WATER RESOURCES PAPER No. 19

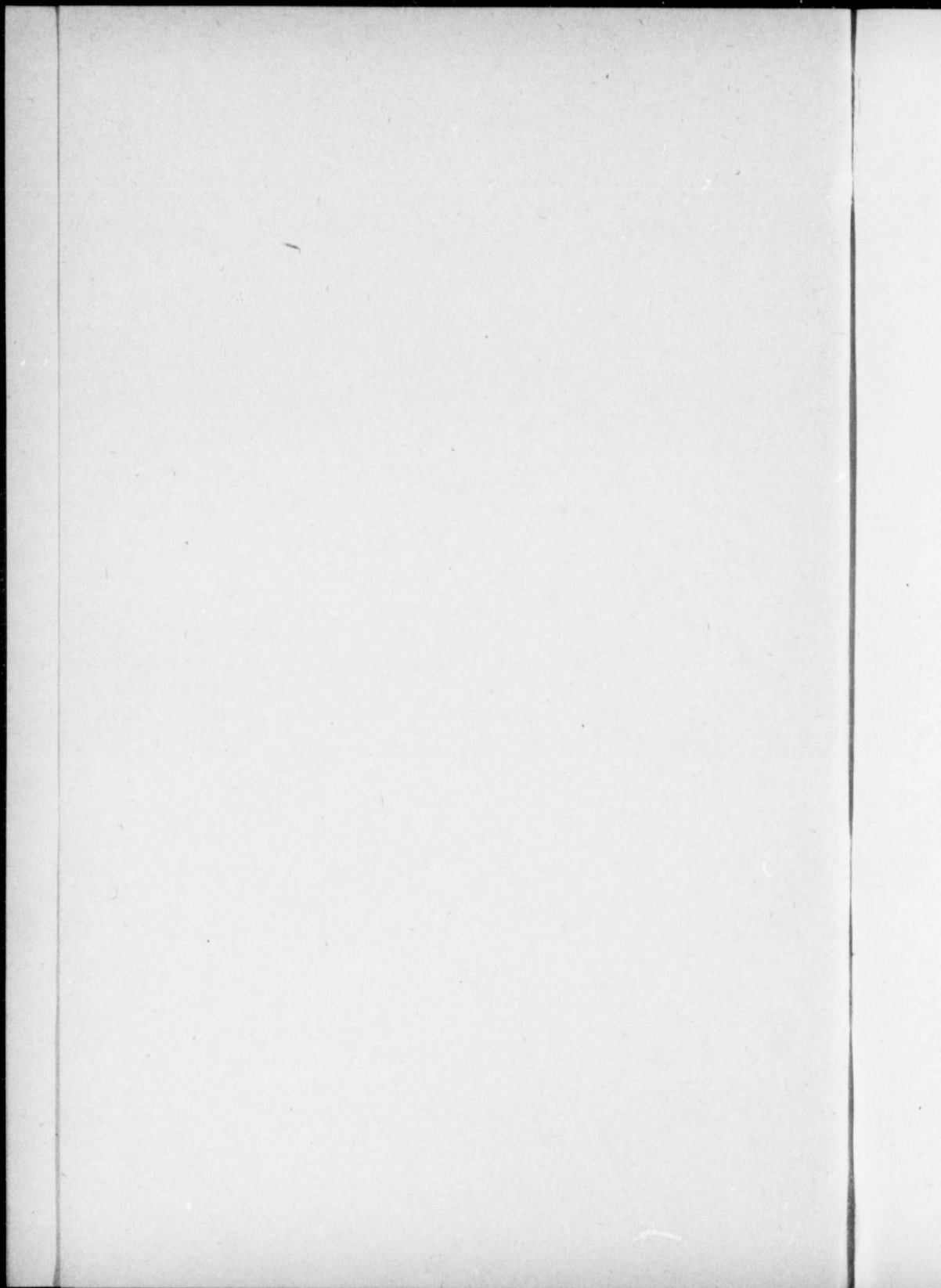# MANITOBA
HYDROMETRIC SURVEY
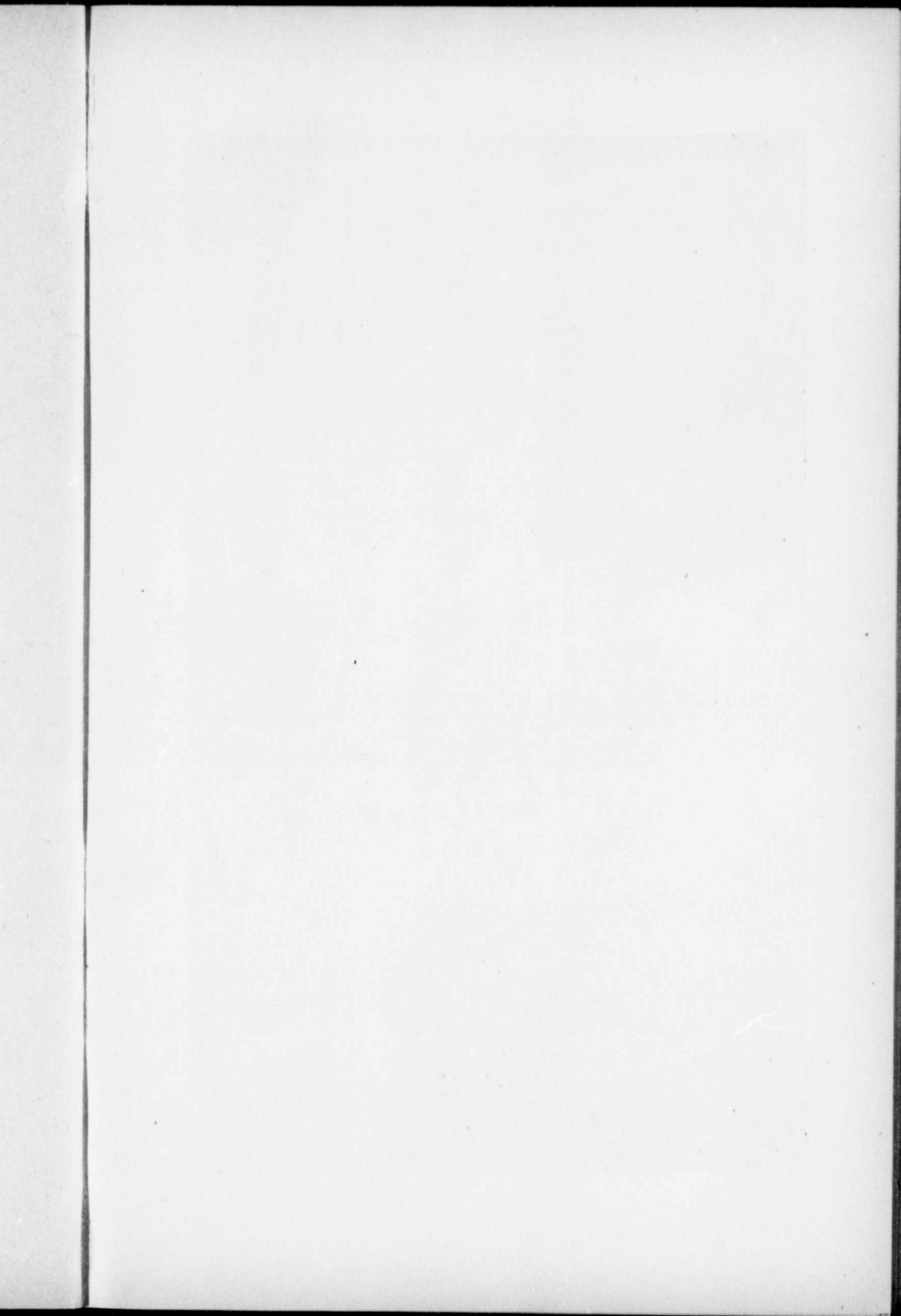# 1915

R 33-19

GRASS RIVER—UPPER PART OF WEKUSKO RAPIDS.   Taken by D. B. Gow.

DEPARTMENT OF THE INTERIOR—CANADA

Hon. W. J. ROCHE, Minister.   W. W. CORY, Deputy Minister.

DOMINION WATER POWER BRANCH,

J. B. CHALLIES, C.E., Superintendent.

PROGRESS REPORT

OF THE

MANITOBA HYDROMETRIC SURVEY

FOR

THE CALENDAR YEAR 1915

BY

M. C. HENDRY, A. M. Can. Soc. C. E.
Chief Engineer

Prepared under the Direction of the Superintendent of Water Power.

PRINTED BY ORDER OF PARLIAMENT

To Fie
Co
Co

MAY IT
Th
of the N

Ot

To Field Marshal, His Royal Highness Prince Arthur William Patrick Albert, Duke of Connaught and of Strathearn, K.G., K.T., K.P., etc., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR ROYAL HIGHNESS:

The undersigned has the honour to lay before Your Royal Highness the Progress Report of the Manitoba Hydrometric Survey for the calendar year 1915.

Respectfully submitted,

W. J. ROCHE,
Minister of the Interior

Ottawa, May 31, 1916.

DEPARTMENT OF THE INTERIOR,
Ottawa, May 31, 1916.

The Honourable W. J. ROCHE, M.D.,
    Minister of the Interior.

SIR,—I have the honour to submit the Progress Report of the Manitoba Hydrometric Survey for the calendar year 1915, and to recommend that it be published as Water Resources Paper No. 19 of the Dominion Water Power Branch.

I have the honour to be, Sir,

Your obedient servant,

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

W. W.

Si
Hydro
Chief I
In
recomm
Power

DEPARTMENT OF THE INTERIOR, DOMINION WATER POWER BRANCH,
Ottawa, May 31, 1916.

W. W. CORY, ESQ., C.M.G.,
    Deputy Minister of the Interior.

SIR,—I have the honour to submit the attached Progress Report of the Manitoba Hydrometric Survey for the calendar year 1915, by M. C. Hendry, A.M.Can.Soc. C.E., Chief Engineer.

In view of its important bearing on the industrial development of Manitoba, I would recommend that it be published as Water Resources Paper No. 19 of the Dominion Water Power Branch.

Respectfully submitted,

J. B. CHALLIES,
Superintendent.

J. I

Sir,

Mar

I wo
Wat

J. B. CHALLIES, ESQ., C.E.;
    Superintendent, Dominion Water Power Branch,
        Department of the Interior,
            Ottawa, Ont.

                                        Winnipeg, May 1, 1916.
Sir,—

    I have the honour to submit herewith the manuscript of the Progress Report of the Manitoba Hydrometric Survey.

    This report covers the Hydrometric work carried on by this Survey during the year 1915. I would request that it be published as one of the Water Resources Papers of the Dominion Water Power Branch.

    I have the honour to be, sir,

                            Your obedient servant,

                                    M. C. HENDRY,
                                        Chief Engineer.

TABLE OF CONTENTS.

PART I.

PART II.

HYDROMETRIC DATA

SES

Lake

Mete
Index

Grass
Meter
Winni
Winni
Winni
Winni
Winni
Winni
Pinaw
Assinil
Little
Swan
Broken
Berens
Nelson
Grass
Grass
Burntw
Burntw
Burntw
Englisl
Englisl
Englisl

Plate
Plate
Plate
Plate

PART III.

PART IV.

LIST OF ILLUSTRATIONS.

LIST OF PLATES.

M.

PROGRESS REPORT

OF THE

MANITOBA HYDROMETRIC SURVEY

FOR

THE CALENDAR YEAR, 1915

———

PART 1

PR

prov
data
studi
parti
vario
at th
and
use i

powe
vario
follov

for t
infor

betw
impo
studi
The
know
In th
of lan
the m
and i
formi

comm
regula
possil
intell

S
fact b
with
quart

25f—

PART I

PROGRESS REPORT OF THE MANITOBA HYDROMETRIC SURVEY FOR THE CALENDAR YEAR 1915

INTRODUCTION.

The report presented herewith covers the hydrometric work carried on throughout the province of Manitoba during the Calendar year 1915.   There is also included in this report, data that has been collected by officers of the Survey in connection with hydrometric studies made at the Outlets of the Lake of the Woods.   The latter information relates particularly to gauge heights, etc., which were observed by different interested parties at various times prior to the interception of the work of the Manitoba Hydrometric Survey at this point.   The information so obtained is of great value and was compiled, collated and made available to the Consulting Engineers of the International Joint Commission for use in connection with the reference relating to the regulation of the Lake of the Woods.

. The gathering of hydrometric data is of prime importance, not only from a hydraulic power standpoint, but also in connection with other uses of the surface water supply.   The various uses for which stream flow data is required in Manitoba may be enumerated as follows:—

1. Domestic, municipal and manufacturing purposes.
2. Irrigation.
3. Water power.
4. Drainage.
5. Sewage disposal.
6. Navigation.
7. Flood prevention.

Throughout the Provinces numerous towns and villages are dependent upon the rivers for their domestic water supply; the demand will rapidly increase with the population and information with regard to the amount of water available will be essential.

In the southwestern part of the Province where the average annual rainfall varies between 14 and 17 inches and where agriculture is chiefly pursued, irrigation may become important.   Throughout the Province many of the rivers present power possibilities, and studies have been made of them with a view to determining their probable economic value. The true value of these potential water powers cannot be determined without a thorough knowledge of the water available in the streams, particularly under low water conditions. In the northern and southeastern portions of the Province, the reclamation of large tracts of land by drainage may be profitably undertaken.   With the rapid filling up of the country, the necessity of throwing open reclaimed lands for settlement will become more pressing, and in connection with such reclamation schemes, a complete knowledge of the streams forming the natural outlets for such drainage schemes is a prime requisite.

The use of the streams of the Province in connection with sewage disposal will soon command attention, as the rapid growth of the towns and villages will render necessary the regulation of waste disposal from these municipalities in such a manner as to obviate any possible danger to the rest of the community.   In order that this question may be handled intelligently, a knowledge of the discharge of the streams is of extreme importance.

Several of the main rivers in the Province might be utilized for navigation purposes, in fact before the coming of the railway the Red River was the only means of communication with the outside world.   Improvement for navigation purposes is being urged in many quarters and demands the study of this and other streams.

ORGANIZATION AND SCOPE.

The organization of the survey is the same as in former years, though a number of changes in the personnel have occurred, due, almost without exception, to enlistment for active service.

The methods used in collecting the data are based upon those followed by the Water Resources Division of the United States Geological Survey. The different streams to be studied are investigated and suitable sites selected for the establishment of metering stations, the selection of the stations depending upon the physical features and the need of data in any particular locality. At these metering stations, gauges are established and some person living in the locality is engaged to read the gauge daily. These daily observations are recorded in a book provided for the purpose, which is examined by the engineer on each of his visits. The readings as entered in the book are transferred to cards by the gauge reader and forwarded weekly to the Chief Engineer. The records are then copied on forms and filed in the office. At the end of each three months the gauge books are renewed, the old ones are forwarded to the office and the readings, as copied from the cards, are checked against those entered in the gauge books by the gauge reader. At the end of the season, discharge curves are constructed for each station from the results of the meterings. Rating tables are compiled and with these and the records of daily gauge heights as a basis, tables of Daily, Monthly and Yearly Discharge are computed. These are the results which are published herein.

On the organization of the Manitoba Hydrometric Survey, the work of the Winnipeg River Power Survey was merged with it, and the former now carries on all hydrometric storage, power or river improvement investigations. By this arrangement the work naturally falling within the scope of the survey may be carried on systematically and conservation may be dealt with in a comprehensive manner with a view to determining the best use of the available water supply.

In gathering this stream flow data it is believed that the results obtained are sufficiently accurate for all practical purposes, the aim being, not to concentrate on few streams and so obtain records of extreme accuracy, but rather to spread the effort over as wide a territory as possible and so serve as many purposes as possible without unduly sacrificing the accuracy of results. In this connection it is essential that the records, in order that they may properly cover all possible range in stage of the rivers investigated, should extend over a considerable term of years. The length of this term will vary with the character and importance of the stream investigated; on some streams the term should be from five to ten years, while in other cases from ten to twenty years is desirable. This variation will depend both upon the importance of the stream and the correlation of the results with the records of other streams in the vicinity. To quote from an authority on this subject,—"the object should be to gauge a certain number of streams at all seasons of the year so as to ascertain their total discharge and its seasonable distribution, also to gauge others at certain stages which have been determined to be the critical points in their regimen." It may be stated here that the United States Geological Survey considers that, owing to the constantly changing flow of the streams, data of reasonable accuracy showing the distribution of flow over several consecutive years are of more importance than very accurate measurements covering short periods of time.

In making use of the records here presented, caution should be exercised in drawing conclusions. Owing to the very limited period of time over which a great many of the records extend, and the fact that the observations are often unsupported by others made before the organization of the survey, considerable error in the conclusions reached may very easily occur.

DISTRICTS.

During the past year seventy stations were operated, at some of these continuous records were obtained, while at others only miscellaneous measurements were secured.

The territory covered by the work is divided, for convenience of description, into several

main divisions, which conform generally to the several drainage systems met with. These may be enumerated as follows:—

1. Winnipeg River and Tributaries.
2. Red River and Tributaries.
3. Assiniboine River and Tributaries.
4. Saskatchewan River and district west of Lake Winnipegosis.
5. East shore of Lake Winnipeg.
6. Hudson Bay Drainage (Nelson River).

WINNIPEG RIVER AND TRIBUTARIES.

This district comprises all the territory lying between the Outlets of the Lake of the Woods and lake Winnipeg which is tributary to the Winnipeg river.

The Outlets of the Lake of the Woods are being given special attention owing to the effect of run-off at this point upon the surface levels of the Lake of the Woods. The reference now before the International Joint Commission relative to the regulation of the lake has necessitated a very comprehensive study of the run-off conditions. The number of outlets from the lake and their method of control has necessitated keeping an engineer and assistant on the ground continuously. Data of a meteorological nature is also being gathered.

The tributaries of the Winnipeg river are not numerous, and with one exception, the English river, are of little magnitude. The English river joins the Winnipeg in the vicinity of the Interprovincial boundary between Ontario and Manitoba, and drains all the country lying to the north and east of the Lake of the Woods district. Lying almost entirely in unsurveyed territory, its drainage area is rather indeterminate, but roughly speaking, it forms somewhat less than one-half of the total tributary drainage area lying above the junction of the two rivers. A station has been established on this river near the mouth, but owing to the remoteness from settlement, it has been found impossible to secure the services of a gauge reader. On this account it has not been possible to determine the daily discharge directly, only scattered meterings being available, but from a consideration of the measurements taken on the Winnipeg river above and below this confluence, the discharge of the English river may be arrived at approximately. The smaller tributaries of the Winnipeg have been metered and records of the discharge kept more or less systematically, depending upon their importance. On the main river, stations have been established at Whitedog falls—north and south channels—and Slave falls, and one on the Pinawa channel near the Control dam, also others at the forebay and tailrace of the Winnipeg Electric Railway plant in the latter channel. The latter stations were established with a view to rating the power plant.

This district lies almost entirely within the Laurentian formation, in fact, the Winnipeg river and the Lake of the Woods may be said to form the southwestern boundary of that formation. This would account in a great measure for the small number of rivers tributary to the basin from the southwest.

The granites and gneisses of the Laurentian formation underlie the whole region, and the topographical features are typical; lakes and rivers abounding throughout the district. Rock outcroppings are very frequent and the soil covering is shallow, conditions which would tend to rapid run-off were they not offset by the numerous lakes and muskegs throughout the district.

The forest covering of the district varies, in some parts it is sparse owing to the shallowness of soil; in other parts dense growths of evergreen such as spruce, pine and balsam are to be found with here and there clumps of birch. Considerable lumbering has been done in the district so that for the most part the larger stands of lumber have been cut off. In other parts the forest has been overrun with fire so that now much of the standing timber is second growth.

RED RIVER DISTRICT.

That portion of the Red River valley lying below the International Boundary and the territory drained by the tributaries with the exception of the Assiniboine, comprises the

Red river District. The nature of the area drained by the river within the Province varies between the swampy muskeg country bordering the Laurentian formation to the east and the open prairie to the west.

Owing to the nature of the eastern part of the drainage area, land reclamation by drainage is to be expected and such work will naturally affect the range in stage of the river and tributaries concerned. This change in regimen caused by the operation of large drainage schemes in the northern part of Minnesota has to some extent already been noticed. These conditions render the study of the river advisable especially owing to the possibility of International questions arising. Drainage already in operation or to be anticipated, however, is not the only reason for collecting hydrometric data. The importance of the river from a navigation standpoint has been put forward on numerous occasions, in fact a careful survey with the idea of its improvement for that purpose was carried out through this organization. Such improvement would not revive an early use of the river as the chief artery of communication and transport with the outside world. In order that all phases of the question may be looked into, metering stations have been established near the International Boundary at Emerson, and at Winnipeg, and gauges were established at several intermediate points. Stations have been operated on the tributaries, viz., the Roseau, the Rat, the Morris and the Seine.

ASSINIBOINE RIVER DISTRICT.

The Assiniboine river which is the chief tributary of the Red, drains the country to the west of the Duck and Riding Mountains and north of the International boundary; some of its tributaries have their source within the province of Saskatchewan. The southern and western part of the drainage area may be termed prairie country, having scattered timber bluffs. The northern section of the area has a greater tree covering, the Riding Mountain district at the source of one of the tributaries being well timbered and lying within a forest reserve. The streams rising in these two areas are characteristic of the country which they drain. One of the chief tributaries, the Souris, has the extreme low winter flow characteristic of the prairie streams. It rises within the province of Saskatchewan, flows southeast, crossing the International boundary into North Dakota, then swings northeast re-crossing the boundary into Manitoba. The stream flows through what may be termed the dry belt of Manitoba, the district drained comprising that part of the Province which has the lowest annual rainfall, this varying between 14 and 17 inches. The Little Saskatchewan, which is also a tributary of the Assiniboine, rises in the Riding Mountains and flows in a general southerly direction joining the main river near Brandon.

As the main river and its branches drain the well populated parts of the Province, it is important as a source of domestic water supply or a means of sewage disposal. In addition to the above, its possible use for irrigation purposes may be anticipated in the southwestern part of the Province, and these demands added to the demand for power purposes render a careful hydrometric study of the river advisable. During the past season a number of new stations have been established on the upper waters of the Little Saskatchewan, in connection with certain water power studies on that river. As opportunity offers it is intended to extend these stations throughout the basin in order that a thorough knowledge of the Assiniboine may be obtained.

SASKATCHEWAN RIVER AND DISTRICT WEST OF LAKE WINNIPEGOSIS.

In this district there are a large number of streams of variable size tributary directly or indirectly to Lake Winnipegosis. The Saskatchewan river, though belonging to the district, flows through the northern portion and empties into lake Winnipeg.

With a few exceptions all the rivers tributary to lake Winnipegosis have their source in either the Riding, Duck or Porcupine mountains. The streams are not of great length and the flow is subject to considerable fluctuation.

Some of these streams are not of immediate interest from a hydrological standpoint, nevertheless as the district becomes populated their importance will increase; new towns

springing up will be dependent on them for water supply and in some cases the success of drainage schemes will depend largely upon the possibility of utilizing the existing streams as outlets. Vast areas along the Saskatchewan river may be profitably reclaimed by channel improvements in the main river combined with a system of interior drainage. Certain of these rivers are capable of development from a power standpoint and the most important in the district viewed from that angle is perhaps the Saskatchewan river. This river has for its drainage basin practically all that section of Alberta and about two-thirds of Saskatchewan lying south of the forty-fourth parallel of latitude. There are several points at which this river might be developed for power purposes.

EAST SHORE OF LAKE WINNIPEG.

In the district covered by the drainage on the east side of lake Winnipeg, the country is for the most part typical of the Laurentian formation, in consequence practically all of the rivers entering on that side of the lake are interrupted at numerous points in their course by falls and rapids. At various points throughout the country are to be found stands of timber which may be utilized either for the manufacture of lumber or for pulp. With these facts in view some studies have been .made of the power possibilities of the rivers, but in order that the conclusions reached may be sound, the possible run-off of the rivers should be known. The district is for the most part uninhabited, so it has been impossible to secure gauge readers. Miscellaneous measurements have been taken at various points on the river as the opportunity offered, and with the exception of the station established at Little Grand Rapids on the Berens river where daily records are obtained, these are all the records available.

HUDSON BAY DRAINAGE.

NELSON RIVER.

The Nelson river forms the sole outlet of practically all the drainage areas included in the last six districts. It forms the outlet of lake Winnipeg into which all the rivers, the Winnipeg, Red, Saskatchewan, Berens, Pigeon, Bloodvein and Dauphin (the outlet of lake Winnipegosis and lake Manitoba), empty. The fall of the Nelson between the outlet of lake Winnipeg and Hudson's Bay is in round numbers, 700 feet. A great portion of this is to be found in the form of swifts, rapids and falls. With such a vast drainage area tributary to the river the discharge must be enormous, while with so many lakes forming natural regulation basins, the minimum flow will probably bear a fairly close relation to the mean flow. The natural storage basins encountered in this drainage area are of great proportions and include the following large lakes:—lake Namakan, Rainy lake and the Lake of the Woods on the Winnipeg; lac Seul on the English, lake Manitoba, lake Dauphin, lake Winnipegosis and lake Winnipeg; there are many others of less extent; for in the Winnipeg river basin alone there are, in addition to those named, 106 lakes varying in area from 3 to 140 square miles.

The Nelson with its numerous falls and rapids and excellent natural regulation has great power possibilities, which are increasingly important as the Hudson's Bay railway nears completion and easier and cheaper transportation becomes available. The early development of some of these powers is by no means improbable. The hydrometric work undertaken in 1914 has been continued and an engineer was kept in the district during the winter and summer of 1915. In addition to this work, a number of measurements were secured at various points on the Grass and Burntwood rivers during 1915, stations and bench marks being established so that the work may be continued at a future date.

DEFINITIONS AND TERMS.

The volume of water flowing in a stream (called 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 "run-off in second-feet per square mile."

(2) Those which represent the actual quantity of water, as "run-off in depth in inches" and "acre-feet."

The units used in this report are "second-feet," "second-feet per square mile," "run-off in inches" and "acre-feet" or "mile-feet." The first two belong to the first group and the last three to the second. They may be defined as follows,—

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

(b) "Second-feet per square mile" is the average number of cubic feet of water 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.

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

(d) "Acre-foot" is equivalent to 43,560 cubic feet. which quantity is the number of square feet in one acre. It is the quantity of water required to cover an acre to the depth of one foot, and is the common unit of measurement of quantity. It is generally used in connection with storage.

(e) "Mile-foot" is equivalent to 27,878,400 cubic feet, which quantity is the number of square feet in one square mile. It is the quantity of water required to cover one square mile to a depth of one foot and is equal to 640 acre-feet. While not a common unit of measurement of quantity, it is sometimes made use of in connection with large storage projects to express the quantity of water stored.

CONVENIENT EQUIVALENTS.

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

1 second-foot equals 6·23 British Imperial gallons per second; equals 538·272 gallons for one day.

1 second-foot equals 7·48 United States gallons per second; equals 646,272 gallons for one day.

1 second-foot for one year covers 1 square mile 1·31 feet or 13,572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet; equals 724 acre-feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one 28-day month covers 1 square mile 1·041 inches deep.

1 second-foot for one 29-day month covers 1 square mile 1·079 inches deep.

1 second-foot for one 30-day month covers 1 square mile 1·116 inches deep.

1 second-foot for one 31-day month covers 1 square mile 1·153 inches deep.

1 second-foot for one day equals 1·983 acre-feet.

1 second-foot for one 28-day month equals 55·54 acre-feet.

1 second-foot for one 29-day month equals 57·52 acre-feet.

1 second-foot for one 30-day month equals 59·50 acre-feet.

1 second-foot for one 31-day month equals 61·49 acre-feet.

100 British Imperial gallons per minute equals 0·268 second-feet.

100 United States gallons per minute equals 0·223 second-feet.

1,000,000 British Imperial gallons per day equals 1·86 second-feet.

1,000,000 United States gallons per day equals 1·55 second-feet.

1,000,000 United States gallons equals 3·07 acre-feet.

1,000,000 British Imperial gallons equals 3·68 acre-feet.

1,000,000 cubic feet equals 22·95 acre-feet.

1 acre-foot equals 43,560 cubic feet.

1 acre-foot equals 271,472 British Imperial gallons.

1 acre-foot equals 325,580 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 acre equals 43,560 square feet.

1 cubic foot equals 6·23 British Imperial gallons.

1 cubic foot equals 7·48 United States gallons.

1 cubic foot of water weighs 62·5 pounds.

1 foot per second equals 0·682 miles per hour.

1 horse-power equals 550 foot pounds per second.

1 horse-power equals 746 watts or ·746 kilowatts.

1. horse-power equals 1 second-foot falling 8·80 feet.

To calculate water-power quickly:—sec. ft. x fall in feet ÷ 11 = net horse-power on water wheel, realizing 80 per cent. of theoretical power.

METHODS OF DETERMINING DISCHARGE.

In Water Resources Paper No. 4 full reference was made to the methods commonly followed in determining the discharge of streams, and it is not therefore considered necessary to repeat the same herein.

EXPLANATION OF DATA.

The following data are given for each regular station:—

1. Description of the station.
2. Table of Discharge Measurements.
3. Table of Daily Gauge Heights and Discharges.
4. Table of Monthly Discharge and Run-off.

The description gives a complete history of the station, noting especially such charges as would effect the records. There is also included information regarding the location and equipment of the station.

In the table of discharge measurements is given the date of each measurement, the name of the field engineer, meter number, width of the section, cross sectional area, mean velocity in the section, the gauge height and the discharge in cubic feet per second.

The table of daily gauge heights and discharge contains a list of the gauge heights for each day reduced to station datum and the corresponding discharge. In some cases the gauge height given is the mean of two or more readings taken at intervals during the day.

The table of monthly discharge and run-off is compiled from the foregoing table. Under "Maximum" is given the greatest mean daily discharge in feet per second occurring during the month, period or year. Similarly under "Minimum" is given the smallest discharge, and under "Mean" the mean discharge for each whole month, period or year. It should be noted that under these headings the figures represent *rates* of flow. In the other part of the table are given under the heading "Run-off Depth in Inches," the depth of which the drainage area could be carried by distributing evenly over the entire area the run-off for each month, period or year. These figures represent *quantities* of water, as do also those under the heading "Total Run-off in Acre-feet."

The size of each drainage area is obtained by planimeter from the area lying within the basin laid down on the sectional maps issued by the Department. These will be revised if necessary from time to time as new maps are issued.

BENCH MARKS.

From time to time the necessity has been felt for good permanent bench marks at the metering stations to which the gauges could be referred. During the early part of the year one was designed and a number secured. The bench mark is made up of a five-foot length of three and a half inch wrought iron pipe, the lower six inches is split and the ends spread, a bronze cap is shrunk on to the upper end, on it being the letters, "B.M. M.H.S." The boss in the centre of the cap is the reference point. The pipe is sunk in the ground, only two or three inches being left above the surface. If rock in place is available, the cap only is used, being drilled and tapped to fit a half inch anchor bolt which may be leaded in a hole drilled

M.H.S.
B.M.

M.H.S.
B.M.

Bolt

Bolt swadged after
Cap is set

Cap.

Hole for Pin wrench

Lead Filled

Expansion bolt
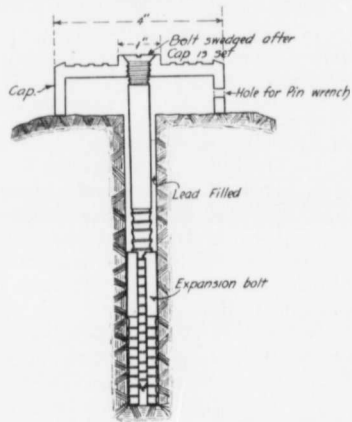
Details of Rock Bench Mark.

DOMINION WATER POWER BRANCH
J. B. CHALLIES C.E. Superintendent

MANITOBA HYDROMETRIC SURVEY

DETAILS OF

PERMANENT BENCH MARK

Scale of Inches
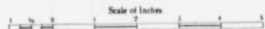
July, 1916.

Winnipeg, Manitoba

Details of Earth Bench Mark.

in the
some

A
feet a
wire f
with
advan
of the
that
specia

M
use wh
is sim
of gea
each
encour
directi
dial re
the dia
to the
be det
one m

T
there
afford
canoes
whales
then f
tag lin
over ei
in the
counti

in the rock. A number of these have been placed and wherever possible are referred to some known datum.

METERING ACCESSORIES.

A number of the stations operated are on large streams where depths up to seventy-five feet are encountered. Piano wire has been used for suspending the meter, a small insulated wire forming the second side of the circuit. Lately a special steel cable of small diameter with an insulated copper core has been experimented with and has given good results, the advantage over piano wire being less liability to break through kinking and the elimination of the second wire. Where either method of suspension is adopted, a reel is necessary, so that all the stations where considerable depths are encountered are equipped with reels, a special equipment being used for metering at boat stations.

Mr. W. J. Ireland, Assistant Engineer, during the year designed a counting device for use with the reels and a number of them are now in use. The counting part of the device is similar to that used in gas meters. It is connected to the spindle of the reel by a train of gears, the counter and gears being enclosed in a metal case. Through the connection, each revolution or part of a revolution of the reel or drum is recorded on the dial of the encounter. By turning in one direction the revolutions are added and by reversing the direction they are subtracted. The counter may readily be thrown out of gear and the dial reading brought to zero. By using a reel exactly one foot in circumference and setting the dial to read zero when the meter is at the surface of the water any position with reference to the surface of the water is automatically registered on the dial. The counting device may be detached from the reel by loosening three thumb screws; they are interchangeable so that one may be carried by each field engineer and used with any reel.

The Nelson and the Saskatchewan are two of the largest rivers metered; on each of these there are Boat Stations. The velocities being high, it has been found that a canoe does not afford a steady enough working platform. The method now employed is to secure two canoes together parallel to one another by means of three pieces of oak laid across the gunwhales and bolted to the thwarts at each end, thus forming a kind of catamaran; a bridle is then fastened to the bows of the canoes and a line led from the centre of this bridle to the tag line stretched across the river. The meter may be suspended between the canoes or over either side by means of the metering board used on boat sections. The board described in the Annual Report for 1913-14, Plate 9, has been modified to permit of its use with the counting device. This modified form of the metering board is fully illustrated below.
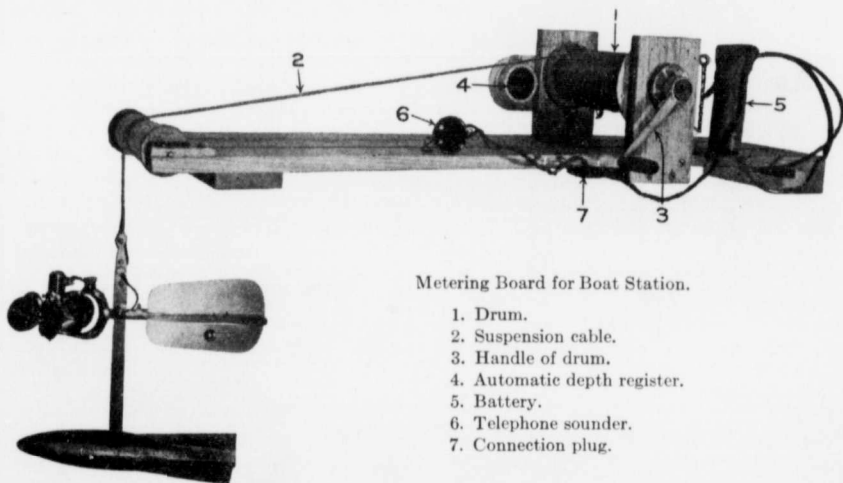
Metering Board for Boat Station.

1. Drum.
2. Suspension cable.
3. Handle of drum.
4. Automatic depth register.
5. Battery.
6. Telephone sounder.
7. Connection plug.
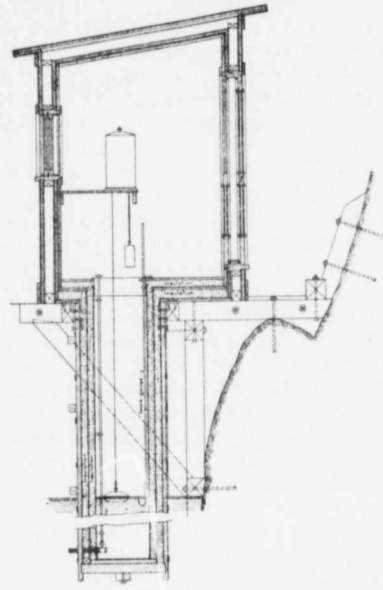
Section on AB
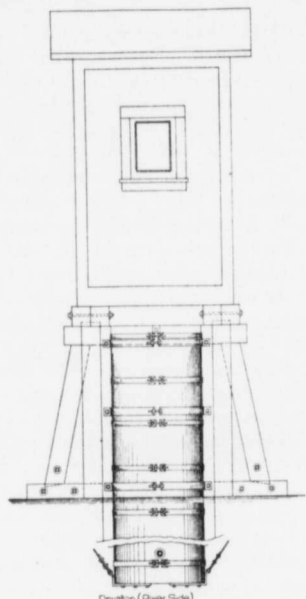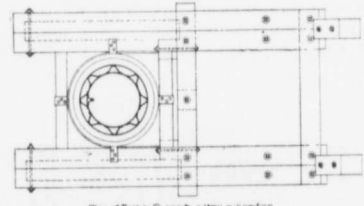
Plan of Timber Supports & Well in position

Plan

Elevation (River Side)
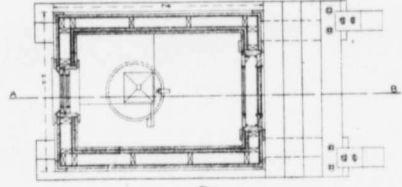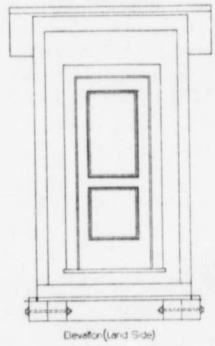
Elevation (Land Side)

DOMINION WATER POWER BRANCH
J. B. CHALLIES, C.E. Superintendent

MANITOBA HYDROMETRIC SURVEY

CONSTRUCTION DETAILS OF

TYPICAL AUTOMATIC GAUGE HOUSE

Scale 4 Ft = 1

July 1914   Winnipeg Manitoba

I
able o
reach
with t
an ele
annou
on pa
the la
forme

A
Engin
sendin
betwe
the la

I
the G
and th
type l
erecti
atten

T
regist
Canad
Office

T
record
datum

T
point,
static
near t

T
river;
Chann
perma
Augu

T
will b
storag
gauge

T
Nelso
at the
manen
Railw

I
Chann
was a

In making soundings at stations where considerable depths are encountered, considerable difficulty is always experienced in determining within close limits when the bottom is reached by the sounding weights. An attachment has been devised by Mr. Ireland for use with the meter bar in sounding, the meter being removed in such case; by means of the device an electrical contact is made when the weight reaches the bottom, the contact being announced in the ear piece the same as when metering. See illustration of metering board on page 11. Good results have been obtained with this, especially when used in sounding the larger streams, and also at the "Cable carrier" stations where the sag in the cable span formerly influenced the results.

A device which has been found very useful and for which we are indebted to the Engineers of the Water Resources Division, United States Geological Survey, for kindly sending samples and placing the same at our disposal, is used in making connection between the meter bar and the suspension cable. It has been used throughout the work of the last year and has, after a few minor changes, given complete satisfaction.

INSTALLATION OF EQUIPMENT.

AUTOMATIC GAUGES.

During the year a number of automatic gauges have been used. They are of two types, the Gurley Printing, of which four have been installed and preparation made for the fifth, and the Gurley Seven Day Stage Register, of which two were used. The four of the first type have been installed at permanent stations and considerable care has been exercised in erection to ensure as far as possible their operation during the Winter season with minimum attention. (See plate No. 2.) The permanent installations are at the following points:—

The first one was installed in February, 1915, on the public dock at Kenora; the gauge registers the Lake of the Woods levels at that point. The gauge readings are referred to Canadian Geodetic Levels Datum, the Canadian Geodetic Bench Mark on the Kenora Post Office being used for the purpose.

The second was installed in the control dam at the head of the Pinawa Channel. It records the water levels above the control dam, the gauge readings being referred to W.P.S. datum. This gauge was placed in operation in May, 1915.

The third installation is at Slave Falls and will be used for rating the discharge at that point, being placed on the left side of the river about two hundred feet above the metering station. The gauge is referred to W.P.S. datum, a permanent bench mark being placed near the gauge. The gauge began operation in June, 1915.

The fourth automatic gauge was installed at the head of Whitedog falls on the Winnipeg river; by means of this installation it will be possible to rate both the North and South Channels at that point. The datum of the gauge is W.P.S. datum, being tied in to a permanent bench mark placed near the gauge. This gauge was put in operation in August, 1915.

The material for the fifth installation has been purchased and is now at the site. This will be at the Hudson's Bay Post at Lac Seul. As this lake forms one of the largest natural storage basins on the Winnipeg river drainage system, it is considered advisable to install a gauge at the point named.

The two seven day gauges were used in connection with the hydrometric studies of the Nelson river near Manitou rapids. They were only temporarily installed and were removed at the end of the season's work. The zero of each gauge was, however, referred to two permanent bench marks which were tied together by a line of levels, also to the Hudson's Bay Railway datum.

CABLE STATIONS.

During the year two new cable stations were built, one at the head of the Pinawa Channel and the other at the South Channel, Whitedog falls. The station at Slave falls was also overhauled and certain repairs and renewals made.

New cable carrier stations were placed at the North Channel of Whitedog falls on the Winnipeg river and at Stuartburn and Dominion City on the Roseau river. (See plate No. 3 below).

PLATE No. 3
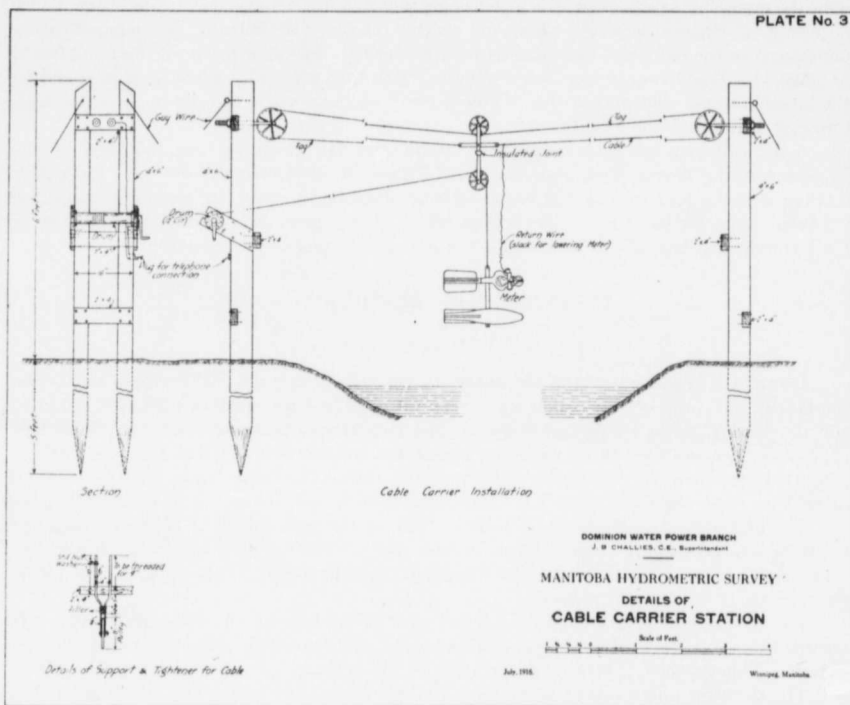
The apparatus at the Bridge Station on the Saskatchewan river at Pas was also over-hauled and repaired.

ACKNOWLEDGMENTS.

The Survey is indebted to the officials of a number of corporations for co-operation in obtaining records and for placing the results of various observations made by their own staff at the disposal of the Survey. The officials to whom acknowledgment is due are those of the Winnipeg Electric Street Railway, the Winnipeg Municipal Plant, the Lake of the Woods Milling Company and the Kenora Municipal Plant.

PROGRESS REPORT

OF THE

MANITOBA HYDROMETRIC SURVEY

FOR

THE CALENDAR YEAR, 1915

PART II

HYDROMETRIC DATA

T
throug
trolled
the lak
Power
the he
race of
the art
formed
into D

B
of Mil
West
below

T
it diffi
estima
station
station
1.
2.
3.
4.
5.
6.
7.
In
dischar
to tim

Th
the op
these c
to det
Scovil,
this pr
one hu
used t

Th
on the
marke

PART II.

HYDROMETRIC DATA.

LAKE OF THE WOODS OUTLETS.

The outflow from the Lake of the Woods into the Winnipeg river below the lake is 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 last, the artificial head race of the Keewatin Lumber and Manufacturing Co.'s plant which was formed by 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 tail races of Mills "A" and "C," the outlet of Darlington Bay and the Western Outlet forming the West Branch, and 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 the 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 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, KENORA POWER HOUSE.

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 so a station was established by A. Pirie, October 8, 1913, about one hundred and fifty feet above the Power House in the Eastern Outlet. This section was used to rate the power station.

LOCATION OF SECTION.

The metering station is about one hundred and fifty feet above the Kenora Power House on the Eastern Outlet of the Lake of the Woods. The I.P. is located on the bank and is marked by an iron bolt set in the rock.

25f—3

RECORDS AVAILABLE.

Daily gauge height readings are available for the head-and tail race of the plant from August 21, 1907, and daily estimates of discharge based upon the load upon the plant are available for a like period.

DRAINAGE AREA.

As in the case of the other outlets of the Lake of the Woods, the drainage area above, for the individual outlets is not significant.

GAUGE.

The tail-race and head-race gauges were established at the Power Plant in 1907, and are the ones used in the records until 1912, when on June 24 and 27, head-and tail race gauges were respectively established by Mr. Scovil, the former being on the upstream side of the timber platform in the head race and the latter two hundred feet below the power house. Both were referred to W.P.S. datum.

CHANNEL.

The channel is permanent, being in solid rock and boulders, is fairly uniform and free from cross 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 in the log chute.

DISCHARGE MEASUREMENTS.

Sufficient measurements were made to rate the station under the range in loads and heads occurring, and a rating curve of load-discharges constructed for various heads. A boat station is used for the measurements.

ACCURACY.

Except for conditions due to small loads the rating may be considered good.

DISCHARGE MEASUREMENTS OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 10...	S. C. O'Grady......	1,718	79	1,294	1·01	1,059·37	1,305
10...	"	1,718	79	1,294	0·99	1,059·37	1,275
10...	"	1,718	79	1,294	0·96	1,059·37	1,243
10...	"	1,718	79	1,294	0·99	1,059·37	1,285
July 14...	C. C. Galloway.....	1,374	79	1,360	0·56	1,060·25	762
14...	"	1,374	79	1,360	0·61	1,060·25	830
Aug. 18...	"	1,374	79	1,308	0·57	1,059·55	745
18...	"	1,374	79	1,308	0·59	1,059·55	771
Oct. 15...	"	1,496	79	1,244	1·16	1,058·99	1,448
15...	"	1,496	79	1,244	1·08	1,058·99	1,348

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE FOR 1915.

Day	January Gauge Height.	January Discharge.	February Gauge Height.	February Discharge.	March Gauge Height.	March Discharge.	April Gauge Height.	April Discharge.	May Gauge Height.	May Discharge.	June Gauge Height.	June Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	59·44	843	59·38	1,168	59·46	905	59·37	684	59·42	817	59·72	934
2	59·44	876	59·43	1,187	59·40	1,046	59·38	618	59·52	645	59·64	922
3	59·49	833	59·42	1,031	59·38	1,026	59·36	916	59·43	1,021	59·57	909
4	59·48	845	59·43	1,129	59·39	986	59·43	633	59·51	1,089	59·65	903
5	59·48	837	59·41	1,163	59·36	1,115	59·38	879	59·53	1,092	59·85	922
6	59·40	1,040	59·45	990	59·37	1,006	59·42	875	59·40	1,103	59·50	686
7	59·41	1,083	59·47	728	59·39	678	59·41	880	59·56	907	59·53	851
8	59·43	1,058	59·43	1,158	59·40	1,113	59·41	877	59·15	922	59·34	960
9	59·42	1,027	59·43	1,074	59·37	1,115	59·41	1,016	59·73	650	59·59	927
10	59·47	781	59·44	1,127	59·37	1,098	59·43	896	59·63	659	59·67	937
11	59·46	1,040	59·40	1,004	59·37	931	59·47	633	59·72	675	59·55	907
12	59·46	1,022	59·41	1,138	59·37	925	59·45	847	59·65	784	59·60	903
13	59·47	1,163	59·44	952	59·36	886	59·43	892	59·73	812	59·47	678
14	59·45	1,069	59·50	698	59·40	670	59·41	1,036	59·69	892	59·90	690
15	59·41	1,079	59·47	1,107	59·39	664	59·39	1,049	59·60	899	59·73	695
16	59·40	1,036	59·46	999	59·41	659	59·39	1,071	59·56	660	59·45	703
17	59·48	801	59·42	1,099	59·42	659	59·43	900	59·56	789	59·85	712
18	59·47	1,018	59·46	1,090	59·33	664	59·44	642	59·67	915	59·69	924
19	59·43	1,161	59·43	1,070	59·43	679	59·41	1,085	59·73	1,068	59·75	863
20	59·42	1,181	59·47	973	59·40	687	59·37	1,137	59·70	977	59·92	673
21	59·45	1,216	59·49	689	59·39	674	59·42	1,120	59·65	1,164	60·04	718
22	59·43	1,213	59·44	1,019	59·40	674	59·37	1,127	59·75	904	59·80	740
23	59·45	1,121	59·41	1,091	59·43	671	59·37	1,123	59·83	694	60·14	859
24	59·47	832	59·40	952	59·38	690	59·39	917	59·74	1,124	59·94	902
25	59·43	1,215	59·37	1,091	59·37	967	59·49	660	59·54	972	60·12	716
26	59·44	1,153	59·39	1,110	59·42	967	59·38	1,118	59·73	942	60·05	708
27	59·42	1,259	59·37	963	59·37	795	59·50	1,116	59·83	922	60·20	679
28	59·42	1,252	59·45	683	59·41	679	59·51	1,128	59·73	938	60·32	832
29	59·42	1,220	. . . .	. . . .	59·38	877	59·48	1,102	59·68	882	60·21	927
30	59·42	1,192	. . . .	. . . .	59·38	699	59·42	1,152	59·72	689	60·30	946
31	59·47	738	. . . .	. . . .	59·34	881	. . . .	. . . .	59·71	849	. . . .	. . . .

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	60·43	720	59·92	742	59·28	644	58·98	1,151	58·68	1,455	58·80	1,535
2	60·35	978	59·85	1,008	59·27	651	59·11	969	58·68	1,474	58·80	1,542
3	60·32	916	59·88	852	59·35	642	58·93	661	58·78	1,462	58·77	1,554
4	60·28	728	59·82	776	59·28	668	58·58	1,131	58·64	1,503	58·78	1,500
5	60·30	889	59·81	771	59·37	621	59·03	1,377	58·98	1,468	58·85	828
6	60·35	981	59·81	771	59·27	643	58·83	1,399	58·74	1,504	58·78	1,237
7	60·34	934	59·75	859	59·27	636	58·48	1,462	58·68	804	58·83	1,268
8	60·37	996	59·75	992	59·32	679	58·62	1,439	58·74	1,142	58·87	761
9	60·42	1,002	59·79	818	59·23	710	59·15	1,427	58·79	1,062	58·84	1,074
10	60·48	929	59·77	754	59·11	731	59·00	746	59·18	985	58·80	1,537
11	60·52	730	59·82	760	59·10	719	58·85	1,207	58·76	1,421	58·84	1,545
12	60·45	818	59·73	750	59·12	639	59·01	1,421	59·10	929	58·89	1,044
13	60·47	772	59·72	753	58·98	884	58·90	1,433	58·80	1,549	58·84	1,539
14	60·26	788	59·62	747	58·96	932	58·92	1,403	58·81	1,096	58·81	1,578
15	60·41	787	59·62	917	59·21	928	58·98	1,413	58·80	1,557	58·82	1,566
16	60·41	759	59·43	753	59·17	936	58·90	1,421	58·84	1,553	58·84	1,485
17	60·14	989	59·62	748	59·08	951	58·95	732	58·97	1,524	58·84	1,562
18	60·28	722	59·55	758	58·88	947	58·91	1,132	58·93	1,515	58·85	1,578
19	60·22	916	59·55	750	59·13	651	59·08	663	58·61	1,490	58·92	900
20	60·21	994	59·62	755	58·46	1,200	58·88	1,019	58·79	1,538	58·86	1,060
21	60·27	776	59·42	726	58·95	972	58·82	1,422	58·67	1,149	58·87	1,506
22	60·32	751	59·47	679	59·07	1,145	58·80	1,426	58·87	1,484	58·85	1,531
23	60·05	973	59·52	713	58·93	916	58·75	1,415	58·83	1,518	58·82	1,544
24	60·26	754	59·23	705	58·79	1,141	58·89	1,393	58·81	1,509	58·82	851
25	60·24	727	59·14	688	58·91	969	59·07	1,424	58·67	1,460	58·94	769
26	60·15	975	59·40	679	58·74	668	58·64	1,461	58·80	1,512	58·94	743
27	60·13	783	59·55	672	58·95	1,163	59·03	1,420	58·78	1,495	58·87	1,347
28	60·09	1,001	59·39	644	59·02	1,193	58·68	1,440	58·90	844	58·84	1,532
29	60·13	976	59·27	636	58·98	1,207	58·78	1,396	58·77	1,283	58·83	1,554
30	60·08	784	59·43	649	59·00	1,018	58·80	1,419	58·80	1,513	58·92	1,571
31	59·93	1,011	59·38	655	. . . .	. . . .	58·91	1,008	. . . .	. . . .	58·87	1,564

NOTE.—Gauge heights are those read at the Forebay.

MONTHLY DISCHARGE OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE FOR 1915.

MONTH	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on Drainage Area.	Total in acre feet.
January	1,259	738	1,039			63,900
February	1,187	683	1,017			59,800
March	1,115	659	841			51,700
April	1,152	633	939			55,900
May	1,164	645	886			54,500
June	960	673	824			49,000
July	1,011	720	866			53,200
August	1,008	636	751			46,200
September	1,145	621	859			51,100
October	1,462	661	1,317			81,000
November	1,557	804	1,360			80,900
December	1,578	743	1,329			81,700
The Year	1,578	621	1,002			728,900

WESTERN OUTLET AT NORMAN TRAFFIC BRIDGE

HISTORY.

Station was established on June 5, 1912 by S.S. Scovil.

LOCATION OF SECTION.

The section is located on 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 Kenora to Keewatin. The Initial Point is marked on the wooden hand rail at the west end of the bridge, the meterings being taken from the deck.

RECORDS AVAILABLE.

Estimates of daily discharge are available for this station from May 1, 1913, and are based upon gauge readings taken at the D.P.W. Forebay gauge, Norman Dam, from May 1 to August 25, 1913, and from August 26, 1913 on, the gauge heights are those recorded by the Manitoba Hydrometric Survey gauge above the Norman Dam.

