	32·15	7,210	32·36	7,810
13	32·14	7,185	32·21	7,375	32·15	7,210	32·13	7,155	32·16	7,235	32·41	7,955
14	32·13	7,155	32·22	7,405	32·15	7,210	32·12	7,130	32·17	7,265	32·49	8,185
15	32·10	7,075	32·23	7,430	32·15	7,210	32·12	7,130	32·17	7,265	32·58	8,465
16	32·09	7,050	32·22	7,405	32·23	7,430	32·11	7,100	32·17	7,265	32·68	8,775
17	32·11	7,100	32·24	7,460	32·23	7,430	32·11	7,100	32·17	7,265	32·76	9,020
18	32·12	7,130	32·21	7,375	32·23	7,430	32·11	7,100	32·18	7,290	32·81	9,175
19	32·17	7,265	32·18	7,290	32·22	7,405	32·10	7,075	32·18	7,290	32·88	9,395
20	32·19	7,320	32·16	7,235	32·22	7,405	32·09	7,050	32·18	7,290	33·01	9,800
21	32·21	7,375	32·20	7,345	32·21	7,375	32·09	7,050	32·20	7,345	33·07	9,990
22	32·15	7,210	32·20	7,345	32·20	7,345	32·09	7,050	32·21	7,375	33·15	10,245
23	32·16	7,235	32·20	7,345	32·19	7,320	32·09	7,050	32·22	7,405	33·18	10,335
24	32·16	7,235	32·20	7,345	32·18	7,290	32·08	7,020	32·22	7,405	33·31	10,755
25	32·17	7,265	32·23	7,430	32·18	7,290	32·08	7,020	32·23	7,430	33·36	10,920
26	32·20	7,345	32·21	7,375	32·18	7,290	32·09	7,050	32·23	7,430	33·41	11,085
27	32·23	7,430	32·17	7,265	32·19	7,320	32·09	7,050	32·23	7,430	33·46	11,255
28	32·24	7,460	32·17	7,265	32·20	7,345	32·09	7,050	32·24	7,460	33·53	11,490
29	32·19	7,320	32·17	7,265	32·21	7,375	32·08	7,020	.....	.....	33·63	11,830
30	32·16	7,235	32·17	7,265	32·22	7,405	32·08	7,020	.....	.....	33·69	12,035
31	32·18	7,290	.....	.....	32·22	7,405	32·08	7,020	.....	.....	33·76	12,275

	April.		May.		June.		July.		August.		September.	
1	33·75	12,240	32·38	7,865	32·52	8,275	32·32	7,695	31·84	6,405	31·68	6,025
2	33·71	12,105	32·35	7,780	32·53	8,310	32·24	7,460	31·84	6,405	31·68	6,025
3	33·67	11,970	32·31	7,665	32·50	8,215	32·22	7,405	31·85	6,430	31·66	5,980
4	33·63	11,830	32·27	7,550	32·47	8,130	32·19	7,320	31·79	6,280	31·66	5,980
5	33·57	11,630	32·24	7,460	32·48	8,155	32·15	7,210	31·78	6,260	31·66	5,980
6	33·55	11,560	32·22	7,405	32·42	7,985	32·17	7,265	31·77	6,235	31·67	6,000
7	33·55	11,560	32·21	7,375	32·44	8,040	32·18	7,290	31·77	6,235	31·69	6,045
8	33·50	11,390	32·18	7,290	32·44	8,040	32·16	7,235	31·78	6,260	31·69	6,045
9	33·38	10,985	32·15	7,210	32·44	8,040	32·12	7,130	31·79	6,280	31·69	6,045
10	33·35	10,885	32·13	7,155	32·41	7,955	32·12	7,130	31·76	6,210	31·70	6,070
11	33·32	10,785	32·09	7,050	32·30	7,635	32·12	7,130	31·75	6,185	31·72	6,115
12	33·22	10,465	32·08	7,020	32·36	7,810	32·14	7,185	31·79	6,280	31·75	6,185
13	33·10	10,085	32·06	6,965	32·37	7,840	32·19	7,320	31 76	6,210	31 76	6,210
14	32 90	9,455	32 06	6,965	32 39	7,895	32·19	7,320	31·74	6,165	31 80	6,305
15	32·81	9,175	32·02	6,860	32·42	7,985	32·14	7,185	31·72	6,115	31·81	6,330
16	32·74	8,960	32·04	6,915	32·44	8,040	32·11	7,100	31·70	6,070	31·84	6,405
17	32·64	8,650	32·04	6,915	32·44	8,040	32·09	7,050	31·70	6,070	31·84	6,405
18	32·62	8,585	32·08	7,020	32·41	7,955	32·09	7,050	31·68	6,025	31·88	6,505
19	32·60	8,525	32·11	7,100	32·42	7,985	32·06	6,965	31·66	5,980	31·90	6,555
20	32·58	8,465	32·08	7,020	32·40	7,925	32·06	6,965	31·66	5,980	31·94	6,655
21	32·57	8,430	32·11	7,100	32·38	7,865	32·03	6,885	31·70	6,070	31·99	6,780
22	32·55	8,370	32·13	7,155	32·42	7,985	32·00	6,805	31·72	6,115	32·02	6,860
23	32·54	8,340	32·19	7,320	32·41	7,955	32·00	6,805	31·72	6,115	32·03	6,885
24	32·52	8,275	32·28	7,575	32·37	7,840	31·96	6,705	31·74	6,165	32·02	6,860
25	32·52	8,275	32·41	7,955	32·34	7,750	31·96	6,705	31·70	6,070	32·04	6,915
26	32·50	8,215	32·50	8,215	32·38	7,865	31·95	6,680	31·70	6,070	32·09	7,050
27	32·49	8,185	32·50	8,215	32·40	7,925	31·96	6,705	31·72	6,115	32·11	7,100
28	32·46	8,100	32·50	8,215	32·38	7,865	31·94	6,655	31·67	6,000	32·13	7,155
29	32·44	8,040	32·51	8,245	32·37	7,840	31·90	6,555	31·67	6,000	32·16	7,235
30	32·41	7,955	32·53	8,310	32·35	7,780	31·90	6,555	31·66	5,980	32·13	7,155
31	.....	.....	32·54	8,340	.....	.....	31·88	6,505	31·67	6,000	.....	.....

NOTE.—1,000·00 should be added to gauge heights to reduce to W.P.S. datum.

Monthly Discharge of Winnipeg River, North and South Channels at White Dog Falls, for years ending Sept. 30, 1917-18.

[Drainage area, 27,200 square miles.]

Month.	Discharge in Second-Feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17.						
October	27,450	19,000	25,595	0·941	1·085	1,573,775
November	20,420	17,270	18,861	0·693	0·773	1,122,307
December	20,200	16,060	18,125	0·666	0·768	1,114,433
January	16,150	14,650	15,038	0·553	0·637	924,651
February	19,350	16,425	18,414	0·677	0·705	1,022,661
March	21,650	18,825	20,167	0·741	0,854	1,240,020
April	21,150	19,575	20,521	0·755	0,842	1,221,084
May	18,050	12,150	14,436	0,531	0,612	887,635
June	11,925	7,370	9,958	0,366	0,408	592,542
July	7,130	6,310	6,666	0·245	0·282	409,876
August	7,240	6,630	6,831	0·251	0,289	420,021
September	6,990	6,550	6,468	0·238	0,265	384,872
The year	27,450	6,310	15,075	0·554	7·520	10,911,209
1917-18						
October	7,460	6,805	7,147	0·263	0·303	439,452
November	7,520	7,235	7,357	0·270	0·301	437,772
December	7,430	7,210	7,305	0·269	0·310	449,167
January	7,375	7,020	7,166	0·263	0·303	440,620
February	7,460	7,050	7,247	0·266	0·277	402,478
March	12,275	7,520	9,169	0·337	0·389	563,780
April	12,240	7,955	9,716	0·357	0·398	578,142
May	8,340	6,860	7,459	0·274	0·316	458,636
June	8,310	7,635	7,964	0·293	0·327	473,891
July	7,695	6,505	7,031	0·258	0·297	432,319
August	6,430	5,980	6,154	0·226	0·261	378,395
September	7,235	5,980	6,462	0·238	0·266	384,516
The year	12,275	5,980	7,513	0·276	3,747	5,439,164

Winnipeg River at Slave Falls.

Station No. 5 PF_1

History.—On October 1, 1911 a metering station was established above Slave falls by D. L. McLean and from that date the station has been in continuous operation.

Location of Station.—The metering station is located in Sec. 36, Tp. 11, R. 11, E.P.M., about two hundred and fifty feet above the crest of Slave falls and four miles below the city of Winnipeg power plant at Point du Bois. Meterings are made from a cable.

Drainage Area.—The drainage area above Slave falls is 49,700 square miles.

Channel.—The channel at this point is straight and free from eddies, except at exceptionally high stages and even then the interference is slight. The bed of the channel is of rock and of a permanent character. The banks are of rock and sufficiently high to confine the discharge to the channel at all stages.

Gauge.—A vertical staff gauge is located on the right bank about seventy-five feet downstream from the section.

On account of the difficulty in obtaining daily readings at this gauge, the station records were originally referred to the tailrace gauge of the power plant at Point du Bois.

This gauge was a vertical staff gauge set in the tailrace about one-hundred feet west of the power house.

In June of 1915, a Gurley printed record water stage register was installed on the left bank of the river, three hundred feet above the metering section.

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573,775
122,307
114,433
924,651
022,661
240,020
221,084
887,635
592,542
409,876
420,021
384,872

911,209

439,452
437,772
449,167
440,620
402,478
563,780
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Slave Falls, Winnipeg River. Discharge, 16,250 C.F.S.

A relation has been obtained between this gauge and the above mentioned tailrace gauge, and all records at this station from the first of the year of 1915 refer to the stage at Slave falls. All these gauges are referred to W.P.S. datum.

Discharge Measurements.—Since the establishment of the station, discharge measurements have been made at frequent intervals. Particular attention has been given this station at times when rapid or exceptional change in stage was anticipated, so that the discharge measurements cover practically the entire range in stage as recorded by the gauge readings. These records cover a range in stage of 916.47 to 929.58, corresponding to a range in discharge of 12,000 to 70,000 c.f.s.

Records Available.—Records of daily gauge height from January 23, 1907 to June 16, 1915 on the tailrace gauge at Point du Bois have been obtained. From the latter date to September 30, 1918, similar records based upon the daily means derived from the records of the automatic gauge have been obtained.

Based on these gauge readings, estimates of daily discharge throughout the above mentioned period are available.

Accuracy.*—The discharge curve is well defined over the complete range in stage observed. As there is no backwater effect at this station caused by ice conditions in the winter, the curve applies with equal accuracy throughout the year.

Discharge Measurements of Winnipeg River at Slave Falls during 1917.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
	Feet.	Sec.-ft.	Auto. Gauge.		Feet.	Sec.-ft.	Auto. Gauge.
July 16	917·34	15,387	917·40	July 26	917·38	15,304	917·44
July 17	917·30	15,359	917·30	July 26	917·58	15,733	917·64
July 18	917·13	14,808	917·25	July 27	917·25	15,125	917·30
July 19	917·22	14,962	917·27	July 27	917·44	15,451	947·50
July 19	917·34	15,220	917·39	July 30	917·41	15,383	917·47
July 20	917·04	14,460	917·06	July 30	917·63	15,986	917·71
July 22	916·85	14,078	916·92	July 31	917·52	15,820	917·60
July 23	917·14	14,828	917·15	July 31	917·60	15,917	917·67
July 23	917·24	15,147	917·27	Aug. 4	917·72	15,933	917·81
July 24	917·13	14,770	917·18				

NOTE.—*Investigations now being carried on may necessitate a slight revision in Slave Falls discharges for winter months, in this, and previous reports.

Daily Gauge Height and Discharge of Winnipeg River, at Slave Falls, for part of year ending September 30, 1917.

[Drainage area 49,700 square miles.]

Day.	October.		November.		December.		January.		February.		March.	
	Gauge Height	Discharge	Gauge Height.	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height.	Discharge.
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1							22·26	30,400	23·48	35,150	24·11	37,750
2							22·38	30,850	23·53	35,375	23·94	37,050
3							22·18	30,100	23·72	36,150	24·15	37,900
4							22·04	29,575	24·06	37,525	23·81	36,500
5							21·88	28,975	24·53	39,475	23·94	37,050
6							21·71	28,350	24·48	39,250	23·56	35,475
7							21·59	27,925	24·48	39,250	22·80	32,475
8							21·88	28,975	24·65	39,975	22·35	30,750
9							21·96	29,275	24·65	39,975	22·09	29,775
10							21·93	29,175	24·70	40,175	21·76	28,550
11							21·96	29,275	24·65	39,975	21·51	27,625
12							22·09	29,775	24·90	41,025	22·04	29,575
13							22·04	29,575	25·07	41,750	22·26	30,400
14							22·04	29,575	25·04	41,600	22·38	30,850
15							22·30	30,350	24·65	39,975	22·26	30,400
16							22·43	31,050	24·45	39,125	22·09	29,775
17							22·55	31,500	24·40	38,925	21·96	29,275
18							22·60	31,700	24·20	38,100	21·76	28,550
19							22·64	31,850	24·56	39,600	22·04	29,575
20							22·43	31,050	24·70	40,175	22·04	29,575
21							22·26	30,400	24·48	39,250	22·18	30,100
22							22·64	31,850	24·48	39,250	22·43	31,050
23							22·69	32,050	24·48	39,250	22·52	31,375
24							22·80	32,475	24·37	38,800	22·60	31,700
25							23·02	33,350	24·11	37,750	22·55	31,500
26							22·96	33,100	24·23	38,225	22·80	32,475
27							23·05	33,450	24·32	38,600	22·97	33,150
28							22·85	32,675	24·23	38,225	22·88	32,800
29							23·05	33,450	.....	.....	22·93	32,975
30							23·27	34,325	.....	.....	22·97	33,150
31							23·36	34,675	.....	.....	22·88	32,800

	April.		May.		June.		July.		August.		September.	
1	22·60	31,700	21·93	29,175	20·14	22,975	17·97	16,750	17·57	15,725	18·86	19,200
2	22·85	32,675	21·85	28,875	20·10	22,850	17·83	16,400	17·58	15,750	18·81	19,050
3	22·72	32,175	21·80	28,700	20·00	22,550	17·95	16,700	17·64	15,900	18·90	19,300
4	22·69	32,050	21·68	28,250	20·17	23,075	17·85	16,450	17·74	16,175	19·03	19,675
5	22·80	32,475	21·42	27,300	20·12	22,925	17·79	16,300	17·77	16,250	18·91	19,325
6	22·85	32,675	21·09	26,100	20·07	22,775	17·67	15,975	17·97	16,750	18·87	19,225
7	22·97	33,150	21·20	26,500	20·02	22,600	17·58	15,750	18·18	17,325	18·90	19,300
8	22·64	31,850	21·09	26,100	19·98	22,500	17·42	15,350	18·15	17,250	18·81	19,050
9	22·97	33,150	20·96	25·650	19·86	22,125	17·58	15,750	18·10	17,100	18·70	18,750
10	23·05	33,450	20·84	25,250	19·84	22,075	17·51	15,575	18·17	17,300	18·93	19,375
11	23·05	33,450	20·75	24,950	20·01	22,575	17·48	15,500	18·17	17,300	18·86	19,200
12	22·97	33,150	20·62	24·525	19·87	22,150	17·41	15,325	18·15	17,250	18·90	19,300
13	22·85	32,675	20·53	24,225	19·81	21,975	17·39	15·275	18·46	18,075	18·88	19,250
14	22·85	32,675	20·75	24,950	19·65	21,500	17·29	15,025	18·45	18,050	18·90	19,300
15	22·93	32,975	20·79	25,075	19·62	21,400	17·18	14,750	18·50	18,200	18·86	19,200
16	23·27	34,325	20·87	25,350	19·62	21,400	17·41	15,325	18·53	18,275	18·78	18,975
17	23·31	34,475	21·04	29,925	19·50	21,050	17·29	15,025	18·61	18,500	19·02	19,650
18	23·39	34,800	20·79	25,075	19·61	21,375	17·24	14,900	18·59	18,425	18·97	19,500
19	23·14	33,800	20·58	24,375	19·36	20,625	17·28	15,000	18·56	18,350	18·87	19,225
20	22·97	33,150	20·50	24,125	19·29	20,425	17·20	14,800	18·81	19,050	19·16	20,050
21	22·72	32,175	20·67	24,675	10·10	19,875	17·08	14,500	18·78	18,975	19·19	20,125
22	22·43	31,050	20·62	24,525	18·97	19,500	16·97	14,225	18·82	19,075	19·02	19,650
23	22·30	30,550	20·75	24,950	18·84	19,125	17·15	14,675	19·03	19,675	18·76	18,900
24	22·26	30,400	20·36	23,675	18·71	18,775	17·08	14,500	18·91	19,325	19·27	20,375
25	22·13	29,900	20·75	24,950	18·76	18,900	17·37	15,225	18·89	19,275	19·27	20,375
26	22·01	29,450	20·92	25,525	18·56	18,350	17·57	15,725	18·87	19,225	19·16	20,050
27	21·96	29 275	20·45	23,950	18·43	18,000	17·46	15,450	19·03	19,650	19·19	20,300
28	21·88	28,975	20·30	23,475	18·39	17,900	17·47	15,475	18·93	19,375	19·24	20,275
29	21·71	28,350	20·26	23,350	18·26	17,550	17·36	15,200	18·94	19,400	19·10	19,875
30	21·93	29,175	20·24	23,300	18·13	17,200	17·57	15,725	18·96	19,475	18·76	18,900
31			20·22	23,225			17·54	15,650	18·95	19,450		

NOTE.—900·00 should be added to gauge heights to reduce to station datum.

Daily Gauge Height and Discharge of Winnipeg River at Slave Falls, for year ending September 30, 1918.

[Drainage area 49,700 square miles.]

Day.	October.		November.		December.		January.		February.		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1	19·01	19,700	19·03	19,675	18·96	19,475	18·73	18,825	18·45	18,050	17·82	16,375
2	18·90	19,300	19·05	19·725	18·92	19,350	18·72	18,800	18·43	18,000	17·80	16,325
3	18·88	19,250	19·02	[illegible],650	19·09	19,850	18·70	18,750	18·32	17,700	17·70	16,050
4	18·91	19,325	18·97	19,500	18·99	19,550	18·65	18,600	18·50	18,200	17·90	16,575
5	18·80	19,200	19·[illegible]	20,050	18·97	19,500	18·62	18,525	18·35	17,775	17·82	16,375
6	18·91	19,325	19·0[illegible]	19,800	18·97	19,500	18·55	18,325	18·32	17,700	17·85	16,450
7	18·63	18,550	19·08	19,800	18·97	19,500	18·82	19,075	18·30	17,650	17·88	16,525
8	18·84	19,125	19·08	19,800	18·88	19,250	18·70	18,750	18·27	17,575	17·93	16,650
9	19·01	19,600	19·08	19,800	18·72	18,800	18·68	18,675	18·26	17,550	17·97	16,750
10	18·90	19,300	19·02	19,650	18·80	19,200	18·67	18,650	18·15	17,250	17·92	16,625
11	18·81	19,050	18·92	19,350	18·81	19,050	18·65	18,600	18·30	17,650	18·16	17,275
12	18·76	18,900	19·19	20,125	18·82	19,075	18·62	18,525	18·15	17,250	18·10	17,100
13	18·81	19,050	19·11	19,900	18·90	19,300	18·50	18,200	18·15	17,250	18·20	17,375
14	18·72	18,800	19·06	19,750	18·90	19,300	18·75	18,875	18·10	17,100	18·23	17,450
15	18·93	19,375	19·03	19,675	18·85	19,150	18·64	18,575	18·07	17,025	18·27	17,575
16	18·86	19,200	19·07	19,775	18·75	18,875	18·63	18,550	18·05	16,975	18·32	17,700
17	18·96	19,475	19·01	19,600	18·96	19,475	18·60	18,450	17·90	16,575	18·30	17,650
18	18·87	19,225	18·89	19,275	18·87	19,225	18·57	18,375	18·20	17,375	18·52	18,250
19	18·88	19,250	19·18	20,100	18·95	19,450	18·55	18,325	18·05	16,975	18·42	17,975
20	18·92	19,350	19·08	19,800	18·82	19,075	18·40	17,925	18·05	16,975	18·45	18,050
21	18·87	19,225	19·05	19,725	18·82	19,075	18·70	18,750	18·00	16,850	18·47	18,100
22	19·07	19,775	19·02	19,650	18·79	19,000	18·60	18,450	18·00	16,850	18·53	18,275
23	18·96	19,475	19·05	19,725	18·67	18,650	18·57	18,375	17·95	16,700	18·55	18,325
24	18·99	19,550	18·98	19,525	18·95	19,450	18·55	18,325	17·82	16,375	18·55	18,325
25	19·00	19,575	18·90	19,300	18·82	19,075	18·55	18,325	18·00	16,850	18·71	18,775
26	18·98	19,525	19·19	20,125	18·80	19,025	18·53	18,275	17·85	16,450	18·64	18,575
27	18·94	19,400	19·06	19,750	18·78	18,975	18·43	18,000	17·85	16,450	18·65	18,600
28	18·88	19,250	19·05	19,725	18·75	18,875	18·62	18,525	17·85	16,450	18·68	18,675
29	19·11	19,900	19·03	19,675	18·75	18,875	18·50	18,200	.....	.....	18·70	18,750
30	19·03	19,675	18·96	19,475	18·65	18,600	18·48	18,125	.....	.....	18·72	18,800
31	19·06	19,750	.....	.....	18·85	19,150	18·46	18,075	.....	.....	18·70	18,750

Day.	April.		May.		June.		July.		August.		September.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1	18·86	19,200	18·62	18,525	20·03	22,650	20·14	22,975	19·69	21,625	19·01	19,600
2	18·80	19,025	18·62	18,525	20·02	22,600	20·22	23,225	19·65	21,500	19·06	19,750
3	18·90	19,300	18·62	18,525	20·28	23,425	20·15	23,025	19·62	21,400	19·17	20,075
4	18·92	19,350	18·58	18,400	20·24	23,300	20·03	22,650	19·52	21,100	19·03	19,675
5	18·94	19,400	18·55	18,325	20·21	23,200	19·97	22,450	19·55	21,200	19·02	19,650
6	18·95	19,450	18·80	19,025	20·17	23,075	19·92	22,300	19·64	21,475	18·80	19,025
7	18·92	19,350	18·74	18,850	20·10	22,850	19·90	22,250	19·54	21,175	18·92	19,350
8	19·10	19,875	18·76	18,900	20·14	22,975	20·04	22,675	19·51	21,075	18·89	19,275
9	19·00	19,575	18·95	19,450	20·08	22,800	19·95	22,400	19·56	21,225	19·02	19,650
10	19·00	19,575	18·95	19,450	20·27	23,375	19·92	22,300	19·58	21,300	18·96	19,475
11	19·00	19,575	18·93	19,375	20·12	22,925	19·93	22,350	19·37	20,650	18·95	19,450
12	19·00	19,575	18·84	19,125	20·11	22,900	19·91	22,275	19·66	21,525	18·90	19,300
13	18·97	19,500	19·09	19,850	20·16	23,050	19·82	22,000	19·53	21,150	18·89	19,275
14	18·88	19,250	18·96	19,475	20·12	22,925	19·80	21,950	19·50	21,050	18·83	19,100
15	19·06	19,750	18·97	19,500	20·14	22,975	19·90	22,250	19·49	21,025	18·77	18,925
16	18·95	19,450	18·98	19,525	20·09	22,825	19·82	22,000	19·48	21,000	19·00	19,575
17	18·90	19,300	18·93	19,375	20·29	23,450	19·90	22,250	19·41	20,775	18·92	19,350
18	18·86	19,200	18·88	19,250	20·25	23,325	19·82	22,000	19·34	20,575	18·93	19,375
19	18·80	19,025	18·92	19,350	20·27	23,375	19·80	21,950	19·50	21,050	18·88	19,250
20	18·80	19,025	19·08	19,800	20·33	23,575	19·85	22,100	19·39	20,725	18·86	19,200
21	18·70	18,750	19·10	19,875	20·20	23,175	19·85	22,100	19·36	20,625	18·84	19,125
22	18·80	19,025	19·10	19,875	20·23	23,275	19·82	22,000	19·34	20,575	18·80	19,025
23	18·65	18,600	19·21	20,200	20·21	23,200	19·75	21,800	19·27	20,375	19·00	19,575
24	18·60	18,450	19·24	20,275	20·33	23,575	19·71	21,675	19·25	20,300	18·91	19,325
25	18·56	18,350	19·39	20,725	20·26	23,350	19·72	21,700	19·18	20,100	18·89	19,275
26	18·55	18,325	19·36	20,625	20·23	23,275	19·78	21,900	19·34	20,575	18·88	19,250
27	18·52	18,250	19·61	21,375	20·21	23,200	19·73	21,750	19·33	20,550	18·88	19,250
28	18·45	18,050	19·59	21,325	20·19	23,150	19·70	21,650	19·24	20,275	18·82	19,075
29	18·70	18,750	19·64	21,475	20·15	23,025	19·80	21,950	19·17	20,075	18·74	18,850
30	18·62	18,525	19·70	21,650	20·08	22,800	19·76	21,825	19·16	20,050	18·96	19,475
31	.....	.....	19·75	21,800	.....	.....	19·73	21,750	19·10	19,875	.....	.....

NOTE.—900·00 should be added to gauge heights to reduce to W. P. S. datum.
From December 13, 1917 to May 8 and July 11 to 25, 1918, (inclusive dates), gauge readings are deduced from tailrace readings at Point du Bois.

Monthly Discharge of Winnipeg River at Slave Falls, for years ending September 30, 1917-18.

[Drainage area 49,700 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches in Drainage Acre.	Total in Acre-feet.
1916-17						
October	47,140	39,760	44,981	0·905	1·043	2,765,774
November	38,800	32,050	34,317	0·690	0·770	2,042,003
December	34,800	30,210	32,659	0·657	0·757	2,008,123
January	31,675	27,925	31,010	0·624	0·719	1,906,731
February	41,750	35,150	38,996	0·785	0·817	2,165,728
March	37,900	27,025	31,998	0·641	0·743	1,967,481
April	34,800	28,350	32,004	0·644	0·719	1,904,370
May	29,175	23,225	25,357	0·510	0·588	1,559,141
June	22,975	17,200	20,870	0·420	0·469	1,241,851
July	16,750	14,225	15,428	0·310	0·357	948,631
August	19,675	15,725	18,061	0·363	0·419	1,110,528
September	20,375	18,900	19,485	0·392	0·437	1,159,439
The year	47,440	14,225	28,703	0·578	7·846	20,775,088
1917-18.						
October	19,900	18,550	19,337	0·389	0·448	1,188,986
November	20,125	19,275	19,716	0·397	0·443	1,173,183
December	19,850	18,600	19,184	0·386	0·445	1,179,578
January	19,075	17,925	18,477	0·372	0·429	1,136,106
February	18,200	16,375	17,199	0·346	0·360	955,184
March	18,800	16,050	17,582	0·354	0·408	1,081,075
April	19,875	18,050	19,094	0·384	0·428	1,136,172
May	21,800	18,325	19,735	0·397	0·458	1,213,458
June	23,575	22,600	23,120	0·465	0·519	1,375,735
July	23,225	21,650	22,167	0·446	0·514	1,362,996
August	21,625	19,875	20,838	0·419	0·483	1,281,279
September	20,075	18,850	19,352	0·389	0·434	1,151,524
The year	23,575	16,050	19,664	0·396	5·375	14,255,870

Winnipeg River.

Winnipeg River at Pinawa Channel, below Control Dam.

Station No. 5 PF_3.

History.—The Pinawa channel was a high water, or back-channel of the Winnipeg river, and was utilized as a diverting channel for a power plant built about nine miles below the inlet, by the Winnipeg Electric Railway Company. At first the plant depended upon the flow of water down this channel due to the natural stage of the river, but the rapid growth of the load necessitated the building of diverting dams in the main river to ensure sufficient flow under all stages. Meterings were made below the control dam on the channel by engineers of the Company from 1907 to 1911. In May, 1912, a boat station was established by A. M. Beale, for the purpose of collecting discharge data, and from that date records have been obtained at this station. In June of 1915 a cable station was installed to take the place of the boat station on practically the same section.

Location of Section.—The metering section is located in the N. W. Sec. 10, Tp. 14, Rge. 12, E.P.M., and approximately two hundred feet downstream from the control dam and eight miles above the power plant of the Winnipeg Electric Railway on the Pinawa channel. This plant is seven miles south-east of the town of Lac du Bonnet.

Channel.—The channel at the meter section is straight and regular, being a rock-cut channel, to which the discharge is confined at all stages of the river.

Gauge.—A vertical staff gauge bolted to the upstream side of the control dam was set in place by the Winnipeg Electric Railway Company.

In May of 1915 a Gurley printed record water stage register was installed on the upstream side of the control dam close to the right bank.

Both of these gauges are referred to W.P.S. datum.

Discharge Measurements.—Discharge measurements covering a range in stage from 893.27 to 896.66 have been taken at frequent intervals since the establishment of the station.

Records Available.—Intermittent records of daily gauge height were obtained by the company from April 28, 1906, to the end of 1914, and these have been placed at the disposal of the Manitoba Hydrometric Survey.

From May, 1915, to September, 1918, the daily gauge record, being the mean of the daily records of the automatic gauge, are available.

Based on the records of gauge height for the open water seasons to 1914, estimates of daily discharge are available.

Accuracy.—During the earlier years of the operation of the plant, the discharge curve was fairly well defined for the open water periods of the year, but since the plant has become heavily loaded the effect of same is apparent on the discharge at the section.

During the winter season the extreme and varying ice conditions on the channel below the station preclude the possibility of obtaining accurate estimates of discharge based on gauge readings alone at the section.

Discharge Measurements of Pinawa Channel, below Control Dam, during 1917-18.

Date.	Gauge height.	Discharge.	Remarks.	Date.	Gauge height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.	Auto. Gauge.	1917.	Feet.	Sec.-ft.	Auto. Gauge.
April 24	895·26	9,950		Aug. 17	894·37	8,795	894·44
May 17	895·07	9,652	895·16	Aug. 17	894·38	8,680	894·43
June 10	894·83	9,505	894·90	Aug. 17	894·38	8,773	894·43
July 10	893·94	8,221	894·04	Aug. 21	894·46	8,800	894·50
July 27	893·94	8,257	894·02	Aug. 22	894·18	8·892	894·55
July 29	893·89	8,265	893·98	Aug. 22	894·47	8,868	894·50
July 29	893·87	8,147	893·96	Aug. 23	894·58	9,013	894·62
July 30	893·84	8,157	893·94	Aug. 23	894·57	9,005	894·61
July 30	893·87	8,132	893·95	Aug. 26	894·56	9,046	894·60
July 31	893·92	8,303	894·00	Aug. 26	894·54	8,984	894·58
Aug. 1	893·91	8,250	894·00	Aug. 27	894·52	8,903	894·56
Aug. 1	893·90	8,199	893·99	Aug. 27	894·55	8,958	894·59
Aug. 2	893·94	8,317	894·03	Aug. 28	894·55	9,037	894·59
Aug. 3	893·99	8,322	894·07	Aug. 28	894·52	8,898	894·54
Aug. 3	894·00	8,361	894·07	Aug. 29	894·52	8,984	894·55
Aug. 4	894·04	8,388	894·12	Aug. 29	894·49	8,851	894·53
Aug. 5	894·04	8,312	894·12	Aug. 29	894·53	9,006	894·55
Aug. 5	894·06	8,327	894·12	Aug. 30	894·49	8,867	894·54
Aug. 5	894·05	8,410	894·13	Aug. 30	894·50	8,891	894·54
Aug. 6	894·07	8,379	894·16	Aug. 31	894·51	8,897	894·55
Aug. 6	894·07	8,349	894·16	Aug. 31	894·49	8,992	894·54
Aug. 12	894·24	8,640	894·31	Nov. 15	894·75	9,015·8	894·79
Aug. 13	894·26	8,640	894·33	Nov. 28	895·88	10,741·5	
Aug. 13	894·26	8,655	894·34	Dec. 27	896·65	9,163·6	
Aug. 14	894·33	8,766	894·39	1918.			
Aug. 14	894·31	8,628	894·36	Jan. 17	897·21	8,328·6	
Aug. 15	894·33	8,720	894·39	Jan. 26	896·82	8,359·6	896·86
Aug. 15	894·33	8,652	894·38	Feb. 19	896·05	8,409·3	896·04
Aug. 16	894·37	8,811	894·41	Mar. 5	895·88	7,936·6	
Aug. 16	894·35	8,734	894·41	April 3	894·75	9,160·9	894·76

NOTE.—Gauge reading below Control Dam.

Winnipeg River at Seven Sisters Falls (Foot of Fourth Falls).

History.—The station was established by E. B. Patterson on July 9, 1917, and has been in operation since that date.

Location of Section.—The metering section is located at the upper end of a narrow reach of the river in the S.E.¼, Sec. 34, Tp. 13, R. 11, E.P.M., about two thousand feet downstream from Fourth falls. On the section there is installed wire tag and anchor lines. The section is operated as a boat station.

Drainage Area.—The drainage area above this station is 50,800 square miles, but as part of the discharge of the river is diverted down the Pinawa channel at a point above the station, this drainage area should not be used in the computation of run-off.

Channel.—The channel at the point is straight and the current free of eddies. The bed of the channel is of rock and of a permanent character. The banks are of rock and sufficiently high to confine the discharge to the channel at all stages.

Gauge.—(a) A vertical staff gauge is located on the left bank five feet upstream from the metering section.

(b) A vertical staff gauge, in the same reach of the river, is located on the left bank of the river in the N.E.¼, Sec. 27, Tp. 13, R. 11, E.P.M., near the mouth of a small creek; three-quarters of a mile below the fourth fall of Seven Sisters rapids. This gauge was established on April 13, 1913.

(c) A vertical staff gauge located on the left bank in a small bay about 1,000 feet south of the first pitch of the Seven Sisters rapids, in S.W.¼, Sec. 31, Tp. 13, R. 11, E.P.M. This gauge was established on May 17, 1913.

Gauge (*a*). This gauge is read during measurements.

Gauge (*b*). Station records during open water season.

Gauge (*c*). Owing to back water conditions at gauge (b) during winter periods a relation has been established between gauges (b) and (c) and all station records from October 1, 1917 have been referred to this latter gauge.

All of these gauges are referred to W.P.S. datum.

Discharge Measurements.—Since the station was established a number of measurements have been taken covering a range in stage of 847.85 to 848.98, corresponding to a range in discharge of 6,800 to 10,300 c.f.s.

Records Available.—A record of daily gauge height and daily discharge from June 12, 1917 to November 30, 1917 and from February 6,1918 to September 30, 1918, is available.

Accuracy.—The discharge curve is well defined over the range in stage covered by the discharge measurements.

Discharge Measurements of Winnipeg River at foot of Fourth Falls, Seven Sisters, during 1917.

Date.	Gauge height.	Discharge.	Gauge at meter sec.	Date.	Gauge height.	Discharge.	Gauge at meter sec.
1917.	Feet.	Sec.-ft.		1917.	Feet.	Sec.-ft.	
July 9	847·94	7,238	847·99	Aug. 29	848·96	10,139·0	848·98
July 10	847·96	7,432	848·00	Aug. 29	848·96	10,035·0	848·98
July 11	848·01	7,332	848·05	Oct. 24	848·93	10,313·9	848·96
July 12	847·95	7 123	848·01	Oct. 24	848·93	10,165·2	848·94
July 16	847·85	6,796	847·85	Nov. 27	848·63	9,084·9	848·66
July 18	847·88	6,941	847.89	Nov. 27	848·63	9,091·4	848·66

Daily Gauge Height and Discharge of Winnipeg River at foot of Fourth Falls, Seven Sisters, for part year ending Sept., 30, 1917.

[Drainage area, 50,610 square miles.]

Day.	April.		May.		June.		July.		August.		September.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1							48·30	8,040	48·08*	7,410	48·91*	9,970
2							48·26*	7,920	48·08	7,410	48·90	9,940
3							48·23*	7,840	48·11*	7,500	48·88*	9,870
4							48·20	7,750	48·14*	7,580	48·86*	9,800
5							48·16*	7,640	48·18	7,690	48·84*	9,740
6							48·12	7,530	48·21*	7,840	48·82*	9,670
7							48·10	7,470	48·29*	8,010	48·81*	9,630
8							48·00	7,190	48·35	8,190	48·80	9,600
9							47·94	7,030	48·37*	8,250	48·81*	9,630
10							47·96	7,080	48·38*	8,280	48·82*	9,670
11							47·99	7,160	48·39*	8,310	48·84	9,740
12					49·62	12,570	47·95	7,050	48·40	8,340	48·87*	9,480
13					49·57*	12,370	47·94	7,030	48·45*	8,490	48·90	9,940
14					49·51*	12,140	47·93	7,000	48·50*	8,640	48·88*	9,870
15					49·46*	11,950	47·90	6,920	48·55	8,790	48·86*	9,800
16					49·40*	11,720	47·85	6,790	48·57*	8,860	48·85	9,770
17					49·35	11,530	47·87*	6,840	48·59*	8,920	48·86*	9,800
18					49·29*	11,310	47·88	6,870	48·61*	8,980	48·88*	9,870
19					49·22*	11,060	47·86*	6,820	48·62	9,010	48·90	9,940
20					49·15	10,810	47·83*	6,740	48·70*	9,270	48·90*	9,940
21					49·07*	10,530	47·80*	6,660	48·78*	9,530	48·90*	9,940
22					49·00*	10,290	47·78	6,610	48·86*	9,800	48·89*	9,910
23					48·92*	10,010	47·84*	6,760	48·94*	10,080	48·88	9,870
24					48·85	9,770	47·90*	6,920	49·02	10,360	48·88*	9,870
25					48·77*	9,500	47·96*	7,080	48·96*	10,150	48·88*	9,870
26					48·68*	9,210	48·03	7,270	48·90	9,940	48·89*	9,910
27					48·60	8,950	48·01*	7,270	48·95*	10,110	48·90	9,940
28					48·52*	8,700	48·04*	7,300	48·99	10,250	48·85*	9,870
29					48·44*	8,460	48·05	7,330	48·97*	10,180	48·86*	9,800
30					48·37*	8,250	48·06*	7,360	48·95*	10,110	48·85	9,770
31							48·07*	7,393	48·93*	10,040		

NOTES.—Gauge heights marked (*) are interpolated.
800·00 should be added to gauge heights to reduce to station datum.

Daily Gauge Height and Discharge of Winnipeg River at foot of Fourth Falls Seven Sisters, for year ending Sept., 30, 1918.

[Drainage area, 50,610 square miles.]

Day.	October.		November.		December		January		February		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft
1	82·96*	9,920	83·06*	10,320							82·56	8,420
2	82·96	9,920	83·06	10,320							82·53*	8,310
3	82·96*	9,920	83·06*	10,320							82·49*	8,170
4	82·96*	9,920	83·06*	10,320							82·46	8,060
5	82·96	9,920	83·06*	10,320							82·46*	8,060
6	82·96*	9,920	83·06	10,320					82·81	9,340	82·46	8,060
7	82·96*	9,920	83·03*	10,200					82·81*	9,340	82·49*	8,170
8	82·96*	9,920	82·99*	10,010					82·81*	9,340	82·53*	8,310
9	82·96	9,920	82·96	9,920					82·81	9,340	82·56	8,420
10	82·96*	9,920	82·98*	10,000					82·74*	9,070	82·61*	8,600
11	82·96*	9,920	83·01*	10,120					82·66	8,780	82·66	8,780
12	82·96	9,920	83·04*	10,240					82·61*	8,600	82·66*	8,780
13	82·96*	9,920	83·06	10,320					82·56	8,420	82·66	8,780
14	82·96*	9,920	83·03*	10,200					82·56*	8,420	82·68*	8,850
15	82·96*	9,920	82·99*	10,040					82·56*	8,420	82·69*	8,880
16	82·96	9,920	82·96	9,920					82·56	8,420	82·71	8,960
17	82·96*	9,920	82·88*	9,600					82·56*	8,420	82·71*	8,960
18	82·96*	9,920	82·80*	9,300					82·56	8,420	82·71	8,960
19	82·96	9,920	82·73*	9,030					82·56*	8,420	82·71*	8,960
20	82·96*	9,920	82·66	8,780					82·56	8,420	82·71	8,960
21	82·96*	9,920	82·66*	8,780					82·56*	8,420	82·69*	8,880
22	82·96*	9,920	82·66*	8,780					82·56	8,420	82·68*	8,850
23	82·96	9,920	82·66	8,780					82·56	8,420	82·66	8,780
24	82·96*	9,920	82·56*	8,420					82·56*	8,420	82·61*	8,600
25	82·96*	9,920	82·46	8,060					82·56	8,420	82·56	8,420
26	82·96	9,920	82·56*	8,420					82·56*	8,420	82·56*	8,420
27	82·96*	10,000	82·66	8,780					82·56	8,420	82·56	8,420
28	83·01*	10,120	82·66*	8,780					82·56*	8,420	82·69*	8,880
29	83·04*	10,240	82·66*	8,780							82·83*	9,410
30	83·06	10,320	82·66	8,780							82·96	9,920
31	83·06*	10,320									82·93*	9,800

Day.	April.		May		June.		July.		August.		September.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft	Feet	Sec.-ft
1	82·91*	9,720	82·81	9,340	83·86	13,920	83·61	12,710	83·33*	11,450	82·96*	9,920
2	82·93*	9,800	82·83*	9,410	83·86*	13,920	83·58*	12,570	83·20*	11,280	82·96	9,920
3	82·96	9,920	82·81*	9,150	83·86	13,920	83·56	12,480	83·26	11,150	82·98*	10,000
4	82·98*	10,000	82·86	9,530	83·86*	13,920	83·53*	12,340	83·26*	11,150	83·01	10,120
5	82·99*	10,040	82·86*	9,530	83·86	13,920	83·49*	12,160	83·26	11,150	82·97*	9,960
6	83·01	10,120	82·86	9,530	83·81*	13,770	83·46	12,020	83·26*	11,150	82·92*	9,760
7	82·98*	10,000	82·86*	9,530	83·79*	13,570	83·46*	12,020	83·26	11,150	82·88	9,600
8	82·96	9,920	82·86	9,530	83·76	13,430	83·46	12,020	83·26*	11,150	82·87*	9,570
9	82·98*	10,000	82·86*	9*530	83·76*	13,430	83·46*	12,020	83·26*	11,150	82·86	9,530
10	83·01	10,120	82·86*	9*530	83·76	13,430	83·46	12,020	83·26	11,150	82·86*	9,530
11	82·98*	10,000	82·86	9,530	83·71*	13,190	83·46*	12,020	83·28*	11,240	82·86	9,530
12	82·94*	9,840	82·83*	9,410	83·66	12,950	83·46*	12,020	83·31	11,360	82·86*	9,530
13	82·91	9,720	82·81	9,310	83·66*	12,950	82·46	12,020	83·24*	11,070	82·86*	9,530
14	82·94*	9,840	82·83*	9,410	83·66*	12,950	83·46*	12,020	83·16	10,730	82·86	9,530
15	82·96	9,920	82·86	9,530	81·66	12,950	83·46	12,020	83·16*	10,730	82·86*	9,530
16	82·96*	9,920	82·86*	9,530	83·66*	12,950	83·46*	12,020	83·16	10,730	82·86	9,530
17	82·96	9,920	82·86*	9,530	83·66	12,950	83·46	12,020	83·16	10,730	82·86*	9,530
18	82·89*	9,640	82·86	9,530	83·66*	12,950	83·46*	12,020	83·16*	10,730	82·86	9,530
19	82·83*	9,410	82·91*	9,720	83·66	12,950	83·46*	12,020	83·16	10,730	82·86*	9,530
20	82·76	9,150	82·96	9,920	83·66*	12,950	83·46	12,020	83·16*	10,730	82·86*	9,530
21	82·76*	9,150	83·01*	10,120	83·66*	12,950	83·46*	12,020	83·16	10,730	82·86	9,530
22	82·76	9,150	82·06	10,320	83·66	12,950	83·46	12,020	83·16*	10,730	82·91*	9,720
23	82·73*	9,030	82·11*	10,520	83·66*	12,950	83·46*	12,020	83·16*	10,730	82·96	9,920
24	82·71	8,960	82·16*	10,730	83·66	12,950	83·46	12,020	83·16	10,730	82·96*	9,920
25	82·73*	9,030	82·21	10,940	83·66*	12,950	83·43*	11,890	83·11	10,520	82·96	9,920
26	82·74*	9,070	83·23*	11,030	83·66	12,950	83·39*	11,720	83·06	10,320	82·96*	9,920
27	82·76	9,150	83·26	11,150	83·66*	12,950	83·36	11,580	83·06*	10,320	82·96*	9,920
28	82·76*	9,150	83·31*	11,360	83·66*	12,950	83·36*	11,580	83·06	10,320	82·96	9,920
29	82·76	9,150	83·36	11,580	83·66	12,950	83·36	11,580	83·03*	10,200	82·96*	9,920
30	82·78*	9,220	83·53*	12,340	83·63*	12,800	83·36*	11,580	82·99*	10,040	82·96	9,920
31			83·70*	13,140			83·36	11,580	82·96	9,920		

NOTES.—Marked thus (*) interpolated.
800·00 should be added to gauge heights to reduce to W. P. S. datum.
Discharges are referred to gauge readings at the head of Seven Sisters Falls.

Monthly Discharge of Winnipeg River at Seven Sisters, foot of Fourth Falls, for years ending September 30, 1917-18.

[Drainage area, 50,160 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square mile.	Depth in inches on Drainage Area.	Total in acre-feet.
1916-17						
October						
November						
December						
January						
February						
March						
April						
May						
June			11,368*			676,443
July	8,010	6,610	7,183			441,665
August	10,360	7,410	8,914			548,101
September	9,970	9,600	9,826			584,687
The period	10,360	6,610	9,302			2,250,396
1917-18						
October	10,320	9,920	9,695			612,724
November	10,320	8,060	9,533			567,253
December						
January						
February			8,632*			479,397
March	9,920	8,060	8,701			535,188
April	10,120	8,960	9,602			571,359
May	13,140	9,340	10,116			622,009
June	13,920	12,800	13,211			786,109
July	12,710	11,580	12,005			738,158
August	11,150	9,920	10,815			664,988
September	10,120	9,530	9,727			578,797
The period	13,920	8,060	10,243			6,155,958

NOTE.—Marked thus (*)estimated.

Discharge per square mile and run-off depth in inches omitted, as this section is one of two branches of the Winnipeg River, the Pinawa Channel being the other.

TRIBUTARIES.

WHITEMOUTH RIVER AT WHITEMOUTH.

Station No. 5 PH_1.

History.—The station was established on May 28, 1912 by G. H. Burnham and has been in practically constant operation since that date.

Location of Section.—The meter section is located in Sec. 36, Tp. 11, Rge. 11, E.P.M., on the downstream side of the traffic bridge across the Whitemouth river in the town of Whitemouth. All open-water measurements are taken from this bridge, and in the winter the measurements are made from the ice on the same cross section of the river.

Drainage Area.—The drainage area of the river above the station is 1,400 square miles.

Channel.—At the metering section there is slight interference to the flow, caused by the presence of pile bents supporting the bridge. These divide the channel into five sections.

The bed of the channel is clay, and the control of the section is located about three hundred feet down stream. There is a possibility of this control shifting during extreme conditions of flow.

The banks at the section are sufficiently high to confine the discharge within their limits, even under extreme flood conditions.

Gauge.—A vertical staff gauge is secured to a pile at station 90 on the section. It is referred to an arbitrary datum.

Discharge Measurements.—Discharge measurements have been taken at frequent intervals since the installation of the station and are over a range in stage of 73.23 to 79.17.

Records Available.—From May 29, 1912 to March 31, 1914, continuous records of daily gauge height for the open water season, and intermittent records for the winter seasons have been obtained. From April 1, 1914, to September 30, 1918, continuous daily gauge readings have been obtained.

Based on these gauge readings, estimates of daily discharge throughout the open water seasons, and where sufficient information was obtained, estimates of daily discharge under ice cover, are available. Estimates of monthly mean discharge based on gauge readings and actual measurements are also available.

Accuracy.—Between gauge heights 73.5 and 76.0 the discharge curve is well defined, beyond these limits the curve is not well defined.

The estimates of daily discharge under winter conditions are reliable.

Discharge Measurements of Whitemouth River, at Whitemouth, during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan. 9	73·49	21·6	Ice cover.	Feb. 5	73·24	8·7	Ice cover.
Feb. 2	73·40	19·5	Ice cover.	May 10	74·06	218·7	
Mar. 5	73·34	19·2	Ice cover.	June 5	76·16	1,426·5	
April 27	76·15	1,764·4		June 28	74·05	217·7	
May 16	75·23	932·2		Aug. 10	73·59	74·3	
June 8	74·01	196·7		Sept. 23	73·47	50·4	
July 11	73·92	140·2					
Dec. 29	73·30	3·5	Ice cover.				

Daily Discharge in Second-feet of Whitemouth River at Whitemouth, for part of year of ending September 30, 1917 and year ending September 30, 1918.

[Drainage area 1,400 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1				29	21	18	26	1,345	300	158	224	270
2				29	20	18	29	1,345	285	154	224	261
3				23	21	18	32	1,285	270	154	233	207
4				23	22	18	32	1,255	261	146	233	154
5				23	23	18	32	1,190	252	146	224	136
6				23	23	18	33	1,190	233	136	207	136
7				25	23	18	33	1,165	207	136	198	129
8				25	23	18	64	1,140	198	129	173	129
9				22	23	17	115	1,120	189	122	158	129
10				21	23	15	177	1,120	181	154	129	129
11				20	23	15	256	1,100	215	154	108	122
12				19	23	15	341	1,090	252	166	102	207
13				19	23	15	429	1,065	242	166	96	224
14				19	23	15	520	915	252	166	115	224
15				19	23	15	615	890	242	173	122	198
16				22	23	14	720	835	224	181	122	181
17				25	23	14	825	835	224	181	108	166
18				28	23	14	925	775	233	181	102	166
19				28	23	13	1,040	735	207	173	115	150
20				28	23	13	1,145	670	233	173	136	158
21				27	23	13	1,265	630	224	173	143	169
22				26	23	13	1,380	585	207	166	136	169
23				26	20	13	1,495	520	198	166	261	162
24				25	20	13	1,495	500	189	158	300	154
25				25	20	15	1,435	456	181	166	310	146
26				24	19	17	1,405	434	194	224	320	136
27				23	19	19	1,435	403	181	224	320	129
28				23	19	19	1,435	372	156	207	310	122
29				22	.....	21	1,390	351	166	215	300	122
30				22	.....	23	1,365	320	158	224	286	111
31				21	.....	25	.....	300	.....	233	280	.....
1917-18.												
1	102	45	.....	.....	.....	.....	.....	330	1,100	242	219	76
2	96	45	.....	.....	.....	.....	.....	330	1,150	290	198	76
3	108	45	.....	.....	.....	.....	.....	280	1,470	290	158	76
4	102	47	.....	.....	.....	.....	.....	280	1,540	242	158	76
5	96	49	.....	.....	9	.....	.....	280	1,435	242	122	64
6	90	50	.....	.....	.....	.....	330	280	1,300	233	105	64
7	84	51	.....	.....	.....	.....	280	233	1,165	198	105	64
8	84	52	.....	.....	.....	.....	280	233	1,000	189	105	64
9	90	53	.....	.....	.....	.....	280	233	905	198	76	64
10	96	54	.....	.....	.....	.....	330	233	905	158	64	64
11	84	55	.....	.....	.....	.....	330	211	730	122	64	64
12	74	55	.....	.....	.....	.....	382	211	670	122	76	53
13	69	55	.....	.....	.....	.....	382	211	615	158	105	53
14	69	57	.....	.....	.....	.....	382	211	560	242	158	36
15	69	60	.....	.....	.....	.....	382	169	505	242	198	36
16	64	63	.....	.....	.....	.....	382	169	424	242	242	36
17	59	65	.....	.....	.....	.....	382	150	398	266	219	36
18	59	66	.....	.....	.....	.....	382	150	346	242	198	36
19	59	67	.....	.....	.....	.....	434	150	295	242	198	36
20	60	68	.....	.....	.....	.....	434	150	295	242	177	36
21	59	69	.....	.....	.....	.....	434	211	295	242	177	29
22	56	68	.....	.....	.....	.....	434	305	266	242	158	29
23	54	65	.....	.....	.....	.....	434	305	266	198	158	29
24	53	60	.....	.....	.....	.....	280	461	242	177	158	29
25	52	55	.....	.....	.....	.....	280	456	242	158	139	29
26	51	50	.....	.....	.....	.....	280	456	198	139	122	23
27	50	45	.....	.....	.....	.....	280	483	198	198	122	23
28	49	40	.....	.....	.....	.....	330	499	206	198	122	23
29	48	40	4	.....	.....	.....	330	510	242	198	105	23
30	47	38	.....	.....	.....	.....	330	1,035	242	198	90	23
31	46	.....	.....	.....	.....	.....	.....	1,035	.....	219	76	.....

NOTE.—Ice conditions October 20, 1917 to April 5, 1918 inclusive

Monthly Discharge of Whitemouth River at Whitemouth, for years ending September 30, 1917-18.

[Drainage area 1,400 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches in Drainage Area.	Total in Acre-feet.
1916-17.						
October	485	295	331	0·236	0·272	20,352
November	695	.....	357*	0·255	0·284	21,243
December	.....	.....	50*	0·036	0·012	3,074
January	29	19	24	0·017	0·020	1,476
February	23	19	22	0·016	0·017	1,222
March	25	13	16	0·011	0·013	984
April	1,495	26	716	0·511	0·570	42,605
May	1,345	300	837	0·598	0·689	51,465
June	300	158	219	0·156	0·174	13,031
July	233	122	171	0·122	0·141	10,514
August	320	96	196	0·140	0·161	12,052
September	270	111	163	0·116	0·129	9,699
The year	1,495	.....	259	0·185	2·511	187,463
1917-18.						
October	108	46	70	0·050	0·058	4,304
November	69	38	54	0·039	0·043	3,213
April	.....	.....	310*	0·221	0·247	18,446
May	1,035	150	331	0·236	0·272	20,352
June	1,540	198	639	0·456	0·509	38,023
July	290	139	212	0·151	0·174	13,035
August	242	64	141	0·101	0·116	8,670
September	76	23	46	0·033	0·037	2,737
The period	1,540	.....	225	0·161	1·461	108,867

NOTE.—Marked thus (*) estimated.