DRAINAGE AREA.

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

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 gauge which was referred to W.P.S. datum.

Owing to the fact that the discharge past this section depends entirely upon the operation of the Norman Dam, the discharge measurements have been referred to the gauge height at that point, and daily discharges are also referred to the same gauge. Two gauges were

established above the Norman Dam, the first being that of the Ontario D.P.W. gauge which was used until the 25 of August, 1913. On the 26 of August, 1913, a vertical staff gauge was established by the Manitoba Hydrometric Survey which was referred to the W.P.S. datum.

<div align="center">CHANNEL.</div>

There is but one channel for all stages of the river, the average depth over the section being approximately forty feet under normal conditions. The bed of the river is loose rock and boulders but is not subject to appreciable change. The velocity of the section is fairly high and some eddies are formed due to the section being located at the apex of a curve.

<div align="center">DISCHARGE MEASUREMENTS.</div>

287 discharge measurements have been made at this station, but owing to the fact that the water at this point is practically at lake level, the range in stage has not been great, amounting to 2.2 feet.

<div align="center">ACCURACY.</div>

The Norman dam which is located about four thousand feet below the station 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 section.

Discharge Measurements of Western Outlet, Lake of the Woods at Norman Traffic Bridge, 1915

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.	Logs out of dam.
Jan. 8.	S. C. O'Grady....	1,861	212	5,116	1·47	59·40	7,535	10
8.	"	1,861	212	5,116	1·47	59·40	7,501	10
14.	"	1,861	212	5,118	1·50	59·41	7,665	10
22.	"	1,861	212	5,118	1·51	59·41	7,713	10
22.	"	1,861	212	5,118	1·50	59·41	7,688	10
Feb. 6.	"	1,861	212	5,122	1·45	59·32	7,434	10
16.	"	1,861	212	5,118	1·51	59·41	7,725	10
16.	"	1,861	212	5,118	1·49	59·41	7,621	10
Mar. 9.	"	1,861	212	5,105	1·45	59·35	7,418	10
9.	"	1,861	212	5,105	1·48	59·35	7,578	10
18.	"	1,861	212	5,091	1·45	59·28	7,379	10
18.	"	1,861	212	5,091	1·47	59·28	7,471	10
April 6.	"	1,861	212	5,114	1·46	59·39	7,459	10 (Removing
6.	"	1,861	212	5,114	1·52	59·39	7,768	10 logs Apr. 6-7.)
10.	"	1,861	212	5,072	2·73	59·19	13,824	42
10.	"	1,861	212	5,072	2·59	59·19	13,128	42
22.	C. C. Galloway...	1,861	205	5,044	2·58	59·11	13,025	42
22	"	1,861	205	5,044	2·63	59·11	13,258	42
May 11.	"	1,861	212	5,119	2·74	59·41	14,028	42 (Removing
11.	"	1,861	212	5,122	3·00	59·43	13,300	42 logs May 17-20).
18.	F. S. Smith......	1,861	212	5,081	3·48	59·24	17,660	134
18.	"	1,861	212	5,072	3·53	59·19	17,907	134
18.	"	1,861	212	5,056	3·80	59·11	19,226	134
19.	"	1,861	211	5,037	4·14	59·03	20,863	134
19.	"	1,861	211	5,029	4·16	59·01	20,907	134
20.	"	1,861	211	5,007	4·56	58·88	22,804	134
21.	"	1,861	211	5,000	4·50	58·85	22,481	(Replacing logs
21.	"	1,861	211	5,000	4·36	58·85	21,778	May 21-22).
21.	"	1,861	211	5,002	4·31	58·86	21,554	
31.	C. C. Galloway...	1,861	212	5,076	3·41	59·21	17,325	83
31.	"	1,861	212	5,076	3·51	59·21	17,833	83
June 7.	"	1,861	211	5,048	3·45	59·08	17,435	83
7.	"	1,861	211	5,048	3·43	59·08	17,397	83
25.	"	1,861	212	5,151	3·62	59·57	18,659	83
25.	"	1,861	212	5,140	3·64	59·52	18,706	83 101-June 29.
30.	"	1,861	212	5,147	4·34	59·56	22,340	115 June 30.
July 5.	"	1,374	212	5,171	4·51	59·67	23,323	115
5.	"	1,374	212	5,171	4·53	59·67	23,427	115
12.	"	1,374	212	5,182	4·46	59·72	23,111	115
12.	"	1,374	212	5,182	4·58	59·72	23,733	115
16.	"	1,374	212	5,173	4·54	59·68	23,488	115
16.	"	1,374	212	5,178	4·53	59·70	23,345	115
22.	"	1,374	212	5,157	4·43	59·60	22,844	115
22.	"	1,374	212	5,157	4·42	59·60	22,794	115 126-July 24.
28.	"	1,374	212	5,089	4·81	59·27	24,478	142 July 26.
28.	"	1,374	212	5,089	4·85	59·27	24,681	142
Aug. 2.	"	1,374	211	5,031	4·72	59·00	23,746	142
2.	"	1,374	211	5,031	4·69	59·00	23,597	142
5.	"	1,374	211	5,017	4·66	58·93	23,379	142
5.	"	1,374	211	5,017	4·65	58·93	23,319	142 119-Aug. 9.
11.	"	1,374	211	5,046	4·19	59·07	21,142	119
16.	"	1,374	205	4,946	4·36	58·63	21,567	130 130-Aug. 13.
16.	"	1,374	205	4,946	4·38	58·63	21,576	130 122-Aug. 18.
27.	"	1,374	212	5,107	2·25	59·36	11,492	20 111-Aug. 19.
27.	"	1,374	212	5,097	2·18	59·31	11,119	20 82-Aug. 20.
30.	"	1,374	212	5,093	2·17	59·29	11,052	20 49-Aug. 21.
30.	"	1,374	212	5,099	2·19	59·32	11,167	20 20-Aug. 25.
Sept. 3.	"	1,374	211	5,052	2·13	59·10	10,760	20
3.	"	1,374	211	5,052	2·14	59·10	10,811	20
8.	"	1,374	211	5,058	2·14	59·14	10,824	20
8.	"	1,374	211	5,058	2·18	59·14	11,027	20
12.	"	1,374	211	5,004	2·06	58·87	10,339	20
13.	"	1,374	211	5,004	2·08	58·87	10,409	20

DISCHARGE MEASUREMENTS OF WESTERN OUTLET, LAKE OF THE WOODS AT NORMAN TRAFFIC BRIDGE, 1915—Continued.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	Logs out of dam.
Sept. 17.	C. C. Galloway...	1,374	211	5,031	2·05	59·00	10,314	20
22.	"	1,374	211	5,031	2·14	59·00	10,767	20
22.	"	1,374	211	5,031	2·07	59·00	10,411	20
27.	"	1,374	211	5,002	2·00	58·86	10,005	20
Oct. 1.	"	1,374	211	5,023	1·42	58·96	7,148	8 Sept. 30.
1.	"	1,374	211	5,023	1·42	58·96	7,128	8
4.	"	1,374	205	4,938	1·37	58·59	6,746	8
4.	"	1,374	205	4,938	1·37	58·59	6,805	8
8.	"	1,496	205	4,959	1·45	58·70	7,218	8
8.	"	1,496	205	4,971	1·40	58·75	6,757	8
13.	"	1,496	205	5,007	1·41	58·88	7,074	8
13.	"	1,496	205	5,007	1·45	58·88	7,246	8
18.	"	1,496	205	5,019	1·41	58·94	7,079	8
18.	"	1,496	205	5,019	1·45	58·94	7,289	8
22.	"	1,496	205	4,982	1·40	58·76	6,967	8
22.	"	1,496	205	4,982	1·42	58·76	7,061	8
27.	"	1,496	205	5,085	1·49	59·26	7,598	8
27.	"	1,435	205	5,085	1·41	59·27	7,170	8
Nov. 3.	"	1,435	205	4,994	1·38	58·82	6,932	8
3.	"	1,435	205	4,994	1·40	58·82	6,988	8
10.	"	1,435	205	5,049	1·41	59·04	7,120	8
10.	"	1,435	205	5,049	1·42	59·04	7,170	8
13.	"	1,435	205	4,998	1·34	58·84	6,678	8
13.	"	1,435	205	4,998	1·36	58·84	6,778	8
15.	"	1,435	205	4,992	1·34	58·81	6,689	8
15.	"	1,435	205	4,992	1·39	58·81	6,939	8
22.	"	1,435	205	4,992	1·34	58·82	6,690	8
22.	"	1,435	205	4,992	1·36	58·82	6,789	8
26.	"	1,435	205	4,990	1·39	58·80	6,936	8
26.	"	1,435	205	4,990	1·38	58·80	6,886	8
Dec. 1.	"	1,435	205	4,983	1·34	58·81	6,660	8
1.	"	1,435	205	4,983	1·32	58·81	6,586	8
6.	"	1,435	205	4,979	1·33	58·79	6,630	8
6.	"	1,435	205	4,979	1·33	58·79	6,630	8
10.	"	2,019	205	4,981	1·33	58·80	6,625	8
10.	"	2,019	205	4,981	1·33	58·80	6,625	8
15.	"	2,019	205	4,979	1·37	58·79	6,812	8
15.	"	2,019	205	4,979	1·37	58·79	6,830	8
21.	"	2,019	205	4,993	1·38	58·86	6,931	8
24.	"	2,019	205	4,997	1·37	58·88	6,857	8
24.	"	2,019	205	4,997	1·37	58·88	6,835	8
28.	"	2,019	205	4,995	1·35	58·87	6,743	8
28.	"	2,019	205	4,995	1·34	58·87	6,694	8

DAILY GAUGE HEIGHT AND DISCHARGE OF WESTERN OUTLET, LAKE OF THE WOODS AT NORMAN TRAFFIC BRIDGE FOR 1915.

[Drainage area 26,400 square miles.]

Day.	January Gauge Height.	January Discharge.	February Gauge Height.	February Discharge.	March Gauge Height.	March Discharge.	April Gauge Height.	April Discharge.	May Gauge Height.	May Discharge.	June Gauge Height.	June Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	59·10	7,545	59·08	7,613	59·00	7,522	58·90	7,588	58·25	13,428	57·50	17,492
2	59·06	7,499	59·10	7,636	59·05	7,579	58·90	7,343	58·25	14,033	57·50	17,448
3	59·05	7,488	59·07	7,602	59·03	7,556	58·90	7,409	58·27	13,456	57·50	17,345
4	59·01	7,442	59·10	7,636	59·00	7,522	58·97	7,548	58·30	13,573	57·48	17,184
5	59·00	7,431	59·12	7,661	59·00	7,522	59·02	7,597	58·30	13,509	57·45	17,178
6	59·00	7,431	59·15	7,698	59·00	7,522	59·10	7,664	58·40	13,615	57·41	17,023
7	59·03	7,465	59·13	7,673	59·00	7,522	59·00	9,378	58·45	13,586	57·40	17,025
8	59·11	7,645	59·10	7,636	59·02	7,545	58·25	12,376	58·50	13,623	57·40	16,768
9	59·09	7,622	59·15	7,698	59·08	7,518	58·25	12,842	58·50	14,036	57·40	17,045
10	59·10	7,633	59·12	7,661	59·03	7,461	58·30	13,302	58·46	13,846	57·45	17,324
11	59·11	7,645	59·10	7,636	59·00	7,427	58·22	13,289	58·40	14,076	57·50	17,323
12	59·11	7,645	59·10	7,636	59·00	7,427	58·25	13,141	58·45	14,117	57·55	17,402
13	59·13	7,670	59·10	7,636	59·00	7,427	58·25	13,233	58·50	14,142	57·55	17,570
14	59·05	7,625	59·10	7,636	59·00	7,427	58·25	13,322	58·48	14,177	57·60	17,573
15	59·10	7,682	59·10	7,636	58·92	7,343	58·20	13,359	58·45	14,150	57·60	17,629
16	59·10	7,682	59·12	7,661	58·95	7,374	58·20	13,340	58·41	14,584	57·60	17,669
17	59·10	7,682	59·15	7,698	58·95	7,374	58·20	13,363	58·37	15,216	57·80	17,560
18	59·10	7,682	59·15	7,698	58·95	7,374	58·20	13,808	57·50	18,284	57·90	17,691
19	59·10	7,682	59·15	7,698	58·95	7,449	58·20	13,424	56·25	20,949	57·60	18,382
20	59·10	7,682	59·12	7,661	58·95	7,449	58·25	13,448	55·90	22,760	57·61	18,288
21	59·05	7,625	59·11	7,648	58·95	7,449	58·30	13,577	56·50	21,702	57·65	18,370
22	59·02	7,617	59·11	7,648	58·95	7,449	58·32	13,725	56·90	19,866	57·65	18,528
23	59·02	7,617	59·10	7,636	58·95	7,449	58·35	13,858	57·57	19,178	57·65	18,600
24	59·00	7,594	59·12	7,661	58·95	7,449	58·37	13,769	57·52	18,719	57·55	18,632
25	59·06	7,662	59·12	7,661	58·95	7,449	58·39	14,101	57·50	18,362	57·55	18,312
26	59·10	7,708	59·12	7,661	58·95	7,449	58·35	13,471	57·60	17,965	57·68	18,181
27	59·15	7,770	59·12	7,661	58·95	7,449	58·28	13,571	57·60	17,755	57·80	18,392
28	59·10	7,708	59·00	7,522	58·95	7,449	58·25	13,495	57·50	17,662	57·96	18,269
29	59·10	7,708			59·02	7,525	58·20	13,631	57·50	17,420	57·25	19,236
30	59·10	7,708			59·05	7,559	58·25	13,468	57·50	17,245	56·85	20,651
31	59·09	7,697			59·05	7,559			57·50	17,444		

Day	July Gauge Height.	July Discharge.	August Gauge Height.	August Discharge.	September Gauge Height.	September Discharge.	October Gauge Height.	October Discharge.	November Gauge Height.	November Discharge.	December Gauge Height.	December Discharge.
1	56·85	21,978	55·70	23,269	58·32	10,543	58·70	8,522	58·68	6,846	58·56	6,762
2	56·85	22,465	55·70	23,229	58·38	10,781	58·87	7,554	58·62	6,923	58·56	6,821
3	56·85	23,013	55·70	23,222	58·45	10,826	59·00	7,960	58·59	6,920	58·56	6,830
4	56·81	23,010	55·70	23,251	58·50	10,792	59·00	7,382	58·63	6,771	58·56	6,805
5	56·86	23,131	55·68	23,177	58·50	11,058	59·00	7,550	58·68	7,025		7,645
6	56·90	23,219	55·65	23,142	58·50	10,599	58·95	7,374	58·72	6,948		6,635
7	56·95	22,857	55·65	23,109	58·48	10,546	58·90	7,546	58·75	6,889		6,716
8	56·95	22,922	55·57	23,124	58·46	10,462	58·83	7,515	58·77	6,886		6,636
9	56·98	23,294	55·98	23,100	58·48	10,426	58·76	7,474	58·78	6,911	58·56	6,771
10	56·98	23,253	56·20	21,593	58·50	10,385	58·73	7,516	58·78	7,624	58·54	6,879
11	56·99	23,382	56·40	21,234	58·52	10,356	58·69	7,280	58·75	7,260	58·54	6,855
12	56·99	23,071	56·35	21,108	58·55	10,486	58·65	7,382	58·61	7,264	58·57	7,005
13	57·00	23,043	56·25	21,403	58·55	10,108	58·62	7,414	58·60	7,129	58·58	6,973
14	57·00	23,028	56·10	23,690	58·45	10,169	58·65	7,408	58·58	6,943	58·58	7,003
15	57·03	22,986	56·00	21,704	58·33	10,306	58·65	7,373	58·57	6,968	58·56	7,016
16	56·93	23,059	55·87	21,334	58·20	10,301	58·63	7,186	58·58	6,920	58·63	7,032
17	56·90	23,015	56·10	21,142	58·25	10,273	58·60	7,337	58·58	6,906	58·63	6,920
18	56·87	23,022	56·20	20,262	58·28	9,913	58·57	7,204	58·56	6,903	58·63	6,952
19	56·90	22,793	56·30	18,973	58·31	10,092	58·52	7,311	58·56	6,830	58·63	6,889
20	56·90	22,661	56·50	15,998	58·35	9,796	58·48	7,302	58·56	6,776	58·62	6,879
21	56·90	22,710	57·72	13,011	58·35	9,987	58·45	7,171	58·56	6,702	58·61	7,007
22	56·94	22,594	58·28	13,116	58·40	10,177	58·49	7,037	58·55	6,731	58·61	6,970
23	56·95	22,521	58·47	13,078	58·10	10,086	58·55	6,920	58·54	6,618	58·61	6,978
24	56·60	22,946	58·55	13,018	58·12	10,031	58·64	7,092	58·55	6,693	58·61	6,953
25	56·26	23,390	58·58	12,826	58·15	9,943	58·71	7,002	58·55	6,743	58·55	7,458
26	55·90	23,672	58·60	11,148	58·19	10,031	58·77	6,676	58·56	6,800	58·65	7,204
27	55·78	23,916	58·55	11,033	58·27	9,834	58·78	6,767	58·56	6,807	58·66	6,824
28	55·75	24,215	58·50	10,912	58·35	9,931	58·77	6,809	58·56	6,695	58·61	6,909
29	55·73	24,254	58·42	10,934	58·48	9,810	55·76	6,898	58·56	6,695	58·61	6,942
30	55·70	24,200	58·34	10,823	58·58	9,283	55·75	6,932	58·56	6,694	58·63	6,972
31	55·70	23,669	58·25	10,855			55·75	7,090			58·66	7,057

NOTE.—Gauge heights are those read on the D.P.W. gauge at the Forebay, Norman Dam.

MONTHLY DISCHARGE OF WESTERN OUTLET, LAKE OF THE WOODS AT NORMAN
TRAFFIC BRIDGE FOR 1915.

[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
January	7,770	7,431	7,622			468,700
February	7,698	7,522	7,650			424,900
March	7,579	7,427	7,470			459,300
April	14,101	7,343	12,115			720,900
May	21,702	13,428	16,209			996,700
June	20,051	16,768	17,850			1,062,200
July	24,254	21,978	23,138			1,422,700
August	23,690	10,823	18,317			1,126,240
September	11,058	9,283	10,244			609,500
October	8,522	6,676	7,290			448,200
November	7,264	6,618	6,882			409,500
December	7,645	6,635	6,945			427,000
The Year	24,254	6,618	11,811			8,575,800

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

MILL "A" HEADRACE, KEEWATIN.

HISTORY.

The station in the Headrace Mill "A" was established by Mr. S. S. Scovil, December 23rd, 1912. This channel has formed one of the outlets of the Lake of the Woods since the Mill was built in 1887. A gauge in the Tailrace was operated from May, 1896, until June, 1912, when it was discontinued.

LOCATION OF SECTION.

The section as first located in the Headrace of Mill "A" was on the downstream side of the foot bridge across the channel. Later it was changed to a position just above the intake racks of the power house in the headrace Mill "A" Lake of the Woods Milling Co., Keewatin, Ont.

RECORDS AVAILABLE.

Intermittent gauge readings in the tailrace from 1896-1912 and from 1913 daily discharge records based upon meterings, head-and tail-gauge readings and loads on the Mill are available.

DRAINAGE AREA.

Total drainage area above the Lake of the Woods outlets is 26,400 square miles.

GAUGE.

A staff gauge has been placed on the metering section close to the right side of the channel. This gauge is referred to a W.P.S. B.M. located about 20 feet west of the gauge.

CHANNEL.

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

DISCHARGE MEASUREMENTS.

A number of meterings have been made to determine the discharge for different gate openings and head so that the daily discharge may be arrived at. They are made from the rack structure.

ACCURACY.

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

DISCHARGE MEASUREMENTS OF MILL "A" FLUME NO. 1 AT HEADRACE, LAKE OF THE WOODS MILLING CO., 1915

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 12...	C. C. Galloway.....	1,718	15	183	1·41	59·20	258
17...	S. C. O'Grady......	1,718	15	188	0·28	59·53	53
17...	"	1,718	15	188	0·32	59·53	60
17...	"	1,718	15	188	0·34	59·53	63
17...	"	1,718	15	188	0·34	59·53	64
Mar. 5...	"	1,718	15	185	0·82	59·29	151
7...	"	1,718	15	187	0·29	59·44	55
7...	"	1,718	15	187	0·29	59·44	54
15...	C. C. Galloway.....	1,718	15	186	1·05	59·39	196
15...	"	1,718	15	186	1·12	59·39	208
June 9...	"	1,718	15	187	1·47	59·45	275
9...	"	1,718	15	187	1·49	59·45	280
July 26...	"	1,374	15	198	1·08	60·19	215
26...	"	1,374	15	198	1·10	60·19	218
Aug. 9...	"	1,374	15	192	1·54	59·76	294
9...	"	1,374	15	192	1·63	59·76	312
Sept. 24...	"	1,374	15	174	1·54	58·61	269
24...	"	1,374	15	174	1·51	58·61	264
Oct. 29...	"	1,435	15	173	1·45	58·53	251
29...	"	1,435	15	173	1·58	58·53	274
Nov. 24...	"	1,435	15	173	1·74	58·50	301
24...	"	1,435	15	173	1·70	58·50	294
Dec. 18...	"	2,019	15	173	1·71	58·53	296
18...	"	2,019	15	173	1·70	58·53	295

DISCHARGE MEASUREMENTS OF MILL "A" FLUME NO.2 AT HEADRACE, LAKE OF THE WOODS MILLING CO., 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Apr. 26...	C. C. Galloway.....	1,718	38	610	1·17	59·24	713
26...	"	1,718	38	610	1·22	59·24	745
June 9...	"	1,718	38	601	1·02	59·45	616
9...	"	1,718	38	601	1·04	59·45	628
Sept. 20...	"	1,374	38	553	1·20	58·13	666
20...	"	1,374	38	553	1·19	58·13	651
Oct. 29...	"	1,435	38	568	1·17	58·53	665
29...	"	1,435	38	568	1·17	58·53	665
Nov. 17...	"	1,435	38	573	1·12	58·68	642
17...	"	1,435	38	573	1·15	58·68	659
Dec. 18...	"	2,019	38	568	1·29	58·53	733
18...	"	2,019	38	568	1·22	58·53	693

MILL "C" HEADRACE, KEEWATIN.

HISTORY.

The station was established on July 17, 1912, by Mr. S. S. Scovil, when the first metering was taken by this Survey.

LOCATION OF SECTION.

The section is located about five feet upstream from the racks in the head race of Mill "C," Lake of the Woods Milling Co., leading from Portage Bay, an arm of Lake of the Woods at Keewatin, Ont. The initial point is marked on the east bank of the channel above the racks.

RECORDS AVAILABLE.

The records of discharge are based upon meterings and gauge heights in the head and tail race and also depend upon the load on the Mill. The daily discharges through the Mill are available for 1912-13-14-15.

DRAINAGE AREA.

This channel forms one of the outlets of the Lake of the Woods, and in consequence the drainage area above has no particular significance. It is however 26,400 square miles.

GAUGE.

The gauge is a vertical staff gauge placed on the east side of the channel about ten feet upstream from the racks. The zero of the gauge is referred to W.P.S. datum, the reference B.M. being a point on the top of the flume.

CHANNEL.

The channel is rectangular, cut in solid rock and has a normal depth of twelve feet. It is straight for about fifteen feet above the section.

DISCHARGE MEASUREMENTS.

The meterings are made from a small bridge spanning the channel and have been taken periodically from July 17, 1912, the range in stage covered being about 2½ feet.

ACCURACY.

The station gives good records but the daily discharge depends upon the gate openings on the turbines so that after rating the station to these, the records are reliable.

DISCHARGE MEASUREMENTS OF MILL "C" AT HEADRACE, LAKE OF THE WOODS MILLING Co., 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Feb. 17...	C. C. Galloway.....	1,718	42	526	1·28	59·43	673
17...	"	1,718	42	526	1·28	59·43	674
21...	"	1,718	42	525	1·43	59·40	750
27...	"	1,718	42	525	1·37	59·40	722
Mar. 16...	"	1,718	42	525	1·21	59·38	637
June 23...	"	1,718	42	545	1·38	58·96	854
23...	"	1,718	42	545	1·54	58·91	840
24...	"	1,718	42	550	1·38	60·02	759
24...	"	1,718	42	550	1·40	60·02	768
July 20...	"	1,374	42	559	1·19	60·25	665
20...	"	1,374	42	559	1·20	60·25	671
Aug. 13...	"	1,374	42	536	1·30	59·67	697
13...	"	1,374	42	536	1·29	59·67	691
Sept. 14...	"	1,374	42	506	1·28	58·93	648
14...	"	1,374	42	506	1·23	58·93	622
Oct. 20...	"	1,496	42	502	1·71	58·84	860
20...	"	1,496	42	502	1·64	58·84	822
Nov. 11...	"	1,435	42	500	1·74	58·79	870
11...	"	1,435	42	502	1·74	58·84	874
Dec. 13...	"	2,019	42	501	1·86	58·81	932
13...	"	2,019	42	501	1·88	58·81	947

KEEWATIN LUMBER & MANUFACTURING CO'S HEADRACE, KEEWATIN, ONT.

HISTORY.

This channel forms one of the outlets of the Lake of the Woods. It was created and used in connection with the above Company's mill, the discharge being controlled by the headgates. After the mill was burned in 1903 these fell into disrepair and leakage occurred; to ascertain this a station was established on December 13, 1913, by S. C. O'Grady and has since been operated.

LOCATION OF SECTION.

The metering section is on the upstream side of the bridge crossing the channel 300 feet above the power house and east of the headgates at the K.L. & M. Co.'s. headrace. The I.P. is a notch cut in the plank floor at the north end of the bridge and marked, "0+00."

RECORDS AVAILABLE.

The daily discharge records are available at this point since the establishment of the station in December, 1913.

GAUGE.

There is no gauge at this point, but the meterings are referred to the lake gauge at the Keewatin bridge where daily records are available.

CHANNEL.

The channel is fairly permanent, composed of clay and rock. It is straight for 150 feet above and 100 feet below the section. The current is not swift and depends upon the leakage at the gates.

DISCHARGE MEASUREMENTS.

Discharge measurements are taken frequently to check the leakage through the headgates, and as this control is fairly permanent the discharge depends largely upon the lake stage. No curve has been plotted for the station but the daily estimated discharge is based upon the meterings. The measurements are made from the bridge.

ACCURACY.

The accuracy may be considered good.

DISCHARGE MEASUREMENTS OF HEADRACE, OLD K.L. & M. CO. AT 2ND BRIDGE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	Lake Gauge.
Jan. 4.	C. C. Galloway...	1,718	30	193	0·88	−6·20	171	99·74
" 4.	"	1,718	30	193	0·82	−6·20	158	99·74
April 14.	"	1,718	30	187	0·92	−6·42	172	99·61
" 14.	"	1,718	30	187	0·92	−6·42	173	99·61
May 18.	M. S. Madden...	1,469	32	186	0·91	−6·85	169	99·95
June 18.	C. C. Galloway...	1,718	29	163	1·09	−7·10	179	99·98
" 18.	"	1,718	29	163	1·09	−7·10	179	99·98
July 7.	"	1,374	30	185	1·17	−6·45	216	100·65
" 7.	"	1,374	30	185	1·17	−6·45	216	100·65
" 7.	"	1,374	30	191	1·18	−6·45	225	100·65
Aug. 13.	"	1,374	29	162	1·22	−7·40	198	99·92
" 13.	"	1,374	29	162	1·22	−7·40	198	99·92
Sept. 15.	"	1,374	29	157	1·19	−7·65	186	99·57
" 15.	"	1,374	29	157	1·25	−7·65	196	99·57
Oct. 20.	"	1,496	29	151	1·14	−7·80	173	99·22
" 20.	"	1,496	29	151	1·11	−7·80	168	99·22
Nov. 17.	"	1,435	29	152	1·02	−7·77	155	99·24
" 17.	"	1,435	29	152	1·05	−7·77	160	99·24
Dec. 17.	"	2,019	29	152	1·04	−7·75	159	99·14
" 17.	"	2,019	29	152	1·01	−7·75	154	99·14

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF HEADRACE, K.L. & M. CO. NEAR 2ND BRIDGE FOR 1915.

[Drainage area 26,400 square miles.]

Day	January Gauge Height.	Dis-charge.	February Gauge Height.	Dis-charge.	March. Gauge Height.	Dis-charge.	April. Gauge Height.	Dis-charge.	May. Gauge Height.	Dis-charge.	June. Gauge Height.	Dis-charge.
	Feet	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	99·74	175	99·65	165	99·70	175	99·61	175	99·67	122	99·95	170
2	99·69	170	99·67	165	99·67	165	99·62	175	99·76	140	99·88	160
3	99·74	180	99·67	165	99·68	165	99·61	175	99·60	113	99·84	155
4	99·74	180	99·66	165	99·64	165	99·60	170	99·75	137	99·90	160
5	99·68	170	99·68	170	99·61	160	99·63	175	99·77	141	100·12	195
6	99·69	170	99·69	170	99·60	160	99·65	180	99·64	119	99·75	135
7	99·67	170	99·75	180	99·67	165	99·67	180	99·82	148	99·75	135
8	99·67	170	99·75	180	99·69	175	99·67	180	99·39	80	99·65	120
9	99·67	170	99·71	175	99·65	165	99·69	180	99·97	175	99·85	155
10	99·75	180	99·68	170	99·65	165	99·70	185	99·86	155	99·94	170
11	99·71	170	99·67	165	99·65	165	99·68	180	99·94	169	99·82	150
12	99·68	170	99·67	165	99·65	165	99·70	185	99·88	158	99·88	160
13	99·71	170	99·67	165	99·62	160	99·65	180	99·95	170	99·62	115
14	99·66	165	99·72	175	99·64	165	99·61	175	99·94	169	100·08	195
15	99·62	160	99·75	180	99·63	160	99·62	175	99·85	152	99·90	160
16	99·61	160	99·67	165	99·62	160	99·67	180	99·75	137	99·67	120
17	99·70	170	99·68	170	99·65	165	99·65	180	99·85	152	100.08	195
18	99·75	180	99·70	170	99·58	155	99·70	185	99·95	170	99·98	175
19	99·67	170	99·69	170	99·62	160	99·70	185	99·97	175	100·02	180
20	99·68	170	99·69	170	99·61	160	99·63	175	99·93	165	100·25	225
21	99·71	170	99·75	180	99·65	165	99·63	175	99·93	165	100·28	230
22	99·69	170	99·75	180	99·65	165	99·61	175	100.00	177	100·02	180
23	99·71	170	99·67	165	99·62	160	99·62	175	100·07	90	100·25	225
24	99·75	180	99·65	165	99·70	165	99·70	180	99·98	175	100·23	220
25	99·75	180	99·65	165	99·61	160	99·80	205	99·82	148	100·32	235
26	99·68	170	99·65	165	99·63	160	99·73	185	99·98	175	100·25	225
27	99·70	170	99·66	165	99·61	160	99·75	195	100·09	198	100·48	265
28	99·65	165	99·70	170	99·63	160	99·75	195	99·98	175	100·53	270
29	99·67	170			99·65	165	99·68	180	99·93	165	100·45	260
30	99·67	170			99·61	160	99·68	180	99·94	169	100·57	280
31	99·67	170			99·61	160			99·93	165		

Day	July. Height	Discharge	August. Height	Discharge	September. Height	Discharge	October. Height	Discharge	November. Height	Discharge	December. Height	Discharge
1	100·63	215	100·14	215	99·52	187	99·28	180	98·95	110	99·10	146
2	100·62	215	100·13	212	99·51	187	99·37	196	98·97	112	99·13	151
3	100·61	215	100·17	217	99·60	200	99·15	160	99·10	132	99·08	145
4	100·47	195	100·06	202	99·50	185	98·85	115	98·95	110	99·08	145
5	100·53	200	100·04	200	99·60	200	99·27	178	99·20	147	99·13	151
6	100·65	225	100·03	200	99·50	185	99·06	146	99·05	125	99·08	145
7	100·65	225	99·98	190	99·45	176	98·75	100	98·93	107	99·12	150
8	100·62	215	100·00	192	99·58	197	98·87	120	99·05	125	99·10	146
9	100·68	230	100·01	192	99·47	180	99·40	200	99·05	125	99·13	151
10	100·73	235	100·00	192	99·34	160	99·20	167	99·37	172	99·10	146
11	100·73	235	100·02	197	99·32	155	99·14	158	99·02	120	99·12	150
12	100·68	230	99·93	180	99·46	178	99·29	182	99·32	165	99·13	151
13	100·69	230	99·92	180	99·30	153	99·18	165	99·10	133	99·15	154
14	100·50	195	99·85	167	99·22	140	99·18	165	99·05	125	99·10	146
15	100·60	215	99·80	160	99·43	172	99·26	175	99·10	133	99·12	150
16	100·60	215	99·65	137	99·45	176	99·18	165	99·13	136	99·15	154
17	100·41	175	99·80	160	99·31	155	99·21	167	99·20	147	99·15	154
18	100·53	200	99·78	158	99·14	130	99·18	165	99·20	147	99·15	154
19	100·50	195	99·70	145	99·39	167	99·28	181	98·90	103	99·17	155
20	100·47	195	99·69	145	98·68	63	99·10	152	99·10	133	99·17	155
21	100·49	195	99·61	132	99·22	140	99·11	153	98·90	103	99·17	155
22	100·53	200	99·68	144	99·34	160	99·10	152	99·14	138	99·17	155
23	100·37	170	99·75	152	99·21	140	99·05	145	99·10	133	99·17	155
24	100·44	185	99·45	105	99·10	124	99·18	165	99·10	133	99·17	155
25	100·45	185	99·41	100	99·19	137	99·25	175	99·00	117	99·20	161
26	100·41	175	99·61	132	99·00	108	98·92	125	99·10	133	99·20	161
27	100·35	165	99·76	152	99·22	140	99·32	185	99·08	130	99·20	161
28	100·35	165	99·63	135	99·30	153	98·95	130	99·15	140	99·16	155
29	100·40	175	99·48	112	99·27	150	99·07	147	99·05	125	99·16	155
30	100·31	160	99·66	138	99·27	150	99·08	148	99·00	133	99·15	155
31	100·21	140	99·60	130			99·15	160			99·16	155

NOTE.—Gauge heights are those read on the D.P.W. Lake gauge.

MONTHLY DISCHARGE OF HEADRACE, OLD K.L. & M. CO. NEAR 2ND BRIDGE, FOR 1915.

[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.
January..................	180	160	168	....	....	10,300
February................	180	165	180	....	....	10,000
March..................	175	155	163	....	....	10,000
April...................	205	175	181	....	....	10,000
May....................	198	80	156	....	....	9,550
June...................	280	115	187	....	....	11,100
July....................	235	140	199	....	....	12,200
August.................	217	100	164	....	....	10,100
September..............	200	63	158	....	....	9,400
October................	200	100	159	....	....	9,800
November..............	172	103	130	....	....	7,750
December..............	161	145	152	....	....	9,350
The Year..........	280	63	166	....	....	120,350

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

C.P.R. CULVERT AT MINK BAY.

HISTORY.

This channel is a tunnel excavated in solid rock under the C.P.R. embankment and connects Mink Bay and Darlington Bay, the latter being an arm of the Winnipeg river. The station was established on July 29th, 1912, by S. S. Scovil, and has since been continuously maintained.

LOCATION OF SECTION.

The section is about 25 feet above the entrance to the tunnel which is about 2,000 feet west of the Old K.L. & M. mill on Mink Bay and forms the outlet for that bay into Darlington bay. The I.P. is a stake driven in the bank at the west side of the channel about 25 feet above the mouth of the tunnel.

RECORDS AVAILABLE.

Meterings have been made at close intervals from July 29, 1912, but no gauge heights are available, so no discharge curve has been constructed.

DRAINAGE AREA.

Not significant as most of the water flowing past this station is leakage through the K.L. & M. Co.'s head gates from Lake of the Woods.

GAUGE.

No gauge has been installed, water levels at the time of metering being obtained by measuring down from a point of rock which is referred to W.P.S. datum.

CHANNEL.

The channel is a rock cut and is constant in section above and below point of metering.

DISCHARGE MEASUREMENTS.

The meterings are taken by Price meter from a plank bridged across the channel.

ACCURACY.

The results obtained are good as the governing conditions are constant. No attempt has been made to obtain the daily discharges from daily gauge heights.

DISCHARGE MEASUREMENTS OF C.P.R. CULVERT AT 1ST TUNNEL WEST OF KEEWATIN, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec	Feet.	Sec.-ft.
Jan. 4...	C. C. Galloway.....	1,718	17	53	3·38	41·00	180
4...	"	1,718	17	53	3·38	41·00	181
20..	"	1,718	17	54	3·15	41·04	172
20..	"	1,718	17	54	3·17	41·04	171
April 14...	"	1,718	17	55	2·92	40·99	160
14...	"	1,718	17	55	2·92	40·99	161
June 18..	"	1,718	18	57	3·10	41·19	176
18..	"	1,718	18	57	3·08	41·19	175
Aug. 13..	"	1,374	17	64	2·80	41·63	178
13..	"	1,374	17	64	2·80	41·63	178
Sept. 15...	"	1,374	17	55	3·23	41·07	177
15...	"	1,374	17	55	3·23	41·07	177
Oct. 20...	"	1,496	17	52	3·01	40·89	156
20..	"	1,496	17	52	3·06	40·89	159
Nov. 17..	"	1,435	17	51	2·89	40·86	148
17..	"	1,435	17	51	3·03	40·86	155
Dec. 17..	"	2,019	17	51	2·82	40·84	143
17..	"	2,019	17	51	2·97	40·84	151

WAR EAGLE OUTLET.

HISTORY.

The station was established by Mr. S. S. Scovil on July 29, 1912.

LOCATION OF SECTION.

The station is situated at downstream end of the culvert under the C.P.R. embankment on the outlet of War Eagle lake about ¼ mile below the lake and near Darlington bay into which it empties. The I. P. is marked on the rock forming the R. side of the channel at the mouth of the tunnel.

RECORDS AVAILABLE.

A number of meterings have been made during the period 1912-1913 but no gauge records have been kept.

DRAINAGE AREA.

The area tributary is about 50 square miles.

GAUGE.

No gauge has been established but the elevation of the water surface is obtained by measuring down from a fixed point marked on the rock near the section.

CHANNEL.

The channel is straight for 20 feet above the section and 60 feet below. The section is fairly uniform, being an artificial rock-cut.

DISCHARGE MEASUREMENTS.

The meterings are made from a plank bridged from side to side of the channel.

ACCURACY.

As only a few discharge measurements have been made covering a very narrow range in stage, no estimate has been made of daily discharge.

DISCHARGE MEASUREMENTS OF WAR EAGLE OUTLET NEAR KEEWATIN, ONT., 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
Jan. 20...	S. C. O'Grady....	1,718	5·5	3·9	0·74	—6·90	2·9
20...	"	1,718	5·5	3·9	0·85	—6·90	3·3
July 19...	C. C. Galloway....	1,374	7·5	8·5	1·74	—6·38	14·8
19...	"	1,374	7·5	8·5	1·72	—6·38	14·8

NORTH TUNNEL ISLAND.

HISTORY.

The station at North Tunnel Island was established on June 28, 1912, by Mr. S. S. Scovil.

LOCATION.

The meter section is on the west branch of the Winnipeg river on the north side of Tunnel Island about one mile below the Keewatin River Bridge. The I.P. of the section is chiselled in the rock on the south bank of the river and is painted "I.P. W.P.S. El. 1039.88."

RECORDS AVAILABLE.

Frequent discharge measurements have been made since the establishment of the station and daily discharges have been estimated for this section from the year 1907 to date.

DRAINAGE AREA.

The drainage area lying above this section is 26,400 square miles, but all of the water coming from this basin does not pass this section as part of it goes through the east branch of the Winnipeg, the two, the east and the west branch joining a short distance below the section.

GAUGE.

A vertical staff gauge reading to 10ths is located on a pile bent at the south end of the Keewatin River Bridge and to which all measurements at the station are referred. The zero of the gauge is referred to W.P.S. datum.

A vertical staff gauge read during metering is located on the north shore about 30 feet above the meter section and is bolted to the rock. It is referred to W.P.S. datum.

CHANNEL.

The river at this point is confined to a single channel at all stages, the bed of the stream is solid rock or boulders and of a very permanent nature, the banks are high and rocky and the river is confined to its channel at all stages. The approach to the section is straight for 100 feet and maintains the same direction for approximately 100 feet below, the cross section being approximately uniform over that distance.

DISCHARGE MEASUREMENTS.

Numerous discharge measurements have been taken at this station and cover a range in stage of 6·3 feet. Owing to the fact that part of the water flowing past this section enters the river through the Lake of the Woods Milling Company'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, the conditions governing discharge at this point vary from time to time and considerable difficulty is experienced in arriving at the daily discharge by means of a discharge curve, the ponding effect in Darlington bay having a very noticeable effect.

ACCURACY.

Owing to the presence of the mills and the operation of the Norman Dam the accuracy of the records is considerably affected.

DISCHARGE MEASUREMENTS OF WEST BRANCH WINNIPEG RIVER NEAR NORTH TUNNEL ISLAND, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per Sec.	Feet.	Sec.-ft.	Gauge at Meter Sec.
Jan. 7.	S. C. O'Grady....	1,718	163	4,579	2·02	35·75	9,248	35·65
7.	"	1,718	163	4,579	2·05	35·75	9,406	35·65
9.	"	1,718	163	4,584	2·04	35·78	9,336	35·68
9.	"	1,718	163	4,584	2·01	35·78	9,235	35·68
11.	"	1,718	163	4,557	2·03	35·65	9,248	35·15
11.	"	1,718	163	4,557	2·03	35·65	9,267	35·15
14.	"	1,718	163	4,589	2·05	35·80	9,392	35·71
14.	"	1,718	163	4,589	2·03	35·80	9,342	35·71
16.	"	1,718	163	4,590	2·05	35·82	9,426	35·72
16.	"	1,718	163	4,590	2·02	35·82	9,261	35·72
19.	"	1,718	163	4,581	2·03	35·72	9,319	35·66
19.	"	1,718	163	4,581	2·03	35·72	9,319	35·66
22.	"	1,718	163	4,601	2·07	35·83	9,512	35·79
25.	"	1,718	163	4,560	1·94	35·62	8,856	35·53
25.	"	1,718	163	4,560	1·99	35·62	9,069	35·53
26.	"	1,718	163	4,595	2·04	35·84	9,373	35·75
30.	"	1,718	163	4,605	2·08	35·86	9,576	35·81
31.	C. C. Galloway...	1,718	163	4,573	1·82	35·67	8,319	35·64
31.	"	1,718	163	4,573	1·83	35·67	8,388	35·61
31.	"	1,718	163	4,563	1·81	35·61	8,281	35·545
31.	"	1,718	163	4,563	1·83	35·61	8,367	35·545
31.	"	1,718	163	4,557	1·77	35·56	8,055	35·51
31.	"	1,718	163	4,557	1·83	35·56	8,340	35·51
Feb. 1.	S. C. O'Grady....	1,718	163	4,555	1·94	35·56	8,838	35·505
1.	"	1,718	163	4,563	2·01	35·61	9,181	35·55
1.	"	1,718	163	4,571	1·98	35·63	9,069	35·595
1.	"	1,718	163	4,573	2·00	35·68	9,159	35·61
1.	"	1,718	163	4,574	2·00	35·70	9,156	35·625
1.	"	1,718	163	4,574	2·04	35·72	9,348	35·625
2.	C. C. Galloway...	1,718	163	4,587	2·04	35·75	9,342	35·695
2.	"	1,718	163	4,587	2·01	35·75	9,211	35·695
6.	S. C. O'Grady....	1,718	163	4,601	2·00	35·83	9,197	35·79
6.	"	1,718	163	4,601	2·04	35·83	9,384	35·79
11.	"	1,718	163	4,601	2·04	35·88	9,393	35·79
11.	"	1,718	163	4,601	2·08	35·88	9,554	35·79
16.	"	1,718	163	4,598	1·87	35·84	8,587	35·77
16.	"	1,718	163	4,598	1·92	35·84	8,835	35·77
24.	"	1,718	163	4,596	2·10	35·85	9,673	35·76
24.	"	1,718	163	4,596	2·17	35·85	9,968	35·76
26.	C. C. Galloway...	1,718	163	4,598	2·12	35·84	9,777	35·77
26.	"	1,718	163	4,598	2·13	35·84	9,809	35·77
Mar. 4.	S. C. O'Grady....	1,718	163	4,582	2·03	35·80	9,319	35·67
4.	"	1,718	163	4,582	2·09	35·80	9,568	35·67
6.	"	1,718	163	4,585	2·06	35·80	9,443	35·69
6.	"	1,718	163	4,585	1·99	35·80	9,142	35·69
12.	"	1,718	163	4,544	1·89	35·54	8,598	35·43
12.	"	1,718	163	4,544	1·95	35·54	8,847	35·43
16.	"	1,718	163	4,515	1·90	35·35	8,600	35·25
16.	"	1,718	163	4,515	1·93	35·35	8,727	35·25
19.	"	1,718	163	4,519	1·89	35·35	8,522	35·27
19.	"	1,718	163	4,519	1·89	35·35	8,524	35·27
23.	"	1,718	163	4,506	1·92	35·28	8,766	35·19
23.	"	1,718	163	4,506	1·88	35·28	8,577	35·19
April 1.	"	1,718	163	4,527	1·95	35·38	8,819	35·32
1.	"	1,718	163	4,527	1·89	35·38	8,572	35·32
6.	"	1,718	163	4,495	1·84	35·23	8,263	35·12
9.	"	1,718	171	4,786	3·02	37·08	14,470	36·845
9.	"	1,718	171	4,786	2·99	37·08	14,325	36·845
13.	"	1,718	171	4,905	3·10	37·78	15,174	37·565
13.	"	1,718	171	4,905	3·03	37·78	14,838	37·565
15.	"	1,718	171	4,940	3·02	38·00	14,929	37·79
15.	"	1,718	171	4,940	3·09	38·00	15,256	37·79
17.	"	1,718	171	4,961	2·99	38·11	14,826	37·92
17.	"	1,718	171	4,961	3·08	38·11	15,284	37·92

DISCHARGE MEASUREMENTS OF WEST BRANCH WINNIPEG RIVER NEAR NORTH TUNNEL ISLAND, 1915—Continued.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per Sec.	Feet.	Sec.-ft.	Gauge at Meter Sec.
April 18.	S. C. O'Grady...	1,718	171	4,910	2·92	37·87	14,348	37·73
18.	"	1,718	171	4,910	2·90	37·87	14,245	37·73
20.	C. C. Galloway...	1,718	171	4,968	3·03	38·16	15,063	37·96
20.	"	1,718	171	4,968	3·08	38·16	15,318	37·96
22.	"	1,718	171	4,983	3·08	38·14	15,339	38·05
22.	"	1,718	171	4,983	3·12	38·14	15,545	38·05
24.	"	1,718	171	5,018	3·14	38·48	15,791	38·265
24.	"	1,718	171	5,018	3·08	38·48	15,440	38·265
27.	"	1,718	171	5,017	3·10	38·47	15,554	38·26
27.	"	1,718	171	5,017	3·07	38·47	15,374	38·26
30.	"	1,718	171	5,022	3·04	38·47	15,254	38·29
30.	"	1,718	171	5,022	2·99	38·47	15,008	38·29
May 4.	"	1,718	171	5,007	3·07	38·40	15,390	38·20
4.	"	1,718	171	5,007	3·04	38·40	15,232	38·20
8.	"	1,718	174	5,033	3·02	38·47	15,224	38·30
8.	"	1,718	174	5,033	2·96	38·47	14,910	38·30
11.	"	1,718	174	5,021	3·16	38·44	15,822	38·23
11.	"	1,718	174	5,021	3·16	38·44	15,856	38·23
14.	"	1,718	174	5,041	3·13	38·60	15,771	38·41
14.	"	1,718	174	5,041	3·15	38·60	15,890	38·41
21.	A. Pirie......... M. S. Madden...	1,469	183	5,364	4·31	40·59	23,138	40·175
21.	C. C. Galloway...	1,469	183	5,366	4·27	40·60	22,916	40·18
21.	S. C. O'Grady... N. Galloway....	1,469	183	5,364	4·15	40·57	22,132	40·17
28.	C. C. Galloway...	1,718	181	5,253	3·59	39·83	18,856	39·54
28.	"	1,718	181	5,253	3·56	39·83	18,710	39·54
June 1.	"	1,718	181	5,233	3·52	39·73	18,437	39·43
8.	"	1,718	181	5,317	3·43	39·62	17,910	39·34
8.	"	1,718	181	5,317	3·43	39·62	17,904	39·34
12.	"	1,718	181	5,328	3·60	39·75	18,870	39·46
12.	"	1,718	181	5,328	3·50	39·75	18,350	39·46
15.	"	1,718	181	5,229	3·58	39·71	18,833	39·41
18.	"	1,718	181	5,246	3·55	39·82	18,651	39·51
18.	"	1,718	181	5,246	3·57	39·82	18,715	39·51
22.	"	1,718	181	5,255	3·70	39·88	19,430	39·56
22.	"	1,718	181	5,255	3·73	39·88	19,601	39·56
24.	"	1,718	181	5,279	3·68	40·00	19,475	39·70
24.	"	1,718	181	5,279	3·72	40·00	19,659	39·70
July 8.	"	1,374	186	5,503	4·35	41·39	23,939	40·93
8.	"	1,374	186	5,503	4·40	41·39	24,214	40·93
10.	"	1,374	186	5,530	4·42	41·51	24,441	41·08
10.	"	1,374	186	5,530	4·46	41·51	24,663	41·08
13.	"	1,374	186	5,521	4·24	41·44	23,411	41·03
13.	"	1,374	186	5,521	4·32	41·44	23,852	41·03
15.	"	1,374	186	5,512	4·41	41·39	24,308	40·98
15.	"	1,374	186	5,512	4·34	41·39	23,922	40·98
21.	"	1,374	186	5,500	4·35	41·33	23,923	40·91
21.	"	1,374	186	5,500	4·29	41·33	23,593	40·91
27.	"	1,374	187	5,539	4·50	41·59	24,924	41·12
27.	"	1,374	187	5,539	4·51	41·59	24,979	41·12
30.	"	1,374	188	5,566	4·53	41·85	25,212	41·55
30.	"	1,374	188	5,566	4·53	41·69	25,212	41·26
Aug. 4.	"	1,374	188	5,539	4·36	41·51	24,149	41·11
4.	"	1,374	188	5,539	4·43	41·51	24,537	41·11
7.	"	1,374	188	5,530	4·35	41·47	24,055	41·06
7.	"	1,374	188	5,530	4·41	41·47	24,386	41·06
10.	"	1,374	187	5,473	4·16	41·16	22,769	40·76
10.	"	1,374	187	5,473	4·12	41·16	22,550	40·76
12.	"	1,374	185	5,447	4·04	40·99	22,006	40·63
12.	"	1,374	185	5,447	4·12	40·99	22,442	40·63
14.	"	1,374	185	5,445	4·21	41·00	22,925	40·62
14.	"	1,374	185	5,445	4·15	41·00	22,598	40·62
17.	"	1,374	184	5,418	4·07	40·84	22,052	40·47

DISCHARGE MEASUREMENTS OF WEST BRANCH WINNIPEG RIVER NEAR NORTH TUNNEL ISLAND, 1915—Continued.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.	Gauge at Meter Sec.
Aug. 17.	C. C. Galloway...	1,374	184	5,418	4·12	40·84	22,323	40·47
26.	"	1,374	169	4,885	2·35	37·63	11,480	37·48
26.	"	1,374	169	4,885	2·32	37·63	11,334	37·48
31.	"	1,374	167	4,776	2·37	36·93	11,318	36·83
31.	"	1,374	167	4,776	2·39	36·93	11,414	36·83
Sept. 2.	"	1,374	167	4,793	2·57	37·05	12,319	36·94
2.	"	1,374	167	4,793	2·57	37·05	12,319	36·94
4.	"	1,374	167	4,787	2·57	37·05	12,303	36·90
4.	"	1,374	167	4,787	2·60	37·05	12,446	36·90
7.	"	1,374	167	4,769	2·53	36·94	12,066	36·79
9.	"	1,374	167	4,776	2·51	36·95	11,987	36·83
9.	"	1,374	167	4,776	2·51	36·95	11,987	36·83
11.	"	1,374	167	4,774	2·51	36·92	11,983	36·82
11.	"	1,374	167	4,774	2·48	36·92	11,840	36·82
16.	"	1,374	167	4,784	2·51	37·00	12,007	36·88
16.	"	1,374	167	4,784	2·47	37·00	11,816	36·88
18.	"	1,374	167	4,773	2·37	36·90	11,311	36·81
18.	"	1,374	167	4,773	2·41	36·90	11,502	36·81
21.	"	1,374	167	4,756	2·45	36·83	11,653	36·71
21.	"	1,374	167	4,756	2·42	36·83	11,511	36·71
23.	"	1,374	167	4,768	2·47	36·91	11,776	36·78
23.	"	1,374	167	4,768	2·44	36·91	11,633	36·78
28.	"	1,374	167	4,755	2·47	36·83	11,745	36·71
28.	"	1,374	167	4,755	2·41	36·83	11,459	36·71
Oct. 2.	"	1,374	164	4,649	1·98	36·15	9,206	36·08
2.	"	1,374	164	4,649	2·00	36·15	9,299	36·08
5.	"	1,374	163	4,593	2·00	35·82	9,186	35·74
5.	"	1,374	163	4,593	2·01	35·82	9,232	35·74
9.	"	1,496	163	4,590	1·99	35·82	9,150	35·72
9.	"	1,496	163	4,590	2·02	35·82	9,258	35·72
12.	"	1,496	163	4,574	2·02	35·73	9,222	35·62
12.	"	1,496	163	4,574	1·97	35·73	9,007	35·62
14.	"	1,496	163	4,574	2·02	35·73	9,267	35·62
14.	"	1,496	163	4,574	1·99	35·73	9,098	35·62
16.	"	1,496	163	4,576	1·92	35·74	8,824	35·63
16.	"	1,496	163	4,576	1·97	35·74	9,025	35·63
19.	"	1,496	163	4,555	2·00	35·58	9,124	35·50
19.	"	1,496	163	4,555	2·03	35·58	9,233	35·50
21.	"	1,496	163	4,561	1·94	35·64	8,849	35·54
21.	"	1,496	163	4,561	1·97	35·64	8,985	35·54
26.	"	1,496	163	4,569	1·83	35·67	8,364	35·59
26.	"	1,496	163	4,569	1·87	35·67	8,530	35·59
28.	"	1,435	163	4,572	1·92	35·70	8,779	35·61
28.	"	1,435	163	4,572	1·90	35·70	8,687	35·61
30.	"	1,435	163	4,571	1·94	35·68	8,867	35·60
30.	"	1,435	163	4,571	1·89	35·68	8,639	35·60
Nov. 2.	"	1,435	163	4,563	1·93	35·64	8,806	35·55
2.	"	1,435	163	4,563	1·87	35·64	8,532	35·55
4.	"	1,435	163	4,563	1·91	35·63	8,715	35·55
4.	"	1,435	163	4,563	1·87	35·63	8,532	35·55
6.	"	1,435	163	4,568	1·91	35·68	8,724	35·58
6.	"	1,435	163	4,568	1·95	35·68	8,907	35·58
9.	"	1,435	163	4,577	1·93	35·72	8,834	35·64
9.	"	1,435	163	4,577	1·95	35·72	8,925	35·64
12.	"	1,435	163	4,579	1 96	35·75	8,974	35·65
12.	"	1,435	163	4,579	2·03	35·75	9,295	35·65
16.	"	1,435	163	4,574	1·90	35·72	8,690	35·62
16.	"	1,435	163	4,574	1·94	35·72	8,873	35·62
18.	"	1,435	163	4,576	1·90	35·73	8,694	35·63
18.	"	1,435	163	4,576	1·92	35·73	8,785	35·63
20.	"	1,435	163	4,572	1·90	35·70	8,687	35·61
20.	"	1,435	163	4,572	1·76	35·70	8,504	35·61
23.	"	1,435	163	4,566	1·81	35·70	8,264	35·57
23.	"	1,435	163	4,566	1·83	35·70	8,356	35·57

DISCHARGE MEASUREMENTS OF WEST BRANCH WINNIPEG RIVER NEAR NORTH TUNNEL ISLAND, 1915.—Continued.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.	Gauge at Meter Sec.
Nov. 25.	C. C. Galloway...	1,435	163	4,567	1·92	35·68	8,770	35·58
25.	" ...	1,435	163	4,567	1·87	35·68	8,541	35·58
27.	" ...	1,435	163	4,567	1·92	35·66	8,724	35·58
27.	" ...	1,435	163	4,567	1·88	35·66	8,587	35·58
30.	" ...	1,435	163	4,561	1·90	35·65	8,266	35·54
30.	" ...	1,435	163	4,561	1·88	35·65	8,575	35·54
Dec. 2.	" ...	1,435	162	4,566	1·90	35·65	8,675	35·57
2.	" ...	1,435	162	4,566	1·91	35·65	8,721	35·57
4.	" ...	1,435	162	4,561	1·90	35·62	8,666	35·535
4.	" ...	1,435	162	4,561	1·88	35·62	8,575	35·535
9.	" ...	2,019	162	4,536	1·90	35·49	8,618	35·375
9.	" ...	2,019	162	4,536	1·87	35·49	8,482	35·375
11.	" ...	2,019	162	4,558	1·96	35·60	8,934	35·52
11.	" ...	2,019	162	4,558	1·93	35·60	8,797	35·52
14.	" ...	2,019	162	4,564	1·96	35·65	8,946	35·56
14.	" ...	2,019	162	4,564	1·95	35·65	8,900	35·56
16.	" ...	2,019	162	4,569	1·95	35·68	8,910	35·59
16.	" ...	2,019	162	4,569	1·94	35·68	8,864	35·59
20.	" ...	2,019	162	4,560	1·94	35·60	8,846	35·53
20.	" ...	2,019	162	4,560	1·90	35·60	8,663	35·53
23.	" ...	2,019	162	4,574	1·97	35·72	9,011	35·62
23.	" ...	2,019	162	4,574	1·91	35·72	8,736	35·62

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF WEST BRANCH WINNIPEG RIVER NEAR NORTH TUNNEL ISLAND, FOR 1915.
[Drainage area 26,400 square miles.]

Day	January Gauge Height (Feet)	January Dis-charge (Sec. ft.)	February Gauge Height (Feet)	February Dis-charge (Sec. ft.)	March Gauge Height (Feet)	March Dis-charge (Sec. ft.)	April Gauge Height (Feet)	April Dis-charge (Sec. ft.)	May Gauge Height (Feet)	May Dis-charge (Sec. ft.)	June Gauge Height (Feet)	June Dis-charge (Sec. ft.)
1	35·48	8,100	35·61	8,750	35·56	9,000	35·41	8,750	38·47	15,100	39·71	18,450
2	35·48	8,200	35·78	9,275	35·74	9,450	35·34	8,500	38·42	14,480	39·72	18,400
3	35·52	8,050	35·82	9,300	35·75	9,450	35·35	8,520	38·20	15,110	39·69	18,295
4	35·45	8,700	35·82	9,300	35·76	9,450	35·24	8,050	38·38	15,170	39·67	18,115
5	35·61	9,075	35·84	9,300	35·77	9,500	35·17	8,200	38·41	15,190	39·65	17,860
6	35·66	9,225	35·84	9,275	35·77	9,250	35·20	8,280	38·04	15,210	39·55	17,400
7	35·71	9,325	35·65	8,175	35·61	8,500	35·29	10,000	38·53	15,215	39·55	18,080
8	35·75	9,300	35·60	8,900	35·51	8,850	35·96	13,000	38·50	15,200	39·62	17,910
9	35·76	9,275	35·81	9,300	35·72	9,250	36·91	14,000	38·36	14,490	39·69	18,240
10	35·62	8,400	35·82	9,375	35·76	9,250	37·32	14,500	38·28	15,315	39·75	18,500
11	35·53	8,800	35·85	9,475	35·60	8,750	37·38	13,800	38·43	15,710	39·75	18,615
12	35·70	9,300	35·85	9,475	35·53	8,750	37·50	14,780	38·53	15,790	39·73	18,605
13	35·75	9,325	35·85	9,475	35·50	8,700	37·74	14,960	38·58	15,835	39·59	17,960
14	35·79	9,375	35·65	8,700	35·34	8,200	37·86	15,020	38·62	15,850	39·61	18,695
15	35·79	9,375	35·62	8,500	35·30	8,500	37·95	15,050	38·61	15,840	39·69	18,840
16	35·80	9,350	35·83	8,725	35·35	8,650	38·03	15,070	38·41	14,980	39·72	18,835
17	35·62	8,400	35·84	9,000	35·33	8,650	38·09	15,040	38·40	16,100	39·74	18,815
18	35·56	8,800	35·85	9,300	35·33	8,550	37·96	14,280	39·03	19,200	39·77	18,890
19	35·76	9,325	35·85	9,550	35·34	8,500	37·94	15,000	39·70	21,910	39·77	19,280
20	35·81	9,450	35·84	9,600	35·35	8,500	38·15	15,180	40·28	23,815	39·70	18,810
21	35·84	9,500	35·67	8,600	35·22	8,050	38·18	15,350	40·54	22,750	39·76	19,410
22	35·83	9,525	35·60	9,100	35·18	8,250	38·24	15,440	40·35	21,000	39·90	19,540
23	35·83	9,500	35·80	9,725	35·26	8,700	38·33	15,580	39·94	19,600	39·99	19,550
24	35·66	8,600	35·83	9,800	35·31	8,700	38·44	15,620	40·01	19,780	40·01	19,560
25	35·62	9,000	35·85	9,800	35·35	8,700	38·28	14,600	39·82	19,390	40·05	19,255
26	35·82	9,375	35·86	9,800	35·38	8,700	38·24	15,220	39·82	19,080	40·02	19,200
27	35·84	9,450	35·86	9,775	35·38	8,700	38·42	15,300	39·84	18,900	39·99	18,960
28	35·86	9,525	35·64	8,750	35·24	8,150	38·46	15,350	39·82	18,740	40·09	19,400
29	35·87	9,550	...	...	35·29	8,650	38·48	15,400	39·81	18,500	40·35	20,420
30	35·86	9,575	...	...	35·50	9,300	38·49	15,300	39·67	17,590	40·67	21,300
31	35·67	8,300	...	...	35·53	8,900	...	...	39·65	18,410	...	...

Day	July Gauge	July Dis	August Gauge	August Dis	September Gauge	September Dis	October Gauge	October Dis	November Gauge	November Dis	December Gauge	December Dis
1	40·92	22,500	41·53	23,715	37·00	12,010	36·30	10,205	35·65	8,640	35·67	8,680
2	40·98	23,100	41·47	24,290	37·09	12,320	36·16	9,260	35·63	8,680	35·66	8,690
3	41·09	23,595	41·56	24,340	37·10	12,350	35·83	8,300	35·64	8,700	35·67	8,675
4	41·09	23,515	41·53	24,350	37·05	12,360	35·62	9,115	35·66	8,590	35·65	8,615
5	41·17	23,790	41·51	24,260	36·94	11,490	35·84	9,205	35·66	8,815	35·37	8,050
6	41·20	23,905	41·49	24,235	36·78	11,985	35·91	9,200	35·65	8,770	35·28	8,445
7	41·29	24,000	41·47	24,215	36·93	12,080	35·87	9,195	35·63	8,600	35·51	8,530
8	41·40	24,080	41·38	23,550	36·97	12,045	35·85	9,190	35·64	8,685	35·51	8,525
9	41·45	24,440	41·30	24,100	36·96	11,990	35·84	9,205	35·69	8,760	35·49	8,555
10	41·48	24,535	41·14	22,640	36·97	11,910	35·62	8,305	35·72	9,100	35·55	8,700
11	41·40	23,905	41·04	22,310	36·94	11,900	35·55	9,000	35·70	9,120	35·56	8,845
12	41·36	24,145	40·99	22,190	36·78	10,890	35·69	9,120	35·70	9,160	35·57	8,890
13	41·44	24,160	40·97	22,485	36·70	11,500	35·73	9,150	35·67	8,980	35·60	8,905
14	41·41	24,140	40·98	24,755	36·84	11,695	35·74	9,160	35·65	8,730	35·67	8,910
15	41·40	24,100	40·89	22,105	36·92	11,860	35·74	9,130	35·69	8,790	35·69	8,905
16	41·39	24,190	40·79	22,300	36·95	11,915	35·73	8,980	35·71	8,760	35·73	8,890
17	41·37	24,105	40·83	22,180	36·95	11,805	35·52	8,215	35·72	8,790	35·77	8,880
18	41·28	23,495	40·79	21,300	36·93	11,400	35·51	9,010	35·73	8,770	35·77	8,830
19	41·26	23,810	40·74	20,000	36·75	10,510	35·61	9,140	35·73	8,690	35·70	8,725
20	41·38	23,750	40·55	17,000	36·66	11,405	35·61	9,105	35·72	8,590	35·66	8,760
21	41·33	23,780	39·91	14,000	36·77	11,600	35·62	8,950	35·69	8,500	35·73	8,820
22	41·31	23,675	39·07	13,490	36·86	11,795	35·66	8,840	35·69	8,570	35·74	8,825
23	41·29	23,610	38·66	13,590	36·88	11,710	35·66	8,715	35·69	8,480	35·74	8,855
24	41·27	23,995	38·35	13,400	36·85	11,655	35·71	8,745	35·67	8,515	35·69	8,850
25	41·37	23,815	38·02	13,200	36·89	11,605	35·69	8,800	35·67	8,630	35·42	7,910
26	41·45	24,680	37·58	11,550	36·71	10,390	35·69	8,450	35·67	8,715	35·15	8,375
27	41·57	24,960	37·41	11,490	36·63	11,510	35·65	8,550	35·65	8,660	35·45	8,695
28	41·65	25,245	37·24	11,405	36·84	11,590	35·70	8,650	35·62	8,520	35·59	8,800
29	41·69	25,300	37·07	11,300	36·88	11,500	35·71	8,740	35·63	8,590	35·64	8,830
30	41·68	25,220	37·08	11,345	36·73	11,000	35·71	8,760	35·65	8,605	35·72	8,860
31	41·65	24,700	36·98	11,380	...	...	35·67	8,795	...	...	35·74	8,890

NOTE.—Gauge heights are those read at the Keewatin River Bridge gauge.

Monthly Discharge of West Branch Winnipeg River Near North Tunnel Island for 1915.

[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.
January................	9,575	8,050	9,066	....	....	557,400
February...............	9,800	8,175	9,218	....	....	511,900
March.................	9,500	8,150	8,790	....	....	540,500
April..................	15,620	8,050	13,438	....	....	799,700
May...................	23,815	14,480	17,395	....	....	1,069,500
June..................	21,300	17,400	18,840	....	....	1,267,400
July..................	25,300	22,500	24,072	....	....	1,480,100
August................	24,755	11,300	19,112	....	....	1,175,100
September.............	12,360	10,390	11,659	....	....	693,700
October...............	10,205	8,215	8,941	....	....	549,800
November.............	9,160	8,480	8,717	....	....	518,700
December.............	8,910	7,910	8,700	....	....	534,900
The Year..........	25,300	7,910	13,162	....	....	9,698,700

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

SESSIONAL PAPER No. 25f

COMBINED DISCHARGE OF WINNIPEG RIVER BELOW LAKE OF THE WOODS OUTLETS, FOR 1915.

[Drainage area 26,400 square miles.]

Day.	January Gauge Height.	January Dis-charge.	February Gauge Height.	February Dis-charge.	March Gauge Height.	March Dis-charge.	April Gauge Height.	April Dis-charge.	May Gauge Height.	May Dis-charge.	June Gauge Height.	June Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1		8,943		9,918		9,905		9,434		15,917		19,384
2		9,076		10,462		10,496		9,148		15,125		19,322
3		8,883		10,331		10,476		9,436		16,131		19,204
4		9,545		10,429		10,436		8,683		16,259		19,018
5		9,912		10,463		10,615		9,079		16,282		18,782
6		10,265		10,265		10,256		9,155		16,313		18,086
7		10,408		8,903		9,178		10,880		16,122		18,931
8		10,358		10,058		9,963		13,877		16,122		18,870
9		10,302		10,374		10,365		15,016		15,140		19,167
10		9,181		10,502		10,348		15,396		15,974		19,437
11		9,840		10,479		9,681		14,433		16,385		19,522
12		10,322		10,613		9,675		15,627		16,574		19,508
13		10,488		10,427		9,586		15,852		16,647		18,638
14		10,444		9,398		8,870		16,056		16,742		19,385
15		10,454		9,607		9,164		16,099		16,739		19,535
16		10,386		9,724		9,309		16,141		15,640		19,538
17		9,201		10,099		9,309		15,940		16,889		19,527
18		9,818		10,390		9,214		14,922		20,115		19,814
19		10,486		10,620		9,179		16,085		22,978		20,143
20		10,631		10,573		9,187		16,317		24,792		19,483
21		10,716		9,289		8,724		16,470		23,914		20,128
22		10,738		10,119		8,924		16,567		21,904		20,280
23		10,621		10,816		9,371		16,703		20,294		20,409
24		9,432		10,752		9,390		16,537		20,904		20,462
25		10,215		10,891		9,667		15,260		20,362		19,971
26		10,528		10,910		9,667		16,338		20,022		19,908
27		10,709		10,738		9,495		16,416		19,822		19,639
28		10,777		9,433		8,829		16,478		19,678		20,232
29		10,770				9,527		16,502		19,382		21,347
30		10,767				9,999		16,452		18,279		22,246
31		9,038				9,781				19,259		

Day	July.	August.	September.	October.	November.	December
1	23,220	24,457	12,654	11,356	10,095	10,215
2	24,078	25,298	12,971	10,229	10,154	10,232
3	24,511	25,192	12,992	8,961	10,162	10,229
4	24,243	25,126	13,028	10,246	10,093	10,115
5	24,679	25,031	12,111	10,582	10,283	8,878
6	24,886	25,006	12,608	10,599	10,274	9,682
7	24,934	25,074	12,716	10,657	9,404	9,798
8	25,076	24,542	12,724	10,629	9,827	9,286
9	25,442	24,918	12,700	10,632	9,822	9,629
10	25,464	23,399	12,641	9,051	10,085	10,237
11	24,635	23,070	12,619	10,207	10,541	10,390
12	24,963	22,940	11,529	10,541	10,089	9,934
13	24,932	23,238	12,384	10,583	10,529	10,444
14	24,928	25,502	12,627	10,563	9,826	10,488
15	24,887	22,822	12,788	10,543	10,347	10,471
16	24,949	23,053	12,851	10,401	10,313	10,375
17	25,094	22,928	12,756	8,947	10,314	10,442
18	24,217	22,058	12,347	10,142	10,285	10,408
19	24,726	20,750	11,161	9,803	10,180	9,625
20	24,744	14,755	12,605	10,124	10,128	9,820
21	24,556	14,726	12,572	10,372	9,649	10,326
22	24,426	14,169	12,940	10,266	10,054	10,356
23	24,583	14,303	12,626	10,130	9,998	10,399
24	24,749	14,105	12,796	10,138	10,024	9,701
25	24,542	13,888	12,574	10,224	10,090	8,679
26	25,655	12,229	11,058	9,911	10,227	9,118
27	25,743	12,162	12,673	9,970	10,155	10,042
28	26,246	12,049	12,783	10,090	9,364	10,332
29	26,276	11,936	12,707	10,136	9,873	10,384
30	26,004	11,994	12,018	10,179	10,118	10,431
31	25,711	12,035		9,803		10,454

COMBINED MONTHLY DISCHARGE OF WINNIPEG RIVER BELOW LAKE OF THE WOODS OUTLETS, FOR 1915.

[Drainage area 26,400 square miles.]

MONTH	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches of Drainage Area.	Total in acre-feet.
January..................	10,777	8,843	10,105	0·383	0·442	621,300
February.................	10,910	8,903	10,235	0·388	0·404	568,400
March...................	10,615	8,724	9,632	0·365	0·421	592,300
April....................	16,703	8,683	14,377	0·545	0·608	855,500
May.....................	24,792	15,125	18,281	0·692	0·798	1,124,100
June....................	22,246	18,086	19,664	0·745	0·831	1,170,100
July....................	26,276	23,220	24,939	0·945	1·090	1,533,400
August..................	25,502	11,936	19,863	0·752	0·867	1,221,400
September...............	13,028	11,058	12,519	0·474	0·529	744,900
October.................	11,356	8,947	10,194	0·386	0·445	626,800
November................	10,541	9,364	10,077	0·382	0·426	599,600
December................	10,486	8,679	10,030	0·380	0·438	616,700
The Year..........	26,276	8,679	14,160	0·536	7·299	10,274,500

DISCHARGE MEASUREMENTS OF WINNIPEG RIVER AT CONTROL No. 1, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
May 18...	C. C. McLennan....	1,814	219	1,690	0·84	38·46	1,416
19...	"	1,814	219	1,814	1·22	39·04	2,205
20...	T. J. Moore........	1,467	228	1,914	1·27	39·50	2,438

DISCHARGE MEASUREMENTS OF CONTROL No. 3 AT LAKE OF THE WOODS OUTLETS, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
May 19...	M. S. Madden.....	1,469	68·5	649	4·68	1,039·42	3,033
19...	"	1,469	68·5	649	4·99	1,039·42	3,227
20...	A. Pirie..........	1,939	68·5	670	5·38	1,039·78	3,606

DISCHARGE MEASUREMENTS OF CONTROL No. 4 AT LAKE OF THE WOODS OUTLETS, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
May 19...	A. Pirie..........	1,939	146	2,218	4·73	1,039·35	10,553
19...	"	1,939	146	2,218	4·80	1,039·28	10,640
20...	"	1,939	147	2,308	5·12	1,039·82	11,811

DISCHARGE MEASUREMENTS OF CONTROL NO. 5 AT LAKE OF THE WOODS OUTLETS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
May 19...	M. S. Madden.....	1,469	145	1,955	3·55	1,038·72	6,945
20...	"	1,469	150·7	2,121	3·72	1,039·32	7,898

WINNIPEG RIVER AND TRIBUTARIES.

WINNIPEG RIVER.

The Winnipeg river is one of the most important in the province of Manitoba, forming the source of a power supply for the city of Winnipeg. It joins Lake of the Woods to lake Winnipeg flowing in a westerly direction. The drainage area of this river is 53,500 square miles above the mouth. The basin has all the characteristics of the Laurentian formation, being dotted with lakes, ponds and muskegs. A considerable portion of the basin is composed of lake areas the size of which range between a few square miles up to 1,500 square miles, the latter being the surface area of the Lake of the Woods. The country drained is rough and more or less timbered. The upper part of the area has been lumbered to a considerable extent and still affords a field for such industry.

The river itself is of considerable proportions, and its characteristics are lake-like expanses joined by short stretches of swift water or falls. On account of these features splendid opportunity is offered for the development of water power. At the present time advantage has been taken of these possibilities in two cases, and developments are to be found at Point du Bois, where the city of Winnipeg has a municipally owned and operated plant, and on the Pinawa Channel where the plant of the Winnipeg Electric Railway Company is in operation. A number of other sites are capable of economic development and it has been estimated that a total output of approximately 420,000 continuous 24 hour horsepower is available from this river within the province of Manitoba from the regulated river.

In consequence of the importance of this river a number of stations at which records of discharge have been obtained have been established. They are as follows:—

1. The Dalles.
2. Throat Rapids.
3. Minaki.
4. Whitedog Rapids.
5. Slave Falls.
6. Otter Falls.
7. Pinawa Channel.
8. Grand du Bonnet Falls.

At some of these points continuous discharges are not available, the records being confined to a few isolated meterings.

TRIBUTARIES.

The tributaries of the Winnipeg river are, with one exception, of minor importance, having for the most part small drainage areas. This exception is the English river with a drainage area of 21,500 square miles, entering the Winnipeg from the north just within the province of Ontario. The other tributaries of the Winnipeg river are the Whiteshell river which joins the main river in the lake-like expanse known as Jessie lake, the Whitemouth which enters just below the Seven Sisters rapids and the Bird river which flows into Lac du Bonnet.

Of these tributaries, the Whitemouth is the only one for which daily records of discharge are available.

WINNIPEG RIVER AT MINAKI.

HISTORY.

The station was established by C. O. Allen on September 23, 1913.   Later it was abandoned for the Whitedog station, difficulty being experienced in operating the station under winter conditions.

LOCATION OF SECTION.

The section is located on the downstream side of the G.T.P. Railway bridge ¾ mile east of the Minaki station and ¼ mile downstream from the Holst Point Hotel.   The I.P. is marked by three spikes driven in the guard rail at the west end of the bridge on the downstream side.

RECORDS AVAILABLE.

A daily gauge height record has been kept since September 24, 1913.   A number of meterings have been taken but there is not sufficient data to construct a rating curve for the station.

DRAINAGE AREA.

The drainage area above Minaki is 27,000 square miles.

GAUGE.

A vertical staff gauge 6 feet long is fastened to a plank which is spiked to crib work a the east end of the bridge and is 30 feet downstream from the section   It is referred to three B.M.'s set to W.P.S. datum.

CHANNEL.

It is straight for 500 feet above the station and 1,000 feet below.   The channel is divided by a pier of the bridge which stands in the river about 65 feet from the east shore.   The stream is moderately swift but the bed of the stream is not liable to shift.   It is confined to the two channels under all stages.

DISCHARGE MEASUREMENTS.

They are made from the bridge deck, the intervals being marked on the guard rail.

ACCURACY.

The channel forms a connecting link or strait between two lake-like expanses; on this account the discharge does not always bear the same relation to gauge heights, the ponding effect below being noticeable.   A discharge curve for the station has not been constructed.

WHITEDOG FALLS, NORTH AND SOUTH CHANNELS.

HISTORY.

On May 18, 1914, a metering station was established on the South channel at Whitedog falls by S. C. O'Grady. This station was operated as a boat station until the end of July 1915, when the section was moved upstream approximately 100 feet and a cable station installed.

On May 23, 1914, a cable carrier station was established on the North channel of Whitedog falls, since which date this station has been in operation.

LOCATION OF SECTION.

The section on the South channel is located about 900 feet above the second falls and is reached either by canoe and a short portage at the first falls or by the road and trail on the large island, leading from the H.B. Co. old warehouse at the head of the first falls.

The I.P. is a cross and circle painted on the rock at the base of the tower and marked "I.P." with white paint.

The section on the North channel is located about 20 feet above the head of the first falls. The I.P. is a white arrow painted on the solid rock on the right bank of the channel.

RECORDS AVAILABLE.

The discharge measurements were taken since the establishment of the stations and are referred to the gauge at Minaki which has been operated since September 24, 1913. Daily discharge records are available since that date. The discharges of these stations must be combined to give the total discharge of the Winnipeg river at that point.

DRAINAGE AREA.

The drainage area above the section is 27,500 square miles.

GAUGE.

The gauge on the South channel is a vertical staff gauge bolted to the rock on the left bank, eighty feet below the section; it reads direct.

On the North channel a vertical staff gauge is bolted to the rock on the right bank about forty feet above the section; it is referred to B.M. placed in the solid rock across the stream at the head of the portage. Owing to the impossibility of getting a gauge reader at these sections, all meterings are referred to the gauge at Minaki, which has been read daily since September, 1913.

In August of 1915, a Gurley Water Stage Register with printed record, was set in place at the head of these falls and the records as obtained by this register are available.
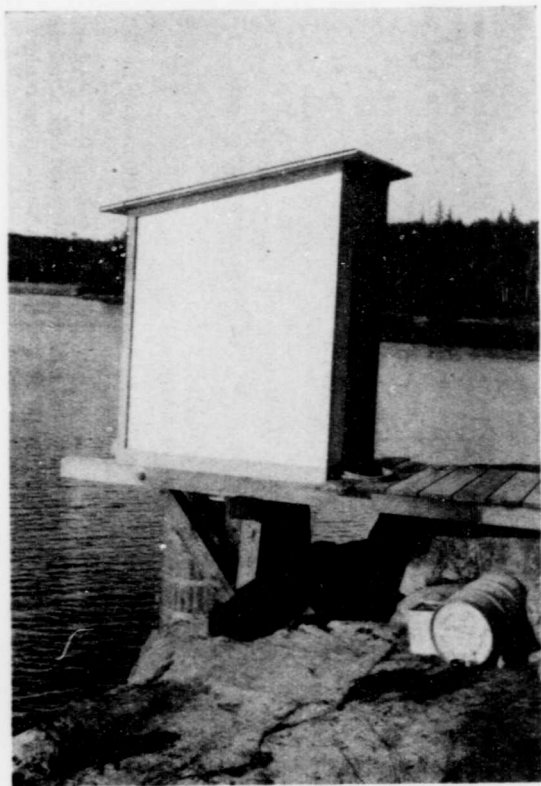
Taken by M. C. Hendry.
WINNIPEG RIVER—WHITEDOG FALLS—
AUTOMATIC GAUGE HOUSE.

Taken by W. J. Ireland.
WINNIPEG RIVER—WHITEDOG FALLS—CABLE STATION—
SOUTH CHANNEL.

CHANNEL.

The South channel is approximately 400 feet wide and is composed of rock and not subject to shifting, the control for the section being the crest of the falls 900 feet below. The banks are high enough to ensure that under flood conditions no overflow will occur. The channel is straight and free from eddies under nearly all conditions.

The North channel is much narrower. It is also composed of clay and solid rock and free from likelihood of shifting, the control being 50 feet below. The channel is straight both above and below the section for a sufficient distance to ensure freedom from eddies.

DISCHARGE MEASUREMENTS.

Sufficient meterings have been made to define the discharge curve over a range of 3'0 feet. Forty-six in all have been taken on the North channel, while thirty-five have been taken on the South channel.

ACCURACY.

The discharge curve is well defined between gauge heights 1033 and 1036 W.P.S datum; above and below those heights the curve is only fairly well defined.
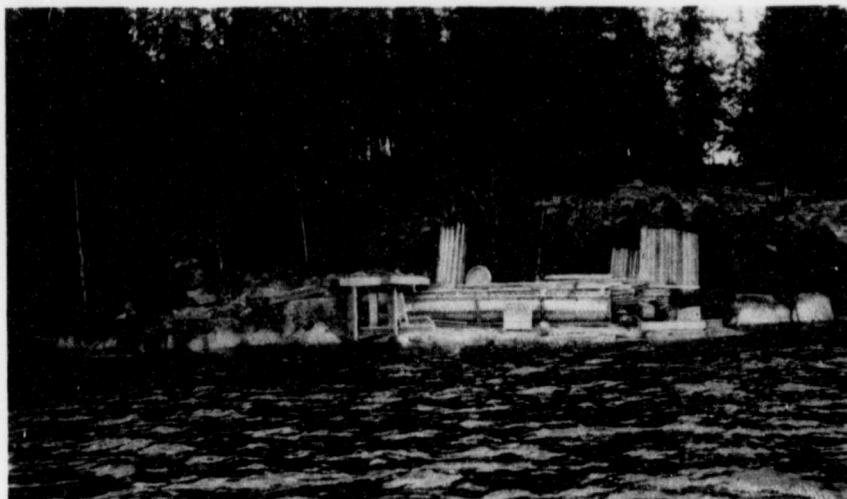
Taken by W. J. Ireland.
WINNIPEG RIVER—WHITEDOG FALLS—TIMBER SUPPORT FOR AUTOMATIC GAUGE.

DISCHARGE MEASUREMENTS OF WINNIPEG RIVER NEAR WHITEDOG FALLS, NORTH CHANNEL, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.	
Feb. 22.	S. C. O'Grady....	1,718	39	207	1·90	32·94	393	
22.	"	1,718	39	207	1·87	32·94	387	
June 4.	"	1,718	46	310	3·29	35·27	1,020	
Aug. 13.	W. J. Ireland....	1,939	41	347	3·69	36·13	1,281	Automatic Gauge. 1,035·95
19.	"	1,939	41	316	3·55	35·96	1,121	1,035·79

WINNIPEG RIVER—WHITEDOG FALLS—CABLE STATION— SOUTH CHANNEL.

Taken by M. C. Heaney. WINNIPEG RIVER—WHITEDOG FALLS— AUTOMATIC GAUGE HOUSE.

DAILY GAUGE HEIGHT AND DISCHARGE OF WINNIPEG RIVER NEAR NORTH CHANNEL, WHITEDOG FALLS, FOR 1915.

[Drainage area 27,500 square miles.]

Day	January Gauge Height (Feet)	January Discharge (Sec. ft.)	February Gauge Height	February Discharge	March Gauge Height	March Discharge	April Gauge Height	April Discharge	May Gauge Height	May Discharge	June Gauge Height	June Discharge
1											35·39	995
2											35·37	990
3											35·38	993
4											35·37	990
5											35·37	990
6											35·43	1,006
7											35·33	979
8											35·29	968
9											35·34	982
10											35·36	987
11											35·43	1,006
12											35·38	993
13											35·37	990
14											35·32	976
15											35·37	990
16											35·34	982
17											35·39	995
18									34·66	798	35·41	1,001
19									34·98	885	35·39	995
20									35·34	982	35·39	995
21									35·42	1,003	35·42	1,003
22					390				35·47	1,017	35·41	1,001
23									35·47	1,017	35·44	1,009
24									35·49	1,022	35·45	1,011
25									35·48	1,020	35·49	1,022
26									35·46	1,014	35·52	1,030
27									35·46	1,014	35·42	1,003
28									35·46	1,014	35·46	1,014
29									35·45	1,011	35·49	1,022
30									35·45	1,011	35·52	1,030
31									35·44	1,009		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	35·58	1,047	36·46	1,284	34·85	849	33·53	498	32·97	352	32·98	355
2	35·71	1,082	36·43	1,276	34·69	806	33·49	487	32·96	350	32·99	357
3	35·92	1,138	36·41	1,271	34·46	744	33·45	477	32·96	350	32·99	357
4	35·94	1,144	36·40	1,268	34·25	687	33·38	459	32·96	350	32·99	357
5	36·00	1,160	36·40	1,268	34·20	674	33·34	448	32·96	347	32·96	350
6	36·21	1,217	36·38	1,263	33·76	558	33·25	425	32·96	350	32·94	344
7	36·41	1,271	36·36	1,257	33·78	563	33·19	409	32·99	357	32·93	342
8	36·46	1,284	36·32	1,246	33·81	571	33·16	402	33·03	368	32·92	339
9	36·34	1,252	36·28	1,236	33·66	532	33·12	391	33·06	376	32·91	337
10	36·26	1,230	36·16	1,203	33·66	532	33·09	383	33·08	381	32·92	339
11	36·30	1,241	36·14	1,198	33·66	532	33·05	373	33·10	386	32·93	342
12	36·34	1,252	36·13	1,195	33·66	532	33·04	370	33·09	383	32·93	342
13	36·37	1,260	36·06	1,176	33·66	532	33·04	370	33·07	378	32·94	344
14	36·37	1,260	36·04	1,171	33·63	524	33·03	368	33·06	376	32·94	344
15	36·36	1,257	36·04	1,171	33·63	524	33·02	365	33·05	373	32·95	347
16	36·38	1,263	36·04	1,171	33·63	524	33·02	365	33·04	370	32·98	355
17	36·34	1,252	36·02	1,165	33·63	524	33·01	363	33·03	368	32·99	357
18	36·33	1,249	36·02	1,165	33·63	524	32·99	357	33·03	368	32·98	355
19	36·31	1,244	36·01	1,163	33·61	519	32·98	355	33·02	365	32·99	357
20	36·30	1,241	36·00	1,160	33·61	519	32·96	350	33·03	368	33·00	360
21	36·32	1,246	35·99	1,157	33·61	519	32·94	344	33·02	365	33·00	360
22	36·31	1,244	35·98	1,155	33·61	519	32·93	342	33·01	363	33·00	360
23	36·30	1,241	35·75	1,092	33·58	511	32·92	339	33·01	363	33·00	360
24	36·29	1,238	35·71	1,082	33·58	511	32·95	347	33·00	360	33·00	360
25	36·22	1,219	35·61	1,055	33·58	511	32·95	347	32·99	357	33·00	360
26	36·27	1,233	35·52	1,030	33·57	508	32·96	350	32·99	357	32·97	352
27	36·29	1,238	35·46	1,014	33·57	508	32·96	350	32·98	355	32·94	344
28	36·33	1,249	35·42	1,003	33·57	508	32·97	352	32·98	355	32·92	339
29	36·38	1,263	35·29	968	33·56	506	32·97	352	32·97	352	32·91	337
30	36·43	1,276	35·17	396	33·56	506	32·97	352	32·97	352	32·92	339
31	36·44	1,279	35·04	901			32·98	355			32·94	344

MONTHLY DISCHARGE OF WINNIPEG RIVER AT NORTH CHANNEL, WHITEDOG FALLS, FOR 1915.

[Drainage area 26,500 square miles.]

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches of Drainage Area.	Total in acre-feet.
January			[1]330			20,300
February			[1]370			20,500
March			[1]380			23,400
April			[1]450			26,800
May			[1]700			43,000
June	1,030	976	998			59,400
July	1,284	1,047	1,228			75,500
August	1,284	901	1,152			79,800
September	849	506	563			33,500
October	498	339	382			23,500
November	386	347	363			21,600
December	360	337	350			21,500
The Year	1,284		605			439,800

NOTE.—Marked thus ([1]) Estimated. Discharge per square mile and Run-off Depth in inches omitted. The channel is one of two of the river, at this point.

DISCHARGE MEASUREMENTS OF WINNIPEG RIVER NEAR WHITEDOG FALLS, SOUTH CHANNEL FALLS, FOR 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per Sec.	Feet.	Sec. ft.	
Feb. 21	S. C. O'Grady	1,718	327	6,321	1·53	27·77	9,706	
21	"	1,718	327	6,321	1·54	27·77	9,723	
June 3	"	1,718	351	7,385	2·52	30·89	18,591	
Aug. 9	W. J. Ireland	1,939	373	9,109	2·51	32·03	22,934	
								Automatic Gauge New.
18	"	1,939	373	8,958	2·38	31·63	21,286	1,035·79
23	"	1,939	373	8,751	2·17	31·12	18,942	1,035·33

DAILY GAUGE HEIGHT AND DISCHARGE OF WINNIPEG RIVER AT SOUTH CHANNEL, WHITEDOG FALLS, FOR 1915.

[Drainage area 27,500 square miles.]

Day	January Gauge Height	January Discharge	February Gauge Height	February Discharge	March Gauge Height	March Discharge	April Gauge Height	April Discharge	May Gauge Height	May Discharge	June Gauge Height	June Discharge
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1											35·39	18,981
2											35·37	18,893
3											35·38	18,937
4											35·37	18,893
5											35·37	18,893
6											35·43	19,157
7											35·33	18,717
8											35·29	18,541
9											35·34	18,761
10											35·36	18,849
11											35·43	19,157
12											35·38	18,937
13											35·37	18,893
14											35·32	18,673
15											35·37	18,893
16											35·34	18,761
17											35·39	18,981
18										34·66	15,769	35·41	19,069
19										34·98	17,177	35·39	18,981
20										35·34	18,761	35·39	18,981
21				9,715						35·42	19,113	35·42	19,113
22										35·47	19,333	35·41	19,069
23										35·47	19,333	35·44	19,201
24										35·49	19,421	35·45	19,245
25										35·48	19,377	35·49	19,421
26										35·46	19,289	35·52	19,553
27										35·46	19,289	35·42	19,113
28										35·46	19,289	35·49	19,289
29										35·45	19,245	35·49	19,421
30										35·45	19,245	35·52	19,553
31										35·44	19,201		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	35·58	19,817	36·46	23,689	34·85	16,605	33·53	11,355	32·97	9,560	32·98	9,590
2	35·71	20,389	36·43	23,557	34·69	15,901	33·49	11,218	32·96	9,530	32·99	9,620
3	35·92	21,313	36·41	23,469	34·46	14,889	33·45	11,087	32·96	9,530	32·99	9,620
4	35·94	21,401	36·40	23,425	34·25	14,025	33·38	10,860	32·96	9,530	32·99	9,620
5	36·00	21,665	36·40	23,425	34·20	13,825	33·34	10,730	32·95	9,500	32·96	9,530
6	36·21	22,589	36·38	23,337	33·76	12,160	33·25	10,437	32·96	9,530	32·94	9,470
7	36·41	23,469	36·36	23,249	33·78	12,230	33·19	10,243	32·99	9,620	32·92	9,440
8	36·46	23,689	36·32	23,073	33·81	12,338	33·16	10,145	33·03	9,740	32·92	9,410
9	36·34	23,161	36·28	22,897	33·66	11,810	33·12	10,015	33·06	9,830	32·91	9,380
10	36·26	22,809	36·16	22,369	33·66	11,810	33·09	9,920	33·08	9,890	32·92	9,410
11	36·30	22,985	36·14	22,281	33·66	11,810	33·05	9,800	33·10	9,950	32·93	9,440
12	36·34	23,161	36·13	22,237	33·66	11,810	33·04	9,770	33·09	9,920	32·93	9,440
13	36·37	23,293	36·06	21,929	33·66	11,810	33·04	9,770	33·07	9,860	32·94	9,470
14	36·37	23,293	36·04	21,841	33·63	11,705	33·03	9,740	33·06	9,830	32·94	9,470
15	36·36	23,249	36·04	21,841	33·63	11,705	33·02	9,710	33·05	9,800	32·95	9,500
16	36·38	23,337	36·04	21,841	33·63	11,705	33·02	9,710	33·04	9,770	32·98	9,590
17	36·34	23,161	36·02	21,753	33·63	11,705	33·03	9,680	33·03	9,740	32·98	9,620
18	36·33	23,117	36·02	21,753	33·63	11,705	32·99	9,620	33·03	9,740	32·98	9,590
19	36·31	23,029	36·01	21,709	33·61	11,635	32·99	9,590	33·02	9,710	32·99	9,620
20	36·30	22,985	36·00	21,665	33·61	11,635	32·96	9,530	33·03	9,740	33·00	9,650
21	36·32	23,073	35·99	21,621	33·61	11,635	32·94	9,470	33·02	9,710	33·00	9,650
22	36·31	23,029	35·98	21,577	33·61	11,635	32·93	9,440	33·01	9,680	33·00	9,650
23	36·30	22,985	35·75	20,565	33·58	11,530	32·92	9,410	33·01	9,680	33·00	9,650
24	36·29	22,941	35·71	20,389	33·58	11,530	32·95	9,500	33·00	9,650	33·00	9,650
25	36·22	22,633	35·61	19,949	33·58	11,530	32·95	9,500	32·99	9,620	33·00	9,650
26	36·27	22,853	35·52	19,553	33·57	11,495	32·96	9,530	32·99	9,620	32·97	9,560
27	36·29	22,941	35·46	19,289	33·47	11,495	32·96	9,530	32·98	9,590	32·94	9,470
28	36·33	23,117	35·42	19,113	33·57	11,495	32·97	9,560	32·98	9,590	32·91	9,410
29	36·38	23,337	35·29	18,541	33·56	11,460	32·97	9,560	32·97	9,560	32·91	9,380
30	36·43	23,557	35·17	18,013	33·56	11,460	32·97	9,560	32·97	9,560	32·92	9,410
31	36·44	23,601	35·04	17,441			32·98	9,590			32·94	9,470

Monthly Discharge of Winnipeg River at South Channel, Whitedog Falls, for 1915.

[Drainage area 27,500 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
January	....	....	[1]9,500	....	....	584,100
February	....	....	[1]9,650	....	....	536,000
March	....	....	[1]9,700	....	....	596,400
April	....	....	[1]10,000	....	....	595,000
May	....	....	[1]15,000	....	....	922,400
June	19,553	18,541	19,031	....	....	1,132,400
July	23,689	19,817	22,774	....	....	1,400,300
August	23,689	17,441	21,496	....	....	1,321,800
September	16,605	11,460	12,269	....	....	730,100
October	11,355	9,410	9,922	....	....	610,100
November	9,950	9,500	9,686	....	....	576,400
December	9,650	9,380	9,530	....	....	586,000
The Year	23,689	....	13,213	....	....	9,591,000

NOTE.—Marked thus ([1]) Estimated. Discharge per square mile and Run-off Depth in inches omitted. The channel is one of two of the river at this point.

Monthly Discharge of Winnipeg River Near Whitedog Falls, for 1915.

[Drainage area 27,500 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.
January	....	....	[1] 9,830	0·321	0·370	604,400
February	....	....	[1] 10,020	0·364	0·379	556,500
March	....	....	[1] 10,080	0·367	0·423	619,800
April	....	....	[1] 10,450	0·380	0·424	621,800
May	....	....	[1] 15,700	0·571	0·658	965,400
June	20,583	19,517	20,029	0·728	0·812	1,191,800
July	24,973	20,864	24,002	0·873	1·007	1,475,800
August	24,973	18,342	22,648	0·824	0·950	1,392,600
September	17,454	11,966	12,832	0·467	0·521	763,600
October	11,853	9,749	10,304	0·375	0·432	633,600
November	10,336	9,847	10,049	0·365	0·407	598,000
December	10,010	9,717	9,880	0·359	0·414	607,500
The Year	24,973	....	13,819	0·500	6·797	10,030,800

NOTE.—Marked thus ([1]) Estimated. This table gives the total combined discharges, Run-off, etc., for the North and South Channels at Whitedog Falls.

WINNIPEG RIVER AT SLAVE FALLS.

HISTORY.

A number of meterings of the Winnipeg river were made by various interested parties between March, 1906, and October, 1911. These have all been referred to gauge heights in the tailrace of the City of Winnipeg Plant at Point du Bois, though they were taken at various points on the river. On October 1, 1911, a metering station was established at Slave falls by D. L. McLean. This is a cable station and has been operated on all measurements taken at this point since the above date. All meterings to the end of 1914 are referred to the gauge in the tailrace at Point du Bois.

In June of 1915 a Gurley automatic water stage register was established above Slave falls. A relation between this gauge and the Point du Bois tailrace gauge has been obtained and all records for this station for the year 1915 refer to the stage at Slave falls.

LOCATION OF SECTION.

The metering section is located about two hundred and fifty feet above the crest of the Slave falls, which is about four miles below the City of Winnipeg's plant at Point du Bois. The I.P. is a chisel mark on the rock marked by paint, on the right bank near the cable carrier.
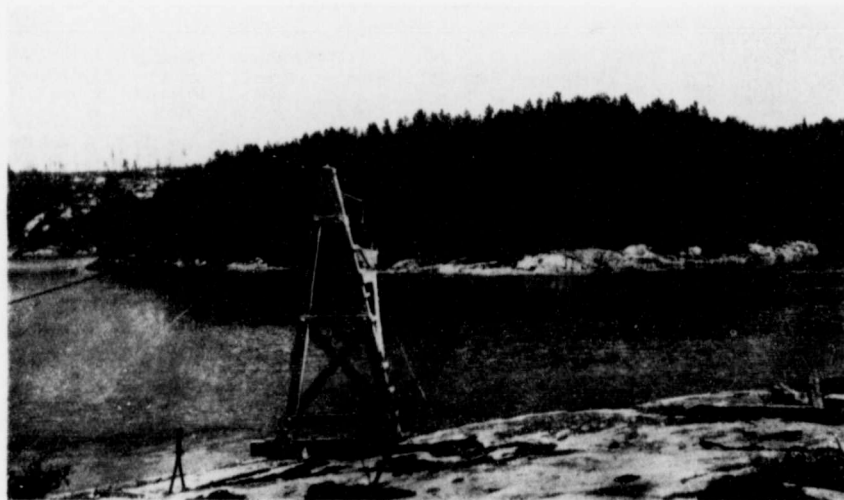
Taken by W. J. Ireland.

WINNIPEG RIVER—SLAVE FALLS—NEW TOWERS FOR METERING STATION.

By
daily di

The
area is

A
on the r
twenty
The
meter s
rock abe

The
below th
left side

Dis
stage rec
a car tra

The
to the Sl
station t
all seaso
favorabl

25f—5½

Taken by W. J. Ireland.

WINNIPEG RIVER—SLAVE FALLS—AUTOMATIC GAUGE HOUSE.

RECORDS AVAILABLE.

By referring the meterings made to the Point du Bois gauge, continuous records of daily discharge have been computed from January of 1907 to the end of 1915.

DRAINAGE AREA.

The drainage area above Otter falls is 50,500 square miles, and above Slave falls the area is 49,700 square miles.

GAUGE.

A vertical staff gauge is located about seventy-five feet downstream from the section on the right bank. This gauge is referred to B.M. 189 A; a rock bench mark situated about twenty feet from the gauge.

The automatic gauge referred to above is located about four hundred feet above the meter section on the left bank, and is referenced to a brass cap bench mark bolted to the rock about thirty feet upstream from the gauge house.

CHANNEL.

The channel is straight for one hundred feet above and one hundred and fifty feet below the gauge at nearly all stages. The bed is of solid rock with a few large boulders at the left side of the section. It is permanent and all the water at all stages is confined to the section.

DISCHARGE MEASUREMENTS.

Discharge measurements have been taken covering practically the complete range in stage recorded since the establishment of the station. These measurements are made from a car travelling on a cable spanning the river at the section.

ACCURACY.

The discharge curve is well defined over the range in gauge height, both when plotted to the Slave falls and Point du Bois gauges. On account of the drop at the falls below the station there is no possibility of backwater effect. Also the section is an open water one at all seasons, so that the open water rating applies the year round. The section is a very favorable one and the accuracy of the records is high.

Taken by W. J. Ireland.

Winnipeg River—Slave Falls—Putting Wood Casing on Well for Automatic Gauge.

Date.
Feb. 19
20
April 26
June 15
July 15
16
17
24
26
31
Aug. 2
3
4
5
6
7
17
18
19
20
21
24
25
26
27
28
30
31
Sept. 1
4
6
7
9
10
16
17
Oct. 29

SESSIONAL PAPER No. 25f

DISCHARGE MEASUREMENTS OF WINNIPEG RIVER AT SLAVE FALLS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.	
								Automatic Gauge.	Point du Bois Tailrace Gauge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	Sec. ft.	
Feb. 19.	M. S. Madden...	1,462	255	6,410	2·70	18·20	17,287	918·40	929·21
20.	" ...	1,462	255	6,410	2·70	18·15	17,296	918·26	929·13
April 26.	A. Pirie.........	1,939	267	7,020	3·23	19·97	22,669	920·11	930·23
June 15.	W. J. Ireland....	1,939	278	7,653	4·11	22·57	31,467	922·75	931·80
July 15.	E. B. Patterson..	1,919	295	8,063	4·59	23·63	37,008	923·96	932·50
16.	" ...	1,919	295	8,075	4·58	23·67	36,986	923·95	932·50
17.	"	1,919	295	8,058	4·59	23·61	36,986	923·92	932·50
24.	"	1,919	295	8,043	4·53	23·56	36,437	923·96	932·58
26.	"	1,919	295	8,079	4·59	23·68	37,081	923·98	932·59
31.	"	1,919	295	8,058	4·45	23·61	35,858	923·91	932·53
Aug. 2.	"	1,919	295	8,095	4·61	23·74	37,319	924·02	932·55
3.	"	1,919	295	8,070	4·62	23·65	37,284	923·94	932·58
4.	"	1,919	295	8,061	4·59	23·62	37,002	923·89	932·55
5.	"	1,919	295	8,061	4·61	23·60	37,159	923·88	932·53
6.	"	1,919	295	8,061	4·57	23·60	36,837	923·88	932·50
7.	"	1,919	295	8,061	4·55	23·61	36,678	923·89	932·53
17.	"	1,919	294	7,978	4·50	23·34	35,903	923·64	932·35
18.	"	1,919	294	7,947	4·47	23·23	35,523	923·51	932·28
19	"	1,919	294	7,935	4·47	23·19	35,472	923·48	932·18
20.	"	1,919	294	7,918	4·42	23·13	34,999	923·39	932·15
21.	"	1,919	294	7,896	4·40	23·05	34,744	923·32	932·10
24.	"	1,919	292	7,825	4·31	22·81	33,725	923·06	931·88
25.	"	1,919	292	7,791	4·28	22·70	33,346	922·94	931·83
26.	"	1,919	291	7,743	4·22	22·54	32,675	922·79	931·75
27.	"	1,919	290	7,675	4·12	22·30	31,622	922·53	931·58
28.	"	1,919	290	7,637	4·06	22·16	31,005	922·35	931·43
30.	"	1,919	288	7,514	3·93	21·72	29,532	921·93	931·15
31.	"	1,919	287	7,427	3·78	21·41	28,075	921·59	931·08
Sept. 1.	"	1,919	272	7,370	3·70	21·21	27,270	921·37	930·93
4.	"	1,919	270	7,235	3·56	20·71	25,756	920·87	930·68
6.	"	1,919	270	7,181	3·47	20·51	24,919	920·67	930·53
7.	"	1,919	269	7,172	3·46	20·48	24,816	920·63	930·61
9.	"	1,919	269	7,137	3·41	20·35	24,339	920·48	930·56
10.	"	1,919	268	7,108	3·37	20·24	23,954	920·37	930·43
16.	"	1,919	265	7,035	3·27	19·97	23,005	920·11	930·23
17.	"	1,919	264	7,008	3·21	19·87	22,497	919·99	930·25
Oct. 29.	W. J. Ireland....	1,940	261	6,787	2·92	19·02	19,819	919·12	929·73

DAILY GAUGE HEIGHT AND DISCHARGE OF WINNIPEG RIVER AT SLAVE FALLS, FOR 1915.

[Drainage area 49,700 square miles.]

Day.	January. Gauge Height.	January. Discharge.	February. Gauge Height.	February. Discharge.	March. Gauge Height.	March. Discharge.	April. Gauge Height.	April. Discharge.	May. Gauge Height.	May. Discharge.	June. Gauge Height.	June. Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	18·76	18,662	18·71	18,501	18·13	16,648	17·63	15,073	20·31	23,778	22·72	32,435
2	18·80	18,791	18·85	18,952	18·18	16,807	17·63	15,073	20·36	23,947	22·67	32,248
3	18·71	18,501	18·80	18,791	18·04	16,362	17·59	14,948	20·56	24,627	22·63	32,098
4	18·80	18,791	18·57	18,050	18·13	16,648	17·46	14,543	20·53	24,524	22·67	32,248
5	18·76	18,662	18·52	17,889	18·01	16,267	17·59	14,948	20·56	24,627	22·58	31,910
6	18·71	18,501	18·47	17,730	17·96	16,109	17·68	15,230	20·61	24,800	22·29	30,823
7	18·68	18,405	18·18	16,807	18·01	16,267	17·63	15,073	20·78	25,385	22·67	32,248
8	18·55	17,986	18·38	17,443	18·01	16,267	17·68	15,230	20·73	25,214	22·68	32,285
9	18·47	17,730	18·35	17,348	18·01	16,267	17·63	15,073	20·70	25,110	22·72	32,435
10	18·47	17,730	18·38	17,443	17·96	16,109	17·68	15,230	21·23	26,959	22·72	32,435
11	18·63	18,244	18·30	17,189	18·01	16,267	17·63	15,073	21·37	27,455	22·75	32,548
12	18·60	18,147	18·35	17,348	17·92	15,984	17·87	15,827	21·57	28,170	22·68	32,285
13	18·55	17,986	18·23	16,966	17·96	16,109	17·87	15,827	21·66	28,497	22·67	32,248
14	18·60	18,147	18·06	16,426	17·87	15,827	17·87	15,827	21·71	28,679	22·75	32,548
15	18·63	18,244	18·30	17,189	17·92	15,984	18·09	16,521	21·71	28,679	22·75	32,548
16	18·60	18,147	18·35	17,348	17·87	15,827	18·30	17,189	21·45	27,738	22·75	32,548
17	18·47	17,730	18·30	17,189	17·84	15,733	18·38	17,443	21·71	28,679	22·82	32,810
18	18·52	17,889	18·43	17,602	17·79	15,576	18·35	17,348	21·62	28,352	22·80	32,735
19	18·63	18,244	18·40	17,507	17·76	15,481	18·71	18,501	21·71	28,679	22·75	32,548
20	18·63	18,244	18·26	17,062	17·71	15,324	18·97	19,338	21·71	28,679	22·75	32,548
21	18·57	18,050	18·01	16,267	17·68	15,230	19·02	19,500	21·71	28,679	22·82	32,810
22	18·52	17,889	18·21	16,903	17·84	15,733	19·19	20,056	21·71	28,679	22·74	32,510
23	18·43	17,602	18·35	17,348	17·87	15,827	19·39	20,710	21·79	28,971	22·82	32,810
24	18·21	16,903	18·30	17,189	17·84	15,733	19·60	21,402	21·94	29,517	22·82	32,810
25	18·63	18,244	18·30	17,189	17·71	15,324	19·60	21,402	22·16	30,335	22·86	32,960
26	18·73	18,565	18·35	17,348	17·71	15,324	20·11	23,102	22·33	30,973	22·90	33,110
27	18·63	18,244	18·30	17,189	17·68	15,230	20·06	22,933	22·65	32,173	22·87	32,998
28	18·85	18,952	17·96	16,109	17·54	14,791	20·11	23,102	22·58	31,910	22·96	33,335
29	18·80	18,791	......	......	17·68	15,230	20·15	23,237	22·58	31,910	22·91	33,148
30	18·85	18,952	......	......	17·63	15,073	20·20	23,406	22·50	31,610	23·03	33,598
31	18·40	17,507	......	......	17·59	14,948	......	......	22·67	32,248	......	......