RED RIVER AND TRIBUTARIES.

RED RIVER.

RED RIVER AT EMERSON.

Station No. 5 O C_1.

History.—The station was established by S. S. Seovil on May 3, 1912 and has been continuously operated since that date.

Location.—The section when established was on the downstream side of the C.N.R. bridge at Emerson. In the spring of 1914, the old bridge was replaced by a new one. At this new bridge, the section is located in lots 5 and 6, Parish of St. Agathe, on the downstream side and approximately twelve feet below the old station.

All discharge measurements are made from this bridge during the open-water season. In the winter the measurements are taken from the ice and downstream from the bridge to escape the effect of the piers.

Drainage Area.—The drainage area of the river above this station is 34,600 square miles.

Channel.—The bed of the channel at the station is composed of clay and gravel and not liable to shifting. It is straight above and below the section and the current is fairly regular throughout its width.

The banks are high and only liable to overflow during exceptional flood periods as were encountered during the years of 1879, 1882, 1897 and 1916.

Gauge.—A nine-foot vertical staff gauge is secured to the sheet piling around the west pier, twenty feet upstream from the section and is used for the lower stages of the river. The records of the upper stage of the river are observed on a gauge placed on the east side of the ice breaker on the upstream side of the bridge.

On April 23, 1916, a chain gauge was established on the bridge, and the gauge records have been obtained from it during the open-water season. During the winter the readings are made at one of the staff gauges. On account of the extreme range in stage noted at this station, it is impossible to obtain satisfactory records at any one gauge. All of the gauges are referred to M.H.S. datum.

Discharge Measurements.—Since the installation of the station, discharge measurements have been taken at frequent intervals and are over a range in stage of 749·38 to 788·31 which represents a range in discharge of 200 to 46,000 c.f.s.

Records Available.—From May 3, 1912 to March 22, 1914, continuous records of daily gauge height for the open-water season, and intermittent records for the winter season have been obtained. From March 23, 1914 to September 30, 1918, continuous daily gauge readings have been obtained.

Based on these gauge readings, estimates of daily discharge throughout the open-water season, and from January 1, 1914, practically continuous estimates of daily discharge during the winter season are available.

Estimates of monthly mean discharge based on gauge readings and actual measurements are also available.

Accuracy.—Between gauge heights 749·0 and 788·5 the discharge curve is well defined. Outside these limits the curve is not well defined.

Discharge Measurements of Red River at Emerson, during 1917-18.

Date.	Gauge height.	Discharge.	Remarks.	Date.	Gauge height.	Discharge.	Remarks.
	Feet.	Sec.-ft.			Feet.	Sec. ft.	
1917.				1918.			
Jan. 20	753·07	1,213	Ice cover.	Jan. 10	750·10	243·8	Ice cover.
Feb. 19	752·55	995·0	"	Feb. 5	750·20	223·5	"
May 5	760·65	8,402·0		April 4	756·05	4,621·5	
June 4	754·18	3,230·0		May 9	752·16	1,879·4	
June 28	752·36	1,924·0		June 20	752·13	1,923·4	
Aug. 22	749·38	557·0		Aug. 13	749·46	725·9	
Sept. 27	749·44	607·0		Sept. 20	749·20	520·8	
Nov 24	750·14	848·6					

Daily Discharge in Second-feet of Red River at Emerson, for part of Year ending September 30, 1917, and Year ending September 30, 1918.

[Drainage area, 34,600 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1	.....	.....	.....	1,360	1,145	1,000	3,695	7,990	3,525	1,935	1,030	505
2	.....	.....	.....	1,360	1,135	1,020	5,080	8,030	3,390	1,905	970	484
3	.....	.....	.....	1,360	1,125	1,030	6,615	7,990	3,255	1,850	925	463
4	.....	.....	.....	1,350	1,120	1,030	8,290	7,860	3,160	1,795	850	429
5	.....	.....	.....	1,345	1,110	1,030	10,075	7,830	3,035	1,795	825	400
6	.....	.....	.....	1,340	1,100	1,030	11,920	7,780	2,960	1,795	800	400
7	.....	.....	.....	1,335	1,095	1,040	13,950	7,700	2,855	1,795	780	400
8	.....	.....	.....	1,340	1,085	1,040	16,030	7,540	2,765	1,765	755	392
9	.....	.....	.....	1,325	1,075	1,040	18,280	7,370	2,670	1,735	720	392
10	.....	.....	.....	1,310	1,070	1,050	20,680	7,170	2,670	1,710	700	387
11	.....	.....	.....	1,200	1,060	1,050	23,225	6,930	2,670	1,690	685	396
12	.....	.....	.....	1,290	1,050	1,060	25,900	6,610	2,645	1,680	665	396
13	.....	.....	.....	1,280	1,040	1,060	24,840	6,300	2,585	1,640	620	404
14	.....	.....	.....	1,260	1,035	1,065	23,660	6,040	2,500	1,595	575	417
15	.....	.....	.....	1,260	1,025	1,065	22,450	5,850	2,470	1,570	575	417
16	.....	.....	.....	1,260	1,020	1,070	20,840	5,580	2,520	1,545	575	417
17	.....	.....	.....	1,250	1,010	1,075	19,040	5,330	2,510	1,515	575	425
18	.....	.....	.....	1,240	1,000	1,080	17,520	5,180	2,490	1,490	560	438
19	.....	.....	.....	1,225	995	1,085	15,890	4,960	2,435	1,415	550	459
20	.....	.....	.....	1,215	995	1,090	14,375	4,680	2,375	1,320	550	471
21	.....	.....	.....	1,210	990	1,095	12,965	4,610	2,345	1,220	550	480
22	.....	.....	.....	1,200	990	1,100	11,835	4,490	2,320	1,160	550	500
23	.....	.....	.....	1,195	990	1,120	10,800	4,340	2,325	1,125	535	500
24	.....	.....	.....	1,190	990	1,140	10,185	4,210	2,310	1,100	535	520
25	.....	.....	.....	1,185	995	1,160	9,550	4,110	2,285	1,000	525	545
26	.....	.....	.....	1,190	1,000	1,190	9,100	4,035	2,225	1,065	505	565
27	.....	.....	.....	1,200	1,000	1,220	8,800	3,935	2,165	1,080	485	590
28	.....	.....	.....	1,180	1,000	1,250	8,540	3,840	2,080	1,055	485	590
29	.....	.....	.....	1,170	.....	1,280	8,290	3,750	2,050	1,055	492	590
30	.....	.....	.....	1,160	.....	1,310	8,120	3,675	2,020	1,030	505	590
31	.....	.....	.....	1,150	.....	2,440	.....	3,575	.....	1,030	505	.....
1917-18.												
1	583	825	850	238	188	277	4,275	1,500	3,210	1,405	775	925
2	583	845	835	238	189	288	4,625	1,485	3,335	1,365	775	1,035
3	583	890	815	239	191	290	4,990	1,535	3,210	1,330	765	1,160
4	570	890	790	237	199	289	4,400	1,640	3,020	1,255	775	1,110
5	570	865	750	232	209	288	4,100	1,700	2,990	1,215	775	1,035
6	570	840	750	233	215	280	3,840	1,770	2,960	1,180	795	940
7	583	810	725	231	221	271	3,475	1,855	2,810	1,155	750	840
8	605	810	705	231	230	272	3,155	2,000	2,660	1,155	705	775
9	614	820	690	233	231	279	2,795	2,020	2,540	1,120	705	705
10	622	820	680	232	232	286	2,505	2,055	2,540	1,110	680	705
11	631	820	650	233	232	300	2,185	2,020	2,540	1,110	680	705
12	644	865	640	236	230	317	1,980	1,965	2,555	1,130	690	690
13	653	915	620	240	229	337	1,955	1,895	2,505	1,130	680	680
14	653	960	610	241	225	359	1,955	1,850	2,475	1,085	680	660
15	644	980	600	242	219	379	1,955	1,795	2,445	1,035	680	630
16	653	980	585	248	213	403	1,925	1,705	2,390	985	705	605
17	680	965	575	240	204	429	1,895	1,705	2,320	940	730	585
18	715	965	555	250	200	460	1,840	1,705	2,245	890	730	550
19	735	965	535	249	201	500	1,805	1,650	2,130	865	730	505
20	745	965	500	244	205	725	1,750	1,590	1,965	865	720	485
21	735	955	465	240	213	970	1,690	1,535	1,830	840	705	454
22	740	965	426	234	222	1,220	1,635	1,510	1,775	920	705	454
23	755	980	379	228	232	1,480	1,635	1,510	1,730	795	705	454
24	770	910	327	220	243	1,750	1,635	1,510	1,692	775	705	463
25	800	885	284	210	251	2,050	1,580	1,510	1,650	750	740	492
26	780	910	260	199	255	2,350	1,530	1,580	1,610	750	775	505
27	755	915	243	192	259	2,640	1,480	1,690	1,530	775	750	484
28	765	920	239	190	267	2,950	1,430	2,035	1,455	760	730	454
29	780	900	233	189	.....	3,260	1,430	2,355	1,405	740	740	450
30	780	880	237	188	.....	3,600	1,470	2,610	1,405	730	750	442
31	800		237	187	.....	3,930	.....	2,905	.....	750	795	.....

NOTE.—1916-17: Ice conditions January 1 to April 11 inclusive. 1917-18: Ice conditions November 29 to April 3 inclusive.

Monthly Discharge of Red River at Emerson, for years ending Sept. 30, 1917-18.

[Drainage area, 34,600 square miles.]

Month.	Discharge in Second-Feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17.						
October	3,820	2,870	3,212	0·093	0·107	197,498
November	3,180	1,695	2,342	0·068	0·076	139,358
December	2,103	1,451	1,730	0·050	0·058	106,373
January	1,360	1,150	1,256	0·036	0·041	77,228
February	1,145	990	1,044	0·030	0·031	57,981
March	2,440	1,000	1,139	0·033	0·038	70,034
April	25,900	3,695	14,018	0 405	0·452	834,129
May	8,030	3,575	5,784	0 167	0·192	355,644
June	3,525	2,020	2,587	0·075	0·084	153,937
July	1,935	1,030	1,469	0·042	0,048	90,325
August	1,030	485	664	0·019	0·022	40,828
September	590	387	465	0·013	0·014	27,669
The year	25,900	387	2,969	0·086	1·167	2,148,947
1917-18.						
October	800	570	681	0·020	0·023	41,873
November	980	810	901	0·026	0·029	53,613
December	850	233	542	0·016	0·018	33,326
January	250	187	228	0·007	0·008	14,019
February	267	188	222	0·006	0·006	12,329
March	3,910	271	1,072	0·031	0·036	65,915
April	4,990	1,430	2,431	0·070	0·078	144,654
May	2,905	1,485	1,812	0·052	0·060	111,416
June	3,335	1,405	2,298	0·066	0·074	136,740
July	1,405	730	994	0·029	0·033	61,119
August	795	680	730	0·021	0·024	44,886
September	1,160	442	666	0·019	0·021	39,630
The year	4,990	233	1,049	0·030	0·407	759,441

TRIBUTARIES.

Roseau River at Stuartburn.

Station No. OD4.

History.—This station was established on May 7, 1915 by A. Pirie and since that time has been in practically constant operation.

Location.—The station as originally established was located in Sec. 2, Tp. 2, Rge. 6, E.P.M., on the downstream side of the Canadian Northern Railway bridge, about five hundred yards east of Stuartburn station. On June 6, 1915 a station was chosen approximately three hundred feet downstream from the above mentioned bridge and a cable-carrier station established. This station has been in operation since that time. Winter measurements are made from the ice on the same cross section of the river.

Drainage Area.—The drainage area of the river above this station is 1,520 square miles.

Channel.—The bed of the channel is composed of sandy silt and during extreme stages of the river is liable to change. This would also apply to the control points below the section.

The banks at the section are high and not subject to overflow.

Gauge.—The original gauge was a vertical staff driven into the bed of the stream and suitably braced. It was located close to the left bank of

the river below the C.N.R. bridge. In July 1916 a chain gauge was installed at this station to take the place of the old staff gauge. It is located on the downstream side of the bridge. These gauges are referred to a permanent M.H.S. bench-mark set to arbitrary datum.

Discharge Measurements.—Since the establishment of the station, discharge measurements have been made at frequent intervals over a range in stage of 91·57 to 100·13, representing a range in discharge of 12 to 3,000 c.f.s.

Records Available.—From May 7 to November 12, 1915, and from April 25 to September 30, 1918, continuous records of daily gauge heights have been obtained. Based on these daily gauge heights, estimates of daily discharge are available. Estimates of mean monthly discharge based on the daily gauge heights together with actual measurements are also available.

Accuracy.—Throughout the range in stage covered by the discharge measurements, the discharge curve is fairly well defined.

Discharge measurements of Roseau River at Stuartburn during 1917-18.

Date.	Gauge height.	Discharge.	Remarks.	Date.	Gauge height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan. 18	92·55	14·2	Ice cover.	May 8	93·01	112·2	
Jan. 19	92·55	13·7	"	June 19	93·15	147·1	
Feb. 21	92·29	9·8	"	Aug. 13	92·55	50·7	
Feb. 22	92·29	11·5	"	Sept. 20	92·48	14·7	
Feb. 23	92·26	11·4	"				
April 3	92·73	34·5	"				
May 4	95·37	900·0					
June 5	92·94	105·0					
June 27	92·74	71·7					
Aug. 23	92·30	8·3					
Sept. 26	92·28	19·8					
Nov. 23	98·82	72·2					

Daily Discharge in Second-feet of Roseau River at Stuartburn, for part of year ending September 30, 1917 and year ending September 30, 1918.

[Drainage area, 1,520 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1				14	12	11	31	922	137	124	63	6
2				14	12	11	33	904	167	117	65	15
3				14	11	11	35	878	179	128	43	17
4				14	11	12	37	871	111	131	53	19
5				14	11	12	42	817	119	137	56	17
6				14	12	13	49	816	107	111	57	16
7				14	12	13	57	800	97	148	56	10
8				14	12	14	65	793	82	111	51	22
9				14	12	14	73	782	83	97	52	15
10				11	12	15	99	793	88	119	49	12
11				14	11	15	128	786	90	97	47	17
12				14	11	16	174	782	93	85	34	20
13				14	11	16	238	768	76	91	36	27
14				14	11	17	301	765	65	88	56	7
15				14	11	17	367	772	97	93	54	6
16				14	10	17	415	768	101	87	52	6
17				14	10	17	506	798	65	88	49	5
18				14	10	18	583	586	68	90	48	5
19				14	10	18	644	586	85	93	47	4
20				14	10	18	712	401	96	72	49	4
21				14	10	19	782	397	97	59	38	4
22				14	11	19	824	246	94	42	39	4
23				13	11	20	856	268	90	32	26	27
24				13	11	21	889	249	85	65	75	29
25				13	11	22	915	219	90	66	52	30
26				13	11	23	930	183	82	61	50	32
27				14	11	24	941	174	82	59	21	33
28				14	11	26	945	164	88	62	13	32
29				14		27	926	153	97	66	11	30
30				13		28	933	148	97	69	9	25
31				13		29		133		73	8	
1917-18.												
1	20	30							339	237	95	27
2	7	35							271	265	71	30
3	5	40							305	231	77	27
4	5	55							373	215	71	33
5	5	60							356	171	64	36
6	7	70							339	185	61	36
7	31	75							441	146	49	36
8	34	72						106	441	112	37	36
9	38	76						96	390	83	43	38
10	41	77						117	356	70	49	41
11	43	79						117	339	67	49	41
12	44	77						117	309	59	52	33
13	45	75						106	278	52	39	33
14	47	73						106	251	52	37	30
15	45	72						406	224	451	39	33
16	44	69						106	199	100	43	30
17	43	75						87	176	18	61	36
18	42	76						78	155	10	56	30
19	39	77						62	137	104	52	30
20	38	73						36	130	100	49	33
21	37	72						17	85	91	48	30
22	38	72						30	85	44	38	25
23	37	72						96	85	2	36	27
24	37	70						117	71	48	41	36
25	35	65						424	71	48	48	45
26	35	65						322	77	38	50	41
27	32	63						254	82	44	48	38
28	30	62						271	148	50	38	45
29	28	60						305	208	40	36	36
30	27	60						305	261	38	38	38
31	25							271		82	30	

NOTE.—1916-17: Ice conditions January 1 to April 27, inclusive. 1917-18: Ice conditions after October 23.

Monthly Discharge of Roseau River at Stuartburn for years ending Sept. 30, 1917-18.

[Drainage area 1,520 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17.						
October	155	68	92	0·061	0·070	5,657
November	222	.....	86*	0·057	0·063	5,117
December	.....	.....	4*	0·003	0·003	246
January	14	13	14	0·009	0·010	861
February	12	10	11	0·007	0·007	611
March	20	11	18	0·012	0·014	1,107
April	945	31	452	0·297	0·331	26,896
May	922	133	571	0·376	0·433	35,109
June	179	65	97	0·064	0·071	5,772
July	148	32	90	0·059	0·068	5,534
August	65	8	44	0·029	0·033	2,705
September	33	4	17	0·011	0·012	1,012
The period	945	4*	125	0·082	1·113	90,474
1917-18.						
October	47	5	32	0·021	0·024	1,968
November	79	30	67	0·044	0·049	3,987
December	.....	.....	.....	.....	.....	.....
January	.....	.....	.....	.....	.....	.....
February	.....	.....	.....	.....	.....	.....
March	.....	.....	.....	.....	.....	.....
April	.....	.....	.....	.....	.....	.....
May	.....	.....	145*	0·095	0·110	8,916
June	441	71	233	0·153	0·171	13,864
July	265	2	92	0·061	0·070	5,657
August	95	30	50	0·033	0·038	3,074
September	45	25	34	0·022	0·025	2,023
The period	441	2	93	0·061	0·485	39,467

NOTE.—Marked thus (*) estimated. For May, 1918, the period covered is the 8th to 31st, inclusive.

ROSEAU RIVER AT BASKERVILLE'S FARM.

Station No. 5 OD$_1$.

History.—This station was established on April 23, 1913, by A. Pirie. It was continued in use until August 12, 1914, when, on account of cost of operation, it was superseded by the station below Dominion City. In the spring of 1916, the latter station was found to be unsatisfactory on account of back water during flood periods; it was, therefore, decided to again operate the Baskerville farm station, and from July 6 of that year the station has been in continuous operation.

Location of Section.—The meter section is located in S.E.¼ Sec. 12, Tp. 3, Rge. 3, E.P.M., on the downstream side of the steel traffic bridge at Baskerville's farm, eight miles northeast of Dominion City. All open-water measurements are taken from this bridge, while winter measurements are taken from the ice on the same cross section of the river.

Drainage Area.—The drainage area of the river above this station is 1,900 square miles.

Channel.—The bed of the channel at this point is a gravelly clay and is not liable to shift. The channel is straight above and below the section and the banks are high enough to prevent overflow.

Gauge.—When the station was established, a vertical staff gauge was secured to a pile on the bank of the river, twenty-five feet above the section. Difficulty

was encountered in obtaining readings on this gauge at all stages of the river, so on March 14, 1914, a chain gauge was placed on the upstream side of the bridge. All records subsequent to this latter date have been obtained at this chain gauge.

Discharge Measurements.—During the periods in which the station has been operated, discharge measurements have been taken at frequent intervals over a range in stage of from 83·67 to 94·66 which represents a range in discharge from 20 to 2,000 c.f.s. under open-water conditions.

Records Available.—From April 12, 1913 to August 12, 1914, continuous records of daily gauge height for the open water season, and intermittent records for the winter season have been obtained.

From July 5, 1916 to September 30, 1918, continuous daily gauge readings have been obtained.

Based on these gauge readings, estimates of daily discharge for the above open-water seasons are available.

Estimates of monthly mean discharge based on gauge readings and actual measurements are also available.

Accuracy.—Between gauge heights 83·7 and 85·0 the discharge curve is well defined; between 85·0 and 94·8 it is fairly well defined. Beyond these limits the curve is not well defined.

Discharge Measurements of Roseau River at Baskerville's Farm during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan. 17	85·24	17·5	Ice cover.	Jan. 9	84·36	0·8	Ice cover.
Feb. 24	85·13	9·8	Ice cover.	May 8	84·74	121·4	
April 3	86·71	99·2	Ice cover.	June 19	84·88	138·7	
May 1	90·45	979·4		Aug. 13	84·12	55·7	
June 5	85·04	122·0		Sept. 20	83·54	29·5	
June 27	84·33	71·5					
Aug. 23	83·71	21·4					
Sept. 26	83·88	32·8					
Nov. 23	84·38	75·8					

Daily Discharge in Second-feet of Roseau River at Baskerville's Farm, for part of year ending September 30, 1917 and year ending September 30, 1918.

[Drainage area 1,900 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17												
1				18	16	10	62	1,076	152	107	61	50
2				18	15	10	71	1,059	104	126	63	22
3				18	15	11	80	1,031	122	131	58	19
4				18	11	11	89	998	130	135	59	18
5				18	14	12	99	975	158	143	52	19
6				18	11	13	113	939	139	163	19	67
7				18	13	13	127	914	125	146	48	58
8				18	13	14	141	881	117	139	45	41
9				18	13	15	164	839	117	121	51	36
10				18	13	15	185	801	109	121	51	35
11				18	12	16	205	740	107	123	19	27
12				18	12	16	228	717	127	120	45	30
13				18	12	17	253	668	104	113	42	19
14				18	11	17	281	631	111	107	42	19
15				18	11	18	314	591	96	101	39	19
16				18	11	19	350	516	92	101	31	17
17				18	10	19	395	507	128	98	48	17
18				18	10	20	446	468	105	92	48	23
19				18	10	20	520	432	108	105	43	25
20				18	10	21	583	392	124	88	46	21
21				18	10	22	652	371	108	84	45	17
22				18	10	24	741	343	100	76	44	13
23				17	10	26	822	309	107	69	47	14
24				17	10	28	895	262	103	60	39	86
25				17	10	30	918	218	97	61	31	68
26				17	10	33	981	235	93	65	62	59
27				17	10	37	1,025	222	89	61	54	46
28				17	10	40	1,059	213	99	55	43	48
29				17		44	1,070	197	97	57	39	32
30				16		49	1,076	181	113	56	31	27
31				16		55		172		54	39	
1917-18												
1	23	35	76	12		3	95	100	384	219	54	30
2	23	45	62	11		5	156	110	307	254	65	31
3	19	50	58	11		6	218	93	273	248	65	29
4	17	55	52	10		6	317	119	285	243	63	28
5	17	60	45	8		6	355	144	318	236	61	27
6	15	65	40	7		6	273	130	339	197	51	28
7	16	67	37	6		6	220	115	356	188	51	30
8	19	73	33	5		7	200	121	363	157	49	29
9	44	77	30	3		8	141	108	357	154	46	29
10	33	78	26	1		9	212	111	359	132	45	29
11	39	84	23	1		10	214	113	282	121	41	29
12	39	83	20	1		11	208	121	243	121	40	29
13	42	83	18	1		12	186	105	224	124	45	29
14	41	177	17	1		14	181	110	224	123	41	29
15	33	151	18	1		15	173	100	198	88	41	27
16	36	126	18	1		16	170	106	196	97	39	27
17	36	116	18	2		17	170	102	159	101	38	27
18	36	106	18	3		19	159	100	150	72	43	26
19	36	142	17	3		20	157	85	133	44	48	27
20	35	105	16	3		24	151	81	150	32	65	27
21	35	91	16	2		29	106	15	139	105	73	27
22	34	113	15	2		32	101	40	105	97	51	28
23	34	92	15	2		38	167	39	95	79	43	29
24	33	88	14	1		43	118	69	117	64	40	32
25	33	86	13	1		49	137	110	105	62	40	30
26	33	84	12			55	137	330	94	65	41	29
27	32	84	10			62	115	296	61	61	38	29
28	32	86	10			67	128	243	117	54	36	29
29	31	88	11			72	121	243	132	54	35	28
30	30	87	11			80	103	256	226	54	34	26
31	33		12			88		263		54	33	

NOTE.—1916-17 Ice conditions January 1 to April 29, inclusive. 1917-18 Ice conditions October 18 to April 4, inclusive.

Monthly Discharge of Roseau River at Baskerville's Farm for years ending September 30, 1917-18.

[Drainage area 1,900 square miles.]

Month.	Discharge in Second-Feet.				Run Off	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area	Total in Acre-feet
1916-17.						
October	156	60	96	0·051	0·059	5,901
November	178		82*	0·043	0·048	4,879
December			14*	0·007	0·008	861
January	18	16	18	0·009	0·010	1,107
February	16	10	12	0·006	0·006	666
March	55	10	22	0·012	0·014	1,353
April	1,076	62	466	0·245	0·273	27,729
May	1,076	172	579	0·305	0·352	35,601
June	158	89	113	0·059	0·066	6,724
July	163	54	100	0·053	0·061	6,149
August	61	30	46	0·024	0·028	2,828
September	86	13	33	0·017	0·019	1,964
The year	1,076	10*	132	0·069	0·937	95,541
1917-18.						
October	44	15	31	0·016	0·018	1,906
November	177	35	89	0·047	0·052	5,296
December	76	10	25	0·013	0·015	1,537
January	12		3*	0·002	0·002	184
February			0*			
March	88	3	27	0·014	0·016	1,660
April	355	95	174	0·092	0·103	10,354
May	350	14	132	0·069	0·080	8,116
June	384	63	216	0·114	0·127	12,853
July	251	32	120	0·063	0·073	7,379
August	73	33	47	0·025	0·029	2,890
September	32	26	28	0·015	0·017	1,666
The year.	384	0	75	0·039	0·529	54,298

NOTE.—Marked thus (*) estimated.

RAT RIVER AT OTTERBURNE.

Station No. 5 OE$_1$.

History.—The station was established by S. S. Scovil on May 23, 1912 and it has been in continuous operation since that time.

Location.—The metering section is in the S.W , sec. 8, Tp. 6, Rge. 4, E.P.M., on the downstream side of the traffic bridge which crosses the Rat at F. X. Joubert's farm, four miles southeast of the Canadian Pacific Railway station at Otterburne. Throughout the open water season the discharge measurements are made from the bridge. In the winter they are made from the ice on the same cross section of the river.

Drainage Area.—The drainage area of the river above the station is 650 square miles.

Channel.—The channel is straight for a considerable distance above and below the section. The banks are high and the bed of the channel, though of mud and clay, is not liable to shift.

Gauge.—A vertical staff gauge is secured to a pile of the bridge about fifteen feet from the left bank on the section. This gauge is referred to a permanent M.H.S. bench-mark, located about thirty feet southwest from the gauge. This bench-mark is set to an assumed datum.

Discharge Measurements.—Since the establishment of this station, discharge measurements have been taken at frequent intervals and cover a range in stage of 88·19 to 99·94, corresponding to a range in discharge of zero to 1,100 c.f.s.

Records Available.—From May 23, 1912 to December 2, 1914, continuous records of daily gauge height for the open-water season, and intermittent gauge readings for the winter season have been obtained.

From April 4, 1915 to September 30, 1918, continuous records of daily gauge height have been obtained. From these records, estimates of daily discharge for the open-water seasons are available. Estimates of mean monthly discharge based on gauge heights and actual measurements are also available.

Accuracy.—From gauge height 88·3 to 92·4 the discharge curve is well defined; from 92·4 to 96·7 it is fairly well defined; beyond these limits it is not well defined.

Discharge Measurements of Rat River at Otterburne during 1917-18.

Date.	Gauge height.	Discharge.	Remarks.	Date.	Gauge height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.	1918.		Feet.	Sec.-ft.	
Jan. 16	89·32	3·0	Ice cover.	Jan. 8	88·83	.....	Ice cover.
April 7	92·87	161·0	"	May 7	89·28	43·8	
May 2	92·40	252·0		June 18	89·42	60·7	
June 6	88·88	35·0		Aug. 14	88·46	18·4	
June 26	88·95	32·0		Sept. 9	88·32	11·2	
Aug. 24	88·18	4·0					
Sept. 25	88·29	8·0					
Nov. 22	88·97	30·4					

Daily Discharge in Second-feet of Rat River at Otterburne, for part of year ending September 30, 1917 and year ending September 30, 1918.

[Drainage area, 660 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept
1916-17.												
1				3	2	1	15	249	41	30	8	3
2				3	2	1	20	246	40	30	8	3
3				3	2	1	21	219	38	32	6	3
4				3	2	2	22	201	35	30	7	3
5					2	2	37	182	33	29	8	3
6					2	2	98	201	30	34	8	2
7					2	2	161	166	28	39	6	2
8					2		169	156	28	40	7	2
9							172	142	27	41	8	2
10							176	132	27	42	7	2
11							77	123	27	46	6	2
12							77	117	30	52	6	2
13							6	109	33	48	5	2
14							1	103	40	41	4	2
15							59	99	44	37	4	2
16							162	91	48	33	4	2
17							160	88	58	30	4	2
18							162	84	55	23	2	2
19							166	79	54	28	2	2
20							177	76	47	32	2	3
21							198	74	42	30	2	3
22							220	73	40	23	2	3
23							236	72	38	19	3	4
24							258	71	37	18	3	5
25							255	67	33	16	3	4
26				3	1	5	248	59	32	13	3	4
27				2	1	6	244	56	32	12	3	4
28				2	1	7	243	48	30	10	2	4
29				2		8	243	45	28	10	2	4
30				2		8	246	44	29	8	3	4
31				2		10		42		6	3	

NOTE.—Ice conditions from January 1 to April 15, inclusive.

1917-18.												
1	4	14	26					56	59	30	30	12
2	5	16	25					55	65	30	28	12
3	6	18	24					55	108	30	25	12
4	6	22	23				91	54	99	29	23	11
5	7	29	21				91	53	115	28	20	11
6	7	31	20				94	51	129	28	18	11
7	8	33	16				97	50	128	27	17	11
8	9	36	12				100	49	127	24	16	11
9	10	38	7				91	48	129	22	14	11
10	10	40	6				86	48	132	22	13	11
11	10	41	6				79	47	134	22	13	10
12	11	39	2				78	46	134	22	14	10
13	11	34	1				75	45	134	24	15	10
14	12	34					75	43	130	25	17	10
15	15	33					76	41	97	24	18	10
16	14	32					77	40	81	22	20	10
17	13	32					76	39	66	24	24	10
18	13	34					74	36	56	26	25	12
19	12	39					72	36	46	27	28	12
20	14	42					69	38	40	29	27	12
21	14	43					68	40	37	25	25	12
22	12	35					64	40	34	24	24	12
23	10	38					62	42	30	18	20	12
24	11	44					59	43	28	17	19	12
25	13	38					58	45	27	16	18	12
26	14	34					57	48	27	17	18	12
27	16	25					56	51	26	20	17	12
28	14	27					55	53	27	21	17	12
29	12	30					55	54	28	24	16	12
30	10	28					57	55	29	25	14	12
31	11							56		28	13	

NOTE.—Ice conditions October 15 to April 3, inclusive.

Monthly Discharge of Rat River at Otterburne, for years ending September 30, 1917-18.

[Drainage area, 650 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17						
October	41	24	31	0·048	0·055	1,906
November	53		28*	0·043	0·048	1,666
December			6*	0·009	0·010	369
January	3	2	3	0·005	0·006	184
February	2	1	1	0·002	0·002	56
March	10	1	3	0·005	0·006	184
April	258	15	166	0·255	0·284	9,878
May	249	42	113	0·174	0·201	6,948
June	58	27	37	0·057	0·063	2,202
July	52	6	28	0·043	0·050	1,722
August	8	2	5	0·008	0·009	307
September	5	2	3	0·005	0·006	179
The year	258	1	35	0·054	0·733	25,333
1917-18.						
October	16	4	11	0·017	0·020	676
November	44	14	33	0·051	0·057	1,963
December	26		7*	0·011	0·013	430
April	100		73*	0·112	0·125	4,344
May	56	36	47	0·072	0·083	2,890
June	134	26	77	0·118	0·132	4,582
July	30	16	24	0·037	0·043	1,476
August	30	13	20	0·031	0·036	1,230
September	12	10	11	0·017	0·019	655
The period	134	0	31	0·051	0·522	18,000

NOTE.—Marked thus (*) estimated.

SEINE RIVER AT STE. ANNE DES CHENES.

Station No. 5 OH_1.

History.—The station was established on October 4, 1912 by A. Pirie, but was discontinued on November 11 of the same year. No further information was obtained at this point until May 1, 1915, when operations were again commenced. Since this latter date this station has been in operation.

Location of Section.—The metering section is located in Lot 19, Parish of Ste. Anne des Chenes, on the downstream side of the Canadian Northern Railway bridge, one mile east of the town of Ste. Anne des Chenes.

Drainage Area.—The drainage area of the river above this station is 310 square miles.

Channel.—The section is located on a slightly curved stretch of the river, but is at right angles to the direction of flow. The bed of the channel is of a sandy nature and the control is located at a point a short distance downstream, formed by the remains of an old dam. There is liable to be interference to the flow at this point. The banks of the channel at the section are high and not liable to overflow.

Gauge.—A vertical staff gauge is secured to a pile of the bridge at the section and is referred to an arbitrary datum.

Discharge Measurements.—During the periods in which this station has been in operation, discharge measurements have been made over a range in stage corresponding to a range in discharge of zero to 440 c.f.s.

Records Available.—From May 1 to November 12, 1915; April 11 to November 11, 1916; April 8 to October 23, 1917, and from March 24 to September 30, 1918, continuous records of daily gauge height are available.

Based on these gauge heights, estimates of daily discharge are available except during times of extreme flood or under ice conditions, when the information at hand was not sufficiently full to allow estimates of discharge being made.

Estimates of mean monthly discharge based on gauge readings and actual measurements are available.

Accuracy.—The discharge curve is fairly well defined over the range in stage covered by the recorded gauge heights.

Discharge Measurements of Seine River at Ste. Anne des Chenes, during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
July 13 ...	93·08	29		June 25.....	92·87	22·9	

Daily Discharge in Second-feet of Seine River at Ste. Anne des Chenes, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area 310 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916–17.												
1								199	33	21	1	2
2								192	25	22	0	2
3								189	21	22	0	2
4								178	21	22	2	2
5								175	22	22	3	2
6								164	22	22	5	0
7								162	22	22	4	0
8								149	15	25	4	0
9								149	15	29	5	0
10								142	15	33	4	1
11								135	16	23	2	1
12								132	22	22	2	1
13								121	22	22	2	3
14								121	36	25	1	2
15								114	50	22	0	2
16								107	50	22	0	2
17								100	47	18	0	2
18								93	43	9	0	2
19							478	87	36	9	2	2
20							292	78	35	9	4	2
21							278	75	36	5	2	2
22							274	71	32	5	2	2
23							264	64	22	5	2	2
24							250	61	33	4	3	2
25							221	57	35	2	2	2
26							311	54	35	5	2	2
27							221	50	29	2	2	0
28							221	50	22	2	2	0
29							206	47	22	2	2	0
30							203	43	22	2	2	1
31								36		0	1	
1917–18.												
1	4							39	51	29	19	8
2	3							39	64	29	14	8
3	4							39	164	29	14	8
4	4							39	178	39	13	8
5	4							29	191	39	8	8
6	3							29	192	21	6	7
7	3							29	192	14	4	5
8	3							29	189	14	4	5
9	3							27	178	14	4	4
10	4							27	164	21	5	4
11	4							29	149	8	4	4
12	4						64	21	135	8	14	6
13	4						64	21	121	8	14	5
14	6						64	21	107	8	21	7
15	7						61	20	93	21	37	6
16	7						51	17	78	21	38	5
17	7						51	14	77	29	31	6
18	7						51	14	64	29	29	8
19	7						51	14	51	29	27	8
20	7						51	14	39	14	29	8
21	7						51	14	37	14	29	8
22	7						45	21	29	14	21	8
23	7						39	21	29	8	20	8
24							29	29	21	14	18	8
25							29	29	15	14	17	8
26							51	29	14	21	15	8
27							37	29	14	25	14	6
28							39	29	14	29	14	8
29							37	29	13	25	13	12
30							37	29	21	28	9	14
31								29		21	10	

NOTE.—Ice conditions prevail to April 16, for 1916–17. Information insufficient to compute daily discharge. Ice conditions for 1917–18—October 18 to April 11, inclusive.

Monthly Discharge of Seine River at Ste. Anne des Chenes, for part years ending September 30, 1917-18.

[Drainage area 310 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Discharge Area.	Total in Acre-feet.
1916-17.						
October						
November						
December						
January						
February						
March						
April	478	0	147*	0·474	0·529	8,747
May	199	36	110	0·355	0·409	6,764
June	50	15	28	0·090	0·100	1,666
July	33	0	15	0·048	0·055	922
August	5	0	2	0·006	0·007	123
September	3	0	1	0·003	0·003	60
The period	478	0	50	0·161	1·096	18,114
1917-18.						
October			5*	0·016	0·018	307
November						
December						
January						
February						
March						
April			37*	0·119	0·133	2,202
May	39	14	26	0·084	0·097	1,599
June	192	13	89	0·287	0·320	5,296
July	39	8	21	0·068	0·078	1,291
August	38	4	17	0·055	0·063	1,045
September	14	4	7	0·023	0·026	417
The period	192	4	29	0·094	0·748	12,306

NOTE.—Marked thus (*) estimated.

MISCELLANEOUS MEASUREMENTS OBTAINED ON STREAMS IN THE MUNICIPALITIES OF DUFFERIN, ROLAND AND GREY.

The points at which discharge measurements were obtained at the instance of the Department of Public Works of the province of Manitoba, in the above municipalities, are as follows:—

Boyne river—2½ miles east of Carman.
Boyne channel—1½ mile north of Homewood.
Elm creek—2 miles west of Elm creek.
Tobacco creek—3 miles north of Roland.

Discharge Measurements of Boyne River 2½ miles East of Carman, for 1918.

Date.	Gauge Height.	Discharge.	Remarks.
1918.	Feet.	Sec.-ft.	
May 2	84·16	21·3	
June 8	83·84	16·3	

Discharge Measurements of Boyne Channel North of Homewood, for 1918.

Date.	Gauge Height.	Discharge.	Remarks.
1918.	Feet.	Sec.-ft.	
May 1	92·68	0·53	
June 8 . .	92·78	1·11	

Discharge Measurements of Elm Creek at Kenyon's Farm, for 1918.

Date.	Gauge Height.	Discharge	Remarks
1918.	Feet.	Sec.-ft	
May 2	95·46	0·12	
June 7	95·55	0·30	

Discharge Measurements of Tobacco Creek, 2 miles North of Roland, for 1918.

Date.	Gauge Height.	Discharge.	Remarks
1918.	Feet.	Sec.-ft.	
May 3	87·69	0·012	
June 8	0·53		

ASSINIBOINE RIVER AND TRIBUTARIES.

ASSINIBOINE RIVER.

Assiniboine River at Millwood.

Station No 5 ME_1.

History.—The station was established by W. G. Worden on October 11, 1912, and since that date has been in practically continuous operation.

Location of section.—The metering section is located in the S.W.¼ Sec. 2, Tp. 20, Rge. 29, W.P.M., at the downstream side of the traffic bridge, four hundred feet downstream from the old mill dam and one-quarter of a mile south of the town of Millwood. All open-water measurements are taken from the bridge. Winter measurements are taken from the ice on the same section of the river.

Drainage Area.—The drainage area of the river above this station is 7,590 square miles.

Channel.—The channel above and below the station is straight and the velocities across the section fairly regular. The bed of the channel is composed of clay and gravel and not liable to shift. During time of extreme flood conditions the river is liable to overflow its banks at this point.

Gauge.—A vertical staff gauge is secured to the central pier of the bridge, and is referred to a permanent M.H.S. bench-mark, located seventy-five feet south-east from the downstream side of the bridge on the left bank. The bench-mark is set to an assumed datum.

Discharge Measurements.—Since the establishment of the station, discharge measurements have been made over a range in stage of 98·91 to 107·42, corresponding to a range in discharge of 30 to 5,200 c.f.s.

Records Available.—From January 27, 1913 to March 29, 1914, continuous records of daily gauge height for open-water seasons, and intermittent records of gauge height for the winter season have been obtained. From March 29, 1914 to September 30, 1918, continuous records of daily gauge height have been obtained.

Based on these daily gauge heights, estimates of daily discharge are available.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are available.

Accuracy.—Under open water conditions the discharge curve is well defined between gauge heights 98·91 and 107·4.

Discharge Measurements of Assiniboine River at Millwood during 1917-18.

Date	Gauge Height	Discharge	Remarks	Date.	Gauge Height	Discharge	Remarks.
1917	Feet	Sec.-Ft.		1918	Feet	Sec.-Ft.	
Feb. 2	100·10	33·0	Ice Cover.	Jan. 17	99·85	59·2	Ice Cover.
Feb. 27	100·10	41·0	Ice Cover.	Feb. 15	99·98	48·9	Ice Cover.
Mar. 28	100·18	56·0	Ice Cover.	Mar. 19	100·13	56·3	Ice Cover.
May 8	105·41	3,925·0		April 23	100·36	705·0	
June 18	100·82	933·0		June 22	99·56	289·3	
Sept. 10	99·64	291·0		Aug. 1	99·42	264·6	
Oct. 25	99·25	196·0		Sept. 13	99·41	199·7	
Dec. 13	99·40	22·0	Ice Cover				

Daily Discharge in Second-feet of Assiniboine River at Millwood, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 7,590 square miles.]

	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1				56	34	42	53	3,215	1,600	1,330	650	344
2				57	33	42	63	3,180	1,490	1,685	525	344
3				46	34	40	64	3,215	1,380	1,745	600	344
4				55	35	42	65	3,215	1,325	1,775	555	344
5				53	36	44	66	3,285	1,215	1,835	525	344
6				52	37	45	67	3,325	1,160	1,895	505	344
7				56	38	50	68	3,495	1,105	1,955	484	344
8				60	37	52	69	3,705	1,050	3,495	444	304
9				58	36	52	70	3,775	1,000	2,465	424	344
10				56	36	52	74	4,000	950	2,315	404	356
11				54	36	52	80	4,000	950	2,195	364	344
12				52	40	52	85	4,150	950	2,165	344	324
13				50	40	52	90	4,310	935	2,135	364	304
14				48	40	52	100	4,630	900	2,135	344	304
15				46	40	52	125	4,875	880	2,045	344	304
16				45	39	52	280	5,300	850	1,630	324	304
17				45	39	52	340	5,470	850	1,465	304	288
18				44	38	52	500	5,640	905	1,410	286	268
19				43	38	54	595	5,550	900	1,215	286	251
20				41	38	54	895	5,470	925	1,105	268	234
21				40	38	54	1,100	5,130	950	1,050	268	234
22				39	38	54	1,320	4,960	975	1,025	268	203
23				38	39	54	1,540	4,710	1,000	950	268	203
24				38	39	54	1,770	4,470	1,105	900	268	173
25				37	39	54	2,010	4,150	1,105	850	251	203
26				37	40	54	2,250	3,705	1,105	800	304	203
27				37	41	54	2,435	3,215	1,215	750	344	188
28				36	41	56	3,495	3,620	1,270	775	344	173
29				35	..	60	3,425	3,195	1,435	825	384	173
30				34	..	52	3,425	1,955	1,520	750	364	173
31				34	.....	63	.....	1,685	...	700	364	...
1917-18												
1	173	173	99	59	48	50	1,050	560	785	610	231	375
2	173	203	90	59	48	52	1,250	535	760	710	231	353
3	173	303	80	60	42	54	1,450	510	760	760	231	313
4	173	203	69	52	45	54	1,655	510	760	865	231	313
5	158	203	68	64	48	52	1,715	485	735	975	231	294
6	143	203	66	64	49	51	1,555	465	710	975	245	261
7	173	173	64	64	50	48	1,525	442	660	920	231	261
8	173	173	62	52	53	48	1,535	420	610	865	217	251
9	173	173	60	59	56	48	1,390	420	610	810	203	245
10	173	188	60	56	56	48	1,280	406	585	760	203	246
11	173	173	56	56	56	46	1,250	375	560	710	203	261
12	173	173	39	56	55	45	1,195	375	510	710	217	261
13	173	203	22	56	52	48	1,195	375	465	685	231	246
14	173	203	22	57	51	50	1,104	375	420	660	261	231
15	173	203	32	57	49	52	1,085	375	397	560	294	217
16	158	218	48	58	48	52	1,030	353	375	510	332	203
17	158	188	65	59	46	53	975	332	353	465	332	203
18	158	158	66	58	44	55	920	332	332	420	375	203
19	158	173	66	60	44	56	865	313	313	420	397	203
20	173	188	64	56	46	70	810	313	294	397	465	203
21	173	203	62	53	48	85	810	294	277	375	465	203
22	173	203	60	50	48	110	785	294	277	332	510	203
23	87	188	59	54	48	140	760	375	261	294	560	231
24	113	173	58	49	50	145	760	420	251	294	560	203
25	206	159	57	44	51	150	760	465	294	277	535	176
26	188	149	56	46	53	155	735	510	332	231	510	175
27	203	139	56	48	54	265	685	560	332	231	487	176
28	233	129	56	50	52	400	660	510	375	245	465	176
29	203	119	56	43	.....	540	635	660	420	317	442	164
30	203	109	57	28	...	700	635	760	465	203	420	164
31	188	.....	58	43	.....	875	.....	760	.....	203	397	.....

NOTE.—Ice conditions for 1917, January 1 to April 26. For 1917-18, November 25 to April 3, inclusive.

Monthly Discharge of Assiniboine River at Millwood, for years ending September 30, 1917-1918.

[Drainage area, 7,800 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square mile.	Depth in inches on Drainage area.	Total in acre-feet.
1916-17.						
October	472	286	349	0·046	0·053	21,459
November	492	194	331	0·044	0·049	19,696
December	194	49	112	0·015	0·017	6,887
January	60	34	43	0·006	0·007	2,644
February	41	33	38	0·005	0·005	2,110
March	63	40	52	0·007	0·008	3,197
April	3,495	63	888	0·117	0·131	52,840
May	5,640	1,685	3,958	0·521	0·601	243,368
June	1,600	850	1,100	0·145	0·162	65,455
July	2,495	700	1,496	0·197	0·227	91,985
August	650	251	383	0·050	0·508	23,550
September	356	173	275	0·036	0·040	16,364
The year	5,640	33	759	0·100	1·357	549·360

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square mile.	Depth in inches on Drainage area.	Total in acre-feet.
1917-18.						
October	206	87	172	0·023	0·027	10,576
November	218	109	177	0·023	0·026	10,532
December	99	22	59	0·008	0·009	3,628
January	64	38	55	0·007	0·008	3,382
February	56	42	50	0·007	0·007	2,777
March	375	46	148	0·019	0·022	9,100
April	1,715	635	1,077	0·142	0·158	64,086
May	760	294	451	0·059	0·068	27,731
June	785	261	476	0·063	0·070	28,324
July	975	203	538	0·071	0·082	33,080
August	560	203	346	0·046	0·053	21,275
September	375	164	234	0·031	0·035	13,924
The year	1,715	22	316	0·042	0·570	228,774

Assiniboine River at Brandon.

Station No. 5 MH$_1$.

History.—This station was established by G. H. Burnham on July 4, 1913, and has been in practically continuous operation since that time.

Location of Section.—The metering section is located in N.W. ¼ Sec. 23, Tp. 10, Rge. 19, W.P.M., on the downstream side of the First Street traffic bridge in the easterly part of the city of Brandon. All discharge measurements during open-water seasons are taken from this bridge. In winter the measurements are taken from the ice, and if conditions are favourable, on the same cross-section of the river. Frequently it is impossible to take an ice measurement at this point; a temporary section is then chosen some distance downstream from the bridge.

Drainage Area.—The drainage area of the river above the section is 34,500 square miles.

Channel.—The section is located in a straight stretch of the river, with high banks. The discharge at all times is confined to the limits of the section.

The bed of the river is clay and liable to shifting during extreme stages of the river.

Gauge.—The original gauge at this station was a vertical-staff gauge secured to the downstream side of the ice breaker opposite the central pier of the bridge. This gauge was replaced in December of 1915 by a vertical-staff gauge, bolted to the downstream side of the central pier. On April 13, 1916, on account of the great range in stage during break up, a chain gauge was established on the upstream side of the bridge and adjacent to the central pier. This gauge is used only during periods of extreme high-water. All of these gauges are referred to a M.H.S. bench-mark set to an assumed datum.

Discharge Measurements.—Since the establishment of the station, discharge measurements have been obtained over a range in stage of 97·32 to 110·02, corresponding to a range in discharge of 60 to 13,000 c. f. s.

Records Available.—From July 4, 1912 to April 17, 1914, continuous records of daily gauge height for open-water seasons, and intermittent records of gauge height for the winter seasons have been obtained. From April 7, 1914 to September 30, 1918, practically continuous records of daily discharge are available.

Based on these gauge heights, estimates of daily discharge are available.

Estimates of mean monthly discharge based on gauge heights and discharge measurements are available.

In addition to the above, a record of daily gauge height has been obtained at the municipal pumping station of the city of Brandon, dating from April 8, 1906 to December 31, 1912. A correlation has been established between this gauge and the gauge at the metering section, and estimates of daily discharge from April 8, 1906 to October 31, 1912, based on deduced normal daily gauge heights are available.

Accuracy.—The discharge curve is very well defined between gauge heights 97·3 and 110·0.

The estimates of daily discharge under ice conditions are reliable.

Discharge Measurements of Assiniboine River at Brandon during 1917–18.

Date.	Gauge Height	Discharge	Remarks.	Date	Gauge Height	Discharge	Remarks.
1917.	Feet	Sec.-ft.		1918	Feet.	Sec.-ft	
Jan. 24	98·82	142·1	Ice cover	Jan. 15	98·50	76·9	Ice cover
Feb. 24	99·23	128·6	Ice cover	Feb. 12	98·68	90·5	Ice cover
Mar. 22	99·05	171·1	Ice cover	April 17	100·29	1,880·5	
May 1	104·16	5,635·8		June 11	99·27	1,251·2	
May 2	104·38	5,818·8		June 27	98·16	581·5	
May 2	104·40	5,886·4		July 26	98·43	739·0	
May 5	104·96	6,073·0		Sept. 4	98·14	494·7	
May 11	104·99	6,293·8					
June 12	101·05	2,497·0					
July 18	101·55	2,602·4					
Sept. 4	98·03	452·2					
Oct. 16	97·69	296·4					
Dec. 12	98·28	172	Ice cover				

Daily Discharge in Second-feet of Assiniboine River at Brandon, for part of year ending September 30, 1917, and Year ending September 30, 1918.

[Drainage area 34,600 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916–17												
1				205	150	115	305	4,975	5,090	2,030	1,085	400
2				205	150	110	315	5,310	4,675	2,040	1,150	423
3				200	145	110	330	5,530	4,125	2,155	1,180	414
4				195	140	110	345	5,740	3,605	2,155	1,100	423
5				190	145	110	350	5,940	3,325	2,320	1,030	423
6				190	150	110	370	5,970	3,090	2,420	995	432
7				205	145	112	400	5,960	2,870	2,470	905	423
8				205	145	115	515	5,990	2,670	2,480	905	414
9				195	142	115	940	5,950	2,590	2,495	815	423
10				195	140	115	770	5,780	2,510	2,560	850	445
11				195	140	112	905	6,020	2,425	2,670	780	445
12				190	140	110	1,050	6,040	2,330	2,805	765	445
13				185	145	110	1,135	6,060	2,330	2,870	740	460
14				180	155	112	1,225	6,090	2,340	2,925	725	432
15				175	150	115	1,320	6,140	2,260	2,865	705	423
16				170	148	115	1,410	6,200	2,170	2,765	685	418
17				165	145	125	1,510	6,140	2,095	2,710	650	414
18				160	145	140	1,615	6,150	2,320	2,735	565	400
19				155	142	150	1,710	6,220	2,120	2,590	545	368
20				150	140	160	1,750	6,250	2,040	2,420	525	368
21				150	138	165	2,585	6,290	1,910	2,275	515	368
22				150	135	170	2,760	6,320	1,895	2,120	505	359
23				145	130	185	2,830	6,410	1,960	1,875	505	350
24				142	128	195	3,345	6,480	1,980	1,770	500	345
25				145	125	210	3,880	6,490	1,930	1,560	500	345
26				150	120	220	4,300	6,480	1,895	1,525	505	333
27				155	118	230	4,490	6,490	1,990	1,470	500	325
28				150	115	245	4,645	6,440	2,095	1,420	475	305
29				150		265	4,695	6,340	2,060	1,320	450	325
30				150		275	4,865	6,210	2,040	1,235	418	305
31				150		195		5,910		1,170	372	
1917–18												
1	288	248			77	108	955	1,235	1,105	505	415	605
2	280	256			78	106	1,385	995	1,100	520	360	530
3	280	260	236		80	107	1,860	1,015	1,220	550	400	510
4	272	264	230		82	108	2,380	1,020	1,260	595	381	465
5	260	272	224		84	107	2,625	970	1,300	605	309	525
6	248	272	219		87	106	2,670	890	1,310	580	309	465
7	260	264	212		89	105	2,705	920	1,265	685	288	400
8	272	272	204		92	104	2,645	965	1,180	780	248	395
9	280	280	197		94	106	2,230	905	1,170	815	309	345
10	272	280	191		92	107	2,195	800	1,260	895	296	372
11	272	284	182		93	109	2,125	835	1,080	1,000	220	345
12	260	296	173		90	110	2,065	845	1,070	965	268	318
13	260	300	170		89	112	2,005	750	1,025	940	203	309
14	260	305	167		88	113	1,925	690	925	920	203	296
15	260	314	164	77	87	115	1,830	795	920	845	268	323
16	260	323	160	78	86	116	1,770	835	910	845	268	300
17	260	327	157	78	85	118	1,790	745	910	860	284	268
18	268	280	154	78	88	119	1,665	755	845	740	300	276
19	264	280	150	78	91	121	1,390	775	760	690	341	272
20	272	323	142	77	94	122	1,315	790	765	670	332	264
21	272	323	134	77	94	124	1,275	765	690	625	341	256
22	280	280	124	76	95	125	1,200	830	660	595	395	256
23	280	280	116	75	96	192	1,435	865	635	555	405	264
24	288	272	108	74	100	237	1,480	745	590	560	440	252
25	300	274	99	74	103	329	1,420	800	545	525	535	264
26	236		90	74	106	418	1,350	820	515	525	560	260
27	232			74	110	515	1,290	855	485	555	560	280
28	232			72	109	595	1,190	870	465	575	625	296
29	232			70		690	1,225	950	465	465	590	288
30	236			72		790	1,225	980	495	450	570	252
31	244			76		850		1,020		425	550	

NOTE.—1916–17 Ice conditions January 1 to April 19
1917–18 Ice conditions November 25 to March 29, inclusive

Monthly Discharge of Assiniboine River at Brandon for Years ending September 30, 1917–18.

[Drainage area 24,800 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum	Mean.	Per Square Mile	Depth in inches on Drainage Area.	Total in Acre-feet
1916-17.						
October	905	515	599	0·017	0·020	36,831
November	855		550*	0·016	0·018	32,727
December			200*	0·008	0·007	12,298
January	205	142	172	0·005	0·006	10,576
February	155	115	140	0·004	0·004	7,775
March	295	140	156	0·005	0·006	9,592
April	4,865	305	1,879	0·054	0·060	111,808
May	6,490	4,975	6,075	0·176	0·203	373,537
June	5,090	1,805	2,548	0·074	0·083	151,617
July	2,925	1,170	2,201	0·064	0·074	135,334
August	1,180	372	708	0·021	0·024	43,533
September	460	305	392	0·011	0·012	23,326
The year	6,490		1,311	0·038	0·516	948,605
Marked thus (*) estimated. 1917-18.						
October	300	232	264	0·008	0·009	16,233
November	327		280*	0·008	0·009	16,661
December			160*	0·005	0·006	9,838
January			80*	0·002	0·002	4,919
February	110	77	91	0·003	0·003	5,054
March	850	104	229	0·007	0·008	14,081
April	2,705	955	1,754	0·051	0·057	104,370
May	1,235	690	872	0·025	0·029	53,617
June	1,310	465	898	0·026	0·029	53,435
July	1,000	425	672	0·019	0·022	41,320
August	625	203	374	0·011	0·013	22,996
September	605	256	342	0·010	0·011	20,350
The year	2,705		501	0·015	0·204	362,707

NOTE.—Marked thus (*) estimated.

ASSINIBOINE RIVER AT HEADINGLY.

Station No. 5 MJ_1.

History.—The station was established by S. S. Scovil on April 9, 1913 and has been in continuous operation since that date. It was established to supersede the station which had been in operation previously at a point eleven miles d wnstream and at the westerly limits of the City of Winnipeg. This latter station was found to be affected by back-water caused by the operation of the St. Andrew's dam on the Red river. The station at Headingly is beyond the effect of this dam.

Location.—The meter section is located in lots 16 and 51, parish of Headingly at the downstream side of the Canadian Pacific Railway bridge, which crosses the Assiniboine river one-quarter of a mile south of the station of Headingly and fourteen miles upstream from the junction of the Assiniboine and Red rivers.

This bridge is used for all discharge measurements taken during the open-water seasons. In the winter, measurements are taken from the ice at a point about four hundred feet upstream from the bridge.

Drainage Area.—The drainage area of the river above the station at this point is 59,420 square miles.

Channel.—The channel above and below the metering section is straight. The bed of the channel is of clay and not liable to shifting. The banks are of sufficient height to confine the discharge to the channel at all stages of the river.

Gauge.—A vertical staff gauge is secured to crib work at the north bank of the river and at the upstream side of the bridge. This gauge is used throughout the open-water season. During the winter, a staff gauge secured to the crib work around the north side of the bridge is used to obtain the daily readings. Both of these gauges are referred to an arbitrary datum.

Discharge Measurements.—Since this station was established, discharge measurements have been taken at frequent intervals over a range in stage of 75·34 to 87·27, corresponding to a range in discharge of 360 to 20,200 c.f.s., under open-water conditions.

Records Available.—From April 17, 1913 to April 2, 1914, continuous records of daily gauge height for the open-water seasons, and intermittent records of gauge height for the winter sensons, have been obtained. From April 2, 1914 to September 30, 1918, practically continuous records of daily gauge height have been obtained.

Based on these gauge heights, estimates of daily discharge throughout the greater part of the above periods are available.

Estimates of mean monthly discharge based on gauge readings and actual measurements are available.

Accuracy.—Between gauge heights 75·3 and 87·3 the discharge curve is well defined for open-water conditions. Under ice conditions the discharge curve is fairly well defined between gauge heights 73·8 and 76·1.

Discharge Measurements of Assiniboine River at Headingly, during 1917–18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-feet.		1918.	Feet.	Sec.-feet.	
Jan. 12	76·32	204·5	Ice cover.	Jan 12 ..	76·27	108·1	Ice cover.
Feb. 6	76·58	248·8	Ice cover.	Feb. 8. ..	76·81	115·6	Ice cover.
Mar. 20	76·89	252·8	Ice cover.	May 1. ..	77·58	1,851·6	
April 27.....	80·05	4,908·3		June 25. ..	76·54	1,058 8	
May 30	81·66	7,423·7		Sept. 17 ..	75·74	470·2	

Daily Discharge in Second-feet of Assiniboine River at Headingly, for portion of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 59,420 square miles.]

	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.
1916-17												
1				300	215	170	450	6,300	7,540	2,390	1,810	750
2				300	205	170	505	6,390	7,450	2,420	1,750	720
3				300	225	160	560	6,480	7,270	2,440	1,670	690
4				275	235	170	615	6,570	7,180	2,490	1,565	660
5				250	250	175	670	6,690	5,910	2,510	1,510	640
6				230	250	185	730	6,830	5,790	2,565	1,470	630
7				205	250	200	790	7,180	5,220	2,545	1,380	620
8				250	240	205	855	7,450	4,935	2,595	1,395	620
9				235	230	215	985	7,540	4,530	2,650	1,410	630
10				220	220	225	1,120	7,540	4,240	2,670	1,380	640
11				205	205	230	1,260	7,540	4,095	2,705	1,320	660
12				205	215	240	1,410	7,490	3,980	2,735	1,245	675
13				195	225	250	1,565	7,420	3,675	2,760	1,230	675
14				185	235	240	1,725	7,310	3,500	2,815	1,210	690
15				205	240	240	1,895	7,350	3,345	2,895	1,205	690
16				203	240	235	2,070	7,400	3,280	2,930	1,120	720
17				250	230	230	2,260	7,360	3,045	3,020	1,065	720
18				240	215	225	2,460	7,450	3,010	3,160	1,035	735
19				235	205	240	2,670	7,450	2,990	3,045	940	735
20				230	195	250	2,895	7,420	2,850	3,000	940	750
21				230	185	250	3,125	7,420	2,760	2,815	940	735
22				225	180	250	3,370	7,360	2,650	2,760	935	720
23				220	170	250	3,810	7,360	2,650	2,705	880	690
24				215	160	275	4,095	7,420	2,670	2,670	860	675
25				205	160	300	4,600	7,420	2,545	2,595	840	660
26				220	170	300	4,675	7,450	2,490	2,490	825	630
27				230	170	300	4,855	7,510	2,390	2,440	810	605
28				250	170	315	5,220	7,540	2,390	2,320	790	605
29				240		315	5,790	7,540	2,460	2,215	790	605
30				230		350	6,050	7,540	2,440	2,050	790	620
31				225		400		7,630		1,920	760	
1917-18												
1	630	690	464	120	107	137	1,525	1,860	1,365	945	810	730
2	620	630	460	118	100	140	1,700	1,795	1,350	895	800	730
3	620	510	442	116	92	139	1,875	1,740	1,350	840	760	730
4	650	495	423	115	96	138	2,070	1,700	1,425	800	730	750
5	605	495	416	114	102	138	2,300	1,660	1,450	755	670	750
6	600	535	400	113	106	137	2,525	1,640	1,480	730	655	750
7	590	550	384	112	110	136	2,825	1,620	1,540	765	630	760
8	575	620	368	112	116	136	3,200	1,580	1,605	800	590	760
9	550	700	356	111	114	136	4,370	1,540	1,620	830	580	750
10	520	860	348	110	113	139	3,515	1,480	1,620	840	560	730
11	510	780	340	109	112	143	3,200	1,450	1,580	880	560	700
12	450	645	300	108	112	148	3,135	1,350	1,580	825	560	670
13	495	575	296	112	112	152	3,100	1,350	1,555	895	545	630
14	495	550	292	115	111	156	2,940	1,315	1,540	990	535	615
15	510	550	288	119	110	160	2,790	1,300	1,540	1,025	535	600
16	520	550	284	124	110	165	2,790	1,255	1,525	1,040	545	600
17	545	550	280	116	109	169	2,790	1,240	1,425	1,800	520	590
18	550	550	272	120	108	172	2,715	1,240	1,350	1,160	505	575
19	550	550	267	124	112	177	2,630	1,185	1,315	1,205	505	560
20	535	550	260	128	116	182	2,545	1 150	1,255	1,130	505	545
21	520	565	258	122	121	186	2,470	1,205	1,220	1,040	520	520
22	510	565	253	118	126	191	2,420	1,255	1,200	990	645	505
23	515	575	252	111	130	280	2,240	1,315	1,150	990	560	505
24	515	575	219	104	136	390	2,200	1,350	1,130	070	730	515
25	520	520	194	98	135	505	2,125	1,390	1,090	970	700	515
26	415	494	160	02	133	615	2,050	1,375	1,060	960	700	505
27	535	494	128	94	132	760	2,035	1,350	1,040	960	690	505
28	565	491	126	100	135	900	2,015	1,350	1,010	970	700	505
29	605	488	125	88		1,050	1,980	1,230	990	970	700	490
30	645	476	123	94		1,200	1,945	1,230	970	930	710	490
31	660		121	100		1,350		1,350		840	730	

NOTE.—Ice conditions for 1916-17, January 1 to April 22; for 1917-18, November 28 to April 5, inclusive.

Monthly Discharge of Assiniboine River at Headingly, for Years ending September 30, 1917–18.

[Drainage area, 59,420 square miles.]

Months.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square mile.	Depth in inches on Drainage area.	Total in acre-feet.
1916–17						
October	935	750	830	0·014	0·016	51,035
November	980	445	760	0·013	0·014	45,223
December	956	301	429	0·007	0·008	26,378
January	300	185	233	0·004	0,005	14,327
February	250	160	210	0,004	0,004	11,663
March	400	160	244	0·004	0·005	15,003
April	6,050	450	2,436	0·041	0·046	144,952
May	7,630	6,300	7,398	0,125	0,144	454,885
June	7,540	2,390	3,976	0·067	0·075	236,588
July	3,160	1,920	2,623	0·044	0·051	161,282
August	1,810	760	1,157	0·019	0·022	71,141
September	750	605	673	0·011	0·012	40,046
The year	7,630	160	1,747	0·029	0·394	1,264,470
1917–18						
October	660	415	552	0·009	0·010	33,941
November	860	476	573	0·010	0·011	34,096
December	464	121	287	0·005	0·006	17,647
January	128	88	111	0·002	0·002	6,825
February	136	92	115	0·002	0·002	6,387
March	1,350	136	336	0·006	0·007	20,660
April	4,570	1,525	2,541	0·043	0·048	151,200
May	1,860	1,150	1,415	0·024	0·028	87,005
June	1,620	970	1,345	0·023	0·026	80,033
July	1,200	730	935	0·016	0·018	57,491
August	810	505	626	0·011	0·013	38,430
September	760	490	620	0·010	0·011	36,893
The year	4,570	88	788	0·013	0·179	570,486

TRIBUTARIES.

Shell River at Asessippi.

Station No. 5 MD_1

History.—The first measurement under direction of this Survey was taken on the Shell river at Asessippi by W. J. Ireland on September 15, 1913. This measurement was taken from the downstream side of the traffic bridge, a short distance below the dam.

As a permanent station this location was not satisfactory, and on June 9, 1914, a cable carrier station was established downstream from the bridge. This station has been in continuous operation since that date.

Location.—This station is located in Sec. 4, Tp. 23, Rge 28, W.P.M., on the Shell river one and one-quarter mile downstream from the traffic bridge in the town of Asessippi and fourteen miles north of the town of Russell.

Drainage Area.—The drainage area of the river above this point is 930 square miles.

Channel.—The channel is straight above and below the section for a short distance, though the general course of the river is very sinuous. The bed of the channel is composed of gravel and boulders. The banks are high and not liable to overflow.

Gauge.—A vertical staff gauge is located about one mile above the meter section. This gauge is referred to an arbitrary datum.

Discharge Measurements.—Since the establishment of this station, discharge measurements have been made over a range of gauge height of 91·04 to 93·57, corresponding to a range in discharge of 51 to 905 c.f.s., under open-water conditions.

Records Available.—From June 9, 1914 to September 30, 1918, practically continuous records of daily gauge height have been obtained.

Based on these gauge heights, estimates of daily discharge throughout the open-water season are available.

Estimates of mean monthly discharge based on daily gauge heights and actual discharge measurements are also available.

Accuracy.—Between gauge heights 91·04 to 93·57 the discharge curve is well defined. Beyond these limits the curve is not well defined.

Discharge Measurements of Shell river at Asessippi, during 1917–18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Feb. 3	94·42	27·8	Ice cover.	Jan. 18	92·82	33·5	Ice cover.
Feb. 28	94·92	30·1	Ice cover.	Feb. 16	93·79	37·2	Ice cover.
Mar. 29	95·00	41·4	Ice cover.	Mar. 18	95·77	37·3	Ice cover.
May 8	93·57	906·0		April 27	92·17	263·1	
June 19	92·35	314·0		June 22	91·52	126·9	
Sept. 10	91·75	149·0		Aug. 1	91·58	137·7	
Oct. 24	91·39	66·8	Ice cover.	Sept. 13	91·60	128·6	
Dec. 14	91·41	20·1	Ice cover.				

Daily Discharge in Second-feet of Shell river at Asessippi, for part of year ending September 30, 1917 and year ending September 30, 1918.

[Drainage area 930 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1				32	28	30	44	362		795	248	117
2				32	28	30	45	410		795	248	112
3				31	28	31	46	458		845	239	112
4				31	28	31	47	650		870	207	121
5				31	29	31	48	750		895	194	139
6				31	29	31	49			920	194	143
7				31	29	31	50			920	182	139
8				30	28	32	51	920		1,015	178	136
9				30	28	32	53			1,015	160	139
10				30	28	32	56			1,015	149	156
11				29	29	32	59			1,065	139	149
12				28	30	32	62			1,115	130	143
13				28	30	33	66			1,190	130	136
14				28	30	33	70			920	124	130
15				28	30	33	75			725	121	124
16				29	30	33	81			675	121	124
17				29	29	33	89			600	117	121
18				29	29	34	98			530	121	121
19				28	29	34	106		332	482	105	105
20				28	29	34	118		340	434	105	97
21				28	29	35	132		362	386	102	93
22				28	29	35	149		362	340	102	88
23				28	29	36	168		386	319	112	88
24				28	30	37	187		434	300	112	84
25				28	30	37	207		458	281	121	84
26				29	30	38	225		482	271	139	77
27				29	30	39	245		625	271	143	75
28				29	30	40	274		725	271	143	75
29				29		41	300		750	271	139	71
30				28		41	328		770	264	136	71
31				28		42				258	121	
1917-18.												
1	75	68	83	28	38	40	200	228	424	520	135	234
2	75	70	82	30	37	42	215	211	395	665	124	228
3	71	72	80	34	36	40	220	201	376	575	135	187
4	75	73	76	35	38	36	230	194	362	770	135	182
5	75	74	72	38	40	35	235	187	340	725	139	149
6	71	75	70	40	40	34	240	160	340	725	143	139
7	71	76	60	40	38	30	250	160	258	675	139	139
8	68	78	50	35	40	30	255	156	248	675	130	139
9	68	80	40	30	42	32	265	156	234	615	121	139
10	66	83	30	28	44	32	275	156	228	595	113	139
11	68	86	24	26	44	34	280	149	211	520	135	143
12	68	90	20	26	42	35	290	143	201	482	143	139
13	66	93	19	32	40	35	300	139	182	424	149	135
14	68	97	20	37	38	35	310	135	178	410	178	135
15	68	102	22	40	87	35	315	130	171	376	194	130
16	66	105	26	39	37	37	319	124	160	319	187	118
17	68	104	25	36	36	37	319	121	149	264	187	118
18	66	104	25	34	35	37	332	121	135	258	201	118
19	66	103	27	34	35	40	340	118	124	239	206	113
20	66	102	30	34	35	70	319	118	118	187	228	113
21	66	100	30	37	36	80	332	121	108	171	234	113
22	66	98	26	40	36	90	340	121	113	130	234	108
23	66	94	25	38	35	100	300	130	149	132	264	108
24	67	0	24	36	34	110	300	143	160	134	332	108
25	68	89	24	34	35	115	293	149	178	135	386	102
26	68	89	24	32	36	125	264	156	187	137	376	93
27	68	88	22	37	36	140	258	160	220	139	332	88
28	67	88	20	38	38	150	234	234	234	156	300	88
29	66	85	20	36		160	234	340	300	143	264	80
30	66	84	22	36		175	234	386	376	139	268	80
31	67		25	38		190		410		139	234	

NOTE.—Ice conditions for 1916-17 from January 1 to May 1, inclusive; for 1917-18, October 19 to April 15, inclusive.

Monthly Discharge of Shell river at Asessippi for years ending Sept. 30, 1917-1918.

[Drainage area 930 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
1916-17.						
October	181	147	164	0·176	0·203	10,084
November	181		125*	0·134	0·149	7,438
December			60*	0·065	0·075	3,689
January	32	28	29	0·031	0·036	1,783
February	30	28	29	0·031	0·032	1,611
March	42	30	34	0·037	0·043	2,091
April	328	44	118	0·127	0·142	7,021
May			722*	0·776	0·895	44,394
June			478*	0·514	0·573	28,443
July	1,115	258	647	0·696	0·802	39,782
August	248	102	148	0·159	0·183	9,100
September	156	71	112	0·120	0·134	6,664
The year	1,115	28	224	0·241	3·271	152,130
1917-18						
October	75	66	68	0·073	0·084	4,181
November	105	68	88	0·095	0·106	5,236
December	83	19	37	0·040	0·046	2,275
January	40	26	35	0·038	0·044	2,152
February	44	34	38	0·041	0·043	2,110
March	190	30	70	0·075	0·087	4,304
April	340	200	277	0·300	0·335	16,483
May	410	118	176	0·189	0·218	10,822
June	424	108	229	0·246	0·275	13,626
July	770	130	376	0·404	0·466	23,119
August	386	113	205	0·220	0·254	12,605
September	234	80	130	0·140	0·156	7,736
The year	770	19	145	0·156	2·118	104,975

NOTE.—Marked thus (*) estimated.

BIRDTAIL CREEK AT BIRTLE.

Station No. 5 M E₂.

History.—This station was established by C. O. Allen on May 14, 1914, and since that date has been in operation during open-water seasons.

Location.—The metering section is located on the downstream side of the traffic bridge on the road between the Canadian Pacific Railway station and the town of Birtle.

Drainage Area.—The drainage area of the river above the station is 400 square miles.

Channel.—The station is located in a straight stretch of the river approximately 350 feet long. The full discharge of the river at all stages is confined within the limits of the banks. The bed of the channel is composed of clay and silt and not liable to shift.

Gauge.—A vertical staff gauge is secured to the bridge close to the right bank of the stream. It is referred to a permanent M.H.S. bench-mark set to an arbitrary datum.

Discharge Measurements.—Since the establishment of the station, discharge measurements have been taken over a range in gauge height of 88·78 to 91·49, corresponding to a range in discharge of 2 to 540 c.f.s., under open-water conditions.

Records Available.—From May 14, 1914 to the end of September 1917, continuous records of daily gauge height for open-water seasons have been obtained. Based on these gauge heights, estimates of daily discharge for open-water seasons are available.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are available.

Accuracy.—The discharge curve is well defined between gauge heights of 88·5 and 91·5.

Discharge measurements of Birdtail Creek at Birtle, during 1917.

Day.	Gauge Height.	Discharge.	Remarks.	Day.	Gauge Height.	Discharge.	Remarks.
May 9	90·84	396·0		June 20	88·97	62·8	
June 20	88·98	68·1		Sept. 7	88·78	2·0	

Daily Discharge in Second-feet of Birdtail Creek at Birtle, for part of year ending September 30, 1917.

[Drainage area, 400 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.
1								500	49	126	5	
2								510	44	134	3	
3								500	44	141	3	
4								464	38	134	3	
5								452	38	119	3	
6								452	49	104	2	
7								441	33	90	2	
8								417	33	90	0	
9								393	33	90	0	
10								369	38	78	2	
11								333	49	66	2	
12								299	49	60	2	
13								278	78	49	2	
14								207	96	38	3	
15								173	96	38	3	
16								157	84	33	3	
17								141	72	27	2	
18								126	66	22	2	
19								96	60	22	2	
20								96	55	16	2	
21								84	72	16		
22								78	84	11		
23								72	96	5		
24								66	104	3		
25							369	66	119	5		
26							452	60	134	5		
27							550	60	134	11		
28							510	55	134	11		
29							488	49	134	11		
30							488	49	126	11		
31								49		11		

NOTE.—Information insufficient to compute daily discharge from August 21 to September 30.

Monthly Discharge of Birdtail Creek at Birtle for year ending September 30, 1917.

[Drainage area, 400 square miles.]

Month.	Discharge in Second Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square mile.	Depth in inches on Drainage area.	Total in acre-feet.
1916-17.						
October	123	87	104	0·260	0·300	6,395
November	...	...	80*	0·200	0·223	4,760
December	...	...	40*	0·100	0·115	2,460
January	...	...	10*	0·025	0·029	615
February	...	...	0*	...	...	...
March	...	...	0*	...	...	...
April	550	...	184*	0·460	0·513	10,949
May	510	49	229	0·572	0·659	14,081
June	134	33	75	0·187	0·209	4,463
July	141	3	51	0·127	0·146	3,136
August	5	0	3*	0·008	0·009	184
September	...	...	7*	0·017	0·019	417
The year	550	0*	65	0·162	2·199	47,047

NOTE.—Marked thus (*) estimated.

MINNEDOSA (LITTLE SASKATCHEWAN) RIVER AT MIDDLETON BRIDGE.

Station No. 5 M F_4.

History.—The station was established by E. B. Patterson on May 17, 1915, and has been in practically continuous operation since that date.

Loaction of Section.—The metering section is located in N.W.$\frac{1}{4}$ Sec. 6, Tp. 20, Rge. 20, W.P.M., at the downstream side of what is locally known as Middleton's bridge, situated approximately fifteen miles north of the town of Elphinstone.

Drainage Area.—The drainage area of the river above the station is 184 square miles.

Channel.—The bed of the channel at this point is gravel and boulders and not liable to shifting. The discharge is confined within the limits of the banks at the station at all stages.

Gauge.—A vertical staff gauge is secured to a pile on the donwstream side of the bridge near the left bank. This gauge is referred to an arbitrary datum.

Discharge Measurements.—Discharge measurements have been obtained over a range in gauge height of 88·39 to 91·96, corresponding to a range in discharge of 3 to 560 c.f.s. under open-water conditions.

Records Available.—From May to December 31, 1915; April 1, to November 25, 1916; April 1 to November 23, 1917, and from March 24 to September 30, 1918, records of daily gauge height have been obtained.

Accuracy.—The discharge curve for this station is not well defined.

Discharge Measurements of Minnedosa River at Middleton Bridge during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
May 14	90·38	253		April 24	88·91	82·3	
July 20	90·09	42		June 19	89·08	22·7	
Sept. 7	88·86	9		July 31	89·09	12·8	

MINNEDOSA (LITTLE SASKATCHEWAN) RIVER AT INDIAN BRIDGE, ELPHINSTONE.

Station No. 5 M F_8.

History.—The station was established by E. B. Patterson on May 10, 1915, and has been in practically continuous operation since that date.

Location of Section.—The metering section is located in Indian Reserve No. 61, at the donwstream side of the traffic bridge, known as the Indian bridge, one and one-half mile north of the town of Elphinstone.

Drainage Area.—The darinage area of the river above this station is 380 square miles.

Channel.—The bed of the channel at the section is composed of boulders and not liable to shift. The channel is curved above the section, but the direction of the current is at right angles to the section.

Gauge.—A vertical staff gauge is secured to a pile on the upstream side of the bridge near the left bank. This gauge is referred to an arbitrary datum.

Discharge Measurements.—Discharge measurements have been obtained at this station over a range in gauge height 93·40 to 95·35, corresponding to a range in discharge of 12 to 680 c.f.s. under open-water conditions.

Records Available.—From May 10, 1915 to December 1, 1917 and from April 25 to September 30, 1918, practically continuous records of gauge height have been secured.

Based on these gauge heights, estimates of daily discharge for the open-water seasons are available.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are available for the whole period.

Accuracy.—The discharge curve is well defined between gauge heights 93·40 and 94·0. Beyond these limits the curve is not well defined.

Discharge Measurements of Minnedosa River at Indian Bridge, during 1917–18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Feb. 1	95·75	10·5	Ice cover.	Mar. 15	.....	.....	Ice cover.
Feb. 28	95·96	13·2	Ice cover.	April 25	94·06	74·6	
May 4	94·83	311·0		June 20	93·75	34·9	
June 16	94·07	97·4		July 31	93·69	26·5	
July 20	94·07	77·6		Sept. 10	93·61	18·5	
Sept. 7	93·62	19·5		Sept. 11	93·59	16·2	
Oct. 23	93·61	15·2	Ice cover.				

Daily Discharge in second-feet of Minnedosa River at Indian Bridge for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 380 square miles.]

Day	Oct	Nov.	Dec.	Jan	Feb.	March.	April.	May	June.	July.	Aug.	Sept
1916–17.												
1				21	11	13			134	155	79	
2				20	10	13			134	155	79	
3				20	11	12			134	155	79	
4				19	12	13		281	134	155	79	
5				19	13	16		281	115	155	62	
6				19	13	16		281	115	155	62	
7				18	12	16		281	116	178	47	
8				18	11	16		310	115	178	47	
9				18	10	16		310	116	178	47	
10				18	10	15		310	115	155	47	
11				17	10	14		310	115	155	47	
12				16	11	13		310	115	155	34	
13				16	12	15		310	115	155	34	
14				15	13	20		310	115	155	34	
15				14	14	18		281	96	155	34	
16				14	14	16		254	96	134	34	
17				14	13	16		254	96	134	34	
18				13	12	16		254	96	116	34	
19				13	12	17		227	96	115	34	
20				13	12	18		227	96	115	23	
21				12	12	19		202	115	96	23	
22				12	12	20		202	115	96	23	
23				12	12	20		202	96	96	34	
24				11	12	20		178	96	79	34	
25				11	12	19		178	96	79	34	
26				11	12	18		178	115	96	34	
27				11	13	17		178	115	96	34	
28				11	13	18		155	115	79	34	
29				11		19		155	115	79	34	
30				11		20		155	134	79	34	
31				11		20		155		79	23	
1917–18												
1	25	10						50	84	31	23	
2	25	10						50	84	26	18	
3	25	11						50	84	26	18	
4	25	12						43	84	26	18	
5	25	13						36	84	26	18	
6	25	14						36	84	26	16	
7	25	15						36	84	36	15	
8	25	16						36	84	36	14	
9	25	17						31	74	31	14	
10	25	18						31	64	31	12	
11	25	19						26	64	31	12	
12	25	20						26	64	26	22	
13	25	20						26	64	26	26	
14	25	20						26	67	26	26	
15	25	21						26	50	26	26	
16	25	21						26	36	26	22	
17	25	21						22	36	26	22	
18	23	21						22	36	26	26	
19	21	22						22	36	22	31	
20	19	23						22	31	22	31	
21	17	23						26	26	18	23	
22	15	23						36	26	22	26	
23	15	23						50	26	22	22	
24	14	22						67	24	50	22	
25	14	22					74	84	18	36	22	
26	13	21					84	84	26	43	22	
27	13	21					64	84	26	36	22	
28	12	20					64	84	31	31	22	
29	12	19					64	84	31	29	22	
30	11	18					57	84	31	26	26	
31	11							84		26	26	

NOTE.—Ice conditions for 1917-18, after October 16.

Monthly discharge of Minnedosa River at Indian Bridge, for years ending September 30, 1917–18.

[Drainage area, 380 square miles.]

Month	Discharge in Second-Feet.				Run-Off.	
	Maximum	Minimum	Mean	Per Square mile	Depth in inches on Drainage area.	Total in acre-feet.
1916-17						
October	124	68	85	0·224	0·258	5,226
November	96		40*	0·105	0·117	2,380
December			20*	0·053	0·061	1,220
January	21	11	15	0·039	0·045	922
February	14	10	12	0·032	0·033	666
March	20	12	17	0·045	0·052	1,045
April			108*	0·284	0·317	6,426
May		155	246*	0·647	0·746	15,126
June	134	96	121	0·295	0·329	6,664
July	178	79	128	0·337	0·389	7,870
August	79	23	42	0·111	0·128	2,582
September	34	23	24	0·063	0·070	1,428
The year			71	0·187	2·838	51,389
1917-18						
October	25	11	20	0·053	0·061	1,230
November	23	10	19	0·050	0·056	1,131
December						
January						
February						
March						
April	84	0	15*	0·039	0·044	893
May	84	22	45	0·118	0·136	2,767
June	84	18	52	0·137	0·153	3,094
July	50	18	29	0·076	0·088	1,783
August	31	12	21	0·055	0·063	1,291
September	26	18	21	0·055	0·061	1,250
The period	84	0	28	0·074	0·672	13,551

NOTE.—Marked thus (*) estimated.

MINNEDOSA RIVER (LITTLE SASKATCHEWAN) RIVER AT BEILBY'S BRIDGE.

Station No. 5 MF$_1$.

History.—The station was established by W. J. Ireland on March 18, 1914 to supersede the station which had been located at Riverdale, at which station it was found there was considerable fluctuation in stage due to the operation of the power plant at Minnedosa. Since the establishment of the Beilby Bridge station it has been in continuous operation.

Location.—The station was originally located in the N.W. $\frac{1}{4}$ Sec. 9, Tp. 16, Rge. 18, W.P.M., on the downstream side of the traffic bridge, one and one-half mile downstream from the junction of the Rolling and Minnedosa rivers, five miles west of Clan William and twelve miles northwest of Minnedosa. After the spring breakup of 1914, it was found that on account of eddies on the section the location was not satisfactory as a metering station, and a cable carrier station was installed four hundred feet downstream from the bridge. Measurements are made at this cross section during all seasons of the year.

Drainage Area.—The drainage area of the river above the station is 1,120 square miles.

Channel.—The station is located in the centre of a straight stretch of the river, eight hundred feet long. The bed and banks are of silt and gravel and fairly permanent, though there may be a shift at the control point a short distance

downstream during extreme stages of the river. The banks are low and subject to overflow during high stages.

Gauge.—A vertical staff gauge is secured to a pile on the downstream side of the bridge above the section and is referred to a permanent M. H. S. benchmark, seventy-three feet north of the north end of the bridge. This benchmark is set to an arbitrary datum

Discharge Measurements.—Since the station was established, discharge measurements have been taken over a range in gauge height of 93·75 to 97·21, corresponding to a range in discharge of 10 to 830 c.f.s. under open-water conditions.

Records Available.—From April 25, 1914 to July 1, 1916, daily records of guage height were obtained. From that date until September 30, 1918 readings have been secured every other day.

Based on these gauge headings, estimates of daily discharge are available for the open-water seasons.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are available over the above period.

Accuracy.—Throughout the range in stage covered by the discharge measurements, viz., between gauge heights 93·7 and 97·2, the discharge curve is fairly well defined.

Discharge Measurements of Minnedosa River at Beilby's Bridge during 1917-18.

Date	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan. 30.	96·61	14·5	Ice cover	Jan. 19	94·16	3·2	Ice cover.
Mar. 1.	96·39	23·0	"	Feb. 14	93·88	4·0	"
Mar. 27	96·77	37·0	"	Mar. 13	94·09	4·9	"
May 2.	96·80	757		April 22	95·06	296·4	
June 15.	94·57	165		June 17	94·23	89·4	
July 19.	94·26	99·5		July 29	94·03	47·0	
Sept. 6.	94·15	46·3		Sept. 9.	94·10	58·9	
Oct. 22.	94·06	29·5	Ice cover.				
Dec. 11.	94·23		"				
Dec. 15.	94·41	4·4	"				

Daily Discharge in Second-feet, of Minnedosa River, at Beilby's Bridge for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 1,120 square miles.]

Day.	Oct.	Nov	Dec	Jan.	Feb	Mar.	April.	May.	June.	July.	Aug.	Sept.
1				22	15	23	43	630	187	156	70	61
2				22	14	23	44	745	184	162	66	63
3				20	14	23	45	575	182	169	65	68
4				19	14	24	47	605	177	174	64	72
5				19	15	24	49	570	172	177	60	75
6				18	15	24	50	535	167	182	58	80
7				17	15	24	53	540	162	184	57	77
8				17	16	25	55	545	156	187	54	75
9				15	16	25	59	545	147	179	52	73
10				15	16	25	62	545	141	172	49	70
11				14	16	25	67	545	151	156	45	68
12				13	16	25	72	545	162	141	42	65
12				12	15	25	80	530	159	133	42	60
14				12	15	27	91	510	174	125	42	55
15		....		12	15	27	100	510	152	122	42	53
16				12	15	28	110	505	162	122	42	52
17				12	17	29	147	478	154	116	42	53
18				12	17	29	184	449	145	109	41	53
19				12	17	30	218	410	143	103	41	54
20				12	18	31	252	371	141	98	41	54
21				12	18	32	288	356	133	92	42	54
22				12	19	33	325	340	125	89	43	54
23				12	19	33	361	327	127	84	45	54
24				12	19	35	397	312	131	81	47	54
25				12	20	25	431	293	133	78	49	54
26				12	20	36	439	278	137	74	51	54
27				13	21	37	444	262	139	74	52	54
28				14	22	38	473	242	141	74	53	54
29				15		39	500	224	145	74	55	54
30				15		41	565	212	151	74	67	53
31				15		42		199		72	59	
1917-18.												
1	52	23	28	4	2	4	241	102	189	34	45	66
2	51	24	25	4	2	4	457	95	189	32	45	66
3	49	25	23	3	2	4	278	91	189	21	43	55
4	48	26	20	3	3	4	299	87	189	29	42	58
5	47	27	18	3	3	3	286	80	189	27	40	70
6	46	28	15	2	2	3	273	75	184	25	39	68
7	43	29	12	2	3	3	257	58	181	25	37	55
8	42	30	11	2	4	4	247	52	179	25	34	52
9	42	31	10	2	5	5	237	60	175	25	31	60
10	42	32	9	2	5	5	227	57	154	27	29	58
11	42	35	8	2	5	7	229	55	153	30	25	57
12	42	35	7	2	4	6	232	52	145	33	24	52
11	42	35	6	2	4	5	234	48	137	37	20	52
14	42	26	5	2	4	6	239	50	131	40	15	50
15	42	38	4	3	4	7	217	53	115	46	17	48
16	42	38	5	3	4	10	194	53	102	38	18	43
17	45	38	5	3	4	15	171	55	87	31	18	40
18	43	38	5	3	4	20	165	60	74	33	19	27
19	40	39	5	3	3	40	158	66	62	34	20	34
20	38	40	4	2	3	50	199	65	57	34	20	33
21	35	40	4	2	2	60	241	65	52	34	22	21
22	30	40	4	3	3	70	286	70	50	29	24	30
23	28	39	4	3	3	80	260	76	48	45	24	29
24	27	37	4	3	4	100	233	113	45	46	24	27
25	27	35	4	3	4	120	217	151	45	48	24	26
26	27	34	2	2	4	140	202	191	43	48	24	25
27	25	23	2	2	4	160	167	191	42	48	24	25
28	25	32	2	2	4	180	135	191	39	48	24	24
29	24	31	3	2	..	200	122	191	37	48	28	24
30	22	30	3	2	....	210	128	191	35	48	34	24
31	23	....	4	2	....	227	....	191	.....	48	48	.....

NOTE.—Ice conditions for 1917, January 1 to April 24, inclusive; for 1917-18, October 18 to March 30, inclusive.

Monthly Discharge of Minnedosa River at Beilby's Bridge for years ending Sept. 30, 1917-18.

[Drainage area, 1,120 square miles.]

Month.	Discharge in Second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
1916-17.						
October	93	58	76	0·068	0·078	4,673
November	.....	..	60*	0·054	0·060	3,570
December	.....	.....	30*	0·027	0·031	1,845
January	22	12	15	0·013	0·015	922
February	22	14	17	0·015	0·016	944
March	42	23	30	0·027	0·031	1,845
April	566	43	202	0·180	0·201	12,020
May	745	199	446	0·398	0·459	27,423
June	187	125	153	0·137	0·153	9,104
July	187	72	124	0·111	0·128	7,624
August	70	41	51	0·046	0·053	3,136
September	80	52	61	0·054	0·060	3,630
The year	745		106	0·095	1·290	76·722
1917-18						
October	52	23	38	0·034	0·039	2,337
November	40	23	33	0·029	0·032	1,964
December	28	3	9	0·008	0·009	553
January	4	2	3	0·003	0·003	184
February	5	2	4	0·004	0·004	222
March	227	3	57	0·051	0·059	3,505
April	299	122	221	0·197	0·220	13,150
May	191	48	95	0·085	0·098	5,841
June	189	35	111	0·099	0·110	6,605
July	48	25	37	0·033	0·038	2,275
August	46	16	29	0·026	0·030	1,783
September	70	24	45	0·040	0·045	2,678
The year	299	2	57	0·051	0·692	41,266

NOTE.—Marked thus (*) estimated.

MINNEDOSA (LITTLE SASKATCHEWAN) RIVER AT MINNEDOSA POWER HOUSE.

History.—The station was established by C. O. Allen on July 13, 1914, and since that time has been in continuous operation. The object in placing a station at this point was to obtain a rating of the power plant of the Minnedosa Power Company. The total discharge of the river at this point is not recorded.

Location.—The station is located in the N.W. $\frac{1}{4}$ Sec. 1, Tp. 15, Rge. 18, W.P.M., at the upstream side of the traffic bridge, across the intake of the plant of the Minnedosa Power Company. It is at the easterly limits of the town of Minnedosa.

Drainage Area.—The drainage area of the river above Minnedosa is 1,200 square miles, though this is not significant in connection with the operation of the station.

Channel.—The channel of the station is formed by the concrete walls and floor of the intake to the plant. It does not carry the full discharge of the river, as at high stages the spillway of the dam discharges the surplus.

Gauges.—The headrace gauge is a vertical staff gauge secured to the wall on the left hand side of the intake.

The tailrace gauge is a vertical staff gauge secured to the retaining wall on the right hand side of the tailrace. Both of these gauges are referred to M.H.S. datum.

Discharge measurements.—Since the establishment of the station, discharge measurements with the accompanying loads on the plant, and forebay and tailrace gauge readings, have been obtained.

Records available.—From June 2, 1914 to September 30, 1918, a continuous record of daily gauge height on the headrace and tailrace gauges of the plant have been obtained.

Discharge Measurements of Minnedosa River at Headrace Minnedosa Power House, during 1917-18.

Date.	Engineer.	Gauge height.	Discharge.	Date.	Engineer.	Gauge height.	Discharge.
1917.		Feet.	Sec.-ft.	1918.		Feet.	Sec.-ft.
May 1	E. B. Patterson	1,652·18	104·0	June 15	C. C. Galloway	1,651·23	63·3
June 15	R. C. Robinson	0·51	95·0	July 28	G. K. Gainsford	1,648·73	68·4
July 19	G. K. Gainsford	0·66	71·0	Sept. 7	G. K. Gainsford	1,646·60	73·3
Sept. 15	M. S. Madden	1,649·20	61·0				
Oct. 30	C. C Galloway	1,648·15	84·2				

Rolling River near C. N. R. Crossing.

Station No. 5 Mr.

History.—The station was established by E. B. Patterson on June 22, 1915 and has been in operation since that date.

Location of Section.—The metering section is located in the S.W. ¼ Sec. 7, Tp. 18, Rge. 18, W.P.M., at the downstream side of Lee's bridge, one-half mile north of the Canadian Northern railway and three and one-half miles from Erickson.

Drainage Area.—The drainage area of the river above this station is 235 square miles.

Channel.—The channel of the river above and below the section is slightly curved, though the direction of the current is at right angles to the section. The bed of the channel is silt and liable to shift in high stages. The banks at the section are sufficiently high to confine the discharge to the channel at all stages.

Gauge.—A vertical staff gauge is secured to the centre pile on the downstream side of the bridge and is referred to an arbitrary datum.

Discharge Measurements.—Since the station was established, discharge measurements have been obtained over a range in gauge height of 88·60 to 95·43, correspondng to a range in discharge of 3 to 610 c.f.s. under open-water conditions.

Records Available.—From June 22 to November 12, 1915, and from January 1, 1916 to September 30, 1918, continuous records of daily gauge height have been obtained.

Based on these gauge heights, estimates of daily discharge for open-water seasons are available.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are available for the whole period.

Accuracy.—The discharge curve between gauge heights 88·6 and 95·4 is fairly well defined.

Discharge Measurements of Rolling River near C.N.R. Crossing, during 1917-18.

Date.	Gauge height.	Discharge.	Remarks.	Date.	Gauge height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan. 31	989·95	7·7	Ice cover.	Mar. 14	88·77	1·4	Ice cover.
Feb. 28	0·12	12·0	"	April 23	91·07	149·6	
May 3	92·63	304 0		June 18	89·27	29·5	
June 16	89·65	58·4		July 30	89·52	16·7	
July 19	89·43	23·0		Sept. 9	89·83	41·4	
Sept 6	90·16	42·4					
Oct. 22	88·72	6·4					
Dec 16	89·05	3·7	Ice cover.				

Daily Discharge in Second-Feet of Rolling River near C.N.R. Crossing for part of of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 235 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1				8	8	12	18	322	54	77	25	42
2				8	8	12	18	289	61	88	23	70
3				8	8	12	18	269	50	83	20	78
4				8	8	13	18	249	46	74	21	74
5				8	8	13	19	238	43	70	19	73
6				8	8	13	19	233	39	66	18	72
7				8	8	13	19	225	36	62	17	70
8				8	8	13	20	221	34	57	16	68
9				8	9	13	20	230	31	52	16	59
10				8	9	14	21	242	32	44	15	52
11				8	9	14	22	254	36	40	14	41
12				8	9	14	23	226	42	38	14	31
13				8	9	14	25	208	50	37	13	27
14				8	9	14	28	198	47	38	13	24
15				8	9	14	30	193	44	47	14	18
16				8	10	14	36	190	41	46	14	15
17				8	10	16	44	188	39	38	14	27
18				8	10	15	53	180	37	34	14	31
19				8	10	15	62	168	34	32	13	31
20				8	10	15	74	163	32	29	13	29
21				8	10	15	90	148	31	27	13	28
22				8	10	15	108	134	30	25	14	24
23				8	11	16	129	130	33	22	15	24
24				8	11	16	154	119	34	19	18	22
25				8	11	16	181	110	33	19	22	21
26				8	11	16	213	96	35	25	25	20
27				8	12	16	246	83	42	36	26	19
28				8	12	17	297	71	62	44	30	17
29				8		17	337	62	59	42	25	16
30				8		17	379	59	67	33	24	16
31				8		17		56		28	25	
1917-18.												
1	16	5	8	3	1		36	38	94	33	29	91
2	16	6	8	3	1		39	34	87	31	27	86
3	15	6	7	2	1		42	30	88	28	26	72
4	14	7	7	2	1		45	27	87	25	24	75
5	12	7	6	2	2		48	24	84	25	24	72
6	11	7	6	2	2		51	21	83	25	24	68
7	11	8	6	2	2		55	19	87	25	27	65
8	10	9	5	2	2		60	18	85	27	26	62
9	10	9	4	1	3		65	17	83	29	23	51
10	10	10	3	1	3		71	16	78	30	21	50
11	10	10	3	1	3		64	16	74	27	20	48
12	10	10	3	1	3		59	15	71	26	19	44
13	10	10	3	1	3		49	15	68	23	22	43
14	10	10	3	1	3	1	46	14	60	23	25	41
15	10	11	3	2	2	2	44	14	54	25	27	41
16	10	11	4	2	2	2	43	14	43	27	26	38
17	9	11	4	2	2	3	62	14	32	29	27	32
18	9	12	4	2	2	4	71	14	28	26	23	29
19	8	12	4	2	2	5	113	16	26	23	18	27
20	7	12	3	2	2	6	188	24	25	21	17	25
21	7	12	3	2	2	7	190	43	24	20	16	24
22	6	11	3	2	1	8	162	55	23	18	15	23
23	6	11	3	2		9	126	74	22	18	15	22
24	6	11	3	2		12	106	86	21	22	14	21
25	6	10	3	2		15	94	101	21	26	13	20
26	6	9	3	1		18	74	115	21	30	13	19
27	5	9	2	1		21	67	142	23	33	12	18
28	5	9	2	1		24	67	150	27	35	12	17
29	5	8	2	1		27	52	134	31	35	11	17
30	5	8	2	1		30	44	119	36	34	16	18
31	5		3	1		33		107		30	46	

NOTE.—Ice conditions for 1916 from January 1 to April 29, inclusive, for 1917-18, October 19 to April 10 inclusive.

Monthly Discharge of Rolling River near C.N.R. Crossing for years ending Sept. 30, 1917-18.

[Drainage area, 235 square miles.]

Month.	Discharge in Second-Feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17.						
October	36	12	23	0·098	0·113	1,414
November	.....	.....	20*	0·085	0·095	1,190
December	.....	.....	10*	0·043	0·050	615
January	8	8	8	0·034	0·039	492
February	12	8	9	0·038	0·040	500
March	17	12	15	0·064	0·074	922
April	379	18	91	0·387	0·432	5,415
May	322	56	179	0·762	0·878	11,006
June	67	30	41	0·174	0·194	2,440
July	88	19	44	0·187	0·216	2,705
August	30	13	18	0·077	0·089	1,107
September	78	15	38	0·162	0·181	2,261
The year	379	8	42	0·179	2·430	30,399
1917-18.						
October	16	5	9	0·038	0·044	553
November	12	5	9	0·038	0·042	536
December	8	2	4	0·017	0·020	246
January	3	1	2	0·009	0·010	123
February	3	..	2*	0·009	0·009	111
March	33	.....	8*	0·034	0·039	492
April	190	36	74	0·315	0·351	4,403
May	150	14	49	0·209	0·241	3,013
June	94	21	53	0·226	0·252	3,154
July	35	18	27	0·115	0·133	1,660
August	46	11	21	0·089	0·103	1,291
September	75	17	40	0·170	0·190	2,380
The year	190	.....	25	0·106	1·439	18,099

NOTE.—Marked thus (*) estimated.

WHIRLPOOL RIVER AT DANVERS.

Station No. 5 MF_9.

History.—The station was established by E. B. Patterson on May 6, 1915, and has been in practically continuous operation since that date.

Location.—The metering section is located at the downstream side of what is locally known as Erickson's bridge, one-half mile from Danvers post office on the north boundary See. 21, Tp. 18, R. 18, W.P.M. During periods of low stage, measurements are made by wading at a point five feet downstream from the bridge.

Drainage Area.—The drainage area of the river above this station is 79 square miles.

Channel.—The bed of the channel is of clay and liable to shift. The banks are low and during periods of high discharge would overflow above and below the station, but all discharge would be confined within the limits of the banks at the station.

Gauge.—A vertical staff gauge is secured to a pile on the downstream side of the bridge. This gauge is referred to an arbitrary datum.

Discharge Measurements.—Since the station was established, discharge measurements have been obtained over a range in gauge height of from 87·27 to 91·74 corresponding to a range of discharge from 4 to 115 c.f.s. under open-water conditions.

Records Available.—From May 6 to November 11, 1915; April 22 to November 9, 1916; April 9 to November 30, 1917, and from March 24 to September 30, 1918, records of daily gauge height have been obtained.

Based on these gauge heights, estimates of daily discharge for the open-water seasons are available.

Accuracy.—The discharge curve is not well defined, except between gauge heights 87·3 and 88·3 ,where discharge is very low.

Discharge Measurements of Whirlpool River at Danvers, during 1917-18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
May 3	91·74	115·0		April 23	88·96	43·1	
June 16	87·31	10·0		June 18	87·45	7·8	
July 19	87·19	6·0		July 30	87·28	5·5	
Oct. 22	87·30	7·5		Sept. 9	89·09	38·7	
Dec. 16	87·04	2·4	Ice cover.				

Daily Discharge in Second-feet of Whirlpool River at Danvers for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area 79 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17												
1								122	9	43	6	25
2								122	9	37	5	29
3								120	11	31	4	33
4								118	8	29	4	33
5								110	7	27	4	31
6								106	6	20	4	27
7								130	6	13	4	23
8								134	6	11	4	21
9								134	6	11	3	20
10								130	6	8	3	15
11								126	7	7	3	13
12								122	11	7	3	10
13								118	11	8	3	10
14								114	8	9	4	9
15								110	8	10	3	8
16								84	7	9	3	14
17								75	7	8	3	15
18								63	7	7	3	15
19								49	11	6	2	17
20								46	11	6	2	18
21								37	6	5	2	13
22								35	6	5	4	14
23								33	7	5	4	15
24								27	7	5	3	11
25								23	7	4	4	7
26												
27							159	20	10	7	5	7
28							159	20	14	9	8	7
29							155	13	25	8	8	7
30							159	13	31	7	8	6
31							146	12	37	7	8	6
								11		6	8	
1917-18												
1	6	3					20	7	37	6	6	50
2	6	3					21	7	35	6	6	53
3	6	4					22	6	35	7	6	56
4	5	4					23	5	32	7	6	56
5	3	4					24	5	29	7	6	56
6	2	4					27	6	30	6	6	56
7	2	4					25	5	38	6	8	53
8	2	5					22	5	33	6	7	53
9	4	5					22	5	33	6	6	41
10	4	5					20	5	33	6	6	38
11	4	6					18	5	27	6	6	38
12	4	6					16	5	25	6	7	36
13	4	6					16	5	20	6	7	30
14	4	6					10	5	17	6	8	30
15	4	6					10	5	12	6	7	28
16	4	6					11	5	8	6	7	26
17	4	6					16	5	8	7	7	23
18	4	6					63	5	7	7	7	19
19	4	6					77	10	4	6	7	17
20	4	5					67	12	6	6	7	17
21	4	5				5	57	19	6	6	6	16
22	3	4				6	48	39	4	6	6	8
23	3	4				7	37	56	5	6	6	8
24	3	4				12	25	67	5	8	6	8
25	3	3				13	20	73	6	8	6	8
26	3	3				14	16	85	6	8	6	8
27	3	3				15	13	97	6	7	6	7
28	3	3				16	12	88	6	7	6	6
29	3	2				17	11	65	6	7	6	6
30	3	2				18	9	60	6	7	14	6
31	3					19		52		6	36	

NOTE.—Previous to April 26, 1917 the discharge was under ice conditions.
Ice conditions October 18, 1917 to April 5, 1918 inclusive.

Monthly Discharge of Whirlpool River at Danvers, for years ending September 30, 1917-18.

[Discharge area 79 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in Inches on Drainage Area.	Total in Acre-feet.
1916-17.						
October	23	8	17	0·215	0·248	1,045
November	46	.....	20*	0·253	0·282	1,190
December	.....	.....	10*	0·127	0·146	615
January	.....	.....	.....	.....	.....	.....
February	.....	.....	.....	.....	.....	.....
March	.....	.....	.....	.....	.....	.....
April	.....	0*	50*	0·633	0·706	2,975
May	134	11	77	0·975	1·124	4,735
June	37	6	10	0·127	0·142	595
July	43	4	12	0·152	0·175	738
August	8	2	4	0·051	0·059	246
September	33	6	16	0·203	0·227	952
The period	134	0	24	0·304	3·109	13,088
1917-18						
October	6	2	4	0·051	0·059	246
November	6	2	4	0·051	0·057	238
December	.....	.....	.....	.....	.....	.....
January	.....	.....	.....	.....	.....	.....
February	.....	.....	.....	.....	.....	.....
March	.....	.....	5*	0·063	0·073	307
April	77	9	26	0·329	0·367	1,549
May	97	5	26	0·329	0·379	1,599
June	38	4	18	0·228	0·254	1,071
July	8	6	6	0·076	0·088	369
August	36	6	8	0·101	0·116	492
September	56	6	29	0·367	0·409	1,726
The period	97	.....	14	0·177	1·810	7,634

NOTE.—Marked thus (*) estimated.

SOURIS RIVER AT MELITA.

Station No. 5 NF_1.

History.—This station was established by M. S. Madden on April 23, 1915 and since that date has been in constant operation. Previous to the date mentioned above, a station was operated at this point by the Irrigation Branch, Department of the Interior.

Location of Section.—The meter section is located in the N.W. ¼ Sec. 31, Tp. 3, Rge. 26, W.P.M., on the downstream side of the traffic bridge in River Park in the town of Melita.

Drainage Area.—The drainage area of the river above the station is 18,024 square miles. Of this area, 8,289 square miles is south of the International Boundary.

Channel.—The station is located on a straight stretch of the river about four hundred feet long. The banks are fairly high and not liable to overflow, except under extreme flood conditions. The bed of the channel is composed of sandy gravel and under ordinary conditions is not liable to shift.

Gauge.—A vertical staff gauge is secured to a pile at the east end of the bridge and is referred to a permanent M.H.S. bench-mark, located fifty-seven feet southeast from the southeast corner of the bridge. This bench-mark is set to an assumed datum.

Discharge Measurements.—Since this station was established, discharge measurements have been obtained covering a range in gauge height of from 87·09 to 100·73, corresponding to a range in discharge of zero to 4,000 c.f.s. under open-water conditions. During the flood period of 1916, when the station was under water, discharge measurements were taken from the C.P.R. bridge and Melita traffic bridge, but were referred to station datum.

Records Available.—From April 23, 1915, to September 30, 1918, continuous records of daily gauge height have been obtained.

Based on these gauge heights, estimates of daily discharge for the open-water seasons are available.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are also available for the whole period.

Accuracy.—Between gauge heights 87·0 and 91·0 the discharge curve is well defined; between 91·0 and 100·0 the curve is fairly well defined. Beyond these limits it is not well defined.

Discharge Measurements of Souris River, at Melita, during 1917-18.

[Drainage area 18,024 square miles.]