Day.	July. Gauge Height.	July. Discharge.	August. Gauge Height.	August. Discharge.	September. Gauge Height.	September. Discharge.	October. Gauge Height.	October. Discharge.	November. Gauge Height.	November. Discharge.	December. Gauge Height.	December. Discharge.
1	22·94	33,260	23·89	36,823	21·40	27,561	19·96	22,597	19·30	20,416	19·69	21,701
2	23·06	33,710	23·99	37,198	21·24	26,995	19·96	22,597	19·22	20,154	19·72	21,800
3	23·09	33,823	23·96	37,085	21·08	26,428	19·83	22,166	19·30	20,416	19·72	21,800
4	23·10	33,860	23·94	37,010	20·89	25,765	19·91	22,431	19·28	20,351	19·72	21,800
5	23·25	34,423	23·91	36,898	20·75	25,283	19·83	22,166	19·31	20,449	19·66	21,601
6	23·31	34,648	23·92	36,935	20·74	25,248	19·77	21,966	19·28	20,351	19·85	22,232
7	23·36	34,835	23·89	36,823	20·73	25,214	19·59	21,369	19·22	20,154	19·75	21,900
8	23·45	35,173	23·90	36,860	20·65	24,938	19·55	21,236	19·36	20,612	19·74	21,867
9	23·54	35,510	23·94	37,010	20·51	24,455	19·57	21,302	19·59	21,369	19·78	22,000
10	23·61	35,773	23·95	37,048	20·43	24,183	19·41	20,776	19·69	21,701	19·78	22,000
11	23·65	35,923	23·90	36,860	20·32	23,812	19·39	20,710	19·62	21,468	19·73	21,834
12	23·82	36,560	23·85	36,673	20·24	23,541	19·45	20,907	19·61	21,435	19·65	21,568
13	23·82	36,560	23·81	36,523	20·33	23,845	19·36	20,612	19·62	21,468	19·76	21,933
14	23·87	36,748	23·75	36,298	20·22	23,474	19·30	20,416	19·74	21,867	19·74	21,867
15	23·94	37,010	23·67	35,998	20·19	23,372	19·27	20,318	19·74	21,867	19·74	21,867
16	23·98	37,160	23·72	36,185	20·13	23,169	19·22	20,154	19·68	21,668	19·83	22,166
17	23·96	37,085	23·61	35,773	20·08	23,000	19·16	19,958	19·69	21,701	19·82	22,132
18	23·95	37,048	23·55	35,548	20·08	23,000	19·32	20,481	19·68	21,668	19·81	22,099
19	24·03	37,348	23·48	35,285	20·00	22,730	19·27	20,318	19·61	21,435	19·90	22,398
20	23·99	37,198	23·42	35,060	19·99	22,697	19·20	20,089	19·60	21,402	19·90	22,398
21	23·97	37,123	23·34	34,760	19·99	22,697	19·20	20,089	19·48	21,005	19·86	22,265
22	23·96	37,085	23·26	34,460	20·01	22,764	19·21	20,122	19·73	21,834	19·87	22,298
23	23·95	37,048	23·31	34,648	19·96	22,597	19·21	20,122	19·70	21,734	19·83	22,166
24	23·92	36,935	23·09	33,823	19·97	22,630	19·13	19,860	19·69	21,701	19·85	22,232
25	23·87	36,748	22·94	33,260	20·09	23,034	19·31	20,449	19·64	21,535	19·81	22,099
26	23·95	37,048	22·75	32,548	19·93	22,498	19·17	19,991	19·68	21,668	19·85	22,232
27	23·90	36,860	22·56	31,835	20·12	23,136	19·26	20,285	19·67	21,634	19·85	22,232
28	23·87	36,748	22·30	30,860	20·03	22,831	19·24	20,220	19·53	21,170	19·74	21,867
29	23·87	36,748	21·97	29,626	20·00	22,730	19·22	20,154	19·71	21,767	19·73	21,834
30	23·87	36,748	21·89	29,335	19·98	22,664	19·26	20,285	19·68	21,668	19·76	21,933
31	23·88	36,785	21·63	28,388	......	......	19·17	19,991	......	......	19·83	22,166

MONTHLY DISCHARGE OF WINNIPEG RIVER AT SLAVE FALLS, FOR 1915.
[Drainage area 49,700 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.
January................	18,952	16,903	18,209	0·366	0·422	1,119,700
February..............	18,952	16,109	17,369	0·349	0·363	964,600
March................	16,807	14,791	15,816	0·318	0·367	972,500
April.................	23,406	14,543	17,939	0·361	0·403	1,067,400
May..................	32,248	23,778	28,051	0·564	0·650	1,724,800
June.................	33,958	30,823	32,554	0·655	0·731	1,937,100
July.................	37,348	33,260	36,114	0·727	0·838	2,220,600
August...............	37,198	28,388	34,950	0·703	0·814	2,149,000
September............	27,561	22,498	23,876	0·480	0·536	1,420,700
October..............	22,597	19,860	20,779	0·420	0·484	1,277,700
November.............	21,867	20,154	21,238	0·427	0·477	1,263,800
December.............	22,398	21,369	21,976	0·442	0·510	1,351,300
The Year..........	37,348	14,543	24,072	0·484	6·595	17,469,200

PINAWA CHANNEL, BELOW CONTROL DAM.

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 house built about nine miles below the inlet by the Winnipeg Electric Railway Company. At first the plant depended upon the stage of the river for water down this channel, but the rapid growth of the load necessitated the building of a diverting dam in the main river to ensure sufficient flow down the Pinawa channel. Meterings were made below the control dam by engineers of the Company from 1907-1911. In May, 1912, a boat station was established on the Pinawa channel by Mr. 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 station is about two hundred feet below the control dam and six miles above the Winnipeg Electric Railway's plant on the Pinawa channel. The I.P. is a point chiselled in the rock on the left bank of the channel and referenced by a rock painted, "I.P."

RECORDS AVAILABLE.

A daily gauge record was obtained at the control dam by the Winnipeg Electric Railway Co. from April 28, 1906, to the end of 1914. The records are not continuous but cover the greater part of the period, and have been placed at the disposal of the Manitoba Hydrometric Survey. The records of a Gurley automatic water stage register installed by this Survey in June of 1914 are also available.

Daily discharge estimates based upon a curve plotted from discharge measurements taken between 1907 and 1911 are available. These cover the period of the years from May to October (the open water months). On account of back water due to ice jams in the channel below, estimates have not been made for the winter months.

GAUGE.

A vertical staff gauge bolted to the upstream side of the control dam was set in place by the Winnipeg Electric Railway Co., and it is this gauge to which records are referred. This gauge is referred to W.P.S. datum.

In May of 1915 a Gurley automatic water stage register was installed on the upstream side of the control dam close to the right bank, and from May 13 the records of this gauge are available. The gauge is referred to W.P.S. datum.
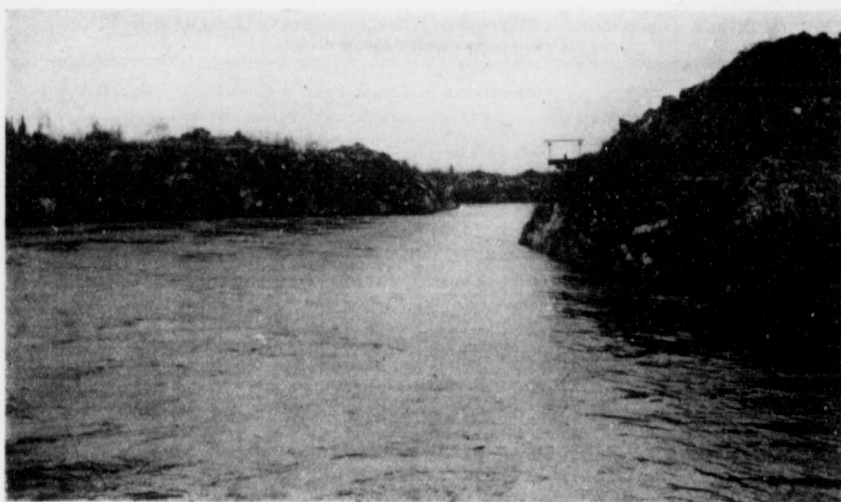
Taken by W. J. Ireland.

PINAWA CHANNEL—CABLE STATION BELOW CONTROL DAM.

CHANNEL.

The channel is straight for one hundred feet above the section and the same distance below; the section is regular, being a rock cut channel, the water being confined to the channel at all stages.

DISCHARGE MEASUREMENTS.

Discharge measurements have been taken at frequent intervals since the establishment of the station, numbering in all, sixty, and covering a range of four feet in gauge height.

DIVERSIONS.

All the water passing through the dam passes the section but there is a diversion channel just above the dam down which water may be diverted.

ACCURACY.

For the earlier years the discharge curve is well defined, but since the power station has been heavily loaded the load fluctuations may be noticed at the section making estimates of discharge rather susceptible to error.

SESSI

D

Date

Feb. 11
11
22
23
24
25
26
May 26
June 19
20
21
22
22
Aug. 12
13
14
14
14
Sept. 2
11
11
13
13
Nov. 3

N

SESSIONAL PAPER No. 25f

DISCHARGE MEASUREMENTS OF PINAWA CHANNEL BELOW CONTROL DAM, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
Feb. 11...	C. O. Allen	1,911	131	1,725	4·71	95·25	8,130
11...	"	1,911	131	1,732	5·24	95·30	9,081
22...	M. S. Madden.....	1,462	131	1,661	5·08	94·86	8,433
23...	"	1,462	131	1,673	5·12	94·99	8,566
24...	"	1,462	131	1,673	5·09	94·97	8,509
25...	"	1,462	131	1,673	5·12	94·90	8,570
26...	"	1,462	131	1,660	5·12	94·86	8,504
May 26...	A. Pirie...........	1,939	129	1,770	6·18	95·99	[1]10,949
June 19...	W. J. Ireland......	1,939	130	1,803	5·80	95·80	[1]10,461
20...	E. B. Patterson....	1,919	130	1,768	5·98	96·07	[1]10,570
21...	"	1,919	130	1,768	5·98	96·07	[1]10,570
22...	"	1,919	130	1,768	6·04	96·07	[1]10,676
22...	"	1,919	130	1,768	6·06	96·07	[1]10,712
Aug. 12...	"	1,919	130	1,762	6·09	96·05	[1]10,732
13...	"	1,919	130	1,760	5·98	96·03	10,523
14...	"	1,919	130	1,758	6·06	96·02	10,656
14...	"	1,919	130	1,758	6·08	96·01	10,691
14...	"	1,919	130	1,757	6·00	96·01	10,543
Sept. 2...	"	1,919	130	1,679	5·86	95·40	9,842
11...	"	1,919	130	1,643	5·81	95·10	9,847
11...	"	1,919	130	1,643	5·83	95·10	9,580
13...	"	1,919	130	1,642	5·80	95·09	9,527
13...	"	1,919	130	1,643	5·85	95·10	9,612
Nov. 3...	M. S. Madden.....	1,469	130	1,651	5·23	94·92	8,636

[1]New cable station.

NOTE.—Gauge heights are those read on the upstream side of the Control Dam.

DEPARTMENT OF THE INTERIOR

DAILY GAUGE HEIGHT AND DISCHARGE OF PINAWA CHANNEL AT CONTROL DAM, FOR 1915.

Day	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	16·45		16·05		14·85		14·24	8,325			15·97	10,570
2	16·25		16·05		14·95		14·24	8,325			15·98	10,580
3	16·35		15·95		14·95		14·24	8,325			15·96	10,555
4	16·15		15·65		14·85		14·24	8,325			15·87	10,430
5	15·85		15·55		14·85		14·24	8,325			15·83	10,395
6	15·85		15·55		14·75		14·24	8,325			15·80	10,335
7	15·45		15·55		14·75		14·24	8,325			15·81	10,350
8	15·55		15·55		14·75		14·24	8,325			15·83	10,375
9	15·55		15·55		14·75		14·34	8,450			15·84	10,390
10	15·35		15·35		14·65		14·34	8,450			15·85	10,400
11	15·35		15·19	8,130[1]	14·55		14·34	8,450			15·84	10,390
			15·24	9,081[1]								
12	15·05		15·25		14·55		14·34	8,450			15·84	10,390
13	15·05		15·15		14·55		14·34	8,450	15·43	9,835	15·84	10,390
14	15·05		15·15		14·55		14·34	8,450	15·43	9,835	15·84	10,390
15	15·05		15·15		14·55		14·34	8,450	15·44	9,850	15·85	10,400
16	15·15		15·15		14·45		14·44	8,575	15·41	9,810	15·83	10,375
17	15·25		15·15		14·45		14·54	8,700	15·43	9,835	15·84	10,390
18	15·25		15·05		14·45				15·45	9,860	15·84	10,390
19	15·25		15·05		14·45				15·45	9,860	15·83	10,375
20	15·45		14·95		14·35				15·45	9,860	15·84	10,390
21	15·65		14·95		14·35				15·59	10,050	15·82	10,360
22	15·75		14·80	8,433[1]	14·35				15·66	10,140	15·81	10,345
23	15·75		14·93	8,566[1]	14·35				15·73	10,240	15·82	10,360
24	15·85		14·91	8,509[1]	14·35				15·79	10,320	15·82	10,360
25	15·85		14·84	8,570[1]	14·35				15·85	10,400	15·82	10,400
26	15·85		14·80	8,504[1]	14·35				15·88	10,445	15·86	10,415
27	15·85		14·75		14·24	8,325			15·93	10,510	15·85	10,400
28	15·95		14·85		14·24	8,325			15·95	10,540	15·84	10,390
29	16·05				14·24	8,325			15·95	10,540	15·85	10,400
30	16·25				14·24	8,325			15·96	10,555	15·86	10,415
31	16·05				14·24	8,325			15·97	10,570		

Day	July.		August.		September.		October.		November.		December.	
1	15·86	10,415	16·01	10,625	15·41	9,810	15·03	9,315	14·81	9,035	14·97	
2	15·87	10,430	16·01	10,625	15·38	9,770	15·02	9,300	14·83	9,065	14·99	
3	15·88	10,445	16·02	10,640	15·33	9,700	15·00	9,275	14·85	9,090	15·05	
4	15·88	10,445	16·01	10,625	15·28	9,635	14·84	9,240	14·84	9,075	15·02	
5	15·90	10,470	16·01	10,625	15·24	9,580	14·99	9,265	14·85	9,090	15·01	
6	15·92	10,500	15·99	10,595	15·22	9,555	14·97	9,240	14·84	9,075	15·22	
7	15·94	10,525	16·00	10,610	15·22	9,555	14·91	9,160	14·85	9,090	15·52	
8	15·95	10,540	16·00	10,610	15·21	9,545	14·90	9,150	14·87	9,115	15·63	
9	16·01	10,625	16·00	10,610	15·16	9,480	14·92	9,175	14·90	9,150	15·76	
10	16·02	10,640	16·01	10,625	15·12	9,425	14·88	9,125	14·98	9,250	15·69	
11	16·00	10,610	16·01	10,625	15·09	9,385	14·85	9,090	14·95	9,215	15·78	
12	16·01	10,625	16·00	10,610	15·09	9,385	14·87	9,115	14·94	9,200	15·94	
13	16·01	10,625	15·98	10,580	15·08	9,375	14·87	9,115	14·95	9,215	16·03	
14	16·02	10,640	15·98	10,580	15·07	9,360	14·85	9,090	14·95	9,215	16·09	
15	16·04	10,665	15·96	10,555	15·06	9,350	14·82	9,050	14·95	9,215	16·15	
16	16·03	10,650	15·96	10,555	15·03	9,315	14·81	9,035	14·94	9,200	16·15	
17	16·03	10,650	15·96	10,555	15·04	9,325	14·81	9,035	14·93	9,190	16·11	
18	16·02	10,640	15·93	10,515	15·02	9,300	14·81	9,035	14·93	9,190	15·95	
19	16·02	10,640	15·92	10,500	15·03	9,315	14·81	9,035	14·92	9,175	15·77	
20	16·02	10,640	15·90	10,470	15·01	9,290	14·81	9,035	14·91	9,165	15·81	
21	16·02	10,640	15·89	10,455	15·01	9,290	14·79	9,015	14·91	9,165	15·96	
22	16·02	10,640	15·87	10,430	15·02	9,300	14·82	9,050	14·95	9,215	15·91	
23	16·02	10,640	15·88	10,445	15·00	9,275	14·82	9,050	14·95	9,215	15·99	
24	16·02	10,640	15·84	10,390	15·03	9,315	14·82	9,050	14·95	9,215	16·11	
25	16·01	10,625	15·79	10,320	15·04	9,325	14·79	9,015	14·97	9,240	16·22	
26	16·01	10,625	15·75	10,270	15·04	9,325	14·81	9,035	14·98	9,250	16·34	
27	16·01	10,625	15·71	10,215	15·05	9,335	14·82	9,050	14·99	9,265	16·37	
28	16·00	10,610	15·64	10,120	15·05	9,335	14·81	9,035	14·98	9,250	16·39	
29	15·99	10,595	15·57	10,025	15·05	9,335	14·81	9,035	14·98	9,250	16·44	
30	16·00	10,610	15·53	9,970	15·03	9,315	14·85	9,090	15·00	9,275	16·42	
31	16·00	10,610	15·48	9,905			14·81	9,035			16·30	

NOTE.—Automatic Gauge.
Discharge Measurements marked [1] actual meterings.
Zero = 880·00 W.P.S. Datum.
Where discharges are omitted opposite gauge readings ice conditions obtain.

MONTHLY DISCHARGE OF PINAWA CHANNEL AT CONTROL DAM FOR THE YEAR 1915.

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches of Drainage Area.	Total in acre-feet.
January						
February						
March						
April			[1]8,413			
May			[2]1,0161			
June	10,580	10,335	10,403			
July	10,665	10,415	10,590			
August	10,640	9,905	10,461			
September	9,810	9,275	9,420			
October	9,315	9,015	9,108			
November	9,275	9,035	9,178			
December						
The period						

NOTE.—[1]Mean of first 17 days records of April.
[2]Mean of last 19 days records of May.

WHITEMOUTH RIVER.

The source of the Whitemouth river is in Whitemouth lake which lies in the South-eastern part of the province. The course of the river is generally North from the source to its junction with the Winnipeg river just below the Seven Sisters rapids on the latter stream.

The drainage area of the river is 1,566 square miles. The upper part of the river flows through that part of the country known as the Julius Muskeg, and as the name would imply is low and wet. The lower part of the valley is narrow, the land is fertile, and a considerable portion has been cleared and is now under cultivation. The lower two miles of the river flows through a well timbered belt of country, spruce, oak and poplar of merchantable size being plentiful.

The bed of the river is generally clay, but at the lower end rock ridges extend across the river bed and at one point form what is known as Whitemouth falls, which is near the mouth. The valley is generally from 30 to 50 feet in height, and the valley proper varies from 200 to 600 feet wide.

WHITEMOUTH RIVER AT WHITEMOUTH.

HISTORY.

The metering section was established at Whitemouth on the river of that name by G. H. Burnham on May 28, 1912.

LOCATION OF SECTION.

The station is located on the downstream side of the traffic bridge which crosses the river about nine hundred feet North-east of the C.P. Ry. station at Whitemouth. The I.P. is marked by three wire nails driven in the handrail of the bridge directly above the south abutment and the intervals are also marked on the handrail.

RECORDS AVAILABLE.

Daily gauge and discharge records are available from May 29, 1912, to the end of 1915 for the open water months. During the winters of 1912-13 and 1913-14 no gauge records were obtained, but during the winter of 1914-15 records are available.

DRAINAGE AREA.

The drainage area of the river above the station is 1,400 square miles. Much of this territory is low lying and of a swampy nature, lately it has been cross cut by the drainage system in connection with the construction of conduit for the Greater Winnipeg water supply, the Whitemouth being used as a discharge channel. This has noticeably affected the flow.

GAUGE.

A vertical staff gauge graduated to tenths is fastened to a pile of the bridge opposite station 91 of the section. It is referred to a B.M. consisting of an iron bolt sunk in a concrete pile near the bridge. An arbitrary datum is used.

CHANNEL.

The river is divided into six channels by the pile bents of the bridge. The bed is of clay and liable to slight shifting. The depth over the section under normal conditions averages four feet. The banks are not subject to overflow.

DISCHARGE MEASUREMENTS.

Sufficient meterings have been secured to define the discharge curve over a range of four feet in gauge height, for open water conditions. Under ice conditions a number have been taken but do not define the curve of discharge clearly. The measurements are made from the bridge.

ACCURACY.

The accuracy for the station curve is high over a range in gauge height of four feet, from 73·8 to 77·3.

DISCHARGE MEASUREMENTS OF WHITEMOUTH RIVER AT WHITEMOUTH, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 18...	C. O. Allen........	1,912	140	200	0·99	73·34	20[1]
Feb. 18...	M. S. Madden.....	1,462	111	162	0·06	73·28	10[1]
Mar. 17...	C. O. Allen.......	1,912	110	179	0·14	73·29	24[1]
April 15...	M. S. Madden.....	1,462	142	582	0·65	74·36	378
May 5...	C. O. Allen........	2,018	151	705	1·13	75·13	796
May 12...	M. S. Madden.....	1,462	164	855	1·97	76·29	1,684
June 2...	"	1,469	137	560	0·66	74·39	370
June 22...	C. O. Allen.......	2,018	144	685	1·14	75·12	781
July 14...	T. H. Boyd........	1,197	155	672	1·28	75·38	860
Aug. 5...	H. H. Pratt........	1,496	141	494	0·31	73·89	154
Aug. 11...	"	1,496	139	467	0·16	73·69	76
Aug. 17...	"	1,496	139	461	0·11	73·56	53
Sept. 17...	"	1,496	137	415	0·07	73·43	31
Nov. 25...	C. O. Allen........	1,374	142	462	0·45	74·13	208[1]

[1] Ice Measurement.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF WHITEMOUTH RIVER AT WHITEMOUTH FOR 1915.
[Drainage area 1,400 square miles.]

Day	January Gauge Height	January Discharge	February Gauge Height	February Discharge	March Gauge Height	March Discharge	April Gauge Height	April Discharge	May Gauge Height	May Discharge	June Gauge Height	June Discharge
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	73·42		73·24		73·29		73·34		75·50	1,030	74·43	395
2	73·40		73·24		73·28		73·35		75·72	1,190	74·39	375
3	73·40		73·24		73·28		73·41		75·74	1,210	74·32	340
4	73·40		73·24		73·28		73·70		75·73	1,200	74·29	326
5	73·40		73·24		73·27		73·69		75·17	817	74·26	312
6	73·38		73·24		73·28		73·70		75·19	829	74·27	317
7	73·38		73·24		73·27		73·71		75·83	1,280	74·25	308
8	73·38		73·24		73·28		74·69		76·31	1,680	74·39	375
9	73·38		73·24		73·27		74·71		76·34	1,710	74·39	375
10	73·35		73·24		73·28		74·79		76·29	1,660	74·40	380
11	73·35		73·24		73·29		74·85		76·31	1,680	75·25	865
12	73·35		73·24		73·27		74·90		76·35	1,720	75·28	883
13	73·35		73·24		73·28		74·93	673	76·31	1,680	75·26	871
14	73·35		73·26		73·29		74·44	400	76·19	1,580	75·20	835
15	73·35		73·26		73·28		74·39	375	76·07	1,470	75·24	859
16	73·32		73·26		73·29		74·40	380	76·06	1,470	75·29	889
17	73·30		73·26		73·30		74·41	385	76·06	1,470	75·35	928
18	73·30	20	73·28	10	73·29		74·42	390	76·06	1,470	75·41	967
19	73·30		73·29		73·34		74·41	385	75·43	981	75·38	947
20	73·30		73·29		73·34		74·40	380	75·39	954	75·29	889
21	73·30		73·29		73·34		74·39	375	75·27	877	75·15	805
22	73·30		73·28		73·30		74·34	350	75·26	871	75·09	769
23	73·30		73·29		73·29		74·44	400	75·21	841	75·08	763
24	73·29		73·29		73·32		75·07	757	75·03	733	75·09	769
25	73·27		73·30		73·40		75·51	1,040	74·93	673	75·08	763
26	73·27		73·29		73·39		75·50	1,030	74·89	649	75·09	769
27	73·27		73·30		73·38		75·49	1,020	74·79	590	75·46	1,000
28	73·27		73·29		73·39		75·71	1,180	74·72	551	75·45	995
29	73·27				73·31		75·72	1,190	74·69	535	75·46	1,000
30	73·26				73·30		75·71	1,180	74·62	496	75·19	829
31	73·24				73·31				74·56	463		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	75·12	787	74·10	240	73·33	27	73·99	193	74·04	214	74·04	
2	75·03	733	74·09	236	73·32	26	74·05	219	74·10	240	74·05	
3	74·82	607	74·06	223	73·32	26	74·09	236	74·07	227	74·02	
4	74·86	631	73·99	185	73·33	27	74·09	236	74·06	223	74·00	
5	74·84	619	73·94	172	73·39	30	74·11	245	74·03	210	73·97	
6	74·82	607	73·93	168	73·32	26	74·12	249	74·01	201	73·85	
7	74·69	535	73·92	164	73·32	26	74·28	321	74·06	223	73·82	
8	74·59	480	73·91	160	73·31	25	74·29	325	74·16	227	73·82	
9	74·59	480	¹73·85	137	73·30	25	74·32	340	74·26	240	73·81	
10	74·69	535	¹73·75	98	73·34	27	74·44	350	74·44	240	73·80	
11	74·68	529	73·67	73	73·36	28	74·30	330	74·79	240	73·80	
12	75·41	967	73·63	63	73·36	28	74·31	335	74·76	245	73·80	
13	75·41	967	73·60	55	73·38	29	74·30	330	74·71		73·80	
14	75·31	902	73·54	45	73·39	30	74·25	307	74·65		73·78	
15	¹75·14	799	73·56	49	73·39	30	74·21	290	74·65		73·76	
16	¹74·97	697	73·54	45	73·39	30	74·19	281	74·54		73·73	
17	¹75·80	595	73·54	45	73·40	30	74·18	276	74·47		73·72	
18	¹75·63	502	73·50	39	73·40	30	74·18	276	74·41		73·70	
19	¹75·46	410	73·46	35	73·42	32	74·16	267	74·35		73·68	
20	¹75·29	326	73·44	34	73·42	32	74·16	267	74·32		73·65	
21	¹75·12	249	73·44	34	73·46	35	74·18	276	74·26		73·62	
22	¹73·95	177	73·44	34	73·46	35	74·19	281	¹74·23		73·60	
23	¹73·78	110	73·40	30	73·52	42	74·17	272	¹74·20		73·59	
24	¹73·61	58	73·37	29	73·52	42	74·10	240	¹74·15		73·58	
25	73·61	58	73·35	28	73·56	49	74·04	214	74·13	208	73·58	
26	73·62	60	73·35	28	73·61	58	74·01	201	74·09		73·58	
27	73·61	58	73·34	27	73·64	65	74·04	214	74·08		73·61	
28	73·63	63	73·34	27	73·80	117	74·10	240	74·06		73·61	
29	73·72	87	73·33	27	73·89	152	74·08	231	74·06		73·61	
30	73·74	95	73·32	26	73·95	177	74·06	223	74·06		73·61	
31	73·81	121	73·32	26			74·04	214			73·59	

Gauge heights marked thus (¹) Interpolated.
Ice conditions from January 1 to April 12 and from November 13 to December 31.
Not sufficient information to compute daily discharges.

Monthly Discharge of Whitemouth River at Whitemouth for the Year 1915.

[Drainage area 1,400 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.
January			[1]18	0·013	0·015	1,100
February			[1]10	0·007	0·007	555
March			[1]10	0·007	0·008	615
April			[1]450	0·321	0·358	26,800
May	1,720	463	1,110	0·793	0·914	68,300
June	1,000	308	697	0·498	0·556	41,500
July	967	58	447	0·319	0·368	27,500
August	240	26	83	0·059	0·068	5,100
September	177	25	45	0·032	0·036	2,700
October	350	193	267	0·191	0·220	16,400
November			[1]210	0·150	0·167	12,500
December			[1]100	0·071	0·082	6,150
The Year	1,720	25	287	0·205	2·799	209,220

Note.—Marked thus ([1]) Estimated.

RED RIVER AND TRIBUTARIES.

RED RIVER.

Tht Red river, one of the most important flowing in the province of Manitoba, has its source near the central part of the State of Minnesota. It flows south and west to the town of Breckenbridge, then north to the International boundary, forming the boundary in that stretch between the States of Minnesota and North Dakota.

The general direction of the river from Breckenbridge to lake Winnipeg, into which body of water the river empties, is North, though the river itself is very sinuous in its course, nearly doubling its length between the points mentioned.

The drainage basin of the river is 116,347 square miles, of which 42,547 are in Minnesota and Dakota, 50,500 in Saskatchewan and 23,300 in Manitoba.

The valley of the river is not defined by high banks as in most cases, but the whole country slopes gently toward the river, which lies in a channel cut to a depth of from 25 to 50 feet below the plain.

The valley of the Red river is the oldest settled district in the Province, the land being practically all settled and farmed. Little standing timber is to be found, only clumps of elm and ash with poplar and cottonwood being found along the river.

The stream afforded the first means of access to the country, and was navigated for a number of years before the advent of the railways to the country between Grand Forks and lake Winnipeg. This traffic has however practically ceased to exist except upon the stretch of the river between Winnipeg and the lake. The Dominion Government have built a dam and lock near the mouth of the river, and by operating it an eight foot depth for navigation purposes is ensured between the lake and the city of Winnipeg.

There are a number of important centres which are located along the river. Among those within the province of Manitoba are:—Emerson, which is just north of the International boundary. Winnipeg, at the junction of the Assiniboine with the Red, and Selkirk, about 22 miles below Winnipeg. In addition to these a number of small communities are ocated along the banks of the river.

Metering stations have been located from time to time and maintained for certain periods at the following points along the river in the province of Manitoba:—

1. At the C.N.R. bridge at Emerson.
2. Three miles below Emerson.
3. At Elm Park bridge in Winnipeg.
4. At Redwood bridge in Winnipeg.

TRIBUTARIES.

The tributaries of the Red which enter that river within the province of Manitoba or close to its boundaries are:—

Pembina river.
Roseau river.
Rat river.
Morris river.
Assiniboine river.
Seine river.

Of these the Assiniboine is the most important and is given a separate section in this report. The others are considered along with the Red river; they enter it in the order given from source to mouth. Records of discharge for the Roseau and Rat are fairly continuous, but for the others only isolated meterings are available and are therefore listed under the head of miscellaneous meterings.

In the case of the Pembina, note should be made that this river flows partly through United States territory. Records of its discharge were kept by the United States Geological Survey at Neche, North Dakota, during the years 1903 to 1910 inclusive, and were included in Water Resources Paper No. 4.

RED RIVER AT EMERSON.

HISTORY.

The station was established by S. S. Scovil on May 3, 1912, and has been operated steadily from that date.

LOCATION OF SECTION.

The section at the time of the establishment of the station was located on the down-stream side of the C.N.R. bridge at Emerson. The I.P. was at the intersection of the end post of the bridge with the wooden handrail on the left hand end of the bridge on the down-stream side.

In the spring of 1914, the old bridge was replaced with a new one. On this new bridge the section is located on the downstream side, the I.P. being located on the west side of the east abutment. This change moved the location of the section approximately twelve feet downstream.

RECORDS AVAILABLE.

Daily gauge height records have been kept for each open water season since the station was established and intermittent readings under winter conditions have been obtained for the same period. A discharge curve for open water and winter conditions has been constructed and from it estimates of daily discharge have been arrived at.

DRAINAGE AREA.

The area tributary to the river above this station is 34,600 square miles and practically all of it is south of the International Boundary.

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. Both of these gauges are referred to a permanent M.H.S. B.M. located on the left bank of the river about sixteen feet upstream from the west bridge abutment. This B.M. is set to M.H.S. datum.

CHANNEL.

The channel is divided by the bridge piers, otherwise it remains the same under all conditions. The bottom is hard clay inlaid with gravel. It is straight for four hundred feet above the station and five hundred feet below. The banks are high and not subject to overflow except under extraordinary conditions. The floods of 1879, 1882 and 1897 overflowed the banks.

DISCHARGE MEASUREMENTS.

Measurements are taken from the downstream side of the bridge except under winter conditions when they are taken from the ice.

ACCURACY.

A range in stage under open water conditions of 26.16 feet is covered, the discharge curve being well defined between gauge heights 749.0 and 765.0, beyond these limits the definition is not so good. Under ice conditions a discharge curve is well defined between the limits 749.0 and 751.5.

DISCHARGE MEASUREMENTS OF RED RIVER AT EMERSON, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
Jan. 22...	C. O. Allen........	1,912	188	769	1·22	751·95	943[1]
May 13...	E. B. Patterson....	1,187	188	710	1·24	752·42	889[1]
Mar. 22...	C. O. Allen........	1,912	191	736	1·25	752·53	920[1]
April 14...	T. J. Moore.......	1,435	294	4,283	2·40	762·19	10,279
May 20...	C. O. Allen........	2,018	264	2,190	2·09	756·19	4,576
June 14...	"	2,018	242	1,521	1·67	753·31	2,540
July 8...	T. H. Boyd........	1,196	328	6,646	3·01	771·21	19,939
July 21...	"	1,196	295	4,179	2·27	761·83	9,486
Aug. 19...	"	1,196	237	1,416	1·62	753·06	2,310
Sept. 15...	"	1,197	227	1,086	1·59	751·74	1,726

[1] Ice Cover.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF RED RIVER AT EMERSON, FOR 1915.

[Drainage area 34,600 square miles.]

Day.	January Gauge Height.	January Discharge.	February Gauge Height.	February Discharge.	March Gauge Height.	March Discharge.	April Gauge Height.	April Discharge.	May Gauge Height.	May Discharge.	June Gauge Height.	June Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	51·39	969	51·86	897	51·84	883	53·84	1,600	53·42	2,613	54·94	3,509
2	51·54	957	51·86	897	51·89	893	54·04	1,700	53·49	2,655	54·66	3,409
3	51·64	957	51·86	878	51·94	893	54·24	2,000	53·44	2,625	54·44	3,263
4	51·74	957	51·89	874	51·96	887	54·54	2,500	53·44	2,625	54·44	3,130
5	51·79	957	51·89	874	51·99	883	54·99	3,633	53·44	2,625	54·02	2,988
6	51·84	957	51·86	874	52·04	883	55·44	3,956	53·54	2,685	53·77	2,828
7	51·79	957	51·86	874	52·14	893	56·21	4,547	53·64	2,747	53·64	2,747
8	51·76	957	51·86	874	52·24	893	57·11	5,279	53·66	2,759	53·44	2,625
9	51·79	957	51·86	869	52·34	893	58·71	6,646	53·84	2,873	53·29	2,536
10	51·84	957	51·86	869	52·34	893	61·70	9,538	53·94	2,937	53·19	2,478
11	51·84	957	51·81	857	52·39	893	61·90	9,746	54·04	3,001	53·09	2,420
12	51·86	950	51·81	857	52·44	893	62·00	9,850	54·14	3,065	53·14	2,449
13	51·86	950	51·79	853	52·44	893	62·20	10,058	54·34	3,196	53·14	2,449
14	51·84	957	51·79	848	52·44	893	62·18	10,037	54·64	3,396	53·19	2,478
15	51·84	957	51·84	848	52·44	893	61·20	9,029	54·84	3,530	53·49	2,655
16	51·89	957	51·89	848	52·54	903	60·40	8,245	55·14	3,738	53·84	2,873
17	51·94	957	51·89	848	52·54	924	59·30	7,192	55·34	3,882	54·54	3,329
18	51·94	935	51·91	852	52·53	922	58·50	6,462	55·63	4,097	55·34	3,882
19	51·94	935	51·91	852	52·55	933	57·40	5,521	55·73	4,172	57·38	5,504
20	51·96	935	51·94	853	52·53	933	56·40	4,699	56·10	4,459	58·68	6,619
21	51·94	935	51·94	853	52·56	950	55·64	4,104	56·63	4,885	59·53	7,411
22	51·94	913	51·96	857	52·58	960	55·04	3,599	57·18	5,337	60·20	8,052
23	51·91	913	51·96	860	52·68	1,008	54·64	3,396	57·38	5,504	60·70	8,536
24	51·94	913	51·96	869	52·79	1,069	54·04	3,196	57·23	5,379	60·90	8,732
25	51·94	913	51·94	874	52·81	1,076	54·04	3,001	57·01	5,196	61·00	8,830
26	51·94	913	51·91	887	52·86	1,120	53·84	2,873	56·70	4,942	60·85	8,683
27	51·91	907	51·89	903	52·94	1,179	53·64	2,747	56·33	4,643	60·70	8,536
28	51·89	913	51·86	897	53·04	1,216	53·49	2,655	56·08	4,443	60·70	8,536
29	51·89	903			53·24	1,316	53·39	2,595	55·83	4,248	61·20	9,029
30	51·89	903			53·42	1,400	53·39	2,595	55·51	4,007	63·10	10,002
31	51·87	899			53·64	1,500			55·23	3,803		

Day	July Gauge Height.	July Discharge.	August Gauge Height.	August Discharge.	September Gauge Height.	September Discharge.	October Gauge Height.	October Discharge.	November Gauge Height.	November Discharge.	December Gauge Height.	December Discharge.
1	64·90	12,918	56·78	5,008	52·34	2,004	51·78	1,701	51·99	1,815	52·39	1,550
2	66·70	14,844	56·40	4,699	52·34	2,004	51·74	1,680	51·99	1,815	52·54	1,555
3	68·20	16,449	56·08	4,443	52·29	1,977	51·81	1,717	51·99	1,815	52·09	1,561
4	70·21	18,600	55·73	4,172	52·24	1,950	51·89	1,761	51·94	1,788	52·01	1,566
5	70·71	19,137	55·53	4,022	52·19	1,923	51·89	1,761	51·94	1,788	51·94	1,572
6	71·21	19,681	55·38	3,911	52·14	1,896	51·87	1,750	51·84	1,734	51·94	1,582
7	71·21	19,681	55·08	3,696	52·14	1,896	51·81	1,717	51·79	1,707	52·09	1,588
8	71·41	19,901	55·03	3,661	52·09	1,869	51·81	1,744	51·89	1,761	52·34	1,593
9	71·61	20,121	54·83	3,523	52·04	1,842	51·99	1,815	51·99	1,815	52·39	1,593
10	71·61	20,121	54·63	3,380	52·01	1,825	51·99	1,815	51·99	1,815	52·37	1,599
11	71·21	19,681	54·40	3,236	51·89	1,788	51·99	1,815	51·96	1,798	52·29	1,604
12	70·61	19,029	54·18	3,091	51·89	1,761	51·99	1,815	51·94	1,788	52·29	1,604
13	69·61	17,958	54·03	2,994	51·79	1,707	52·01	1,825	51·94	1,734	52·19	1,609
14	68·21	16,460	53·88	2,898	51·69	1,653	52·05	1,847	51·94	1,685	52·19	1,609
15	66·40	14,523	53·64	2,747	51·67	1,642	52·09	1,869	52·14	1,647	52·34	1,609
16	65·30	13,346	53·54	2,685	51·67	1,642	52·09	1,869	52·21	1,604	52·34	1,609
17	64·20	12,169	53·34	2,566	51·69	1,653	51·89	1,869	51·89	1,561	52·31	1,609
18	63·50	11,432	53·14	2,449	51·74	1,680	52·11	1,879	51·57	1,501	52·41	1,609
19	62·90	10,792	53·06	2,403	51·74	1,680	52·12	1,885	51·34	1,464	52·41	1,609
20	62·50	10,372	52·96	2,346	51·77	1,696	52·12	1,885	51·31	1,447	52·39	1,604
21	61·90	9,746	52·92	2,323	51·84	1,734	52·11	1,879	51·36	1,474	52·39	1,599
22	61·50	9,333	52·84	2,278	51·94	1,788	52·06	1,852	51·34	1,464	52·34	1,593
23	60·90	8,732	52·69	2,195	51·99	1,815	52·01	1,825	51·54	1,480	52·34	1,588
24	60·20	8,052	52·67	2,184	52·01	1,815	52·01	1,825	51·94	1,491	52·24	1,582
25	59·70	7,572	52·64	2,167	52·01	1,825	52·02	1,831	51·99	1,507	52·14	1,577
26	59·20	7,098	52·56	2,123	51·99	1,815	52·04	1,842	51·94	1,512	52·14	1,572
27	58·83	6,753	52·44	2,058	52·04	1,798	52·04	1,842	51·96	1,523	52·09	1,566
28	58·33	6,314	52·44	2,058	51·94	1,788	52·06	1,852	52·24	1,528	52·11	1,561
29	57·83	5,885	52·39	2,031	51·89	1,761	52·09	1,869	52·39	1,534	52·11	1,555
30	57·53	5,630	52·34	2,004	51·81	1,717	52·09	1,869	52·39	1,539	52·09	1,550
31	57·13	5,296	52·34	2,004			52·04	1,842			52·07	1,545

NOTE—Ice conditions from January 1 to April 4 and November 14 to December 31.
    700·00 should be added to gauge heights to bring to Station Datum.

DEPARTMENT OF THE INTERIOR

MONTHLY DISCHARGE OF RED RIVER AT EMERSON, FOR THE YEAR 1915.

[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
January	969	899	938	0·027	0·031	57,700
February	903	848	868	0·025	0·026	48,200
March	1,500	883	992	0·029	0·034	61,000
April	10,058	1,600	5,097	0·147	0·164	303,300
May	5,504	2,613	3,744	0·108	0·124	230,200
June	10,002	2,420	5,020	0·145	0·162	298,700
July	20,121	5,296	13,149	0·380	0·438	808,500
August	5,008	2,004	2,947	0·085	0·098	181,200
September	2,004	1,642	1,798	0·052	0·058	107,000
October	1,885	1,680	1,818	0·053	0·061	111,800
November	1,815	1,447	1,638	0·047	0·052	97,500
December	1,609	1,545	1,588	0·046	0·053	97,700
The Year	20,121	848	3,316	0·096	1·301	2,402,800

RED RIVER AT ELM PARK.

HISTORY.

The station was established by M. S. Madden on August 19, 1914, the object of establishing a station at this point was to secure some information regarding discharge with a view to making some determinations by slope measurements.

LOCATION OF SECTION.

The meter section is situated on the downstream side of Elm Park traffic bridge which crosses the Red river at Elm Park within the city limits of Winnipeg and about four and one-half miles above the junction of the Assiniboine and Red rivers. The I.P. of the section is marked on the wooden hand rail at the north end of the bridge on the downstream side.

RECORDS AVAILABLE.

Daily gauge height readings have been taken from August 19, 1914, on. A number of discharge measurements have also been secured.

The presence of the St. Andrews Dam in the Red river has a material effect upon the discharge measurements taken at this point, but one of the objects of establishing the station was to secure records over that period when the dam was opened. There have been no estimates made of daily discharge for this station.

DRAINAGE AREA.

The area tributary to the Red river above Elm Park bridge is 41,060 square miles.

GAUGE.

A nine foot vertical staff gauge was spiked to the wooden ice breaker opposite station 160 on the metering section. This was replaced on November 6 by a vertical staff gauge which was fastened to the concrete pier in midstream and just below the ice breaker. The gauge is referred to M.H.S. datum.

CHANNEL.

The channel is straight for 1,000 feet above the section and 1,500 feet below, the banks are high and not liable to overflow, the bed of the channel is composed of sand and clay and somewhat liable to shifting. The channel itself is divided into two channels by a centre bridge pier.

DISCHARGE MEASUREMENTS.

The discharge measurements are taken from the downstream side of the bridge.

ACCURACY.

Owing to the effect of the operation of the St. Andrews Dam, it has not been possible to construct a discharge curve for this station. Primarily the station was established with the object of making slope discharge experiments, under conditions obtaining when the dam was closed, but owing to the distance that the water is backed up beyond the station, sufficient fall could not be obtained in a stretch of several miles to render the results obtained at all reliable. When the dam is open the discharge measurements are quite reliable.

DISCHARGE MEASUREMENTS OF RED RIVER AT ELM PARK, WINNIPEG, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
Jan. 8...	C. O. Allen........	1,912	335	2,480	0·36	729·78	894[1]
8...	"	1,912	335	2,480	0·35	729·80	875[1]
16...	"	1,912	325	2,452	0·35	729·90	875[1]
April 2...	"	1,912	330	2,476	0·47	730·54	1,156
13...	T. J. Moore........	1,435	421	5,296	1·99	735·74	10,533
17...	"	1,435	408	5,098	1·96	735·19	9,984
30...	E. B. Patterson....	1,920	380	4,285	0·50	733·19	2,162
May 12...	T. J. Moore........	1,197	428	5,383	0·68	736·03	3,660
Aug. 12...	T. H. Boyd........	1,197	428	5,494	0·67	736·15	3,683

[1] Ice measurement.

RED RIVER AT REDWOOD BRIDGE, WINNIPEG.

HISTORY.

A gauge was set on the Red River at the Redwood bridge in the City of Winnipeg on August 21, 1912, by G. H. Burnham, in connection with the work of the Red River survey, and from that time intermittent gauge readings have been obtained at this point.

LOCATION OF GAUGE.

The Redwood bridge crosses the Red River on Redwood Ave. in the City of Winnipeg about three miles downstream from the junction of the Red and Assiniboine rivers.

The gauge is located inside the ice breaker and facing the upstream side of the bridge, and is referenced to a B.M. set to M.H.S. datum, on the top of the bridge pier adjacent to the gauge.

RECORDS AVAILABLE.

Intermittent gauge readings have been obtained on this gauge from the time of installation to the end of the year 1915.

RED RIVER AT MORRIS.

HISTORY.

A gauge was established on the Red river at the town of Morris on May 1, 1914, by A. Pirie, and from that date gauge readings have been obtained at this point.

LOCATION OF GAUGE.

A twelve-foot staff gauge has been secured to a rod driven into the bed of the stream at a point directly below the C.N.R. pump house on the left bank of the river and about six hundred feet below the pontoon bridge.

The gauge is referred to a permanent M.H.S. B.M. set to M.H.S. datum and located behind the C.N.R. pump house.

RECORDS AVAILABLE.

Continuous records of daily gauge readings have been obtained from the time of installation of the gauge, May 1, 1914, to November 21, 1915.

RED RIVER AT ST. AGATHE.

HISTORY.

A gauge was set on the Red river at St. Agathe by A. Pirie on May 1, 1914, and except during times of interference during high water records have been obtained since that time.

LOCATION OF GAUGE.

A nine-foot enamelled staff gauge has been secured to a rod driven into the bed of the stream close to the left bank, two hundred feet downstream from the ferry. The gauge is referred to a permanent M.H.S. B.M. set to M.H.S. datum and located at top of bank near the gauge.

RECORDS AVAILABLE.

Gauge records are available from May 1 to December 31, 1914, from January 1 to April 2, from May 10 to June 30, and from July 21 to November 12, 1915.

ROSEAU RIVER.

The Roseau river is the largest tributary entering the Red river from the east within the Province of Manitoba. The mouth of the Roseau is about 12 miles north of the International boundary and it drains the territory lying to the west and south of the Lake of the Woods.

The general direction followed by the Roseau is northwest, but the actual course of the river is very sinuous, about half of its length lying in United States territory. The banks of the river vary from ten to twelve feet in height and are cut sharply down from the prairie level. The river bottom and banks are composed chiefly of heavy clay.

The drainage area is 1,987 square miles, 890 square miles being in Manitoba and 1,097 square miles in the State of Minnesota. A large part of the drainage area is under cultivation, there being little standing timber in that part within the province. What there is consists mostly of elm, ash and oak, very little of which is of commercial size.

Considerable drainage work has been done in the basin, especially on the United States side of the line. There are no towns of any size to be found along the river, but three small villages are so located; these are Sprague, near the International boundary on the Ridgeville branch of the C.N.R., Stuartburn on the same line and Dominion City located at the crossing of the Emerson branch of the C.P.R. Dominion City has a population of about 200.

Discharge measurements have been made at various sections on the river since the establishment of the Survey in 1912. The sections were used and then abandoned in favor of more suitable ones for various reasons and are as follows:—

1. At Dominion City.
2. At Baskerville's Farm.
3. At Mayne's Farm.
4. Below Dominion City, in use at present.

The records and results obtained at these stations follow.

ROSEAU RIVER AT STUARTBURN.

HISTORY.

On May 7, 1915, a metering station was established on the Roseau river at Stuartburn, Manitoba, by A. Pirie, and the station was operated throughout the open water season of that year.

LOCATION OF SECTION.

The station established by A. Pirie was located on the downstream side of the C.N. Ry. bridge about five hundred yards east of Stuartburn station. On June 6 a section was chosen two hundred and eighty-five feet downstream from the above mentioned bridge and at this point a cable carrier station was established. The Initial Point is a large permanent hub placed between the left bank cable support and the water's edge.

RECORDS AVAILABLE.

From the time of the installation of the gauge on May 7, continuous records of gauge readings are available up to November 15 of the same year, at which time ice cover conditions were met with.

Discharge measurements were taken at various times thoughout this period, covering a range in stage of 3·3 feet, and from these estimated daily discharges have been computed.

DRAINAGE AREA.

The drainage area tributary to the river at this point is 1,520 square miles.

GAUGE.

A nine-foot staff gauge secured to a two by four inch scantling driven into the bed of the stream near the left bank at the C.N.R. bridge. The gauge is referred to a permanent M.H.S. B.M. set to an arbitrary datum and located about sixty-five feet northwest of west end of bridge.

CHANNEL.

The bed of the stream is composed of sandy silt and liable to shift during flood. The banks at the section are high and not liable to overflow.

DISCHARGE MEASUREMENTS.

All discharge measurements since the discontinuance of the bridge station are made from a traveller suspended from a cable from which the meter is lowered into the stream at the points of measurement.

ACCURACY.

The discharge curve for the range in stage covered by the discharge measurements is fairly well defined.

DISCHARGE MEASUREMENTS OF ROSEAU RIVER NEAR STUARTBURN, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
May 7	A. Pirie	1,939	85	451	1·65	94·73	747	At C.N.R. Bridge.
May 18	C. O. Allen	2,018	88	512	1·82	95·26	932	" "
June 15	"	2,018	86	463	1·65	94·81	763	" "
July 6	T. H. Boyd	1,197	91	486	1·87	95·62	908	Cable section.
July 7	"	1,197	91	486	1·96	95·64	952	" "
Aug. 17	"	1,197	81	258	0·43	92·94	111	" "
Sept. 16	"	1,197	81	206	....	92·33	....	No discharge.
Sept. 16	"	1,197	17·2	11	1·74	92·29	20	Metering taken at 1st rapids below gauge.
Nov. 18	C. O. Allen	1,374	90	265	0·56	93·25	148	

DAILY GAUGE HEIGHT AND DISCHARGE OF ROSEAU RIVER NEAR STUARTBURN, FOR 1915.

[Drainage area 1,520 square miles.]

Day.	January. Gauge Height.	Dis-charge.	February. Gauge Height.	Dis-charge.	March. Gauge Height.	Dis-charge.	April. Gauge Height.	Dis-charge.	May. Gauge Height.	Dis-charge.	June. Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1											94·94	684
2											94·84	649
3											94·64	579
4											94·44	512
5											94·34	480
6											94·18	429
7										94·76	621	94·14	417
8									94·66	585	94·19	432
9									94·72	606	94·24	448
10									94·72	606	94·37	489
11									94·71	603	94·49	528
12									94·79	631	94·64	579
13									94·92	678	94·76	621
14									95·04	721	94·79	631
15									95·12	750	94·82	640
16									95·18	772	94·98	700
17									95·22	786	95·07	732
18									95·27	804	95·17	768
19									95·29	811	95·16	765
20									95·36	837	95·22	786
21									95·38	844	95·27	704
22									95·42	858	95·34	829
23									95·46	873	95·38	844
24									95·48	880	95·39	848
25									95·49	883	95·44	865
26									95·50	887	95·61	927
27									95·46	873	95·58	916
28									95·44	866	95·54	901
29									95·44	866	95·47	876
30									95·24	794	95·44	865
31									95·12	750		

Day	July. Gauge	Dis.	August. Gauge	Dis.	September. Gauge	Dis.	October. Gauge	Dis.	November. Gauge	Dis.	December. Gauge	Dis.
1	95·47	876	94·26	454	92·49	40	92·48	39	92·59	54		
2	95·52	894	94·14	417	92·34	24	92·45	35	92·62	58		
3	95·61	927	94·07	396	92·14	10	92·52	44	92·60	55		
4	95·59	919	93·96	363	91·99	5	92·62	58	92·59	54		
5	95·60	923	93·89	342	91·86	3	92·67	65	92·62	58		
6	95·62	930	93·79	313	92·17	12	92·59	54	92·62	58		
7	95·62	930	93·74	300	92·29	19	92·64	61	92·61	56		
8	95·64	937	93·64	273	92·34	24	92·62	58	92·61	56		
9	95·66	945	93·56	251	92·32	22	92·60	55	92·59	54		
10	95·76	981	93·47	228	92·29	19	92·59	54	92·62	58		
11	95·88	1,024	93·32	190	92·29	19	92·57	51	92·62	58		
12	95·86	1,017	93·04	129	92·30	20	92·57	51	92·64	61		
13	95·85	1,013	92·85	94	92·29	19	92·61	56				
14	95·84	1,009	93·02	125	92·31	21	92·64	61				
15	95·72	966	92·99	119	92·32	22	92·62	58				
16	95·65	941	92·96	114	92·29	19	92·54	47				
17	95·56	909	92·94	110	92·34	24	92·56	49				
18	95·59	919	92·89	101	92·36	25	92·59	54				
19	95·62	930	92·82	89	92·32	22	92·56	49				
20	95·48	880	92·76	79	92·34	24	92·56	49				
21	95·39	847	92·74	75	92·33	23	92·60	55				
22	95·17	768	92·64	61	92·34	24	92·62	58				
23	95·14	757	92·62	58	92·35	25	92·60	55				
24	95·06	729	92·62	58	92·40	29	92·48	39				
25	94·97	696	92·59	54	92·42	31	92·59	54				
26	94·77	624	92·62	58	92·44	34	92·57	51				
27	94·69	595	92·84	92	92·46	36	92·49	40				
28	94·64	579	92·92	107	92·46	36	92·56	49				
29	94·59	561	92·96	114	92·50	41	92·56	54				
30	94·49	528	92·94	110	92·52	44	92·62	58				
31	94·33	477	92·57	51			92·54	47				

NOTE.—Station established May 7, 1915.

    Ice conditions from November 13 to end of year.

    Not sufficient information to compute daily discharges.

MONTHLY DISCHARGE OF ROSEAU RIVER AT STUARTBURN FOR 1915.

[Drainage area 1,810 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
May			[1]775	0·428	0·493	47,700
June	927	417	678	0·375	0·418	40,300
July	1,084	477	840	0·464	0·535	51,600
August	454	51	172	0·095	0·110	10,600
September	44	3	24	0·013	0·014	1,430
October	65	35	52	0·029	0·033	3,200
November			[1]60	0·033	0·037	3,570
December			[1]30	0·017	0·020	1,850
The Period	1,084	3	329	0·182	1·660	160,250

NOTE.—Discharges marked thus ([1]) are estimated.

ROSEAU RIVER BELOW DOMINION CITY.

HISTORY.

The section at Baskerville's farm while satisfactory was considerably out of the route and entailed a drive of nearly eighteen miles. On April 14, 1914, the above station was established by D. B. Gow to supersede it.