Date.	Gauge Height.	Discharge	Remarks.	Date.	Gauge Height	Discharge	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan 27	88·35	3·3	Ice cover.	Apr 19	90·21	353·6	
Mar 26	88·98	21·1	Ice cover.	June 13	88·37	92·0	
May 4	94·19	1,196·0		Aug 5	87·47	17·3	
June 13	89·85	289·0		Sept. 5	87·37	19·4	
Sept. 1	87·36	14·8					
Oct 18	87·44	2·0					

Daily Discharge in Second-feet of Souris River, at Melita, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area 18,024 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug	Sept.
1916-17												
1				6	3	4	74	989	821	132	25	14
2				6	3	4	86	1,003	799	126	21	12
3				6	3	4	98	1,007	772	120	19	9
4				6	4	4	123	1,011	750	118	34	10
5				6	4	6	162	1,027	711	110	23	14
6				6	4	6	214	1,025	664	104	17	13
7				6	4	6	282	1,027	586	106	16	11
8				6	4	9	335	1,029	500	103	29	10
9				6	4	9	445	1,019	450	100	17	8
10				6	4	9	557	1,007	408	108	19	7
11				5	4	9	821	997	364	97	18	6
12				4	4	9	969	987	316	99	17	11
13				4	4	12	933	981	292	104	20	13
14				3	4	12	937	964	289	110	20	13
15				3	4	12	948	952	286	118	16	12
16				4	4	15	958	941	285	115	14	11
17				4	4	15	969	927	262	110	15	10
18				4	4	15	985	916	246	106	16	9
19				4	4	18	967	907	235	105	15	9
20				3	4	18	950	893	223	104	15	9
21				3	4	18	937	889	222	100	14	8
22				3	4	18	935	891	222	75	16	8
23				3	4	18	929	891	202	56	14	8
24				3	4	18	938	895	184	67	12	8
25				3	4	21	945	897	172	60	10	8
26				3	4	21	952	873	163	54	14	8
27				3	4	28	960	851	154	51	14	8
28				3	4	28	965	855	152	47	13	8
29				3		30	975	853	146	40	13	7
30				3		50	983	849	140	32	14	7
31				3		62		842		29	14	
1917-18.												
1	7	2	8				418	180	140	23	17	10
2	7	3	8				466	170	137	26	16	11
3	9	5	7				459	178	133	24	14	12
4	11	7	7				447	163	128	21	14	14
5	11	10	6				442	154	120	18	13	15
6	12	13	5				450	143	104	17	11	15
7	10	15					471	149	100	16	10	16
8	9	17					484	163	97	18	12	17
9	9	23					510	175	94	19	14	16
10	8	28					545	170	92	19	16	14
11	10	27					525	165	91	17	18	12
12	9	24					535	161	91	16	18	12
13	7	27					540	207	94	17	19	12
14	7	31					510	210	92	17	21	12
15	6	25					470	217	87	17	22	10
16	9	20					439	214	84	16	23	9
17	19	19					417	211	76	17	24	8
18	14	18				15	382	206	70	16	23	10
19	9	17				20	341	196	63	16	24	12
20	8	18				25	299	184	55	15	21	13
21	7	19				30	279	183	45	13	22	14
22	7	16				35	222	179	35	12	21	15
23	7	16				40	230	168	31	13	19	14
24	7	14				76	247	152	23	15	19	14
25	7	12				114	255	140	21	15	18	10
26	6	10				155	246	124	17	16	17	6
27	5	9				196	235	135	12	18	17	8
28	4	10				236	226	140	10	20	16	10
29	3	10				282	214	136	14	17	15	11
30	2	9				325	198	133	18	16	13	10
31	2					372		137		16	11	

NOTE.—Ice conditions for 1916-17, January 1 to April 9, inclusive; 1917-18, October 21 to April 1, inclusive.

Monthly Discharge of Souris River, at Melita, for years ending September 30, 1917-18.

[Drainage area 18,024 square miles.]

Month	Discharge in Second-Feet				Run-Off	
	Maximum	Minimum	Mean	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
1916-17						
October	72	36	54	0·003	0·003	3,320
November	69		20*	0·001	0·001	1,190
December			5*	0·000	0	307
January	6	3	4	0·000	0	246
February	4	3	4	0·000	0	222
March	62	4	17	0·001	0·001	1,045
April	985	74	712	0·040	0·045	42,367
May	1,029	842	942	0·052	0·060	57,921
June	321	140	367	0·020	0·022	21,838
July	132	29	91	0·005	0·006	5,595
August	24	10	17	0·001	0·001	1,043
September	14	7	10	0·001	0·001	595
The year	1,029	3	187	0·010	0·136	135,349
1917-18						
October	19	2	8	0·000	0·000	492
November	31	2	16	0·001	0·001	952
December	8	0	2*	0·000	0·000	123
January						
February						
March	372		64*	0·004	0·005	3,935
April	545	198	383	0·021	0·021	22,790
May	217	124	169	0·009	0·010	10,391
June	140	10	72	0·004	0·004	4,284
July	26	12	17	0·001	0·001	1,045
August	24	10	17	0·001	0·001	1,045
September	17	6	12	0·001	0·001	714
The year	545	2	76	0·004	0·048	46,116

NOTE.—Marked thus * estimated.

SOURIS RIVER AT WAWANESA.

Station No. 5 NG1.

History. This station was established on October 7, 1912 by W. G. Worden, and has been practically in continuous operation since that date.

Location of Section.—The meter section is located in the N.W. ¼ Sec. 26, Tp. 7, Rge. 17, W.P.M., on the downstream side of the traffic bridge across the Souris river, approximately one-quarter of a mile north of the town of Wawanesa. This bridge is used for all open-water measurements. Winter measurements are made from the ice on the same cross section of the river.

Drainage area.—The drainage area of the Souris above the station is 20,056 square miles. Of this area, 8,289 square miles lies south of the International Boundary.

Channel.—For two hundred feet above and six hundred feet below, the channel is straight. The bed of the river is composed of mud and gravel and the control points are liable to shift during extreme conditions of flow. The banks at the section are sufficiently high to confine the river within their limits even under the most extreme flood conditions.

Gauge.—A vertical staff gauge is secured to the downstream side of the north pier of the bridge. This gauge is referred to a permanent M.H.S. bench-mark set to an arbitrary datum and located about fifty feet south-west of the southerly end of the bridge.

Discharge measurements.—Discharge measurements have been taken at frequent intervals since the time of installation of the station and are over a range in gauge height of 100.29 to 108.98. The range in discharge covered under open-water conditions is from zero to 4,950 c.f.s.

Records available.—From October 7, 1912 to March 31, 1914, continuous records of daily gauge height for the open-water seasons, and intermittent records for the winter seasons have been obtained. From April 1, 1914 to September 30, 1918, continuous daily gauge readings have been obtained.

Based on these gauge readings, estimates of daily discharge throughout the open-water seasons are available.

Estimates of monthly mean discharge based on gauge readings and actual measurements are also available.

Accuracy.—Between gauge heights 100.7 and 107.0 the discharge curve is well defined, and from 107.0 to 109.0 is fairly well defined.

Discharge Measurements of Souris River, at Wauanesa, during 1917.

Date	Gauge Height	Discharge	Remarks.	Date	Gauge Height	Discharge	Remarks.
1917	Feet	Sec.-ft.		1918	Feet	Sec.-ft.	
Jan. 25	101·93	0·0	Ice Cover.	April 18	102·78	594·6	
Jan. 26	101·98	0·0	Ice Cover.	June 12	101·06	106·3	
Mar. 23	101·91	19·0	Ice Cover.	June 28	100·81	74·3	
May 3	103·86	1,079·0		Aug. 6	100·20	16·3	
June 13	102·58	538		Sept. 5	100·27	13·6	
Sept. 3	100·32	13·7					
Oct. 17	100·29	2·0					
Dec. 13	100·53		Ice Cover				

Daily Discharge in Second-feet of Souris River, at Wawanesa, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 20,056 square miles.]

	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.
1916-17												
1						0	76	1,075	955	208	68	17
2						0	92	1,075	935	194	68	16
3						0	130	1,075	920	194	66	15
4						0	150	1,085	915	192	57	14
5						0	194	1,095	890	181	52	15
6						2	218	1,110	860	165	51	15
7						2	272	1,110	825	150	46	16
8						3	360	1,125	790	165	50	16
9						3	422	1,125	735	165	54	16
10						4	525	1,125	680	142	51	16
11						5	678	1,125	615	134	46	15
12						7	805	1,120	565	128	45	14
13						9	1,100	1,110	515	124	40	14
14						12	1,200	1,090	463	128	38	14
15						13	1,350	1,080	425	138	39	14
16						14	1,520	1,075	390	122	37	15
17						15	1,390	1,070	336	112	33	16
18						16	1,215	1,060	333	112	29	15
19						17	1,140	1,045	342	128	29	14
20						18	1,230	1,075	327	122	28	13
21						18	1,145	1,020	312	130	26	12
22						19	1,120	995	286	116	26	12
23						19	1,090	985	15	116	30	14
24						20	1,085	985		97	33	13
25						20	1,110	973		118	25	12
26						21	1,090	970	40	114	22	12
27						22	1,110	975	61	103	19	11
28						28	1,090	975	239	90	19	11
29						38	1,075	965	236	87	19	11
30						50	1,075	960	216	79	20	13
31						62		960		75	19	
1917-18												
1	12	10	17			1	172	216	146	55	16	
2	12	10	14			1	358	228	146	55	15	19
3	14	12	12			1	380	194	157	46	14	15
4	15	14	10			1	473	199	157	39	12	15
5	15	14	7			1	493	216	146	30	12	14
6	12	15	4			2	528	206	140	29	12	13
7	14	15	3			2	767	211	138	31	11	13
8	12	15	2			3	602	201	142	34	12	11
9	12	15	2			3	556	181	138	33	12	11
10	12	16	1			3	531	161	124	31	8	11
11	10	16	1			3	550	159	110	32	10	11
12	10	16	1			4	602	159	105	27	11	11
13	10	17				25	621	154	122	26	11	10
14	10	18				65	602	161	136	24	11	8
15	12	20				126	609	170	128	22	11	8
16	13	29				204	621	181	114	19	13	8
17	15	37				300	621	206	97	19	12	8
18	15	40				375	590	242	92	18	11	8
19	14	34				325	553	275	94	18	16	9
20	16	48				92	497	286	90	17	19	10
21	15	44				92	446	280	84	16	25	11
22	16	44				84	406	286	73	16	36	12
23	14	44				76	369	264	69	18	61	12
24	14	40				69	348	258	66	26	61	13
25	14	30				62	291	250	60	22	43	13
26	14	24				56	275	226	61	28	30	14
27	13	24				50	280	204	52	26	34	15
28	12	24				50	280	201	65	22	26	16
29	11	24				50	255	176	55	21	25	18
30	10	20				50	216	159	61	19	23	19
31	10					101		148		18	22	

NOTE.—Ice conditions for 1917, January 1 to April 12, inclusive; for 1917-18, October 21 to April 3, inclusive.

Monthly Discharge of Souris River, at Wauchesa, for years ending Sept. 30, 1917-18

[Drainage area, 20,050 square miles.]

Month	Discharge in Second-Feet				Run-Off.	
	Maximum.	Minimum.	Mean	Per Square Mile	Depth in inches on Drainage area	Total in acre-feet
1916-17						
October	92	67	79	0·004	0·005	4,85[illegible]
November			60*	0·003	0·003	3,57[illegible]
December			20*	0·001	0·001	1,23[illegible]
January			0	0·000	0·000	
February			0	0·000	0·000	
March	62	0	15	0·001	0·001	92[illegible]
April	1,520	76	842	0·042	0·047	50,10[illegible]
May	1,125	980	1,050	0·052	0·060	64,56[illegible]
June	955	216	517	0·026	0·029	30,784
July	208	75	133	0·007	0·008	8,178
August	68	19	38	0·002	0·002	2,337
September	17	11	14	0·001	0·001	83[illegible]
The year	1,520		231	0·012	0·164	167,19[illegible]
1917-18						
October	16	10	13	0·001	0·001	79[illegible]
November	48	10	24	0·001	0·001	1,42[illegible]
December	17	0	3*	0·000	0·000	184
January		0	0*			
February		0	0*			
March	175	1	73	0·004	0·005	4,48[illegible]
April	767	172	459	0·024	0·026	27,31[illegible]
May	286	148	208	0·010	0·012	12,85[illegible]
June	157	52	106	0·005	0·006	6,30[illegible]
July	55	16	27	0·001	0·001	1,66[illegible]
August	61	8	21	0·001	0·001	1,29[illegible]
September	19	8	12	0·001	0·001	714
The year	767	0	79	0·004	0·054	57,14[illegible]

NOTE.—Marked thus * estimated.

TRIBUTARIES OF LAKE WINNIPEGOSIS.

RED DEER RIVER.

Red Deer River at Hudson Bay Junction.

Station No. 5 LC_2.

History. The station was established by G. Ebner on August 12, 1915 and has been in continuous operation during the open-water seasons since that date.

This station superseded one established by E. Bankson on June 1 of the same year, but which was discontinued on account of difficulty of operation.

Location of Section.—The metering section is located in the S.E.¼ Sec. 28 Tp. 44, R. 33, W.2.M., at the ferry crossing, five hundred feet downstream from the confluence of the Etomami and Red Deer rivers, and three and one-half miles south of the town of Hudson Bay Junction. The previous section was located about four hundred feet further downstream. All measurements in open-water season are taken from the ferry or a boat. In winter, the measurements are taken from the ice at the same cross section of the river.

Drainage area.—The drainage area of the river above the section is 4,900 square miles.

Channel.—The section is located on a straight section of the river, about one thousand feet long. The bed of the channel is composed of gravel and boulders and is not liable to shift. The banks of the channel are liable to overflow at high stages.

Gauge.—A vertical staff gauge is driven into the bed of the stream, about forty feet below the section of the right bank. It is referred to a permanent M.H.S. bench-mark set to an arbitrary datum.

Discharge measurements.—Since the establishment of the station, discharge measurements have been secured over a range in gauge height of 99·79 to 103·97, corresponding to a range in discharge of 60 to 1,100 c.f.s. under open-water conditions.

Records available.—From July 9, 1913 to October 31, 1917, and April 1 to September 30, 1918, continuous records of daily gauge height during the open-water seasons, and intermittent gauge readings for the winter season have been obtained.

Based on these gauge heights, estimates of daily discharge for the open-water seasons are available.

Estimates of mean monthly discharge based on gauge readings and actual discharge measurements are also available for the whole period.

Accuracy.—Between gauge heights 100·0 and 102·5 the discharge curve is well defined; from 102·5 to 104·0 it is fairly well defined; beyond these limits it is not well defined.

Discharge Measurements of Red Deer River, at Hudson Bay Junction, during 1917–18.

Date	Gauge Height	Discharge	Remarks	Date	Gauge Height	Discharge	Remarks
1917	Feet	Sec.-ft.		1918	Feet	Sec.-ft.	
May 23	103·29	3,110		Mar. 26			Ice cover
June 24	102·60	2,101		May 28	101·97	1,460·1	
Aug. 14	100·51	245·0		July 11	102·03	1,220·1	
Oct. 9	100·18	111·4		Aug. 24	101·06	390·5	

Daily Discharge in Second-feet of Red Deer River, at Hudson Bay Junction, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 4,900 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.
1916-17												
1								7,350	1,765	3,905	392	210
2								6,500	1,620	4,190	380	207
3								6,840	1,550	4,020	362	199
4								8,370	1,450	3,595	356	182
5								8,880	1,390	3,290	325	182
6								9,220	1,430	2,970	315	172
7								8,370	1,250	2,575	310	169
8								8,200	1,240	2,320	300	166
9								7,950	1,230	2,065	285	169
10								7,690	1,080	1,835	280	175
11								7,350	1,080	1,750	275	179
12								6,670	1,250	1,658	275	186
13								6,500	1,645	1,635	260	193
14								6,330	2,375	1,570	238	196
15								5,990	2,745	1,510	238	199
16								5,060	3,035	1,450	230	184
17								4,720	2,970	1,280	222	199
18								4,465	2,915	1,180	214	189
19								4,210	2,745	1,070	207	182
20								3,700	2,575	1,060	199	166
21								3,615	2,630	870	199	157
22								3,700	2,320	790	207	113
23								3,255	2,235	735	214	138
24								3,000	2,150	675	218	125
25								2,915	2,235	630	222	120
26								2,575	2,320	570	230	118
27								2,405	2,695	545	238	116
28							3,785	2,150	2,885	505	234	114
29							3,615	1,985	3,170	476	226	114
30							4,635	1,875	3,510	446	218	112
31							5,650	1,835		404	214	
1917-18												
1	111						500	410	860	2,870	520	295
2	116						515	380	1,120	2,435	530	290
3	106						530	440	940	2,170	520	285
4	114						515	740	820	1,885	520	285
5	114						540	410	565	2,000	510	295
6	112						545	380	530	2,260	500	310
7	112						550	335	565	2,205	494	290
8	112						555	325	1,025	2,145	505	285
9	116						560	350	630	1,885	510	255
10	118						565	368	525	1,605	630	240
11	116						565	380	434	1,310	860	226
12	114						780	635	386	1,120	1,365	205
13	116						780	565	374	1,045	1,780	196
14	116						820	470	320	915	1,710	189
15	116						780	285	295	860	1,595	178
16	114						670	280	320	700	1,410	169
17	114						600	275	560	640	1,195	165
18	112						1,050	275	362	580	980	160
19	110						780	265	735	525	900	151
20	98						675	265	1,470	610	870	148
21	95						1,025	500	1,885	810	750	145
22	85						910	398	2,180	915	620	142
23	76						670	398	1,835	870	550	145
24	78						600	410	1,665	790	510	125
25	74						600	410	1,550	735	446	125
26	72						565	392	1,525	610	410	120
27	70						780	470	2,700	595	368	120
28	69						530	1,070	2,885	585	340	120
29	66						500	900	3,240	600	315	118
30	63						428	810	3,445	570	310	120
31	60							900		545	305	

NOTE.—In 1916-17 ice conditions prevailed previous to April 27, 1917-18, October 20 to April 9, inclusive.

Monthly Discharge of Red Deer River, at Hudson Bay Junction, for years ending September 30, 1917–18.

[Drainage area, 4,900 square miles.]

Month	Discharge in Second Feet.				Run-Off.	
	Maximum	Minimum	Mean	Per square Mile.	Depth in inches on Drainage area.	Total in acre-feet.
1916-17						
October						
November						
December						
January						
February						
March						
April	5,650		700*	0·143	0·159	41,653
May	9,220	1,835	5,280	1·078	1·243	324,654
June	3,510	1,080	2,116	0·432	0·482	125,910
July	4,190	404	1,665	0·340	0·392	102,377
August	392	199	261	0·053	0·061	16,048
September	210	112	166	0·034	0·038	9,878
The period	9,220	112	1,709	0·349	2·375	620,177
1917-18						
October	118	60	100	0·020	0·023	6,149
November						
December						
January						
February						
March						
April	1,050	428	651	0·133	0·148	38,737
May	1,070	265	467	0·095	0·110	28,715
June	3,445	295	1,195	0·244	0·272	71,090
July	2,870	525	1,266	0·246	0·284	74,154
August	1,780	305	736	0·150	0·173	45,255
September	310	118	196	0·040	0·045	11,663
The period	3,445	60	650	0·133	1·059	275,835

NOTE.—Marked thus (*) estimated.

WOODY RIVER AT BOWSMAN.

Station No. 5 LE_2.

History.—The station was established by F. S. Smith on May 31, 1915, and since that date has been in continuous operation during open-water periods.

Location of Section.—The metering section is located in the N.W. $\frac{1}{4}$, Sec. 36, Tp. 37, Rge. 27, W.P.M., on the downstream side of a traffic bridge which spans the river one mile south of the town of Bowsman.

Drainage area.—The drainage area of the river above this point is 731 square miles.

Channel.—The station is located in a straight stretch of the river about eight hundred feet long. The bed of the channel is of gravel and boulders and of a permanent nature. The entire discharge of the river at all times will be confined within the limits of the metering section.

Gauge.—A chain gauge is located on the downstream side of the bridge and is referred to a permanent M.H.S. bench-mark set to an arbitrary datum.

Discharge measurements.—Since the establishment of the station, discharge measurements have been obtained over a range in gauge height of 88.51 to 90.26, corresponding to a range in discharge of 10 to 520 c.f.s., under open-water conditions.

Records available.—Continuous records of gauge height have been obtained for the open-water seasons during the period, May 31, 1915, to September 30, 1918.

Based on these gauge heights, estimates of daily discharge for the open-water seasons are available.

Estimates of mean monthly flow, based on gauge readings and discharge measurements for the months included in the above periods are also available.

Accuracy.—Between gauge heights 88.51 and 90.26 the discharge curve is well defined.

Discharge Measurements of Woody River, at Bowsman, during 1917.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
May 24	90·19	447·0		Mar. 28	89·95	77·6	Ice cover.
June 28	90·48	468·0		May 30	90·75	674·4	
Aug. 16	88·87	20·0		July 16	89·81	256·7	
Oct. 11	88·60	3·8		Aug. 27	89·16	87·8	
Dec. 13	89·14		Ice cover.				

Daily Discharge in Second-feet of Woody River, at Bowsman, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area 731 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1								451	190	646	61	32
2								443	197	634	55	32
3								539	204	593	47	30
4								589	187	568	44	30
5								716	171	634	55	31
6								1,113	158	646	42	30
7								1,235	152	634	42	30
8								1,432	142	580	42	29
9								1,533	139	515	37	28
10								1,390	136	459	26	26
11								1,386	155	435	24	23
12								1,340	177	412	33	24
13								1,222	194	397	30	23
14								1,130	200	385	32	25
15								1,038	230	359	33	23
16								907	217	322	30	22
17								840	220	294	37	22
18								798	207	260	31	23
19								728	237	243	26	22
20								687	304	223	25	20
21								601	374	200	26	19
22								535	389	174	32	18
23								495	400	152	32	18
24								431	397	133	32	18
25								81	443	109	34	19
26								69	503	139	37	18
27								115	564	115	38	16
28								283	548	98	40	15
29								260	531	84	38	15
30								253	548	101	38	15
31								194		69	33	
1917-18												
1	9							105	432	1,048	80	45
2	9							90	330	1,110	92	38
3	9							88	366	1,083	92	30
4	10							80	410	938	84	35
5	10							77	436	872	97	36
6	9							70	405	858	90	34
7	9							71	388	797	84	24
8	9							77	335	726	75	29
9	8							75	300	665	77	37
10	9							79	287	643	84	31
11	9						70	79	246	564	75	24
12	7						92	77	203	520	68	20
13	7						101	70	183	462	80	23
14	7						105	68	174	423	105	22
15	6						99	63	155	330	115	19
16	6						141	58	136	274	105	14
17	6						186	52	130	231	120	12
18	6						213	49	117	199	123	15
19	6						257	60	95	167	107	15
20	6						265	55	189	158	105	11
21	6						270	63	344	141	97	12
22	6						269	66	480	133	99	9
23	6						183	68	603	125	90	9
24	6						206	82	660	127	82	11
25	7						174	113	616	115	90	11
26	6						155	152	652	101	79	8
27							155	206	687	92	68	9
28						78	147	253	880	107	61	11
29							136	401	986	99	53	14
30							113	542	968	88	47	13
31								379		84	52	

NOTE.—Ice conditions for 1917-18, October 27 to April 10, inclusive

Monthly Discharge of Woody River, at Bowsman, for years ending September 30, 1917-18.

[Drainage area 731 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
1916-17						
October						
November						
December						
January						
February						
March						
April	400*	0*	56*	0·077	0·086	3,332
May	1,533	194	762	1·042	1·201	46,854
June	564	136	284	0·389	0·434	16,899
July	646	109	342	0·468	0·540	21,029
August	61	24	37	0·051	0·059	2,275
September	32	15	23	0·031	0·035	1,369
The period	1,533	0	253	0·346	2·355	91,810
1917-18						
October	10		7*	0·010	0·012	430
November						
December						
January						
February						
March						
April	270		131*	0·179	0·200	7,795
May	542	49	122	0·167	0·193	7,501
June	986	95	406	0·555	0·619	24,159
July	1,110	84	428	0·585	0·674	26,317
August	123	47	86	0·118	0·136	5,288
September	45	8	21	0·029	0·032	1,250
The period	1,110		172	0·235	1·870	73,018

NOTE.—Marked thus * estimated.

SWAN RIVER AT SWAN RIVER.

Station No. 5 LE_1.

History.—The station was established by W. G. Worden on October 12, 1912 and since that time has been in practically continuous operation.

Location.—The metering section is located in the N.W. $\frac{1}{4}$ Sec. 21, Tp. 36, Rge. 27, W.P.M., at the downstream side of the traffic bridge which spans the Swan river at the northerly end of the town of Swan River.

All open-water discharge measurements are taken from this bridge. In winter, the measurements are taken from the ice on the same cross section of the river.

Drainage area. The drainage area of the river above this point is 1,215 square miles.

Channel.—The station is located in a straight section of the river, about five hundred feet long. The bed of the channel is clay and boulders and is not subject to shifting. The banks at the section are of sufficient height to confine the discharge to the river bed for all stages of the river.

Gauge.—A chain gauge is secured to the lower chord of the truss on the upstream side of the bridge. It is referred to a permanent M.H.S. bench-mark

located forty-five feet northeast of the north abutment of the bridge. This bench-mark is set to an arbitrary datum.

Discharge measurements.—Since this station was established, discharge measurements have been obtained over a range in gauge height between 99.39 and 104.14, corresponding to a range in discharge of 10 to 4,200 c.f.s.

Records available.—From October 24, 1912 to March 31, 1914, continuous records of daily gauge height for the open-water seasons, and intermittent gauge readings for the winter periods have been obtained. From April 1, 1914 to September 30, 1918, continuous records of daily gauge height have been obtained.

Based on these gauge heights, estimates of daily discharge throughout the open-water seasons are available.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are also available for the whole periods.

Accuracy.—Between gauge heights 90.40 and 101.8, the discharge curve is well defined; between 101.8 and 104.20 it is fairly well defined.

Discharge Measurements of Swan River, at Swan River, during 1917–18.

Date.	Gauge Height.	Discharge.	Remarks	Date.	Gauge Height	Discharge.	Remarks
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft	
Jan. 20	100·41	5·6	Ice cover.	Jan 29	100·64	9·7	Ice cover.
May 24	101·37	730·3		Feb. 28	100·71	2·3	"
June 28	101·38	756·1		Mar. 28	104·64	698·8	
Aug 16	99·81	60·4		May 30	101·40	708·3	
Oct. 11	99·69	46·7		July 16	101·29	631·6	
				Aug. 27	100·33	189·6	

Daily Discharge in Second-feet of Swan River, at Swan River, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 1,215 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916–17.												
1				7	4	1	10	2,000	390	1,325	120	84
2				7	4	1	11	1,770	360	1,510	114	82
3				6	4	1	12	1,770	336	1,700	111	78
4				6	4	2	14	1,880	304	1,710	105	80
5				6	4	3	16	1,925	278	1,570	103	80
6				7	4	3	20	2,210	258	1,435	98	82
7				7	4	3	22	2,280	242	1,165	96	80
8				7	4	3	26	2,210	234	980	94	78
9				6	4	3	33	2,145	223	865	91	80
10				6	4	4	48	2,170	219	770	87	84
11				6	4	4	68	2,080	234	665	84	84
12				6	4	4	89	2,045	258	600	84	82
13				6	4	4	132	2,060	266	575	82	80
14				6	3	4	150	2,035	278	560	72	76
15				6	3	4	209	1,940	291	500	62	72
16				6	3	4	278	1,825	299	435	64	66
17				6	3	4	365	1,670	331	410	64	62
18				6	3	4	420	1,480	355	375	61	59
19				6	3	4	496	1,230	360	336	56	57
20				6	3	4	570	1,110	370	304	57	56
21				5	3	5	630	1,005	385	274	59	54
22				5	3	5	720	905	405	262	64	51
23				5	3	5	850	810	440	242	78	48
24				5	3	5	980	755	460	219	91	48
25				5	2	5	1,115	675	510	205	108	50
26				5	2	5	1,210	605	570	195	108	50
27				5	2	5	1,890	555	665	180	103	48
28				5	2	6	2,045	515	810	162	96	47
29				5		6	2,170	466	870	147	94	48
30				5		8	2,045	435	1,090	138	91	48
31				4		8		415		129	89	
1917–18												
1	49	46	54	20	9	3	610	250	955	2,045	242	150
2	50	48	54	20	9	4	590	242	910	2,080	223	150
3	50	50	52	20	8	5	575	226	855	2,250	216	150
4	52	52	50	19	7	4	555	216	810	2,330	205	150
5	52	55	46	18	7	3	540	205	740	2,130	202	147
6	52	55	42	17	6	2	520	195	660	1,950	202	141
7	50	55	40	17	6	2	500	183	605	1,760	198	138
8	50	56	36	16	6	2	480	183	575	1,630	195	138
9	49	56	35	15	6	2	465	183	545	1,560	198	138
10	49	57	34	14	5	2	450	183	500	1,500	202	138
11	46	57	34	12	4	3	530	183	455	1,425	198	138
12	47	57	33	12	4	4	410	183	395	1,300	195	138
13	49	56	33	12	4	5	385	180	360	1,175	223	138
14	52	56	32	12	4	15	380	171	322	1,030	278	135
15	52	56	33	12	3	20	430	168	295	845	331	132
16	52	56	34	12	2	30	472	162	266	650	390	129
17	50	56	34	12	1	40	500	156	238	555	400	123
18	49	57	35	12	2	45	500	153	226	490	380	117
19	49	61	34	12	3	50	515	153	212	460	355	111
20	47	62	32	12	3	70	515	159	425	440	326	108
21	46	64	30	11	4	100	525	156	725	420	295	108
22	46	64	28	11	5	410	478	177	970	405	270	108
23	47	64	26	11	4	445	430	195	1,280	375	258	105
24	46	64	24	10	3	490	415	216	1,290	350	250	105
25	45	64	24	9	2	540	375	370	1,265	326	230	103
26	45	62	24	9	1	595	336	410	1,600	308	205	100
27	44	60	23	8	1	645	317	575	1,680	295	195	98
28	44	60	23	8	2	700	308	675	1,700	283	180	95
29	44	60	22	10		675	291	750	1,870	274	165	95
30	44	55	22	10		650	274	795	1,940	262	159	93
31	45		21	10		630		910		254	147	

Monthly Discharge of Swan River, at Swan River, for years ending Sept. 30, 1917–18.

[Drainage area, 1,215 square miles.

Month.	Discharge in Second-Feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17						
October	165	87	130	0·107	0·123	7,993
November			75*	0·062	0·069	4,463
December			18*	0·015	0·017	1,107
January	7	4	6	0·005	0·006	369
February	4	2	3	0·002	0·002	167
March	8	1	4	0·003	0·003	246
April	2,170	10	555	0·457	0·510	33,025
May	2,250	415	1,451	1·194	1·377	89 218
June	1 090	219	403	0·332	0·330	23,980
July	1 710	129	643	0·529	0·610	39,537
August	120	56	87	0·072	0·083	5,340
September	84	47	66	0·054	0·060	3,927
The year	2,280	1	289	0·238	3·231	209,177
1917-18						
October	52	44	48	0·040	0·046	2,951
November	61	46	57	0·047	0·052	3,392
December	54	21	34	0·028	0·032	2,091
January	20	8	13	0·011	0·013	799
February	9	1	4	0·003	0·003	222
March	700	2	200	0·165	0·190	12,298
April	610	274	456	0·375	0·418	27,134
May	910	153	289	0·238	0·274	17,770
June	1,940	212	822	0·677	0·755	48·912
July	2,330	254	1,005	0·827	0·953	61,795
August	400	147	242	0·199	0·229	14,880
September	150	93	124	0·102	0·114	7,379
The year	2,330	1	276	0.227	3·081	199,815

NOTE:—Marked thus (*) estimated.

MOSSY RIVER AT WILSON'S FARM (BELOW FORK RIVER).

Station No. 5 LJ_2.

History.—The station was established by W. J. Ireland on July 28, 1914 and superseded a station which had been previously operated at Lacey's farm, just below lake Dauphin. This latter station was discontinued on account of its inaccessibility and the difficulty of obtaining gauge records.

Location.—The metering section is located in the N.E.$\frac{1}{4}$ Sec. 36, Tp. 29, Rge. 19, W.P.M., one-quarter of a mile upstream from the house on the farm of D. F. Wilson, two and one-half miles northeast of the town of Fork River.

The section is equipped as a cable carrier station, and from this cable all measurements during the open-water season are taken. During the winter months the measurements are taken from the ice at the same cross section of the river.

Drainage area.—The drainage area of the river above the station is 3,950 square miles.

Channel.—The bed of the channel is of gravel and boulders and is of a permanent character. The banks are sufficiently high to confine the discharge at all stages of the river.

Gauge.—A vertical staff gauge is secured to a post driven into the bed of the stream near the left bank, near D. F. Wilson's house and about a quarter of a mile downstream from the metering section. It is referred to a permanent M.H.S. bench-mark set to an arbitrary datum.

Discharge measurements.—Since this station was established, discharge measurements have been obtained over a range in gauge height between 90.04 and 94.26 feet, corresponding to a range in discharge of 60 to 1,300 c.f.s.

Records available.—From July 14, 1913 to August 10, 1914, a continuous record of daily gauge height during open-water seasons, and intermittent gauge readings during the winter seasons were obtained at the original station on the river at Lacey's farm. From July 3, 1914 to September 30, 1918, a continuous record of daily gauge height has been obtained at the Wilson farm station.

Based on the above gauge readings, estimates of daily discharge for the whole of the period covered by gauge readings obtained at Lacey's farm and on those obtained during the open-water seasons at the Wilson farm station, are available.

Estimates of mean monthly discharge based on gauge readings and actual discharge measurements are available for the above periods.

It will be noted that the discharge at the Wilson's farm station includes the discharge of the Fork river which enters the Mossy below the original station at Lacey's.

Accuracy.—The curve is fairly well defined over a range in gauge height of from 90.0 to 94.2.

Discharge Measurements of Mossy River, below Fork River, during 1917-18.

Date.	Gauge Height.	Discharge	Remarks	Date.	Gauge Height	Discharge	Remarks
1917	Feet	Sec.-ft.		1918	Feet	Sec.-ft.	
Jan. 23	91·53	226·6	Ice cover	Jan. 31	91·76	126·7	Ice cover
Feb. 14	91·85	316·8	"	Feb. 21	91·83	146·6	
Feb. 14	91·85	317·5	"	Mar. 30	92·60	644·2	
Mar. 8	91·93	316·6	"	May 22	91·05	256·2	
May 26	92·14	515·0		July 9	91·38	282·3	
June 30	94·17	1,210·6		Aug. 20	91·18	280·4	
Aug. 18	91·81	440·2					
Oct. 3	91·35	463·9					
Dec. 6	91·66	220·8	Ice cover				

Daily Discharge in Second-feet of Mossy River, below Fork River, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 3,950 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17												
1				221	237	310	264	653	506	962	467	941
2				224	235	307	337	646	461	1,120	467	335
3				224	235	305	314	633	476	1,128	609	355
4				218	236	303	273	616	479	1,086	467	352
5				214	239	305	250	626	476	1,044	383	259
6				216	250	308	246	601	458	886	464	329
7				237	258	312	244	735	455	817	470	381
8				231	261	317	242	764	497	660	386	321
9				232	263	321	235	753	461	701	383	324
10				232	271	321	246	760	446	813	402	329
11				227	280	319	235	749	357	616	417	352
12				221	293	309	229	742	394	646	437	350
13				216	305	305	229	704	391	619	412	320
14				218	317	2	231	694	246	606	434	353
15				219	322	284	227	680	401	592	401	344
16				222	324	277	235	680	476	569	412	352
17				224	324	268	239	606	482	612	417	355
18				227	313	214	242	633	334	572	386	282
19				231	314	275	305	616	391	536	476	324
20				231	315	307	370	599	365	636	383	330
21				231	318	307	684	582	476	572	391	331
22				231	321	305	741	566	572	461	407	365
23				227	298	304	920	563	473	545	235	352
24				227	303	304	965	539	533	443	371	360
25				228	306	303	943	461	599	742	407	282
26				235	308	298	893	476	606	764	389	235
27				239	309	293	802	491	663	725	334	440
28				241	310	324	735	461	969	646	350	293
29				242		293	684	404	1,128	626	470	248
30				242		239	684	449	1,208	595	404	291
31				239		246		485		542	370	
1917-18												
1	525	237	234	131	138	159	600	300	425	443	229	214
2	266	250	232	135	129	162	527	307	520	357	206	218
3	307	260	220	140	120	161	458	244	550	321	265	168
4	276	268	207	137	134	160	461	381	549	329	214	246
5	289	277	209	134	147	159	431	277	515	284	191	214
6	394	286	211	131	135	158	399	277	302	298	268	208
7	132	286	200	128	139	160	324	321	452	324	189	357
8	289	282	190	133	145	161	350	311	384	288	242	141
9	266	286	194	130	152	163	350	186	407	319	235	155
10	314	282	184	126	160	165	347	242	482	191	207	258
11	81	277	190	128	152	167	329	273	425	288	178	184
12	268	286	185	131	142	168	321	229	386	291	261	193
13	425	289	180	134	130	170	319	233	345	291	193	189
14	286	273	182	130	118	172	319	311	360	277	225	172
15	244	289	185	137	117	178	316	339	420	210	237	158
16	275	286	187	150	116	178	319	326	281	212	246	149
17	268	277	190	148	[illegible]	180	324	202	291	254	263	178
18	187	268	184	147	115	183	331	309	321	254	270	165
19	179	289	188	145	114	189	342	265	288	256	275	172
20	210	273	170	143	131	202	350	112	254	350	277	214
21	210	244	177	141	147	223	402	345	275	212	275	212
22	204	324	184	140	159	257	123	223	350	235	273	172
23	196	284	170	145	174	340	396	539	345	239	258	186
24	220	269	154	153	169	430	425	357	321	127	279	174
25	235	160	141	118	164	535	277	368	368	212	193	189
26	241	257	127	120	159	650	337	412	347	225	252	174
27	233	255	110	130	154	775	363	510	316	265	288	149
28	225	253	113	118	156	910	350	580	254	237	187	155
29	220	250	118	104		768	263	595	342	212	214	152
30	210	236	122	115		764	329	580	360	288	225	143
31	223	[illegible]	127	124		680		525		235	227	

NOTE.—Ice conditions for 1917, January 1 to March 25, inclusive; for 1917-18 October 19 to March 27, inclusive.

Monthly Discharge of Mossy River, below Fork River, for years ending Sept. 30, 1917–18.

[Drainage area, 3,950 square miles.]

Month	Discharge in Second-Feet				Run-Off.	
	Maximum	Minimum	Mean	Per Square Mile	Depth in inches on Drainage Area.	Total in Acre-feet
1916–17						
October	521	180	338	0·086	0·099	20,786
November			221*	0·056	0·062	13,289
December			130*	0·033	0·038	7,996
January	242	214	228	0·058	0·067	14,019
February	324	235	288	0·073	0·076	15,995
March	324	214	298	0·075	0·086	18,321
April	965	227	441	0·112	0·125	26,241
May	764	404	614	0·155	0·179	37,753
June	1,208	246	520	0·134	0·149	31,478
July	1,128	443	707	0·179	0·206	43,472
August	609	235	410	0·104	0·120	25,210
September	440	235	330	0·084	0·094	19,636
The year	1,208		379	0·096	1·303	274,319
1917–18						
October	525	81	255	0·065	0·075	15,679
November	324	236	272	0·069	0·077	16,185
December	234	110	176	0·045	0·052	10,822
January	153	104	133	0·034	0·039	8,178
February	174	114	140	0·035	0·036	7,775
March	910	158	314	0·079	0·091	19,307
April	800	121	359	0·091	0·101	21,362
May	595	112	338	0·086	0·099	20,783
June	550	254	374	0·095	0·106	22,255
July	443	127	273	0·069	0·080	16,786
August	296	178	239	0·061	0·070	14,698
September	357	141	189	0·048	0·054	11,246
The year	910	81	256	0·065	0·882	185,336

NOTE. Marked thus (*) estimated.

TRIBUTARIES OF LAKE DAUPHIN.

VALLEY RIVER AT VALLEY RIVER.

Station No. 5 LJ6.

History.—The station was established by W. H. Worden on October 25, 1912 and since that date has been in practically continuous operation.

Location of Section.—The metering section is located in Sec. 13, Tp. 26, Rge. 20 W.P.M., on the downstream side of the Canadian Pacific Railway bridge across the Valley river, and fifteen hundred feet north of the railroad station of Valley river.

Drainage area.—The drainage area of the river above this station is 1,028 square miles.

Channel.—At low stages the water is confined to one channel, while under high water conditions, there are two, but at all stages the discharge is confined within the limits of the section. The bed of the channel is of a permanent nature composed of gravel and boulders.

Gauge.—A vertical staff gauge secured to the downstream side of the south bridge abutment was the gauge used in connection with the operation of the

station until April 4, 1916, when a chain gauge was installed. Readings were obtained on this gauge from the above date to May 26, 1916, when the chain gauge was removed owing to the dismantling of the bridge for repairs. From the latter date to September 30, 1918, gauge readings have been obtained on the old staff gauge.

Discharge measurements.—Since the station was established, discharge measurements have been obtained over a range in gauge height between 99.23 and 106.10, corresponding to a range in discharge of zero to 3,000 c.f.s.

Records available.—From October 25, 1912 to December 19, 1914, continuous records of daily gauge height throughout the open-water season and intermittent records of gauge readings for the winter seasons have been obtained.

From March 29, 1915 to September 30, 1918, continuous records of daily gauge height have been obtained.

Based on these gauge readings, estimates of daily discharge for the open-water seasons are available.

Estimates of mean monthly discharge based on gauge readings and actual discharge measurements are available for practically the whole of the above period.

Accuracy.—The discharge curve is well defined between gauge heights 99.5 and 101.7; beyond these limits the curve is not well defined.

Discharge Measurements of Valley River, at Valley River, for 1917-18.

Date	Gauge Height	Discharge	Remarks	Date	Gauge Height.	Discharge	Remarks.
1917.	Feet	Sec.-ft.		1918	Feet.	Sec.-ft.	
Jan. 23	99·60	0·00	Ice cover	Feb. 1	99·23		Ice cover.
Mar. 9		0·00	"	Mar. 29	102·78	706·5	
May 25	101·79	524·00		May 31	101·31	240·3	
June 29	102·41	895·00		July 8	100·45	62·8	
Aug. 18	100·13	40·00		Aug. 20	100·56	81·4	

Daily Discharge in Second-feet of Valley River, at Valley River, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area, 1,028 square miles.]

Day	Oct	Nov	Dec.	Jan	Feb	Mar	April	May	June	July	Aug	Sept
1916-17												
1								1,135	806	1,370	141	74
2								1,100	476	1,360	122	67
3								985	341	1,250	113	63
4								900	221	1,145	107	60
5								1,015	169	1,045	101	57
6								1,195	176	900	96	56
7							5	1,220	401	780	91	56
8							14	3,430	287	690	95	70
9							24	1,445	191	650	98	85
10							38	1,460	129	595	93	129
11							55	3,250	129	565	90	169
12							76	3,250	180	530	87	205
13							101	1,245	229	498	101	148
14							128	925	310	459	129	105
15							160	695	280	184	116	67
16							198	35	254	303	90	58
17							242	540	248	248	64	52
18							293	805	242	242	55	46
19							353	625	180	240	50	43
20							421	459	148	231	46	40
21							495	448	221	221	44	41
22							580	336	176	271	41	40
23							675	780	357	193	46	47
24							775	660	320	182	52	50
25							875	555	555	166	55	52
26							975	459	459	158	49	54
27							1,075	357	805	154	46	56
28							1,135	505	840	152	49	58
29							1,165	459	825	148	46	59
30							1,195	417	885	144	44	56
31								398		140	62	
1917-18												
1		35	24	12			10	176	220	93	150	78
2		35	25	10			240	381	194	63	81	69
3		34	25	7			240	428	220	78	70	61
4		53	26	6			240	381	194	76	63	59
5		52	26	5			220	381	170	74	59	51
6		47	27	4			170	381	194	72	54	78
7		43	27	3			161	148	153	69	98	70
8		40	27	3			114	345	148	66	80	51
9		36	27	4			93	278	129	63	58	78
10		31	29	3			93	345	110	78	52	45
11		30	32	3			102	345	102	78	54	31
12		29	31	3			110	420	39	93	63	34
13		29	30	3			93	383	45	90	63	30
14		27	30	3			102	153	30	51	129	28
15		27	31	4			102	102	34	50	78	30
16		27	29	4			102	110	39	45	78	32
17		27	27	4			119	234	51	39	59	79
18		28	25	3			133	102	51	30	78	21
19		29	25	4			170	278	63	42	63	18
20		29	25	4			194	427	70	37	78	16
21		28	25	4			220	278	78	63	78	14
22		28	25	4			278	194	93	70	93	35
23		28	24	4			272	153	110	78	278	14
24		28	24	3			310	102	129	81	249	12
25		28	23	2			278	110	110	93	194	12
26		28	22	1			214	361	93	110	110	12
27		27	20	1		700	278	326	148	220	129	13
28		26	18	1		700	278	345	93	194	110	12
29		25	16	1		705	240	310	93	148	93	12
30		24	14	1		705	249	363	78	93	78	10
31		24		1		459		249		194	63	

NOTE.—Ice conditions for 1917, January 1 to April 26, inclusive; for 1917-18 October 21 to March 31, inclusive.

Monthly Discharge of Valley River, at Valley River, for years ending September 30, 1917–18.

[Drainage area, 1,028 square miles.]

Month	Discharge in Second Feet				Run Off	
	Maximum	Minimum	Mean	Per square Mile	Depth in inches on Drainage Area	Total in Acre-feet
1916-17						
October	110	74	91	0·089	0·068	5,591
November	111		50*	0·049	0·055	2,977
December			5*	0·005	0·006	307
January			0*	0		
February			0*	0		
March			0*	0		
April	1,195	2*	589	0·459	0·490	34,957
May	1,460	118	834	0·810	0·934	51,279
June	885	120	348	0·338	0·377	20,707
July	1,350	140	197	0·483	0·557	30,559
August	143	11	78	0·076	0·088	4,796
September	203	46	70	0·068	0·076	4,165
The year	1,195	0	194	0·189	2·566	140,416
1917-18						
October	55	24	30	0·033	0·038	2,091
November	36	14	26	0·025	0·028	1,547
December	12	1	4	0·004	0·005	246
January			0			
February			0			
March	705	0*	200*	0·195	0·225	12,298
April	310	24	192	0·187	0·209	11,425
May	526	102	278	0·270	0·311	17,094
June	220	30	109	0·106	0·118	6,486
July	220	22	82	0·080	0·092	5,042
August	278	22	80	0·087	0·100	5,472
September	78	10	31	0·030	0·033	1,845
The year	705	0*	88	0·086	1·167	64,709

NOTE.—Marked thus (*) estimated.

OCHRE RIVER AT OCHRE RIVER.

Station No. 5 L.I$_5$.

History.—The station was established by W. G. Worden on October 18, 1912, and since that date it has been in practically continuous operation.

Location.—From the time of the establishment of the station up to June 1, 1916, the station was located in the N.W. ¼ Sec. 10, Tp. 24, Rge. 17, W.P.M., at the downstream side of a traffic bridge across the Ochre river, about one-quarter of a mile north of the railway station of the town of Ochre River. During low water stages in the above period, measurements were frequently taken by wading, at a point one hundred feet above the regular section.

On June 1, 1916, a cable-carrier station was established at a point four hundred feet downstream from the old station.

Drainage area.—The drainage area of the river above the station is 250 square miles.

Channel.—The bed of the channel at this point is a sandy gravel and not liable to shift, except in extreme stages of the river. There is liable to be an overflow of the banks at extremely high stages.

Gauge.—A vertical staff gauge is secured to a pile at the southerly end of the traffic bridge, four hundred feet upstream from the cable carrier station. This gauge, which has been in the same location since the establishment of the station, is referred to a permanent M.H.S. bench-mark set to an arbitrary datum.

Discharge measurements.—Since this station was established, discharge measurements have been obtained over a range in gauge height 99.50 to 108.01, corresponding to a range in discharge of 3 to 1,200 c.f.s.

Records available.—From October 18, 1912 to September 30, 1918, continuous records of daily gauge height for open-water periods, and intermittent records of gauge height for the winter periods have been obtained.

Based on these gauge readings, estimates of daily discharge throughout the open-water periods are available.

Estimates of mean monthly discharge based on gauge heights and actual discharge measurements are also available.

Accuracy.—Between gauge heights 99.5 and 101.0 the discharge curve is well defined, between 101.0 and 108.0 it is fairly well defined. Beyond this upper limit it is not well defined.

Discharge Measurements of Ochre River at Ochre River, during 1917–18

Date.	Gauge Height.	Discharge.	Date.	Gauge Height.	Discharge.
1917.	Feet.	Sec.-ft.	1918	Feet.	Sec.-ft.
May 28	100·20	42	Mar. 31	101·87	201·9
May 28	100·20	42	May 24	102·23	287·3
June 22	101·24	147	July 18	99·59	11·9
Aug. 20	99·50	6	Aug. 19	99·75	21·9
Oct. 5	99·61	7			
Oct. 5	99·61	6·9			

Daily Discharge in Second-feet of Ochre River, at Ochre River, for part of year ending September 30, 1917, and year ending September 30, 1918.

[Drainage area 250 square miles.]

Day.	Oct	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1								146	22	380	7	4
2								214	22	220	7	4
3								285	21	151	6	3
4								348	19	106	5	3
5								471	17	106	5	3
6								356	17	88	5	6
7								356	16	65	4	5
8								320	16	46	4	4
9								275	15	62	4	4
10								221	15	88	3	5
11								184	139	96	3	5
12								157	116	46	3	4
13								131	82	38	3	4
14								113	70	31	3	4
15								102	54	26	3	3
16								94	46	25	2	4
17								90	46	20	2	4
18								70	35	16	2	4
19								64	38	15	2	4
20								57	106	12	1	4
21								49	146	10	1	4
22								42	106	8	4	4
23								38	102	8	5	4
24								37	97	7	10	3
25							83	31	455	11	10	3
26							106	30	536	38	11	3
27							122	28	278	21	11	3
28							136	26	292	18	11	3
29							190	27	214	13	8	3
30							151	26	536	11	7	3
31								24		7	6	
1917-18.												
1	5	8					132	26	90	42	8	2
2	5	8					109	23	81	25	7	5
3	5	9					153	23	72	17	7	4
4	5	10					113	23	68	17	7	4
5	6	19					90	23	62	16	6	3
6	7	14					85	23	58	13	6	3
7	7	18					77	22	56	12	6	3
8	6	15					101	18	53	14	4	3
9	6	15					80	18	45	13	3	2
10	6	16					96	18	34	10	3	2
11	7	16					88	17	33	9	5	3
12	7	10					80	17	24	7	5	3
13	7	12					90	17	23	6	52	3
14	6	13					90	17	20	6	28	3
15	7	13					97	13	17	6	17	2
16	7	13					90	18	16	6	12	2
17	7	12					196	38	15	6	10	2
18	8	7					293	38	14	5	10	3
19	8	16					197	129	12	4	8	2
20	10	12					116	99	12	4	8	4
21	9	13					110	81	18	6	8	4
22	7	15					71	210	17	6	9	3
23	6	15				185	60	201	12	9	8	3
24	8	7				100	55	383	13	12	8	3
25	9	8				120	46	545	13	16	8	3
26	9	9				140	34	383	12	14	6	3
27	8	10				160	34	284	17	13	4	3
28	8	10				200	31	213	72	14	3	2
29	7	9				241	31	143	93	21	3	2
30	7	9				220	27	139	62	16	3	3
31	7					211		78		14	2	

NOTE.—1916-17. Ice conditions prevail to April 24; For 1917-18, November 25 to March 29, inclusive. Information insufficient to compute daily discharge.

Monthly Discharge of Ochre River, at Ochre River, for years ending September 30, 1917 18.

[Drainage area 250 square miles.]

Month	Discharge in Second-Feet				Run Off.	
	Maximum	Minimum	Mean	Per Square Mile	Depth in inches on Drainage Area	Total in Acre-feet
1916 17						
October						
November						
December						
January						
February						
March						
April	190	0*	33*	0·132	0·147	1,964
May	471	24	142	0·568	0·655	8,731
June	536	15	122	0·488	0·544	7,260
July	380	7	58	0·232	0·267	3,566
August	11	1	5	0·020	0·023	307
September	6	3	4	0·016	0·018	238
The period	536		61	0·244	1·661	22,136
1917 18						
October	10	5	7	0·028	0·032	430
November	19	7	12	0·048	0·054	714
December						
January						
February						
March			55*	0·220	0·254	3,382
April	293	27	96	0·384	0·428	5,712
May	545	13	106	0·424	0·489	6,518
June	93	12	38	0·152	0·170	2,261
July	42	4	12	0·048	0·055	738
August	52	2	9	0·036	0·042	555
September	5	2	3	0·012	0·013	179
The period	545	2	37	0·148	1·514	20,177

NOTE.—Marked thus * estimated.

THE TRIBUTARIES OF LAKE WINNIPEG ON THE WEST.

SASKATCHEWAN RIVER.

SASKATCHEWAN RIVER AT THE PAS.

Station No. 5 KJ_2.

History.—The station was established by W. G. Worden on October 21, 1912. On May 21, 1913, a new station was located by E. Bankson, which has been in continuous operation since that date.

Location of Section.—The metering section as originally located was a boat station situated about one-quarter of a mile below the bridge (then in course of construction) of the Hudson Bay Railway across the Saskatchewan at The Pas. On the completion of this bridge, the metering section was located in Sec. 16, Tp. 56, Rge. 26, W.P.M., on the downstream side of same. All open-water measurements are taken from this bridge. Under winter conditions, the measurements are made from the ice at a point about two hundred feet down-stream from the regular section.

Drainage area.—The drainage area of the river above the section is 149,500 square miles.

Channel.—The river is divided by bridge piers into six channels, at ordinary stages. The section is located on a straight stretch of the river approximately 1,000 feet long. The bed of the channel is composed of clay, gravel and boulders, but is liable to a certain amount of shifting during flood periods each year. The right bank is high and not liable to overflow; there is likely to be a certain amount of overflow on the left bank during high stages. At extreme high stage there is a small discharge through an overflow channel about five hundred yards south of the bridge.

Gauge.—A vertical staff gauge is secured to the downstream side of the south pier and ten feet upstream from the metering section. This gauge is referred to a permanent M.H.S. bench-mark which is set to Hudson Bay Railway datum.

Discharge measurements.—Since this station was established, discharge measurements have been obtained over a range in gauge height of 815.81 to 832.13, corresponding to a range in discharge of 5,100 to 102,000 c.f.s.

Records available.—From February 9, 1913 to April 30, 1914, a continuous record of daily gauge height for open-water periods, and an intermittent record of gauge height for winter periods have been obtained. From May 1, 1914 to September 30, 1918, practically a continuous record of daily gauge height has been obtained.

Based on these gauge readings, estimates of daily discharge are available.

Estimates of mean monthly flow, based on gauge readings and actual discharge measurements are available for the years 1913 to 1918.

Accuracy.—The discharge curve for the station is well defined between gauge heights 818.5 and 822.7. Between 822.7 and 828.0 the discharge curve exhibits all the characteristics that are peculiar to certain large rivers, in that the discharge for the same gauge height varies according as the river is on a rising or a falling stage. Above gauge height 827.0 and below 818.5 the discharge curve is fairly well defined.

Discharge Measurements of Saskatchewan River at The Pas, during 1917–18.

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan. 17	816·86	6,551	Ice cover.	Jan. 26	815·40	4,186·5	Ice cover.
Feb. 10	816·71	6,437	Ice cover.	Feb. 26	816·20	5,533·7	Ice cover.
Feb. 11	816·70	6,489	Ice cover.	Mar. 7	816·55	6,508·8	Ice cover.
Mar. 12	817·32	6,292	Ice cover.	Mar. 23	816·45	5,744·7	Ice cover.
Mar. 13	817·36	6,207	Ice cover	May 25	821·15	28,925·2	
May 16	828·80	73,126		July 13	826·03	47,755·9	
May 17	828·75	73,804		Aug 22	823·73	42,555·0	
May 17	828·73	74,151					
May 18	828·64	71,886					
May 19	828·62	73,296					
May 20	828·49	70,452					
June 26	831·48	88,994					
June 26	831·48	509	Flood channel.				
Aug. 11	827·66	59,003					
Oct 6	819·92	22,786					
Dec 10	817·21	5,722	Ice cover.				

Daily Gauge Height and Discharge of Saskatchewan River at The Pas, for part year ending September 30

[Drainage area 149,500 square

Day.	October.		November		December.		January		February.		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
1916–17	Feet	Sec.-ft.	Feet	Sec.-ft	Feet.	Sec.-ft	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet.	Sec.-ft
1							16·75	7,300	16·60	5,970	17·07	5,850
2							16·82	7,200	17·61	5,950	17·07	5,780
3							16·70	7,050	17·61	5,960	17·05	5,720
4							16·65	6,850	17·62	6,100	17·05	5,800
5							16·52	6,700	17·64	6,300	17·05	5,900
6							16·40	6,650	16·65	6,440	17·05	5,970
7							16·37	6,630	16·71	6,420	17·15	6,200
8							16·35	6,550	16·75	6,380	17·15	6,200
9							16·30	6,400	16·72	6,410	17·20	6,300
10							16·25	6,500	16·71	6,430	17·23	6,330
11							16·32	6,500	16·70	6,480	17·28	6,250
12							16·35	6,450	16·72	6,550	17·32	6,290
13							16·39	6,400	17·16	6,700	17·35	6,210
14							16·40	6,350	17·16	6,650	17·35	6,300
15							16·40	6,350	17·16	6,650	17·35	6,300
16							16·75	6,500	17·20	6,550	17·35	6,350
17							16·84	6,550	17·20	6,350	17·35	6,300
18							16·91	6,500	17·20	6,300	17·35	6,250
19							16·80	6,450	17·20	6,150	17·35	6,300
20							16·77	6,360	17·20	6,100	17·35	6,300
21							16·72	6,350	17·17	6,090	17·35	6,290
22							16·70	6,300	17·15	5,900	17·35	6,300
23							16·67	6,200	17·13	5,890	17·35	6,310
24							16·63	6,120	17·12	5,770	17·35	6,250
25							16·60	6,100	17·10	5,830	17·35	6,300
26							16·57	6,100	17·08	5,900	17·35	6,230
27							16·57	6,120	17·08	5,900	17·35	6,300
28							16·57	6,100	17·07	5,850	17·40	6,310
29							16·57	6,060			17·40	6,280
30							16·57	6,020			17·40	6,230
31							16·58	6,000			17·43	6,200

	April.		May.		June.		July.		August.		September.	
1	17·43	6,150	28·05	59,800	28·75	68,950	31·56	89,550	29·45	73,350	23·35	39,050
2	17·43	6,120	28·65	61,500	28·81	69,300	31·69	90,800	29·35	72,700	23·25	38,550
3	17·43	6,090	28·95	63,250	28·87	69,700	31·65	90,400	29·23	71,950	23·15	38,000
4	17·45	6,090	29·25	65,300	28·95	70,250	31·60	89,900	29·05	70,800	23·15	38,000
5	17·45	6,100	29·65	67,100	29·07	70,950	31·60	89,900	28·90	69,850	28·15	38,000
6	17·45	6,100	29·75	69,250	29·28	72,250	31·65	90,400	28·75	68,950	23·10	37,750
7	17·48	6,200	29·85	71,150	29·42	73,150	31·61	90,000	28·54	67,650	22·95	37,000
8	17·48	6,300	30·05	73,050	29·66	74,700	31·57	89,650	28·35	66,540	22·87	36,650
9	17·48	6,350	30·95	75,300	29·79	75,550	31·57	89,650	28·27	66,080	22·70	35,800
10	17·50	6,400	30·05	77,250	29·95	76,600	31·52	89,290	28·15	65,300	22·45	34,550
11	17·50	6,400	29·85	75,950	30·05	77,250	31·46	88,650	27·95	64,100	22·30	33,850
12	17·57	6,550	29·25	72,100	30·33	79,350	31·41	88,200	27·65	62,350	22·15	33,150
13	17·62	6,680	29·05	70,800	30·76	82,450	31·34	87,550	27·25	60,100	22·09	32,850
14	17·65	6,800	28·85	69,550	30·75	82,400	31·28	87,050	27·05	58,950	22·05	32,700
15	17·70	7,100	28·90	69,850	30·55	80,800	31·20	86,300	26·65	56,700	21·85	31,775
16	17·70	7,450	28·79	69,200	30·57	80,950	31·14	85,800	26·40	55,300	21·75	31,325
17	17·70	7,800	28·75	68,900	30·75	82,400	31·07	85,150	26·15	53,900	21·70	31,100
18	17·71	8,100	28·75	68,950	30·80	82,800	31·01	84,650	25·95	52,850	21·50	30,200
19	17·72	9,450	28·64	68,250	30·95	84,100	30·95	84,100	25·70	51,450	21·35	29,550
20	17·74	12,900	28·50	67,400	31·10	85,450	30·90	83,650	25·40	49,800	21·20	28,900
21	21·15	15,000	28·37	66,600	31·15	85,900	30·79	82,700	25·25	49,000	21·05	28,275
22	22·80	18,000	28·27	66,000	31·20	86,300	30·73	82,250	25·00	47,650	20·95	27,850
23	24·45	24,000	28·20	65,600	31·25	86,750	30·65	81,600	24·85	46,850	20·87	27,525
24	24·95	30,000	28·17	65,400	31·36	87,750	30·52	80,600	24·77	46,450	20·80	27,225
25	25·25	37,250	28·15	65,300	31·44	88,150	30·35	79,350	24,59	45,500	20·70	26,825
26	26·85	50,900	28·21	65,650	31·50	89,000	30·21	78,350	24·35	44,200	20·60	26,400
27	28·05	52,550	28·35	66,500	31·57	89,650	30·05	77,250	24·10	42,900	20·50	26,000
28	29·35	54,500	28·40	66,800	31·56	89,550	29·95	76,600	23·95	42,150	20·35	25,400
29	27·45	56,150	28·46	67,150	31·44	88,450	29·86	76,000	23·85	41,600	20·15	24,600
30	27·55	57,500	28·57	67,800	31·45	88,550	29·80	75,600	23·70	40,850	20·00	24,000
31			28·64	68,250			29·63	74,500	23·45	39,550		

NOTES.—800·00 should be added to gauge heights to reduce to station datum.
Ice conditions January 1 to May 10.

Daily Gauge Height and Discharge of Saskatchewan River, at The Pas, for year ending September 30, 1918.

[Drainage area 149,500 square miles.]

Day.	October		November.		December.		January.		February.		March.	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
1917-18	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1	19·85	23,425	20·15	20,150	18·70	16,800	15·10	4,640	15·53	4,395	16·27	5,715
2	19·85	23,425	20·05	20,025	18·65	16,475	15·09	4,620	15·54	4,415	16·30	5,830
3	19·85	23,425	20·25	19,875	18·50	15,400	15·09	4,600	15·59	4,500	16·32	5,830
4	19·90	23,600	20·15	19,750	18·30	14,400	15·08	4,580	15 61	4,540	16·35	5,950
5	19·95	23,800	19·95	19,650	18 15	12,125	15·08	4,560	15·65	4,600	16·40	6,070
6	19·97	23,875	19·85	19,500	18·00	10,000	15·07	1,510	15·70	4,710	16·50	6,360
7	19 95	23,800	19·00	19,400	17 80	8,075	15 07	4,520	15·73	4,750	16·55	6,500
8	19·95	23,800	18 70	18,650	17 55	6,300	15 05	1,500	15·71	4,775	16·60	6,600
9	19·90	23,600	18 60	18,275	17·35	5 825	15·02	4,475	15·75	4,775	16·66	6,700
10	19·85	23,425	18·55	17,900	17·26	5,725	15·00	4,450	15·79	4,865	16·66	6,700
11	19·70	22,825	18·51	17,900	16 95	5,650	14·95	4,400	15·85	4,975	16·66	6,650
12	19·45	21,850	18·50	17,900	16 65	5,600	11·85	4,300	15·89	5,060	16·63	6,550
13	19·30	21,275	18 65	18,275	16·35	5,550	11·85	4,300	15·91	5,085	16·61	6,455
14	19·15	20,700	19 00	19,400	16 07	5,500	14·90	4,300	15·97	5,215	16·57	6,335
15	19·10	20,525	19·03	19,750	15·79	5,475	14·90	4,350	16·05	5,370	16·53	6,215
16	19·05	20,325	19·05	19,875	15·50	5,150	14·95	4,400	16·11	5,510	16·51	6,120
17	19·05	20,325	19·10	20,000	15·25	5,450	11·95	4,450	16·15	5,600	16·48	6,020
18	19·05	20,325	19·15	20,150	15 25	5,500	14 97	4,500	16·15	5,600	16·47	5,975
19	19·02	20,225	19 25	20,325	15·29	5,600	15·00	4,500	16·17	5,600	16·47	5,925
20	19·00	20,150	19·30	20,525	15·33	5,600	15·00	4,100	16·19	5,625	16·47	5,900
21	18·95	19,750	19·45	20,900	15 37	5,575	15 00	4,300	16·20	5,625	16·46	5,830
22	18·85	19,400	19 40	20,900	15·42	5,550	15·05	4,200	16·21	5,600	16·45	5,785
23	18 80	19,025	19 35	19,400	15·40	5,500	15·35	4,150	16·21	5,600	16·45	5,745
24	18·75	18,650	18·97	18,275	15 40	5,450	15·37	4,120	16·21	5,600	16·44	5,715
25	18·70	18,475	18 95	18,100	15·31	5,300	15·38	4,150	16·19	5,535	16·37	5,760
26	18·64	18,275	18·90	17,900	15 25	5,150	15·40	4,185	16·20	5,535	16·45	6,070
27	18·60	18,100	18·80	17,725	15 23	5,100	15·43	4,250	16·22	5,575	16·55	6,550
28	18·85	18,275	18·75	17,550	15·15	4,800	15·45	4,290	16·25	5,645	16·63	6,800
29	19·15	18,650	18·70	17,200	15·10	4,700	15·45	4,310	..	..	16·75	7,300
30	19·45	19,025	18·70	17,000	15·10	4,680	15·49	4,330	..	..	16·84	7,690
31	20·05	19,750			15·10	4,660	15·51	4,375	..	..	16·95	8,080

	April.		May		June.		July.		August.		September.	
1	17·17	8,745	23·40	39,300	21·05	28,275	24·93	47,300	24·25	43,700	22·89	36,700
2	17·70	10,300	23·30	38,800	21·05	28,275	25 10	48,200	24·20	43,450	22·80	36,250
3	18·75	12,775	23·15	38,000	21·08	28,400	25·30	19,250	24·15	43,200	22·69	35,725
4	21·17	15,775	22 80	36,275	21·13	28,600	25·43	49,950	24·10	42,900	22·53	35,050
5	22 58	19,025	22·55	35,050	21·15	28,700	25·55	50,650	24 10	42,900	22·45	34,575
6	24·06	22,150	22·31	33,900	21·20	28,900	25·65	51,200	24·08	42,800	22·35	34,100
7	24·67	26,400	21·95	32,225	21·05*	28,275	25·78	51,900	24·08	42,800	22·27	33,725
8	24·85	30,200	21 70	31,100	20·95	27,850	25·87	52,400	24·09	42,850	22·17	33,250
9	25·05	35,300	21·55	30,425	20·75	27,025	25·96	52,900	24·11	42,950	22·05	32,675
10	25·07	36,250	21·45	29,975	20·83	27,350	96·10	53,650	24·15	43,200	21·95	32,225
11	25·10	37,250	21·40	29,775	20·95	27,850	26·12	53,750	24·15	43,200	21·85	31,775
12	25·62	39,800	21·15	28,700	21·05	28,275	26·10	53,650	24·15	43,200	21·72	31,200
13	25·95	42,000	21·01	28,100	21·25	29,125	26·10	53,650	24·11	42,950	21·62	30,740
14	26 27	43,950	20·88	27,550	21·55	30,425	26·05	53,400	24·09	42,850	21·53	30,325
15	26·65	45,000	20·80	27,225	21 67	30,975	26·01	53,150	24·05	42,650	21·43	29,900
16	26·95	46,050	20·73	26,950	21·67	30,975	25·92	52,650	24·02	42,500	21·31	29,375
17	27·35	47,100	20·64	26,575	21·69	31,050	25·77	51,850	24·00	42,400	21·17	28,775
18	27·30	48,200	20·51	26,050	21·70	31,100	25·65	51,200	23·95	42,150	21·03	28,175
19	26·55	48,750	20·45	25,800	21·70	31,100	25·57	50,750	23·90	41,900	20·88	27,550
20	25·30	49,250	20·60	26,400	21·73	31,225	25 50	50,350	23·85	41,600	20·73	26,950
21	24·95	47,400	20·67	26,700	21·79	31,500	25·40	49,800	23·80	41,350	20·50	26,000
22	24·65	45,800	20·75	27,025	22·15	33,150	25·27	49,100	23·75	41,100	20·37	25,475
23	24·40	44,500	20·80	27,225	22·35	34,000	25·17	48,550	23·70	40,850	20·25	25,000
24	24·17	43,300	20·83	27,350	22·05	37,000	25·05	47,900	23·65	40,600	20·17	24,675
25	23·97	42,250	21·15	28,700	23·55	40,050	24·93	47,300	23·59	40,250	20·05	24,200
26	23·85	41,600	21·10	28,475	23·85	41,600	21·83	46,750	23·45	39,5[illegible]	19·95	23,800
27	23·69	40,800	21·09	28,425	24·15	43,200	24·70	46,050	23·35	39,050	19·85	23,425
28	23·65	40,600	21·06	28,300	24·40	44,500	24·60	45,550	23·27	38,650	19·83	23,325
29	23·53	40,000	21·06	28,300	24·65	45,800	24·50	45,000	23·17	38,100	19·74	22,975
30	23·45	39,550	21·05	28,275	24·80	46,600	24 40	44,500	23·05	37,[illegible]00	19·65	22,625
31	..	..	21·05	28,275	..	..	24·30	43,950	22·98	37,150	..	..

NOTES.—Marked thus (*) interpolated.
Ice conditions October 21 to April 19, inclusive.
800·00 should be added to gauge heights to reduce to station datum.

Monthly Discharge of Saskatchewan River, at The Pas, for years ending September 30, 1917-18.

(Drainage area, 149,500 square miles.)

Month	Discharge in Second Feet.				Run-Off	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17						
October	66,100	36,030	50,110	0·335	0·386	3,081,111
November	36,760	15,430	29,848	0·200	0·223	1,776,080
December	15,080	6,950	10,159	0·068	0·078	624,653
January	7,300	6,000	6,412	0·043	0·050	396,104
February	6,700	5,770	6,207	0·042	0·044	344,719
March	6,350	5,720	6,190	0·041	0·047	380,608
April	57,800	6,090	17,909	0·120	0·134	1,065,659
May	77,250	59,800	68,226	0·456	0·526	4,195,053
June	89,650	68,950	80,655	0·539	0·601	4,799,305
July	90,800	74,500	84,689	0·567	0·654	5,207,324
August	73,350	39,550	56,298	0·376	0·433	3,461,629
September	39,050	24,000	31,760	0·212	0·236	1,889,851
The year	90,800	5,720	37,601	0·252	3·421	27,215,416
1917-18						
October	23,875	18,100	21,035	0·141	0·163	1,293,392
November	20,900	17,000	19,074	0·128	0·143	1,134,981
December	16,800	4,660	7,192	0·048	0·055	442,219
January	4,640	4,120	4,389	0·029	0·033	269,869
February	5,645	4,395	5,167	0·035	0·036	286,961
March	8,080	5,715	6,314	0·042	0·048	388,233
April	49,250	8,745	36,376	0·243	0·271	2,164,523
May	39,300	25,800	29,846	0·200	0·231	1,835,159
June	46,600	27,025	32,708	0·219	0·244	1,946,261
July	53,750	43,950	49,879	0·334	0·385	3,066,940
August	43,700	37,150	41,629	0·278	0·321	2,559,668
September	36,700	22,625	29,352	0·196	0·219	1,746,565
The year	53,750	4,120	23,668	0·158	2·145	17,134,851

SASKATCHEWAN RIVER AT HEAD OF GRAND RAPIDS.

Station No. 5 KL₁.

History.—The station was established by E. B. Patterson on July 31, 1912 and has been in continuous operation since that date.

Location of section.—The metering section is located in the S.W. ¼ Sec. 30, Tp. 48, Rge. 13, W.P.M., 3,200 feet above the head of Grand rapids and 640 feet below the Hudson's Bay Company's wharf, situated at the upper end of their tramway. The station is operated as a boat station during open-water periods. During winter periods, measurements are made on the same cross section from the ice.

Drainage area.—The drainage area of the river above the station is 155,100 square miles.

Channel.—The section is located on a straight stretch of the river about 1,300 feet long. The banks are high and not liable to overflow. The bed of the channel is partly rock and partly of gravel and boulders and not liable to shift.

Gauge.—A vertical staff gauge is located at the left bank on the section. It is secured to a crib which acts as a retaining wall for the bank. This gauge was set on November 10, 1913. Prior to this date a vertical staff gauge was secured to the Hudson's Bay Company's wharf above the section.

Both of these gauges are referred to M.H.S. datum, this being approximately mean sea level datum.

Discharge measurements.—Since this station was established, discharge measurements have been obtained over a range in gauge height of 784·64 to 789·72, corresponding to a range in discharge of 7,000 to 76,000 c.f.s.

Records available.—Intermittent records of daily gauge height extend over a period from August 3, 1912 to September 6, 1913, during the open-water seasons. Continuous records of daily gauge height have been obtained over the periods from November 7, 1913 to September 5, 1914 and from March 2, 1915 to August 31, 1918.

Based on these gauge heights, estimates of daily discharge are available for the following periods: August 1 to November 30, 1912, May 19 to November 11, 1913, April 23 to September 5, 1914, March 2 to December 31, 1915, and from April 15, 1916 to August 31, 1918.

Accuracy.—The discharge curve is fairly well defined between gauge heights 85·04 and 89·72, which is the range over which the discharge measurements extend.

Discharge Measurements of Saskatchewan River, at Head of Grand Rapids, during 1917–18.

(Drainage area 155,100 square miles.)

Date.	Gauge Height.	Discharge	Remarks	Date	Gauge Height.	Discharge	Remarks.
1917.			Gauge Head Grand Rapids.	1918.			Gauge Head Grand Rapids.
Mar. 15	805·57	8,108	784·97	Mar. 15	785·32	7,884·7	Ice cover.
Mar 15	805·53	8,703	785·06	Mar. 16	785·35	8,006·6	"
Mar. 16	805·475	8,481	784·83	Mar. 16	785·35	8,090·9	"
Mar. 17	805·45	8,367	784·82	Mar. 17	785·36	7,983·4	"
Mar. 19	805·365	8,390	785·00	Mar. 17	785·36	8,232·8	"
Mar. 19	805·345	8,361	785·00	Mar. 18	785·35	8,202 0	"
Mar. 19	805·335	8,142	785 00	Mar. 18	785·35	8,284·0	"
Mar 20	805 385	8,265	784·87	Mar 19	785·31	8,231·4	"
Mar 20	805·405	8,193	784·87				
Mar 22	805·490	8,448	784·64				
Mar. 22	805·360	8,609	784·64				
Mar 22	805·370	8 447	784·64				
Mar 23	805·390	8,686	744·73				

Note.—On account of bad ice conditions prevailing at the regular meter section the meterings for 1917 were taken from the ice about 1,000 feet above Red Rock rapids.

Daily Gauge Height and Discharge of Saskatchewan River, at Head of Grand Rapids, for part of year ending September 30, 1917.

(Drainage area, 155,100 square miles.)

Day.	October.		November.		December.		January.		February.		March.	
	Gauge height.	Discharge.	Gauge height.	Discharge.	Gauge height.	Discharge.	Gauge height.	Discharge.	Gauge height.	Discharge.	Gauge height.	Discharge.
1916–17.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft.
1							85·68		85·13		85·97	8,200
2							85·73		85·09		85·93	7,800
3							85·72		85·00		86·01	7,800
4							85·76		85·07		86·37	8,000
5							85·72		84·30		86·27	8,300
6							85·70		84·16		85·82	8,500
7							85·69		84·57		85·52	8,800
8							85·64		84·51		85·31	9,000
9							85·62		85·00		85·24	8,900
10							85·65		85·44		85·22	8,800
11							85·63		85·67		85·07	8,700
12							85·60		85·70		85·07	8·600
13							85·70		85·85		84·90	8,500
14							85·73		85·71		84·79	8,400
15							85·70		85·85		85·06	8,700
16							85·69		85·89		84·83	8,500
17							85·77		85·99		81·82	8,350
18							85·81		85·88		85·06	8,300
19							85·74		85·81		85·00	8,300
20							85·47		85·68		84·87	8,225
21							85·30		85·60		84·72	8,300
22							85·25		85·53		84·64	8,500
23							85·23		85·51		84·73	8·600
24							85·22		85·47		84·56	8,800
25							85·20		85·71		84·51	9,000
26							85·23		85·91		84·54	9,000
27							85·17		85·96		84·63	9,000
28							85·16		85·99		84·52	9,200
29							85·31				84·57	9,200
30							85·24				84·46	9,100
31							85·03				84·58	9,000

	April.		May.		June		July		August		September.	
	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.	Sec.-ft.
1	84·62	9,000	84·16	15,300	88·52	59,500	89·79	78,000	89·79	78,000	88·20	55,300
2	84·59	8,900	84·15	15,500	88·56	60,100	89·66	76,000	89·66	76,000	88·11*	54,200
3	84·56	8,900	84·12	15,650	88·54	59,800	89·62	75,400	89·45	72,800	88 02	53,000
4	84·58	8,900	84·14	15,800	88·56	60,100	89·57	74,600	89·51	73,700	87·87	51,200
5	84·52	8,900	84·40	17,550	88·52	59,500	89 61	75,200	89·65	75,900	87·85	50,900
6	84·55	8,900	84·56	18,700	88·55	59,900	89·66	76,000	89·48	73,300	87·79	50,200
7	84·43	8,900	84·74	20,025	88·60	60,600	89·74	77,200	89·51	73,700	87·82	50·500
8	84·36	9,000	84·83	20,725	88·64	61,200	89·82	78,500	89·42	72,400	87·68	48,800
9	84·38	9,200	84·98	21,900	88·66	61,400	89·71	76,800	89·45	72,800	87·56	47,350
10	84·46	9,200	85·12	23,000	88·78	63,100	89·82	78,500	89·36	71,500	87·59	47,750
11	84·51	9,200	85·26	24,150	88·94	65,400	89·95	80,500	89·28	70,300	87·54	47·150
12	84·43	9,200	85·47	25,900	89·10	67,700	89·97	80,800	89·24	69,700	87·45	46,050
13	84·46	9,200	85·73	28,200	89·19	69,000	89·94	80,400	89·17	68,700	87·31	44,450
14	84·44	9,200	86·05	31,200	89·26	70,000	89·92	80,000	89·22	69,400	87·26	43,850
15	84·40	9,200	86·20	32,650	89·18	68,800	89·97	80,800	89·20	69,100	87·22	43,400
16	84·38	9,200	86·48	35,450	89·14	68,200	89·98	81,000	89·05	66,900	87,16	42,750
17	84·41	9,500	86·74	38,150	89·12	68,000	89·94	80,400	89·08	67,400	87·14	42,500
18	84·43	9,800	86·99	40,850	89·17	68,700	90·01	81,500	89·11	67,800	87·13	42,400
19	84·46	10,100	87·21	43,300	89·16	68,500	89·95	80,500	88·99	66,100	87·04	41,400
20	84·41	10,400	87·46	46,200	89·22	69,400	89·86	79,100	8·90	84,800	87·02	41,200
21	84·38	10,700	87·62	48,100	89·27	70,100	89,84	78,800	88·88	64,500	86·89	39,750
22	84·17	11,000	87·74	49,550	89·19	69,000	89·91	79,900	88·93	65,200	86,83	39,150
23	84·16	11,500	87·88	51,300	89·20	69,100	89·75	77,400	88·90	64,800	86·78	38,600
24	84·15	12,500	88·01	52,900	89·25	69,800	89·86	79,100	88·82	63,700	86·75	38,300
25	84·17	14,100	88·06	53,500	89·28	70,300	89·81	78,300	88·79	63,200	86·74	38,150
26	84·16	14.300	88·10	54,000	89·35	71,300	89·80	78,200	88·75	62,700	86·62	36,900
27	84·13	14,500	88·18	55,100	89·40	72,100	89·74	77,200	88·71	62,100	86·35	34,150
28	84·14	14,700	88·31	56,800	89·49	73,400	89·62	75,400	88·49	59,100	86·48	35,250
29	84·15	14,900	88·47	58,900	89·35	71,500	89·65	75,800	88·28	56,400	86·63	37,000
30	84·15	15,100	88·45	58,600	89·40	72,100	89·74	77,200	88·24	55,800	86·39	34,550
31			88·48	59,000			89·72	76,900	88·24	55,800		

Note.—Gauge heights marked thus (1) are interpolated. 700 00 should be added to gauge heights to reduce to station datum. Ice conditions January 1, to May 3.

Daily Gauge Height and Discharge of Saskatchewan River above Grand Rapids, for year ending September 30, 1918.

(Drainage area, 155,100 square miles.)

Day	October		November.		December		January.		February.		March.	
	Gauge height	Discharge.	Gauge height	Discharge	Gauge height	Discharge	Gauge height	Discharge.	Gauge height	Discharge.	Gauge height	Discharge
1917-18	Feet.	Sec.-ft.	Feet.	Sec.-ft.	Feet.	Sec.-ft	Feet	Sec.-ft.	Feet	Sec.-ft	Feet	Sec.-ft
1	86·34	34,050	84·89	21,175	84·39	11,700	84·88		85·09		85·19	7,400
2	86·27	33,350	84·81	20,550	85·02	11,650	85 05		85·06		85·22	7,400
3	86·09	31,800	84·94	21,575	85·05	11,600			85·03		85·20	7,400
4	86·10	31,700	84·80	20,475	84·40	11,500			85·05		85·21	7,400
5	85·94	30,150	84 72	19,875	84·49	11,400	85·20		85 02		85·17	7,400
6	86·18	32,475	84 65	19,350	84·54	11,350	85·22		84·99		85·15	7,375
7	86 01	30,825	84 61	19,050	84·60	11,300	85·25		85 01		85·18	7,325
8	85·99	30,625	84·54	18,550	84·68	11,200	85·28		84·98		85·20	7,325
9	85·96	30,350	84·49	18,200	84·70	11,150	85·30		85·00		85·19	7,350
10	85·81	28,950	84· 2	19,125	84·67	11,100	85·33		85·02		85·21	7,400
11	86·07	31,400	84·64	19,275	84·66	11,050	85·31		84·99		85·24	7,500
12	85 70	27,950	84 60	18,975	84·63	11,000	85 35		85 01		85·27	7,600
13	85·61	27,150	84·58	18,825	84·65	10,950	86·34		85 02		85·28	7,700
14	85·71	28,025	84·61	19 050	84·69	10,900	85·36		85·04		85·31	7,800
15	85·66	27,5 5	84·57	18,775	84·70	10,900	85·40		85 05		85·31	7,885
16	85·68	27,750	84·59	18,900	84·67	10,900	85·37		85·07		85·35	8,050
17	85·67	27,650	84·57	18,775	84 69	10,850	86·45		85·10		85·36	8,110
18	85·54	26,525	84·54	18,550	84·81	10,900	85·48		85·12		85·35	8,240
19	85·52	26,350	84·51	18,325	84·96	10,925	85·50		85 09		85·31	8,230
20	85·47	25,925	84·53	18,475	85·04	10,975	85·55		85·13		85·29	8,250
21	85·41	25,675	84·57	18,775	85·17	11,000	85·53		85·11		85·28	8,300
22	85·21	23,750	84·55	18,625	84·88	10,600	85·58		85·10		85·27	8,350
23	85·15	23,250	84·56	18,700	84·92	10,700)	85·72		85·14		85·29	8,400
24	85·17	23,425	84·54	18,550	84, 84	10,508)	85·73		85·12		85·30	8,450
25	85·13	23,100	83·91	14,325	84·82	10,450	85 70		85·15		85·32	8,500
26	85 '1	22,925	83, 88	14,150	84·85	10,400	85·69		85·17		85·31	8,550
27	85·18	23,500	83,64	12,708)	84·80	10,350	85·74		85,18		85·34	8,600
28	85·14	23,175	83·99	12,425	84·75	10,300	85·68		85·21		85·33	8,650
29	85·21	23,750	83·52	12,025	84·33	10,000	85·70				85·36	8,700
30	85·35	24,900	83 48	11,800	84·54	10,100	85·23				85·41	8,800
31	85·12	23,600			84·66	10,150	85·08				85·35	8,900

Day	April.		May.		June		July.		August.		September.	
1	85·29	9,080)	86·42	34,850	86·14	32,100	86·19	32,550	87·50	46,650		
2	85·21	9,100	86·44	35,050	86·06	31,300	86·32	33,850	87·52	46,900		
3	85·19	9,200	86·49	35,550	85·95	30,250	86·29	33,550	87·57	47,580)		
4	85·22	9,300	86·52	35,900	86·01	30,800	86·55	36,200	87·55	47,250		
5	85·10	9,400	86·50	35,650	85·97	30,450	86·62	36,980	87·59	47,750		
6	83·16	9,508)	86·53	36,000	86·22	32,850	86·71	37,850	87·61	48,000		
7	83·19	9,800	86·50	35,650	86·04	31,100	86·67	37,450	87·66	48,600		
8	83, 22	10,200	86,64	37,100	86·04	31,100	86, 84	39,250	87·62	48,100		
9	83·21	10,325	86·68	37,550	86·02	30,900	86·75	38,300	87·47	46,300		
10	83·26	10,575	86 66	37,350	85·97	30, 150	86·90	39,900				
11	83·47	11,750	86·68	37,550	86·12	31,900	86·96	40,550				
12	83·59	12,425	86·69	37,650	85·99	30,650	87·02	41,200				
13	83·73	13,250	86·74	38,150	85·96	30,350	87·06	41,600				
14	83·86	14,025	86·57	36,400	85·85	29,300	87·08	41,850				
15	83·98	14,775	86·46	35,250	85·74	28,300	87·11	42,150				
16	84·13	15,725	86·44	35,050	85·70	27,950	87·24	43,650				
17	84·25	16,525	86·44	35,050	85·97	30,450	87·29	44,200				
18	84·37	17,350	86·33	33,950	86·02	30,900	87·32	44,550				
19	84·51	18,325	86·55	36,200	85·85	29,300	87·28	44,100				
20	84·63	19,200	86·45	35,150	86·04	31,100	87·29	44,200				
21	84·77	20,250	86·43	34,950	86·00	30,750	87·31	44,450				
22	85·06	22,525	86·37	34,350	85·89	29,700	87·39	45,350				
23	85·33	24,750	86·24	33,050	85·98	30,550	87·42	45,700	87·44	45,950		
24	85·57	26,800	86·09	31,600	85·94	29,900	87·56	47,350				
25	85·78	28,650	86·07	31,400	85·95	30,250	87·58	47,600				
26	85·88	29,600	86·09	31,600	85·90	29,800	87·50	46,650				
27	86·03	31,000	86·11	31,800	85·98	30,550	87·49	46,550				
28	86 16	32,250	86·14	32,250	86·21	32,750	87·52	46,900				
29	86·24	33,050	86·18	32,450	86·17	32,350	87·41	45,600				
30	86·35	34,150	86·14	32,100	86·13	32,000	87·43	45,850				
31			86·17	32,350			87·47	46,300				

Notes.—Ice conditions December 1 to April 8, inclusive. 700·00 should be added to gauge heights to reduce to station datum.

Monthly Discharge of Saskatchewan River at Head of Grand Rapids, for years ending September 30, 1917 18.

(Drainage area, 155,100 square miles.)

Month	Discharge in Second-Feet				Run-Off	
	Maximum	Minimum	Mean	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
1916 17						
October	72,000	47,400	61,329	0·397	0·458	3,783,271
November	48,200	25,500	35,700	0·231	0·258	2,129,651
December	25,300	17,600	20,420	0·132	0·152	1,255,57
January			16,000*	0·103	0·118	983,80
February			10,400*	0·067	0·070	577,587
March	9,200	7,800	8,593	0·055	0·063	528,363
April	15,100	8,900	10,603	0·068	0·076	630,922
May	59,000	15,300	36,385	0·235	0·271	2,237,227
June	73,400	59,500	66,580	0·429	0·479	3,961,786
July	81,500	74,600	78,239	0·504	0·581	4,810,729
August	78,000	55,800	67,535	0·435	0·502	4,152,565
September	55,300	34,150	43,872	0·283	0·316	2,610,566
The year	81,500	7,800	38,209	0·246	3·339	27,655,483
1917 18						
October	34,050	22,925	27,446	0·177	0·204	1,687,588
November	21,575	11,800	17,931	0·116	0·129	1,066,968
December	11,700	10,000	10,898	0·070	0·081	670,092
January			9,400*	0·061	0·070	577·983
February			7,600*	0·049	0·051	422,083
March	8,900	7,325	7,979	0·051	0·059	490,609
April	34,150	9,000	17,759	0·115	0·128	1,058,162
May	38,150	31,400	34,805	0·224	0·258	2,140,076
June	32,850	27,950	30,670	0·198	0·221	1,824,992
July	47,600	32,550	42,002	0·271	0·312	2,582,786
August			46,500*	0·300	0·346	2,859,173
The period			18,842	0·121	1·508	13,640,986

Note.—Marked thus * estimated.

FAIRFORD RIVER.

Fairford River at Fairford.

History.—The station was established by G. H. Burnham on June 27, 1912 and has been in continuous operation since that date.

Location of Section.—The metering section is located on the down stream side of the Canadian Northern Railway bridge which crosses the Fairford river at Fairford, two and one-half miles below lake Manitoba.

Drainage Area.—The drainage area of the river above the station is 31,900 square miles.

Channel.—The section is located in a straight stretch of the river, nine hundred feet long. The channel was originally divided by fifteen piers of the bridge but in 1914 the old bridge was replaced by a steel structure resting on piers which divide the channel into four sections. The old piling was entirely removed.

The bed of the channel is gravel and not liable to shift.

The full discharge of the river is confined within the limits of the section at all stages.

Gauge.—A vertical staff gauge is secured to the first bridge pier from the left bank. Records from this gauge up to the end of 1914 were referred to C.N.R.

datum, but during an M.H.S. reconnaissance survey of the river in 1913 the gauge was tied in to M.H.S. datum, and records following the end of 1914 were referred to the latter datum. In this report all records obtained at this station since its establishment have been reduced to M.H.S. datum.

Discharge Measurements.—Since the station was established, discharge measurements have been obtained over a range in gauge height of 801·51 to 805·76, corresponding to a range in discharge of 2,700 to 8,000 c.f.s.

Records Available.—A continuous record of daily gauge height with accompanying estimated daily discharge is available from June 28, 1912 to September 30, 1918.

Estimates of daily and mean monthly discharge for the above periods are also available.

Accuracy.—The discharge curve is fairly well defined over the entire range covered by the observed gauge heights.

Discharge Measurement of Fairford River, at Fairford, for 1918.

Date	Gauge Height	Discharge	Remarks
1918	Feet	Sec. ft.	
March 5	802·88	2,094·1	

Daily Discharge in Second Feet of Fairfoot River, at Fairford, for part of year ending September 30, 1912 and year ending September 30, 1913.

[Drainage area, 31,900 square miles.]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.
1911 12												
1										9,090	7,470	8,240
2										10,525	7,260	7,920
3										5,680	7,850	7,920
4										7,850	8,240	7,100
5										7,120	9,090	7,550
6										7,850	8,650	10,125
7										7,550	8,240	8,320
8										7,470	7,850	7,550
9										6,910	7,850	7,920
10										7,850	8,240	7,550
11										5,050	8,240	7,920
12										7,700	8,910	7,700
13										8,240	8,310	6,520
14										6,910	7,470	3,620
15										8,840	8,240	6,210
16										9,270	8,400	6,840
17										7,290	8,240	7,550
18										8,240	8,480	7,770
19										8,240	7,470	8,320
20										7,470	7,470	8,160
21										7,470	8,000	7,920
22										7,680	6,450	7,920
23										7,470	7,470	7,190
24										7,400	7,470	6,520
25										7,470	7,850	6,710
26										7,850	8,240	6,710
27										8,000	7,850	7,400
28										8,240	7,470	6,840
29										8,650	9,540	8,240
30										7,850	11,050	7,190
31										7,470	9,540	
1912 13												
1	8,240	7,190	6,810	6,810	5,910	5,200	6,760	6,210	7,550	7,550	9,090	8,120
2	8,240	7,550	6,490	5,940	5,360	5,680	6,710	6,520	7,550	8,740	8,740	8,120
3	7,920	7,920	6,780	6,000	5,330	5,650	6,060	6,840	7,190	7,920	8,320	7,770
4	8,160	7,550	6,780	5,910	5,280	6,300	6,750	7,190	7,920	8,320	8,740	8,530
5	8,160	7,550	6,120	5,550	5,630	5,650	6,780	7,190	7,550	8,320	8,320	9,180
6	7,550	7,920	6,120	5,380	5,910	5,710	6,840	7,190	6,840	8,740	8,320	8,960
7	6,520	8,320	6,330	5,710	6,120	6,060	6,840	7,050	7,190	8,740	9,180	8,740
8	8,740	7,190	6,390	6,150	5,880	6,150	6,840	6,840	7,920	9,640	9,180	8,560
9	6,080	7,550	6,950	6,180	5,710	6,580	6,840	6,840	9,180	7,920	7,550	11,450
10	8,740	8,080	6,240	5,460	5,680	6,030	6,840	7,190	10,125	8,320	7,550	7,850
11	7,770	7,550	5,970	5,380	5,330	5,880	6,840	7,920	9,610	10,125	8,740	9,640
12	7,190	7,190	6,270	5,410	6,120	6,270	6,840	7,770	8,740	9,180	8,320	8,120
13	7,850	6,210	6,580	5,770	6,180	5,680	6,840	6,840	7,920	9,840	8,740	7,920
14	6,840	7,370	6,810	5,910	5,520	5,710	6,840	7,190	8,320	9,180	7,920	9,180
15	7,770	7,330	6,680	5,940	6,120	5,910	7,190	7,920	8,320	9,840	8,740	8,530
16	8,160	7,260	6,780	5,650	5,940	5,940	7,190	7,920	7,920	10,125	8,740	8,120
17	7,920	7,370	6,840	5,360	6,240	5,970	7,190	7,190	7,190	9,640	7,700	8,240
18	7,920	7,700	6,740	5,710	6,090	5,600	7,190	6,520	7,920	9,180	7,550	8,01
19	6,810	7,480	6,650	5,410	5,820	5,520	7,190	7,190	7,550	8,320	8,400	8,...
20	7,190	7,550	6,240	5,030	5,790	5,680	7,190	7,550	7,550	8,740	9,090	7,...
21	7,190	7,400	6,180	5,250	5,850	5,740	7,190	7,550	7,920	8,740	8,...	8,...
22	7,550	7,330	6,550	5,680	5,880	5,910	7,190	7,190	8,320	8,740	8,...	9,...
23	8,740	7,220	6,680	5,410	6,060	5,850	7,190	7,190	8,320	7,920	7,...	9,...
24	9,180	7,260	6,680	5,600	6,060	5,600	6,840	6,840	9,180	8,740	7,...	7,...
25	8,740	7,190	6,520	5,680	5,280	5,880	6,840	7,920	8,740	8,740	8,480	7,260
26	7,920	7,120	6,420	5,710	5,440	5,940	6,840	7,920	7,550	8,320	7,920	6,520
27	8,320	6,950	6,810	5,880	5,680	6,180	6,940	7,920	7,920	8,320	8,530	7,700
28	7,190	7,050	6,910	6,210	5,490	6,680	6,980	7,550	7,550	8,740	8,740	7,...
29	8,740	6,980	6,710	6,210		6,710	7,190	7,920	8,320	8,740	7,770	7,...
30	6,840	7,080	6,710	5,160		6,520	6,520	7,920	8,740	8,740	8,550	7,...
31	6,210		6,550	5,370		6,780		7,920		8,740	7,700	

NOTE.—Ice conditions from November 14, 1912, to April 5, 1913.

Daily Discharge in Second Feet of Fairford River, at Fairford, for years ending September 30, 1914 15.

(Discharge area, 11,900 square miles.)

Day	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept
1913 14												
1	7,360	7,220	6,710	6,120	5,630	5,570	5,460	6,050	6,360	6,240	6,680	5,440
2	7,370	7,220	6,750	6,330	5,820	5,630	5,200	5,940	6,950	6,550	6,240	4,210
3	7,190	7,010	6,710	6,020	5,360	5,820	5,263	5,940	6,760	6,490	6,180	1,640
4	6,880	6,880	6,810	6,120	5,250	5,910	5,180	5,940	6,300	6,240	5,940	4,090
5	5,630	7,220	6,810	6,300	5,100	5,970	5,250	5,940	7,370	6,880	6,550	4,150
6	6,210	7,050	6,950	6,150	5,080	5,550	5,230	6,120	7,880	7,580	5,380	4,190
7	7,920	6,240	7,330	6,180	5,010	5,440	5,080	6,240	7,580	6,240	5,310	4,130
8	7,010	5,650	7,330	6,020	5,130	5,320	5,150	6,240	7,330	6,120	6,180	4,315
9	6,910	5,650	7,220	5,880	5,050	5,440	5,410	6,300	7,220	6,810	5,630	5,110
10	5,360	5,710	6,880	5,910	4,925	5,150	5,280	5,940	7,440	6,350	4,880	5,540
11	6,840	6,180	6,750	5,880	4,880	5,440	5,380	5,940	6,680	6,240	5,130	5,130
12	6,360	6,330	6,710	5,790	5,100	5,460	5,520	6,240	6,000	6,880	5,630	5,230
13	6,710	11,000	6,580	5,940	5,410	5,600	5,680	5,940	6,490	6,240	5,820	5,660
14	7,920	5,880	6,490	6,090	5,180	5,520	5,650	5,940	6,360	6,680	6,615	7,050
15	7,010	6,180	6,490	6,090	5,330	5,740	5,650	6,550	6,240	6,880	4,510	6,880
16	6,840	6,750	6,490	6,050	5,410	5,380	5,650	6,710	6,880	7,220	5,130	5,940
17	7,190	6,850	6,550	5,970	5,210	5,140	5,940	6,740	6,810	5,650	5,000	5,130
18	7,330	6,810	6,390	6,050	5,200	5,080	5,940	6,880	6,640	6,240	4,855	5,540
19	6,050	6,710	6,490	6,120	1,785	5,130	5,650	6,360	6,240	6,420	4,880	5,660
20	5,630	6,880	6,180	5,880	5,280	5,250	5,940	9,690	6,550	5,940	5,100	5,080
21	6,210	6,850	5,850	5,740	5,030	5,000	5,940	6,050	5,940	6,550	4,645	4,510
22	7,010	6,880	6,050	5,820	4,785	5,080	6,050	5,650	6,550	6,880	4,555	4,130
23	7,100	6,850	5,940	5,850	5,030	5,130	5,940	6,240	6,880	6,240	4,295	4,190
24	7,010	6,850	5,540	5,710	5,550	5,100	5,940	6,710	5,940	6,240	4,425	4,315
25	7,190	6,850	5,520	5,680	5,550	4,975	6,090	6,880	6,050	6,550	4,715	4,295
26	6,520	6,880	5,850	5,740	5,680	4,905	6,050	6,740	5,940	6,680	4,645	4,425
27	6,520	6,880	5,940	5,740	5,880	4,950	5,940	6,550	6,240	6,550	4,810	4,975
28	7,190	6,940	5,970	5,880	5,100	5,200	5,940	7,010	5,940	6,080	4,925	4,735
29	6,880	6,810	6,360	5,880		5,100	6,120	7,220	6,240	7,290	5,280	4,465
30	7,370	6,780	6,490	5,630		5,280	5,940	6,880	6,300	6,520	5,130	4,645
31	7,470		6,020	5,710		5,130		6,740		6,810	5,280	
1914 15												
1	5,360	4,820	3,955	3,380	3,415	4,205	2,710	2,790	2,960	3,235	2,460	2,140
2	4,210	4,880	3,875	3,235	3,330	2,660	2,915	2,705	3,220	2,685	2,555	2,000
3	3,345	4,555	3,855	3,710	1,620	2,875	2,980	2,820	2,900	2,555	2,845	1,905
4	3,820	3,820	3,785	3,895	3,000	3,065	3,020	2,845	3,080	2,435	2,820	2,100
5	1,090	3,745	3,895	3,905	3,220	3,065	3,020	2,205	3,300	2,660	2,980	2,230
6	4,425	4,010	3,980	3,820	3,035	2,930	2,900	2,505	3,320	2,685	2,820	2,205
7	4,315	3,640	3,935	3,745	3,380	3,020	2,930	2,435	2,530	2,900	2,555	2,230
8	4,465	4,010	3,840	3,605	3,365	2,980	3,020	1,810	2,300	3,020	2,580	1,810
9	4,555	4,210	3,515	3,500	3,345	2,980	3,050	2,435	2,820	3,104	2,605	1,380
10	4,210	4,255	3,570	3,915	3,300	2,945	3,050	2,605	2,820	2,960	2,765	2,275
11	3,640	4,010	3,550	3,600	3,265	3,095	2,930	2,820	2,980	3,250	2,875	2,295
12	3,820	4,030	3,675	3,785	3,155	3,155	2,960	2,555	2,875	3,265	2,630	2,000
13	4,170	4,010	3,550	3,895	2,820	3,265	2,980	2,685	2,765	3,020	2,605	2,040
14	4,645	3,980	3,265	3,605	3,415	3,285	3,095	2,555	3,065	2,555	2,555	1,885
15	5,130	3,875	3,330	3,465	3,220	3,020	3,095	2,205	3,170	2,555	2,735	2,530
16	5,280	3,980	3,430	3,115	3,065	3,050	2,980	2,205	2,685	2,685	2,685	1,365
17	1,315	3,535	3,640	3,585	3,220	3,185	3,020	1,905	2,900	2,555	2,580	2,295
18	1,625	3,585	3,785	3,585	3,330	2,915	3,050	2,630	2,930	2,660	2,710	2,100
19	1,555	3,905	3,745	3,655	3,300	2,980	2,980	2,820	3,065	2,710	2,820	2,110
20	1,645	3,980	3,675	3,995	3,450	2,945	2,900	2,945	3,110	2,830	2,765	1,690
21	4,600	3,895	3,700	3,110	3,465	2,980	2,980	2,845	3,095	2,820	2,505	1,905
22	4,555	3,785	3,865	3,050	3,380	2,980	2,820	2,960	3,110	2,900	2,555	2,320
23	4,425	3,980	3,250	2,960	2,915	3,185	2,820	2,710	2,710	2,435	1,420	1,925
24	4,600	4,150	4,205	3,005	3,110	2,975	2,685	2,765	3,020	2,685	2,320	1,850
25	4,820	4,275	3,845	2,830	3,170	2,595	2,875	2,685	3,095	2,960	1,810	2,100
26	1,125	3,980	4,430	2,820	2,860	2,710	2,960	2,960	3,110	3,050	2,100	1,980
27	1,435	3,875	3,480	2,710	3,035	3,050	3,110	3,265	3,265	3,080	2,320	2,100
28	3,800	4,210	535	2,885	3,445	3,080	2,765	3,330	3,020	3,095	2,960	2,165
29	4,090	4,275	3,418	2,685		2,605	2,875	3,110	3,395	2,605	1,590	2,110
30	4,130	3,915	3,395	3,005		2,790	2,555	2,980	3,095	2,505	1,405	2,130
31	4,295		3,515	3,235		2,790		2,980		2,695	2,100	

Note.—Ice conditions from November 9, 1913, to April 18, 1914.

Daily Discharge in Second-feet of Fairford River at Fairford for years ending September 30, 1916-17.

[Drainage area, 31,900 miles square.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	2,320	1,640	1,665	1,505	1,420	1,370	1,700	2,100	2,040	3,170	3,285	2,205
2	2,205	1,960	1,855	1,600	1,480	1,410	1,545	2,100	2,205	2,960	3,110	2,165
3	2,140	2,020	1,810	1,610	1,445	1,475	1,705	2,090	2,295	3,110	3,235	2,000
4	1,905	2,060	1,905	1,650	1,490	1,495	1,625	2,000	1,410	3,265	2,960	2,120
5	2,100	2,320	1,905	1,480	1,475	1,575	1,540	2,020	2,250	3,605	2,900	2,820
6	1,460	2,205	1,925	1,410	1,460	1,655	1,530	2,0[illegible]	2,555	3,110	2,685	2,710
7	1,725	2,100	2,000	1,495	1,405	1,630	1,575	2,080	2,495	2,710	2,845	2,435
8	1,775	1,725	1,925	1,555	1,515	1,525	1,615	1,850	2,685	2,960	2,900	2,340
9	2,930	1,515	1,875	1,630	1,445	1,625	1,750	2,100	2,555	3,080	3,265	2,390
10	2,140	2,080	1,840	1,560	1,400	1,580	1,740	1,420	2,445	2,960	2,630	2,435
11	2,320	2,000	1,765	1,525	1,445	1,610	1,750	1,760	2,685	3,110	2,990	3,430
12	2,435	1,875	1,840	1,340	1,435	1,760	1,420	1,960	2,750	3,020	2,765	2,735
13	2,100	1,850	1,630	1,360	1,420	1,540	1,775	2,000	2,820	2,960	2,875	1,355
14	2,185	1,885	1,575	1,420	1,615	1,515	1,795	2,205	2,435	3,235	2,845	1,055
15	2,205	1,830	1,740	1,460	1,740	1,615	1,855	2,000	2,205	3,265	2,820	1,640
16	2,230	1,740	1,940	1,460	1,840	1,405	1,795	1,560	2,000	2,990	3,080	1,740
17	2,250	1,940	1,680	1,665	1,895	1,615	1,765	1,795	2,205	3,110	2,735	2,000
18	2,230	1,950	1,630	1,610	1,585	1 530	1 750	1,690	2,100	3,300	2,710	2,060
19	2,365	1,970	1,615	1,665	1,715	1,545	1,850	1,940	2,060	4,170	3,110	2,140
20	2,435	1,910	1,740	1,750	1,675	1,740	1,830	2,100	2,120	3,265	3,365	1,850
21	2,000	1,930	1,765	1,725	1,700	1,600	1,865	2,100	2,329	3,110	2,685	1,575
22	1,905	1,785	1,840	1,515	1,575	1,495	2,000	2,275	2,205	2,960	2,765	1,775
23	2,050	1,925	1,810	1,540	1,680	1,560	2,000	2,205	1,640	3,990	2,555	1,980
24	2,100	1,925	1,775	1,590	1,525	1,725	2,060	2,100	2,250	3,080	2,460	2,000
25	1,625	1,925	1,785	1,510	1,630	1,640	2,020	2,020	2,555	3,020	2,000	2,090
26	1,810	1,850	1,600	1,460	1,615	1,530	2,040	2,100	2,485	2,790	2,100	2,000
27	2,435	1,940	1,515	1,555	1,510	1,690	2,000	2,805	2,435	2,820	2,320	1,940
28	1,905	1,960	1,750	1,570	1,545	1,795	2,020	2,505	2,685	3,080	2,485	1,905
29	2,120	1,840	1,690	1,715	1,340	1,775	2,000	2,165	2,805	2,960	1,960	2,165
30	2,000	1,660	1,615	1,480	.....	1,765	2,000	2,205	3,430	2,990	2,320	2,320
31	2,660	.....	1,715	1,435	.....	1,705	.....	2,485	.....	2,820	1,610	.....
1916–17												
1	2,710	2,375	2,260	2,080	1,805	2,060	2,270	2,[illegible]0	2,485	2,250	2,205	2,660
2	1,740	2,355	2,215	2,090	1,715	2,040	2,215	2,[illegible]35	2,100	2,100	2,485	2,390
3	1,640	2,460	2,270	2,140	1,620	1,810	2,215	2,435	2,390	2,250	2,620	2,365
4	2,140	2,295	2,425	1,865	1,875	1,875	2,240	2,435	2,165	2,735	2,960	2,630
5	2,305	2,470	2,260	1,820	1,930	2,130	2,215	2,435	2,555	2,710	2,990	2,320
6	2,555	2,605	2,120	2,040	2,165	2,230	2,355	2,435	2,505	2,960	2,750	2,390
7	1,905	2,425	2,270	1,940	2,130	2,185	2,260	2,435	2,555	2,990	2,710	2,710
8	2,275	2,270	2,110	2,090	1,885	2,070	2,460	2,390	2,555	2,295	2,275	2,250
9	2,230	2,285	2,070	1,925	1,805	2,215	2,400	2,390	2,990	2,555	2,685	2,285
10	2,605	2,185	2,110	1,830	1,850	2,100	2,425	2,435	2,620	2,805	2,435	2,605
11	2,530	2,165	2,030	1,775	1,775	2,070	2,305	2,400	2,205	2,900	2,695	2,710
12	2,260	2,050	1,970	1,970	1,970	2,060	2,260	2,390	2,605	2,820	2,630	2,435
13	2,320	2,050	1,915	1,905	2,070	2,305	2,330	2,425	2,570	2,805	2,620	2,435
14	2,100	2,165	1,875	1,680	2,215	2,150	2,330	2,320	1,810	2,555	2,875	2,460
15	2,435	2,185	1,850	1,730	2,230	2,230	2,410	2,410	1,355	2,555	2,630	2,555
16	2,445	2,250	1,925	1,925	2,110	2,090	2,355	2,435	2,230	2,765	2,710	2,605
17	2,295	2,185	1,830	2,060	1,840	2,130	2,400	2,435	2,505	2,845	2,660	2,630
18	2,100	2,320	1,805	2,020	1,795	2,930	2,400	2,960	1,905	3,020	2,630	1,355
19	1,355	2,260	1,750	1,980	1,760	2,165	2,425	2,230	2,960	2,900	2,605	2,435
20	2,365	2,260	1,765	1,795	1,765	2,240	2,330	2,205	2,040	2,990	2,505	2,605
21	2,320	2,285	1,895	1,865	2,050	2,195	2,330	2,320	2,425	3,430	2,685	2,685
22	1,925	2,295	1,950	1,840	1,925	2,355	2,375	2,230	2,375	2,875	2,320	2,670
23	2,505	2,305	1,930	1,865	1,855	2,285	2,435	2,365	2,530	2,990	2,140	2,750
24	2,570	2,070	1,820	1,750	1,760	2,285	2,435	2,410	2,580	3,110	2,320	2,900
25	2,435	2,080	1,830	1,775	1,905	2,285	2,435	2,000	2,605	3,585	2,410	2,470
26	2,530	2,295	2,080	1,810	1,960	2,355	2,435	2,205	2,790	3,110	2,435	2,250
27	2,140	2,230	2,100	2,040	1,950	2,185	2,410	2,320	2,900	3,330	2,645	2,555
28	2,390	2,320	1,990	2,205	2,030	2,410	2,410	2,435	2,685	2,900	2,250	2,820
29	2,390	2,230	1,925	1,850	.....	2,260	2,375	2,400	2,805	2,990	2,555	2,580
30	2,390	2,285	1,875	1,795	.....	2,375	2,390	2,090	2,960	3,605	2,990	2,365
31	2,425	.....	2,040	1,750	.....	2,340	.....	2,205	.....	2,960	2,685	.....