LOCATION OF SECTION.

The station below Dominion City is about 2,000 feet below the C.P.R. bridge over the Roseau and about 2,100 feet below the C.P.R. dam on the river. The I.P. is a nail in an eight inch white ash tree blazed and near the top of the left bank.

RECORDS AVAILABLE.

A daily gauge height record has been kept since April 14, 1914, and sufficient meterings have been taken to define the discharge curve. Daily discharges have been computed for the station.

DRAINAGE AREA.

The drainage area is 1,940 square miles.

GAUGE.

The gauge is a vertical staff fastened to a two by four inch scantling driven into the stream bed and braced. It is located one thousand feet below the section and is nearer the town on account of the winding of the river.

CHANNEL.

There is only one channel at all stages. The bottom is fairly permanent, the banks are sloping and not subject to overflow. The channel is straight for three hundred and fifty feet above the section and for one hundred feet below.

DISCHARGE MEASUREMENTS.

Measurements are made by means of a cable carrier, the cable being stretched across the stream and the meterings are made by suspending the meter from it. The meterings cover a range in stage of five feet.

ACCURACY.

The discharge curve is well defined between gauge heights 87·00 and 89·00 and fairly well defined between gauge heights 89·00 and 92·70.

DISCHARGE MEASUREMENTS OF ROSEAU RIVER BELOW DOMINION CITY, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
Jan. 21.	C. O. Allen......	1,912	43·0	45	0·24	87·46	11	Ice Measurement.
21.	"	1,913	43·0	45	0·19	87·46	9	" "
Mar. 20.	"	1,912	33·0	25	0·67	88·43	17	" "
April 15.	T. J. Moore......	1,435	66·5	520	1·86	93·32	967	Boat Measurement.
May 22.	C. O. Allen......	2,018	83·5	512	1·88	90·06	963	Not at regular sec.
June 19.	"	2,018	62·0	411	1·89	92·56	778	
July 9.	T. H. Boyd......	1,197	86·0	692	1·77	95·51	1,226	
9.	"	1,197	86·0	692	1·73	95·49	1,198	
22.	"	1,197	67·7	465	1·92	93·20	893	
22.	"	1,197	67·7	465	1·91	93·18	888	
Aug. 20.	"	1,197	50·3	119	0·95	87·60	113	
Sept. 14.	"	1,197	42·0	64	0·37	86·47	24	
Nov. 21.	C. O. Allen......	1,374	51·0	137	0·91	88·35	124	Ice Measurement.

DAILY GAUGE AND HEIGHT DISCHARGE OF ROSEAU RIVER BELOW DOMINION CITY FOR 1915.

[Drainage area 1,880 square miles.]

Day	January Gauge Height	January Dis-charge	February Gauge Height	February Dis-charge	March Gauge Height	March Dis-charge	April Gauge Height	April Dis-charge	May Gauge Height	May Dis-charge	June Gauge Height	June Dis-charge
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1									91·96	682	92·72	796
2									92·13	707	92·24	724
3									92·23	723	91·94	679
4									92·25	725	91·42	601
5									92·16	712	91·12	556
6									91·93	677	90·94	529
7									91·92	676	90·47	459
8									91·73	647	90·42	452
9									91·53	618	90·52	466
10									91·55	621	90·54	469
11									91·63	632	90·81	510
12									91·38	595	91·02	541
13									91·73	647	91·31	585
14									92·02	691	91·54	619
15							93·33	888	92·25	726	91·62	631
16							92·93	827	92·54	769	91·81	660
17							92·83	812	92·62	781	92·12	706
18							92·63	782	92·74	799	92·37	743
19							92·05	696	92·82	811	92·55	771
20					88·43	17	92·03	692	92·97	834	92·72	796
21	87·71	10					91·82	661	93·04	844	92·80	808
22							91·72	646	93·14	859	92·89	822
23							91·63	632	93·21	869	93·00	838
24							91·42	601	93·32	886	93·12	856
25							91·23	573	93·34	889	93·19	867
26							91·05	546	93·42	901	93·32	886
27							90·95	530	93·47	909	93·50	914
28							91·07	548	93·51	916	93·55	922
29							91·22	571	93·42	901	93·65	938
30							91·42	601	93·21	869	93·70	946
31									93·01	839		

Day	July Gauge Height	July Dis-charge	August Gauge Height	August Dis-charge	September Gauge Height	September Dis-charge	October Gauge Height	October Dis-charge	November Gauge Height	November Dis-charge	December Gauge Height	December Dis-charge
1	93·82	964	90·60	478	86·82	49	86·62	34	86·82	49	88·21	
2	94·00	991	90·52	466	86·57	31	86·53	28	86·89	54	88·16	
3	¹94·20	1,021	90·30	435	86·47	24	86·63	35	86·91	56	88·13	
4	¹94·30	1,036	90·10	407	86·46	24	86·64	36	86·51	27	88·11	
5	94·50	1,066	89·92	381	¹86·46	24	86·83	49	86·66	37	88·09	
6	94·85	1,119	89·72	353	¹86·47	24	86·89	54	86·80	47	88·06	
7	95·10	1,156	89·55	330	¹86·46	24	86·94	58	86·89	54	88·06	
8	95·39	1,200	89·30	297	¹86·45	23	86·96	60	86·93	57	88·03	
9	95·50	1,216	89·22	287	¹86·40	20	87·04	66	87·01	64	87·91	
10	95·82	1,264	89·10	273	¹86·38	19	86·99	62	87·03	65	87·99	
11	95·95	1,284	88·90	249	¹86·40	20	86·93	57	87·06	68	87·99	
12	95·90	1,276	88·79	236	¹86·38	19	87·04	66	87·40	98	87·96	
13	95·42	1,204	¹88·60	215	¹86·43	22	87·03	65	87·21	81	87·95	
14	95·05	1,149	¹88·40	193	86·46	24	86·95	59	87·50	85	87·95	
15	95·10	1,156	¹88·10	163	86·45	23	87·04	66	87·50	107	87·94	
16	94·70	1,096	¹87·80	134	86·41	21	86·94	58	88·01		87·94	
17	94·35	1·044	¹87·60	116	86·41	21	86·97	61	88·60		87·91	
18	93·95	984	¹87·40	98	86·45	23	86·91	56	88·51		87·93	
19	93·82	964	¹87·30	89	86·46	24	86·87	53	88·46		87·81	
20	93·80	961	87·22	82	86·45	23	86·84	50	88·41		87·99	
21	93·79	960	87·16	76	86·41	21	86·74	43	88·31	124	88·01	
22	93·10	853	87·07	69	86·38	19	86·81	48	88·39		88·01	
23	92·89	822	86·99	62	86·45	23	86·67	38	88·29		87·99	
24	92·80	808	86·87	53	86·46	24	86·84	50	88·41		87·96	
25	92·49	762	86·86	52	86·58	32	86·87	53	88·36		87·95	
26	92·10	703	86·77	45	86·61	34	86·91	56	88·31		87·95	
27	91·80	658	86·69	39	86·65	37	86·94	58	88·31		87·95	
28	91·52	616	86·67	38	86·65	37	86·96	60	88·31		87·95	
29	91·30	583	86·66	37	86·61	34	86·91	56	88·26		87·95	
30	91·09	552	86·57	31	86·58	32	86·82	49	88·23		87·96	
31	90·85	516	86·76	44			86·87	53			87·96	

NOTE.—Gauge heights marked thus (¹) Interpolated.

Ice Conditions from January 1 to April 14 and from November 16 to December 31. Not sufficient information to compute daily discharges.

Monthly Discharge of Roseau River Near Dominion City for 1915.

[Drainage area 2,150 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.
January..................	....	....	[1]10	0·005	0·006	615
February.................	....	....	[1]8	0·004	0·004	444
March...................	....	....	[1]15	0·007	0·008	922
April....................	....	....	[1]360	0·167	0·187	21,400
May.....................	916	595	766	0·356	0·410	47,100
June....................	946	452	703	0·327	0·365	41,800
July....................	1,284	516	967	0·450	0·519	59,500
August..................	478	31	188	0·087	0·100	11,600
September...............	49	19	26	0·012	0·013	1,550
October.................	66	28	53	0·025	0·029	3,250
November................	....	....	[1]90	0·042	0·047	5,350
December................	....	....	[1]45	0·021	0·024	2,775
The Year............	1,284	....	269	0·125	1·712	196,306

NOTE.—Discharges marked thus ([1]) are estimated.

THE RAT RIVER.

The drainage area of the Rat river from its source to its mouth comprises 997 square miles. The northern boundary of this area is formed by the watersheds of the Whitemouth and Seine rivers, while its southern limits consist of the northern slope of the watershed of the Roseau river.

The west branch of the river takes its rise in the country lying to the southeast of the town of Woodridge on the Ontario Branch of the Canadian Northern Railway, and is confined chiefly to Tp. 3, R. 11, E.P.M. The first ten miles of its course the river has a southwesterly bearing, from this latter point it flows northwest for about four miles, then nearly due south for three miles, then north for about six miles. This latter point lies about two miles east of the town of Zhoda, from this point it flows through a swampy and marshy country due west for about eighteen miles and then in a northwesterly direction to its mouth at the Red river.

The territory drained is generally flat prairie country, except in the upper reaches, where the land is inclined to be wet and swampy. Nearly all the drainage area is under cultivation, the settlement being about the oldest in the province.

RAT RIVER AT OTTERBURNE.

HISTORY.

The station was established by S. S. Scovil on May 23, 1912.

LOCATION OF SECTION.

The section is on the downstream side of the bridge which crosses the Rat at F. X. Joubert's farm, four miles from Otterburne by the C.P.R. and two miles from St. Pierre. The I.P. is marked by a spike driven in the south end of the downstream railing

RECORDS AVAILABLE.

A daily gauge height record has been kept for the open water periods from May 23, 1913, to date. During the winter periods an intermittent record has been kept and is available. Estimates of daily discharge have been prepared based upon the rating curve constructed from the meter records.

DRAINAGE AREA.

The area drained is 650 square miles. The basin lies between the Roseau on the south and the Seine and Whitemouth on the north and east.

GAUGE.

The gauge is a nine-foot vertical staff gauge secured to a pile sixteen feet from the left bank at the section. This gauge is referred to a permanent M.H.S. B.M. located about 30 feet southwest from the gauge. The B.M. is set to an assumed datum.

CHANNEL.

Above the station the channel is straight for two hundred feet and for one hundred feet below. There is one channel at all stages. The bottom is of clay and liable to shift.

DISCHARGE MEASUREMENTS.

Discharge measurements are made from the downstream side of the bridge. A range in stage of 8.4 feet has been defined on the rating curve. Under winter conditions it has not been possible to obtain a rating.

DIVERSIONS.

The C.P.R. has constructed a dam four miles below the metering station and use the pond created as a source of supply. Under low water conditions it is reported the company utilize the whole flow of the river.

ACCURACY.

From gauge height 88.30 to 92.40 the discharge curve is well defined, from 92.40 to 96.70 it is fairly well defined. It is not possible to define a discharge curve for winter conditions.

DISCHARGE MEASUREMENTS OF RAT RIVER AT OTTERBURNE, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 4	M. S. Madden	1,462	21·0	3·3	0·00	88·37	0·0[1]
April 16	T. J. Moore	1,435	51·2	151·6	1·11	91·49	168·3
May 22	C. O. Allen	2,018	43·0	103·2	0·94	90·18	97·0
June 20	"	2,018	38·3	81·5	0·88	89·68	71·7
July 10	T. H. Boyd	1,197	35·7	57·7	0·66	89·10	38·1
July 23	"	1,197	35·7	67·5	0·71	89·22	48·0
Aug. 21	"	1,197	29·7	29·8	0·00	88·19	0·0[2]
Nov. 17	C. O. Allen	1,374	37·0	57·4	0·62	89·57	35·6[1]

[1] Ice cover.
[2] No discharge.

Daily Gauge Height and Discharge of Rat River at Otterburne for 1915.
[Drainage area 650 square miles.]

Day.	January. Gauge Height.	Dis-charge.	February. Gauge Height.	Dis-charge.	March. Gauge Height.	Dis-charge.	April. Gauge Height.	Dis-charge.	May. Gauge Height.	Dis-charge.	June. Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1									91·48	172	89·08	37
2									91·52	174	89·00	33
3									91·56	177	88·94	30
4	88·37	0					90·56		91·61	181	88·89	28
5							90·59		91·65	184	88·85	26
6							90·79		91·60	180	88·85	26
7							90·79		91·20	154	88·88	27
8							90·81		91·10	148	88·91	28
9							90·86		91·10	148	89·01	33
10							91·36		91·03	144	89·09	38
11							¹91·36		91·00	142	89·17	42
12							¹91·36		91·03	144	89·28	47
13							¹91·38		91·04	144	89·46	56
14							¹91·43		91·07	146	89·67	67
15							¹91·47		91·05	145	89·80	73
16							91·49	172	91·00	142	89·81	74
17							91·42	167	90·76	128	89·78	72
18							91·09	147	90·74	127	89·73	70
19							90·80	130	90·50	112	89·63	64
20							90·38	105	90·45	109	89·68	67
21							90·35	103	90·26	98	89·65	66
22							90·30	100	90·21	95	89·62	64
23							90·22	95	90·09	88	89·50	58
24							90·29	99	89·98	82	89·49	57
25							90·73	126	89·90	78	89·46	56
26							90·98	137	89·82	74	89·42	54
27							91·10	148	89·70	68	89·39	53
28							91·30	160	89·69	68	89·42	54
29							91·40	166	89·50	58	89·45	55
30							91·42	167	89·40	53	89·47	56
31									89·28	47		

Day	July.	Dis.	August.	Dis.	September.	Dis.	October.	Dis.	November.	Dis.	December.	Dis.
1	89·48	57	88·74	20	88·08	1	88·82	24	89·01	33	89·23	
2	89·43	55	88·72	19	88·07	1	88·82	24	89·04	35	89·22	
3	89·38	52	88·68	17	88·05		88·81	23	89·03	34	89·14	
4	89·33	49	88·64	15	88·02		88·77	22	89·00	33	89·12	
5	89·30	48	88·60	13	88·01		88·80	23	88·96	31	89·12	
6	89·25	45	88·55	11	88·00		88·87	27	88·92	29	89·12	
7	89·20	43	88·47	8	88·00		88·88	27	88·89	28	89·11	
8	89·10	38	88·44	7	88·01		88·87	27	88·96	31	89·11	
9	89·10	38	88·42	7	88·01		88·85	25	89·02	34	89·16	
10	89·10	38	88·37	5	88·02		88·82	24	89·02	34	89·27	
11	89·10	38	88·32	4	88·02		88·79	23	89·05	35	89·27	
12	89·10	38	88·30	4	88·02		88·78	22	88·95	30	89·24	
13	89·10	38	88·30	4	88·09	1	88·82	24	89·04		89·27	
14	89·09	38	88·10	1	88·21	2	88·85	25	89·15		89·26	
15	89·09	38	87·80		88·32	4	88·84	25	89·27		89·25	
16	89·07	37	87·70		88·33	5	88·82	24	89·55		89·24	
17	89·06	36	87·60		88·34	5	88·80	23	89·58	36	89·27	
18	89·04	35	87·70		88·35	5	88·80	23	89·47		89·25	
19	89·03	34	87·80		88·34	5	88·79	23	89·38		89·23	
20	89·00	34	88·00		88·37	5	88·78	22	89·35		89·22	
21	89·05	35	88·11	1	88·38	6	88·77	21	89·33		89·21	
22	89·05	35	88·09	1	88·39	6	88·76	21	89·31		89·19	
23	89·06	36	88·08	1	88·40	6	88·76	21	89·17		89·20	
24	89·08	37	88·08	1	88·37	6	88·75	20	89·17		89·20	
25	89·19	43	88·09	1	88·43	7	88·82	24	89·27		89·23	
26	89·16	41	88·09	1	88·47	8	88·87	27	89·28		89·24	
27	89·10	38	88·10	1	88·54	11	88·92	29	89·29		89·25	
28	89·05	35	88·11	1	88·55	11	88·95	30	89·29		89·25	
29	88·98	32	88·11	1	88·56	11	88·97	32	89·28		89·12	
30	88·22	24	88·12	1	88·62	14	88·97	32	89·17		89·10	
31	88·76	21	88·10	1			88·97	32			89·14	

Note.—Gauge heights marked thus (¹) interpolated.
Ice conditions from January 1 to April 15 and November 13 to December 31.
Not sufficient information to compute daily discharges.

No

Or
Ste. An
and no
were ag

Th
The me
downst
west en

Rec
year 19
also ava
of 3·3 fe

The

A si
downstre
first tele

MONTHLY DISCHARGE OF RAT RIVER AT OTTERBURNE FOR THE YEAR 1915.

[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.
January			¹0			
February			¹0			
March			¹2	0·003	0·003	123
April			¹95	0·146	0·163	5,650
May	184	47	123	0·189	0·218	7,550
June	74	26	50	0·077	0·086	2,975
July	57	21	39	0·060	0·069	2,400
August	20	0	5	0·008	0·009	307
September	14	0	4	0·006	0·007	238
October	32	20	25	0·038	0·044	1,540
November			¹25	0·038	0·042	1,500
December			¹5	0·008	0·009	307
The Period	184	0	31	0·048	0·650	22,590

NOTE.—All marked thus (¹) estimated.

SEINE RIVER AT STE. ANNE DE CHENES.

HISTORY.

On October 4, 1912, a metering station was established on the Seine river near Ste. Anne des Chenes, but observations were discontinued on November 11 of the same year, and no further information was obtained at this point until May 1, 1915, when operations were again commenced in an endeavour to obtain a rating of the river.

LOCATION OF SECTION.

The Seine is a tributary of the Red river and joins same in the City of St. Boniface. The metering station is located about one mile east of the town of Ste. Anne des Chenes on the downstream side of the C.N. Ry. bridge at this point. The Initial Point is a bolt on the west end of the bridge.

RECORDS AVAILABLE.

Records of gauge readings are available from October 4 to November 11 for the year 1912, and from May 1 to November 12 for 1915. Estimated daily discharges are also available during the latter period based on discharge measurements covering a range of 3·3 feet.

DRAINAGE AREA.

The drainage area tributary to the river at this point is 310 square miles.

GAUGE.

A six-foot vertical staff gauge is secured to the fourth pile from the west end on the downstream side of the C.N. Ry. bridge This gauge is referred to a B.M. located on the first telegraph pole west of the bridge.

CHANNEL.

The section is located at a slightly curved part of the river. The bed of the stream is sandy, and at all stages the flow of the river will be confined to the one channel covered by the section.

DISCHARGE MEASUREMENTS.

The discharge measurements at all stages of the river are taken from the bridge.

ACCUARCY.

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

DISCHARGE MEASUREMENT OF SEINE RIVER AT STE. ANNE DES CHENES, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 1...	Alex. Pirie.........	1,939	71	288·8	1·52	95·93	440·7
May 19...	G. K. Gainsford....	1,187	61	161·7	1·09	94·02	176·5
June 8...	C. O. Allen........	2,018	56	131·2	0·43	93·24	56·4
June 28..	E. B. Patterson....	1,920	62	152·6	0·72	93·83	109·9
Aug. 6 ..	T. H. Boyd........	1,197	44	77·5	0·00	92·67	0·00

DAILY GAUGE HEIGHT AND DISCHARGE OF SEINE RIVER AT STE. ANNE DES CHENES FOR 1915.

[Drainage area 310 square miles.]

Day.	January. Gauge Height.	Dis- charge.	February. Gauge Height.	Dis- charge.	March. Gauge Height.	Dis- charge.	April. Gauge Height.	Dis- charge.	May. Gauge Height.	Dis- charge.	June. Gauge Height.	Dis- charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1									95·93	440	93·14	42
2									95·52	382	93·13	40
3									95·29	348	93·04	28
4									94·93	297	93·04	28
5									94·76	272	92·94	15
6									94·58	247	93·04	28
7									94·50	236	93·02	25
8									94·59	249	93·23	54
9									94·77	274	93·24	56
10									94·85	285	93·51	94
11									94·75	271	93·53	97
12									94·65	257	93·61	108
13									94·61	251	93·63	111
14									94·50	236	93·67	117
15									94·35	214	93·68	118
16									94·25	199	93·69	120
17									94·10	178	93·74	127
18									93·95	157	93·79	134
19									94·04	170	93·83	139
20									93·94	155	93·77	131
21									93·84	141	93·73	125
22									93·74	127	93·69	120
23									93·69	120	93·67	117
24									93·61	108	93·59	106
25									93·54	99	93·57	103
26									93·50	93	93·53	97
27									93·42	81	93·67	117
28									93·39	77	93·81	136
29									93·34	70	93·88	146
30									93·24	56	93·69	120
31									93·22	53		

Day	July.		August.		September.		October.		November.		December.	
1	93·63	111	92·84	7	92·38	0	92·99	21	93·39	77		
2	93·59	106	92·79	5	92·38	0	92·99	21	93·39	77		
3	93·58	104	92·74	2	92·38	0	92·99	21	93·41	80		
4	93·53	97	92·69	0	92·39	0	92·99	21	93·37	74		
5	93·51	94	92·69	0	92·38	0	92·97	18	93·35	71		
6	93·49	92	92·67	0	92·37	0	92·99	21	93·33	68		
7	93·44	84	92·64	0	92·34	0	92·99	21	93·29	63		
8	93·34	70	92·59	0	92·38	0	92·99	21	93·34	70		
9	93·27	60	92·58	0	92·34	0	93·09	35	93·39	70		
10	93·28	61	92·55	0	92·37	0	93·24	56	93·41	80		
11	93·20	50	92·54	0	92·38	0	93·30	64	93·42	81		
12	93·19	49	92·58	0	92·37	0	93·34	70	93·44	84		
13	93·47	89	92·57	0	92·41	0	93·39	77				
14	93·48	90	92·49	0	92·47	0	93·40	78				
15	93·39	77	92·47	0	92·49	0	93·39	77				
16	93·29	63	92·45	0	92·50	0	93·38	75				
17	93·19	49	92·44	0	92·48	0	93·39	77				
18	93·19	49	92·49	0	92·57	0	93·39	77				
19	93·19	49	92·51	0	92·59	0	93·39	77				
20	93·17	46	92·49	0	92·58	0	93·39	77				
21	93·29	63	92·50	0	92·56	0	93·89	148				
22	93·39	77	92·49	0	92·55	0	93·86	143				
23	93·29	63	92·48	0	92·59	0	93·89	148				
24	93·19	49	92·47	0	92·61	0	93·39	77				
25	93·18	47	92·45	0	92·89	9	93·40	78				
26	93·14	42	92·41	0	92·69	0	93·29	63				
27	93·09	35	92·40	0	92·64	0	93·34	70				
28	92·99	21	92·39	0	92·89	9	93·27	60				
29	92·89	10	92·41	0	92·99	21	93·34	70				
30	92·86	8	92·39	0	92·99	21	93·39	77				
31	92·79	5	92·39	0			93·40	78				

NOTE—Ice conditions November 13 to December 31.
Not sufficient information to compute daily discharges.

MONTHLY DISCHARGE OF SEINE RIVER AT STE. ANNE DES CHENES FOR 1915.

[Drainage area 310 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.
May	440	53	198	0·639	0·737	12,200
June	146	15	93	0·300	0·335	5,530
July	111	5	62	0·200	0·231	3,800
August	7	0	0	0·000	0·000	0
September	21	0	2	0·006	0·007	119
October	148	18	65	0·210	0·242	4,000
November			¹40	0·129	0·144	2,380
December			¹10	0·032	0·037	615
The Period			59	0·189	1·733	28,644

NOTE.—Marked thus (¹) estimated.

ASSINIBOINE RIVER AND TRIBUTARIES.

ASSINIBOINE RIVER.

The Assiniboine river is one of the chief tributaries of the Red river, joining the latter within the city limits of Winnipeg, rising in the province of Saskatchewan on the south-eastern slope of the Nut mountains. It flows in a southeasterly direction and crosses the Manitoba boundary in Tp. 26, R. 28, W.P.M., and thence nearly due south until it reaches Tp. 10, R. 25, W.P.M., where it turns and flows south and east to the Red river.

The principal tributaries of the Assiniboine are the Shell, Qu'Appelle, Little Saskatchewan and Souris rivers. The total drainage area is 59,550 square miles, of which 8,800 square miles are in the State of North Dakota, 37,700 square miles in the province of Saskatchewan and 13,050 square miles in the province of Manitoba.

The area drained varies between the open prairie to be found in the southwestern part of the province and the well timbered country lying on the slopes of the Duck and Riding mountains. In the prairie country the banks are sharp cut, rising abruptly from the water's edge for a height varying from three to twenty-five feet. In the wooded section or the upper part of the drainage area the valley is well defined and narrow, the rise from the river in some places reaching an elevation of two hundred and fifty feet above the water level.

In the lower part of the river basin the land is nearly all under cultivation, the soil is rich but in the valley bottom it is subject to overflow. It flows through the most densely populated part of the Province, the three largest cities, Portage La Prairie, Brandon and Winnipeg being built upon its banks.

The importance of this river as a source of water supply, a means of drainage and sewage disposal is great in a district where the natural water supply is somewhat limited. In order that a study may properly be made of its regimen and data for various purposes be gathered several gauging stations have been established. All have not been in continuous operation but discharge records have been obtained at the following places on the river:—

    1. Millwood.
    2. Brandon.
    3. Headingly.
    4. St. James.

TRIBUTARIES.

The tributaries of the Assiniboine river in order from source to mouth are:—

    1. Shell river.
    2. Qu'Appelle river.
    3. Birdtail Creek.

4.   Little Saskatchewan river.
5.   Souris river.
6.   Cypress river.

On all of these, with the exception of the Qu'Appelle river, records of discharge are available.

ASSINIBOINE RIVER AT MILLWOOD.

HISTORY.

The station on the Assiniboine river at Millwood was established by W. G. Worden on October 11, 1912, and has been in operation since that time.

LOCATION OF SECTION.

The meter section is located on the downstream side of the traffic bridge, four hundred feet below the dam, one-quarter of a mile south from the town and one-half mile below the C.P.R. bridge. The I.P. is an arrow cut and painted on the top of the wooden hand rail of the bridge at the northeast corner on the downstream side. It is marked "O+OO I.P."

RECORDS AVAILABLE.

Daily gauge height records are available for the station from October 11, 1912, to the end of 1915, except for the period February 9 to March 28, 1914. Estimates of daily discharge are available from January 27, 1913, to the end of 1915, except for the above period.

DRAINAGE AREA.

The area tributary to the Assiniboine river above the station is 7,590 square miles.

GAUGE.

A 12-foot vertical staff gauge is secured to the centre pier of the bridge on the downstream side; it is referred to a permanent M.H.S. B.M. located 75 feet southeast from the downstream side of the bridge on the left bank. This B.M. is set to an assumed datum.
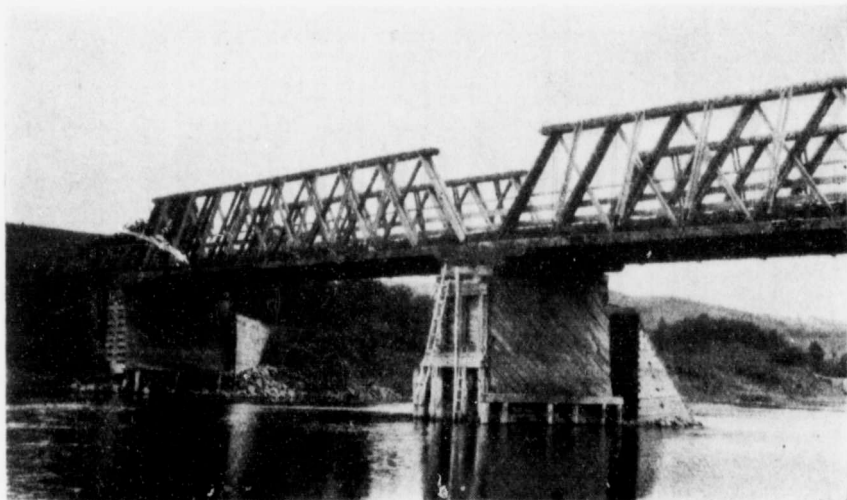
Taken by T. H. Boyd.

ASSINIBOINE RIVER—MILLWOOD—BRIDGE FROM BELOW, SHOWING GAUGE.

CHANNEL.

For four hundred feet above the section and two hundred feet below the channel is straight. The river at all stages occupies one channel, which is divided just above the section by a central pier of the bridge. The bed of the stream is clay, sand and gravel and not subject to shifting. The banks are low and liable to overflow at high stages.

DISCHARGE MEASUREMENTS.

The discharge measurements are taken from the downstream side of the bridge and cover a range in stage under open water conditions of 8·3 feet.

ACCURACY.

Under open water conditions the discharge curve is well defined between the limits 98·91 and 107·4, beyond which it is not well defined. The discharge curve for ice conditions is fairly well defined between gauge heights 97·5 and 99·5.

DISCHARGE MEASUREMENTS OF ASSINIBOINE RIVER AT MILLWOOD, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec	Feet.	Sec. ft.
Jan. 21...	M. S. Madden.....	1,462	141	153	0·31	99·90	51[1]
Mar. 17...	"	1,462	131	183	0·34	99·83	63[1]
April 18...	C. O. Allen.......	1,912	145	647	1·51	101·12	972
27...	"	1,912	145	488	0·87	99·96	423
May 12...	"	2,018	142	409	0·63	99·37	258
June 3...	"	2,018	143	373	0·54	99·19	201
July 28...	T. H. Boyd........	1,197	141	423	0·95	99·79	402
Sept. 3...	"	1,197	145	286	0·35	99·06	100
Oct. 26...	C. O. Allen........	1,374	143	358	0·48	99·02	172

[1] Ice Measurement

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF ASSINOBOINE RIVER AT MILLWOOD FOR 1915.

[Drainage area 7,590 square miles.]

Day	January Gauge Height.	January Discharge.	February Gauge Height	February Discharge.	March Gauge Height.	March Discharge.	April Gauge Height.	April Discharge.	May Gauge Height.	May Discharge.	June Gauge Height.	June Discharge.
	Feet	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	99·56	......	99·98	......	99·73	......	99·58	......	99·72	373	99·21	193
2	99·43	......	100·08	......	99·78	......	99·53	......	99·66	349	99·19	187
3	99·73	......	100·09	......	99·91	......	99·58	......	99·61	329	99·15	175
4	99·98	......	100·03	......	99·91	......	99·60	......	99·56	311	99·11	163
5	99·78	......	99·98	......	99·96	......	99·63	......	99·52	297	99·11	163
6	99·65	......	99·98	......	100·35	......	99·71	369	99·50	290	99·21	193
7	99·68	......	99·78	......	99·83	......	99·74	381	99·46	276	99·22	196
8	99·61	......	99·73	......	99·71	......	99·83	417	99·43	265	99·27	211
9	99·80	......	99·68	......	99·75	......	99·88	436	99·40	255	99·31	224
10	99·80	......	100·03	......	99·78	......	100·15	558	99·36	241	99·36	241
11	99·73	......	99·83	......	99·88	......	100·18	571	99·37	245	99·44	269
12	99·68	......	99·64	......	99·88	......	100·33	638	99·37	245	99·41	258
13	99·79	......	100·25	......	99·85	......	100·44	690	99·36	241	99·41	258
14	99·63	......	99·78	......	99·88	......	100·79	865	99·35	237	99·51	293
15	99·68	......	99·78	......	99·78	......	100·82	880	99·33	230	99·49	286
16	100·16	......	99·80	......	99·83	......	101·21	1,075	99·31	224	99·46	276
17	99·83	......	99·78	......	99·83	......	101·44	1,202	99·31	224	99·51	293
18	99·88	......	99·71	......	99·88	......	101·14	1,040	99·31	224	99·46	276
19	99·93	......	99·70	......	99·78	......	100·81	875	99·31	224	99·41	258
20	99·93	......	99·76	......	99·88	......	100·69	815	99·31	224	99·48	283
21	99·87	......	99·66	......	99·83	......	100·52	730	99·31	224	99·61	329
22	99·84	......	100·48	......	99·83	......	100·41	675	99·31	224	99·55	307
23	99·68	......	99·78	......	99·73	......	100·27	612	99·31	224	99·55	307
24	99·53	......	99·73	......	99·58	......	100·12	544	99·30	220	99·57	315
25	100·08	......	99·83	......	99·68	......	100·06	517	99·29	217	99·55	307
26	100·18	......	99·78	......	99·79	......	100·00	490	99·29	217	99·53	300
27	100·68	......	99·78	......	99·69	......	99·91	450	99·27	211	99·51	294
28	100·38	......	99·86	......	99·69	......	99·86	429	99·26	208	99·51	294
29	100·18	......			99·68	......	99·84	421	99·26	208	99·48	283
30	100·08	......			99·58	......	99·78	397	99·25	205	99·46	276
31	99·88	......			99·58	......			99·23	199		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	99·45	273	99·55	308	98·87	98	99·04	142	99·00	130	......	......
2	99·45	273	99·51	293	98·89	102	99·05	145	99·00	130	......	......
3	99·43	265	99·46	276	98·91	107	99·11	163	99·01	133	......	......
4	99·41	258	99·41	258	98·93	113	99·10	160	99·01	133	......	......
5	99·51	293	99·36	241	98·90	105	99·10	160	99·01	133	......	......
6	99·52	297	99·31	224	98·91	108	99·09	157	99·02	136	......	......
7	99·54	304	99·26	208	98·91	108	99·08	154	99·02	136	......	......
8	99·53	300	99·21	193	98·92	101	99·06	148	99·00	130	......	......
9	99·53	300	99·16	178	99·93	112	99·05	145	98·88	100	......	......
10	99·51	293	99·12	166	99·00	130	99·04	142	98·75	70	......	......
11	99·51	293	99·08	154	98·99	127	99·03	139	98·86	95	......	......
12	99·46	276	99·06	148	98·95	117	99·03	139	99·00	130	......	......
13	99·43	265	99·04	142	98·93	112	99·02	136	99·02	136	......	......
14	99·41	259	99·03	139	98·92	110	99·02	136	99·02	136	......	......
15	99·53	300	99·01	133	98·93	112	99·02	136	99·00	130	......	......
16	99·59	321	98·98	125	98·94	115	99·01	133	98·98	125	......	......
17	99·74	381	98·96	120	98·96	120	99·01	133	98·98	125	......	......
18	99·81	409	98·94	115	98·98	125	99·01	133	99·00	130	......	......
19	99·85	425	98·91	107	99·00	130	99·01	133	99·03	139	......	......
20	99·92	454	98·89	103	99·01	133	99·00	130	99·05	145	......	......
21	100·16	562	98·88	100	99·02	136	99·00	130	99·06	148	......	......
22	100·30	625	98·87	98	99·01	133	98·99	127	99·07	151	......	......
23	100·21	584	98·86	95	99·00	133	99·00	130	99·07	151	......	......
24	100·16	562	98·85	92	99·00	130	99·00	130	99·08	154	......	......
25	100·07	521	98·84	90	98·98	125	99·01	133	99·09	157	......	......
26	99·96	472	98·83	88	98·96	120	99·02	136	99·10	160	......	......
27	99·91	449	98·82	85	98·95	118	99·02	136	99·10	160	......	......
28	99·79	401	98·82	85	98·95	118	99·01	133	99·11	163	......	......
29	99·71	369	98·83	88	98·96	120	99·01	133	99·11	......	......	......
30	99·67	353	98·84	90	98·99	128	99·01	133	99·12	......	......	......
31	99·59	321	98·85	92			99·01	133			......	......

NOTE.—Ice Conditions from January 1 to April 5 and November 29 to end of year. Not sufficient information to compute daily discharges.

MONTHLY DISCHARGE OF ASSINIBOINE RIVER AT MILLWOOD FOR THE YEAR 1915.

[Drainage area 7,590 square miles.]

| MONTH. | DISCHARGE IN SECOND-FEET. | | | | RUN-OFF. | |
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches of Drainage Area.	Total in acre-feet.
January		51	¹45	0·006	0·007	2,775
February			¹63	0·008	0·008	3,500
March			¹65	0·009	0·010	4,000
April	1,202		¹590	0·078	0·087	35,100
May	373	199	247	0·032	0·037	15,200
June	329	163	257	0·034	0·038	15,300
July	625	258	370	0·049	0·056	22,800
August	308	88	149	0·020	0·023	9,200
September	136	98	119	0·016	0·018	7,100
October	163	130	140	0·018	0·021	8,600
November	163		¹130	0·017	0·019	7,700
December			¹75	0·010	0·011	4,600
The Year	1,202	51	188	0·025	0·335	135,875

NOTE.—Marked thus (¹) estimated.

ASSINIBOINE RIVER AT BRANDON.

HISTORY.

The station on the Assiniboine at Brandon was established on July 4, 1912, by G. H. Burnham and has been operated since that date.

LOCATION OF SECTION.

The meter section is located on the downstream side of First Street traffic bridge, locally known as the Iron Bridge, in the city of Brandon, Manitoba. The I.P. is marked on the iron railing on the downstream side of the bridge at the south end.

RECORDS AVAILABLE.

Nearly continuous records of daily gauge heights are available from July 4, 1912, to the end of 1915. Estimates of daily discharge have been made for the same period.

DRAINAGE AREA.

The drainage area of the Assiniboine river above Brandon is 34,500 square miles.

GAUGE.

A nine-foot vertical staff gauge is nailed to the ice breaker fifty feet upstream from and opposite station 1+60 on the metering section.

CHANNEL.

For three hundred feet upstream and one hundred and fifty feet downstream the channel is straight. It is divided at the section into three parts by the bridge piers. The bottom is of mud and liable to shift, especially at high stages. The banks are high but liable to overflow at high stages.

SESSIONAL PAPER No. 25f

DISCHARGE MEASUREMENTS.

The meterings are made from the downstream side of the bridge. They cover a range in stage under open water conditions of 12·5 feet.

ACCURACY.

Between gauge heights 97·5 and 104·1 the discharge curve is well defined, between 104·1 and 110·0 it is fairly well defined, above and below these limits it is not well defined for open water conditions. Between gauge heights 96·5 and 98·0 the discharge curve for winter conditions is fairly well defined.

DISCHARGE MEASUREMENTS OF ASSINIBOINE RIVER AT BRANDON, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 4...	C. O. Allen........	1,912	183	201	0·35	98·07	71[1]
26...	M. S. Madden.....	1,462	169	186	0·30	98·35	57[1]
Mar. 22...	"	1,462	129	110	0·98	98·33	108[2]
April 14...	C. O. Allen........	1,912	172	426	2·24	98·87	956
21...	"	1,912	197	582	2·46	99·65	1,432
23...	"	1,912	197	582	2·50	99·69	1,451
23...	"	1,912	197	582	2·50	99·68	1,454
May 7...	"	2,018	172	381	1·83	98·51	698
26...	"	2,018	170	361	1·60	98·33	587
29...	"	2,018	170	342	1·59	98·25	544
Aug. 2...	T. H. Boyd.......	1,197	162	349	1·97	98·47	629
Sept. 2...	"	1,197	141	162	0·97	97·32	157
Oct. 3...	C. O. Allen........	1,374	151	242	1·06	97·65	257

[1] Ice measurement.
[2] Section partly open.

DAILY GAUGE HEIGHT AND DISCHARGE OF ASSINIBOINE RIVER AT BRANDON FOR 1915.
[Drainage area 34,500 square miles.]

Day	January		February		March		April		May		June	
	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	98·14	.....	98·35	.....	98·43	.....	98·36	.....	98·49	672	98·19	497
2	98·12	.....	98·35	.....	98·43	.....	98·32	.....	98·48	666	98·19	497
3	98·07	.....	98·38	.....	98·43	.....	98·33	.....	98·49	672	97·93	374
4	98·07	71	98·39	.....	98·44	.....	98·30	.....	98·51	684	97·91	365
5	98·07	.....	98·41	.....	98·43	.....	98·30	.....	98·51	684	97·95	383
6	98·07	.....	98·43	.....	98·43		98·27	.....	98·45	647	97·92	370
7	98·07	.....	98·43	.....	98·43		98·03	.....	98·47	659	98·00	405
8	98·03	.....	98·43	.....	98·40		97·98		98·39	610	98·05	428
9	98·01	.....	98·39	.....	98·39		97·90		98·41	622	98·05	428
10	98·01	.....	98·40	.....	98·39		98·01		98·40	616	98·05	428
11	97·99	.....	98·40	.....	98·38		98·26		98·29	551	97·92	370
12	97·99	.....	98·41	.....	98·40		98·38	604	98·25	530	97·89	357
13	97·99	.....	98·43	.....	98·40		98·38	604	98·25	530	97·90	361
14	98·03	.....	98·45	.....	98·40		98·95	968	98·26	535	97·96	387
15	98·06	.....	98·45	.....	98·40		98·99	994	98·28	546	98·02	414
16	98·08	.....	98·46	.....	98·39	.....	100·68	2,134	98·34	581	98·07	438
17	98·13	.....	98·44	.....	98·39		100·91	2,296	98·24	524	98·12	462
18	98·13	.....	98·43	.....	98·39		101·14	2,464	98·31	563	98·18	492
19	98·13	.....	98·43	.....	98·39		100·87	2,268	98·34	581	98·22	513
20	98·15	.....	98·43	.....	98·39		100·97	2,339	98·33	575	98·24	524
21	98·17	.....	98·43	.....	98·37		99·62	1,408	98·33	575	98·20	502
22	98·23	.....	98·41	.....	98·35	108	99·67	1,442	98·34	581	98·00	405
23	98·27	.....	98·41	.....	98·34		99·24	1,157	98·34	581	98·03	419
24	98·27	.....	98·40	.....	98·34		98·98	987	98·29	551	98·20	502
25	98·27	.....	98·40	.....	98·35		98·93	954	98·24	524	98·20	502
26	98·33	57	98·40	.....	98·36		98·90	935	98·24	524	98·32	569
27	98·34	.....	98·40	.....	98·36		98·83	889	98·24	524	98·44	641
28	98·34	.....	98·41	.....	98·46		98·67	786	98·24	524	98·24	524
29	98·33	.....			98·48		98·63	760	98·22	513	98·52	691
30	98·33	.....			98·46		98·57	722	98·22	513	98·32	569
31	98·33	.....			98·40				98·20	502		

Day	July		August		September		October		November		December	
1	98·30	557	98·57	722	97·37	184	97·74	298	.....		.....	
2	98·27	541	98·39	610	97·32	171	97·83	332	.....		.....	
3	98·27	541	98·37	598	97·59	247	97·80	320	.....		.....	
4	98·29	551	98·31	563	97·39	189	97·67	273	.....		.....	
5	98·11	457	98·37	598	97·34	176	97·65	267	.....		.....	
6	98·33	575	98·16	482	97·42	198	97·76	305	.....		.....	
7	98·12	462	98·04	424	97·53	229	97·65	267	.....		.....	
8	98·08	443	98·19	497	97·48	214	97·66	270	.....		.....	
9	98·10	452	97·98	396	97·68	276	97·66	270	.....		.....	
10	98·10	452	97·88	353	97·70	283	97·39	189	.....		.....	
11	98·28	546	97·88	353	97·49	217	97·38	187	.....		.....	
12	98·00	405	97·86	345	97·70	283	97·38	187	.....		.....	
13	98·10	452	97·81	324	97·56	238	97·37	184	.....		.....	
14	98·10	452	97·72	290	97·68	276	97·37	184	.....		98·02	
15	97·98	396	97·79	316	97·72	290	97·37	184	.....		98·07	
16	98·06	433	97·69	280	97·77	309	97·36	182	.....		98·08	
17	97·94	379	97·67	273	97·56	238	.....		.....		98·15	
18	98·20	502	97·67	273	97·78	313	.....		.....		98·15	
19	98·09	447	97·67	273	97·76	305	.....		.....		98·16	
20	98·01	410	97·69	280	97·68	276	.....		.....		98·16	
21	97·98	396	97·73	294	97·70	283	.....		.....		98·09	
22	98·10	452	97·79	316	97·64	263	.....		.....		98·10	
23	98·42	628	97·69	280	97·59	247	.....		.....		98·07	
24	98·78	857	97·69	280	97·56	238	.....		.....		98·08	
25	98·62	754	97·67	273	97·56	238	.....		.....		98·11	
26	98·51	684	97·64	263	97·57	241	.....		.....		98·13	
27	98·61	747	97·60	250	97·56	238	.....		.....		98·17	
28	98·93	954	97·48	214	97·58	244	.....		.....		98·17	
29	98·70	805	97·53	229	97·56	238	.....		.....		98·18	
30	98·81	876	97·48	214	97·58	244	.....		.....		98·19	
31	98·79	864	97·38	187			.....				98·20	

Gauge heights marked thus (*) interpolated.
NOTE.—No gauge records from January 1 to April 11, and October 17 to December 14.
Not sufficient information to compute daily discharges.

MONTHLY DISCHARGE OF ASSINIBOINE RIVER AT BRANDON FOR THE YEAR 1915.
[Drainage area 34,500 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.
January........................	....	....	[1]65	0·002	0·002	4,000
February.......................	....	57	[1]60	0·002	0·002	3,325
March.........................	....	....	[1]90	0·003	0·003	5,550
April..........................	2,464	....	[1]900	0·026	0·029	53,600
May...........................	684	502	580	0·017	0·020	35,600
June..........................	691	357	462	0·013	0·015	27,500
July..........................	876	379	582	0·017	0·020	35,800
August........................	722	187	358	0·010	0·012	22,000
September.....................	313	171	245	0·007	0·008	14,600
October.......................	....	....	[1]180	0·005	0·006	11,100
November......................	....	....	[1]170	0·005	0·006	10,100
December......................	....	....	[1]100	0·003	0·003	6,150
The Period.........	2,464	57	316	0·009	0·126	229,325

NOTE.—Marked thus ([1]) estimated.

ASSINIBOINE RIVER AT HEADINGLY.

HISTORY.

The metering station was established on April 9, 1913, by S. S. Scovil and has been operated since that date.

LOCATION OF SECTION.

The meter section is located on the downstream side of the C.N.R. bridge, which crosses the Assiniboine river one-quarter mile from the C.N.R. Headingly station.

The I.P. is marked on the flooring at the north end of the bridge on the downstream side and is painted white, "Init. Pt. 0+00."

RECORDS AVAILABLE.

Gauge height records are available from April 17 to November 23, 1913, and for the years 1914 and 1915.   Estimates of daily discharge have been prepared from April 17 to November 23, 1913, June 1 to March 1, 1914, and from April 22, 1914, to the end of 1915, except for part of November, 1914.

DRAINAGE AREA.

The area drained by the Assiniboine river above Headingly is 59,420 square miles.

GAUGE.

A nine-foot vertical staff gauge is fastened to the north abutment of the bridge and is read in summer.   A winter gauge, three-foot staff, is fastened to the ice breaker for winter readings.   Both are referred to the same arbitrary datum.

CHANNEL.

The channel is straight above and below the section for a considerable distance. The stream is divided into four channels by the three central piers of the bridge. The bottom of the stream is of gravel and mud and not liable to shift. The right bank is low and wooded and liable to overflow at higher stages. The left bank is high and not liable to overflow.

DISCHARGE MEASUREMENTS.

The meterings have been made from the downstream side of the bridge in the open water season and in the winter they have been made from the ice at a point about four hundred feet upstream from the bridge.

ACCURACY.

Between gauge heights 75·5 and 80·9 the discharge curve is well defined. Under ice conditions between gauge heights 73·8 and 76·1 the discharge curve is fairly well defined.

DISCHARGE MEASUREMENTS OF ASSINIBOINE RIVER AT HEADINGLY, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 9...	C. O. Allen........	1,912	267	563	0·21	75·73	117
Feb. 25...	W. J. Ireland......	1,187	279	566	0·26	76·19	145[1]
Mar. 11...	D. B. Gow........	1,187	290	606	0·26	76·18	161[1]
Mar. 25...	M. S. Madden....	1,462	282	699	0·40	76·67	278[1]
Mar. 31...	C. O. Allen........	1,912	285	791	0·49	76·75	384[1]
April 14...	E. B. Patterson....	1,469	209	1,008	1·13	76·67	1,140
May 8...	T. J. Moore........	1,197	202	781	1·03	76·26	803
June 14...	T. H. Boyd........	1,197	193	753	0·82	75·86	617
July 26...	"	1,197	194	699	0·84	75·78	587
Aug. 11...	"	1,197	194	772	0·87	75·86	671
Sept. 16...	H. H. Pratt........	1,496	174	646	0·56	75·34	364

[1] Ice Measurement.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF ASSINIBOINE RIVER AT HEADINGLY FOR 1915.

[Drainage area 59,420 square miles.]

Day.	January. Gauge Height.	January. Discharge.	February. Gauge Height.	February. Discharge.	March. Gauge Height.	March. Discharge.	April. Gauge Height.	April. Discharge.	May Gauge Height.	May Discharge.	June. Gauge Height.	June. Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	75·67	114	75·95	132	76·22	163	76·76	361	76·96	1,380	75·87	653
2	75·67	114	75·97	134	76·23	165	76·74	342	76·79	1,253	75·87	653
3	75·72	116	75·97	134	76·25	168	76·75	352	76·69	1,183	75·87	653
4	75·73	117	75·99	135	76·25	168	76·82	420	76·59	1,113	75·86	648
5	75·77	119	75·99	135	76·25	168	76·82	420	76·50	1,050	75·85	642
6	75·77	119	75·99	135	76·26	169	¹76·82	500	76·37	966	75·87	653
7	75·77	119	76·02	138	76·25	168	¹76·86	800	76·27	900	75·89	665
8	75·77	119	76·05	142	76·25	168	¹76·87	800	76·27	900	75·92	682
9	75·72	116	76·05	142	76·25	168	¹77·06	1,000	76·27	900	75·82	626
10	75·74	117	76·05	·142	76·22	163	¹77·27	1,100	76·28	907	75·87	653
11	75·74	117	76·07	144	76·24	166	¹77·42	1,200	76·27	900	75·91	676
12	75·77	119	76·07	144	76·24	166	76·97	1,387	76·19	849	75·93	688
13	75·79	120	76·08	145	76·24	166	76·87	1,313	76·17	835	75·83	632
14	75·79	120	76·07	144	76·24	166	76·62	1,134	76·14	816	75·84	637
15	75·79	120	75·92	130	76·21	161	76·47	1,030	76·12	803	75·81	620
16	75·79	120	75·92	130	76·21	161	76·36	959	76·07	772	75·78	604
17	75·83	123	75·92	130	76·22	163	76·17	835	75·97	712	75·73	576
18	75·84	124	75·87	126	76·19	159	76·18	842	75·97	712	75·71	565
19	75·85	125	75·87	126	76·21	161	76·45	1,018	75·97	712	75·67	543
20	75·85	125	75·97	134	76·25	168	76·58	1,106	75·98	718	75·67	543
21	75·87	126	76·07	144	76·37	188	76·69	1,183	75·98	718	75·72	571
22	75·87	126	76·07	144	76·47	211	76·97	1,387	76·00	730	75·72	571
23	75·87	126	76·07	144	76·67	287	77·17	1,541	76·04	754	75·77	599
24	75·87	126	76·07	144	76·77	371	77·21	1,573	75·97	712	75·82	626
25	75·87	126	76·07	144	76·67	287	77·17	1,541	75·97	712	75·86	648
26	75·86	125	76·20	160	77·23	287	77·23	1,589	75·97	712	75·85	643
27	75·87	126	76·22	163	76·67	287	77·35	1,685	75·97	712	75·94	694
28	75·87	126	76·22	163	76·67	287	77·27	1,621	75·97	712	75·94	694
29	75·91	129	....	....	76·68	293	77·17	1,541	75·88	659	75·87	653
30	75·91	129	....	....	76·74	342	77·05	1,448	75·90	670	75·89	665
31	75·95	132			76·76	361			75·87	653	....	....

Day	July. Gauge	July. Dis.	August. Gauge	August. Dis.	September. Gauge	September. Dis.	October. Gauge	October. Dis.	November. Gauge	November. Dis.	December. Gauge	December. Dis.
1	76·16	829	76·07	772	75·19	295	75·58	494	75·47	435	75·77	....
2	76·16	829	76·05	760	75·17	285	75·58	494	75·47	435	75·80	....
3	76·11	796	76·10	790	75·17	285	75·57	488	75·45	425	75·82	....
4	76·08	778	76·27	900	75·17	285	75·56	483	75·45	425	75·83	....
5	76·07	772	76·20	855	75·12	260	75·53	465	75·45	425	75·81	....
6	76·07	772	76·20	855	75·07	236	75·47	435	75·57	488	75·73	....
7	76·04	754	76·08	778	75·17	285	75·37	385	75·55	477	75·72	....
8	75·99	724	76·00	730	75·37	385	75·35	375	75·55	477	75·72	....
9	75·97	712	75·90	670	75·29	345	75·33	365	75·55	477	75·72	....
10	75·94	694	75·87	653	75·29	345	75·57	440	75·57	477	75·72	....
11	75·96	706	75·86	648	75·35	375	75·55	477	75·59	500	75·72	....
12	75·96	706	75·79	610	75·42	410	75·55	477	75·67	543	75·72	....
13	75·87	653	75·77	699	75·37	385	75·47	435	75·65	533	75·72	....
14	75·87	653	75·68	549	75·47	435	75·47	435	75·27	335	75·72	....
15	75·82	626	75·57	488	75·42	410	75·45	425	75·17	....	75·82	....
16	75·77	599	75·67	543	75·34	370	75·42	410	75·27	....	75·87	....
17	75·74	582	75·47	435	75·37	385	75·43	415	75·17	....	75·86	....
18	75·72	571	75·47	435	75·44	420	75·50	450	75·32	....	75·84	....
19	75·78	604	75·47	435	75·45	425	75·50	450	75·51	....	75·83	....
20	75·78	604	75·46	430	75·47	435	75·45	425	75·42	....	75·82	....
21	75·76	593	75·42	· 410	75·46	430	75·37	385	75·56	....	75·82	....
22	75·75	587	75·36	380	75·38	390	75·37	385	75·66	....	75·82	....
23	75·77	599	75·37	385	75·39	395	75·37	385	75·72	....	75·82	....
24	75·72	571	75·37	385	75·45	425	75·38	390	75·72	....	75·84	....
25	75·67	543	75·27	335	75·47	435	75·53	466	75·72	....	75·87	....
26	75·77	599	75·27	335	75·48	440	75·57	488	75·70	....	75·89	....
27	75·70	560	75·27	335	75·57	488	75·55	477	75·67	....	75·92	....
28	75·68	549	75·27	335	75·57	488	75·48	440	75·68	....	75·92	....
29	75·80	615	75·26	330	75·53	466	75·48	440	75·76	....	75·96	....
30	75·97	712	75·22	310	75·52	461	75·50	450	75·78	....	75·97	....
31	76·08	778	75·27	335			75·47	435			75·98	....

NOTE—All gauge heights marked thus(¹) interpolated.
Ice conditions from January 1 to April 11.

MONTHLY DISCHARGE OF ASSINIBOINE RIVER AT HEADINGLY FOR THE YEAR 1915.