NOTE.—Ice conditions from November 12, 1915, to April 21, 1916, and from October 28, 1916, to April 22, 1917.

Daily Discharge in Second-feet of Fairford River at Fairford, for year ending September 30, 1918.

[Drainage area, 31,900 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1917-18												
1	2,790	2,435	2,130	2,175	2,150	2,285	2,250	2,320	2,000	3,570	2,685	2,820
2	2,435	2,425	2,260	2,120	2,000	2,295	2,205	2,410	2,605	2,685	3,020	2,875
3	2,505	2,425	2,160	2,230	1,930	2,355	2,365	2,020	2,555	2,790	3,050	2,435
4	2,205	2,495	2,020	2,195	1,895	2,150	2,385	2,960	2,645	2,960	2,975	2,505
5	1,355	2,435	2,110	2,130	2,175	2,090	2,435	2,385	2,960	2,670	2,875	2,820
6	2,250	2,410	2,130	1,990	2,090	2,110	2,425	2,100	2,765	2,505	2,975	2,660
7	2,230	2,425	2,080	1,925	2,160	2,160	2,410	2,320	2,735	2,685	3,020	2,685
8	2,435	2,425	1,960	1,930	2,215	2,040	2,400	2,410	2,645	2,930	3,110	1,810
9	1,905	2,375	2,000	2,110	2,240	2,010	2,425	2,020	2,820	2,685	3,205	2,570
10	2,790	2,340	1,915	2,000	2,215	2,215	2,495	2,040	3,080	2,750	3,605	3,110
11	2,205	2,275	2,060	2,040	2,175	2,175	2,460	2,580	2,750	2,960	2,790	2,630
12	2,485	2,355	1,925	2,020	2,090	2,240	2,435	2,435	2,820	2,975	2,340	2,820
13	2,205	2,355	1,950	2,090	2,020	2,215	2,445	2,320	2,580	3,110	2,765	2,710
14	2,320	2,330	1,925	2,295	1,950	2,160	2,505	2,100	2,685	3,050	2,805	2,555
15	2,000	2,375	2,070	2,120	1,990	2,215	2,485	2,205	2,820	2,435	2,685	2,435
16	2,275	2,340	2,185	2 260	1 930	2 330	2 435	2 185	2 765	2 735	2 685	2 205
17	2 485	2 355	2,215	2,090	2,110	2,230	2,410	2,100	2,960	2,975	2,820	2,320
18	2,445	2,340	2,130	2,215	1,970	2,340	2,435	2,505	2,945	2,960	3,110	2,275
19	1,355	2,330	2,195	2,205	1,915	2,375	2,445	2,820	3,020	2,435	3,235	2,250
20	2,205	2,400	2,050	2,175	1,950	2,195	2,485	2,410	3,605	2,555	3 095	2 435
21	2 435	2 425	2 110	2,130	2,010	2,230	2,505	2,305	2,685	2,660	3,110	2,685
22	1,355	2,330	2,205	1,960	2,175	2,260	2,435	2,410	2,790	2,710	2,610	2,205
23	3,020	2,340	2,185	2,130	2,305	2,375	2,205	2,560	2,900	2,990	2,990	2,320
24	2,765	2,260	1,950	2,195	2,340	2,285	2,340	2,000	2,735	2,435	3,205	2,460
25	2,900	2,195	1,925	1,925	2,090	2,330	1,830	2,020	2,820	2,700	3,110	2,495
26	2,485	2,320	1,960	1,855	2,205	2,340	1,530	2,205	2,805	2,685	3,020	2,685
27	2,205	2,340	1,895	2,040	2,070	2,365	2,320	2,400	3,605	2,765	3,270	2,765
28	2,460	2,330	1,925	2,070	2,175	2,385	2,275	2,560	2,485	2,485	3,140	2,385
29	2,695	2,320	1,895	1,915	.....	2,355	2,000	2,685	2,385	2,700	2,960	2,205
30	2,765	2,205	2,120	1,875	.....	2,305	2,385	3,130	2,365	2,960	2,845	2,020
31	2,445		2,110	1,875	.....	2,285		3,125		2,950	2,930	.....

NOTE. Ice conditions November 2 to April 1, inclusive.

Monthly Discharge of Fairford River, at Fairford, for part of 1912 and years ending September 30, 1913-15.

[Drainage area 31,900 square miles.]

Month	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1912						
July	10,525	5,050	7,752	0·247	0·280	476,652
August	11,050	5,310	8,061	0·253	0·292	495,652
September	10,125	3,620	7,451	0·234	0·261	443,365
The period	11,050	3,620	7,758	0·243	0·831	1,435,338
1912-13						
October	9,180	6,080	7,755	0·243	0·280	476,837
November	8,320	6,210	7,380	0·231	0·258	439,140
December	6,950	5,970	6,558	0·205	0·236	403,232
January	6,810	5,030	5,720	0·179	0·206	351,710
February	6,240	5,280	5,775	0·181	0·188	320,728
March	6,780	5,200	5,966	0·187	0·216	366,839
April	7,190	6,520	6,913	0·217	0·242	411,349
May	7,920	6,210	7,320	0·229	0·264	450,090
June	10,125	7,190	8,076	0·253	0·282	480,357
July	10,125	7,550	8,891	0·279	0·322	546,682
August	9,180	7,550	8,324	0·261	0·301	511,826
September	11,450	5,910	8,041	0·252	0·281	478,470
The year	11,450	5,030	7,235	0·227	3·981	5,236,656
1913-14						
October	9,880	5,360	6,942	0·218	0·251	426,843
November	7,220	5,650	6,632	0·208	0·232	394,629
December	7,330	5,520	6,449	0·202	0·233	396,533
January	6,330	5,630	5,944	0·186	0·214	365,486
February	5,880	4,785	5,243	0·164	0·171	291,177
March	5,970	4,905	5,347	0·168	0·194	328,770
April	6,120	5,080	5,644	0·177	0·198	335,838
May	9,690	5,650	6,452	0·202	0·233	396,723
June	7,890	3,640	6,489	0·203	0·227	386,126
July	7,580	5,650	6,532	0·205	0·236	401,633
August	6,680	4,295	5,239	0·164	0·189	322,133
September	7,050	3,640	4,874	0·153	0·171	290,028
The year	9,880	3,640	5,989	0·188	2·552	4,334,808
1914-15						
October	5,360	3,345	4,349	0·136	0·157	267,413
November	4,880	3,535	3,988	0·125	0·139	237,306
December	3,990	3,205	3,590	0·113	0·130	220,740
January	3,935	2,685	3,381	0·106	0·122	207,891
February	3,730	2,820	3,272	0·103	0·107	181,721
March	3,285	2,595	2,975	0·093	0·107	182,927
April	3,110	2,555	2,935	0·092	0·103	174,648
May	3,330	1,810	2,679	0·084	0·097	164,723
June	3,395	2,320	2,962	0·093	0·104	176,249
July	3,265	2,435	2,813	0·088	0·102	172,964
August	2,990	1,390	2,479	0·078	0·090	152,423
September	2,530	1,365	2,036	0·064	0·071	121,147
The year	5,360	1,365	3,122	0·098	1·330	2,259,688

Monthly Discharge of Fairford River, at Fairford, for years ending September 30, 1916-18.

[Drainage area 31,900 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1915-16.						
October	2,930	1,460	2,131	0·067	0·077	131,031
November	2,320	1,515	1,911	0·060	0·067	113,710
December	2,000	1,515	1,765	0·055	0·063	108,527
January	1,750	1,340	1,543	0·048	0·055	94,874
February	1,895	1,340	1,552	0·049	0·053	89,275
March	1,795	1,370	1,597	0·050	0·058	98,200
April	2,060	1,420	1,764	0·055	0·061	104,968
May	2,605	1,420	2,051	0·064	0·074	126,111
June	3,430	1,410	2,372	0·074	0·083	141,139
July	4,170	2,710	3,128	0·099	0·114	192,332
August	3,365	1,610	2,724	0·085	0·098	167,496
September	3,430	1,055	2,112	0·066	0·074	125,669
The year.	4,170	1,055	2,060	0·064	0·871	1,495,102
1916-17.						
October.	2,710	1,355	2,269	0·071	0·082	139,513
November	2,605	2,050	2,267	0·071	0·079	134,897
December	2,425	1,750	2,008	0·063	0·073	123,467
January	2,205	1,680	1,910	0·060	0·069	117,440
February	2,230	1,715	1,916	0·060	0·063	106,413
March	2,375	1,810	2,175	0·068	0·078	133,737
April	2,435	2,215	2,354	0·074	0·083	140,068
May	2,960	2,000	2,360	0·074	0·085	145,110
June	2,990	1,255	2,459	0·077	0·086	146,326
July	3,605	2,100	2,861	0·090	0·104	175,911
August	2,990	2,140	2,584	0·081	0·093	158,886
September	2,900	1,355	2,496	0·078	0·087	148,527
The year.	3,605	1,355	2,308	0·072	0·983	1,670,519
1917-18.						
October	2,790	1,355	2,339	0·073	0·084	143,819
November	2,495	2,195	2,357	0·074	0·083	140,251
December	2,260	1,895	2,056	0·064	0·074	126,418
January	2,295	1,855	2,074	0·065	0·075	127,525
February	2,340	1,895	2,091	0·066	0·069	116,128
March	2,385	2,010	2,248	0·070	0·081	138,224
April	2,505	1,532	2,339	0·073	0·081	139,180
May	3,125	2,000	2,388	0·075	0·086	146,832
June	3,605	2,000	2,778	0·087	0·097	165,302
July	3,570	2,435	2,790	0·087	0·100	171,550
August	3,605	2,340	2,969	0·093	0·107	182,557
September	3,116	1,810	2,505	0·079	0·088	149,058
The year	3,605	1,532	2,413	0·076	1·032	1,746,932

TRIBUTARIES OF LAKE WINNIPEG FROM THE EAST.

Brokenhead River at Sinnot.

Station No. 5 S_1.

History.—The station was established by G. H. Burnham on May 30, 1912 and since that date has been in practically continuous operation.

Location of Section.—The metering section is located in the S.E. $\frac{1}{4}$ Sec. 32, Tp. 12, Rge. 8, E.P.M., on the downstream side of the traffic bridge across the Brokenhead river, nine hundred feet north-east of the Canadian Pacific Railway station at Sinnot.

Drainage Area.—The drainage area of the river above the station is 530 square miles.

Channel.—The section is located in the centre of a straight stretch of the river about six hundred feet long.

The bed of the channel is of clay and boulders and fairly permanent. The full discharge of the river is confined within the limits of the banks at all stages.

Gauge.—A vertical staff gauge is secured to a pile on the downstream side of the bridge and is referred to a permanent M.H.S. bench-mark, located twenty-three feet south-east of the bridge. This bench-mark is set to an arbitrary datum.

Discharge Measurements.—Since the station was established, discharge measurements have been obtained over a range in gauge height of 90.41 to 95.36 corresponding to a range in discharge of 3 to 1,100 c.f.s.

Records Available.—Continuous records of daily gauge height have been obtained for the following periods:—From June 8 to November 30, 1912; from April 29 to November 30, 1913, and from April 2, 1914 to September 30, 1918; with the exception of from the 7th to the 10th of April 1914. Intermittent records were also obtained during December of 1912.

Based on these gauge heights, estimates of daily discharge are available for the open-water periods.

Estimates of mean monthly flow based on gauge heights and actual discharge measurements are also available for the whole of the above periods.

Accuracy.—For the open-water seasons, the discharge curve is well defined between gauge heights 90.3 and 92.5, from 92.5 to 95.5 it is fairly well defined.

Discharge Measurements of Brokenhead River, at Sinnot, during 1917-18.

[Drainage area, 530 square miles].

Date.	Gauge Height.	Discharge.	Remarks.	Date.	Gauge Height.	Discharge.	Remarks.
1917.	Feet.	Sec.-ft.		1918.	Feet.	Sec.-ft.	
Jan. 10	91·25	1·6	Ice cover.	Feb. 7	91·07	0·4	Ice cover.
Feb. 3	91·65	0·0	Ice cover.	May 11	91·06	37·9	.....
Mar. 6		5·3	Ice cover.	June 5	92·54	226·3	.....
Apr. 27	93·13	369 0		June 28	91·24	43 9	.....
May 16	92·18	175 0		Aug. 10	91·49	61·9	.....
June 8	90·92	29·7		Sept.24	90·90	21·1	.....
July 11	90·96	24·8					
Nov.28	91·17	27·4	Ice cover.				
Dec. 31..	90·57	1·2	Ice cover.				

Daily Discharge in Second Feet of Brokenhead River at Sinnot for part of year ending September 30, 1917 and year ending September 30, 1918.

[Drainage area 530 square miles.]

Day.	Oct	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17.												
1								342	47	27	26	26
2								322	42	26	25	25
3								313	37	23	24	24
4								301	35	21	23	23
5								294	32	25	23	23
6								297	30	24	23	22
7								292	29	24	24	21
8							10	251	27	23	27	19
9							11	238	26	23	34	16
10							12	228	25	19	32	17
11							29	219	24	29	30	16
12							50	209	35	27	27	15
13							78	198	41	27	24	23
14							116	189	53	26	21	24
15							159	182	55	26	23	23
16							209	172	57	23	22	22
17							271	165	52	23	17	21
18							340	154	45	21	16	21
19							418	142	44	20	14	37
20							435	133	40	19	12	38
21							471	121	39	18	11	35
22							468	112	37	15	10	32
23							462	108	36	12	15	30
24							450	102	40	12	18	29
25							423	87	39	11	14	28
26							401	80	37	21	13	27
27							373	74	35	19	13	26
28							357	67	33	17	22	25
29							357	63	32	14	24	24
30							350	56	30	23	26	22
31								49		23	27	
1917-18.												
1		21	22	20		2	145	80	143	47	137	37
2		19	23	19		3	148	72	193	46	128	36
3		20	24	17		3	148	62	247	45	126	34
4		20	25	13		3	146	56	267	43	118	33
5		20	28	10		3	143	53	249	40	100	33
6		19	30	7		3	135	50	228	38	88	32
7		19	38	4		3	112	47	224	45	75	30
8		18	45	1		3	96	44	224	55	63	29
9		18	55	1		3	88	41	222	51	62	27
10		19	55	2		3	94	39	207	49	75	25
11		19	57	2		3	96	37	191	45	77	29
12		20	58			4	100	37	172	43	78	30
13		20	59			4	98	33	164	45	80	30
14		20	60			4	86	32	146	53	73	28
15		21	60			4	80	30	133	58	65	27
16		19	63			5	76	30	128	63	64	26
17		24	72			6	73	29	104	77	77	26
18		27	72			8	69	27	98	75	74	28
19		29	86			10	66	30	87	66	77	30
20		30	65			20	63	29	83	61	76	30
21		33	66			30	61	27	74	52	73	30
22		35	63			51	57	37	75	51	64	27
23		37	50			73	52	37	76	40	62	26
24		35	42			98	52	44	65	41	58	26
25		34	25			129	52	62	58	42	53	25
26		32	26			130	58	64	55	54	47	25
27		28	26			133	59	72	52	93	46	24
28		25	27			136	68	69	51	105	45	21
29		22	28			137	75	66	49	116	40	18
30		20	24			140	80	63	47	137	37	18
31		21				142		58		140	33	

NOTE.—Ice conditions for 1917, January 1 to 18, inclusive; for 1917-18, October 24 to April 2, inclusive.

Monthly Discharge of Brokenhead River at Sinnot for years ending September 30, 1917-18.

[Drainage area 530 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
1916-17.						
October	133	52	78	0·147	0·169	4,796
November			90*	0·170	0·190	5,355
December			10*	0·019	0·022	615
January			2*	0·004	0·005	123
February			2*	0·004	0·004	111
March			6*	0·011	0·013	369
April	471	10	210*	0·396	0·442	12,498
May	342	49	179	0·338	0·390	11,006
June	57	24	38	0·072	0·080	2,261
July	29	11	21	0·040	0·046	1,291
August	34	10	21	0·040	0·046	1,291
September	38	15	24	0·045	0·050	1,428
The year	471	0	57	0·107	1·452	41,256
1917-18.						
October	37	18	24	0·045	0·052	1,476
November	86	22	46	0·087	0·097	2,737
December	20	0	4*	0·008	0·009	246
January	4	0	1*	0·002	0·002	61
February			0*			
March						
April	142	2	42	0·079	0·091	2,582
May	148	52	89	0·168	0·187	5,296
June	80	27	47	0·089	0·103	2,890
July	267	47	137	0·258	0·288	8,132
August	140	38	62	0·117	0·135	3,812
September	137	33	73	0·138	0·139	4,489
The year	37	18	28	0·053	0·059	1,666
	267	0	46	0·087	1·181	33,375

NOTE. Marked thus (*) estimated.

MANIGOTAGAN RIVER ABOVE WOOD FALLS.

Station No. 5 RA_1.

History.—The station was established by G. J. Lamb on December 21, 1912, and from that time to the end of 1916 has been in practically continuous operation.

Location of Section.—The metering section is located two hundred feet above Wood falls, which are the first falls above the mouth of the river, and one mile north east of the village of Manigotagan. The station is operated as a boat station, and in winter, measurements are made from the ice on the same cross section.

Drainage area.—The drainage area of the river above the station is 375 square miles.

Channel.—The discharge of the river at this point is confined to one channel during all stages. The bed of the channel is composed of clay and boulders and not liable to shift.

Gauge.—There are two vertical staff gauges on which records of river stage are observed at this station. The first is driven into the bed of the stream in a small bay on the right bank above the falls and about 135 feet below the metering section. The second is secured to the vertical face of rock on the right shore, 100 feet below and facing Wood falls. Both of these gauges are referred to M.H.S. datum.

Discharge measurements.—Since the station was established, discharge measurements have been obtained over a range in gauge height of 728.97 to 731.14.

Records available.—From January 4, 1913 to December 5, 1914, a continuous record of daily gauge height for open-water seasons, and intermittent record of gauge height for the winter seasons have been obtained.

From December 12, 1914 to August 31, 1916, a continuous record of daily gauge height has been obtained.

Based on these records, estimates of daily discharge for open-water seasons are available.

Estimates of mean monthly discharge based on gauge readings and discharge measurements for the above period are also available.

Accuracy.—On account of the small number of measurements taken at this point, the discharge curve is not well defined.

Discharge Measurement of Manigotagan River, above Wood Falls, for 1917.

Date.	Gauge Height.	Discharge.	Remarks.
	Feet.	Sec.-ft.	
Feb 10	730·57	91·2	Ice cover

Daily Discharge in Second-feet of Manigotagan River, above Wood Falls, for part of year ending September 30, 1916.

[Drainage area 375 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1915–16.												
1								1,300	1,235	1,125	925	
2								1,320	1,210	1,100	925	
3								1,345	1,210	1,100	905	
4								1,365	1,210	1,100	905	
5								1,365	1,210	1,100	905	
6								1,365	1,210	1,080	905	
7								1,365	1,190	1,080	905	
8								1,365	1,190	1,080	905	
9								1,365	1,190	1,080	905	
10								1,365	1,190	1,060	905	
11								1,345	1,190	1,060	905	
12								1,345	1,190	1,060	880	
13								1,345	1,190	1,060	880	
14								1,345	1,170	1,035	880	
15								1,345	1,170	1,035	880	
16						107		1,345	1,170	1,035	880	
17								1,345	1,170	1,015	880	
18								1,345	1,170	1,015	880	
19							1,055	1,345	1,170	1,015	880	
20							1,055	1,320	1,170	990	880	
21							1,080	1,320	1,170	990	860	
22							1,100	1,320	1,145	990	860	
23							1,125	1,320	1,145	990	860	
24							1,145	1,300	1,145	990	860	
25							1,165	1,300	1,145	970	860	
26							1,165	1,300	1,145	970	860	
27							1,1 0	1,300	1,145	970	860	
28							1,210	1,300	1,125	970	860	
29							1,255	1,235	1,125	950	860	
30							1,275	1,235	1,125	950	860	
31								1,235		950	860	

NOTE.—Ice conditions January 1 to April 19. Information insufficient to compute daily discharge.

Monthly Discharge of Manigatagan River, above Wood Falls, for part of year ending September 30, 1916.

[Drainage area 375 square miles.]

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum	Minimum	Mean.	Per Square Mile	Depth in inches on Drainage Area.	Total in Acre-feet
1915-16						
October						
November						
December						
January			100*	0·267	0·308	6,149
February			100*	0·267	0·288	5,752
March			100*	0·267	0·308	6,149
April	1,275	100*	671*	1·789	1·996	39,927
May	1,365	1,235	1,326	3·536	4·076	81,533
June	1,235	1,125	1,174	3·131	3·494	69,858
July	1,125	950	1,030	2·747	3·167	63,333
August	925	860	883	2·355	2·715	54,294
September						
The period	1,365	100*	675	1·800	16·334	326,600

NOTE.—Marked thus (*) estimated.

MISCELLANEOUS RECORDS.

In a number of cases where stations have been established, after one or several meterings have been taken, it was found that the location was unfavorable, either on account of the difficulty of obtaining an observer for the daily gauge heights, or on account of the physical features obtaining at the station preventing accurate records being obtained.

In other cases, sufficient information has not been obtained to properly define a discharge curve, though the records obtained would indicate that a curve may be defined by fuller information. In this case the gauge heights are on file, and when the necessary additional data are secured, estimates of daily discharge will be made.

Where the above conditions have been encountered, and as the discharges obtained may be of some immediate value, the records are published under the heading "Miscellaneous Meterings".

BERENS RIVER ABOVE LITTLE GRAND RAPIDS.

History.—This station was established on August 28, 1914 by D. B. Gow and has been in operation since that date.

Location of Section.—The metering section is located 2700 feet above Little Grand Rapids, at the entry of the river into Family Lake.

Drainage area.—The drainage area of the river above the section is 6,280 square miles.

Channel.—The section of the channel on which the metering section is located is straight for approximately 800 feet. The banks are high and not subject to overflow. The bed of the channel is rock.

Gauge.—A vertical staff gauge is located in a small bay on the right bank, 500 feet above Little Grand Rapids close to the upper end of the portage across same.

Discharge measurements.—Since this station was established discharge measurements have been obtained over a range in stage of 1,002·93 to 1,005·85, corresponding to range in discharge of 1,424 to 7,263 c.f.s.

Records available.—Continuous records of daily gauge height over periods from August 28, 1914 to June 12, 1915; July 19, 1915 to March 19, 1916. From August 28, 1914 to September 30, 1917, and from July 15 to September 30, 1918, intermittent records of daily gauge height are available.

Based on these gauge heights, estimates of daily gauge height and of mean monthly discharge are available over the entire period from August 28, 1914 to September 30, 1917, and from July 15 to September 30, 1918.

Accuracy.—Throughout the range in stage covered by the discharge measurements, the discharge curve is well defined.

Discharge Measurements of Berens River, above Little Grand Rapids, during 1917-18.

Date	Gauge Height	Discharge.	Remarks.	Date	Gauge Height	Discharge	Remarks.
1917	Feet.	Sec.-ft.		1918	Feet.	Sec.-ft.	
Feb. 19	93·41	1,498·2		Aug. 3	97·30	10,460·6	
1918.				Aug. 3	97·31	10,275·0	
July 17	97·84	13,275·5		Aug. 12	96·97	9,049·4	
July 17	97·85	13,382·2		Aug. 12	96·97	9,315·6	
July 22	97·64	12,287·3		Aug. 17	96·89	8,649·9	
July 22	97·64	12,333·4		Aug. 17	96·89	8,957·2	
July 30	97·42	11,667·5					

Discharge Measurements of Berens River, $8\frac{1}{2}$ miles from Mouth, for 1917.

Date	Gauge Height.	Discharge.	Remarks.
	Feet.	Sec.-ft.	
Feb. 24	817·42	466	Ice cover.

Daily Discharge in Second-feet of Berens River above Little Grand Rapids, for part of year ending September 30, 1914 and year ending September 30, 1915.

[Drainage area 6,280 square miles.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1913-14												
1										7,160		2,885
2												2,885
3												2,720
4												2,720
5												2,560
6												2,410
7												2,410
8												2,410
9										7,595		2,265
10												2,265
11												2,265
12												2,130
13												2,130
14												2,130
15												2,130
16												2,000
17												2,000
18												2,000
19												1,880
20												2,000
21												2,000
22												1,880
23												1,880
24												1,880
25												1,880
26												1,760
27												1,760
28												1,760
29											3,020	1,760
30											2,955	1,760
31											2,885	1,650
											2,885	
1914-15												
1	1,640	1,740	3,005	2,655	1,940	1,585	1,200	1,485	8,785	5,645	3,040	1,915
2	1,640	1,740	3,005	2,500	1,940	1,485	1,200	1,565	8,785	5,525	2,830	1,855
3	1,640	1,855	3,005	2,500	1,940	1,485	1,200	1,565	9,215	5,415	2,830	1,855
4	1,640	1,855	3,005	2,500	1,940	1,485	1,200	1,565	9,215	5,300	2,670	1,855
5	1,535	1,855	3,005	2,500	1,940	1,485	1,200	1,565	9,215	5,190	2,670	1,795
6	1,535	1,975	3,005	2,500	1,820	1,485	1,200	1,670	9,215	5,080	2,705	1,740
7	1,535	1,975	3,005	2,500	1,820	1,485	1,200	1,670	9,215	4,975	2,705	1,740
8	1,535	2,100	3,005	2,500	1,820	1,485	1,200	1,785	9,215	4,875	2,705	1,795
9	1,535	2,100	3,005	2,500	1,820	1,485	1,200	1,785	8,785	4,770	2,625	1,740
10	1,535	2,100	3,005	2,500	1,820	1,390	1,200	1,865	8,785	4,670	2,625	1,680
11	1,535	2,240	3,005	2,500	1,820	1,390	1,200	2,025	8,785	4,570	2,545	1,680
12	1,535	2,240	3,005	2,500	1,820	1,390	1,200	2,155	8,785	4,475	2,545	1,625
13	1,535	2,380	3,005	2,350	1,705	1,390	1,200	2,440	8,785	4,380	2,360	1,625
14	1,535	2,380	3,005	2,350	1,705	1,390	1,200	2,730	8,785	4,285	2,395	1,625
15	1,485	2,380	3,005	2,350	1,705	1,390	1,200	2,915	8,575	4,190	2,360	1,625
16	1,525	2,530	3,005	2,350	1,705	1,390	1,200	3,275	8,375	4,100	2,395	1,625
17	1,535	2,530	3,005	2,210	1,705	1,305	1,295	3,670	8,170	4,010	2,320	1,575
18	1,535	2,530	3,005	2,210	1,705	1,305	1,295	4,100	7,975	3,920	2,320	1,575
19	1,535	2,530	3,005	2,210	1,705	1,305	1,295	4,570	7,780	3,835	2,250	1,575
20	1,535	2,685	3,005	2,210	1,595	1,305	1,295	5,095	7,595	3,730	2,250	1,575
21	1,535	2,685	3,005	2,210	1,595	1,305	1,385	5,360	7,410	3,625	2,320	1,575
22	1,535	2,685	2,830	2,210	1,595	1,305	1,385	5,645	7,275	3,625	2,250	1,525
23	1,535	2,685	2,830	2,210	1,595	1,305	1,385	5,945	7,055	3,525	2,185	1,525
24	1,535	2,685	2,830	2,210	1,595	1,305	1,385	6,255	6,885	3,430	2,185	1,525
25	1,535	2,850	2,830	2,075	1,595	1,220	1,385	6,585	6,715	3,430	2,115	1,525
26	1,535	2,850	2,830	2,075	1,595	1,220	1,385	6,920	6,550	3,240	2,115	1,525
27	1,535	2,850	2,670	2,075	1,595	1,220	1,475	7,270	6,385	3,240	2,115	1,525
28	1,640	2,850	2,670	2,075	1,595	1,220	1,475	7,630	6,225	3,240	2,115	1,475
29	1,640	3,020	2,670	2,075		1,220	1,475	8,015	6,065	3,145	1,990	1,475
30	1,640	3,020	2,670	2,075		1,220	1,475	8,415	5,910	3,145	1,990	1,475
31	1,750		2,670	2,075		1,220		8,415		3,055	1,925	

Daily Discharge in Second-feet of Berens River above Little Grand Rapids, for years ending September 30, 1916-17.

Day	Oct	Nov.	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Sept
1915-16												
1	1,420	1,235	1,545	1,940	1,760	1,495	1,260	1,605	7,705	8,870	6,715	4,235
2	1,420	1,235	1,545	1,940	1,760	1,450	1,250	1,615	7,780	8,745	6,650	4,145
3	1,420	1,235	1,545	1,940	1,760	1,450	1,245	1,640	7,855	8,615	6,615	4,055
4	1,420	1,235	1,595	1,940	1,705	1,450	1,235	1,670	7,935	8,535	6,585	3,965
5	1,420	1,235	1,650	1,940	1,705	1,450	1,235	1,705	8,090	8,455	6,550	3,880
6	1,420	1,235	1,705	1,940	1,705	1,450	1,235	1,740	8,250	8,375	6,485	3,815
7	1,375	1,235	1,705	1,940	1,705	1,440	1,235	1,760	8,170	8,290	6,450	3,730
8	1,375	1,235	1,760	1,940	1,650	1,440	1,225	1,695	8,535	8,210	6,385	3,645
9	1,375	1,235	1,760	1,940	1,650	1,400	1,225	1,615	8,700	8,170	6,355	3,545
10	1,375	1,155	1,820	1,940	1,650	1,400	1,220	1,555	8,860	8,090	6,320	3,505
11	1,375	1,155	1,820	1,940	1,650	1,400	1,220	1,485	8,995	8,015	6,260	3,465
12	1,330	1,195	1,820	1,940	1,650	1,400	1,210	1,420	9,125	7,935	6,225	3,410
13	1,330	1,195	1,820	1,940	1,650	1,400	1,220	1,355	9,260	7,860	6,160	3,390
14	1,330	1,195	1,820	1,940	1,595	1,400	1,235	1,605	9,430	7,780	6,095	3,450
15	1,330	1,195	1,820	1,940	1,595	1,385	1,250	1,890	9,565	7,705	6,035	3,295
16	1,330	1,235	1,820	1,940	1,595	1,355	1,270	2,210	9,705	7,630	5,975	3,255
17	1,330	1,235	1,820	1,940	1,595	1,330	1,285	2,595	9,840	7,560	5,820	3,200
18	1,285	1,235	1,880	1,940	1,595	1,330	1,305	3,020	9,840	7,485	5,675	3,165
19	1,285	1,275	1,880	1,940	1,545	1,310	1,320	3,485	9,840	7,410	5,530	3,110
20	1,285	1,275	1,880	1,940	1,545	1,310	1,340	3,965	9,795	7,340	5,385	3,075
21	1,285	1,320	1,880	1,940	1,545	1,310	1,355	4,500	9,795	7,270	5,275	3,020
22	1,285	1,320	1,880	1,940	1,545	1,320	1,375	5,085	9,750	7,190	5,165	2,985
23	1,285	1,320	1,880	1,880	1,545	1,320	1,400	5,730	9,750	7,125	5,060	2,935
24	1,285	1,365	1,880	1,880	1,545	1,330	1,430	6,450	9,705	7,055	4,950	2,900
25	1,285	1,365	1,880	1,820	1,545	1,330	1,465	7,235	9,705	6,980	4,875	2,850
26	1,285	1,410	1,880	1,820	1,495	1,310	1,505	7,305	9,565	6,955	4,770	2,815
27	1,285	1,410	1,880	1,820	1,495	1,295	1,545	7,375	9,430	6,920	4,670	2,765
28	1,245	1,505	1,940	1,820	1,495	1,280	1,555	7,445	9,305	6,885	4,570	2,735
29	1,245	1,505	1,940	1,820	1,495	1,280	1,575	7,520	9,170	6,850	4,500	2,688
30	1,245	1,555	1,940	1,760		1,270	1,585	7,595	9,040	6,815	4,425	2,640
31	1,245		1,940	1,760		1,260		7,630		6,785	4,330	
1916-17												
1	2,640	2,320	2,470	2,210	1,615	1,555	1,180	1,090	1,225	2,025	3,275	7,195
2	2,625	2,320	2,470	2,155	1,615	1,565	1,170	1,105	1,225	2,075	3,410	7,410
3	2,610	2,320	2,470	2,100	1,605	1,575	1,165	1,125	1,235	2,130	3,545	7,595
4	2,595	2,320	2,470	2,050	1,605	1,585	1,155	1,140	1,235	2,185	3,670	7,780
5	2,575	2,320	2,470	2,040	1,605	1,575	1,145	1,155	1,245	2,210	3,795	7,975
6	2,560	2,335	2,485	2,025	1,595	1,565	1,140	1,165	1,250	2,240	3,920	8,090
7	2,545	2,335	2,485	2,015	1,595	1,565	1,130	1,180	1,260	2,285	4,055	8,170
8	2,500	2,335	2,485	2,005	1,585	1,555	1,130	1,185	1,270	2,295	4,190	8,290
9	2,470	2,335	2,485	1,990	1,585	1,555	1,130	1,195	1,280	2,320	4,545	8,370
10	2,440	2,335	2,485	1,975	1,575	1,545	1,125	1,205	1,285	2,320	4,425	8,370
11	2,440	2,350	2,470	1,960	1,565	1,545	1,115	1,210	1,295	2,335	4,475	8,575
12	2,425	2,350	2,470	1,960	1,565	1,535	1,105	1,225	1,305	2,335	4,520	8,575
13	2,425	2,350	2,455	1,950	1,555	1,525	1,090	1,225	1,320	2,350	4,570	8,785
14	2,410	2,350	2,455	1,925	1,555	1,515	1,075	1,235	1,330	2,365	4,620	8,785
15	2,395	2,365	2,455	1,900	1,545	1,505	1,075	1,245	1,340	2,365	4,670	8,995
16	2,395	2,365	2,455	1,880	1,535	1,495	1,060	1,250	1,350	2,380	4,720	8,995
17	2,395	2,365	2,440	1,855	1,525	1,485	1,055	1,260	1,365	2,395	4,830	9,205
18	2,380	2,365	2,440	1,830	1,515	1,475	1,045	1,260	1,385	2,410	4,875	9,215
19	2,380	2,395	2,425	1,820	1,505	1,465	1,045	1,260	1,390	2,425	4,950	9,410
20	2,365	2,425	2,410	1,795	1,505	1,455	1,045	1,260	1,450	2,110	5,030	9,430
21	2,350	2,425	2,395	1,775	1,515	1,450	1,040	1,250	1,505	2,455	5,190	9,660
22	2,350	2,425	2,380	1,740	1,515	1,430	1,040	1,250	1,555	2,470	5,300	9,660
23	2,335	2,440	2,365	1,715	1,525	1,410	1,030	1,245	1,615	2,470	5,535	9,885
24	2,335	2,440	2,350	1,685	1,525	1,390	1,030	1,245	1,680	2,485	5,700	9,885
25	2,335	2,455	2,335	1,650	1,535	1,365	1,040	1,245	1,750	2,500	5,820	10,120
26	2,320	2,455	2,320	1,650	1,535	1,340	1,045	1,235	1,805	2,515	5,975	10,120
27	2,320	2,455	2,310	1,650	1,545	1,310	1,055	1,235	1,840	2,625	6,160	10,355
28	2,310	2,455	2,295	1,640	1,545	1,280	1,060	1,235	1,890	2,735	6,355	10,355
29	2,310	2,455	2,280	1,640		1,250	1,065	1,235	1,940	2,865	6,550	10,600
30	2,310	2,455	2,265	1,625		1,225	1,075	1,235	1,985	3,005	6,715	10,600
31	2,310		2,250	1,625		1,195		1,235		3,145	6,955	

Monthly Discharge of Berens River, above Little Grand Rapids, for years ending September 30, 1915-17.

(Drainage area, 6,280 square miles.)

Month	Discharge in Second-Feet.			Run-off		
	Maximum	Minimum	Mean	Per Square Mile	Depth in inches on Drainage Area	Total in Acre-feet
1914-15						
October	1,750	1,485	1,583	0·252	0·290	97,334
November	3,020	1,740	2,397	0·382	0·426	142,632
December	3,005	2,670	2,923	0·465	0·536	179,728
January	2,655	2,075	2,458	0·375	0·432	151,088
February	1,940	1,595	1,740	0·277	0·288	88,582
March	1,585	1,220	1,360	0·217	0·250	83,623
April	1,475	1,200	1,286	0·205	0·229	76,582
May	8,415	1,465	4,039	0·643	0·741	248,348
June	9,215	5,910	8,024	1·278	1·426	477,461
July	5,645	3,055	4,182	0·666	0·768	257,141
August	3,040	1,925	2,402	0·382	0·440	147,690
September	1,915	1,475	1,641	0·261	0·291	97,647
The year	9,215	1,200	2,830	0·451	6·122	2,049,108
1915-16						
October	1,420	1,215	1,285	0·205	0·236	79,011
November	1,555	1,155	1,285	0·205	0·229	76,461
December	1,545	1,940	1,804	0·287	0·331	110,924
January	1,940	1,760	1,905	0·303	0·349	117,133
February	1,760	1,495	1,613	0·257	0·277	92,781
March	1,495	1,260	1,366	0·218	0·251	83,992
April	1,585	1,210	1,327	0·212	0·237	78,962
May	7,630	1,355	3,661	0·583	0·672	225,106
June	9,810	7,705	9,090	1·447	1·615	540,893
July	8,870	6,785	7,674	1·222	1·409	471,856
August	6,715	4,330	5,705	0·908	1·047	350,786
September	4,235	2,040	3,320	0·529	0·590	197,554
The year	9,810	1,155	3,341	0·532	7·241	2,421,824
1916-17						
October	2,640	2,310	2,589	0·412	0·475	159,191
November	2,455	2,320	2,347	0·374	0·417	139,656
December	2,485	2,250	2,403	0·388	0·443	148,369
January	2,210	1,625	1,866	0·297	0·342	114,736
February	1,615	1,505	1,557	0·248	0·258	98,472
March	1,585	1,195	1,461	0·233	0·269	89,834
April	1,180	1,030	1,089	0·173	0·193	64,800
May	1,260	1,090	1,214	0·193	0·223	74,646
June	1,985	1,225	1,454	0·232	0·259	86,519
July	3,145	2,025	2,424	0·386	0·445	149,046
August	8,955	4,275	4,914	0·782	0·902	310,141
September	10,600	7,195	9,016	1·436	1·602	536,493
The year	10,600	1,030	2,696	0·429	5·823	1,931,351

Berens River below Night Owl Falls.

History.—This station was established on June 29, 1914 by D. B. Gow and has been in operation since that date.

Location of section.—The metering section is located 6,000 feet below Night Owl or Thirtieth Falls.

Channel.—The section of the channel on which the metering section is located is straight for a distance of 3,500 feet. The banks are high and not subject to overflow. The river has a width at this point of 170 feet.

Gauge.—At the section water levels have been taken, on a temproary vertical staff gauge set and readings taken during measurements.

On Family lake near the Hudson's Bay Company's Post there is a vertical staff gauge, from which daily records are obtained. All measurements made at this point are referred to this gauge.

Discharge measurements.—Since the station was established, discharge measurements have been obtained over a range in stage of 942·97 to 945·2, corresponding to a range in discharge of 1,871 to 4,015 c.f.s.

Records available.—From March 7, 1916 to January 25, 1917 continuous records of daily gauge height have been obtained, with the exception of periods from March 8 to 13, July 9 to 25 and September 14 to 30. During the month of February, 1917 intermittent records are available, while from March 1 to September 30, 1917 and July 15 to September 30, 1918, a continuous record of daily gauge height has been obtained.

Discharge Measurements of Berens River, below 30th, at Night Owl Falls, for 1918.

Date	Gauge height	Discharge	Remarks	Date	Gauge height	Discharge	Remarks
1918				1918			
July 23	986·33	4,005·3		Aug. 9	986·14	3,513·4	
July 23	986·33	4,014·9		Aug. 9	986·14	3,560·2	
July 24	986·31	3,958·3		Aug. 19	985·86	3,114·2	
July 24	986·31	3,990·8		Aug. 19	985·86	3,157·8	
Aug. 9	986·11	3,517·6					

BERENS RIVER—ROUTE CHANNEL.

History.—The station was established by E. B. Patterson on July 25, 1918.

Location of section.—The section is located thirty feet above a small rapid which occurs about 400 feet downstream from Clearwater lake.

Channel.—The channel has a width of forty feet. The bed and banks are not liable to shifting, the control for the section being the crest of the rapids, thirty feet below. The channel is straight at this point and free from eddies. The banks are of sufficient height to confine the discharge at all stages.

Gauge.—There is no gauge at this section, measurements are referred to a bench-mark in W.P.S. (approx.) sea level datum.

Discharge measurements.—A discharge measurement was taken on July 25, 1918.

Discharge Measurement of Berens River, at Route Channel, outlet Clearwater L., 1918.

Date	Gauge Heights	Discharge.	Remarks
1918	Feet	Sec.-ft	
July 25	1,018·89	63·9	

Discharge Measurement of Otter Creek River, near Scandinavia, 1917.

Date	Gauge height	Discharge	Remarks
	Feet	Sec.-ft	
May 3	91·00	18	

Discharge Measurement of Bloodvein River, above 1st Rapids, 1917.

Date	Gauge height.	Discharge.	Remarks
	Feet.	Sec.-ft.	
Feb. 12	716·40	626·8	Ice cover.

Pigeon River above Shining Falls.

History.—This station was established on July 4, 1914 by D. B. Gow and has been in operation since that date.

Location of section.—The metering section is located 200 feet above the crest of Shining falls.

Channel.—The channel at this point is 380 feet wide, with banks of sufficient height to confine the discharge at all stages. The control for the section is the crest of Shining falls, 200 feet below. The channel is straight and free from eddies.

Gauge.—At the section water levels have been taken, or a temporary vertical staff gauge set and readings taken during measurements.

On Family lake, near the Hudson's Bay Company's Post, there is located a vertical staff gauge, from which daily records are obtained. All measurements are referred to this gauge.

Discharge measurements.—Since this station was established discharge measurements have been obtained over a range in stage of 984·02 to 986·64, corresponding to a range in discharge of 2,939 to 8,830 c.f.s.

Records available.—From March 7, 1916 to January 25, 1917 continuous records of daily gauge height have been obtained, with the exception of periods from March 8 to 13, July 9 to 25 and September 14 to 30. During the month of February, 1917 intermittent records are available, while from March 1 to September 30, 1917 and July 15 to September 30, 1918, a continuous record of daily gauge height has been obtained.

Discharge Measurements of Pigeon River, above First Rapids, 1917.

Date	Gauge height.	Discharge.	Remarks
	Feet	Sec.-ft.	
Feb. 15	89·63	1,371	Ice cover

Discharge Measurements of Pigeon River above Shining Falls, during 1918.

Date	Gauge height	Discharge.	Remarks
1918	Feet	Sec.-ft.	
July 19	986·60	8,793·6	
July 19	986·60	8,829·7	
Aug. 7	986·20	7,449·2	

Date	Gauge height	Discharge	Remarks
1918	Feet	Sec.-ft	
Aug. 8	486·19	7,159·9	
Aug. 16	985·92	6,932·0	
Aug. 16	985·92	6,960·9	

PART III.

GAUGE RECORDS.

Lake of the Woods at Keewatin.

Gauge.—Staff (installed by Ontario D.P.W.).
Location.—On pile at SW. end of Keewatin Lake bridge.
Records available.—May 1, 1913 to September 30, 1918.

Mean Daily Gauge Height, in feet, of Ontario D.P.W. Lake Gauge at Keewatin, for part of year ending September 30, 1917 and year ending September 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
1916-17												
1				99·03	98·77	98·44	97·90	97·95	98·37	98·33	98·80	98·74
2				99·00	98·78	98·37	97·78	98·09	98·16	98·13	98·61	98·67
3				98·95	98·75	98·38	97·79	98·01	98·25	98·37	98·86	98·62
4				98·97	98·78	98·45	97·73	98·01	98·20	98·48	98·97	98·73
5				98·96	98·75	98·35	97·70	98·04	98·23	98·59	98·72	98·70
6				98·95	98·70	98·31	97·70	98·12	98·20	98·50	98·84	98·68
7				99·00	98·69	98·30	97·68	98·09	98·21	98·55	98·82	98·76
8				98·94	98·69	98·31	97·75	98·09	98·29	98·50	98·72	98·47
9				98·91	98·67	98·29	97·67	98·13	98·30	98·38	98·75	98·52
10				98·95	98·66	98·23	97·65	98·16	98·35	98·61	98·71	98·67
11				98·97	98·67	98·27	97·63	98·17	98·33	98·40	98·79	98·70
12				98·93	98·65	98·20	97·63	98·18	98·61	98·51	98·77	98·69
13				98·95	98·60	98·18	97·61	98·24	98·45	98·55	98·77	98·57
14				98·98	98·58	98·15	97·6	98·27	97·95	98·52	98·90	98·60
15				98·98	98·55	98·13	97·68	98·28	98·36	98·58	98·72	98·62
16				99·01	98·50	98·13	97·63	98·26	98·40	98·61	98·77	98·63
17				98·95	98·53	98·10	97·65	98·21	98·32	98·64	98·87	98·64
18				98·95	98·59	98·16	97·65	98·30	98·29	98·73	98·74	98·66
19				98·89	98·53	98·05	97·68	98·11	98·05	98·59	98·80	98·14
20				98·91	98·49	98·07	97·70	98·30	98·40	98·70	98·71	98·68
21				98·89	98·48	98·03	97·72	98·26	98·08	98·69	98·95	98·63
22				98·91	98·47	97·98	97·81	98·20	98·29	98·57	98·80	98·73
23				98·84	98·50	97·96	97·75	98·22	98·30	98·60	98·82	98·76
24				98·86	98·48	97·91	97·77	98·27	98·33	98·84	98·53	98·85
25				98·85	98·52	98·05	98·77	97·27	98·39	98·70	98·71	98·75
26				98·81	98·47	97·92	97·81	98·07	98·24	98·72	98·72	98·57
27				98·81	98·47	97·92	97·84	98·32	98·40	98·82	98·63	98·67
28				98·87	98·42	97·89	97·89	98·40	98·33	98·84	98·61	98·62
29				98·87		97·88	97·95	98·29	98·37	98·77	98·77	98·46
30				98·81		97·85	97·94	97·98	98·57	98·84	99·02	98·50
31				98·78		97·83		98·02		98·70	98·75	
1917-18												
1	98·71	98·54	98·45	98·50	98·47	98·29	98·01	98·21	98·61	98·86	98·76	98·95
2	98·51	98·52	98·58	98·50	98·42	98·27	97·99	98·12	98·60	98·83	98·45	98·82
3	98·56	98·50	98·48	98·50	98·46	98·28	97·99	98·08	98·67	98·88	99·15	98·83
4	98·44	98·68	98·49	98·50	98·42	98·17	97·99	98·31	98·73	98·86	98·90	98·89
5	98·16	98·48	98·49	98·50	98·41	98·19	97·99	98·22	98·79	98·83	98·86	98·96
6	98·85	98·49	98·47	98·50	98·41	98·21	97·97	98·05	98·49	98·74	98·91	98·81
7	98·60	98·55	98·49	98·50	98·40	98·22	98·01	98·23	98·77	98·82	98·82	98·91
8	98·51	98·51	98·19	98·50	98·42	98·22	98·00	98·31	98·68	98·89	98·96	99·05
9	98·48	98·55	98·50	98·50	98·41	98·15	98·05	98·08	98·78	98·78	99·01	98·68
10	98·68	98·50	98·49	98·50	98·44	98·21	98·06	98·22	98·81	98·65	99·06	99·00
11	98·01	98·50	98·48	98·50	98·47	98·12	98·03	98·33	98·58	98·78	98·85	98·77
12	98·27	98·55	98·48	98·51	98·49	98·17	98·02	98·15	98·79	98·79	98·83	98·89
13	98·61	98·59	98·18	98·57	98·35	98·12	98·02	98·43	98·82	98·96	98·89	98·77
14	98·46	98·50	98·49	98·51	98·31	98·13	98·06	98·22	98·75	98·81	98·92	98·78
15	98·39	98·55	98·47	98·53	98·38	98·15	98·01	98·23	98·98	98·77	98·88	98·65
16	98·43	98·51	98·50	98·55	98·36	98·12	98·00	98·38	98·02	98·79	98·86	98·73
17	98·32	98·36	98·47	98·51	98·40	98·11	98·03	98·39	98·78	98·82	98·97	98·77
18	97·85	98·18	98·49	98·47	98·32	98·08	98·04	98·30	98·79	98·82	99·07	98·73
19	98·49	98·50	98·46	98·50	98·32	98·06	98·06	98·53	98·90	98·81	99·05	98·49
20	98·45	98·47	98·41	98·54	98·36	98·04	98·09	98·27	98·89	98·90	99·00	98·77
21	98·70	98·31	98·43	98·51	98·36	98·07	98·13	98·13	98·41	98·72	98·97	98·87
22	98·06	98·45	98·48	98·19	98·31	98·05	98·04	98·43	98·80	98·74	99·08	98·86
23	98·88	98·51	98·49	98·14	98·33	98·07	98·01	98·44	99·04	98·80	98·99	98·63
24	98·64	98·32	98·50	98·19	98·36	98·08	98·13	98·52	98·07	98·70	99·08	98·70
25	98·57	98·48	98·50	98·47	98·33	98·01	98·17	98·40	98·78	98·71	98·82	98·65
26	98·54	98·71	98·50	98·45	98·29	98·00	97·84	98·38	98·97	98·78	98·98	98·75
27	98·71	98·54	98·46	98·51	98·34	97·98	97·97	98·43	99·01	98·81	99·21	98·73
28	98·55	98·54	98·46	98·16	98·30	97·95	97·98	98·50	98·81	99·00	98·88	98·54
29	98·44	98·53	98·48	98·48		97·96	97·99	98·57	98·73	98·73	99·09	98·54
30	98·47	98·16	98·48	98·45		97·99	98·15	98·59	98·09	99·09	98·86	98·58
31	98·50		98·50	98·45		98·07		98·60		99·01	98·97	

Note. From Jan. 1, 1917 to April 30, 1918, 959·76 = zero of gauge to W.P.S. Datum = 961·07 U.S.C. & G.S. Datum.
From May 1, to Sept. 30, 1918, 959·71 = zero of gauge to W.P.S. Datum = 961·02 U.S.C. & G.S. Datum.

Lake of the Woods at Kenora.

Gauge.—Gurley automatic quarter-hourly printed record.
Location.—On D. P. W. dock at north end of Kenora bay.
Records Available.—February 1, 1916 to September 30, 1918.