[Drainage area 59,420 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
January	132	114	122	0·002	0·002	7,500
February	163	126	140	0·002	0·002	7,800
March	371	159	210	0·004	0·005	12,900
April	1,685	342	1,070	0·018	0·020	63,700
May	1,380	653	843	0·014	0·016	51,800
June	694	543	632	0·011	0·012	37,600
July	829	543	667	0·011	0·013	41,000
August	900	310	545	0·009	0·011	33,500
September	488	236	382	0·006	0·007	22,700
October	494	365	438	0·007	0·008	26,900
November			¹350	0·006	0·007	20,800
December			¹160	0·003	0·004	9,800
The Year	1,685	114	463	0·008	0·107	336,000

NOTE.—All marked thus (¹) are estimated.

SHELL RIVER.

The Shell river is one of the largest tributaries of the Assiniboine, emptying into that river in Tp. 23, R. 29, W.P.M. The source of the river is on the northwestern slope of the Duck mountains, which it parallels for a considerable distance, the course being almost due south for the entire length of the river. About five miles from the junction with the Assiniboine it turns sharply to the west and flows in that direction to its mouth.

The watershed drained is narrow, lying between that of the Valley and the Assiniboine, except at the upper part, where it opens out to a width of about thirty-five miles. The total length of the basin being about sixty miles, though the river itself has a length of ninety miles.

In the upper part of the basin the river flows through the Duck Mountain forest reserve, a district in which valuable timber is to be found. The valley of the river is narrow and quite deep, varying between one hundred and three hundred and fifty feet. The valley itself is gravelly and boulder strewn, but the land forming the upper benches and table land is good for agriculture.

At Asessippi, the only town located on the stream, a small flour mill was operated by water power from 1884 to 1911, in which year the dam was washed out.

SHELL RIVER AT ASESSIPPI.

HISTORY.

The first metering of the Shell at Asessippi was taken by W. J. Ireland on September 15, 1913, but the point at which the measurement was made was not considered suitable for a permanent section. This point was at the bridge just below the dam. A second section was established by E. J. Budge on January 16, 1914, one-quarter mile below the bridge, this latter section was afterwards abandoned for one which was located by C. O. Allen on June 9, 1914.

LOCATION OF SECTION.

The section finally located on the Shell river at Asessippi is one and one-quarter miles downstream from the Asessippi bridge, two miles below the mouth of Bear creek, thirteen and one-half miles from Russell and twenty miles south of Roblin. The I.P. is marked by a nail driven in the base of a blazed tree which is on the right bank.

RECORDS AVAILABLE.

Daily gauge heights have been obtained since June 9, 1914, and estimates of daily discharge for the same period have been made.

DRAINAGE AREA.

The area tributary to the Shell above the meter section is 930 square miles. It lies between the watersheds of the Valley river on the east and the Assiniboine on the west.

GAUGE.

A six-foot vertical staff gauge was placed six hundred feet downstream from D. Martel's house and about one mile above the meter section. The gauge is referred to a B.M., which is a nail driven into the foot of a blazed scrub oak tree standing fourteen feet back from the gauge. The datum is arbitrary. On November 18, it was discovered that back water effect was being caused between the gauge and the meter section by beaver dams. A new gauge was therefore established at the meter section, which was referred to a temporary bench mark placed on the side of a blazed 6-inch poplar tree standing one hundred feet above the meter station on the right bank.

CHANNEL.

For sixty feet above the section and one hundred and fifty feet below the channel is straight. The bottom is of small rock and gravel and is permanent. The banks are high and clear and are not liable to overflow. The current is swift.

DISCHARGE MEASUREMENTS.

Measurements are made by means of a cable carrier travelling on a cable stretched across the stream at the section. Sufficient measurements have been taken to define a discharge curve.

ACCURACY.

The curve is well defined over a range in stage of 1·3 feet for open water conditions. Discharge curve for winter conditions is not so well defined.

DISCHARGE MEASUREMENTS OF SHELL RIVER AT ASESSIPPI, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 20	M. S. Madden	1,462	28	15·9	0·80	93·42	12·6[1]
Mar. 16	"	1,462	31	20·7	0·91	94·67	20·7[1]
April 17	C. O. Allen	1,912	45	91·3	3·28	92·94	300·2
April 28	"	1,912	39	63·9	2·68	91·73	171·2
May 13	"	2,018	39	52·9	1·99	91·39	105·3
June 4	"	2,018	38	47·1	2·03	91·19	95·5
July 29	T. H. Boyd	1,197	38	46·2	2·14	91·43	98·9
Sept. 4	"	1,197	34	36·4	1·46	90·95	53·1
Oct. 26	C. O. Allen	1,374	36	40·2	1·65	91·40	66·3

[1] Ice measurement.

DAILY GAUGE HEIGHT AND DISCHARGE OF SHELL RIVER AT ASESSIPPI FOR 1915.
[Drainage area 930 square miles.]

Day.	January. Gauge Height.	Dis-charge.	February. Gauge Height.	Dis-charge.	March. Gauge Height.	Dis-charge.	April. Gauge Height.	Dis-charge.	May. Gauge Height.	Dis-charge.	June. Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	92·87	......	92·87	......	94·05	......	94·63	......	91·69	158	91·25	79
2	92·47	......	92·87	......	93·85	......	94·63	......	91·65	150	91·25	79
3	92·47	......	92·98	......	93·85	......	94·43	......	91·61	142	91·24	78
4	92·58	......	92·98	......	93·85	......	94·42	......	91·57	134	91·24	78
5	92·58	......	93·08	......	93·85	......	94·82	......	91·52	124	91·26	80
6	92·68	......	92·99	......	93·65	......	94·72	......	91·43	107	91·28	83
7	92·69	......	98·99	......	93·65	......	94·52	......	91·44	109	91·36	96
8	92·69	......	92·99	......	93·65	......	94·32	......	91·42	106	91·38	99
9	92·69	......	92·90	......	93·65	......	94·12	......	91·39	100	91·40	102
10	92·50	......	92·90	......	93·65	......	94·02	......	91·32	89	91·43	107
11	92·60	......	92·90	......	93·85	......	93·82	......	91·35	94	91·46	113
12	92·60	......	92·90	......	93·84	......	93·72	......	91·34	92	91·48	116
13	92·91	......	92·81	......	94·04	......	93·62	......	91·39	100	91·48	116
14	93·21	......	92·81	......	94·14	......	93·42	......	91·38	99	91·48	116
15	93·21	......	92·81	......	94·24	......	93·42	......	91·36	96	91·48	116
16	93·22	......	92·81	......	94·24	......	93·62	......	91·36	96	91·48	116
17	93·22	......	92·92	......	94·64	......	92·91	402	91·36	96	91·47	115
18	93·42	......	92·62	......	94·94	......	92·61	342	91·35	94	91·47	115
19	93·43	......	94·02	......	94·94	......	92·11	242	91·34	92	91·46	113
20	93·43	13	91·02	......	95·04	......	92·11	242	91·32	89	91·46	113
21	93·43	......	94·03	......	95·04	......	92·01	222	91·30	86	91·47	115
22	93·44	......	94·03	......	95·04	......	91·91	202	91·29	85	91·48	116
23	93·44	......	94·03	......	95·03	......	91·91	202	91·28	83	91·48	116
24	93·24	......	94·03	......	95·13	......	91·81	182	91·27	82	91·48	116
25	93·15	......	94·04	......	94·93	......	91·81	182	91·26	80	91·47	115
26	93·15	......	94·04	......	94·93	......	91·81	182	91·26	80	91·46	113
27	93·15	......	94·04	......	94·93	......	91·81	182	91·26	80	91·45	111
28	93·06	......	94·04	......	94·83	......	91·71	162	91·26	80	91·43	107
29	93·06	......			94·83	......	91·71	162	91·26	80	91·40	102
30	92·96	......			94·73	......	91·69	158	91·26	80	91·38	99
31	92·87	......			94·63	......			91·26	80		

Day	July. Gauge	Dis.	August. Gauge	Dis.	September. Gauge	Dis.	October. Gauge	Dis.	November. Gauge	Dis.	December. Gauge	Dis.
1	91·37	97	91·30	86	90·88	37	91·33	91	91·40	102	91·38	......
2	91·36	96	91·26	80	90·93	42	91·34	92	91·40	102	91·38	......
3	91·38	99	91·24	78	90·95	43	91·35	94	91·40	102	91·38	......
4	91·38	99	91·22	75	90·95	43	91·36	96	91·40	102	91·38	......
5	91·38	99	91·18	69	90·93	42	91·36	96	91·28	83	91·38	......
6	91·38	99	91·14	64	90·92	41	91·36	96	91·18	69	91·38	......
7	91·38	99	91·14	64	90·90	39	91·36	96	91·18	69	91·38	......
8	91·41	104	91·14	64	91·03	51	91·36	96	91·38	99	91·38	......
9	91·44	109	91·14	64	91·06	55	91·36	96	91·38	99	91·38	......
10	91·41	104	91·14	64	91·08	57	91·36	96	91·38	99	91·38	......
11	91·48	116	91·13	63	91·10	59	91·36	96	91·38	......	91·38	......
12	91·48	116	91·13	63	91·13	63	91·36	96	91·38	......	91·38	......
13	91·48	116	91·13	63	91·16	67	91·37	97	91·58	......	91·38	......
14	91·48	116	91·11	60	91·15	65	91·37	97	91·58	......	91·38	......
15	91·50	120	91·10	59	91·14	64	91·37	97	91·58	......	91·38	......
16	91·56	132	91·08	57	91·14	64	91·37	97	91·48	......	91·38	......
17	91·58	136	91·06	55	91·14	64	91·37	97	91·38	......	91·38	......
18	91·64	148	91·04	52	91·14	64	91·38	99	91·38	......	91·38	......
19	91·70	160	91·02	50	91·14	64	91·38	99	91·38	......	91·38	......
20	91·76	172	90·98	46	91·18	69	91·38	99	91·38	......	91·38	......
21	91·78	176	90·97	45	91·20	72	91·38	99	91·38	......	91·38	......
22	91·80	180	90·96	44	91·20	72	91·38	99	91·38	......	91·38	......
23	91·78	176	90·95	43	91·20	72	91·38	99	91·38	......	91·48	......
24	91·74	168	90·94	43	91·22	75	91·38	99	91·38	......	91·48	......
25	91·68	156	90·92	41	91·26	80	91·38	99	91·38	......	91·48	......
26	91·58	136	90·91	40	91·28	83	91·39	100	91·30	......	91·48	......
27	91·53	126	91·00	48	91·28	83	91·39	100	91·38	......	91·48	......
28	91·48	116	90·88	37	91·30	86	91·39	100	91·38	......	91·48	......
29	91·44	109	90·88	37	91·31	88	91·39	100	91·38	......	91·48	......
30	91·38	99	90·88	37	91·31	88	91·40	102	91·38	......	91·48	......
31	91·33	91	90·88	37			91·40	102			91·48	......

NOTE—Ice conditions January 1 to April 17, and November 11 to December 31.
Not sufficient information to compute daily discharges.

MONTHLY DISCHARGE OF SHELL RIVER AT ASESSIPPI FOR THE YEAR 1915.
[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
January			[1]10	0·011	0·013	615
February			[1]15	0·016	0·017	833
March			[1]25	0·027	0·031	1,540
April	402		[1]160	0·172	0·192	9,500
May	158	80	99	0·106	0·122	6,100
June	116	78	105	0·113	0·126	6,250
July	180	91	125	0·134	0·155	7,700
August	86	37	56	0·060	0·069	3,450
September	88	37	63	0·068	0·076	3,750
October	102	91	97	0·104	0·120	5,950
November			[1]70	0·076	0·085	4,175
December			[1]30	0·033	0·038	1,850
The Year	402		63	0·077	1·044	51,713

NOTE.—Marked thus ([1]) estimated.

BIRDTAIL CREEK.

Birdtail Creek is one of the small tributaries of the Assiniboine river. It joins the latter in Indian Reserve No. 57. The source of the river is on the south slope of the Riding mountains and the course is generally south from the headwaters to the mouth.

The upper part of the drainage area, which is 400 square miles, is very well timbered, and lumbering has been carried on in the district. Towards the mouth the land is given up to agriculture.

There was some question of a small power development on the river, so records of the discharge have been kept. These show that the power output would be very small and subject to interruption during the winter months.

BIRDTAIL CREEK AT BIRTLE.

HISTORY.

This station was established May 14, 1914, by C. O. Allen.

LOCATION OF SECTION.

The meter section is located on the downstream side of the Birtle traffic bridge, on the road between the C.P.R. station and the town of Birtle, one mile from the C.P.R. The I.P. is painted on the handrail of the bridge at the left end on the downstream side.

RECORDS AVAILABLE.

The estimates of daily discharge have been deduced for the open water seasons of 1914 and 1915.

DRAINAGE AREA.

The drainage area is 400 square miles, extending from the Riding mountains southeast to the Assiniboine.

GAUGE.

A vertical staff gauge is secured to the floor of the bridge and is referred to a permanent M.H.S. B.M. This B.M. is set to an arbitrary datum about forty feet northeast of the upstream north end of the bridge.

CHANNEL.

The stream is confined to one channel at all stages; for two hundred and fifty above and one hundred feet below the section the channel is straight. The current is fairly swift and the banks are high and clear and not liable to overflow. The bottom of the stream is of mud and hard clay, not liable to shift.

DISCHARGE MEASUREMENTS.

The measurements are taken from the downstream side of the traffic bridge under open water conditions. For winter conditions measurements are made from the ice.

ACCURACY.

The discharge curve is only fairly well defined over a range in gauge height of three feet, extending from 88·5 to 91·5.

DISCHARGE MEASUREMENTS OF BIRDTAIL CREEK AT BIRTLE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 22...	M. S. Madden.....	1,462	21·0	9·0	....	88·23	..........[1]
Mar. 18...	"	1,462	12·0	5·6	....	....	..........[1]
April 19...	C. O. Allen........	1,912	52·1	104·5	0·67	89·10	69·7
April 29...	"	1,912	48·5	87·4	0·44	88·62	38·1
May 11...	"	2,018	47·5	79·7	0·28	88·67	22·2
May 31...	"	2,018	46·5	78·3	0·31	88·63	24·3
July 31...	T. H. Boyd........	1,197	48·2	74·0	0·26	88·76	19·2
Sept. 1 ...	"	1,197	46·2	67·8	....	88·48	..........[1]
Oct. 27...	C. O. Allen........	1,374	55·5	92·6	0·28	88·92	25·9

[1] No discharge.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF BIRDTAIL CREEK AT BIRTLE FOR 1915.

[Drainage area 400 square miles.]

Day.	January. Gauge Height.	Dis- charge.	February. Gauge Height.	Dis- charge.	March. Gauge Height.	Dis- charge.	April. Gauge Height.	Dis- charge.	May. Gauge Height.	Dis- charge.	June. Gauge Height.	Dis- charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1									88·75	30	88·65	18
2									88·75	30	88·60	13
3									88·75	30	88·60	13
4									88·75	30	88·60	13
5									88·70	24	88·65	18
6									88·70	24	88·65	18
7									88·65	18	88·65	18
8									88·65	18	88·65	18
9									88·65	18	88·65	18
10									88·65	18	88·70	24
11									88·67	21	88·70	24
12									88·70	24	88·70	24
13									88·70	24	88·70	24
14									88·70	24	88·75	29
15									88·75	29	88·80	35
16									88·80	35	88·85	40
17									88·80	35	88·80	35
18									88·85	41	88·80	35
19						89·10	69	88·85	41	88·80	35
20						89·01	58	88·80	35	88·85	40
21						89·01	58	88·80	35	88·85	40
22	88·23					89·01	58	88·75	30	88·90	46
23						88·96	53	88·70	24	88·90	46
24						88·96	53	88·70	24	88·95	51
25						88·96	53	88·65	18	89·00	57
26						88·96	53	88·65	18	89·05	63
27						88·91	47	88·65	18	89·05	63
28						88·91	47	88·65	18	89·00	57
29						88·91	47	88·65	18	88·95	51
30						88·90	46	88·65	18	88·95	51
31								88·65	18		

Day	July.		August.		September.		October.		November.		December.	
1	88·95	51	88·74	28	88·44		88·94	50	89·00	68		
2	88·95	51	88·69	23	88·44		88·94	50	89·14	74		
3	88·95	51	88·64	17	88·44		88·99	56	89·14	74		
4	88·95	51	88·64	17	88·44		89·04	62	89·09	68		
5	88·95	51	89·64	17	88·44		89·04	62	89·04	62		
6	88·90	46	88·59	12	88·44	1	89·04	62	88·99	56		
7	88·90	46	88·59	12	88·49	1	89·04	62	88·94	50		
8	88·85	40	88·54	6	88·49	1	88·99	56	88·94	50		
9	88·85	40	88·54	6	88·54	6	88·99	56	88·99	56		
10	88·80	35	88·54	6	88·68	21	88·99	56	88·99	56		
11	88·80	35	88·54	6	88·74	28	88·99	56	88·99	56		
12	88·75	29	88·49	1	88·74	28	88·99	56	88·99	56		
13	88·75	29	88·49	1	88·74	28	88·94	50	88·94			
14	88·75	29	88·49	1	88·79	34	88·94	50	88·94			
15	88·75	29	88·49	1	88·79	34	88·94	50	88·94			
16	88·80	35	88·49	1	88·79	34	88·89	45	88·99			
17	88·80	35	88·49	1	88·74	28	88·89	45	88·99			
18	88·95	51	88·44		88·74	28	88·89	45	88·99			
19	89·20	81	88·44		88·74	28	88·89	45	88·99			
20	89·25	87	88·44		88·79	34	88·84	39	88·99			
21	89·25	87	88·44		88·79	34	88·84	39	88·99			
22	89·20	81	88·39		88·79	34	88·84	39	88·99			
23	89·20	81	88·39		88·79	34	88·94	34	88·94			
24	89·15	75	88·39		88·84	39	88·79	34	88·94			
25	89·05	63	88·34		88·84	39	88·84	39	88·94			
26	88·95	51	88·34		88·84	39	88·89	45	88·94			
27	88·85	40	88·34		88·84	39	88·89	45	88·94			
28	88·80	35	88·39		88·94	45	88·94	50	88·99			
29	88·75	29	88·39		88·89	45	88·99	56	88·99			
30	88·75	29	88·39		88·89	45	88·99	56	88·99			
31	88·76	31	88·39				89·04	62				

MONTHLY DISCHARGE OF BIRDTAIL CREEK AT BIRTLE FOR THE YEAR 1915.

[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.
January..................	....	....	[1]0	....	....	
February.................	....	....	[1]0	....	....	
March...................	....	....	[1]0	....	....	
April...................	....	....	[1]45	0·112	0·125	2,678
May.....................	41	18	25	0·062	0·071	1,537
June....................	63	13	34	0·085	0·095	2,023
July....................	87	29	49	0·122	0·140	3,013
August..................	28	0	5	0·012	0·014	307
September...............	45	0	24	0·060	0·067	1,428
October.................	62	34	50	0·125	0·144	3,074
November................	....	....	[1]45	0·112	0·125	2,678
December................	....	....	[1]20	0·050	0·058	1.230
The Period....	87	0	25	0·062	0·839	17,968

NOTE.—All marked thus ([1]) estimated.

LITTLE SASKATCHEWAN RIVER.

The source of the Little Saskatchewan river is on the southern slope of the Riding mountains. It flows in a general southeastern direction until it reaches the town of Minnedosa in Tp. 15, R. 18, W.P.M. at which point it turns and flows almost southwest to its junction with the Assiniboine river in Tp. 10, R. 20, W.P.M. about eight miles west of the city of Brandon.

The drainage area is 1,640 square miles. In the upper part of the basin there are numerous small lakes, and in this section the greater part of the drainage is obtained. The largest tributary, the Rolling river, enters the Little Saskatchewan about thirteen miles above Minnedosa.

In the upper waters the country is covered to a considerable extent by stands of good merchantable timber, a considerable portion of which is within the forest reserve. The rest of the country drained is very well settled, the land offering splendid opportunity for agriculture.

The river valley is well defined, lying between 100 and 300 feet below the general level of the surrounding country. It varies in width between one-quarter of a mile and one and one-quarter miles, the course of the river in the valley bottom being very sinuous, almost doubling its length over the total length of the drainage basin.

A number of small towns are to be found along the course of the river, as Rivers, Gautier, Rapid City, Riverdale and Minnedosa, the latter having a population of about 1,700. There are possible power sites on the river, three of which have been developed, these are at Minnedosa, Rapid City and the Brandon Power Company's plant about two miles from the mouth of the river.

LITTLE SASKATCHEWAN RIVER AT MIDDLETON BRIDGE.

HISTORY.

A metering station was established on the Little Saskatchewan at Middleton Bridge on May 17, 1915, by E. B. Patterson, and from that date this station has been in operation.

LOCATION OF SECTION.

The metering section is located on the downstream side of what is locally known as Middleton bridge, situated in Sec. 6, Tp. 20, R. 20, W.P.M., and approximately eighteen miles north of the town of Elphinstone. The Initial Point is painted on the east end of the handrail of the bridge.

RECORDS AVAILABLE.

Daily gauge readings have been taken from the time of the establishment of the station to the end of the year 1915. Discharge measurements have been made at various stages throughout this period, and from these estimated daily discharges have been computed for a period from May 17 to November 9, 1915. From the latter date to the end of the year ice cover conditions prevailed, and the information obtained is not sufficient to allow the estimating of daily discharges.

DRAINAGE AREA.

The drainage area tributary to the river at this metering station is 184 square miles.

GAUGE.

A six-foot vertical staff gauge has been secured to a pile on the downstream side of the bridge near the left bank. This gauge is referred to a B.M. on a 10-inch blazed poplar tree, twenty feet west of the bridge on the north side of the road. This B.M. is set to an arbitrary datum.

CHANNEL.

The section of the river on which the station is located is curved both above and below, but the current is sluggish and even across the section. On account of the bridge embankment the entire flow of the stream must cross the section even under high water conditions.

DISCHARGE MEASUREMENTS.

The discharge measurements are taken by wading during low water and from the bridge when medium or high water conditions prevail.

ACCURACY.

Throughout the stage met with during the time observations have been made on the river at this point the discharge curve is not well defined.

DISCHARGE MEASUREMENTS OF LITTLE SASKATCHEWAN RIVER AT MIDDLETON BRIDGE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
May 17.	E. B. Patterson..	1,920	18	6·1	1·37	88·56	8·3	Not regular sec.
May 25.	"	1,920	18	6·1	0·73	88·47	4·4	" "
May 28.	"	1,920	22	5·5	0·66	88·45	3·6	" "
May 29.	"	1,920	18·5	5·6	0·60	88·44	3·4	" "
June 2.	"	1,920	19	5·5	0·44	88·39	2·4	" "
June 5.	"	1,920	90	81·6	0·67	89·27	46·3	Regular section.
June 16.	"	1,920	21	8·4	0·64	88·63	5·4	1 mile above regular.
July 24.	G. K. Gainsford..	1,435	98	131·2	0·28	89·87	37·2	Regular section.
Aug. 24.	H. H. Pratt......	1,496	98	63·0	0·15	89·15	9·6	
Sept. 25.	G. K. Gainsford..	1,196	96	76·3	0·15	89·25	11·4	
Nov. 6.	"	1,196	99	63·5	0·32	89·17	20·3	

DAILY GAUGE HEIGHT AND DISCHARGE OF LITTLE SASKATCHEWAN RIVER AT MIDDLETON BRIDGE FOR 1915.

[Drainage area 184 square miles.]

Day	January Gauge Height	January Dis-charge	February Gauge Height	February Dis-charge	March Gauge Height	March Dis-charge	April Gauge Height	April Dis-charge	May Gauge Height	May Dis-charge	June Gauge Height	June Dis-charge
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1											88·39	3
2											88·38	3
3											88·39	3
4											88·39	3
5											90·06	46
6											90·16	51
7											90·16	51
8											89·71	30
9											89·37	20
10											89·26	18
11											89·26	18
12											89·26	18
13											88·96	11
14											88·61	6
15											88·61	6
16											88·61	6
17										88·46	4	88·66	6
18									88·56	5	88·63	6
19									88·51	4	88·61	6
20									88·51	4	88·63	6
21									88·51	4	88·81	9
22									88·50	4	88·81	9
23									88·49	4	88·86	9
24									88·49	4	88·81	9
25									88·48	4	88·81	9
26									88·46	4	88·76	8
27									88·45	4	89·01	12
28									88·45	4	88·96	11
29									88·45	4	88·96	11
30									88·44	3	88·96	11
31									88·44	3		

Day	July Gauge Ht.	July Dis.	August Gauge Ht.	August Dis.	September Gauge Ht.	September Dis.	October Gauge Ht.	October Dis.	November Gauge Ht.	November Dis.	December Gauge Ht.	December Dis.
1	88·76	8	89·86	36	88·86	9	89·26	17	89·26	17	89·06	
2	88·76	8	89·81	34	88·86	9	89·26	17	89·26	17	89·06	
3	88·71	7	89·71	30	88·81	9	89·36	20	89·26	17	89·06	
4	88·81	9	89·66	29	88·76	8	89·36	20	89·26	17	89·06	
5	88·81	9	89·66	29	88·76	8	89·36	20	89·16	15	89·06	
6	88·68	7	89·66	29	88·76	8	89·36	20	89·16	15	89·06	
7	88·66	6	89·66	29	88·86	9	89·36	20	89·06	13	89·06	
8	88·56	5	89·66	29	88·96	11	89·36	20	89·06	13	89·06	
9	88·66	6	89·66	29	89·16	15	89·36	20	89·06	13	89·06	
10	88·71	7	89·56	26	89·16	15	89·26	17	89·06		89·06	
11	89·51	24	89·56	26	89·16	15	89·26	17	89·06		89·06	
12	89·86	36	89·56	26	89·11	14	89·26	17	89·06		89·06	
13	89·86	36	89·46	23	89·06	13	89·26	17	89·06		88·96	
14	89·86	36	89·46	23	89·26	17	89·16	15	89·06		88·86	
15	89·91	39	89·46	23	89·36	20	89·16	15	89·06		88·76	
16	89·96	41	89·46	23	89·36	20	89·16	15	89·06		88·66	
17	89·91	39	89·46	23	89·36	20	89·16	15	89·06		88·66	
18	89·91	39	89·46	23	89·26	17	89·06	13	89·06		88·66	
19	89·91	39	89·46	23	89·46	23	89·06	13	89·06		88·66	
20	89·86	36	89·36	20	89·46	23	89·06	13	89·06		88·56	
21	89·86	36	89·36	20	89·36	20	89·06	13	89·06		88·56	
22	89·86	36	89·36	20	89·36	20	89·06	13	89·06		88·56	
23	89·86	36	89·36	20	89·36	20	89·06	13	89·06		88·56	
24	89·76	32	89·16	15	89·26	17	89·06	13	89·06		88·46	
25	89·86	36	89·06	13	89·26	17	89·06	13	89·06		88·46	
26	89·86	36	89·06	13	89·26	17	89·16	15	89·06		89·46	
27	89·86	36	89·06	13	89·26	17	89·26	17	89·06		89·41	
28	89·76	32	89·06	13	89·31	18	89·26	17	89·06		89·41	
29	89·76	32	88·96	11	89·36	20	89·26	17	89·06		89·41	
30	89·76	32	88·96	11	89·26	17	89·26	17	89·06		89·41	
31	89·76	32	88·86	9			89·26	17			89·41	

Station established May 17.

NOTE.—Ice conditions from November 10 to end of year.
    Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF LITTLE SASKATCHEWAN RIVER AT MIDDLETON BRIDGE FOR PERIOD
MAY—NOVEMBER, 1915.

[Drainage area 184 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.
May....................	....	....	¹5	0·027	0·031	307
June....................	51	3	14	0·076	0·085	833
July.....................	41	5	26	0·041	0·163	1,600
August	36	9	22	0·120	0·138	1,350
September..............	23	8	16	0·087	0·097	952
October................	20	13	16	0·087	0·100	984
November..............	....	....	¹9	0·049	0·055	536
December..............	....	....	....	....	....	....
The Period....	51	3	15	0·084	0·669	6,562

NOTE.—Marked thus (¹) estimated.

LITTLE SASKATCHEWAN AT ELPHINSTONE.

HISTORY.

A metering station was established on the Little Saskatchewan near Elphinstone on
May 10, 1915, by E. B. Patterson, and observations have been carried on at this station
since that date.

LOCATION OF SECTION.

The section is located on the downstream side of the traffic bridge known as Indian
bridge, one and one-half miles north of the town of Elphinstone. The I.P. is painted
on the handrail at the west end of the bridge.

RECORDS AVAILABLE.

From May 10, 1915, to the end of the year daily gauge heights have been recorded,
and at various times discharge measurements have been made covering the greater part
of the range in stage recorded by the daily gauge height. Estimates of daily discharge have
been made for the period from May 10 to November 13. From November 13 to
the end of the year ice cover conditions obtained, and sufficient information has not been
secured to allow the estimating of daily discharges for this period.

DRAINAGE AREA.

The drainage area tributary to the river at this point is 380 square miles.

GAUGE.

A six-foot enamelled staff gauge has been secured to a pile on the upstream side of the
gauge near the left bank. This gauge is referred to a B.M. located fifty-five feet east of
the bridge. The B.M. is set to an arbitrary datum.

25f—8½

CHANNEL.

The channel is straight for about one hundred feet below the section, but above it is curved for about three hundred feet; the right bank above and below the section is liable to overflow during high water, but the embankment would prevent overflow at the section. The bed of the stream is composed of boulders and not liable to shift.

DISCHARGE MEASUREMENTS.

The discharge measurements at this station are taken either by wading during low water or from the bridge during high water.

ACCURACY.

Throughout the range in stage recorded by the daily gauge height the discharge curve is well defined.

DISCHARGE MEASUREMENTS OF LITTLE SASKATCHEWAN RIVER AT INDIAN BRIDGE, ELPHINSTONE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 10...	E. B. Patterson....	1,920	21	21·7	0·73	93·42	15·9
May 18...	"	1,920	24	23·4	0·99	93·53	23·2
May 26...	"	1,920	24	18·8	0·67	93·41	12·6
May 27...	"	1,920	24	21·0	0·69	93·40	14·4
May 28...	"	1,920	27	16·1	0·96	93·40	15·5[1]
June 7...	"	1,920	74	47·2	1·16	93·86	54·9
June 17...	"	1,920	25	21·5	0·76	93·50	16·4
July 24...	G. K. Gainsford....	1,435	69	55·2	1·37	93·92	75·6
Aug. 24...	H. H. Pratt........	1,496	35	21·4	1·25	93·59	26·8
Sept. 25...	G. K. Gainsford....	1,196	69	48·6	1·21	93·82	58·8
Nov. 6...	"	1,196	69	48·7	1·05	93·81	51·1

[1] Not at regular section.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF LITTLE SASKATCHEWAN RIVER AT INDIAN BRIDGE, ELPHINSTONE, FOR 1915.

[Drainage area 380 square miles.]

Day.	January.		February.		March.		April.		May.		June.	
	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											93.41	15
2											93.40	15
3											93.39	14
4											93.38	14
5											93.59	26
6											93.77	46
7											93.86	61
8											93.84	57
9											93.86	61
10									93.42	16	93.87	63
11									93.45	17	93.85	59
12									93.49	19	93.78	47
13									93.49	19	93.64	31
14									93.49	19	93.58	26
15									93.53	22	93.52	21
16									93.57	25	93.51	21
17									93.54	23	93.50	20
18									93.53	22	93.49	19
19									93.49	19	93.48	19
20									93.48	19	93.51	21
21									93.45	17	93.59	26
22									93.43	16	93.59	26
23									93.42	16	93.61	28
24									93.43	16	93.60	27
25									93.41	15	93.62	29
26									93.40	15	93.67	34
27									93.40	15	93.74	42
28									93.41	15	93.78	47
29									93.44	17	93.70	37
30									93.42	16	93.66	33
31									93.42	16		

Day	July.		August.		September.		October.		November.		December.	
1	93.64	31	93.82	54	93.44	17	93.82	54	93.84	57	94.09	
2	93.61	28	93.81	52	93.43	16	93.83	55	93.83	55	94.24	
3	93.60	27	93.77	46	93.47	18	93.86	61	93.81	52	94.12	
4	93.59	26	93.72	40	93.45	17	93.87	63	93.77	46	93.99	
5	93.59	26	93.72	40	93.44	17	93.86	61	93.76	45	94.02	
6	93.55	24	93.70	37	93.45	17	93.86	61	93.80	50	94.12	
7	93.52	21	93.68	35	93.52	24	93.86	61	93.74	42	94.14	
8	93.50	20	93.67	34	93.62	29	93.84	57	93.72	40	94.22	
9	93.50	20	93.66	33	93.63	30	93.82	54	¹93.73	41	94.29	
10	93.51	21	93.62	29	93.66	33	93.81	52	¹93.74	42	94.30	
11	93.56	24	93.61	28	93.60	27	93.81	52	¹93.75	44	94.24	
12	93.67	34	93.61	28	93.60	27	93.81	52	¹93.76	45	94.33	
13	93.93	75	93.60	27	93.60	27	93.80	50	93.77	46	94.35	
14	93.95	80	93.59	26	93.71	38	93.79	49	93.85		94.39	
15	93.90	90	93.57	25	93.75	44	93.79	49	93.83		94.43	
16	94.08	112	93.55	24	93.76	45	93.79	49	93.89		94.40	
17	94.07	110	93.54	23	93.76	45	93.79	49	93.90		94.37	
18	94.05	105	93.53	22	93.77	46	93.79	49	93.91		94.41	
19	94.03	100	93.52	21	93.78	47	93.79	49	93.91		94.42	
20	94.01	95	93.51	21	93.81	52	93.78	47	93.92		94.43	
21	93.99	90	93.73	41	93.84	57	93.78	47	93.92		94.47	
22	93.97	85	93.66	33	93.83	55	93.75	44	93.90		94.55	
23	93.95	80	93.60	27	93.82	54	93.75	44	93.85		94.57	
24	93.92	72	93.57	25	93.81	52	93.75	44	93.92		94.57	
25	93.90	68	93.53	22	93.82	54	93.82	54	93.92		94.58	
26	93.88	64	93.52	21	93.81	52	93.78	47	93.92		94.58	
27	93.85	59	93.50	20	93.81	52	93.82	54	93.91		94.59	
28	93.83	55	93.49	19	93.81	52	93.86	61	93.92		94.71	
29	93.82	54	93.48	19	93.82	54	93.91	70	93.99		94.75	
30	93.78	47	93.49	19	93.84	57	93.86	61	94.02		94.79	
31	93.77	46	93.46	18			93.86	61			94.82	

NOTE.—Gauge heights marked thus (¹) interpolated.
Ice conditions from November 14 to December 31.
Not sufficient information to compute daily discharges.

DEPARTMENT OF THE INTERIOR

MONTHLY DISCHARGE OF LITTLE SASKATCHEWAN RIVER AT INDIAN BRIDGE, ELPHINSTONE,
FOR 1915.

[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.
May..................	....	....	[1]16	0·042	0·048	984
June.................	63	14	33	0·087	0·097	1,960
July.................	112	20	58	0·153	0·176	3,575
August...............	54	18	29	0·076	0·088	1,780
September............	57	16	38	0·100	0·112	2,260
October..............	70	44	54	0·142	0·164	3,325
November.............	....	....	[1]30	0·079	0·088	1,780
December.............	....	....	[1]5	0·013	0·015	307
The Period....	112	14	33	0·086	0·788	15,971

NOTE.—Marked thus ([1]) estimated.

CLEAR CREEK.

Clear Creek is one of the tributaries of the Little Saskatchewan in the northerly section of the drainage area. Its source is in Clear lake, from which it derives its name, and from a point at the westerly end of the lake in Tp. 20, R.19, W.P.M., it flows almost due west for a distance of nine miles to its junction with the Little Saskatchewan.

The importance of this creek lies mainly in the fact of its being the outlet of Clear lake. At its head a storage dam has been built to conserve the run-off from the area tributary to the lake, for the use of the power developments on the Little Saskatchewan.

CLEAR CREEK ABOVE JUNCTION WITH LITTLE SASKATCHEWAN.

HISTORY.

A metering station was established on Clear creek by E. B. Patterson on May 31, 1915, and from that time to the end of the year the station has been operated.

LOCATION OF SECTION.

The section is located on the creek one mile upstream from its junction with the Little Saskatchewan. The Initial Point is a three-inch poplar post, three feet from the water's edge on the right bank, and indicated by the painted letters "I.P."

RECORDS AVAILABLE.

From the time of the establishment of the station gauge readings have been made tri-weekly. Sufficient meterings have been made to define a discharge curve covering the range in stage met with, and estimated daily discharges are available to the end of 1915.

DRAINAGE AREA.

The drainage area tributary to the creek at the metering station is ninety-five square miles.

GAUGE.

The gauge at this station is a six-foot enamelled staff gauge secured to a post driven into the bed of the creek and braced. This gauge is referred to a B.M. set to an arbitrary datum, located 50 feet northeast of Initial Point. The bench mark is a four-inch poplar stump painted red, marked " M.H.S. B.M. El. 100.00."

CHANNEL.

The stream throughout its course is very sinuous, but the station is located at a point where the channel is fairly straight. The bed of the stream is gravelly and not liable to change. During high water the left bank is liable to overflow, but this condition would not likely hold for any extended period.

DISCHARGE MEASUREMENTS.

The discharge measurements at this point are made by wading.

ACCURACY.

For the range in stage covered by the discharge measurements the discharge curve is well defined.

DISCHARGE MEASUREMENTS OF CLEAR CREEK ABOVE JUNCTION WITH LITTLE SASKATCHEWAN RIVER, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec	Feet.	Sec. ft.
May 10...	E. B. Patterson.....	1,920	7·5	3·0	0·85	....	2·6
May 19...	"	1,920	12·0	8·8	0·46	93·07	4·0
May 31...	"	1,920	12·6	10·4	0·63	93·22	6·5
June 2...	"	1,920	12·6	10·4	0·56	93·20	5·8
June 5...	"	1,920	12·8	10·9	0·63	93·23	6·8
June 15...	"	1,920	12·5	9·4	0·43	93·11	4·0
July 24...	G. K. Gainsford....	1,435	11·5	15·2	0·37	93·13	5·6
Aug. 24...	H. H. Pratt........	1,496	12·2	12·3	0·23	93·14	2·9
Sept. 25...	G. K. Gainsford....	1,196	14·0	18·2	1·08	93·77	19·7
Nov. 6...	"	1,196	14·0	15·6	0·98	93·54	15·3

DAILY GAUGE HEIGHT AND DISCHARGE OF CLEAR CREEK AT JUNCTION WITH LITTLE SASKATCHEWAN RIVER FOR 1915.

[Drainage area 95 square miles.]

Day	January Gauge Height (Feet)	January Discharge (Sec. ft.)	February Gauge Height	February Discharge	March Gauge Height	March Discharge	April Gauge Height	April Discharge	May Gauge Height	May Discharge	June Gauge Height	June Discharge
1												
2											93·20	6
3												
4												
5											93·23	7
6												
7											93·22	6
8												
9											93·22	6
10												
11											93·12	4
12												
13												
14											93·07	4
15											93·11	4
16											93·12	4
17												
18											93·12	4
19									93·07	4		
20												
21											93·25	7
22												
23											93·15	5
24												
25											93·22	6
26												
27												
28											93·47	13
29												
30											93·22	6
31									93·22	6		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1					93·07	4	93·77	20	93·62	16	94·17	
2	93·17	5	93·14	5								
3					93·09	4			93·59	16	94·12	
4			93·12	4			93·72	19				
5	93·22	6							93·59	16		
6			93·12	4	93·12	4	93·72	19	93·54	14	94·27	
7	93·12	4										
8			93·07	4	93·22	6	93·72	19	93·54	14	94·27	
9	93·12	4										
10					93·29	8			93·39	11	94·14	
11			93·02	3			93·64	17				
12	93·27	8							94·04	27		
13			93·05	3	93·62	16	93·57	15			93·87	
14	93·12	4										
15					93·72	19	93·64	17	94·27	33	94·07	
16	93·34	10	93·05	3								
17					93·79	21			93·92		94·14	
18			93·07	4			93·62	16				
19	93·32	9							93·89			
20			93·12	4	93·82	22	93·62	16			94·07	
21	93·22	6										
22					93·74	19	93·62	16			94·12	
23	93·27	8	93·19	6					93·99			
24	93·13	5	93·14	5	93·74	19			94·02		94·32	
25			93·05	3	93·77	20	93·67	18				
26	93·12	4							93·82			
27			93·02	3	93·72	19	93·69	18			94·32	
28	93·12	4										
29					93·74	19	93·69	18	93·97		94·17	
30	93·12	4	93·07	4								
31											94·32	

MONTHLY DISCHARGE OF CLEAR CREEK AT JUNCTION WITH LITTLE SASKATCHEWAN RIVER
FOR 1915.

[Drainage area 95 square miles.]

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches of Drainage Area.	Total in acre-feet.
May....................	....	....	[1]5	0·053	0·061	307
June....................	13	4	6	0·063	0·070	357
July....................	10	4	6	0·063	0·073	369
August..................	6	3	4	0·042	0·048	246
September...............	22	4	14	0·147	0·164	833
October.................	20	15	18	0·189	0·218	1,107
November.......	33	....	[1]12	0·126	0·141	714
The Period........	33	4	9	0·098	0·775	3,933

NOTE.—Marked thus ([1]) estimated.

LITTLE SASKATCHEWAN RIVER AT BEILBY'S BRIDGE.

HISTORY.

The station on the Little Saskatchewan was established on March 18, 1914, by W. J. Ireland, under ice cover conditions. It was found when the ice went out that the location was unsatisfactory on account of eddies on the section, and a cable carrier station was established downstream from the bridge. This station has been in continuous operation since that time.

LOCATION OF SECTION.

The meter section is located four hundred feet downstream from Beilby's traffic bridge. It is twelve miles northwest of Minnedosa, five miles west of Clan William and one and one-half mile downstream from the junction of the Little Saskatchewan and Rolling rivers.

RECORDS AVAILABLE.

Records of daily gauge height have been secured from April 25, 1914. Sufficient meterings have been made to define a curve and estimate daily discharges during the open water season from April 25 to November 29, 1914, and from April 12 to November 11, 1915. During the closed water season of 1915 sufficient infomartion was not obtained for computing daily discharges.

DRAINAGE AREA.

The area tributary to the Little Saskatchewan above Beilby's bridge is 1,120 square miles.

GAUGE.

A nine-foot vertical staff gauge is secured to a pile, sixty-four feet from the north end of the bridge on the downstream side. It is referred to a permanent M.H.S. B.M., located seventy-three feet north of the north end of the bridge. This B.M. is set to an arbitrary datum.

CHANNEL.

For five hundred feet above the section and three hundred feet below, the channel is straight. At all stages the river is confined to one channel, the bed of the stream is of sand and gravel and fairly permanent, the banks are low and subject to overflow at extreme stages.

DISCHARGE MEASUREMENTS.

Discharge measurements are made by means of a cable carrier, which travels on a cable which is stretched across the river at the section. The measurements cover a range in stage of 2·5 feet.

ACCURACY.

The discharge measurements taken do not define the discharge curve very well, due to difficulty in obtaining accurate soundings at the section.

DISCHARGE MEASUREMENTS OF LITTLE SASKATCHEWAN RIVER AT BEILBY'S BRIDGE, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 1...	C. O. Allen.........	1,912	60·0	48·0	....	94·99	.........[1]
Jan. 23...	M. S. Madden.....	1,462	37·0	20·6	0·02	93·89	0·5[2]
Mar. 20...	"	1,462	25·0	7·6	0·12	93·98	0·9[2]
April 15...	C. O. Allen........	1,912	75·5	190·3	0·87	94·69	166·5
April 25...	"	1,912	74·2	160·4	0·57	94·24	91·6
May 14...	"	2,018	74·0	129·0	0·37	93·89	47·7
May 20...	E. B. Patterson	1,920	74·0	134·8	0·50	93·97	67·1
June 5...	C. O. Allen........	2,018	74·0	117·9	0·31	93·68	36·5
June 11...	E. B. Patterson	1,920	76·0	152·9	0·62	94·19	95·3
June 23...	"	1,920	76·0	151·4	0·58	94·15	87·5
July 20...	G. K. Gainsford....	1,435	77·0	172·3	0·62	94·43	106·3
Aug. 19...	H. H. Pratt........	1,496	74·0	91·4	0·11	93·75	9·8
Sept. 23...	G. K. Gainsford....	1,196	76·0	133·0	0·41	94·08	54·5
Oct. 29...	C. O. Allen........	1,374	76·0	148·0	0·57	94·09	84·4

[1] No flow. Water flooding ice.
[2] Ice measurement.

DAILY GAUGE HEIGHT AND DISCHARGE OF LITTLE SASKATCHEWAN RIVER AT BEILBY'S BRIDGE FOR 1915.

[Drainage area 1,120 square miles.]

Day.	January.		February.		March.		April.		May.		June.	
	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	94·99	0	94·62						94·07	75	93·73	37
2	94·97				95·13				94·05	73	93·72	36
3							95·78		94·02	69	93·72	36
4							95·76		93·99	66	93·72	36
5			94·87				95·74		94·97	64	93·75	40
6					94·93		95·73		94·95	62	93·77	42
7	94·77						95·55		94·91	57	93·79	44
8							95·48		94·87	53	93·97	64
9			95·05		94·75		95·32		94·82	47	94·17	87
10							95·28		94·84	49	94·18	88
11	94·42						95·25		94·85	51	94·19	90
12							95·17	250	94·87	53	94·22	94
13			95·07		94·53		94·89	194	94·89	55	94·22	94
14							94·74	167	94·89	55	94·19	90
15	94·02						94·69	160	94·96	63	94·12	81
16			95·21		94·33		94·67	157	94·94	60	94·19	90
17							94·67	157	94·99	66	94·19	90
18							94·63	151	94·05	73	94·17	87
19	93·87		95·29				94·61	148	94·01	68	94·17	87
20					93·98	1	94·47	128	93·97	64	94·19	90
21							94·45	125	93·95	62	94·17	87
22							94·39	117	93·91	57	94·15	84
23	93·89	1	95·37		95·93		94·32	107	93·89	55	94·17	87
24							94·29	103	93·87	53	94·19	90
25							94·27	100	93·85	51	94·21	92
26	94·02		95·19		95·95		94·22	94	93·81	46	94·22	94
27							94·17	87	93·77	42	94·25	97
28							94·15	85	93·76	41	94·29	103
29							94·12	81	93·75	40	94·32	107
30	94·27				95·73		94·09	77	93·74	38	94·27	100
31									93·73	37		

	July.		August.		September.		October.		November.		December.	
1	94·17	87	93·97	64	93·75	40	94·09	77	94·15	85		
2	94·15	84	93·97	64	93·74	38	94·12	81	94·13	82		
3	94·11	79	93·95	62	93·73	37	94·13	82	94·11	79		
4	94·09	77	93·95	62	93·72	36	94·14	83	94·09	77	94·37	
5	94·07	75	93·95	62	93·72	36	94·15	85	94·07	75		
6	94·05	73	93·93	59	93·72	36	94·17	87	94·05	73		
7	94·03	70	93·92	58	93·72	36	94·22	90	94·06	74	94·39	
8	93·99	66	93·91	57	93·72	36	94·22	94	94·06	74		
9	93·95	62	93·89	55	93·72	36	94·22	94	94·07	75		
10	93·92	58	93·87	53	93·72	36	94·52	135	94·07	75		
11	93·91	57	93·87	53	93·77	42	94·52	135	94·09	77	94·42	
12	93·89	55	93·87	53	93·79	44	94·42	121	94·10			
13	93·87	53	93·85	51	93·82	47	94·37	114	94·11			
14	93·87	53	93·77	42	93·83	48	94·32	107	94·12			
15	93·97	64	93·77	42	93·87	53	94·22	94				
16	94·17	87	93·76	41	93·92	58	94·17	87				
17	94·22	94	93·75	40	93·95	62	94·16	86	94·15			
18	94·32	107	93·75	40	93·95	62	94·15	85			94·47	
19	94·37	114	93·75	40	93·95	62	94·13	82	94·19			
20	94·42	121	93·75	40	93·97	64	94·11	79				
21	94·39	117	93·75	40	93·97	64	94·07	75			94·45	
22	94·37	114	93·75	40	93·99	66	94·05	73	94·22			
23	94·32	107	93·75	40	94·02	69	94·03	70				
24	94·27	100	93·75	40	94·05	73	94·02	69				
25	94·17	87	93·75	40	94·07	75	94·05	73			95·43	
26	94·07	75	93·75	40	94·07	75	94·07	75				
27	94·12	81	93·75	40	94·05	73	94·09	77	94·25		94·41	
28	94·07	75	93·75	40	94·05	73	94·11	79				
29	94·02	69	93·75	40	94·07	75	94·13	82	94·29			
30	93·98	65	93·75	40	94·09	77	94·15	85				
31	93·97	64	93·75	40			94·16	86			94·39	

NOTE—Ice conditions from January 1 to April 11, and November 12 to December 31. Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF LITTLE SASKATCHEWAN RIVER AT BEILBY'S BRIDGE FOR THE YEAR
1915.

[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
January			0	0.000	0.000	0
February			[1]0	0.000	0.000	0
March			[1]2	0·002	0·002	120
April	250		[1]95	0·085	0·095	5,600
May	75	37	56	0·050	0·058	3,450
June	107	36	78	0·070	0·078	4,650
July	121	53	80	0·071	0·082	4,925
August	64	40	48	0·043	0·050	2,950
September	77	36	54	0·048	0·054	3,225
October	135	69	88	0·079	0·091	5,400
November	85		[1]40	0·036	0·040	2,380
December			[1]8	0·007	0·008	492
The Year	250		46	0·041	0·558	33,192

NOTE.—Marked thus ([1]) estimated.

LITTLE SASKATCHEWAN RIVER AT MINNEDOSA.

HISTORY.

A station was first established on the Little Saskatchewan at Minnedosa in October,
1912, by W. G. Worden at the highway bridge within the town. This was abandoned and
later one was established by C. O. Allen at the power house on July 13, 1914. This station
is still in operation.

LOCATION OF SECTION.

The meter section is located on the upstream side of the traffic bridge crossing the
Minnedosa Power Company's intake, and about three-quarters of a mile from the C.P.R.
station.

RECORDS AVAILABLE.

A gauge height record was kept at the old station on the highway bridge from October
14 to November 2, 1912. A record of daily gauge height has been kept at the head
and tailwater of the Minnedosa Power Company from June 2, 1914, to the end of the
year 1915.

DRAINAGE AREA.

The drainage area above Minnedosa is 1,200 square miles. The area is not significant
in this case, as the station is only used to determine the discharge through the power plant.

GAUGE.

The gauge in the headrace is a six-foot vertical staff enamelled gauge fastened to the
intake wall of the power plant on the left hand side. The tailrace gauge is a six-foot vertical
staff enamelled gauge fastened to the side of the retaining wall in the tailrace on the right
hand side.

CHANNEL.

The channel at the meter section is that formed by the intake for the power plant.

DISCHARGE MEASUREMENTS.

Measurements are taken from the bridge across the intake.

ACCURACY.

Owing to the fact that the discharge is controlled entirely by the operation of the power station and quite irrespective of gauge heights, no discharge curve has been constructed.

DISCHARGE MEASUREMENTS OF LITTLE SASKATCHEWAN INTAKE AT MINNEDOSA POWER HOUSE, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
April 15...	C. O. Allen........	1,912	19·5	168·5	0·55	1,647·72	92·9
May 14...	"	2,018	19·5	252·0	0·39	1,652·12	98·3
June 5...	"	2,018	19·6	239·8	0·39	1,651·22	93·5
23...	E. B. Patterson....	1,920	19·5	268·7	0·36	1,653·14	96·7
July 20...	G. K. Gainsford....	1,435	19·0	279·5	0·29	1,653·32	82·5
Aug. 18...	H. H. Pratt........	1,496	19·5	213·4	0·33	1,651·64	69·3
Oct. 29...	C. O. Allen........	1,374	19·6	271·6	0·33	1,652·91	89·6

ROLLING RIVER (ERICKSON'S BRIDGE).

HISTORY.

A metering station was established on the Rolling river at Erickson's bridge on May 4, 1915, but it was only operated for a short time, owing to interference with the control points on the stream in this locality through the workings of beavers above and below the section.

LOCATION OF SECTION.

The section is located thirty feet downstream from Erickson's bridge on the E. boundary, Sec. 21, Tp. 18, R. 18, W.P.M. The Initial Point is painted on a fence post on the right bank.

RECORDS AVAILABLE.

From May 3 to June 22, 1915, records of gauge height and estimated daily discharges are available, also miscellaneous discharge measurements taken through the summer of the same year.

DRAINAGE AREA.

The drainage area tributary to the river at this point is 112 square miles.
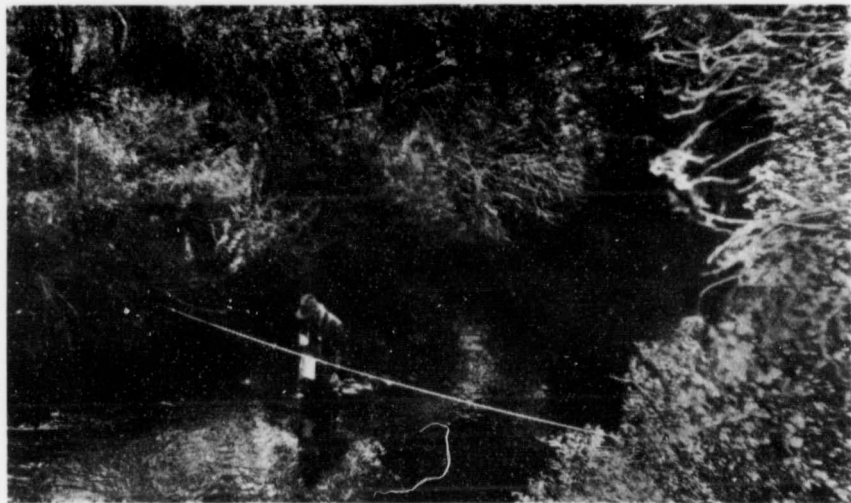
Taken by E. B. Patterson.

LITTLE SASKATCHEWAN DRAINAGE AREA—ROLLING RIVER METER SECTION AT ERICKSON'S BRIDGE.

GAUGE.

A six-foot vertical staff gauge is secured to a pile on the downstream side of the bridge above the section. This gauge is referred to a B.M. set to an arbitrary datum and located twenty yards northwest of bridge. The B.M. is a notch cut in the root of a spruce tree.

CHANNEL.

The channel at the section is straight for a short distance above and below. The bed of the stream is of a gravelly nature. The left bank is liable to overflow in times of high water.

DISCHARGE MEASUREMENTS.

All discharge measurements are taken by wading.

ACCURACY.

On account of the variable control which led to the abandonment of the station, the accuracy is not high.

DISCHARGE MEASUREMENTS OF ROLLING RIVER AT ERICKSON'S BRIDGE, DANVERS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 4...	E. B. Patterson....	1,920	22	29·0	0·39	92·79	11·3
6...	"	1,920	22	26·9	0·31	92·74	8·2
13...	"	1,920	23	37·4	0·80	93·18	29·8
21...	"	1,920	22	27·9	0·40	92·81	11·1
June 10...	"	1,920	24	34·2	0·72	93·12	24·6
22...	"	1,920	24	36·4	0·73	93·19	26·7
July 21...	G. K. Gainsford....	1,435	22	29·9	0·57	93·00	17·0
Sept. 24...	"	1,196	23	25·2	0·16	92·67	4·0

DAILY GAUGE HEIGHT AND DISCHARGE OF ROLLING RIVER AT ERICKSON'S BRIDGE, DANVERS, FOR 1915.

[Drainage area 112 square miles.]

Day.	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1			92·56	1								
2			92·56	1								
3			92·49	0								
4	92·79	11	92·39	0								
5	⁰92·76	9	92·56	1								
6	92·74	8	92·66	5								
7	92·74	8	92·86	14								
8	92·74	8	92·96	18								
9	92·74	8	93·06	23								
10	92·86	14	93·16	27								
11	92·76	9	93·66	50								
12	92·86	14	93·45	40								
13	93·16	27	93·06	24								
14	93·06	23	93·16	27								
15	93·16	27	93·26	32								
16	93·06	23	93·66	50								
17	93·06	23	93·66	50								
18	92·96	18	93·16	27								
19	92·73	8	93·16	27								
20	92·86	14	92·75	9								
21	92·81	11	93·06	23	93·00	20						
22	92·76	9	93·19	29								
23	92·66	5										
24	92·66	5							92·67	5		
25	92·66	5										
26	92·66	5										
27	92·66	5										
28	92·66	5										
29	92·56	1										
30	92·56	1										
31	92·56	1										

NOTE.—Marked thus(⁰) interpolated.

MONTHLY DISCHARGE OF ROLLING RIVER AT ERICKSON'S BRIDGE, DANVERS, FOR 1915.

[Drainage area 112 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.
May			¹10	0·089	0·103	615
June	50	0	¹23	0·205	0·229	1,370
July			¹15	0·134	0·155	922
August			¹10	0·089	0·103	615
September			¹9	0·080	0·089	536
October			¹10	0·089	0·103	615
November			¹11	0·098	0·109	655
December						
The Period			13	0·112	0·891	5,328

NOTE.—Marked thus (¹) estimated.

ROLLING RIVER NEAR C.N.R. CROSSING.

HISTORY.

A metering station was established on the Rolling river at Lee's bridge on June 22, 1915, and was in operation throughout the open water season of that year.

LOCATION OF SECTION.

The section is located on the downstream side of Lee's bridge, three and one-half miles from Erickson and one-half mile north of C.N.R. The bridge is in Sec. 7, Tp. 18, R. 18, W.P.M. The Initial Point is painted on the downstream hand rail at the east end of the bridge.

RECORDS AVAILABLE.

From the date of the establishment of the station, June 22, 1915, to November 12 daily gauge heights and estimated discharges have been obtained. After the latter date ice cover conditions prevailed and the information obtained was not sufficient to allow the estimating of daily discharges. Discharge measurements covering a range of two feet were obtained.

DRAINAGE AREA.

The drainage area tributary to the river at this point is 235 square miles.

GAUGE.

A six-foot vertical staff gauge is secured to the center pile on the downstream side of the bridge. This gauge is referred to a B.M. set to an arbitrary datum located on the root of a spruce tree one hundred and fifty feet east of the bridge.

CHANNEL.

The section is located in a slightly curved stretch of the river. The banks are high but at extreme high water the right bank is liable to overflow. The bed of the stream is silt and is liable to shift in high water.

DISCHARGE MEASUREMENTS.

Discharge measurements are made from the bridge at all stages of the river.

ACCURACY.

The discharge curve for the range in stage covered by the discharge measurements is fairly well defined.

DISCHARGE MEASUREMENTS OF ROLLING RIVER NEAR C.N.R. CROSSING, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
June 22...	E. B. Patterson....	1,920	38	77·7	0·73	89·70	56·4
July 21...	G. K. Gainsford....	1,435	37	81·2	0·53	89·79	43·3
Aug. 20...	H. H. Pratt.......	1,496	34	18·4	0·10	87·79	2·5
Sept. 24...	G. K. Gainsford....	1,196	36	55·9	0·31	89·14	17·3
Nov. 4...	"	1,196	36	52·8	0·34	89·01	18·0

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF ROLLING RIVER NEAR C.N.R. CROSSING FOR
1915.

[Drainage area 235 square miles.]

Day.	June.		July.		August.		September.		October.		November.	
	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	....	....	89·60	35	88·97	16	88·40	7	89·35	26	89·18	21
2	....	....	89·47	30	89·03	17	88·40	7	89·45	29	89·16	21
3	....	....	89·42	28	89·25	23	88·40	7	89·52	33	89·11	19
4	....	....	89·32	25	89·22	23	88·40	7	89·60	35	89·07	18
5	....	....	89·32	25	89·18	21	88·50	9	89·64	37	89·01	17
6	....	....	89·31	25	89·11	19	88·72	12	89·69	39	89·04	18
7	....	....	89·27	23	89·03	17	88·80	13	89·82	44	89·07	18
8	....	....	89·12	20	88·91	15	88·72	12	90·25	63	89·10	19
9	....	....	89·14	20	88·85	14	88·78	13	90·61	82	89·13	20
10	....	....	89·00	17	88·82	13	88·92	15	90·67	85	89·18	21
11	....	....	89·15	20	88·84	14	88·98	16	90·67	85	89·21	22
12	....	....	89·20	22	88·86	14	88·90	15	90·38	69	89·27	23
13	....	....	89·42	28	88·70	11	88·90	15	90·15	58	....	....
14	....	....	89·35	26	88·75	12	88·92	15	89·95	50	....	....
15	....	....	89·35	26	88·70	11	89·02	17	89·75	41	....	....
16	....	....	89·37	27	88·70	11	89·09	19	89·57	34	....	....
17	....	....	89·55	33	88·70	11	89·10	19	89·37	27	....	....
18	....	....	89·82	44	88·70	11	89·02	17	89·27	23	....	....
19	....	....	89·87	40	88·69	11	89·00	17	89·23	22	....	....
20	....	....	89·83	44	88·63	10	89·00	17	89·16	21	....	....
21	....	....	89·82	44	88·60	10	89·05	18	89·10	19	....	....
22	89·73	40	89·68	38	88·60	10	89·30	24	89·09	19	....	....
23	89·72	40	89·58	34	88·60	10	89·24	23	89·08	18	....	....
24	89·67	38	89·50	31	88·60	10	89·19	21	89·11	19	....	....
25	89·74	41	89·37	27	88·60	10	89·15	20	89·13	20	....	....
26	89·88	47	89·27	23	88·58	10	89·10	19	89·14	20	....	....
27	89·93	49	89·17	21	88·54	9	89·07	18	89·16	21	....	....
28	90·00	52	89·10	19	88·51	9	89·02	17	89·17	21	....	....
29	89·85	45	89·02	17	88·50	9	89·07	18	89·18	21	....	....
30	89·70	39	89·01	17	88·47	8	89·17	21	89·19	21	....	....
31			88·90	15	88·40	7	....	....	89·19	21	....	....

NOTE.—Ice conditions from November 13 to December 31.
Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF ROLLING RIVER AT C.N.R. CROSSING FOR THE PERIOD
JUNE—NOVEMBER, 1915.

[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.
May...................	....	....	[1]16	0·068	0·078	984
June...................	....	....	[1]40	0·170	0·190	2,375
July...................	46	15	27	0·114	0·131	1,660
August................	23	7	13	0·055	0·063	799
September.............	24	7	16	0·068	0·076	952
October...............	85	18	36	0·153	0·176	2,210
November.............	....	....	[1]16	0·068	0·076	952
The Period....	85	7	25	0·099	0·790	9,932

NOTE.—Marked thus ([1]) estimated.

WHIRLPOOL RIVER AT DANVERS.

HISTORY.

A metering station was established on the Whirlpool river at Danvers on May 6,
1915, by E. B. Patterson, and throughout the open water season of that year the station was
in operation.

LOCATION OF SECTION.

The section is located on the downstream side of what is locally known as Erickson's bridge, one-half mile from Danvers P.O., on the north boundary of Sec. 21, Tp. 18, R. 18, W.P.M. The Initial Point is indicated by a painted I.P. on a pile at east side of section.

RECORDS AVAILABLE.

From the date of the establishment of the station, May 6, 1915, to November 11 of that year, daily gauge heights with estimated daily discharges are available. Discharge measurements covering a range in stage of one and a half feet have been obtained.

DRAINAGE AREA.

The drainage area tributary to the Whirlpool river above the metering section is 79 square miles.

GAUGE.

A six-foot staff gauge is secured to a pile on the downstream side of the bridge. This gauge is referred to a B.M. set to an arbitrary datum on the root of a dry spruce tree on the south side of the road, four hundred feet east of the bridge.

CHANNEL.

The banks in the vicinity of the station are low and in high water will overflow. The bed of the stream is sandy and liable to shift.

DISCHARGE MEASUREMENTS.

The discharge measurements are taken by wading, except during high stages of the river, when they are taken from the bridge.

ACCURACY.

Throughout the range of stage covered by the discharge measurements obtained the discharge curve is well defined.

DISCHARGE MEASUREMENTS OF WHIRLPOOL RIVER AT DANVERS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 6...	E. B. Patterson....	1,920	10·0	6·5	0·56	87·27	3·6
May 13...	"	1,920	10·5	7·3	0·66	87·28	4·8
May 21...	"	1,920	12·0	9·6	0·61	87·55	6·7
June 10...	"	1,920	12·0	8·8	0·61	87·52	5·4
June 22...	"	1,920	19·0	25·7	0·71	88·29	18·2
July 21...	G. K. Gainsford....	1,435	18·5	21·2	0·67	88·23	14·3
Aug. 20...	H. H. Pratt.........	1,496	12·6	7·8	0·18	86·87	1·4
Sept. 24...	G. K. Gainsford....	1,196	17·5	15·7	0·44	87·76	6·9
Nov. 4...	"	1,196	19·0	21·0	0·34	87·66	7·1

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF WHIRLPOOL RIVER AT DANVERS FOR 1915.

[Drainage area 79 square miles.]

Day.	January.		February.		March.		April.		May.		June.	
	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											87·07	2
2											87·07	2
3											87·07	2
4											87·07	2
5											87·07	2
6									87·27	4	87·17	3
7									87·27	4	87·27	4
8									87·27	4	87·37	4
9									87·27	4	87·79	9
10									87·27	4	87·57	6
11									87·27	4	87·47	5
12									87·67	7	87·37	4
13									87·87	10	87·27	4
14									87·87	10	88·07	14
15									87·87	10	88·87	29
16									87·87	10	88·82	28
17									87·97	12	88·82	28
18									87·83	10	88·77	27
19									87·67	7	88·67	25
20									87·67	7	88·57	23
21									87·56	6	88·57	23
22									87·37	4	88·29	18
23									87·27	4	88·37	19
24									87·27	4	88·37	19
25									87·27	4	88·57	23
26									87·27	4	88·67	25
27									87·27	4	88·83	29
28									87·17	3	88·80	28
29									87·07	2	88·79	28
30									87·07	2	88·57	23
31									87·07	2		

	July.		August.		September.		October.		November.		December.	
1	88·27	17	87·57	6	86·87	1	88·17	15	87·77	9		
2	88·17	15	87·67	7	86·87	1	88·17	15	87·77	9		
3	88·17	15	87·57	6	86·87	1	88·37	19	87·81	9		
4	88·07	14	87·47	5	86·87	1	88·27	17	87·67	7		
5	87·97	12	87·17	3	86·87	1	88·17	15	87·67	7		
6	87·87	10	87·07	2	86·87	1	88·17	15	87·67	7		
7	87·77	9	87·07	2	86·97	2	89·77	51	87·67	7		
8	87·57	6	87·07	2	87·78	9	90·80	80	87·67	7		
9	87·79	9	87·07	2	87·47	5	90·87	82	87·67	7		
10	87·47	5	87·07	2	87·47	5	90·81	80	87·67	7		
11	87·57	6	86·97	2	87·47	5	90·27	65	87·67	7		
12	87·77	9	86·97	2	87·37	4	89·47	43				
13	87·81	9	86·97	2	87·37	4	89·27	38				
14	87·57	6	86·97	2	87·37	4	88·87	29				
15	87·67	7	86·97	2	87·80	9	88·47	21				
16	87·97	11	86·97	2	87·67	7	88·17	15				
17	88·27	17	86·63	1	87·67	7	87·87	10				
18	88·37	19	86·83	1	87·80	9	87·77	9				
19	88·27	17	86·87	1	87·79	9	87·67	7				
20	87·86	10	86·87	1	87·57	6	87·67	7				
21	87·86	10	86·97	2	87·67	7	87·67	7				
22	88·07	14	86·97	2	87·51	6	87·67	7				
23	87·87	10	86·97	2	87·67	7	87·67	7				
24	87·57	6	86·97	2	87·67	7	87·67	7				
25	87·47	5	86·97	2	87·77	9	87·67	7				
26	87·78	9	86·97	2	87·77	9	87·81	9				
27	87·37	4	86·83	1	87·82	9	87·87	10				
28	87·77	9	86·87	1	87·87	10	87·77	9				
29	87·27	4	86·87	1	87·97	12	87·81	9				
30	86·86	1	86·87	1	88·07	14	87·67	7				
31	87·17	3	86·87	1			87·67	7				

25f—9½

MONTHLY DISCHARGE OF WHIRLPOOL RIVER AT DANVERS, FOR 1915.

[Drainage 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.
May.....................	....	....	¹5	0·063	0·073	307
June....................	29	2	15	0·190	0·212	893
July....................	19	1	10	0·127	0·146	615
August..................	7	1	2	0·025	0·029	123
September..............	14	1	6	0·076	0·085	357
October................	82	7	23	0·291	0·336	1,410
November..............	....	....	¹4	0·051	0·057	238
December...............	....	....	....	....	....	....
The Period....	....	....	9	0·118	0·938	3,943

NOTE.—Marked thus (¹) estimated.

SOURIS RIVER.

The source of the Souris river is in the province of Saskatchewan, northwest of the town of Weyburn. The course of the river from its source is generally southeast crossing the International boundary into the State of North Dakota in Tp. 1, R. 34 West Principal Meridian. After crossing the boundary it bends northeast re-crossing the International boundary to the east of the boundary between Saskatchewan and Manitoba and flowing in a general northeastern direction to its junction with the Assiniboine river near the city of Brandon.

The drainage area of the Souris (22,860 square miles) is very large when compared with the discharge as will be noted by reference to the following tables.

The area drained is largely settled and under cultivation, the soil being of a gravelly nature lightly overlaid by an alluvial deposit. The land is largely open prairie and very little timber is to be found.

The upper part of the river valley is not deep but as the mouth is approached the depth is increased until banks of from 150 to 200 feet are encountered.

The district drained is about the most closely settled in the province and the question of water supply for various purposes renders the gathering of discharge data important.

SOURIS RIVER AT MELITA.

HISTORY.

A metering station was established on the Souris river at Melita on April 23rd and from that date observations have been made at the station.

LOCATION OF SECTION.

The station is located on the downstream side of the traffic bridge in River park in the town of Melita. The Initial Point is painted on the side of the railing at the west end of the bridge.

RECORDS AVAILABLE.

From the date of the establishment of the station to the end of the year 1915 daily gauge records have been obtained. Discharge measurements have been made at various stages of the river covering practically the entire range during the period, and estimates of daily discharge are available for the period from April 23 to November 13. From this latter date to the end of the year ice cover conditions prevailed and the information obtained was not sufficient to allow the estimating of daily discharges.

DRAINAGE AREA.

The drainage area tributary to the river at this metering station is 10,673 square miles.

GAUGE.

A six-foot vertical staff gauge has been secured to the centre pier at the east end of the bridge close to the water's edge on the right bank. The gauge is referred to a permanent M.H.S. B.M. located fifty-seven feet southeast from the southeast corner of the bridge. This B.M. is set to an assumed datum.

CHANNEL.

The channel is straight for a distance of three hundred feet above the section and one hundred and fifty feet below. The banks are high and not liable to overflow. The bed is composed of sandy gravel and under ordinary conditions not liable to shift.

DISCHARGE MEASUREMENTS.

Discharge measurements are made from the bridge during all stages of the river.

ACCURACY.

The discharge curve throughout the range of stage met with since the establishment of the station is fairly well defined.

DISCHARGE MEASUREMENTS OF SOURIS RIVER AT MELITA, FOR 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
April 23...	M. S. Madden.....	1,462	75	119·4	0·25	87·80	30·2
May 28...	C. O. Allen........	2,018	83	167·4	0·56	88·25	93·7
Aug. 4...	T. H. Boyd........	1,197	72	69·8	0·03	87·09	1·9
Aug. 31...	"	1,197	72	77·8	....	87·19	[1]
Oct. 22...	C. O. Allen........	1,374	76	93·0	0·20	87·31	18·6

[1] No discharge.

DAILY GAUGE HEIGHT AND DISCHARGE OF SOURIS RIVER AT MELITA, FOR 1915.
[Drainage area 10,673 square miles.]

Day	January Gauge Height	January Discharge	February Gauge Height	February Discharge	March Gauge Height	March Discharge	April Gauge Height	April Discharge	May Gauge Height	May Discharge	June Gauge Height	June Discharge
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1									87·93	66	87·18	9
2									87·83	58	87·18	9
3									87·98	70	87·08	2
4									87·85	59	87·13	5
5									87·78	54	87·18	9
6									87·67	45	87·05	1
7									87·58	38	86·97	
8									87·63	42	86·93	
9									87·88	62	86·95	
10									88·05	76	87·00	
11									88·17	86	87·03	1
12									87·63	42	87·08	2
13									87·75	52	86·95	
14									88·08	78	87·08	2
15									88·38	105	87·13	5
16									87·88	62	87·08	2
17									88·33	100	87·27	¹15
18									88·38	105	89·23	²181
19									88·31	98	89·18	177
20									88·21	89	88·75	138
21									88·23	91	88·21	89
22									88·08	78	87·95	68
23							87·78	54	88·18	87	87·89	63
24							87·85	60	88·21	89	88·18	87
25							87·88	62	88·33	100	87·86	60
26							88·17	86	88·32	99	87·89	63
27							88·35	102	88·34	101	87·98	70
28							87·85	60	88·30	98	87·73	50
29							87·73	50	87·76	52	87·55	36
30							87·88	62	87·35	21	87·38	23
31									87·25	14		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	87·25	14	86·99	0	87·35	21	86·95	0	87·36	22	87·71	
2	87·15	7	86·95	0	87·36	22	86·94	0	87·33	19	87·73	
3	87·05	1	87·08	2	87·32	19	86·93	0	87·24	13	87·63	
4	87·03	1	87·06	2	88·43	²109	86·93	0	87·28	16	87·53	
5	87·05	1	87·08	2	88·58	123	87·43	27	87·33	19	87·73	
6	88·08	78	87·11	4	88·53	118	88·23	91	87·35	21	87·72	
7	88·03	74	87·13	5	87·94	67	87·95	68	87·38	23	87·71	
8	87·96	68	87·13	5	87·68	46	87·79	55	87·27	15	87·71	
9	87·99	71	87·15	7	87·53	34	87·68	46	87·18	9	87·70	
10	87·96	68	87·18	9	87·42	26	87·63	42	87·17	8	87·68	
11	87·85	60	87·21	11	87·41	25	87·53	34	87·16	7	87·69	
12	87·78	54	87·20	10	87·33	19	87·43	27	87·13	5	87·67	
13	87·70	48	87·18	9	87·32	19	87·42	26	87·14	6	87·70	
14	87·63	42	87·22	11	87·27	15	87·36	22	87·28		87·72	
15	87·45	28	87·28	16	87·16	7	87·35	21	87·24		87·69	
16	87·41	25	87·33	19	87·13	5	87·34	20	87·18		87·71	
17	87·35	21	87·25	14	87·08	2	87·32	19	87·26		87·70	
18	87·45	28	87·21	11	87·00		87·31	18	87·28		87·72	
19	87·41	25	87·23	12	87·01		87·28	16	87·26		87·73	
20	87·35	21	87·26	14	86·93		87·23	12	87·18		87·43	
21	87·32	19	87·25	14	86·91		87·26	14	87·19		87·42	
22	87·25	14	87·23	12	86·89		87·30	17	87·21		87·40	
23	87·41	25	87·25	14	86·91		87·27	15	87·24		87·27	
24	87·35	21	87·26	14	86·92		87·30	17	87·33		87·26	
25	87·32	19	87·28	16	86·93		87·36	22	87·39		87·19	
26	87·21	11	87·20	10	86·95		87·28	16	87·43		87·05	
27	87·15	7	87·21	11	86·96		87·23	12	87·53		¹87·03	
28	87·08	2	87·28	16	86·97		87·26	14	87·63		¹87·00	
29	87·06	1	87·23	12	86·96		87·32	19	87·68		¹86·95	
30	87·08	2	87·19	9	86·94		87·40	25	87·70		¹86·93	
31	87·03	1	87·18	9			87·38	23			¹86·93	

NOTE—Marked thus (¹) interpolated.
(²) On June 18 and September 4 a dam above the section gave way.
Ice conditions November 14 to December 31.
Not sufficient information to compute daily discharges.

MONTHLY DISCHARGE OF SOURIS RIVER AT MELITA, FOR 1915.
[Drainage area, 10,673 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.
January.................	....	....	[1]0	0.000	0.000	....
February................	....	....	[1]0	0.000	0.000	....
March...................	....	....	[1]25	0·002	0·002	1,500
April...................	105	14	72	0·007	0·008	4,425
May....................	181	0	39	0·004	0·004	2,320
June....................	78	1	28	0·003	0·003	1,725
July....................	19	0	10	0·001	0·001	615
August.................	118	0	23	0·002	0·002	1,370
September..............	91	0	24	0·002	0·002	1,475
October................	....	....	[1]7	0·001	0·001	416
November..............	....	....	[1]0	0	0	....
December..............						
The Period....	....	....	19	0·002	0·023	13,846

NOTE.—Marked thus ([1]) estimated.

SOURIS RIVER AT WAWANESA.

HISTORY.

The station on the Souris at Wawanesa was established on October 7, 1912, by W. G. Worden.

LOCATION OF SECTION.

The meter section is located on the downstream side of the traffic bridge across the Souris river one-quarter of a mile north of Wawanesa. The I.P. is an arrow carved and painted on the guard rail at the intersection of the girder and the guard rail on the downstream side of the bridge at the south end.

RECORDS AVAILABLE.

Daily gauge height records are available for the open water seasons over the period October 7, 1912, to the end of 1915. During the winter season the gauge heights were obtained at intervals of several days. Estimates of daily discharge have been prepared for the open water seasons during the period October 7, 1912, to the end of 1915. There was not sufficient information to estimate daily discharges during the winter season.

DRAINAGE AREA.

The drainage area of the Souris above Wawanesa is 22,500 square miles, part of which lies south of the International boundary.

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. B.M. located about seventy-five feet southwest of I.P. The B.M. is set to an arbitrary datum.

CHANNEL.

For two hundred feet above the section and six hundred feet below, the channel is straight, the bed of the river is composed of sand and gravel and not liable to shift. The right bank of the stream is moderately high and not liable to overflow. The left bank is low, marshy and rather thickly wooded with small trees and scrub and is liable to overflow at high stages.

DISCHARGE MEASUREMENTS.

The meterings are taken from the downstream side of the bridge.

ACCURACY.

Between gauge height 100·7 and 102·0 the discharge curve is well defined. Between 102·0 and 104·5 the curve is fairly well defined. Beyond these limits the curve is not well defined.

DISCHARGE MEASUREMENTS OF SOURIS RIVER AT WAWANESA, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 5...	C. O. Allen........	1,912	55	27	0·05	100·95	1·6[1]
Jan. 28...	M. S. Madden....	1,462	13	2	....	100·90	1
Mar. 23...	"	1,462	62	14·9	0·46	101·35	6·8[1]
April 13...	C. O. Allen........	1,912	86	148·3	0·62	101·16	92·4
April 21...	M. S. Madden....	1,462	86	152·0	0·68	101·24	103·1
April 22...	C. O. Allen........	1,912	86	156·3	0·70	101·24	109·3
May 8...	"	2,018	84	138·3	0·44	100·97	60·8
May 27...	"	2,018	86	146·0	0·51	101·07	74·5
Aug. 3...	T. H. Boyd......	1,197	81	105·5	0·16	100·72	17·0
Sept. 1...	"	1,197	74	76·7	0·00	100·43	00·0
Oct. 21...	C. O. Allen........	1,374	80	126·8	0·28	100·87	35·5

[1] Ice measurement.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF SOURIS RIVER AT WAWANESA, FOR 1915.

[Drainage area 22,500 square miles.]

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft
1	100·97	......	100·89	......	100·90	......	101·35	......	101·04	62	101·16	86
2	100·95	......	100·89	......	100·90	......	101·36	......	101·13	79	101·15	84
3	100·94	......	100·89	......	100·89	......	101·38	......	101·10	73	101·09	71
4	100·95	......	100·89	......	100·88	......	101·40	......	101·05	64	101·04	62
5	100·99	2	100·88	......	100·89	......	101·36	......	101·02	59	100·99	53
6	100·96	......	100·88	......	100·89	......	101·34	......	100·97	50	100·92	41
7	100·94	......	100·88	......	100·89	......	101·25	......	100·97	50	100·92	41
8	100·93	......	100·91	......	100·89	......	101·18	......	101·00	55	100·89	37
9	100·94	......	100·91	......	100·89	......	101·29	......	101·04	62	100·85	31
10	100·94	......	100·90	......	100·86	......	101·23	101	101·02	59	100·85	31
11	100·93	......	100·87	......	101·15	......	101·12	77	100·98	52	100·84	29
12	100·93	......	100·90	......	101·05	......	101·03	60	100·97	50	100·83	28
13	100·93	......	100·90	......	101·02	......	101·60	198	100·95	47	100·80	23
14	100·95	......	100·90	......	100·90	......	101·90	298	100·94	45	100·79	22
15	100·95	......	100·89	......	100·92	......	101·70	229	101·00	55	100·76	18
16	100·96	......	100·91	......	100·85	......	101·63	207	101·14	81	100·76	18
17	100·95	......	100·91	......	100·72	......	101·61	201	101·15	84	100·75	17
18	100·94	......	100·91[1]	......	100·63	......	101·62	204	101·12	77	100·73	15
19	100·94	......	100·90	......	100·64	......	101·50	167	101·11	75	100·72	13
20	100·94	......	100·91	......	100·81	......	101·40	140	101·13	79	100·72	13
21	100·94	......	100·92	......	100·90	......	101·24	98	101·12	77	100·71	12
22	100·93	......	100·91	......	100·94	......	101·24	98	101·07	68	100·70	11
23	100·93	......	100·91	......	101·35	7	101·31	118	101·14	81	101·30	116
24	100·92	......	100·90	......	101·25	......	101·25	105	101·16	86	101·29	114
25	100·91	......	100·90	......	101·27	......	101·21	96	101·15	84	101·28	112
26	100·89	......	100·89	......	101·26	......	101·25	105	101·15	84	101·27	109
27	100·93	......	100·92	......	101·23	......	101·23	101	101·06	66	101·16	86
28	100·90	0	100·90	......	101·43	......	101·13	79	101·05	64	101·11	75
29	100·91	......			101·33	......	101·09	71	101·08	69	101·08	69
30	100·89	......			101·32	......	101·05	64	101·11	75	101·01	57
31	100·87	......			101·34	......			101·12	77		

	July.		August.		September.		October.		November.		December.	
1	100·99	53	100·79	22	100·45	0	100·78	21	100·82	26	100·96	......
2	101·04	62	100·78	21	100·43	0	100·94	45	100·83	28	101·02	......
3	101·03	60	100·77	19	100·44	0	[1]100·93	43	100·82	26	100·99	......
4	101·02	59	100·74	16	100·45	0	100·91	40	100·81	25	101·01	......
5	100·99	53	100·71	12	100·44	0	100·88	35	100·80	23	101·02	......
6	100·95	47	100·69	10	100·46	0	100·86	32	100·78	21	101·03	......
7	100·91	40	100·67	8	100·49	0	100·83	28	100·77	19	101·02	......
8	100·86	32	100·65	7	100·74	16	100·81	25	100·77	19	101·01	......
9	100·85	31	100·63	5	100·85[1]	31	100·78	21	100·76	18	101·01	......
10	100·85	31	100·62	4	100·91	40	[1]100·76	18	100·74	16	101·00	......
11	100·79	22	100·60	2	101·21	96	100·74	16	100·75	17	101·03	......
12	100·76	18	100·60	2	101·17	88	100·72	13	100·77	19	101·05	......
13	100·74	16	100·57	1	101·11	75	100·71	12	101·06	......	101·05	......
14	100·70	11	100·58	1	101·06	66	100·70	11	101·13	......	101·04	......
15	101·02	59	100·59	2	101·02	59	100·72	13	101·05	......	101·08	......
16	101·01	57	100·57	1	100·97	50	100·93	43	101·12	......	100·90	......
17	101·00	55	100·59	2	100·94	45	100·94	45	101·09	......	100·88	......
18	100·99	53	100·57	1	100·91	40	100·95	47	101·06	......	100·88	......
19	100·97	50	100·55	0	100·88	35	100·94	45	101·05	......	100·95	......
20	100·94	45	100·52	0	100·85	31	100·91	40	101·03	......	100·93	......
21	100·91	40	100·50	0	100·82	26	100·88	35	101·04	......	101·02	......
22	100·91	40	100·80	0	100·80	23	100·84	29	101·00	......	101·10	......
23	100·93	43	100·46	0	100·78	21	100·82	26	100·98	......	101·12	......
24	100·91	40	100·45	0	100·76	18	[1]100·90	38	100·96	......	[1]101·30	......
25	100·89	37	100·44	0	100·82	26	101·00	55	100·95	......	101·51	......
26	100·88	35	100·43	0	100·80[1]	23	101·01	57	100·94	......	101·05	......
27	100·87	34	100·42	0	100·80	23	100·98	52	100·95	......	101·02	......
28	100·86	32	100·44	0	100·79	22	100·94	45	100·98	......	101·02	......
29	100·86	32	100·47	0	100·78	21	100·91	40	100·90	......	100·99	......
30	100·81	25	100·48	0	100·79	22	100·90	38	100·93	......	100·98	......
31	100·79	22	100·47	0	......	......	100·86	32	......	......	101·03	......

NOTE.—All gauge heights marked thus [1] interpolated.
Ice conditions from January 1 to April 9 and November 13 to December 31.
Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF SOURIS RIVER AT WAWANESA FOR THE YEAR 1915.

[Drainage area 22,500 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.
January...............	....	....	[1]0	0	0	0
February..............	....	....	[1]0	0	0	0
March................	....	....	[1]2	0	0	123
April.................	....	....	[1]95	0·004	0·004	5,650
May..................	86	45	67	0·003	0·003	4,125
June.................	116	11	50	0·002	0·002	2,975
July.................	62	11	40	0·002	0·002	2,460
August...............	22	0	4	0·000	0·000	246
September............	96	0	30	0·001	0·001	1,790
October..............	57	11	34	0·002	0·002	2,090
November............	....	....	[1]8	0·000	0·000	476
December............	....	....	[1]2	0·000	0·000	123
The Year......	116	0	28	0·001	0·014	20,058

NOTE.—All marked thus ([1]) estimated

TRIBUTARIES OF LAKE WINNIPEGOSIS.

GENERAL.

Practically all of the drainage west of lake Manitoba and between the Riding mountains and the Saskatchewan river drains directly or indirectly into lake Winnipegosis.

Three small lakes act as intermediate basins and to these the greater part of the drainage first finds its way, being drained from them into lake Winnipegosis. These lakes are:—

Red Deer lake, into which Red Deer river drains, is then drained by the same river into Dawson bay, an arm of lake Winnipegosis.

Swan lake, drained by the Shoal river into Dawson bay which is the collecting basin for the Swan and Woody rivers.

Lake Dauphin, drained by the Mossy river and having as tributaries among others, the Valley and Ochre rivers. The Fork river is a tributary of the Mossy.

RED DEER RIVER.

The source of the Red Deer river is in Tp. 44, R.19 W.2.M, south of Melfort, Saskatchewan. It flows in a general easterly direction into Red Deer lake, an expanse of the river, and also drains the lake into lake Winnipegosis.

The total drainage area of the Red Deer is 5,478 square miles, including Red Deer lake which has an area of 100 square miles. The valley through which the river flows is deep and wide. In the upper portion the tributaries which head in small lakes and swamps are Fir, Etoimami, Pipestone and Barrier rivers, nearly all of which enter from the south.

The upper portion of the drainage area is well timbered, growths of spruce and poplar of merchantable size being found. The Red Deer Lumber Company carry on lumbering operations on the river and operate a saw mill on Red Deer lake, the logs being floated downstream to the mill.

The Canadian Northern Railway crosses the river at Erwood, thirty miles west of the lake, and a spur line has been built in from Powell to touch the west end of the lake at Barrows.

LAKE WINNIPEGOSIS AT WINNIPEGOSIS.

HISTORY.

A gauge was set on lake Winnipegosis on May 22, 1913, by G. Ebner, and during the open water seasons daily gauge records have been obtained at this point.

LOCATION OF GAUGE.

A six-foot vertical staff gauge has been secured to a pile thirty feet north of Standard Lumber Company's wharf in the Mossy river and about 350 feet from the point where the river empties into lake Winnipegosis.

RECORDS AVAILABLE.

Daily gauge readings at this point are available from May 22 to October 27, and at intervals during November and December of 1913, from April 16 to November 15, in 1914, and from May 18 to November 16, 1915.

RED DEER RIVER AT HUDSON'S BAY JUNCTION.

HISTORY.

The station on the Red Deer at Hudson's Bay Junction was established by G. Ebner on August 12, 1913, and replaced a station established by E. Bankson on June 4, 1913, four hundred feet below the ferry.

LOCATION OF SECTION.

The meter section is located at the ferry crossing of the Red Deer river five hundred feet below its confluence with the Elk river and three and one-half miles south of Hudson's Bay Junction on the road to the Red Deer Lumber Company's camp. The I.P. is marked by a nail driven in a pile sixty feet from the water's edge on the right bank at the ferry crossing.

RECORDS AVAILABLE.

Records of daily gauge height have been obtained from July 9 to October 31, 1913, April 30 to November 27, 1914, and from April 14 to December 31, 1915. A few gauge heights are also available taken during the winter seasons. Estimated daily discharges cover the period July 9 to October 31, 1913, April 30 to November 27, 1914, and from April 14 to November 9, 1915.

DRAINAGE AREA.

The area tributary to the Red Deer above the station at Hudson's Bay Junction is 4,900 square miles.

GAUGE.

The gauge is a vertical staff gauge driven into the bed of the river and braced; it is near the right bank and forty feet below the section. This gauge is referred to a permanent M.H.S.B.M. located fifty-two feet upstream from the I.P.

CHANNEL.

The channel is straight for about five hundred feet above and below the section; the river is confined to one channel at all stages; the bed of the stream is covered with boulders and not liable to shift. The banks of the river are low wooded and liable to overflow at high stages.

DISCHARGE MEASUREMENTS.

Meterings are made from a boat by means of a small Price meter.

ACCURACY.

Eleven discharge measurements define the curve fairly well between gauge heights 99·8 and 103·0. Owing to the fact that the Red Deer Lumber Company operate a number of lumber dams on the upper waters of the river the records do not give a true idea of the natural regimen of the river.

DISCHARGE MEASUREMENTS OF RED DEER RIVER AT HUDSON'S BAY JUNCTION, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
Jan. 14...	M. S. Madden.....	1,462	100	97	0·02	99·23	2[1]
Feb. 9...	"	1,462	82	83	....	98·81	1
Mar. 4...	"	1,462	60	60	....		1
April 24...	F. S. Smith.......	1,186	146	423	0·48	100·51	207
April 26...	"	1,186	146	423	0·51	100·48	214
May 1...	"	1,186	147	418	0·49	100·42	207
May 3...	"	1,186	146	399	0·45	100·39	180
June 1...	"	1,186	144	364	0·26	100·01	95
June 2...	"	1,186	144	359	0·28	100·02	101
July 3...	C. O. Allen.......	2,018	152	433	0·68	100·60	295
Aug. 5...	"	2,018	124	399	0·78	100·59	311
Sept. 28...	"	2,018	147	341	0·28	100·06	96
Nov. 23...	M. S. Madden.....	1,462	111	262	0·06	99·85	14[1]

[1] Ice measurement.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF RED DEER RIVER AT HUDSON'S BAY JUNCTION
FOR 1915.
[Drainage area 4,900 square miles.]

Day.	January. Gauge Height.	January. Dis-charge.	February. Gauge Height.	February. Dis-charge.	March. Gauge Height.	March. Dis-charge.	April. Gauge Height.	April. Dis-charge.	May. Gauge Height.	May. Dis-charge.	June. Gauge Height.	June. Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	......	......	......	......	......	......	......	......	100·45	193	100·02	88
2	......	......	......	......	......	......	......	......	100·40	175	100·02	88
3	......	......	......	......	......	......	......	......	100·40	175	100·02	88
4	......	......	......	......	......	0	......	......	100·30	145	100·00	85
5	......	......	......	......	......	......	......	......	100·30	145	100·05	93
6	......	......	......	......	......	......	......	......	100·30	145	100·20	120
7	......	......	......	......	......	......	......	......	100·30	145	100·30	145
8	......	......	......	......	......	......	......	......	100·35	160	100·35	160
9	......	......	.98·81	0	......	......	......	......	100·45	193	100·40	175
10	......	......	......	......	......	......	......	......	100·40	175	100·40	175
11	......	......	......	......	......	......	......	......	100·35	160	100·42	182
12	......	......	......	......	......	......	......	......	100·30	145	100·38	169
13	......	......	......	......	......	......	......	......	100·30	145	100·40	175
14	99·23	2	......	......	......	......	102·40	1.745	100·25	132	100·40	175
15	......	......	......	......	......	......	102·20	1,515	100·25	132	100·40	175
16	......	......	......	......	......	......	101·20	600	100·25	132	100·40	175
17	......	......	......	......	......	......	101·15	565	100·25	132	100·40	175
18	......	......	......	......	......	......	101·05	500	100·20	120	100·35	160
19	......	......	......	......	......	......	100·90	410	100·15	110	100·35	160
20	......	......	......	......	......	......	100·70	300	100·15	110	100·35	160
21	......	......	......	......	......	......	100·70	300	100·10	100	100·35	160
22	......	......	......	......	......	......	100·60	250	100·10	100	100·32	151
23	......	......	......	......	......	......	100·50	210	100·15	110	100·32	151
24	......	......	......	......	......	......	100·50	210	100·15	110	100·30	145
25	......	......	......	......	......	......	100·50	210	100·15	110	100·30	145
26	......	......	......	......	......	......	100·45	193	100·10	100	100·30	145
27	......	......	......	......	......	......	100·45	193	100·15	110	100·30	145
28	......	......	......	......	......	......	100·45	193	100·20	120	100·38	169
29	......	......	......	......	......	......	100·45	193	100·10	100	100·45	193
30	......	......	......	......	......	......	100·45	193	100·05	93	100·55	230
31	......	......	......	......	......	......	......	......	100·05	93	......	......

Day	July. Gauge Height.	July. Dis-charge.	August. Gauge Height.	August. Dis-charge.	September. Gauge Height.	September. Dis-charge.	October. Gauge Height.	October. Dis-charge.	November. Gauge Height.	November. Dis-charge.	December. Gauge Height.	December. Dis-charge.
1	100·55	230	101·00	470	100·13	106	100·07	95	100·02	88	99·87	......
2	100·58	242	100·90	410	100·08	97	100·07	95	100·02	88	99·87	......
3	100·60	250	100·80	350	99·98	83	100·05	92	100·02	88	99·87	......
4	100·75	325	100·70	300	99·93	77	100·02	88	99·99	84	99·92	......
5	100·82	362	100·58	242	99·90	74	100·02	88	99·99	84	99·92	......
6	100·85	380	100·53	222	99·88	72	99·97	82	99·99	84	99·92	......
7	100·80	350	100·43	185	99·88	72	99·97	82	99·99	84	99·92	......
8	100·70	300	100·36	163	100·18	116	99·97	82	99·99	84	99·97	......
9	100·60	250	100·30	145	99·93	77	99·92	76	99·97	82	100·02	......
10	100·60	250	100·23	128	99·83	68	99·92	76	100·05	......	100·02	......
11	100·72	310	100·23	128	99·83	68	99·92	76	99·92	......	99·92	......
12	100·90	410	100·18	116	99·83	68	99·92	76	99·92	......	99·92	......
13	101·40	740	100·13	106	99·83	68	99·92	76	99·87	......	99·97	......
14	101·45	780	100·08	97	99·83	68	99·92	76	99·87	......	99·97	......
15	101·40	740	100·03	90	99·83	68	99·92	76	99·87	......	99·92	......
16	101·70	980	99·98	83	99·93	77	99·92	76	99·82	......	99·87	......
17	102·30	1,630	100·03	90	99·83	68	99·89	73	99·82	......	99·87	......
18	102·45	1,802	100·03	90	99·88	72	99·89	73	99·82	......	99·97	......
19	102·45	1,802	100·08	97	99·88	72	99·89	73	99·82	......	99·97	......
20	102·25	1,573	100·13	106	99·98	83	99·89	73	99·82	......	99·97	......
21	102·05	1,342	100·18	116	99·93	77	99·89	73	99·82	......	99·97	......
22	101·80	1,070	100·33	154	99·93	77	99·92	76	99·82	......	99·97	......
23	101·68	964	100·28	140	99·93	77	99·92	76	99·82	14	99·92	......
24	101·50	820	100·23	127	99·98	83	99·92	76	99·82	......	99·92	......
25	101·35	705	100·20	120	100·03	90	99·92	76	99·87	......	99·92	......
26	101·22	614	100·16	112	100·03	90	99·92	76	99·87	......	99·92	......
27	101·15	565	100·23	127	100·06	94	99·95	80	99·92	......	99·92	......
28	101·15	565	100·23	127	100·05	92	99·95	80	99·92	......	99·92	......
29	101·20	600	100·20	120	100·07	95	99·97	82	99·87	......	99·92	......
30	101·15	565	100·18	116	100·07	95	99·97	82	99·87	......	99·92	......
31	101·10	530	100·13	106	......	......	100·02	88	......	......	99·92	......

NOTE.—Ice conditions from January 1 to April 13 and November 10 to December 31.
Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF RED DEER RIVER AT HUDSON'S BAY JUNCTION, FOR 1915.

[Drainage area 4,900 square miles.]

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square mile.	Dept in inches on Drainage Area.	Total in acre-feet.
January	....	....	[1]1	0·000	0·000	....
February..............	....	....	[1]0	0·000	0·000	....
March................	....	....	[1]1	0·000	0·000	....
April.................	....	....	[1]275	0·056	0·062	16,400
May..................	193	93	133	0·027	0·031	8,180
June.................	230	85	152	0·031	0·035	9,050
July.................	1,802	230	711	0·145	0·167	43,700
August...............	470	83	161	0·033	0·038	9,900
September............	116	68	81	0·017	0·019	4,825
October..............	95	73	80	0·016	0·018	4,925
November............	....	....	[1]36	0·007	0·008	2,140
December............	....	....	[1]5	0·001	0·001	307
The Year	1,802	0	136	0·028	0·379	99,427

NOTE.—Marked thus ([1]) estimated.

SWAN RIVER.

The Swan river rises on the extreme northwestern slope of the Porcupine mountains. Its course is generally south and east until it reaches a point in Tp. 34, R. 3 W.P.M. when it turns and flows almost due northeast through the valley between Porcupine and Duck mountains into Swan lake.

The valley between the two mountains is broad and deep, but nearly all the drainage entering this section of the river is from the south, most of the tributaries heading in the Duck mountains. To the north the basin is confined by the drainage area of the Woody river which follows a parallel course to the Swan.

The banks of the valley are an alluvial deposit of clay and gravel. The river has an average width of one hundred and fifty feet, the banks ranging from ten to fifty feet in height. The upper parts of the valley are largely covered with a timber growth, but in the lower bottom lands mixed farming is extensively followed. The valley is well settled, the town of Swan River being the principal community.

In 1909 an investigation of the power possibilities of the river was made and a site located in the vicinity of Swan river with a view to supplying that town with power.

SWAN RIVER AT SWAN RIVER.

HISTORY.

The Swan River station was established by W. G. Worden on October 12, 1912, and has been operated since that date.

LOCATION OF SECTION.

The meter section is located on the downstream side of the new steel traffic bridge which spans the Swan river at the north end of the town of Swan River, Man. The I.P. is marked on the top of the south abutment at the east side.
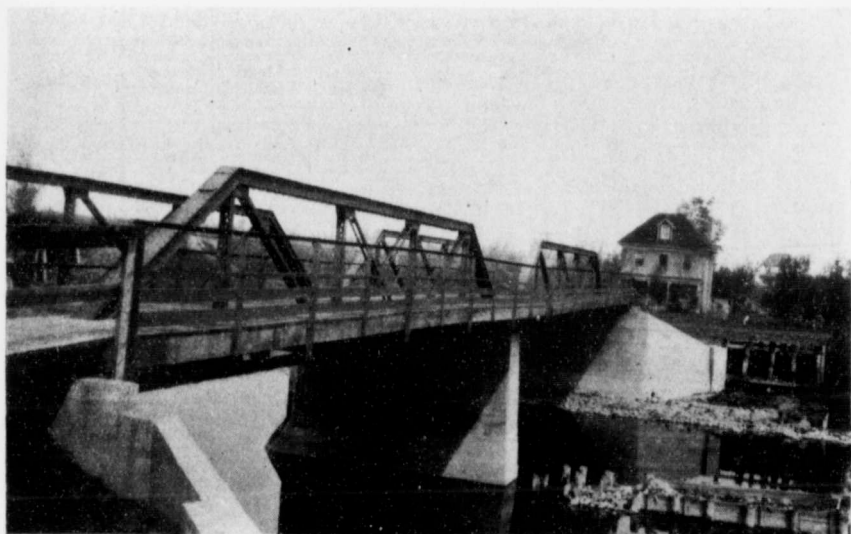
SWAN RIVER—SWAN RIVER—SHOWING I.P. AND POSITION OF B.M.

RECORDS AVAILABLE.

Records of daily gauge height are available for part of the period October 12, 1912, to the end of 1915. Blanks in the record occur during winter seasons. Estimated daily discharges are on hand for the periods October 24 to November 16, 1912, April 12 to November 8, 1913, April 15 to November 15, 1914, and from April 14 to November 15 1915.

DRAINAGE AREA.

The area drained above the station of the Swan river is 1,215 square miles.

GAUGE.

The gauge at this station is a chain gauge secured to the lower chord of the upstream side of the bridge; it is referred to a permanent M.H.S. B.M. located forty-five feet northeast of the north abutment of the bridge.

CHANNEL.

Above the section the channel is straight for three hundred feet and also for two hundred feet below. The bridge is a clear span and the river lies in one channel at all stages. The stream bed is of clay and subject to shifting; the current is swift. The right bank is of clay, is high and not liable to overflow. The left bank is low and wooded and liable to overflow at high stages.

DISCHARGE MEASUREMENTS.

The meterings are made from the bridge with a small Price current meter.

ACCURACY.

Between gauge heights 99·40 and 101·80 the discharge curve is well defined; between 101·80 and 104·20 it is fairly well defined.

DISCHARGE MEASUREMENTS OF SWAN RIVER AT SWAN RIVER, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
Jan. 8...	M. S. Madden.....	1,462	83	....	....	102·92	.......[1]
Feb. 11...	"	1,462	81	151·7		102·92	.......[1]
Mar. 3...	"	1,462	6	3·9	0·57	102·32	2·2[1]
Mar. 30...	"	1,462	164	51·5	0·49	103·69	25·7[1]
April 23...	F. S. Smith........	1,186	128	262·6	0·65	100·34	171·6
May 4...	"	1,186	124	233·3	0·48	100·04	110·8
May 29...	"	1,186	122	205·3	0·29	99·74	59·9
June 26...	C. O. Allen........	2,018	127	242·9	0·46	100·02	111·8
July 31...	H. H. Pratt........	1,496	132	270·8	0·56	100·22	152·4
Aug. 31...	"	1,496	126	201·1	0·28	99·75	56·9
Sept. 30...	C. O. Allen........	2,018	122	210·2	0·32	99·75	67·3
Nov. 18...	M. S. Madden.....	1,462	108	149·2	0·21	99·68	30·8[1]

[1] Ice measurement.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF SWAN RIVER AT SWAN RIVER, FOR 1915.

[Drainage area 1,215 square miles.]

Day.	January. Gauge Height.	January. Discharge.	February. Gauge Height.	February. Discharge.	March. Gauge Height.	March. Discharge.	April. Gauge Height.	April. Discharge.	May. Gauge Height.	May. Discharge.	June. Gauge Height.	June. Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1							103·80		100·09	132	99·74	53
2							103·81		100·07	126	99·72	50
3					102·32	2	103·83		100·05	120	99·72	50
4							103·88		100·05	120	99·71	49
5							103·90		100·02	111	99·72	50
6							103·92		99·99	103	99·75	55
7							103·94		99·96	96	99·86	74
8							104·03		99·95	94	99·91	84
9							103·59		99·94	91	99·88	78
10							103·38		99·88	78	99·97	98
11			102·92	0			103·12		99·89	80	100·01	108
12							102·63		99·90	82	100·01	108
13							102·60		99·89	80	100·02	111
14							101·82	1,142	99·92	86	100·02	111
15							101·64	989	99·89	80	100·00	105
16							101·58	938	99·89	80	100·00	105
17							101·57	930	99·90	82	100·00	105
18							101·52	887	99·89	80	99·99	103
19							101·51	879	99·87	76	99·99	103
20							101·51	879	99·87	76	100·02	111
21							101·49	863	99·83	68	99·99	103
22							101·49	863	99·80	62	100·00	105
23							101·21	653	99·78	59	100·08	129
24							100·81	415	99·78	59	100·10	135
25							100·34	209	99·77	58	100·07	126
26							100·19	162	99·77	58	100·03	114
27							100·14	147	99·77	58	100·02	111
28							100·12	141	99·77	58	100·02	111
29							100·11	138	99·77	58	100·02	111
30							100·09	132	99·72	50	100·02	111
31					103·69	26			99·76	56		

Day	July. Gauge	July. Dis.	August. Gauge	August. Dis.	September. Gauge	September. Dis.	October. Gauge	October. Dis.	November. Gauge	November. Dis.	December. Gauge	December. Dis.
1	100·01	108	100·16	153	99·74	53	99·78	59	99·74	53	99·70	
2	100·01	108	100·14	147	99·70	47	99·80	62	99·74	53	99·71	
3	100·01	108	100·11	138	99·64	39	99·80	62	99·75	55	99·69	
4	100·00	105	100·08	129	99·60	33	99·80	62	99·76	56	99·69	
5	99·99	103	100·05	120	99·60	33	99·80	62	99·77	58	99·69	
6	99·99	103	100·01	108	99·60	33	99·80	62	99·77	58	99·69	
7	100·01	108	99·96	96	99·60	33	99·80	62	99·77	58	99·69	
8	100·01	108	99·88	78	99·61	34	99·80	62	99·78	59	99·69	
9	100·01	108	99·85	72	99·59	32	99·80	62	99·78	59	99·70	
10	99·99	103	99·80	62	99·56	29	99·80	62	99·78	59	99·70	
11	99·99	103	99·75	55	99·56	29	99·80	62	99·79	61	99·70	
12	99·99	103	99·72	50	99·59	32	99·80	62	99·80	62	99·70	
13	99·97	98	99·67	43	99·59	32	99·80	62	99·80	62	99·70	
14	99·97	98	99·64	39	99·59	32	99·80	62	99·80	62	99·70	
15	100·26	183	99·63	37	99·59	32	99·80	62	99·80	62	99·70	
16	100·44	246	99·62	36	99·59	32	99·80	62	99·70		99·69	
17	100·57	299	99·59	32	99·59	32	99·80	62	99·70		99·70	
18	100·67	346	99·59	32	99·60	33	99·80	62	99·70		99·70	
19	100·81	415	99·62	36	99·60	33	99·80	62	99·69		99·70	
20	100·82	420	99·61	34	99·61	34	99·80	62	99·70		99·71	
21	100·78	400	99·66	41	99·62	36	99·79	61	99·70		99·72	
22	100·72	370	99·83	68	99·63	37	99·78	59	99·70		99·72	
23	100·65	336	99·87	76	99·64	39	99·78	59	99·75		99·70	
24	100·55	291	99·88	78	99·66	41	99·78	59	99·72		99·70	
25	100·50	270	99·85	72	99·72	50	99·75	55	99·70		99·70	
26	100·43	242	99·82	66	99·79	61	99·76	56	99·71		99·70	
27	100·39	227	99·94	91	99·79	61	99·79	53	99·70		99·69	
28	100·32	202	100·12	141	99·76	56	99·76	56	99·72		99·70	
29	100·28	189	99·78	59	99·76	56	99·74	53	99·70		99·70	
30	100·27	186	99·77	58	99·77	58	99·74	53	99·70		99·69	
31	100·24	177	99·77	58			99·74	53			99·70	

NOTE.—Ice conditions from January 1 to April 13 and from November 16 to end of year. Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF SWAN RIVER AT SWAN RIVER FOR THE YEAR 1915.

[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.
January....................	....	....	[1]0	....	....	....
February...................	....	....	[1]0	....	....	....
March.....................	....	....	[1]14	0·011	0·013	860
April......................	1,142	....	[1]400	0·329	0·367	23,800
May.......................	132	50	81	0·067	0·077	5,000
June......................	135	49	96	0·079	0·088	5,700
July......................	420	98	202	0·166	0·191	12,400
August....................	153	32	74	0·061	0·070	4,550
September.................	61	32	39	0·032	0·036	2,325
October...................	62	53	60	0·049	0·056	3,690
November..................	62	....	[1]40	0·033	0·037	2,380
December..................	....	....	[1]10	0·008	0·009	615
The Year......	1,142	32	85	0·070	0·944	61,320

NOTE.—Marked thus ([1]) estimated.

WOODY RIVER AT BOWSMAN.

HISTORY.

A metering station was established on the Woody river at Bowsman on May 31, 1915, by F. S. Smith, and since that time has been in operation.

LOCATION OF SECTION.

The section is located on the downstream side of a traffic bridge one mile south of the town of Bowsman. The Initial Point is painted on the lower bar, also on top of the hand rail at the north end of the bridge.

RECORDS AVAILABLE.

From the 31st of May to the 9th of November 1915, daily gauge readings and estimates of daily discharges are available. During this period discharge measurements have been made at the station and these are also available.

DRAINAGE AREA.

The drainage area tributary to the Woody river at this point is 731 square miles.

GAUGE.

A chain gauge has been established at this station referred to a permanent M.H.S. B.M. located forty-five feet east of the north end of the bridge. This B.M. is set to an arbitrary datum.