Mean Half-daily Gauge Height, in feet, of Lake of the Woods at Kenora (Automatic Gauge) for part of year ending September 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May	June	July	Aug.	Sept.
1	.....	.....	.....	.....	59·78	59·47	58·89	58·98	59·22	59·43	59·84	59·71
2	.....	.....	.....	.....	59·78	59·46	58·90	58·99	59·34	59·11	59·77	59·70
3	.....	.....	.....	.....	59·79	59·42	58·87	59·02	59·31	59·11	59·35	59·64
4	.....	.....	.....	.....	59·78	59·40	58·84	59·03	59·08	59·10	59·68	58·65
5	.....	.....	.....	.....	59·76	59·41	58·82	59·03	59·15	59·27	59·78	59·63
6	.....	.....	.....	59·99	59·76	59·41	58·80	59·05	59·24	59·39	59·87	59·60
7	.....	.....	.....	60·01	59·77	59·42	58·78	59·04	59·22	59·42	60·04	59·68
8	.....	.....	.....	59·99	59·76	59·43	58·77	59·05	59·16	59·44	59·81	59·71
9	.....	.....	.....	60·00	59·75	59·40	58·76	59·05	59·20	59·52	59·79	59·88
10	.....	.....	.....	59·99	59·73	59·37	58·75	59·07	59·22	59·53	59·66	59·53
11	.....	.....	.....	59·96	59·72	59·35	58·74	59·09	59·19	59·50	59·79	59·63
12	.....	.....	.....	60·00	59·71	59·31	58·74	59·09	59·17	59·48	59·80	59·65
13	.....	.....	.....	60·02	59·72	59·32	58·73	59·09	59·17	59·52	59·79	59·74
14	.....	.....	.....	60·00	59·69	59·31	58·73	59·10	59·19	59·52	59·79	59·65
15	.....	.....	.....	59·99	59·70	59·32	58·73	59·10	59·25	59·54	59·78	59·49
16	.....	.....	.....	59·97	59·69	59·32	58·73	59·12	59·24	59·34	59·62	59·45
17	.....	.....	.....	59·97	59·68	59·32	58·71	59·13	59·23	59·30	59·72	59·47
18	.....	.....	.....	59·95	59·67	59·31	58·67	59·15	59·28	59·41	59·73	59·55
19	.....	.....	.....	59·97	59·67	59·28	58·68	59·15	59·29	59·50	59·73	59·63
20	.....	.....	.....	59·98	59·65	59·24	58·67	59·16	59·34	59·51	59·72	59·64
21	.....	.....	.....	59·99	59·65	59·24	58·68	59·16	59·33	59·43	59·76	59·64
22	.....	.....	.....	59·96	59·66	59·25	58·68	59·17	59·30	59·38	59·77	59·65
23	.....	.....	.....	59·94	59·65	59·25	58·67	59·19	59·47	69·45	59·73	59·66
24	.....	.....	~	59·95	59·63	59·22	58·66	59·21	59·69	59·52	59·77	59·61
25	.....	.....		59·97	59·60	59·21	58·66	59·22	59·54	69·54	59·81	59·53
26	.....	.....		59·98	59·61	59·17	58·66	59·24	59·28	59·53	59·86	59·50
27	.....	.....		59·99	59·62	59·17	58·65	59·24	58·96	59·52	59·92	59·56
28	.....	.....		60·00	59·59	59·19	58·65	59·26	59·00	59·48	59·85	59·58
29	.....	.....		59·99	59·59	57·18	58·67	59·26	59·24	59·51	59·74	59·59
30	.....	.....		59·99	59·57	59·17	58·71	59·27	59·38	59·54	59·70	59·58
31	.....	.....		59·99	59·55	59·15	58·69	59·27	59·42	59·57	59·68	59·59
				60·02	59·49	59·14	58·67	59·26	59·29	59·58	59·75	59·59
				59·98	59·51	59·13	58·69	59·26	59·27	59·59	59·85	59·61
				59·95	59·58	59·13	58·71	59·22	59·29	59·61	59·78	59·61
				59·97	59·58	59·12	58·68	59·30	59·33	59·63	59·67	59·68
				59·96	59·59	59·14	58·68	59·28	59·21	59·67	59·73	59·58
				59·93	59·55	59·11	58·72	59·15	59·02	59·62	59·79	59·37
				59·92	59·53	59·08	58·73	59·12	59·15	59·54	59·60	59·50
				59·93	59·53	59·09	55·74	59·23	59·33	59·62	59·60	59·63
				59·93	59·51	59·08	58·75	59·22	59·12	59·67	59·72	59·67
				59·90	59·49	59·05	58·77	59·24	59·10	59·64	59·89	59·62
				59·91	59·53	59·05	68·77	59·20	59·13	59·69	59·85	59·63
				59·96	59·52	59·03	58·79	59·19	59·25	69·64	58·77	59·71
				59·95	59·50	59·01	58·81	59·17	59·27	59·51	59·81	59·68
				59·80	59·54	59·01	58·79	57·21	59·26	59·58	59·71	59·70
				59·89	59·53	59·01	58·77	59·19	59·31	59·65	59·19	59 65
				59·90	59·51	58·99	58·77	59·24	59·33	59·81	59·39	59·71
				59·90	59·51	58·97	58·77	59·25	59·29	59·76	59·57	59·80
				59·90	59·50	59·04	58·80	59·27	59·33	59·63	69·68	59·77
				59·89	59·48	59·03	58·82	59·17	59·35	59·77	59·70	59·76
				59·87	59·49	58·99	58·83	59·01	59·25	59·66	59·68	59·71
				59·86	59·50	58·95	58·86	59·10	59·26	59·76	59·65	59·48
				59·86	59·49	58·96	58·86	59·25	59·35	59·78	59·58	59·59
				59·85	59·49	58·95	58·90	59·29	59·41	59·85	58·65	59·67
				59·87	59·45	58·94	58·90	59·37	59·25	59·88	59·62	59·65
				59·89	59·46	58·94	58·90	59·28	69·26	59·78	69·61	59·62
				59·87		58·93	54·92	59·24	59·33	59·75	59·70	59·54
				59·86		58·89	58·96	59·15	59·36	59·77	59·77	59·41
				59·85		58·88	58·96	58·94	59·50	59·74	69·95	69·42
				59·81		58·86	58·97	59·03	59·49	59·83	59·92	59·55
				59·78		58·89		59·02		59·72	59·69	
				59·79		58·89		59·06		59·74	59·77	

Mean Half-daily Gauge Height, in Feet, of Lake of the Woods, at Kenora (Automatic Gauge) for the year ending September 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.
1	59·69	59·43	59·42	..	59·46	59·29	59·02	59·28	59·66	59·81	59·81	59·90
	59·68	59·60	59·45	59·47	59·44	59·27	58 99	59·10	59·60	59·88	59·73	59·90
2	59·48	59·55	59·50	59·48	59·42	59·27	58·98	59·02	59·63	59·80	59·87	59·74
	59·50	59·50	59·49	59·49	59·49	59·26	58·98	59·16	59·61	59·83	59·93	59·88
3	59·47	59·48	59·48	59·51	59·42	59·24	58·99	59·18	59·65	59·83	60·02	59·88
	59·62	59·49	59·46	59·51	59·45	59·26	59·00	59·11	59·67	59·85	59·94	59·79
4	59·51	59·57	59·47	59·51	59·43	59·20	58·98	59·18	59·68	59·84	59·90	59·85
	59·31	59·56	59·46	59·49	59·43	59·16	59·00	59·29	59·73	59·96	59·85	59·86
5	59·36	59·50	59·46	59·49	59·40	59·17	58·99	59·25	59·72	60·00	59·83	59·89
	59·53	59·47	59·46	59·49	59·41	59·19	58·97	59·12	59·83	59·69	59·86	59·91
6	59·81	59·46	59·46	59·50	59·41	59·20	58·97	59·06	59·67	59·68	59·86	59·83
	59·57	59·48	59·46	59·51	59·40	59·22	58·97	59·07	59·50	59·72	59·91	59·77
7	59·10	59·55	59·48	59·50	59·38	59·21	58·99	59·17	59·70	59·75	59·76	59·83
	59·07	59·51	59·47	59·49	58·38	59·22	59·00	59·26	59·83	59·77	59·85	59·87
8	59·43	59·49	59·45	59·49	59·40	59·19	59·00	59·31	59·83	59·80	59·88	59·97
	59·70	59·47	59·43	59·51	59·41	59·18	59·00	58·27	59·70	59·81	59·91	59·74
9	59·59	59·52	59·44	59·50	59·40	59·12	59·01	59·10	59·76	59·64	59·93	59·53
	59·42	59·50	59·47	59·51	59·39	59·14	59·03	59·06	59·78	59·63	60·03	59·71
10	59·51	59·47	59·47	59 52	59·38	59·16	59·05	59·19	59·78	59·74	60·01	59·92
	59·79	59·47	59·47	59·52	59·40	59·15	59·03	59·21	59 82	59·74	60·06	59·98
11	59·36	59·42	59·44	59·50	59·40	59·13	59·02	59·32	59·76	59·74	59·82	59·84
	59·87	56·46	59·41	59 49	59·36	59·11	59·01	59·34	59·51	59·76	59·83	59·73
12	59·10	59·51	59·46	59·49	59·37	59·14	59·02	59·09	59·71	59·76	59·80	59·83
	59·34	59·53	59 47	59·52	59·37	59·14	59·01	59·28	59·80	59·75	59·87	59·86
13	59·57	59·54	59·47	59·52	59·33	59·11	59·02	59·43	59·80	59·91	59·92	59·74
	59·57	59·58	59·46	59·53	59·34	59·10	59·02	59·28	59·72	59·86	59·89	59·78
14	59·48	59·53	59·46	59·53	59·32	59·11	59·03	59·12	59·69	59·79	59·89	59·81
	59·39	59·50	59·46	59·52	59·33	59·10	59·03	59·30	59·76	59·81	59·90	59·73
15	59·42	59·53	59·43	59·51	59·36	59·10	59·03	58·26	59·93	59·81	59·88	59·63
	59·35	59 51	59 45	59·51	59·36	59·13	59·01	59 21	59·91	59·70	59·84	59·65
16	59·40	59·50	59·46	59·52	59·34	59·10	59·01	59·29	59·70	59·73	59·85	59·70
	59·40	59·49	59·46	59 47	59·36	59·11	59·01	59·36	59·70	59·79	59·82	59·70
17	59·37	59·48	59·45	59·49	59·37	59·09	59·05	59·32	59·75	59·83	59·87	59·75
	59·13	59·29	59·46	59·49	59·37	59·08	59·00	59·38	59·78	59·81	59·91	59·74
18	59·88	59·29	59 49	59·49	59·32	59·09	59·01	59·30	59·77	59·75	60·00	59·76
	59·93	59·57	58·43	59·48	59·29	59·06	59·05	59·30	59·74	59·84	59·98	59·64
19	59·31	59·55	59·43	59·48	58 30	59·06	59·06	59·42	59·79	59·81	59·97	59·51
	59·56	59·46	59 44	59·49	59·32	59·07	59·07	59·44	59·96	59·75	60·01	59·51
20	59·54	59·45	59·42	59·49	59·34	59·04	59·08	59·25	60·11	59·81	59·95	59·69
	59·41	59·46	59 43	59 51	59·37	59·04	59·09	59·34	59·78	59·87	59·93	59·77
21	59·36	59·45		59·51	59·35	59·07	59·09	59·36	59·48	59·78	59·97	59·83
	59·52	59·16		59·49	59 34	59·07	59·12	59·48	59·49	59·69	59·93	59·80
22	59·19	59·27		59·49	59 34	59·05	59·11	59·61	59·73	59·72	58·95	59·75
	59·16	59 16		59·49	59·35	59·04	59·01	59·38	59·80	59·73	60·12	59·64
23	59·48	59 50		59·16		59·06	58·99	59·39	59·95	59·77	59·92	59·58
	59·80	59·43		59·45	59·33	59·05	59·05	59·49	59 85	59·78	59·96	59·64
24	59·79	59·29		59·48	59·34	59·05	59·11	59·52	59·67	59·76	59·99	59·67
	59·52	59·35		59·46	59·31	59·06	59·15	59·40	59·65	59·61	60·10	59·67
25	59·47	59 43		59·48	59·29	59·03	59·20	59·36	59·74	59·64	59·95	59·66
	59·56	59 51		59·47	59·34	59·02	59·08	59·38	59·76	59·67	59·84	59·65
26	59·52	59 50		59 46	59·30		58·86	59·33	59·89	59·76	59·87	59·69
	59·47	59·52			59·29		58·87	59·38	59·92	58·79	59·96	59·74
27	59·52	59·51			59·30		58·97	59·41	59·93	59·78	60·12	59·75
	59·60	59 51			59·29	58·96	59·00	59·46	60·07	59·83	60·09	59·66
28	59 51	59·49			59 30	58·96	58·96	59·49	59·89	59·97	59·90	59·53
	59·48	59·51		59·48	59·29	58·94	58·86	59·49	59·76	59·80	59·84	59·51
29	59·42	59 51		59·46		58·95	58·66	59·53	59·70	59·66	59·93	59·55
	59 41	59 49				58·99	58·66	59·55	59·74	59·84	59·97	59·53
30	59·43	59·46		59·45		59·00	59·02	59·58	59·69	59·94	59·88	59·57
	59·47	59·42		59·46		58·99	59·24	59·57	59·73	59·92	59·88	59·61
31	59 48			59·45		59·02		59·60		59·91	59·95	
	59 48			59·46		59·04		59 58		59·98	59·92	

Zero of Gauge = 1000·00 U.S.C. & G.S. Datum = 998·69 W.P.S. Datum.
NOTE. A.M. (12 midnight to 12 noon) and P.M. (means from gauge record.)

Winnipeg River at Pine Falls.

Gauge.—Staff.

Location.—On left bank at head of Pine falls in SW. ¼ Sec. 29, Tp. 18, R. 10, E.P.M.

Records available.—June 21, 1911, to September 30, 1918.

Mean Daily Gauge Height in feet of Winnipeg River, at Head of Pine falls, for part of year ending September 30, 1917, and year ending September 30, 1918.

Day	Oct.	Nov.	Dec.	Jan	Feb.	Mar.	April	May.	June.	July.	Aug	Sept
1917												
1				724·13	724·33	723·83	722·83	723·33	721·63	720·63	720·23	721·33
2				724·13	724·43	723·83	722·88	723·18	721·58	720·53	720·28	721·28
3				724·03	724·63	723·83	722·88	723·18	721·58	720·43	720·33	721·23
4				723·98	724·83	723·78	722·88	723·21	721·61	720·38	720·33	721·18
5				724·03	724·93	723·68	722·97	723·16	721·62	720·33	720·38	721·13
6				723·93	724·83	723·63	722·78	723·08	721·58	720·28	720·38	721·08
7				723·98	724·68	723·58	722·78	722·98	721·53	720·23	720·43	721·03
8				724·03	724·63	723·48	722·78	722·95	721·51	720·21	720·43	720·98
9				724·03	724·73	723·33	722·73	722·88	721·51	720·18	720·48	720·98
10				724·03	724·73	723·13	722·73	722·83	721·48	720·13	720·48	720·93
11				723·98	724·78	722·93	722·73	722·73	721·51	720·08	720·43	720·93
12				723·98	724·83	722·83	722·68	722·68	721·53	720·05	720·43	720·88
13				725·03	724·93	722·73	722·68	722·63	721·53	720·03	720·38	720·88
14				723·93	724·93	722·68	722·73	722·58	721·51	720·00	720·38	720·86
15				723·88	724·13	722·68	722·73	722·58	721·48	719·98	720·43	720·83
16				724·88	724·73	722·68	722·78	722·58	721·46	719·95	720·48	720·83
17				724·88	724·83	722·68	722·78	722·53	721·43	719·93	720·53	720·83
18				724·88	724·78	722·68	722·83	722·48	721·41	719·93	720·58	720·85
19				724·88	724·78	722·68	722·83	722·43	721·38	719·91	720·63	720·86
20				724·88	724·73	722·73	722·88	722·43	721·35	719·88	720·68	720·88
21				723·83	724·78	722·73	722·88	722·23	721·33	719·86	720·73	720·88
22				723·83	724·78	722·73	722·93	722·13	721·28	719·83	720·83	720·88
23				724·88	724·83	722·78	722·98	722·03	721·23	719·78	720·88	720·88
24				723·88	724·83	722·78	723·03	721·98	721·18	719·78	720·93	720·88
25				723·93	724·83	722·73	723·13	721·93	721·13	719·83	721·03	720·88
26				723·93	724·83	722·73	724·13	721·91	721·03	719·88	721·13	720·88
27				724·93	724·83	722·73	724·18	721·88	720·93	719·93	721·23	720·88
28				724·88	723·83	722·73	723·23	721·83	720·88	719·98	721·33	720·88
29				723·88		722·78	723·28	721·78	720·83	720·03	721·38	720·88
30				723·93		722·83	723·28	721·73	720·73	720·13	721·43	720·86
31				724·13		722·83		721·68	...	720·18	721·38	
1917 18												
1	720·85	720·99	720·83		722·43		720·87	720·87	721·57	721·59	721·27	720·82
2	720·84	720·96	720·83	721·43		721·53		720·89	721·92	721·62	721·24	720·82
3	720·8	720·93	720·83				720·87	720·89	722·52	721·62	721·22	720·80
4	720·83	720·93	720·84	721·53	722·48	721·43		720·89	722·52	721·57	721·22	720·77
5	720·81	720·93	720·83				720·92	720·88	722·57	721·52	721·20	720·75
6	720·80	720·94	720·93		722·53	721·33		720·87	722·62	721·49	721·18	720·72
7	720·79	720·94	720·88	721·53			720·97	720·87	722·57	721·47	721·17	720·69
8	720·78	720·95	721·03		722·53	721·23		720·87	722·52	721·45	721·15	720·67
9	720·78	720·95		721·53			721·02	720·87	722·47	721·42	721·12	720·65
10	720·78	720·95	722·03		722·48	721·13		720·87	722·37	721·40	721·12	720·62
11	720·76	720·95		721·68			721·07	720·87	722·17	721·37	721·12	720·60
12	720·75	720·95	721·13		722·43	721·08		720·85	722·12	721·37	721·14	720·62
13	720·73	720·95					721·12	720·82	722·07	721·37	721·17	720·62
14	720·73	720·96	721·13	721·83	722·33	721·03		720·80	722·02	721·37	721·17	720·62
15	720·73	720·96					721·20	720·82	721·97	721·37	721·17	720·62
16	720·75	720·98		721·93	722·13	720·98	721·16*	720·82	721·92	721·35	721·17	720·62
17	720·78	720·98	721·33				721·12	720·85	721·87	721·37	721·17	720·62
18	720·78	720·96		722·03*	721·93	720·93	721·12	720·82	721·82	721·37	721·17	720·62
19	720·81	720·93	721·33				721·07	720·82	721·79	721·39	721·17	720·57
20	720·83	720·93			721·83	720·88	721·07	720·80	721·77	721·42	721·17	720·57
21	720·83	720·91	721·33	722·13			721·02	720·82	721·75	721·42	721·15	720·57
22	720·83	720·88			721·78	720·83	720·97	720·87	721·72	721·39	721·12	720·57
23	720·83	720·88		722·18			720·92	720·92	721·70	721·37	721·07	720·57
24	720·83	720·88	721·33		721·73	720·78	720·87	720·97	721·69	721·35	721·02	720·57
25	720·83	720·86		722·23			720·82	721·02	721·67	721·37	721·00	720·57
26	720·82	720·85	721·38		721·68	720·73	720·82	721·12	721·65	721·37	720·97	720·57
27	720·83	720·85					720·82	721·22	721·62	721·35	720·95	720·57
28	720·85	720·87	721·63	722·33	721·63	720·73	720·82	721·37	721·59	721·32	720·92	720·57
29	724·86	720·83					720·82	721·32	721·57	721·32	720·90	720·57
30	720·88	720·83		722·38		720·77	720·84	721·37	721·57	721·29	720·87	720·57
31	720·88		721·93					721·42		721·27	720·84	

Note.—*Interpolated. Levels reduced to Water Power Survey Datum

Location of Gauges.

Gauges have been maintained at the following stations throughout the year and while the records are not published in this report, copies of the readings at any station will be furnished on application.

Lake of the Woods Outlets, at:
- Tailrace Norman dam.
- Ontario D.P.W. River gauge, Keewatin.
- Slope Gauges, western outlet.
- Tailrace, Kenora Power House.

Winnipeg River, at:
- Minaki.
- Forebay, Point du Bois.
- Tailrace, Point du Bois.
- Head of Eight Foot Falls.
- Foot of Eight Foot Falls.
- Intake Gauge, Pinawa Channel.
- Above Control Dam Pinawa Channel.
- Forebay and Tailrace, W.E.R. Co's. Plant, Pinawa.
- Below Twin Falls at B.M. 180A.
- City Tramway Bridge, Lac du Bonnet.
- Foot of First McArthur Falls.
- Below Second McArthur Falls.
- Head of Grand du Bonnet Falls.
- Head of Little du Bonnet Falls.
- Foot of Little du Bonnet Falls.
- Head of Whitemud Falls.
- Head of Silver Falls.
- Foot of Silver Falls.
- Foot of Pine Falls.
- Fort Alexander (Lake Winnipeg level).

Red River, at:—
- Morris.
- Elm Park bridge.
- Red Wood bridge.

Assiniboine River and Tributaries, at:
- Otter creek near Scandinavia.

Berens River, at:—
- Mouth (lake Winnipeg).

Nelson River, at:
- Norway House (Playgreen lake.)
- Manitou Bridge crossing.
- Kettle Bridge crossing.
- Cross Lake.

La Salle River, at:
- Sanford.

Whitemud River, at:
- Holmfield.

Lake Winnipeg, at:
- Winnipeg Beach.

PART IV.

METEOROLOGICAL RECORDS.

METEOROLOGICAL STATIONS.

Meteorological stations have been maintained at the following points:—
Keewatin;
Pinawa.
Evaporation records are also obtained at these two points.

Meteorological Station, Keewatin.

In the spring of 1913, a meteorological station was established at Keewatin on the Lake of the Woods, and from the month of May of that year continuous records have been obtained at this station.

In addition to the regular meteorological equipment, apparatus for observing evaporation has been installed. This consists of a tank equipped with a measuring point. The tank is floated on a raft, which is moored in the bay at Keewatin. The records, therefore, indicate evaporation from water surface.

Meteorological Data of M.H.S. Station at Keewatin, Ont., for January, 1917.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hr.		Inches.	Inches.	Inches.	%	
1			6		3·0	S.					
	32						28·14				
2			12		4·1	S.					S
			16	14	2·1	S.	27·89				P
3			14		2·9	S.					Q
	32		18	16	5·0		27·93				N
4			−14		5·1	W.					N
			5	−9	2·1	S.E.	28·08		0·30		P
5			−16		8·4	N.W.					N
	32		−10	−9	3·5	W.	28·34				P
6			4		5·0	S.E.					Q
			3	−5	5·0	N.W.	28·14		0·40		S
7			−6		5·3	S.					S
	32			−11			28·31		0·30		S
8			2		5,3	E.					
			14	8	4·0	N.	28·88		0·60		S
9			−13		6·1	N.E.					S
	32		− 5	− 9	3·8	E.	27·97				S
10			−21		3·8	N.W.					Q
			−16	−18	8·1	N.W.	28·40				P
11			−19		2·8	W.					P
	32		−10	−15	2·6	S.	28·49				Q
12			− 5		4·5	S.E.					Q
			1	− 3	4·7	N.E.	28·41				
13					7·3	N.					
	32		−11		15·7	N.W.	28·35		0·20		S
14			−24		7·9	N.W.					P
15							28·88				
			−32		3·1	S.W.					
	32		−13	−23	2·3	S.	29·07				P
16			− 6		5·0	N.W.					P
			10	8	16·8	N.W.	28·69				I
											S

Meteorological Data of M.H.S. Station, Keewatin, Ont., for January, 1917 —Concluded.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
					Miles per hour.		Inches.	Inches.	Inches.	%	
17			3		9·2	S.W.					P
	32		11	− 7	5·3	N.W.	28·16		0·05		S
18			4		11·3	N.W.					S
			− 6	− 2	6·6	N.W.	28·33				S
19			− 8		3·0	N.W.					P
	32		Zero	− 4	2·4	N.	28·34				Q
20					5·0	N.W.					
			−10		1·3	S.E.					Q
21					3·6	N.					
	32		−13				28·57				
22			−22		6·9	S.W.					P
			− 5	−14	7·3	S.	28·23				S
23			−18		5·1	N.E.					P
	32		− 2	−10	3·7	N.	28·22				P
24					2·3	S.					
			− 9		1·6	S.	28·35				Q
25			−24		3·3	N.W.					P
	32		−12	−18	4·9	N.W.	28·44				P
26					1·9	S.E.					
			− 8		3·1	S.E.	28·44				P
27			2		5·0	S.					S
	32		10	6	8·6	S.	28·32		0·10		S
28					11·5	S.W.					S
			20				28·42		0·10		S
29			− 4		6·6	N.W.					Q
	32		−10	− 7	6·0	W.	28·15				P
30			−18		4·7	W.					P
			− 8	−13	5·7	N.W.	28·51				Q
31					5·4	N.W.					Q
	32		− 7		5·1	N.W.	28·76				Q

Average time of observations 7·45 a.m. and 5·00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.

Meteorological Data of M.H.S. Station at Keewatin, Ont., for February, 1917.

Day.	Temperature. Lake.	Tank.	Air.	Day.	Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain	Humidity.	General.
	°	°	°	°	Miles per hour		Inches	Inches.	Inches	%	
1 ..											
			−22		6·5	N.W.					P
2....			−12	−17	9·3	W.	28·76				P
			−28		11·2	N.W.					P
3...	32		−14	−21	7·1	N.W.	28·70				Q
			−20		4·0	N.W.					Q
4....			−13	−17	7·3	N.W.	28·35				Q
			−10		15·0	N W.					Q
5. .	32			−17			28·46				
			+ 4		10·5	W					R
			−12	− 7	3·0	S W.	28·43				P
6 ...											
	32		+ 7		1·5	S.W					S
7...			−13	+ 8	7·9	N W	28·29		0·20		S
			+13		8·4	N.W.					S
8....			+ 1	+12	15·6	N.W.	28·16				Q
			−12		7·6	N W					P
9...	32		− 2	−10	9·7	N W	28·34				P
			−20		6·5	W					P
10 ..			− 3	−15	5·4	N W.	28·35				P
			−16		5·9	N W					P
	32		− 7	−14	15·3	N W	28·51				P
11....											
			−16		1·0	W					P
12....				−20			28·87				
			− 2		8·1	S					S
13....	32		+10	Zero	4·6	S W	28·56				S
			+ 1		5·5	N E.					R
14....			+12	+ 6	2·9	W	28·56				Q
			+16		5·9	W					S
15. ..	32			+15	4·7	N W.	28·25		0·05		R
			+18		4·6	W					S
			+22	+16	7·4	N W.	28·06		0·10		R
16......											
			+ 8		6·1	E.					Q
17.... .	32		+12	+ 9	7·6	N E.	28·17		0·20		S
			− 5		7·8	N.W					P
18....			−19	−11	5·8	W.	28·14	..	0·50		P
			−13	−12	2·9	S E.					P
19.......	32						28·49				
			−31		2·8	S E					P
20....			+ 4	−15	0·9	S.	28·49				P
			−26		3·3	N.E.					P
	32		+ 6	+19	2·3	S.	28·42				P
21..											
			+ 7		5·6	N					S
22....			+ 4	−10	15·3	N.W.	28·24		0·50		Q
			−10		4·6	S.					S
23......	32		− 2	−11	4·3	N.	28·27		0·20		S
			−10		4·0	W					P
24 ...			− 3	− 8	8·9	W.	28·23				P
			−31		2·9	S.					Q
25.. ..	32		+ 7	−15	3·0	S.	28·44				P
			Zero		2·5	N.					Q
26......				−12			28·22				
			− 6		4·7	S.W.					P
27.... .	32		+ 8	− 6	9·0	S.W.	28·17				P
			− 7		7·2	S.					P
28....			+15	+ 2	4·1	S.	28·41				Q
			− 9		7·4	W.					P
	32		+10	− 2	6·6	W.	28·54				S

A—Average time of observations 7.45 a.m. and 5.00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.

Meteorological Data of M.H.S. Station, at Keewatin Ont., for March, 1917.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches	%	
1			2		7·1	S.W.					
2			19	5	10·3	W.	28·44				P
			4		4·6	N.					Q
3	32		13	7	5·7	N.	28·54				P
			−13		6·7	N.W.					Q
4			3	−9	6·5	N.W.	28·88				P
			−1		4·4	S.					P
5	32			−24			28·69				P
			10		7·5	S.					
			21	10	7·3	S.	28·11				R
6											S
	32		19		5·4	N.E.					
7			32	25	1·9	N.	28·20		0·15		R
			24		3·9	N.E.					R
8			33	26	9·1	N.E.	28·26				Q
			16		5·8	N.					R
9	32		34	24	3·5	N.	28·35		0·05		P
			17		3·0	S.E.					P
10			30	18	2·7	S.E.	28·39		0·20		P
					6·6	N.					Q
	32		34	13	5·9	N.	28·31				R
11				20	0·8	N.					P
			26				28·52				P
12			6		4·8	S.E.					P
	32		38	17	4·0	S.	28·72				P
13					7·2	S.E.					P
			27	25	8·1	E.	28·63		0·025		R
14			20		10·5	N.					S
	32		26	22	12·5	N.	28·45		0·20		S
15			19		7·8	N.E.					S
			33	22	2·0	E.	28·72				P
16											P
	32		14		4·3	N.					
17				18	2·9	N.	28·54				P
			28		7·1	N.					S
18			21	16	14·9	N.W.	28·22				Q
	32		1		13·1	S.					P
19				2			28·56				P
			18		6·2	S.					
20			29	19	3·3	S.	28·02				P
			22		2·9	S.					R
	32		42	26	7·4	S.	28·07				Q
21											R
			31		2·7	S.					
22			39	32	4·1	S.	28·12				P
			32		3·6	S.E.					S
23	32		40	33	2·3	S.	28·09				R
			30		3·2	N.					R
24			36	31	3·6	S.W.	28·09		0·03		P
			31		4·0	S.					P
25	32		35	30	7·5	S.E.	27·80		0·10		S
			35		8·3	W.					R
				31			28·01		0·10		Q
26											
	32		30		4·8	S.					
27			36	28	4·4	N.	28·28				R
			28		6·3	N.					R
28			36	28	2·2	S.	28·30		0·07		Q
			30		9·2	S.E.					Q
29	32		34	28	13·3	W.	27·92		0·25		R
			32		10·6	W.					S
30			35	29	10·6	N.W.	28·28				Q
			32		5·2	S.E.					R
31	32		44	34	15·5	S.E.	28·00				Q
			32		9·5	S.W.					R
			39	34	10·7	W.	28·06				Q
											P

Average time of observations 7·45 a.m. and 5 00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.

Meteorological Data of M.H.S. Station at Keewatin, Ont., for April, 1917.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
					Miles per hour.		Inches.	Inches.	Inches.	%	
1	32		23	25	6·3	W.	28·32				P
2			22		7·3	SW.					P
			33	25	7·2	W.	28·33				P
3			18		5·3	N.					P
	32		14	26	4·0	W.	26·54				Q
4			23		5·1	E.					P
			40	29	3·0	W.	28·6				P
5			26		1·8	NW.					P
	32		43	33	3·2	N.	28·47				P
6			34		5·2	E.					P
7			23	32	5·1	NW.	28·61				P
	32		40	28	4·6	NW.	28·72				P
8			30		4·2	NW.					P
9			33	31	6·4	SE.	28·67				Q
	32		43	37	11·4	SE.	28·35				Q
10			37		13·5	SE.					Q
			38	37	4·1	N.	28·13		0·08		R
11			34		5·6	NW.					R
	32		38	34	9·8	NW.	28·39		0·05		R
12			28		6·6	NE.					R
			42	32	6·0	E.	28·67				P
13			23		5·7	N.					P
	32		43	31	7·3	N.	28·66				P
14			28		6·2	NE.					P
			39	31	10·0	N.	28·48				R
15			34		9·2	NE.					P
	32			32			28·50				
16			36		5·9	SE.					P
			47	35	4·5	E.	28·52				Q
17			36		4·2	N.					P
	32		40	37	1·6	N.	28·50		0·29		Z
18			35		6·0	E.			0·11		S
			37	36	11·1	E.	28·40				S
19			38		2·9	N.					S
	32		40	37	7·4	N.	28·30		0·03		S
20			34		7·8	N.					S
			44	38	9·8	NW.	28·22				S
21			32		7·8	N.					R
	33		37	35	13·9	NW.	28·22				S
22					6·0	NW.					P
			39	38			28·49				P
23			37		3·4	SE.					P
	32		51	38	3·7	E.	28·53				Q
24			40		7·9	SE.					P
			47	38	9·7	E.	28·48				S
25			38		5·5	NE.					P
	32		39	37	10·3	NE.	28·38				S
26			38		5·1	N.					P
			44	41	9·4	N.	28·52		0·02		R
27			38		5·5	N.					P
	32		50	41	7·9	NE.	28·62				P
28			40		4·5	N.					P
			52	43	6·6	N.	28·62				P
29			42		5·8	N.					Q
	32			41			28·49				
30			39		3·3	N.			0·05		R
			45	44	3·7	E.	28·40				S

Average time of observations 7·45 a.m. and 5·00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.

Meteorological Data of M.H.S. Station, Keewatin, Ont., for May, 1917.

Day	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer	Evaporation.	Rain.	Humidity.	General.
	Lake	Tank	Air	Day.							
	°	°	°	°	Miles per hour		Inches	Inches.	Inches.	%	
1			42		4·1	N.					R
			46	42	10·3	N.	28·39				P
2			47		3·4	NW.					Q
			52	43	6·1	W.	28·49				P
3			43		3·0	S.					P
			58	46	6·0	SW.	28·52				R
4			52		3·4	N.					P
			61	48	5·3	E.	28·53				P
5			49		3·0	S.					P
			65	50	3·4	SW.	28·65				P
6					2·6	S.					
			60	48			28·63				P
7			57		4·4	N.					R
			56	50	5·6	NE.	28·65	0·02	0·05		S.
8					2·1	S.					
			64	49	3·8	NW.	28·47	0·03			P
9					4·3	S.					
	42	46	58	49	3·6	S.	28·43	0·03		47	Q
10	41	42	44		2·8	NW.		0·01		85	P
	41	46	70	51	6·1	W.	28·49	0·04		44	P
11					5·4	E.					
	14	16	69	52	0·1	N.	28·56	0·04		47	P
12					2·9	SE.				28	
	43	49	75	52	4·3	SE.	28·63	0·06			P
13	48	50	69		1·8	N.		0·03		44	P
				58			28·69				
14	52	52	53		2·7	S.		0·06		88	P
	47	50	76	60	4·4	S.	28·59	0·04		32	P
15	50	52	60		5·7	W.		0·06		70	P
	46	49	72	63	10·3	SE.	28·71	0·06		40	P
16	16	46	56		3·0	SE.		0·04		88	P
	48	50	79	64	7·4	S.	28·10	0·02		44	P
17					5·5	NW.					
	46	49	74	64	18·0	W.	28·10	0·06	0·05	37	P
18	47	47	54		4·1	SW.		0·02		88	P
	46	48	74	60	16·3	W.	28·12	0·08		40	P
19					10·7	NE.					
	45	46	54	47	10·3	NE.	28·17	0·09		48	Q
20	47	47	53		4·9	E.		0·02		58	P
				47			28·53				
21	46	47	42		6·5	NW.		0·07			P
	49	52	68	52	8·3	NE.	28·51	0·09		35	P
22					6·2	NE.					
	48	52	63	48	9·0	E.	28·42	0·12		51	P
23	46	47	40		6·4	N.		0·03			P
	46·5	50·5	63	49	9·0	N.	28·38	0·08		28	P
24					4·9	N.					
	17	49	60	54			28·33	0·03		32	P
25	48	50	52		3·9	S.		0·97		82	P
	49	55	70	56	9·0	N.	28·37	0·0		66	P
26					10·2	NE.					
	47·5	53·5	62	48	9·1	NE.	28·38	0·10		15	P
27	52·5	56·5	59		3·5	SW.		0·07		64	P
				50			28·33				
28	50	50	53		5·9	SW.		0·08		66	R
	50	55	65	56	5·7	NW.	28·14	0·05		43	Q
29	49·5	53·5	59		4·2	N.		0·03		56	P
	48	54	63	52	5·3	NW.	2 15	0·05		52	R
30					13·6	N.					
	48·5	54	62	48	10·8	N.	28·39	0·08		27	P
31					11·1	NE.					
	48·5	53	60	50	11·9	NW.	28·46	0·14		20	P

Average time of observations 7.45 a.m. and 5 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.

Meteorological Data of M.H.S. Station, Keewatin, Ont., for June, 1917.

Day.	Temperature				Velocity of Wind.	Direction of Wind	Barometer	Evaporation.	Rain.	Humidity.	General
	Lake	Tank.	Air	Day							
	°	°	°	°	Miles per hour.		Inches.	Inches	Inches	%	
1	49	49	47		4·8	SW.					
2	50·5	52	63	51	7·2	S.	28·36	0·04		63	P
					1·3	NW.		0·09		33	P
3	50	55·5	62	53	9·6	NW.	28·31	0·06		26	P
	50·5	53	54		5·9	N.		0·05		57	Q
4	52	52·5	46	49			28·47				
	50·5	57·5	60		3·9	N.		0·06		96	P
5	52	55	63	54	7·6	NE.	28·44	0·08		12	P
	54·5	58	66	55	4·4	NE.		0·05		36	P
6					6·4	NE.	28·33	0·02		35	R
7	55	60	78	60	5·0	NE.					
	54	55	55		9·0	NE.	28·26	0·09		35	P
8	57	62	79	62	5·5	N.		0·07		50	P
	55·5	55·5	59		9·0	NE.	28·08	0·08		21	P
9	59·5	62·5	74	62	5·7	NE.		0·03		77	R
	59	60·5	62		5·2	NE.	28·11	0·04		34	P
10	60·5	62·5	78	68	2·7	NE.		0·03		70	Q
					6·6	SE.	28·12	0·06		31	P
	64	66	78	71	6·7	SE.					
11	60	60	63				28·06	0·08		43	Q
	59	60·5	66		13·7	SE.					
12				65	9·7	SE.	28·01		0·16	82	R
	57	58	56		10·3	W.			0·10	66	R
13	54			55	21·7	SW.	28·14				
	54	53·5	47		17·4	W.			0·48	61	R
14				44	13·6	W.	28·17				
	54	57·5	62		15·5	NW.			0·12	82	R
15	53·5	53·5	52	48	16·5	NW.	28·45	0·10		25	Q
	55·5	56·5	65		7·6	W.		0·05		74	Q
16				54	9·3	SW.	28·46	0·09		36	P
17	57·5	61	72	60	6·5	NW.					
					5·3	N.	28·20	0·01	0·23	44	Q
18	60	62·5	69	63	3·3	N.					
	59·5	60·5	60				28·19	0·01		64	P
19	56·5	59	61	60	7·7	NW.		0·04	0·26	84	Q
					11·6	NW.	28·17	0·07		56	Q
20	56	62	70	55	13·0	N.					
					10·4	NW.	28·26	0·08	0·05	33	P
21	52	53	59	53	3·3	N.					
					9·3	NW.	28·22	0·10	0·18	58	S
22	55	56·5	59	48	12·7	W.					
	55	54	49		15·7	NW.	28·40	0·15		25	Q
23	57·5	60·5	62	51	4·3	SE.		0·04		67	Q
	56·5	55·5	54		5·9	N.	28·51	0·07		41	Q
24	58·5	60·5	65	56	3·8	NE.		0·03		70	Q
	58	58·5	60		6·7	NE.	28·37	0·05		55	Q
25				61	4·2	W.		0·04		77	Q
	60·5	60·5	61				28·38				
	60·5	64·0	74	65	4·7	N.				77	R
26					8·1	NW.	28·19	0·08	0·05	49	R
27	60	63	72	62	8·3	NW.					
	60	62·5	63		9·7	N.	28·35	0·10	0·28	42	P
28	61	61·5	65	63	3·1	N.		0·03		75	P
	59·5	60·5	59		9·1	NW.	28·37	0·08	0·02	72	R
29	59·5	63·5	71	63	5·3	W.				83	R
	59·5	60·5	55		12·8	NW.	28·32	0·09	0·04	51	Q
30	63·5	66·5	73	62	5·8	SE.		0·03		85	P
					3·7	SE.	28·38	0·04		44	P
	64	68·5	80	69	9·5	N.					
					7·3	SW.	28·07	0·09	0·20	63	R

Average time of observations 7 45 a.m. and 5 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.

Meteorological Data of M.H.S. Station, Keewatin, Ont., for July, 1917.

Day.	Temperature. Lake	Tank	Air	Day	Velocity of Wind	Direction of Wind	Barometer	Evaporation	Rain	Humidity	General
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	59	59	52	56	9.8	NW					
2	57	56.5	48		18.7	NW	28.14	0.08	0.02	72	S
3	56.5	55	50	51	11.8	N	28.12	0.16	0.14	80	S
	62					N		0.07	0.01	84	S
4	59.5			58	2.8	N	28.44	0.09		45	P
	62		6[illegible]		2.4	N		0.02		71	P
5	60				[illegible]8	N	28.32	0.06		40	P
6	60		63			S	28.18		0.48	90	S
7	[illegible]					SE	28.18	0.03	0.24	97	S
						SW				69	P
8						SW	28.23	0.08		42	P
						SW					
9						NE	28.33	0.15		60	Q
10						NE	28.55	0.05		74	Q
						SE		0.04		60	P
						SE		0.05		89	S
11							28.45	0.04		69	S
12						NW					
						NW	28.25	0.04	0.73	72	S
13	61.5				9.8	N					
	64.5				1	N	28.08	0.09		36	R
14	64.5				5	SW		0.04		74	P
	64				9	NW	28.11	0.09		70	S
15	64	68.5			2	NW		0.03		89	S
	68.5	72	72		3.4	NW	28.30	0.02		64	Q
				67	4.7	N		0.03		54	P
16	68	67.5	61				28.55		0.12		
17	75	76	82	70	1.0	NW		0.10		67	P
					1.4	SE	28.51	0.07		35	P
18	76	77	84	74	1.5	S					
	72.5	72	72		3.5	S	28.40	0.15		40	P
19	72.5	72	69	72	3.2	S		0.06		71	P
					5.5	SE	28.31	0.07	0.67	92	S
20	71	73.5	77	68	4.9	E					
					6.7	NE	28.31	0.17	0.18	56	P
	72	73.5	83	70	6.2	S					
21					3.7	SW	28.22	0.12		46	P
22	74	76.5	86	75	5.4	SW					
					12.3	SW	28.15	0.10		60	P
23	72	73	80	74	5.0	NE					
	71	69.5	63		7.1	S	28.30	0.13		44	P
24	73.5	75	84	72	5.9	S		0.08		61	P
					5.7	S	28.37	0.07		49	P
25	72	74	79	78	12.0	SW	28.30	0.10	0.02	77	R
	71	71.5	75	68	4.8	E					
26					6.7	SE	28.29	0.0	0.78	93	S.
	70	69	62		8.4	S		0.01	0.51	83	R
27	74	75	79	69	3.1	SW	28.42	0.07		63	P
28	73	74.5	80	77	5.2	S					
					6.3	S	28.30	0.11		71	P
29	73	74	80	78	8.3	SE					
					7.3	SE	27.98	0.06	0.34	81	R
30	76	80	84	77	4.7	NE	27.92	0.03	0.10	41	P
	72	72	64		5.7	SW		0.07		52	P
31.	72	73	79	72	7.1	SW	28.18	0.16		54	P
	73.5	72.5	77	70	5.9	N					
					2.9	S	28.20	0.09		83	P

Average time of observations 7.45 a.m. and 5 p.m.
P—Clear, no clouds
Q—Small fleecy clouds
R—Cumuli.
S—Heavy, overcast, threatening

Meteorological Data of M.H.S. Station, Keewatin, Ont., for August, 1917.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Dav.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1					5·8	W.					
2	70	68·5	60	60	13·1	W.	28·15	0·08	0·44	94	S
					10·7	NW.					
3	68	69	65	60	8·4	NW.	29·53	0·21	0·32	0	R
					3·6	S					
4	69·5	70	73	68	7·5	SE.	28·42	0·13		63	P
					12·7	SE.					
5	68	68·5	65	63	6·3	NW.	28·12	0·00	0·05	90	R
					9·5	W.					
				57			28·33				
6	66	65	59		9·9	SW.		0·29		94	P
	67·5	69	71	63	6·1	SW.	28·49	0·10		94	P
7	66	65	62		3 6	S		0·05		81	R
	68	68·5	68	66	4·1	SW.	28·39	0·04		81	P
8	66	55·5	59		2·8	NW.		0·05	0·03	86	S
	66·5	67·5	65	61	9·6	NW.	28·37	0·06	0·08	53	P
9					7·5	W.					
	66	67	72	63	10·3	NW.	28·38	0·19		51	P
10	65·5	65	60		6·3	NW.		0·08		78	R
	66	68·5	74	64	4·3	W.	28·31	0·04		42	P
11					5·3	SW.					
	67	69·5	79	66	8 0	W.	28·31	0·14		42	P
12					2·3	SW.					
	70	74	78	69			28·34	0·05		41	P
13	68·5	68	66		2·7	SW.		0·11		90	Q
	69·5	70	77	72	5·6	SW.	28·33	0·12		51	P
14					5·1	S					
	69	69·5	76	72	6·6	SW.	28·27	0·10		67	S
15	67	67	62		5·3	NW.		0·04		87	Q
	68	69·5	69	65	3·6	NW.	28·42	0·02	0·24	68	P
16					5·7	NW.					
	69	70·5	60	63	2·5	NE.	28·53	0·05		58	P
17					3·6	SW.					
	69·5	72·5	84	71	7·9	SW.	28·34	0·12		53	P
18	68	63·5	62		4·3	N.		0·04		0	P
	73	73·5	78	70	2 5	NE.	28·37	0·05		45	P
19					9·7	W.					
				69			28·28				
20	67	65·5	55		6·7	E.		0·27		71	S
	67	67	61	58	2·8	SE	28·43	0·06		59	R
21					5·6	S					
	67·5	68·5	76	67	6·6	SE.	28·17	0·05	0 02	63	P
22					4·4	SE.					
	68·5	69·5	76	70	6·3	SE.	27·95	0·03	0·04	59	P
23					12·9	NW.					
	65	64·5	61	59	17·1	NW.	28·03	..	0 50	66	S
24					18·1	N.					
	64	65·5	64	53	12·4	N.	28·30	0·18		56	P
25					3·1	NW.					
	65·5	67	72	59	2·2	NW.	28·25	0·09		44	P
26											
	65·5	66	69		3·6	SE		0·05		47	P
27				59			28·21				
	64·5	64·5	60	56	9·7	NW.					
28					12·7	NW.	28·26	0·20	0·31	68	R
	63·5	64	59	54	8·1	NW.					
29	63	62	48		8·9	NW.	28·49	0·14	0·14	55	Q
	64·5	64·5	64	58	1·8	W.		0·03		90	S
30					3·9	SW.	28·48	0·09		61	P
	63	64	68	63	7·2	S					
31	63·5	62·5	59		8·0	S	28·20		0 23	0·59	S
	63·5	64	66	61	3·1	SW.			0·04	86	Q
					5·7	SW.	28·13	0·07		68	

Average time of observations 7·45 a m and 5 0 p m
P—Clear, no clouds
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening

Meteorological Data of M.H.S. Station, Keewatin, Ont., for September, 1917.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1					5·9	W.					
2	61·5	61·5	59	55	11·5	W.	28·33	0·16		60	S
3				54	5·1	W.					
4	60	62	58	54	4·0	NW.	28·59	0·19	0·05	94	P
5	63	63	62	57	3·7 4·3	SW. SW.	28·71	0·18		89	S
6	62	62	60	57	11·1 17·5	NW. NW.	28·23	0	0·45	0	S
7	60	60	50 68	59	3·1 4·0	SW. S.	28·42	0·04 0·06		0	Fog P
8	61	62	68	61	4·1 4·7	S. SW.	28·31	0·10		57	P
9	60 59	60 58	51 48	49	6·9 10·8 8·1	NE. NE. N.	28·56	0·07 0·04		81 73	S R
10	58 59	56 60	41 61	44 52	4·9 7·9	SW. W.	28·86 28·77	0·15 0·13		0 54	P P
11					5·3	SW.					
12	60	60	66	59	7·6 5·8	SW. SE.	28·46	0·12		62	P
13	59·5	60	60	61	6·5 4 2	E. NE.	28·26	0·05	0·04	94	S
14	59·5	59	58	58	9·1 5·8	NE. E.	28·38	0·05	0·03	80	S
15	59·5 59·5 59·5	59·5 58·5 60·5	62 58 64	59 61	4·9 5·5 6·3	E. SE. SE.	28·51 28·64	0·05 0·03 0·02		78 91 77	S S S
16					3·7	SE.					
17	60 62	60 61·5	61 62	65	2·3	W.	28·89	0·02		89	S Q
18	63·5	67 5	76	70	4·1 3 2	SE. S.	28·51	0·02 0		0 78	R P
19	61·5	62·5	66	66	5·9 11·4	NW. N.	28 35	0	0·08	81	S
20	59·5 60	60·5 61	62 70	55 57	8·5 2·7 4·5	NE. SW. SW.	28·52 28·51	0·08 0·09	0·02	28 43	Q P
21					3·3	SW.					
22	61 5	61·5	68	60	3·5 5 7	S S	28 53	0·06		32	P
23	61	62	71	63	5·6 4·1	S S	28 37	0·07		53	P
24	62·5 61·5	63 62·5	68 74	68	5·5	S.	28·29	0·04 0·02		71 86	P S
25	61·0	61·5	67	70	8·3 7·2	S S	28·24	0·05		60	P
26	60	60	56	61	6·9	SW.	28·10	0·03	0·35	94	S.
27	56·5	57	45	52	7·3 12·1	NW. NW.	28·26	0 11	0·14	92	S
28	58	58	54	54	4·8 9·4	SE. SE.	28·22	0·11		73	S
29	58·5	57·5	56	54	9·4 6·7	SW. NW.	28·08	0 11	0·06	67	S
30	57	57	52	49	7 2 15 7	NW. NW.	28 27	0 11	0 07	73	R
31	57·5	57·5	49	46	10 5	N.	28 53	0 08		62	P

Average time of observations 7 45 a m and 5 p m
P—Clear, no clouds.
Q—Small fleecy clouds
R—Cumuli.
S—Heavy, overcast, threatening

Meteorological Data of M.H.S. Station, Keewatin, Ont., for October, 1917.

Day.	Temperature. Lake.	Tank.	Air.	Day.	Velocity of Wind	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General.
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches	%	
1	56·5	57			6·3	SE		0·01		46	P
2	55·5	54·5	62	58	11·1 7·8	SE NW	28·27	0·07		74	S
3	55·5	55·5	54	52	8·3 6·0	NW NE	28·28	0·13		47	R
4	55	54·5	49	46	4·0 7·7	S NE	28·27	0·07		47	S
5	54·5	53·5	43	43	7·3 7·8	N N	28·15	0·07	0·24	88	S
6	54	53·5	44	44	2·8	N	28·58	0·14	0·09	53	R
7	52·5	51	48	47	7·2 10·4 21·6	S W N	28·17	0·12	0·01	74	S
8	50	48·5	33	33	11·2	SW	28·54	0·14		84	S
9	50·5	49·5	39	40	7·5	E	28·52	0·18		65	Q
10	50·5	49·5	41	42	3·0 2·8	NE SW	28·47	0·48	0·12	75	S
11	49·5	49	45	42	10·0	SW	28·29	0·15		77	S
12	47	45	26	35	15·0 22·7 15·8	N N NE	28·30	0·06	0·61	87	S
13	46·5	46·5	34	28	6·0 5·6	NE S	28·47	0·15		42	P
14	[illegible]	40	40	29	7·9 5·0	S NW	28·11	0·12		77	R
15	46·5	46	46	36			27·88	0·10	0·15	77	Q
16	46·5	45·5	38	40	8·0 11·4	NW NW	28·19	0·06	0·04	72	S
17	46·5	45	44	44	4·0 2·5 7·2	N N NE	28·44	0·05		60	P
18	45·5	42·5	44	45	12·1 10·2	NE N	28·48		0·64	100	S
19	43·5	41	26	28	20·6 8·0	N NW	28·28	0·08	0·00		S
20	43	42	26	25	5·1 2·9	S NW	28·31				S
21	42·5	42	41	[illegible]	7·4	NW	28·35	0·10	0·10		S
22	42·5	42	32	28	3·6	SE	28·40	0·05	0·05		Q
23	41	40·5	25	25	13·3 12·3	NE NE	28·81	0·20	0·25		Q P
24	[illegible]	40·5	30	25	5·6 10·0	S SE	28·71	0·10			S
25	41	41	39·5	34	8·3 4·5	S S	28·28	0·10		55	Q
26	40	40	38	34	5·9 10·9	SE SE	28·16	0·06	0·30		S
27	40·5	40	34	33	6·2 4·3	SW NW	27·87		0·50	100	S
28	50	39	32	31	[illegible] 9·7 9·6	SW SW W	27·79	0·09	[illegible]		S
29	[illegible]	[illegible]	32	30			28·24	0·07	0·20	95	S
30	[illegible]	34·5	23	22	9·2 9·9	W NW	28·34	0·10	0·10		S R
31	37	35	26	[illegible]	[illegible] 6·3	NW NW	28·29			87	S
	[illegible]	35	[illegible]	[illegible]	4·0 2·5	NW NW	28·33				S

Average time of observations 7.45 a.m. and 5 p.m.
P Clear, no clouds.
S Small fleecy clouds.
Q Cumuli.
R Heavy overcast threatening.

Meteorological Data of M.H.S. Station, Keewatin, Ont., for November, 1917.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1					4·6	NW.					
2	38	36·5	34	29	5·1	SW.	28·50	0·05		74	S
3	38	38	44	36	3·7	SW.	28·39	0·05		87	P
4	39·5	40	54	40	2·8	SW.	28·58	0·02		56	P
5	38·5	38·5	39	43	3·0	SE.	28·50	0·04		83	Q
6	38·5	39·5	46	43	6·5	SE.	28·62	0·07		52	P
7	38	38	41	34	9·7	E.	28·72	0·03		68	P
8	37·5	37	35	31	3·9	S.	28·72	0·00		95	S
9	38	37	41	33	5·1	S.	28·66	0·04		82	P
10	37·5	37	34	32	6·4	SE.	28·56	0·00		95	S
11	38	38	42	34	4·3	SE.	28·53	0·00		87	R
12	37·5	37	37	31	3·5	SE.	28·67	0·04		69	S
13	36·5	36·5	31	32	4·0	S.	28·66	0·07	0·07	100	S
14	38		31	33	3·8	E.	28·53	*		90	S
15	37		34		1·7	E.					
	36·5		35	35	0·7	NW.	28·58		0·05	100	S
16	38		48	42	1·0	NW.	28·52			15	P
17	37·5		47	42	5·6	NE.	28·40		*	60	P
18	37		37	36	6·3	W.	28·55			81	S
19	34·5		24	27	3·6	S.	28·70			80	S
20	36·5		42		4·0	NW.	28·30			67	P
21	37		41		11·3	NW.	28·09		0·04	79	S
22	36		28		9·0	S.	28·10		0·06	100	S
23	33·5		23		4·3	W.	28·47			73	S
24	34		31		3·5	SW.	28·47		0·05	100	S
25	33		16		1·5	NE.	28·64		0·05		S
26	33		15		2·0	S.	28·87				R
27			28		5·6	NW.	28·65		0·20		S
28	34		31		15·4	N.	28·45				S
29	33·5		37		2·9	NE.	28·23				R
30	33		38		4·4	S.	28·04				P
	32		16		2·1	SE.					
					3·1	N.					
					8·6	NE.					
					7·4	NE.					
					5·1	SE.					
					9·9	N.					
					7·3	N.					
					5·5	SE.					
					4·9	N.					
					3·8	SE.					
					5·9	S.					
					4·9	SE.					
					4·4	N.					
					9·1	NE.			0·05		S
					12·8	NW.	28·28				

Average time of observations 7·45 a.m. and 5 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.
*Tank shut down

Meteorological Data of M.H.S. Station, Keewatin, Ont., for December, 1917.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1					8·0	NE.					
2	34		16	15	7·4	NE.	28·49				S
					12·5	SW.					
3	33·5		28	24			28·28		0·30		S
					8·0	N.					
4	32		7	7·0	6·9	N	28·49				R
					6·9	NW.					
5	32		0	1	6·5	NW.	28·54				P
					5·9	NW					
	32		−5	1	4·3	NW	28·61				P
6					1·6	S					
7	32		5	2	6·1	SE	28·43				P
					4·8	W					
8	32		8	6	4·3	SW.	28·42		0·05		P
					8·9	N.					
9	32		2	3	14·7	N	28·25		0·03		S
					14·2	N					
10	32		15	16			28·54				P
					7·9	N					
	32		23	14	2·3	N	28·48				P
11			9		3·6	SE					
12	32		+1	4	7·0	SE	28·48		0·10		S
					7·0	NW					
	32		19	16	7·1	NW	28·63				P
13					2·5	SW					
14	32		−24	−18	0·4	SW	28·53				P
					2·6	NW					
15	32		24	23	0·8	NW	28·63				P
					5·0	SE					
	32		8	8	10·4	SE	28·52		0·10		S
16					6·0	SE					
17	32		12	14			28·42		0·10		S
			4		9·9	E					
18	32		2A	24	4·2	SW	28·03				R
					9·5	NW					
19	32		13	15	12·6	NW	28·19		0·05		S
					6·2	SE					
20	32		6	14	9·1	NE	28·15				S
					4·1	NE.					
	32		6	5	4·7	NW	28·42				S
21					3·3	S					
22	32		6	0	4·9	SE	28·49		0·10		S
					5·4	NE					
23	32		12	13	3·9	NE.	28·34				S
					6·2	SE					
24	32		25	17			28·01		0·03		S
					7·1	NW					P
25	32		21		26·5	NW			0·30		P
					6·2	NW					
	32		19				29·02				P
26					4·8	NE					
27	32		20		7·1	NE	28·75				R
			26		9·9	NW					
28	32		21	23	13·3	NW.	28·73				P
			18		6·0	NW					
29	32		34	26	3·8	NW.	29·08				P
			12		2·8	SE					
30	32		30	21	2·0	SE	28·92				P
					5·5	SW					
31	32		2				28·40		0·20		P
			5		7·0	N					
	32		2	4	0·7	W			0·10		S

Average time of observations 7.45 a.m. and 5 p.m.
P Clear, no clouds.
Q Small fleecy clouds.
R Cumuli.
S Heavy overcast, threatening.

Meteorological Data of M.H.S. Station, Keewatin, Ont., for January, 1918.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour		Inches.	Inches.	Inches.	%	
1	32		6	5	8·2	E.					
2 ..	32		8	5	5·6	SE	28·25		0·80		S
3	32		5	0	5·9	SE	28·46				R
4	32		20	18	8·9	SE.	28·18		0·50		S
5	32		22	21	6·3	S.	28·01				S
6	32		0	14	2·5	NW.	28·35		0·20		S
7	32		3	1	0·9	NW.	28·61				P
8	32		3	8	3·1	NW.	28·46				P
9	32		22	11	4·5	NW.	28·43				P
10	32		13	7	7·5	N	28·47				R
11	32		8	8	5·6	NW	28·48				S
12	32		6	8	2·6	NW	28·20		0·10		S
13	32		12	10	4·1	N	27·95				P
14	32		3	5	0·5	NW	27·94		0·10		S
15	32		6	2	2·3	NW	28·07				R
16	32		4	1	0·2	NW	27·82				R
17	32		−2	5	6·3	NW	27·93		0·15		Q
18	32		2	3	4·7	SW	28·21				Q
19	32		4	−2	5·3	NW	28·16				R
20	32		12	6	8·1	N	28·36		0·05		P
21	32		13	9	12·9	NW	28·34				R
22	32		4	6	8·6	NW	28·24		0·10		R
23	32		2	6	8·8	NW	28·25				P
24	32		6	0	5·2	N	27·94		0·20		S
25	32		8	6	2·9	NW	27·74		0·10		S
26	32		21	19	7·6	NW	28·33				P
27	32		38	28	7·0	NW	28·69				P
28	32		16	10	3·3	SW	28·60				Q
29	32		2	2	5·7	NW	28·25		0·10		S
30	32		39	28	8·4	N	28·59				P
31	32		18	23	7·1	NW	28·81				P
	32		10	20	3·4	NW	28·63				P
					6·1	SE					
					7·6	SE					
					3·4	SW					
					2·3	NW					
					9·4	NW					
					9·3	N					
					5·1	N					
					1·3	SW					
					2·6	S					
					8·6	SW					
					9·7	SW					
					7·7	N					
					4·6	NW					
					1·5	N					
					3·3	SW					
					4·9	SW					
					3·8	SW					

Average time of observations 7·45 a m and 5 p m
P—Clear, no clouds
Q—Small fleecy clouds
R—Cumuli
S—Heavy overcast, threatening

Meteorological Data of M.H.S. Station, Keewatin, Ont., for February, 1918.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General
	Lake	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1	32		4	− 8	6·3	SW.	28·15		0·10		P
					9·3	SW.					P
2	32		− 1	−10	9·3	NW.	28·31		0·05		P
					1·2	NW.					
3	32		−23	−16	1·7	N.	28·57				P
					6·4	NW.					
4	32		−25	−14	3·7	NW.	28·65				P
					9·9	SE.					
5	32		14	9	5·0	SE.	27·86		0·10		S
					6·2	N.					
6	32		11	5	8·2	NW.	26·26		0·05		P
					7·0	SE.					
7	32		12	2	12·2	SE.	28·27				Q
					7·6	NW.					
8	32		18	13	11·7	NW.	28·47		0·10		P
					4·8	NW.					
9	32		28	18	4·6	SW.	28·27				P
					3·3	S.					
10	32		26	26			28·05		0·05		Q
					6·5	NW.					
11	32		26	27	8·1	NW.	27·94				Q
					4·5	N.					
12	32		14	12	3·7	N.	27·98		0·15		Q
					4·9	N.					
13	32		6	1	6·9	N.	28·20				P
					5·6	N.					
14	32		− 7	− 2	8·3	N.	28·46				P
					6·7	NW.					
15	32		6	− 6	2·0	NW.	28·74				P
					4·0	NW					
16	32		7	− 7	2·3	NW.	28·65				P
					5·6	S.					
17	32		4	− 1			28·60				P
					5·4	NE.					
18	32		0	− 4	7·8	N.	28·42		0·10		Q
					10·6	N.					
19	32		− 4	− 8	9·1	NW.	28·48				P
					8·0	NW.					
20	32		−12	−19	12·4	N.	28·82				P
					7·4	NW.					
21	32		− 5	−13	5·2	N.	28·50				Q
					4·9	N.					
22	32		24	7	7·3	N.	27·97				Q
					6·3	N.					
23	32		41	26	6·1	N.	27·70				P
					10·9	W.					
24	32		34	30			27·80		0·10		P
					10·0	N.					
25	32		13	13	10·9	N.	28·07		0·30		P
					5·8	N.					
26	32		20	8	3·7	N.	27·84		0·20		S
					5·4	NW.					
27	32		17	8	5·4	NW.	28·35				P
			17	8	3·8	N.					P
28	32		25	6	5·0	N.	28·47				P

Average time observations, 7.45 a.m. and 5.00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast threatening.

Meteorological Data of M.H.S. Station, Keewatin, Ont., for March, 1918.

Day.	Temperature				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Dav.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches	%	
1					6·4	N.					
2	32		41	30	4·8	N.	28·29				P
					10·9	W.					
3	32		32	26	13·0	NW.	28·32				P
					3·3	N.					
4	32		31	28			28·35				P
					7·7	NE.					
5	32		15	22	13·3	NE.	28·14				H
					12·6	NE.					
	32		10	6	9·7	N.	28·41		0·30		R
6					3·0	NE.					
7	32		19	8	5·7	NE.	28·12				Q
					9·2	NW.					
8	32		24	16	10·3	NW.	27·91		0·07		P
					10·9	NW.					
9	32		13	6	7·3	N.	28·43		0·05		P
					5·3	N.					
10	32		14	4	5·5	N.	28·56				Q
					6·0	E.					
	32		17	12			28·57				R
11					2·1	NE.					
12	32		29	22	6·8	NE.	28·24		0·03		P
					6·5	NW.					
1	32		29	21	9·0	NW.	28·26		0·39		P
					2·4	N.					
14	32		37	19	1·2	N.	28·27				P
					5·7	NW.					
15	32		30	26	12·0	NW.	28·57				P
					1·9	SW.					
	32		40	26	13·5	SW.	28·56				P
16					8·0						
17	32		47	37	13·7	W.	28·12				P
					7·9	SW.					
18	32		32	33			28·16				S
					5·8	SW.					
19	32		52	42	1·2	SW.	27·89				P
					4·1	SW.					
20	32		52	42	5·6	NW.	27·95				P
					4·6	SE.					
	32		46	36	4·6	E.	28·17				S
21											
22	32		34	31	6·1	NW.	28·32		0·46	54	P
					14·7	NW.					
23	32		42	32	4·7	NW.	28·51			49	Q
					3·5	SE.					
24	32		54	44	10·5	NW.	28·39			34	R
					10·4	NW.					
25	32		42	37	8·0	NW.	28·55			32	P
					6·3	NW.					
	32		31	35	3·0	NE.	28·19			38	P
26					6·4	N.					
27	32		41	32	4·3	N.	28·42			51	Q
					8·8	NE.					
28	32		49	38	10·0	NE.	28·41			93	P
					9·5	NW.					
29	32		40	38	5·9	W.	28·54			91	R
					2·6	NE.					
30	32		36	40			28·60		0·15	87	S
					7·3	NE.					
31	32		53	45	3·7	NE.	27·87			51	S
					10·0	W.					
	32		42	38			27·68			57	R

Average time of observations, 7·45 a.m. and 5 m. p.m.
P—Clear, no clouds
Q—Small fleecy clouds
R—Cumuli.
S—Heavy, overcast, threatening

Meteorological Data of M.H.S. Station, Keewatin, Ont., for April, 1918.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1					8·3	NW.					
	32		28	26	10·6	NW.	27·96			100	S
2					10·3	N.					
	32		34	24	7·9	N.	28·48		0·01	50	P
3					2·4	NW.					
	32		42	29	7·9	NW.	28·63			35	P
4					3·6	N.					
	32		52	37	4·4	NE.	28·54			18	P
5					4·4	N.					
	32		56	42	4·5	N.	28·39			33	P
6					6·9	N.					
	32		36	37	4·4	N.	28·20		0·18	91	S
7					9·9	NW					
	32		20	24			28·47		0·44	72	S
8					6·0	NE.					
	32		32	21	2·6	NE.	29·05			79	P
9					6·4	NE.					
	32		50	36	8·9	NE.	28·80			39	P
10					9·2	N.					
	32		54	45	11·3	N.	28·48			28	S
11					5·1	NE.					
	32		58	48	4·0	NE.	28·41			40	P
12					4·5	NE.					
	32		65	50	3·9	N.	28·38			25	P
13					5·6	NE.					
	32		60	50	7·0	NE.	28·32			58	Q
14					6·3	NE.					
	32		58	53			28·27			45	P
15					7·5	NE.					
	32		68	53	7·6	NE.	28·32			25	P
16					7·0	NE.					
	33		58	52	8·7	NE.	28·05			34	S
17					9·1	NE.					
	33		45	42	9·5	NE.	28·09		0·22	77	R
18					9·0	NE.					
	34		43	35	4·9	N.	28·47			24	P
19					3·6	N.					
	35		50	38	4·3	NE.	28·72			61	P
20					2·9	N.					
	35		59	44	8·0	SW.	28·51			29	P
21					3·7	S.E.					
	36		51	47			27·99			47	R
22					12·5	NW					
	37		23	23	19·2	NW	27·98		0·02	100	S
23					13·3	N.					
	37		39	28	8·3	NW.	28·27		0·12	39	P
24					3·6	N.					
	38		57	42	7·7	N.	28·19			31	Q
25					8·6	SW.					
	39		57	49	8·0	SW.	28·14			44	P
26					12·9	NE.					
	39		32	31	11·0	NE.	28·34		0·10	66	S
27					8·0	NE.					
	38		41	36	5 3	NE.	28·35			76	S
28					7 3	NE.					
	38		44	41			28·02		0·07	82	S S S
29					20·0	N.					
	39 5		48	42	29·6	NW	28·12		0·05	31	S
30					7·0	W					
	40		62	48	13·7	SW	28·36			26	P

Average time of observations, 7 45 a m and 5 00 p m
P—Clear, no clouds
Q—Small fleecy clouds
R—Cumuli
S—Heavy, overcast, threatening

Meteorological Data of M.H.S. Station, Keewatin, Ont., for May, 1918.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches	%	
1					6·2	NW.					
2	41	42	74	55	5·6	NW.	28·26			29	P
	41	44	75	46	9·0	NE.					
3					2·8	NE.	28·48	0·7		54	R
	42	50	66	56	9·2	N.					
4					7·7	N.	28·22	0·09		27	P
	43	46	70	54	4·3	NE.					
5					4·7	NW.	28·10	0·10		38	P
	44·5	56·5	78	66	7·3	NE.					
6							27·88	0·04		25	P
	44·5	44·5	51	49	9·6	NE.					
7					11·5	NE.	28·16			70	R
	45·5	47	52	46	5·8	NE.					
8					1·6	NE.	28·12	0·06	0·14	68	S
	46	49·5	67	52	3·9	NW.					
9					5·4	W.	28·11	0·09		38	P
	44·5	48·5	51	40	10·9	N.					
10					11·7	N.	28·22	0·05		27	P
	43·5	47·5	51	39	9·0	NW.					
11					8·4	NW.	28·20	0·07		32	Q
					2·3	W.					
12	43·5	45·5	50	38	6·3	W.	27·97	0·11	0·06	34	S
	44·5	44·5	34	32	9·8	NW.					
13							28·17	0·05	0·11	56	P
			38	40	6·1	NW.					
14					11·4	NW.	28·12	0·13			P
	44	46	48	36	13·2	NE.					
15					5·6	NE.	28·51	0·07		33	P
	46	48·5	63	44	8·6	E.					
16					5·5	E.	28·23	0·12	0·04	61	Q
					9·2	SE.					
17	46·5	52	71	56	7·5	NE.	27·87	0·05		48	Q
	46	52·5	65	57	4·6	W.					
18					9·7	NW.	28·12	0·07		52	P
	48	51	65	52	3·0	NE.					
19					1·7	NE.	28·17	0·01		54	P
	49	50	58	51	7·6	W.					
20							27·86	0·04	0·50	71	S
	44·5	42·5	32	39	13·0	NW.					
21					4·4	NW.	28·44	0·02	0·01	76	S
					6·1	SE.					S
22	45	44·5	42	43	11·7	SE.	28·20	0·08	0·85	96	S
	46	47	49	43	13·2	W.					
23					14·6	NW.	28·36	0·06	0·24	59	R
	47	45·5	51	44	5·8	NE.					
24					7·1	S.	28·48	0·06	0·04	80	R
	46·5	49	54	52	6·6	SE.					
25							28·28			81	S
	46	48	52	46	7·3	E.					
26					4·3	N.	28·35	0·01	0 42	77	S
	48	48·5	47	44	6·3	N.					
27							28·43	0·06	0·20	72	S
	49	53	62	51	5·8	N.					
28					3·8	NW.	28·49	0·04		53	P
	52	58·5	69	54	1·4	NE.					
29					3·3	NE.	28·52	0·07		35	P
	52	57	66	56	1·5	S.					
30					4·9	S.	28·42	0·04		58	P
	51·5	54·5	66	59	4·1	S.					
31					3·1	S.	28·12	0·00		86	Q
	52	55·5	64	62	5·1	SE.					
					4·9	SE.	27·84	0·02		87	S

Average time of observations, 7 45 a m and 5 00 p m
P—Clear, no clouds
Q—Small fleecy clouds
R—Cumuli
S—Heavy, overcast, threatening

Meteorological Data of M.H.S. Station, Keewatin, Ont., for June, 1918.

Day	Temperature. Lake.	Tank.	Air.	Day.	Velocity of Wind.	Direction of Wind.	Barometer	Evaporation.	Rain.	Humidity.	General
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1	49.5	50.5	49	51	9.9 14.9	W. W.	27.79	0.05	0.47	73	S
2	48.5	48.5	49	48	10.1	W.	29.20	0.06		76	S
3	51.5	47	64	49	3.9 2.0	SE. SE.	28.45	0.06		86	P
4	51.5	55.5	64	57	2.1 6.0	NW. W.	28.44	0.08	0.24	94	R
5	53	55.5	64	56	4.4 9.5	SE. S.	29.38	0.05		74	P
6	50	54	57	54	9.0 19.2	N. NW.	28.37	0.10	0.02	48	P
7	53	57	72	56	8.5 8.8	SE. SW.	28.43	0.14		31	P
8	53	57	66	58	9.8 5.4	NE. SE.	28.32	0.08		30	P
9	53	56	58	58	1.7	SE.	28.37	0.05		60	P
10	60.5	64	77	97	4.6 3.9	SE. S.	28.15	0.09		81	P
11				68	12.9 24.1	NW. NW	28.06				
12	59	64.5	70	60	9.2 2.7 1.8	SE. SE SE	28.34	0.19		65	P
13	56	92.5	75	65	7.4 8.0	N. E.	28.26	0.07		26	P
14	61	64	70	60	5.1 8.2	S. S.	28.34	0.09		88	P
15	60.5	64	72	97	6.7	S.	28.12	0.07	0.02	73	S
16	60	63.5	64	50	8.8	N.	28.51	0.10	1.04	56	P
17	64.5	66.5	72	91	6.0 0.8 1.0	SW NW E.	28.66	0.11		51	P
18	65	66.5	79	63	1.9 4.8	SE. SE.	28.56	0.09		40	P
19	65	66.5	72	65	7.4 8.3	SW. W.	28.35	0.07		50	S
20	56.5	56.5	74	64	12.8	W.	28.08	0.12	0.28	86	Q
21	58	61.5	64	53	17.1 14.2 4.1	N. N. N.	28.32	0.06		51	Q
22	60	93	87	56	5.9 6.4	N. SW.	28.35	0.06		51	P
23	61	63.5	73	68			28.07	0.09		56	Q
24	60.5	63	72					0.06		58	
	60	60.5	56	92	9.1 8.2	NE. SE.	28.23	0.07		85	R
25	62.5	65	71	60	4.0 3.7	SE. SE.	28.20	0.09		91	P
26	61.5	63.5	81	81	8.9 9.5 8.2	SW. W. SW.	27.96	0.01	0.78	82	S
27	61	63	65	58	14.0 9.2	SW. NW.	27.77	0.14	0.05	82	S
28	59.5	59.5	63	51	9.4 7.5	NW. NE.	27.91	0.06	0.24	84	S
29	59	59.5	54	49	5.4 5.3	NE. NE.	29.32	0.09	0.01	76	S
30	59.5	59.5	56	53			28.38	0.06	0.12	82	S

Average time of observations, 7 45 a m and 3 00 p m.
P—Clear, no clouds
Q—Small fleecy clouds
R—Cumuli.
S—Heavy, overcast, threatening

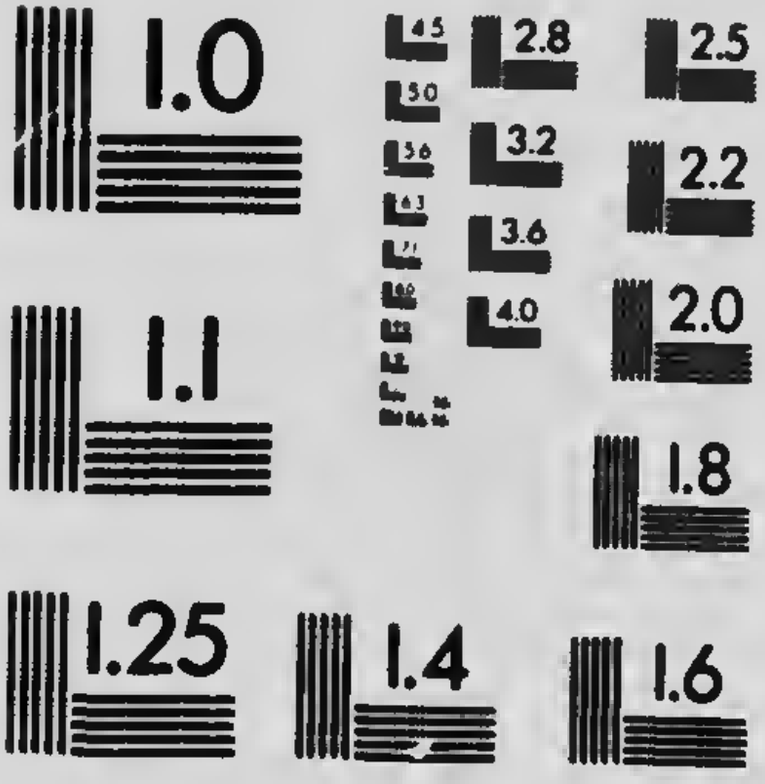
Meteorological Data of M.H.S. Station, Keewatin, Ont., for July, 1918.

Day.	Temperature.				Velocity of Wind	Direction of Wind.	Barometer	Evaporation	Rain	Humidity.	General
	Lake.	Tank.	Air.	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1					1·6	S.					
2	60·5	61·5	60	58			28·22	0·06		76	Q
3					5·0	W.					
4	64	66	78	65	5·0	W.	26·21	0·15		34	P
5					4·2	SE.					
	63·5	63·5	72	66	12·7	SE.	28·15	0·10	•	53	S
					9·5	W.					
	64	63·5	74	67	13·9	W.	28·13	0·11	0·27	0·35	P
	62	62·5	58	56	16·2	W.					
6					15·4	W.	28·32	0·17	0·06	81	S
					9·4	W.					
7	64	66	72	59	7·1	NE.	28·54	0·11		39	P
					4·1	SE.					
8	68	66·5	80	62			28·53	0·07		47	P
					2·8	S.					
9	63	63	60	60	4·4	S.	28·50	0·13	0·10	94	P
					8·7						
10	63·5	64·5	64	58	9·1	NW.	28·55	0·04	0·18	0·70	P
					3·2						
11	66	69	75	60	6·1	NW.	28·32	0·10	0·03	42	P
					4·1	NW.					
12	66·5	71·5	80	67	2·0	NW.	28·65	0·11		49	P
					0·8	SE.					
13	73	68	71	66	2·4	SE.	28·54	0·08		70	R
					8·1	SE.					
14	65	65·5	62	60	11·5	SE.	28·38	0·09	1·07	95	S
					2·3	W.					
15	67·5	67·5	66	65			28·63	0·05		88	R
					2·0	N.					
16	65·5	68	67	64	7·6	N.	28·45	0·05		66	R
					4·4	N.					
17	66·5	70·5	74	61	3·2	N.	28·47	0·08		74	S
					4·2	SW.					
18	66	68·5	80	65	8·7	W.	28·34	0·12		41	S
					3·6	SE.					
19	67·5	69	72	63	3·6	SE.	28·22	0·08	0·20	60	S
					2·3	N.					
20	68	71	74	64			28·25	0·10	0·05	60	S
					2·6						
21	68·5	70·5	77	67	5·6	S.	28·10	0·05	0·10	74	S
					7·0	N.					
22	68	71	69	64			28·23	0·07		69	P
					4·0	NE.					
23	68	71	77	64	2·1	NE.	28·43	0·10		62	Q
					0·5	SE.					
24	72·5	74·5	81	70	3·0	SE.	28·29	0·09		54	P
					2·7	NW.					
25	70·5	71	62	64	7·3	N.	28·35	0·03	0·28	89	S
					6·3	NE.					
26	65·5	65	58	55	7·7	W.	28·38	0·13		72	S
					6·3	W.					
27	64	65	59	56	10·3	W.	28·30	0·11	0·46	73	S
					2·6	SE.					
28	65·5	65·5	61	56	8·0	SE.	28·43	0·14		67	R
					8·0	SW.					
29	68·5	69·5	68	60			28·26	0·13	0·86	70	P
					11·7	N.					
30	66·5	69	69	57	2·6	N.	28·56	0·12	0·05	53	P
					0·7	SW.					
31	70·5	70·5	75	64	3·7	SE.	28·45	0·15		58	P
					2·3	SE.					
	68·5	69·5	76	69	5·0	S.	28·25	0·10		60	Q

Average time of observations, 7.45 a.m. and 5.00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli
S—Heavy, overcast, threatening.

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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Meteorological Data of M.H.S. Station, Keewatin, Ont., for August, 1918.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer.	Evaporation.	Rain.	Humidity.	General
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1					6·8	N.					
	69·5	69·5	71	65	4·0	NE.	28·33	0·12		49	P
2					4·3	SE.					
	67·5	69	71	60	3·5	SE.	28·42	0·13		58	P
3					7·6	SE.					
	67	67	64	68			28·16	0·14	0·27	78	P
4					4·9	NW.					
	69	67·5	72	72			28·09	0·18	0·05	51	P
5					9·0	NW.					
	70·5	72	78	67	1·6	SE.	28·27	0·13		58	P
6					0·5	SE.					
	69·5	71	75	66	3·5	SW.	28·16	0·14		50	Q
7					6·3	N.					
	68·5	70·5	68	59	2·7	SE.	28·36	0·11	0·29	64	P
8					1·7	SW.					
	69	72	72	65	3·9	S.	28·26	0·14		68	P
9					3·1	SE.					
	69·5	71	75	68	5·8	SE.	28·08	0·11		60	S
10					9·1	SW.					
	66·5	65·5	55	65	11·2	SW.	28·06	0·10	0·17	72	P
11					10·3	N.					
	66·5	66·5	61	60			28·35	0·21		54	R
12					4·4	E.					
	67	66·5	64	62	6·4	SE.	28·18	0·18	0·86	87	S
13					8·4	W.					
	67	67	67	59	9·4	W.	28·31	0·9		57	Q
14					3·1	SW.					
	68	69·5	78	64	6·9	W.	28·42	0·15		44	P
15					4·2	NE.					
	73	73·5	80	64	1·7	N.	28·44	0·16		83	P
16					1·8	NE.					
	67	67	66	61	4·5	NW.	28·48	0·07	0·04	95	S
17					5,6	SE.					
	68·5	69·5	76	66	9·0	SE.	28·48	0·13	0·09	68	P
18					8·4	S.					
	67·5	67·5	71	68			28·57	0·13		60	Q
19					9·9	S.					
	68	69	72	68	6·1	S.	28·52	0·10		81	Q
20					3·4	SW.					
	67	67	67	65	2·1	SE.	28·36	0·01	1·03	95	S
21					1·7	S.					
	74	74·5	80	67	2·3	SW.	28·30	0·07	0·03	55	P
22					4·4	SW.					
	68·5	68·5	65	65	11·1	SW.	28·07	0·08	0·06	85	S
23					7·8	W.					
	72	72	72	62	4·7	W.	28·24	0·15		60	Q
24					4·3	SW.					
	71	71·5	83	68	12·1	SW.	28·19	0·04	0·61	80	P
25					9·7	W.					
	68	68·5	68	64			28·28	0·16	0·03	83	
26					4·6	S.					
	69	71	70	62	1·7	SE.	28·42	0·10		66	P
27					6·8	S.					
	68·5	70	82	69	10·1	SW.	28·11	0·18	0·03	50	P
28					4·9	W.					
	68	69	70	61	15·3	NW.	28·25	0·13	0·05	52	P
29					6·8	SW.					
	66·5	67	67	59	7·9	SW.	28·28	0·15		52	R
30					4·3	N.					
	66·5	67	69	59	5·0	W.	28·30	0·13	0·04	50	P
31					2·1	W.					
	66·5	68	69	58	3·7	W.	28·27	0·11	0·03	69	R

Average time of observations, 7.45 a.m. and 5.00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, Threatening.

Meteorological Data of M.H.S. Station, Keewatin, Ont., for September, 1918.

Day.	Temperature.				Velocity of Wind.	Direction of Wind.	Barometer	Evaporation.	Rain.	Humidity.	General.
	Lake.	Tank.	Air.	Day.							
	°	°	°	°	Miles per hour.		Inches.	Inches.	Inches.	%	
1					1·2	W.					
2	65·5	64	56	58	7·3	NW.	28·33	0·05		75	P
3	65	65·5	57	54	9·7	NW.	28·42	0·17		67	P
4	64	63·5	52	48	9·9	W.	28·47	0·17	0·23	64	R
5	63·5	63	50	46	3·2	NE.					
					0·7	W.	28·54	0·12		59	R
6	63·5	64	62	54	0·5	SW.	28·41	0·19		75	R
7	63·5	65	67	56	3·7	NE.	28·36	0·12	0·04	52	P
8	64·5	66·5	72	56	4·8	N.					
					3·8	SE.					
9	63·0	60	54	53	5·8	SE.	28·36	0·08		60	P
					5·6	SE.	28·31	0·08		88	R
10	62·5	61·5	56	44	10·3	N.					
					6·7	NW.	28·73	0·12	0·38	60	P
11	61	61·5	57	51	3·4	S.					
					7·7	SW.	28·63	0·17		76	P
12	60·5	61	60	51	3·4	NE.					
					5·0	N.	28·36	0·07	0·23	73	Q
13	61	63	72	56	3·2	SW.					
					5·8	W.	28·25	0·10		46	P
14	60·5	62·5	65	57	5·4	NW.					
					5·1	N.	28·28	0·10		55	P
15	61·5	63	68	56	2·5	NW.					
					6·3	NW.	28·24	0·07		43	P
16	60	60	52	47	9·6	W.	28·31	0·12	0·08	68	R
17	59	58·5	47	42	7·5	NW.					
					6·0	NW.	28·41	0·15	0·10	59	P
18	58·5	59·5	56	45	2·3	NW.					
					3·9	N.	28·32	0·09		64	Q
19	58	58	52	43	1·7	NE.					
					5·0	NE.	28·29	0·09	0·13	89	R
20	57	56·5	47	41	10·1	N.					
					12·5	N.	28·50	0·18	0·02	74	Q.
21	58·5	58·5	58	46	1·8	W.					
					4·4	W.	28·61	0·12		60	P
22	57	58	64	55	2·8	SW.					
					3·8	SW.	28·51	0·14		60	P
23	57·5	57	49	53	1·8	NE.					
							28·53	0·05		64	P
24	56·5	57	60	49	7·8	NE.					
					8·0	NE.	28·61	0·15		57	Q
25	58	59	72	52	3·6	NE.					
					1·9	NW.	28·55	0·09		46	P
26	56·5	58·5	73	51	2·6	NW.					
					3·0	NW.	28·57	0·10		47	P
27	56·5	58·5	68	55	1·8	SW.					
					5·4	SW.	28·55	0·08		45	Q
28	57·5	59	73	59	6·8	W.					
					13·5	NW.	28·21	0·10		47	Q
29	56	55·5	49	44	12·1	NW.					
					11·3	NW.	28·34	0·10		82	R
30	55·5	54·5	43	40	8·3	N.	28·40	0·09		84	P
	55	55	50	42	8·6	NW.					
					8·9	W.	28·54	0·19		54	R

Average time of observations, 7.45 a.m. and 5.00 p.m.
P—Clear, no clouds.
Q—Small fleecy clouds.
R—Cumuli.
S—Heavy, overcast, threatening.

Pinawa Channel (Evaporation Station).

History.—The station was established by W. J. Ireland on May 14, 1915, and has been operated during the open-water seasons since that date.

Location.—The evaporation tank is supported by a timber raft and anchored to the boom stretched across the forebay about one hundred yards above the racks of the Winnipeg Electric Railway Company's plant at Pinawa.

Records available.—A record of daily evaporation is available for the open water season from May 30, 1915, to September 30, 1918.

Daily Evaporation, in Inches, at Pinawa Evaporation Station, for 1917-18.

Day.	1917.					1918				
	May.	June.	July	Aug.	Sept.	May.	June	July.	Aug.	Sept.
1		0·120	*	0·120	0·106			0·066	0·059	0·103
2		0·053	*	0·165	0·146			0·098	0·140	0·140
3		0·106	0·426	0·093	0·103			0·059	0·141	0·110
4		0·076	0·046	0·130	0·096				0·063	0·103
5		0·066	0·130	0·236	0·120		0·023	0·139	0·084	0·136
6		0·073	0·036	0·133	0·083		0·100	0·138	0·097	0·078
7		0·050	0·036	0·140	0·110		0·089	0·084	0·092	0·089
8		0·083	0·060	0·116	0·130		0·066	0·065	0·140	0·115
9	0·010	0·080	0·093	0·173	0·120		0·079	0·075	0·143	0·153
10	0·036	0·130	0·010	0·133	0·136		0·063	0·087	0·090	
11	0·036	0·050	0·014	0·113	0·136		0·120	0·086	0·045	
12	0·063	*	0·116	0·117	0·073		0·075	0·046		
13	0·033	0·100	0·093	0·093	0·116		0·040	0·040	0·093	
14	0·026	0·173	0·056	0·090	0·063		0·067	0·017	0·103	
15	0·050	0·106	0·070	0·070	0·040			0·032	0·143	
16	0·040	0·086	0·093	0·133	0·020		0·107	0·089	0·068	
17	0·063	0·056	0·086	0·086	0·010		0·087	0·098	0·099	
18	0·073	0·053	0·063	0·066	0·006		0·049	0·089	0·160	
19	0·093	0·103	0·096	0·103	0·110		0·087	0·069	0·023	
20	0·076	0·070	0·070	0·157	0·063	0·020		0·126	0·060	
21	0·073	0·110	0·080	0·120	0·063	0·080	0·096	0·010	0·030	
22	0·100	0·103	0·103	0·056	0·086	0·130	0·075	0·106	0·063	
23	0·123	0·060	0·143	0·450	0·053		0·119	0·066	0·075	
24	0·083	0·043	0·143	0·087	0·040	0·020	0·043	0·180	0·120	
25	0·056	0·053		0·110	*			0·123	0·136	
26	0·100	0·063	0·550	0·093	0·140	0·070		0·250	0·143	
27	0·103	0·060	*	0·253	0·100	0·040	0·092	0·065		
28	0·076	0·093	0·140	0·160	0·100	0·050	0·080	0·140	0·046	
29	0·056	0 080	0·036	0·106	0·096	0·060	0·133	0·072	0·114	
30	0·083	*		0·110	0·120		0·099	0·106	0·064	
31	0·146			0·073				0·089	0·110	
Total	1·598	2·299	2·779	4·085	2·585	0·470	1·809	2·389	2·764	1·027

Note.—*Too windy for reading; tank filled by spray.

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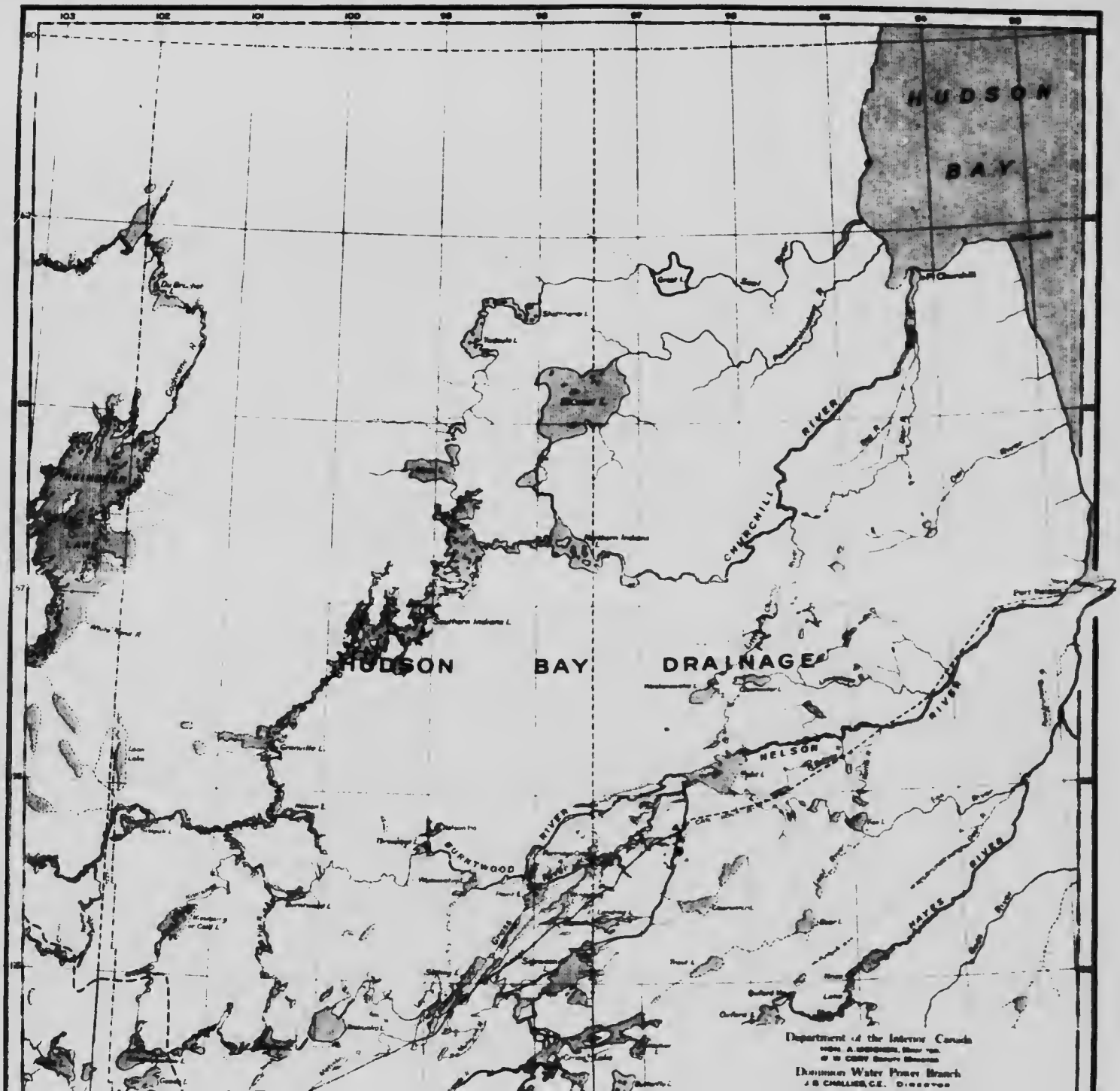
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WINNIPEG LAKE
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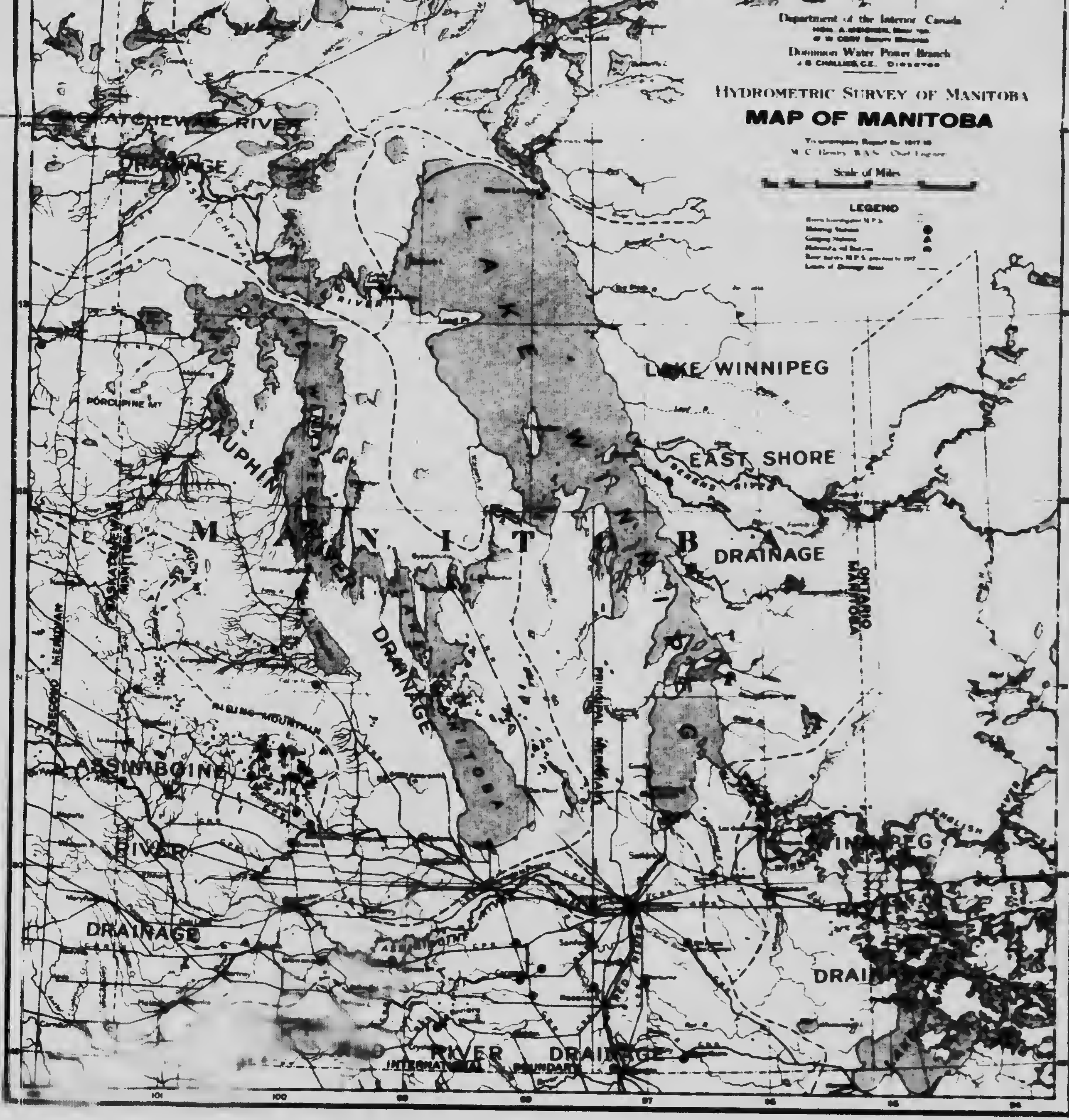
Dominion Water Power Branch



Department of the Interior Canada
Dominion Water Power Branch
HYDROMETRIC SURVEY OF MANITOBA
MAP OF MANITOBA
Scale of Miles
LEGEND
LAKE WINNIPEG
LAKE WINNIPEG
EAST SHORE
DRAINAGE
MANITOBA
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INTERNATIONAL BOUNDARY
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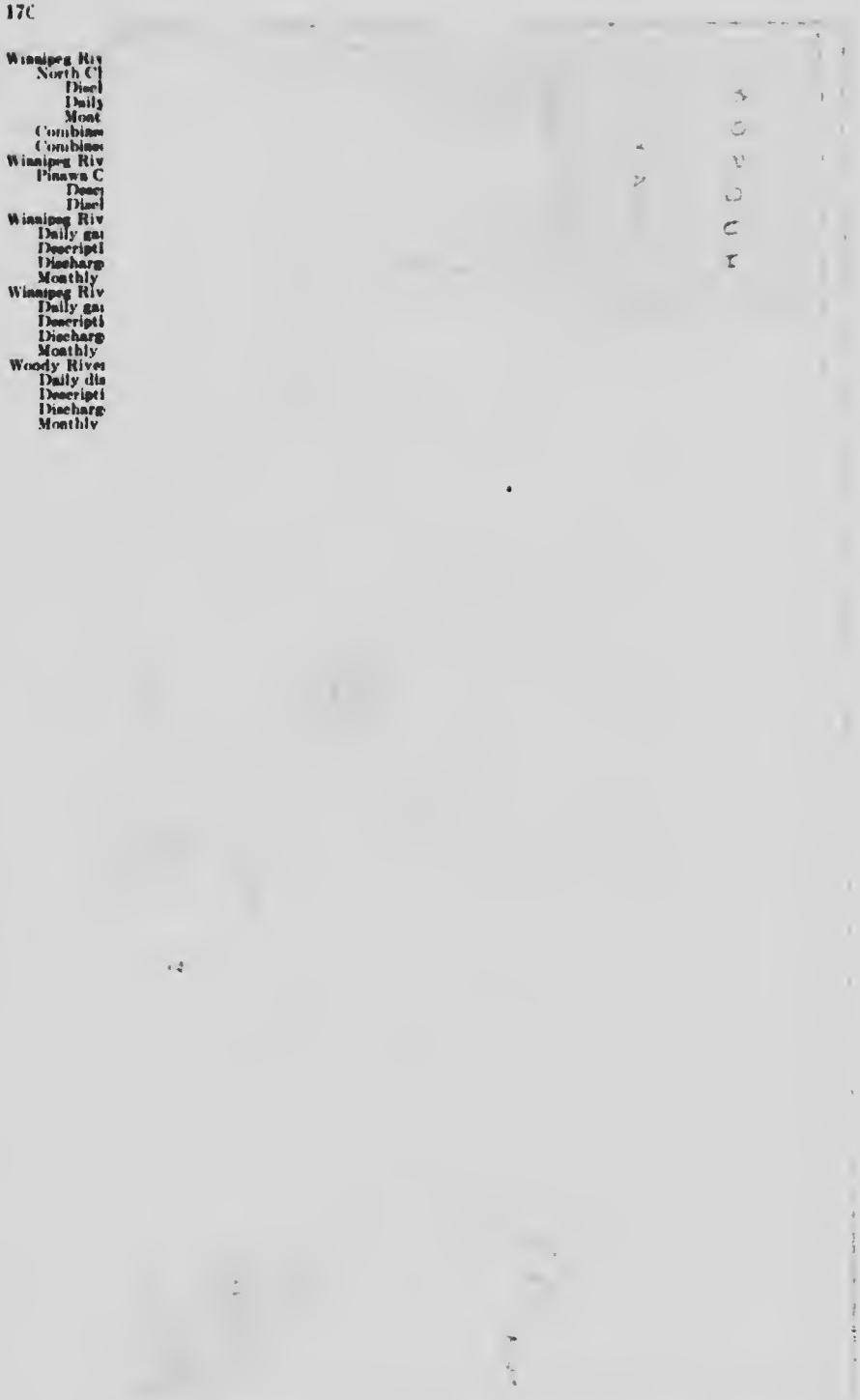
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CLASSIFIED LIST OF REPORTS

The Reports published by the Dominion Water Power Branch, with the exception of the Annual Reports, have been called Water Resources Papers, and have been numbered, 1, 2, etc.

Annual Reports previous to 1913 are included with the Annual Report of the Department of the Interior, and can be secured from the Secretary of the Department.

Annual Report for 1912-13, published 1914. Out of print.

Annual Report for 1913-14, published 1915.

Annual Report for 1914-15, published 1916.

Annual Report for 1915-16, published 1917.

Annual Report for 1916-17, published 1918.

Annual Report for 1917-18 and

Annual Report for 1918-19, combined in one volume. In course of preparation.

WATER RESOURCES PAPER No. 1.—Report of the Railway Belt Hydrometric Survey for 1911-12, by P. A. Carson, Chief Engineer. Part I outlines the history of the Railway Belt with special reference to its administrative, legal and physical problems in regard to water. Describes the organization, scope and methods of the Hydrometric Survey. Parts II, III and IV give all hydrometric data acquired from the commencement of the survey in May, 1911, to the end of 1912. Published 1914.

WATER RESOURCES PAPER No. 2.—Report on Bow River Power and Storage Investigations (Bow River west of Calgary) by M. C. Hendry, Chief Engineer in charge of surveys. This is a complete study of the Bow river west of Calgary. It deals with meteorological conditions and their effect on run-off and ice formation. Existing and possible power and storage developments, together with maps and plans are appended complete. Published 1914.

WATER RESOURCES PAPER No. 3.—Report on Power and Storage Investigations, Winnipeg River, by J. T. Johnston, Chief Hydraulic Engineer, Dominion Water Power Branch. A complete study based on field surveys and office computations of the Winnipeg River basin; deals fully with history, international considerations, topography, climate, storage possibilities; describes existing and gives preliminary designs and estimates for possible power developments; discusses other sources of power and the power market. Maps, plans and all relevant data are appended. Published 1915.

WATER RESOURCES PAPER No. 4.—Report of the Manitoba Hydrometric Survey to end of 1914, by M. C. Hendry, Chief Engineer. Part I outlines organization and scope, districts and methods of survey. Part II contains complete hydrometric data secured during 1912-13-14. Part III is a gazetteer of lakes and rivers in Manitoba. Published 1917.

WATER RESOURCES PAPER No. 5.—Preliminary Report on the Pasquia Reclamation Project, by T. H. Dunn, Chief Engineer in charge of Reclamation Survey. This is a progress report of investigations carried out to determine the possibility of lowering the level of Cedar lake and its effect in a general scheme for reclaiming the low-lying lands contiguous to the Saskatchewan river in the Pasquia region. Published 1914. Out of print.

WATER RESOURCES PAPER No. 6.—Report on cost of various sources of power for pumping in connection with the South Saskatchewan Water Supply Diversion Project, by H. E. M. Kenait. It deals with the problem of power for pumping water from the South Saskatchewan river for the supply of cities and towns in the central portion of South Saskatchewan. Published 1914. Out of print.

WATER RESOURCES PAPER No. 7.—Report on the Manitoba Water Powers, by D.L. McLean, S. S. Scovil and J. T. Johnston, compiled for the Manitoba Public Utilities Commission. A general survey of the water-power situation in Manitoba, with all available general information and hydrometric data published to date in condensed form concerning the rivers in Manitoba. Published 1914.

WATER RESOURCES PAPER No. 8.—Report of the British Columbia Hydrometric Survey for 1913, by R. G. Swan, Chief Engineer, in co-operation with the Provincial Water Rights Branch, Victoria, B.C. Continues the hydrometric work of the Railway Belt Hydrometric Survey with scope enlarged so as to cover territory beyond the Railway Belt. Published 1915.

WATER RESOURCES PAPER No. 9.—Report of Red River Navigation Surveys, by S. S. Scovil, Assistant Chief Engineer of Manitoba Hydrometric Surveys. In course of preparation.

WATER RESOURCES PAPER No. 10.—General Guide for Compilation of Water Power Reports of Dominion Water Power Branch, prepared for the guidance of field engineers of the Dominion Water Power Branch by J. T. Johnston, Chief Hydraulic Engineer. Published 1915. Limited edition.

WATER RESOURCES PAPER No. 11.—Second Report on the Pasquia Reclamation Project by T. H. Dunn, Chief Engineer in charge of Reclamation Survey. This is a continuation report based on further investigations as outlined under Water Resources Paper No. 5. Published 1915.

CLASSIFIED LIST OF REPORTS—Continued

WATER RESOURCES PAPER No. 12.—Report on Small Water Powers in Western Canada and discussion of sources of power for the Farm, by A. M. Beale. Part I is a brief description of certain small western water-power developments. Part II gives an analysis of requirements and cost data for the farm power supply. Published 1915.

WATER RESOURCES PAPER No. 13.—Report of the Coquitlam-Buntzen Hydro-Electric Development. A complete description of the project and of the details of construction, with plans, diagrams and illustrations, by G. R. G. Conway, Chief Engineer of the British Columbia Electric Railway Company, Limited. Published 1915.

WATER RESOURCES PAPER No. 14.—Report of the British Columbia Hydrometric Survey for 1914 by R. G. Swan, Chief Engineer. Continues the hydrometric work and data acquired as outlined in Water Resources Paper No. 8 to the close of the calendar year 1914. Published 1915.

WATER RESOURCES PAPER No. 15.—Report on the Water Powers of Alberta and Saskatchewan by C. H. Attwood, Chief Engineer Alberta and Saskatchewan Power Surveys. In course of preparation.

WATER RESOURCES PAPER No. 16.—Water Powers of Canada. A series of five pamphlets in one volume covering the water-power situation in Canada, prepared for distribution at the Panama Pacific Exposition, San Francisco, 1915, by G. R. G. Conway, Consulting Engineer, Toronto; Percival H. Mitchell, Consulting Engineer, Toronto; H. G. Acres, Hydraulic Engineer, Hydro-Electric Power Commission, Ontario; F. T. Kaelin, Asst. Chief Engineer, Shawinigan Water and Power Co., Montreal; K. H. Smith, Engineer, Nova Scotia Water Power Commission, Halifax, N.S. Published 1916.

WATER RESOURCES PAPER No. 17.—Canadian Hydraulic Power Development and Electric Power in Canadian Industry, by Percival H. Mitchell, Consulting Engineer to Dominion Water Power Branch. Part I deals with progress of utilization, features in design, construction and operation specially applicable to Canada. Description of certain typical Canadian water-power developments. Part II analyses the uses, growth and future of electrical power in Canadian industry. Published 1916.

WATER RESOURCES PAPER No. 18.—Report of the British Columbia Hydrometric Survey for 1915, by R. G. Swan, Chief Engineer. Continues the hydrometric work of the survey to the close of the calendar year 1915. Published 1917.

WATER RESOURCES PAPER No. 19.—Report of the Manitoba Hydrometric Survey for 1915, by M. C. Hendry, Chief Engineer. Continues the hydrometric work of the survey to the close of the calendar year 1915. Published 1917.

WATER RESOURCES PAPER No. 20.—Report on the Interests Dependent on Winnipeg River Power, with Special Reference to the Capital Invested and the Labour Employed, by H. E. M. Kenelt. A detailed study of the industrial growth and future power requirements of the district tributary to the Winnipeg River power sites. Published 1917.

WATER RESOURCES PAPER No. 21.—Report of the British Columbia Hydrometric Survey for 1916, by R. G. Swan, Chief Engineer. Continues the hydrometric work of the survey to the close of the calendar year 1916. Published 1918.

WATER RESOURCES PAPER No. 22.—Report of the Manitoba Hydrometric Survey for 1916, by M. C. Hendry, Chief Engineer. Continues the hydrometric work of the survey to the close of the calendar year 1916. Published 1918.

WATER RESOURCES PAPER No. 23.—Report of the Hydrometric Survey of British Columbia for 1916-17 and 17-1918, by R. G. Swan, Chief Engineer. Continues the hydrometric work of the survey to September 30, 1918. Inaugurates the use of the climatic year in place of the calendar year. Published 1919.

WATER RESOURCES PAPER No. 24.—Report of the Hydrometric Survey of Manitoba for 1916-17 and 1917-18, by M. C. Hendry, Chief Engineer. Continues the hydrometric work of the survey to September 30, 1918. Inaugurates the use of the climatic year in place of the calendar year. Published 1919.

WATER RESOURCES PAPER No. 27.—Directory of Central Electric Stations in Canada to January 1, 1919, compiled by J. T. Johnston, Asst. Director, Dominion Water Power Branch. Comprises an analysis of the central electric census statistics, and a directory of the stations. Published 1919.