CHANNEL.

The channel is straight for about two hundred feet above and about six hundred feet below the section.   The bed of the stream is of gravel and boulders and not liable to shift.   The right bank is low and liable to overflow, but the embankment at the bridge confines the entire flow of the river to the channel at the section.

DISCHARGE MEASUREMENTS.

All discharge measurements are made from the bridge.

ACCURACY.

Throughout the range of stage covered by the discharge measurements obtained, the discharge curve is well defined.

DISCHARGE MEASUREMENTS OF WOODY RIVER AT BOWSMAN, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 31...	F. S. Smith.........	1,186	64·0	54·7	0·31	88·57	16·8
June 28...	C. O. Allen.........	2,018	72·5	78·1	0·72	88·90	56·2
July 31...	H. H. Pratt.........	1,496	80·8	87·7	1·14	89·22	99·9
Aug. 31...	"	1,496	60·8	45·7	0·21	88·51	9·8
Sept. 30...	C. O. Allen.........	2,018	59·0	53·1	0·21	88·51	11·2
Nov. 19...	M. S. Madden.....	1,462	40·0	30·1	0·17	88·70	5·0[1]

[1] Ice measurement.

DAILY GAUGE HEIGHT AND DISCHARGE OF WOODY RIVER AT BOWSMAN, FOR 1915.

[Drainage area 731 square miles.]

Day.	January. Gauge Height.	January. Discharge.	February. Gauge Height.	February. Discharge.	March. Gauge Height.	March. Discharge.	April. Gauge Height.	April. Discharge.	May. Gauge Height.	May. Discharge.	June. Gauge Height.	June. Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1											88·56	15
2											88·55	14
3											88·53	12
4											88·51	10
5											88·59	18
6											88·58	17
7											88·64	24
8											88·66	26
9											88·72	33
10											88·72	33
11											88·73	35
12											88·73	35
13											88·71	32
14											88·68	29
15											88·67	27
16											88·69	30
17											88·69	30
18											88·68	29
19											88·67	27
20											88·69	30
21											88·75	37
22											88·88	53
23											88·95	62
24											88·91	57
25											88·90	56
26											88·86	51
27											88·88	53
28											88·86	51
29											88·87	52
30											88·87	52
31										88·57	16		

Day	July. Gauge Height.	July. Discharge.	August. Gauge Height.	August. Discharge.	September. Gauge Height.	September. Discharge.	October. Gauge Height.	October. Discharge.	November. Gauge Height.	November. Discharge.	December. Gauge Height.	December. Discharge.
1	88·85	49	89·16	90	88·49	9	88·51	10	88·53	12		
2	88·85	49	89·09	81	88·47	8	88·52	11	88·53	12		
3	88·90	56	89·00	69	88·46	8	88·58	17	88·53	12		
4	88·93	60	89·00	69	88·45	7	88·54	13	88·53	12		
5	88·88	53	88·96	64	88·46	8	88·54	13	88·58	17		
6	88·86	51	88·91	57	88·44	7	88·58	17	88·66	26		
7	88·86	51	88·87	52	88·43	7	88·56	15	88·53	12		
8	88·83	47	88·78	41	88·46	8	88·58	17	88·53	12		
9	88·79	42	88·79	42	88·43	7	88·61	20	88·57	16		
10	88·80	43	88·79	42	88·43	7	88·59	18				
11	88·90	56	88·75	37	88·40	6	88·57	16				
12	89·03	73	88·71	32	88·39	6	88·57	16				
13	89·09	81	88·70	31	88·40	6	88·57	16				
14	89·07	78	88·69	30	88·40	6	88·57	16				
15	89·10	82	88·64	24	88·40	6	88·58	17				
16	89·61	157	88·63	23	88·41	6	88·58	17				
17	89·92	204	88·62	21	88·41	6	88·58	17				
18	89·95	208	88·61	20	88·43	7	88·57	16				
19	89·91	202	88·60	19	88·49	9	88·57	16				
20	89·89	200	88·61	20	88·50	9	88·57	16				
21	89·86	195	88·61	20	88·49	9	88·56	15				
22	89·82	189	88·60	19	88·48	8	88·56	15				
23	89·75	178	88·60	19	88·48	8	88·56	15				
24	89·65	163	88·60	19	88·47	8	88·55	14				
25	89·58	153	88·58	17	88·48	8	88·55	14				
26	89·47	137	88·53	12	88·50	9	88·55	14				
27	89·37	122	88·53	12	88·51	10	88·54	13				
28	89·33	116	88·58	17	88·51	10	88·54	13				
29	89·29	110	88·57	16	88·51	10	88·54	13				
30	89·25	103	88·55	14	88·51	10	88·54	13				
31	89·23	100	88·51	10			88·53	12				

MONTHLY DISCHARGE OF WOODY RIVER AT BOWSMAN FOR 1915.

[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.
June...................	62	10	34	0·047	0·052	2,020
July..................	208	42	110	0·150	0·173	6,750
August...............	90	10	34	0·047	0·054	2,090
September............	10	6	8	0·011	0·012	476
October..............	20	10	15	0·021	0·024	922
November............	....	....	[1]10	0·014	0·016	595
The Period....	208	6	35	0·048	0·331	12,853

NOTE.—**Marked thus** ([1]) estimated.

MOSSY RIVER.

The Mossy river is the connecting link between lake Dauphin and lake Winnipegosis, draining the former into the latter. It heads in the extreme northern end of lake Dauphin and flows generally north for a distance of about twenty-one miles.

The Fork and Fishing rivers are tributaries that have their sources on the eastern slope of the Duck mountains. All the basin of the Mossy river, with the exception of that supplied by these rivers, is gathered by the rivers tributary to lake Dauphin. These are the Valley, Turtle, Ochre, Wilson and Vermilion rivers. The upper part of the basin is well timbered, while the lower part is prairie country and used extensively for mixed farming.

The banks of the Mossy vary between five and fifteen feet in height and are of clay overlying a bed of gravel. The river varies in width from 120 to 200 feet and has been considerably improved by dredging.

The country adjacent to the river is very well settled, especially on the west side. The town of Winnipegosis, with a population of 600 people, is situated at the mouth of the river, and the town of Dauphin is the chief centre in the district.

In 1908 the Department of Public Works made a survey of the river, with a view of lowering lake Dauphin. In connection with this project, dredging operations were carried on in the river between 1908 and 1912. A water power project has been looked into on the river near Winnipegosis, and a reconnaissance survey for this purpose was made by a field party of the Manitoba Hydrometric Survey, in the summer of 1913.

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

HISTORY.

This station was established on July 28, 1914, by W. J. Ireland, and superseded the one at Lacey's farm owing to the difficulty in securing a gauge reader at that point.

LOCATION OF SECTION.

The meter section is located on Wilson's farm two and one-half miles northeast of Fork river. It is marked by a blazed poplar tree which stands on the left bank just below the metering section. The I.P. is located by a nail driven in the post supporting the cable of the section on the left hand bank.

RECORDS AVAILABLE.

Daily gauge height records have been kept from July 3, 1914, to December 31, 1915. Daily discharges have been computed for a period from July 3 to November 16, 1914, and from March 22 to November 10, 1915. The data secured has not been sufficient to permit the compilation of discharge under ice conditions, which held during the periods from November 16, 1914, to March 22, 1915, and from November 10, 1915, to the end of the year.

DRAINAGE AREA.

The drainage area is 3,950 square miles.

GAUGE.

A six-foot vertical staff gauge is located about nine hundred feet downstream from the section and thirty feet southeast from Mr. Wilson's residence. The gauge is driven into the bed of the stream and braced to the shore. It is referenced to a permanent M.H.S. B.M. located one hundred feet southwest from the gauge.

CHANNEL.

The channel is straight for one hundred and fifty feet above and three hundred feet below the section. The river is confined to a single channel under all stages. The bed of the river is of gravel and permanent. The banks are high and covered with scrub but not liable to overflow.

DISCHARGE MEASUREMENTS.

Meterings are made by means of a cable carrier running on a cable stretched across the river.

ACCURACY.

The discharge curve is fairly well defined over the range in stage covered by the meterings.

DISCHARGE MEASUREMENTS OF MOSSY RIVER AT WILSON'S FARM, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 6...	M. S. Madden.....	1,462	86	239	0·65	91·72	155[1]
Feb. 15...	"	1,462	77	226	0·71	91·71	161[1]
Mar. 12...	"	1,462	79	264	0·67	91·60	177[1]
April 19...	F. S. Smith........	1,186	86	275	0·80	90·71	221
May 7...	"	1,186	86	264	0·70	90·71	186
May 28...	"	1,186	82	254	0·73	90·60	186
June 25...	C. O. Allen........	2,018	85	238	0·79	90·63	187
July 30...	H. H. Pratt........	1,496	82	194	0·52	90·48	101
Aug. 30...	"	1,496	78	175	0·34	90·04	61
Oct. 2...	C. O. Allen........	2,018	80	205	0·52	90·11	107
Nov. 17...	M. S. Madden.....	1,462	77	196	0·36	90·22	71[1]

[1] Ice measurement.

SESSIONAL PAPER No. 25f

Daily Gauge Height and Discharge of Mossy River below Fork River for 1915.

[Drainage area 3,950 square miles.]

Day.	January. Gauge Height.	January. Dis-charge.	February. Gauge Height.	February. Dis-charge.	March. Gauge Height.	March. Dis-charge.	April. Gauge Height.	April. Dis-charge.	May. Gauge Height.	May. Dis-charge.	June. Gauge Height.	June. Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	91·56	....	91·53	....	91·71	....	92·27	581	90·78	207	90·58	175
2	91·55	....	91·54	....	91·73	....	92·12	539	90·77	205	90·59	177
3	91·55	....	91·53	....	91·79	....	92·01	508	90·68	191	90·56	172
4	91·62	....	91·54	....	91·81	....	92·01	508	90·59	177	90·48	160
5	91·64	....	91·55	....	91·82	....	91·85	463	90·18	117	90·48	160
6	91·72	155	91·53	....	91·75	....	91·50	365	90·58	175	90·58	175
7	91·74	....	91·63	....	91·61	....	90·80	210	90·69	192	90·59	177
8	91·69	....	91·66	....	91·73	....	90·78	207	90·18	117	90·35	141
9	91·70	....	91·68	....	91·75	....	90·74	200	90·78	207	90·58	175
10	91·73	....	91·67	....	91·68	....	90·74	200	90·69	192	90·59	177
11	91·71	....	91·68	....	91·71	....	90·72	197	90·67	189	90·58	175
12	91·72	....	91·72	....	91·69	177	90·69	192	90·50	163	90·59	177
13	91·53	....	91·84	....	91·56	....	90·82	213	90·63	183	90·57	174
14	91·53	....	91·73	....	91·60	....	90·77	205	90·77	205	90·68	191
15	91·73	....	91·71	161	91·63	....	90·82	213	90·67	189	90·38	145
16	91·74	....	91·86	....	91·61	....	90·78	207	90·18	117	90·58	160
17	91·76	....	91·86	....	91·49	....	90·76	204	90·56	172	90·68	191
18	91·76	....	91·86	....	91·11	....	90·77	205	90·67	189	90·60	178
19	91·52	....	91·63	....	91·00	....	90·76	204	90·68	191	90·63	183
20	91·43	....	91·83	....	91·23	....	90·75	202	90·68	191	90·66	188
21	91·62	....	91·84	....	91·56	....	90·76	204	90·60	178	90·88	224
22	91·66	....	91·87	....	92·25	575	90·68	191	90·67	189	90·32	137
23	91·64	....	91·90	....	92·21	564	90·70	194	90·53	168	90·88	224
24	91·50	....	91·87	....	92·13	541	90·71	196	90·54	169	90·63	183
25	91·58	....	91·71	....	91·87	497	90·75	202	90·61	180	90·77	205
26	91·56	....	91·59	....	92·68	695	90·77	205	90·59	177	90·68	191
27	91·53	....	91·73	....	92·89	754	90·78	207	90·69	192	90·64	184
28	91·52	....	91·83	....	92·48	639	90·53	168	90·63	183	90·53	168
29	91·51	....			92·53	653	90·63	183	90·73	199	90·58	175
30	91·50	....			92·50	645	90·78	207	90·68	191	90·48	160
31	91·46	....			92·45	631			90·48	160		

Day	July. Gauge	July. Dis.	August. Gauge	August. Dis.	September. Gauge	September. Dis.	October. Gauge	October. Dis.	November. Gauge	November. Dis.	December. Gauge	December. Dis.
1	90·57	174	90·56	172	89·98	91	90·13	111	90·00	94	90·15	....
2	90·50	163	90·47	159	89·96	89	90·15	114	90·10	107	89·88	....
3	90·48	160	90·49	162	89·98	91	90·10	107	90·21	121	90·36	....
4	90·38	145	90·50	163	90·13	111	90·09	106	90·12	110	90·39	....
5	90·58	175	90·48	160	90·07	103	90·25	127	90·21	121	90·40	....
6	90·67	189	90·36	142	90·13	111	89·98	91	90·12	110	90·42	....
7	90·66	188	90·32	137	90·08	104	89·85	75	90·21	121	90·43	....
8	90·63	183	90·30	134	89·87	77	89·98	91	89·99	93	90·46	....
9	90·78	207	90·36	142	90·06	102	90·50	163	90·07	103	90·52	....
10	90·78	207	90·35	141	89·98	91	90·20	120	90·58	175	90·52	....
11	90·68	191	90·32	137	89·68	53	90·08	104	90·16	....	90·36	....
12	90·64	184	90·23	124	90·08	104	90·26	128	89·66	....	90·34	....
13	90·48	160	90·27	130	90·02	97	90·25	127	90·20	....	90·40	....
14	90·38	145	90·18	117	89·92	84	90·10	107	90·15	....	90·39	....
15	90·47	159	90·23	124	90·08	104	90·19	119	90·20	....	90·34	....
16	90·83	215	90·18	117	89·94	86	90·15	114	90·22	....	90·31	....
17	90·67	189	90·31	135	90·30	134	90·20	120	90·23	71	90·33	....
18	90·89	225	90·37	144	89·97	90	90·16	115	⁺90·26	....	90·33	....
19	90·98	241	90·33	138	90·26	128	90·15	114	⁺90·26	....	90·33	....
20	91·27	304	90·20	120	89·73	59	89·55	37	90·29	....	90·35	....
21	91·36	327	90·08	104	90·05	101	90·08	104	90·31	....	90·32	....
22	91·33	319	90·23	124	90·27	130	90·15	114	90·33	....	90·32	....
23	91·18	283	89·96	89	90·06	102	90·10	107	90·33	....	90·34	....
24	91·03	251	89·95	88	90·06	102	90·18	117	90·35	....	90·34	....
25	90·97	240	89·81	69	90·17	116	90·12	110	90·35	....	90·30	....
26	90·88	224	90·13	111	89·88	78	89·50	31	90·39	....	90·20	....
27	90·84	217	90·16	115	90·10	107	90·50	163	90·38	....	90·26	....
28	90·71	196	89·95	88	90·18	117	89·90	81	90·40	....	90·34	....
29	90·58	175	90·01	95	90·10	107	90·21	121	90·38	....	90·30	....
30	90·58	175	90·09	106	90·06	102	90·12	110	90·36	....	90·29	....
31	90·58	175	90·09	106	....	....	90·20	120			90·32	....

NOTE.—Gauge heights marked thus (⁺) interpolated.
Ice conditions from January 1 to March 21 and November 11 to end of year.
Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF MOSSY RIVER BELOW FORK RIVER FOR THE YEAR 1915.

[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.
January..................	....	....	[1]150	0·038	0·044	9,200
February................	....	....	[1]160	0·041	0·043	8,900
March...................	754	....	[1]300	0·076	0·088	18,400
April....................	581	168	259	0·066	0·074	15,400
May.....................	207	117	179	0·045	0·052	11,000
June....................	224	137	177	0·045	0·050	10,500
July....................	327	145	206	0·052	0·060	12,700
August..................	172	69	126	0·032	0·037	7,750
September...............	134	53	99	0·025	0·028	5,900
October.................	163	31	109	0·028	0·032	6,700
November................	....	....	[1]80	0·020	0·022	4,750
December................	....	....	[1]65	0·016	0·018	4,000
The Year......	754	....	160	0·040	0·548	115,200

NOTE.—Marked thus ([1]) estimated.

MOSSY RIVER AT LAKE DAUPHIN.

HISTORY.

On May 20, 1913, a gauge was established at the head of the Mossy river by G. Ebner, and from that date gauge readings have been recorded at this station.

LOCATION OF GAUGE.

The gauge is a six-foot vertical staff gauge secured to a support driven into the bed of the river and braced to crib of Clendenning's bridge. This bridge is across the Mossy river about one hundred and fifty feet below the point at which it flows out of Lake Dauphin, and the gauge registers lake level.

RECORDS AVAILABLE.

Gauge records at this point are available for the following periods, from May 21 to December 31, 1913, from January 1 to December 31, 1914, and from January 1 to September 30, 1915.

VALLEY RIVER.

The Valley river is a tributary of lake Dauphin; it rises on the western slope of the Duck mountains, flows south along the foot of the western slope of these mountains, then turns east and flows between the Duck and Riding mountains and continues this generally easterly course to its mouth. There are two tributaries to the valley which are of fair size. These are Short creek, which rises on the slope of Riding mountains, and Drifting river, which joins the Valley three miles west of Valley River station on the C.N.R.

The valley between the Riding and Duck mountains, through which the river flows and from which it takes its name, is about one hundred feet deep and from seven hundred to twenty-five hundred feet wide. The river at ordinary summer stages has a width of between one hundred and two hundred feet. The river bed is composed of gravel and boulders, the banks being of clay which overlies a gravel and boulder bed.

The upper part of the drainage area is practically all within the Duck Mountain Forest Reserve, where considerable stands of spruce, jackpine and poplar are to be found. In the immediate vicinity of the river little clearing has been done, though in the lower part of the valley, and somewhat back from the river, farming is carried on to a considerable extent.

VALLEY RIVER AT VALLEY RIVER.

HISTORY.

This station was established on October 25, 1912, by W. G. Worden, and has been in operation since that date.

LOCATION OF SECTION.

The metering section is located on the downstream side of the C.N.R. bridge crossing the Valley river fifteen hundred feet north of the railroad station in that town and one hundred and fifty feet upstream from the traffic bridge. The I.P. is an arrow carved and painted on the downstream side of the bridge at the south end.

RECORDS AVAILABLE.

Records of daily gauge heights have been secured for the greater part of the period October 25, 1912, to the end of 1915. Estimates of daily discharge have been computed for the following periods:—October 25 to November 17, 1912, April 4 to November 16, 1913, April 25 to November 16, 1914, and from April 12 to November 17, 1915. There is not sufficient information to arrive at estimates of daily discharge under winter conditions.

DRAINAGE AREA.

The area tributary to the Valley river above the station is 1,028 square miles.

GAUGE.

A twelve-foot vertical staff gauge is secured to the downstream side of the south bridge abutment, 264 feet from the I.P. on the section. The gauge is referred to a permanent M.H.S. B.M. located 48 feet south of gauge. This B.M. is set to an arbitrary datum.

CHANNEL.

During low stages the water is confined to one channel, but under high water conditions there are two. The channel is straight for 400 feet above and 600 feet below the section. The bed of the stream is of gravel and sand and permanent. The right bank is low, wooded and liable to overflow. The left bank is high and not liable to overflow.

DISCHARGE MEASUREMENTS.

Meterings are taken from the downstream side of the bridge and cover a range in gauge height of 6·6 feet.

ACCURACY.

The discharge curve is well defined between gauge heights 99.5 and 101.7, between gauge heights 101·7 and 105·0 the discharge curve is not well defined.

DISCHARGE MEASUREMENTS OF VALLEY RIVER AT VALLEY RIVER, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 16	M. S. Madden						[1]
Mar. 12	"						[1]
Mar. 29	"						[1]
April 22	F. S. Smith	1,186	52	91·7	0·92	100·33	84·4
May 7	"	1,186	50	78·2	0·65	100·03	50·7
May 27	"	1,186	47	64·3	0·49	99·90	31·8
June 25	C. O. Allen	2,018	51	102·4	1·18	100·54	120·8
July 30	H. H. Pratt	1,496	51	73·5	0·51	99·92	37·1
Aug. 30	"	1,496	41	32·9	0·06	99·23	2·0
Oct. 1	C. O. Allen	2,018	48	74·9	0·76	100·10	56·9
Nov. 17	M. S. Madden	1,462	39	45·0	0·36	99·65	16·3 [2]

[1] Section frozen solid.

[2] Ice measurement.

DAILY GAUGE HEIGHT AND DISCHARGE OF VALLEY RIVER AT VALLEY RIVER FOR 1915.

[Drainage area 1,028 square miles.]

Day	January Gauge Height	January Discharge	February Gauge Height	February Discharge	March Gauge Height	March Discharge	April Gauge Height	April Discharge	May Gauge Height	May Discharge	June Gauge Height	June Discharge
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1							100·34		100·21	63	99·98	39
2							100·58		100·15	57	99·95	37
3							100·46		100·13	54	99·91	33
4							100·42		100·09	50	99·89	31
5							100·76		100·11	52	99·91	33
6							100·84		100·05	46	100·03	44
7							100·95		100·04	45	100·07	48
8							101·04		100·03	44	100·11	52
9							101·36		100·03	44	100·36	82
10							101·31		99·99	40	100·33	78
11							101·34		100·03	44	100·44	93
12						0	100·98	189	100·45	94	100·37	83
13							101·06	206	100·27	70	100·40	87
14							101·01	195	100·18	60	100·37	83
15							100·86	164	100·10	51	100·36	82
16		0					100·63	122	100·05	46	100·35	81
17							100·62	120	100·03	44	100·21	63
18							100·46	98	99·98	39	100·33	78
19							100·49	100	99·97	38	100·35	81
20							100·39	86	99·97	38	100·43	91
21							100·33	78	100·31	75	100·39	86
22							100·32	77	100·50	101	100·36	82
23							100·58	114	100·31	75	100·55	109
24							100·99	191	100·11	52	100·61	119
25							100·68	131	100·02	43	100·55	109
26							100·37	83	99·93	35	100·53	106
27							100·35	81	99·88	30	100·48	98
28							100·28	72	100·38	84	100·43	91
29					100·21	0	100·33	78	100·09	50	100·42	90
30					100·11		100·29	73	100·02	43	100·40	87
31					100·16				99·99	40		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	100·36	82	99·90	32	99·23	2	100·07	48	100·05	46	99·46	
2	100·33	78	99·88	30	99·28	3	100·05	46	100·02	43	99·52	
3	100·32	77	99·84	27	99·29	3	100·03	44	100·00	41	99·51	
4	100·33	78	99·72	18	99·28	3	100·03	44	99·97	38	99·51	
5	100·31	75	99·64	13	99·28	3	100·05	46	99·95	37	99·47	
6	100·27	70	99·68	16	99·26	3	100·06	47	99·95	37	99·48	
7	100·20	62	99·70	17	99·28	3	100·06	47	99·94	36	99·46	
8	100·08	49	99·66	15	99·34	3	100·07	48	99·92	34	99·46	
9	100·06	47	99·60	11	99·40	4	100·08	49	99·90	32	99·44	
10	100·04	45	99·59	11	99·56	9	100·07	48	99·87	30	99·45	
11	100·01	42	99·56	9	99·67	12	99·96	37	99·96	37	99·46	
12	99·99	40	99·52	8	99·70	17	99·94	36	99·82	25	99·46	
13	99·94	36	99·48	6	99·71	18	99·94	36	99·73	19	99·46	
14	100·27	70	99·46	6	99·82	26	99·93	35	99·72	18	99·44	
15	100·47	97	99·45	6	99·81	25	99·92	34	99·72	18	99·43	
16	100·62	120	99·42	5	99·81	25	99·92	34	99·72	18	99·42	
17	100·74	141	99·40	4	99·82	26	99·91	33	99·66	16	99·42	
18	101·02	197	99·40	4	99·82	26	99·90	32	99·62		99·41	
19	101·04	202	99·37	4	99·84	27	99·90	32	99·60		99·42	
20	101·08	211	99·35	4	99·84	27	99·90	32	99·58		99·41	
21	101·03	200	99·35	4	99·86	29	99·90	32	99·58		99·40	
22	100·92	174	99·34	3	99·88	30	99·91	33	99·58		99·40	
23	100·54	107	99·32	3	99·89	31	99·92	34	99·59		99·39	
24	100·52	104	99·31	3	99·90	32	99·93	35	99·60		99·39	
25	100·48	98	99·30	3	99·94	36	99·92	34	99·60		99·38	
26	100·32	77	99·28	3	99·98	39	99·91	33	99·61		99·38	
27	100·15	57	99·26	3	99·98	39	99·91	33	99·62		99·38	
28	100·12	53	99·26	3	99·96	38	99·92	34	99·60		99·38	
29	100·03	44	99·24	2	100·00	41	99·93	35	99·56		99·37	
30	99·92	34	99·23	2	100·02	43	99·95	37	99·52		99·36	
31	99·91	33	99·23	2			99·97	38			99·37	

NOTE—Ice conditions from January 1 to April 11, November 12 to December 31.
Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF VALLEY RIVER AT VALLEY RIVER FOR 1915.

[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.
January.................	0[1]	0[1]	0[1]	0[1]	....	....
February................	0[1]	0[1]	0[1]	0[1]	....	....
March..................	0[1]	0[1]	0[1]	0[1]	....	....
April...................	206	0[1]	80[1]	0·078	0·087	4,775
May....................	101	30	53	0·052	0·059	3,250
June...................	119	31	76	0·074	0·083	4,525
July...................	211	33	90	0·089	0·103	5,550
August.................	32	2	9	0·009	0·010	553
September..............	43	2	21	0·020	0·022	1,250
October................	49	32	38	0·039	0·045	2,340
November..............	46	0[1]	20[1]	0·020	0·022	1,190
December..............	0[1]	0[1]	0[1]	....	....	....
The Period....	206	0	32	0·032	0·431	23,433

NOTE.—Marked thus([1]) estimated.

OCHRE RIVER.

The Ochre river is a small tributary of lake Dauphin. It rises on the northeastern slope of Riding mountain and flows northeast to the lake, its mouth being in Tp. 20, R. 17, West of the First meridian. The total drainage area of the river is approximately 270 square miles, of which 250 square miles lies above the metering station at Ochre river.

OCHRE RIVER AT OCHRE RIVER.

HISTORY.

This station was established by W. G. Worden on October 18, 1912, and has been in operation since that date.

LOCATION OF SECTION.

The metering section on the Ochre river is located on the downstream side of the traffic bridge, which is one quarter of a mile north of the railway station and one quarter of a mile below the C.N.R. bridge. The I.P. is marked on the guard rail seven feet from the south end on the downstream side.

RECORDS AVAILABLE.

Records of daily gauge height have been obtained for the period October 18, 1912, to the 14th of November, 1915, with omission during the winter months. Estimates of daily discharge have been obtained for the same period.

DRAINAGE AREA.

The drainage area of the Ochre river above Ochre river is 250 square miles.

DEPARTMENT OF THE INTERIOR

GAUGE.

A nine-foot vertical staff enamelled gauge is fastened to a timber which is spiked to a pile of the bridge at the south end on the downstream side. This gauge is referred to a permanent M.H.S. B.M. located about nine feet southeast of gauge. This B.M. is set to an arbitrary datum.

CHANNEL.

The channel just above the section is divided by a pile bent which supports the bridge. For fifty feet above and three hundred feet below the station the channel is straight. The bed of the stream is of sand and gravel with a vegetable growth. The banks are low and wooded and liable to overflow at high stages.

DISCHARGE MEASUREMENTS.

The discharge measurements are taken from the downstream side of the bridge under open water conditions. During the winter season they are made from the ice at a point about one hundred feet downstream from the bridge.

ACCURACY.

Between gauge heights 99·5 and 101·3 the curve is well defined, between 101·3 and 107·3 the curve is not well defined. Under ice conditions a fairly well defined curve for the range in gauge height 99·2 to 100·4 has been obtained.

DISCHARGE MEASUREMENTS OF OCHRE RIVER AT OCHRE RIVER, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 11...	M. S. Madden.....	1,462	8·5	....	....	....	No flow.[1]
Mar. 27...	"	1,462	38·0	13·4	0·27	101·74	3·6
April 21...	F. S. Smith.......	1,186	40·0	48·7	1·22	100·68	58·8
April 21...	"	1,186	40·0	48·2	1·34	100·67	64·5
April 21...	"	1,186	40·0	48·2	1·29	100·66	62·3
May 6...	"	1,186	40·0	33·7	0·82	100·30	27·6
May 6...	"	1,186	40·0	33·7	0·77	100·30	26·0
May 6...	"	1,186	40·0	33·7	0·79	100·30	26·6
May 26...	"	1,186	39·4	35·6	1·06	100·39	37·8
May 26...	"	1,186	39·4	35·6	1·10	100·39	39.3
June 24...	C. O. Allen........	2,018	37·8	38·8	1·34	100·41	52·0
Aug. 2	H. H. Pratt.......	1,496	32·0	14·5	0·98	99·92	14·3
Sept. 1...	"	1,496	27·0	6·2	0·67	99·55	4·2
Oct. 5...	C. O. Allen........	2,018	37·0	47·0	1·17	100·75	55·2
Nov. 25...	M. S. Madden.....	1,462	26·0	33·0	0·56	100·40	18·6[1]

[1] Ice measurement.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF OCHRE RIVER AT OCHRE RIVER, FOR 1915.

[Drainage area 250 square miles.]

Day.	January Gauge Height.	January Dis-charge.	February Gauge Height.	February Dis-charge.	March Gauge Height.	March Dis-charge.	April Gauge Height.	April Dis-charge.	May Gauge Height.	May Dis-charge.	June Gauge Height.	June Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1							101·60		100·59	82	100·07	26
2							101·51		100·53	75	100·06	25
3							101·52		100·50	71	100·00	20
4							101·51		100·43	63	100·00	20
5							101·68		100·42	61	100·10	28
6							101·66		100·42	61	100·12	30
7							101·80		100·41	60	100·29	47
8							102·38		100·46	66	100·43	63
9							102·37		100·43	63	100·60	83
10							102·22		100·42	61	100·88	118
11							102·17		100·43	63	100·78	105
12							101·76	246	101·26	171	100·69	94
13							101·69	235	101·05	142	100·52	73
14							101·34	183	101·05	142	100·45	65
15							101·25	170	100·70	95	100·60	83
16							101·23	167	100·70	95	100·60	83
17							101·19	162	100·68	93	100·60	83
18							100·92	124	100·66	90	100·53	75
19							100·79	107	100·47	67	100·44	64
20							100·62	85	100·37	56	100·35	53
21							100·61	84	100·36	55	100·42	61
22					101·63		100·85	115	100·28	46	100·43	63
23					101·64		100·78	105	100·26	44	100·37	56
24					101·64		100·73	99	100·25	42	100·47	67
25					101·78		100·74	100	100·35	53	100·43	63
26					101·78		100·87	117	100·37	56	100·43	63
27					101·74	4	100·86	116	100·36	55	100·67	91
28					101·74		100·80	108	100·24	41	100·56	78
29					101·66		100·70	95	100·16	33	100·43	63
30					101·63		100·63	87	100·14	32	100·37	56
31					101·61				100·10	28		

Day	July		August		September		October		November		December	
1	100·31	49	99·90	14	99·55	3	101·15	156	100·76	95		
2	100·26	14	99·92	15	99·55	3	101·10	149	100·62	85		
3	100·27	45	99·91	15	99·57	3	101·00	135	100·54	76		
4	100·55	77	99·83	10	99·71	5	101·00	114	100·52	73		
5	100·48	69	99·81	9	99·62	3	100·70	95	100·50	71		
6	100·30	48	99·81	9	99·62	3	100·60	83	100·34	52		
7	100·22	39	99·79	9	99·82	10	100·58	81	100·40	59		
8	100·14	32	99·72	6	100·17	34	100·53	75	100·40	59		
9	100·09	27	99·72	6	100·23	40	100·49	70	100·41	60		
10	100·09	27	99·71	5	100·06	25	100·47	67	100·42	61		
11	100·20	37	99·71	5	99·93	16	100·42	61	100·42	61		
12	100·22	39	99·70	5	99·86	12	100·40	59	100·43	63		
13	100·14	32	99·69	5	99·87	12	100·35	53	100·43	63		
14	100·07	26	99·69	5	99·96	18	100·34	52	100·43	63		
15	100·75	101	99·67	4	99·98	19	100·32	50				
16	100·93	125	99·71	5	100·03	22	100·30	48				
17	101·39	190	99·70	5	99·97	18	100·30	48				
18	101·23	167	99·69	5	99·96	18	100·25	42				
19	101·13	153	99·76	7	99·96	18	100·25	42				
20	100·91	122	99·76	7	100·66	90	100·20	37				
21	100·51	72	99·73	6	100·66	90	100·18	35				
22	100·47	67	99·64	4	100·46	66	100·18	35				
23	100·34	52	99·63	4	100·36	55	100·16	33				
24	100·21	38	99·62	3	100·26	44	100·16	33				
25	100·14	32	99·62	3	100·26	44	100·25	42	100·40	19		
26	100·11	29	99·62	3	100·14	32	100·35	53				
27	100·09	27	99·61	3	100·27	45	100·45	65				
28	100·00	20	99·59	3	100·27	45	100·67	91				
29	99·97	18	99·56	3	100·65	89	100·85	114				
30	99·91	15	99·57	3	101·16	157	100·78	105				
31	99·91	15	99·57	3			100·75	102				

NOTE.—Ice conditions from January 1 to April 12 and from November 15 to December 31. Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF OCHRE RIVER AT OCHRE RIVER FOR THE YEAR 1915.

[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.
January..................	....	....	[1]0	0·000	0·000	....
February.................	....	....	[1]0	0·000	0·000	....
March...................	....	0	[1]2	0·008	0·009	123
April...................	246	....	[1]95	0·380	0·434	5,650
May....................	171	28	70	0·280	0·323	4,300
June....................	118	20	63	0·252	0·281	3,750
July....................	190	15	59	0·236	0·272	3,600
August..................	15	3	6	0·024	0·028	369
September...............	157	3	35	0·140	0·156	2,100
October.................	156	33	72	0·288	0·332	4,400
November................	....	....	[1]40	0·160	0·179	2,400
December................	....	....	[1]4	0·016	0·018	246
The Year......	246	0	37	0·149	2·022	26,938

NOTE.—All marked thus([1]) estimated.

INDEX TRIBUTARIES OF LAKE WINNIPEG FROM THE WEST.

GENERAL.

The rivers coming under this head are the Saskatchewan, Fairford and Dauphin, though they are included in that part known for administration purposes as the District west of lake Winnipegosis.

The Saskatchewan is very important from a navigation, reclamation and power standpoint. The Fairford is also important and to some extent for the above reasons. Its chief importance is that it forms the only outlet of lake Manitoba and through it lake Winnipegosis, lake Dauphin, Swan lake and Red Deer lake are drained.

SASKATCHEWAN RIVER.

The Saskatchewan river is one of the principal tributaries of lake Winnipeg; it flows into that lake near the northern end and drains a large territory to the west of the lake. The total drainage area is 155,000 square miles, extending from the summit of the Rocky mountains eastward to lake Winnipeg. There are two main branches of the river, known as the North and South Saskatchewan. The north branch heads in the Rockies southwest of Edmonton, and flows generally east to its junction with the south branch about fifty miles east of Prince Albert. The tributaries entering the river from the north are small, as the northern limit of the basin follows the river itself closely. The south branch is formed by the junction of the Bow and Old Man rivers, and below the junction of these two the Red Deer enters.

In the province of Manitoba the country adjacent to the river is low lying and swampy, a considerable portion of the level being liable to flooding during high water. Near the mouth the river enlarges into two lake-like expanses known as Cedar lake and Cross lake, from the latter lake the river flows into lake Winnipeg. Cross Lake rapids, Red Rock rapids and Grand rapids occur in this stretch of the river.

In Manitoba the river has an average width of one thousand feet, though above Grand rapids a minimum width of five hundred feet occurs. The river bottom above Cedar lake is composed of clay and gravel, below that point limestone ridges occur between which the bottom is covered with boulders. Valuable timber is to be found along the river at various points, but generally speaking, as the lake is approached, the growth becomes stunted, being for the most part second growth.

Above Grand rapids the river is navigable at certain stages and steamers have been operating as far upstream as Edmonton. At present all navigation below Pas is confined to gasoline launches and like small craft.

Considerable work in the way of reconnaissance and detailed surveys for various purposes has been done by the Dominion Water Power Branch in this part of the river, and in order to further the work, two metering stations have been established by the Manitoba Hydrometric Survey, one at Pas and the other at the head of Grand rapids.

LAKE WINNIPEG AT WINNIPEG BEACH.

HISTORY.

A gauge was set on lake Winnipeg at Winnipeg Beach on May 1, 1913, and records of daily gauge readings have been kept since that date.

LOCATION OF GAUGE.

A nine-foot vertical staff gauge is secured to the inner side of the C.P.R. pier. The gauge is referred to a B.M. of the Canadian Geodetic Survey set in the concrete base at the southeast corner of the C.P.R. water tank at the Winnipeg Beach station.

RECORDS AVAILABLE.

Records of daily gauge readings are available from May 1 to October 31, and at intervals during November and December of 1913, at intervals during January, February and March, and continuous from April 2 to December 31 in 1914, and continuous throughout the year of 1915.

LAKE MANITOBA AT DELTA.

HISTORY.

A gauge was installed on lake Manitoba at Delta on July 9, 1914, by C. O. Allen, and observations as to lake level have been made practically continuously since that time.

LOCATION OF GAUGE.

Delta is a small station on the C.N. Ry. located at the southerly end of lake Manitoba. The gauge installed at this point is a six-foot staff gauge secured to the piling of the breakwater, a short distance south of the bridge across the canal.

RECORDS AVAILABLE.

During the year 1914 daily gauge readings are available from June 12 to the 14th of November, and from the 7th of December to the end of the year. In 1915 the full year records are available.

SASKATCHEWAN RIVER AT PAS.

HISTORY.

The station on the Saskatchewan river at Pas was first established by W. G. Worden on October 21, 1912. On May 27, 1913, a new section at Pas was established by E. Bankson, and this station has been in operation since that date.

LOCATION OF SECTION.

The first section was located about one-quarter of a mile below the site of the Hudson's Bay Railway bridge at Pas. On May 27, 1913, this section was moved upstream to the downstream side of the H.B. Railway bridge. The I.P. is located on the handrail near the south end of the bridge on the downstream side, and is vertically above the river face of the south abutment. It is painted white and marked "0+00 I.P."

RECORDS AVAILABLE.

Records of daily gauge height were kept at various intervals from th early part of 1912 to the end of 1915. From October 21, 1912, to the end of 1915 the gauge heights are rather more continuous. Estimates of daily discharge have been computed for the periods covered by daily gauge heights from April 13, 1913, to the end of 1915.

DRAINAGE AREA.

The drainage area tributary to the Saskatchewan above Pas comprises the greater portion of Western Canada lying between parallels 49 and 54 north latitude and between the Rocky mountains and lake Winnipeg. The total area is 149,500 square miles.

GAUGE.

A twenty-foot vertical staff gauge has been fastened to the downstream side of the first pier from the south bank and 10 feet above the metering section. The gauge is referred to D.P.W. B.M. No. 79, which is a cross on a copper plug set on the west side of the south abutment of the H.B. Railway bridge, and is about three feet from the ground level. It is marked P.W.D. B.M. No. 79.

CHANNEL.

The river is divided by the bridge piers into six channels at low water and eight channels at high water. For 1,300 feet above and 2,700 feet below the section the channel is straight. The bed of the river is covered with gravel and small boulders, but at the section the stream bottom is somewhat shifting. The right bank is high and not liable to overflow, the left bank is low and liable to overflow at high stages. At extreme high water there is a small discharge through an overflow channel about 500 yards south of the bridge.

DISCHARGE MEASUREMENTS.

The discharge measurements were taken from a boat on the first section established. Since May, 1913, the meterings have been taken from the downstream side of the H.B. Ry. bridge.

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 which 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 627·0 and below 818·5 the discharge curve is fairly well defined.

DISCHARGE MEASUREMENTS OF SASKATCHEWAN RIVER AT PAS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per	Feet.	Sec.-ft.	
Jan. 12.	M. S. Madden...	1,462	759	8,929	0·50	15·86	4,467	Ice measurement. Winter section.
Feb. 4.	"	1,462	757	8,956	0·54	15·81	4,990	" "
Feb. 5.	"	1,462	757	8,922	0·58	15·83	5,220	" "
Feb. 6.	"	1,462	757	8,921	0·57	15·83	5,148	" "
Mar. 8.	"	1,462	760	8,901	0·57	16·07	5,144	" "
Mar. 9.	"	1,462	760	8,851	0·58	16·08	5,174	" "
April 2.	"	1,462	761	9,535	0·64	16·64	6,090	" "
April 29.	F. S. Smith......	1,186	746	13,970	2·31	21·91	32,316	Regular section.
April 30.	"	1,186	744	13,637	2·14	21·39	29,146	
June 4.	"	1,186	755	14,149	2·61	22·40	36,873	
June 12.	M. S. Madden...	1,462	760	15,266	2·73	23·59	41,690	
June 15.	"	1,462	767	15,858	3·07	24·33	48,753	
June 30.	C. O. Allen......	2,019	781	17,448	3·35	26·57	58,426	
July 1.	"	2,019	781	17,481	3·48	26·69	60,920	
July 9.	"	2,019	796	19,947	3·90	29·71	77,836	
July 10.	"	2,019	797	20,163	4·03	29·92	81,222	
July 12.	"	2,019	799	20,517	4·07	30·31	83,406	
July 14.	"	2,019	800	20,797	3·87	30·45	80,427	
July 15.	"	2,019	800	20,797	3·82	30·47	79,550	
July 16.	"	2,019	800	20,797	3·92	30·53	81,513	
July 17.	"	2,019	800	20,797	3·82	30·52	79,350	
July 19.	"	2,019	800	20,897	3·97	30·55	83,040	
July 20.	"	2,019	800	20,977	3·98	30·58	83,435	
July 21.	"	2,019	800	21,077	3·97	30·57	83,605	
July 22.	"	2,019	800	21,081	3·96	30·66	83,565	
July 23.	"	2,019	801	21,165	3·96	30·69	83,854	
July 26.	"	2,019	802	21,510	4·07	31·01	87,669	
July 27.	"	2,019	803	21,576	4·09	31·13	88,157	
July 28.	"	2,019	805	21,950	4·16	31·27	91,269	
July 29.	"	2,019	805	22,005	4·24	31·40	93,396	
July 31.	"	2,019	806	22,176	4·27	31·67	94,647	
Aug. 2.	"	2,019	810	22,531	4·38	31·89	98,562	
Aug. 3.	"	2,019	810	22,602	4·32	31·96	97,710	
Aug. 9.	"	2,019	810	22,664	4·32	32·09	97,997	
Aug. 10.	"	2,019	810	22,736	4·47	32·13	101,694	
Aug. 11.	"	2,019	810	22,751	4·38	32·11	99,745	
Aug. 12.	"	2,019	810	22,774	4·33	32·11	98,536	
Aug. 13.	"	2,019	810	22,694	4·46	32·09	100,551	
Aug. 14.	"	2,019	810	22,694	4·40	32·07	99,885	
Aug. 16.	"	2,019	810	22,537	4·19	31·86	94,347	
Aug. 17.	"	2,019	810	22,536	4·14	31·88	93,269	
Aug. 18.	"	2,019	810	22,536	4·10	31·87	92,315	
Aug. 19.	"	2,019	810	22,531	4·09	31·84	92,300	
Aug. 20.	"	2,019	810	22,448	4·10	31·74	91,970	
Aug. 26.	"	2,019	806	21,843	3·86	31·10	84,306	
Aug. 28.	"	2,019	805	21,724	3·76	30·86	81,614	
Aug. 31.	"	2,019	799	21,338	3·60	30·28	76,761	
Sept. 1.	"	2,019	799	21,248	3·53	30·25	75,017	
Sept. 2.	"	14,819	799	21,248	3·65	30·20	77,557	
Sept. 3.	"	2,019	799	21,141	3·67	30·16	77,486	
Sept. 4.	"	2,019	798	21,083	3·74	30·03	78,945	
Sept. 8.	"	2,019	796	20,792	3·53	29·61	73,366	
Sept. 10.	"	2,019	796	20,652	3·48	29·37	71,855	
Sept. 11.	"	2,019	795	20,589	3·42	29·23	70,518	
Sept. 13.	"	2,019	790	20,171	3·47	28·75	70,055	
Sept. 15.	"	2,019	788	19,869	3·44	28·32	68,344	
Sept. 16.	"	2,019	785	19,637	3·39	28·07	66,641	
Sept. 17.	"	2,019	784	19,467	3·36	27·80	65,417	
Sept. 18.	"	2,019	783	19,309	3·32	27·60	64,056	
Sept. 20.	"	2,019	780	18,857	3·18	27·15	59,889	
Sept. 22.	"	2,019	779	18,515	3·10	26·67	57,435	
Sept. 23.	"	2,019	776	18,393	3·11	26·42	57,198	
Sept. 24.	"	2,019	775	18,162	2·99	26·14	54,309	

NOTE:—**Add 800·00 to gauge heights to bring to station datum.**

DAILY GAUGE HEIGHT AND DISCHARGE OF SASKATCHEWAN RIVER AT PAS, FOR 1915.

[Drainage area 149,500 square miles.]

Day.	January. Gauge Height.	Dis-charge.	February. Gauge Height.	Dis-charge.	March. Gauge Height.	Dis-charge.	April. Gauge Height.	Dis-charge.	May. Gauge Height.	Dis-charge.	June. Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	15·95	......	15·65	4,745	16·02	5,226	16·60	5,980	21·55	30,645	22·50	35,050
2	15·85	......	15·75	4,875	16·04	5,252	16·65	6,045	21·50	30,420	22·52	35,146
3	15·75	......	15·81	4,953	16·02	5,226	16·65	6,045	21·35	29,750	22·60	35,530
4	15·75	......	15·83	4,979	16·01	5,213	16·65	6,045	21·35	29,750	22·75	36,255
5	15·65	......	15·83	4,979	16·03	5,239	16·85	6,305	21·30	29,530	22·84	36,696
6	15·70	......	15·83	4,979	16·10	5,230	16·95	6,435	21·05	28,445	22·90	36,990
7	15·72	......	15·87	5,031	16·05	5,265	17·00	6,500	20·95	28,020	22·97	37,333
8	15·75	......	15·89	5,057	16·07	5,291	17·05	6,565	20·95	28,020	23·00	37,480
9	15·75	......	15·89	5,507	16·08	5,304	17·05	6,565	20·83	27,416	23·10	37,980
10	‡15·80	......	15·93	5,109	16·08	5,304	‡18·50	7,000	20·47	26,007	23·12	38,080
11	‡15·83		15·95	5,135	16·09	5,317	‡20·10	8,000	19·99	24,060	23·14	38,180
12	‡15·86	4,467	15·93	5,109	16·20	5,460	21·70	10,000	19·50	22,120	23·59	40,488
13	‡15·95	......	15·95	5,135	16·25	5,525	‡23·25	12,000	19·38	21,652	24·00	42,650
14	16·15	......	16·05	5,265	16·25	5,525	24·45	15,000	19·20	20,960	24·06	42,968
15	16·35	......	16·10	5,330	16·25	5,525	25·35	18,000	19·05	20,390	24·32	44,346
16	16·15	......	16·10	5,330	16·30	5,590	25·55	30,000	18·98	20,122	24·47	45,141
17	16·05	......	16·10	5,330	16·25	5,525	25·35	49,925	18·85	19,630	24·75	46,650
18	16·05	......	16·09	5,317	16·25	5,525	25·05	48,275	18·73	19,174	24·90	47,460
19	16·05	......	16·09	5,317	16·35	5,655	24·85	47,145	18·55	18,490	24·95	47,730
20	16·05	......	16·08	5,304	16·40	5,720	24·75	46,650	18·40	17,930	25·04	48,220
21	16·00	......	16·08	5,304	16·40	5,720	24·75	46,650	18·73	19,174	25·35	49,925
22	16·05	......	16·07	5,291	16·45	5,785	24·55	45,435	18·95	20,010	25·45	50,475
23	16·05	......	16·08	5,304	16·45	5,785	23·95	42,385	19·95	23,900	25·65	51,590
24	16·55	......	16·07	5,291	16·45	5,785	23·45	39,760	20·30	25,310	26·00	53,550
25	16·55	......	16·05	5,265	16·45	5,785	23·35	39,245	20·35	25,515	26·15	54,390
26	16·05	......	16·05	5,265	16·50	5,850	23·05	37,730	20·50	26,130	26·18	54,558
27	16·00	......	16·05	5,265	16·50	5,850	22·95	37,235	20·60	26,550	26·20	54,670
28	15·45	......	‡16·03	5,239	16·50	5,850	22·85	36,475	20·65	26,760	26·27	55,062
29	15·45	......	....	....	16·55	5,915	21·91	32,286	20·75	27,180	26·47	56,182
30	15·47	......	....	....	16·55	5,915	21·75	31,550	21·85	32,010	26·50	56,350
31	15·47	......	....	....	16·60	5,980	....	....	21·86	32,056	....	....

Day	July.		August.		September.		October.		November.		December.	
1	26·63	57,091	31·76	95,360	30·25	80,330	24·56	45,624	20·35	25,515	‡16·80	......
2	26·86	58,452	31·88	96,936	30·19	79,863	24·48	45,194	20·24	25,064	‡16·55	......
3	27·17	60,186	31·96	98,004	30·15	79,555	24·26	44,028	20·16	24,740	‡16·30	......
4	27·60	62,650	32·01	98,676	30·03	78,638	24·04	42,862	20·04	24,260	16·15	......
5	28·04	65,274	32·05	99,220	29·90	77,670	23·88	42,014	19·93	23,820	16·10	......
6	28·48	68,032	32·07	99,492	29·81	77,013	23·57	40,384	19·86	23,540	16·00	......
7	28·94	71,024	32·07	99,492	29·72	76,364	23·48	39,916	19·74	23,060	15·98	......
8	29·30	73,440	32·08	99,628	29·61	75,581	23·40	39,500	19·58	22,432	16·01	......
9	29·71	76,292	32·09	99,764	29·49	74,741	23·36	39,296	19·55	22,315	16·05	......
10	29·93	77,892	32·13	100,137	29·35	73,780	23·03	37,630	‡19·60	22,510	16·05	......
11	30·15	79,555	32·11	100,039	29·23	72,964	22·87	36,843	‡19·65	22,705	16·25	......
12	30·33	80,960	32·11	100,039	28·98	71,288	22·76	36,304	‡19·75	23,100	16·55	......
13	30·41	81,602	32·09	99,764	28·75	69,775	22·67	35,866	‡19·80	23,300	16·25	......
14	30·45	81,930	32·06	99,356	28·51	68,224	22·48	34,954	‡19·90	23,700	16·25	......
15	30·49	82,258	31·96	98,004	28·31	66,953	22·36	34,382	‡19·95	......	16·17	......
16	30·53	82,592	31·87	96,804	29·05	65,335	22·24	33,818	‡20·05	......	15·96	......
17	30·63	82,592	31·88	96,936	27·80	63,840	21·99	32,654	‡20·15	......	16·25	......
18	30·54	82,676	31·87	96,804	27·59	62,622	21·86	32,056	20·20	......	16·50	......
19	30·55	82,760	31·84	96,408	27·36	61,288	21·75	31,550	19·84	......	16·65	......
20	30·58	83,012	31·75	95,230	27·13	59,954	21·59	30,825	19·60	......	16·59	......
21	30·59	83,096	31·68	94,328	26·88	58,516	21·46	30,240	19·30	......	16·57	......
22	30·66	83,696	31·64	93,824	26·66	57,262	21·28	29,442	19·00	......	16·46	......
23	30·70	84,040	31·53	92,466	26·41	55,846	21·17	28,961	18·60	......	16·46	......
24	30·79	84,832	31·49	91,984	26·13	54,278	21·05	28,445	19·03	......	16·43	......
25	30·92	86,008	31·28	89,608	25·90	52,990	20·94	27,978	‡18·90	......	16·42	......
26	30·99	86,666	31·10	87,740	25·56	51,086	20·66	26,802	‡18·65	......	16·36	......
27	31·14	88,148	30·99	86,666	25·45	50,475	20·25	25,105	‡18·45	......	16·25	......
28	31·27	89,502	30·86	85,460	25·15	48,825	20·67	26,844	‡18·30	......	16·26	......
29	31·43	91,288	30·66	83,696	24·95	47,730	20·71	27,012	‡18·15	......	16·26	......
30	31·56	92,832	30·50	82,340	24·83	47,082	20·45	25,925	‡17·00	......	16·27	......
31	31·68	94,328	30·30	80,720	....	....	20·45	25,925	17·00	......	16·27	......

NOTE.—Gauge heights marked thus (‡) interpolated.
Ice conditions January 1 to April 16 and November 15 to December 31.
Not sufficient information to compute daily discharges.
Add 800·00 to gauge heights to bring to station datum.

MONTHLY DISCHARGE OF SASKATCHEWAN RIVER AT PAS, FOR SEASON 1915.

[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.
January	....	....	¹4,500	0·030	0·035	276,700
February	5,330	4,745	5,163	0·034	0·033	286,700
March	5,980	5,213	5,556	0·037	0·043	341,600
April	49,925	5,980	24,583	0·164	0·183	1,462,800
May	32,056	17,930	25,069	0·168	0·194	1,537,500
June	56,350	35,050	44,904	0·300	0·335	2,672,000
July	94,328	57,091	79,185	0·530	0·611	4,868,900
August	100,317	80,720	94,697	0·633	0·730	5,822,700
September	80,330	47,082	65,329	0·437	0·487	3,887,400
October	45,624	25,105	34,141	0·228	0·263	2,099,200
November	....	....	¹21,000	0·140	0·156	1,249,500
December	....	....	¹7,000	0·047	0·054	430,400
The Year	100,317	4,745	32,519	0·229	3·124	24,935,400

NOTE.—Marked thus (¹) estimated.

SASKATCHEWAN RIVER AT THE HEAD OF GRAND RAPIDS.

HISTORY.

This station was established by E.B. Patterson on July 31, 1912, and has been in continuous operation since that date.

LOCATION OF SECTION.

The meter section on the South Saskatchewan river at the head of Grand Rapids is located 640 feet below the Hudson's Bay Company's wharf, situated at the upper end of their tramway and 3,200 feet above the head of Grand Rapids. The I.P. is a hub at the top of the left bank. It is referenced to the end of a traverse line running from the Hudson's Bay Company tramway.

RECORDS AVAILABLE.

Intermittent records of daily gauge height extend over the period, August 3, 1912, to November 6, 1913, during the open water season. From November 7, 1913, to September 5, 1914, and from March 2 to December 31, 1915, a record of continuous gauge heights has been taken. Estimates of daily discharge have been prepared for the following periods:— August 1 to November 30, 1912, May 19 to November 11, 1913, April 23 to September 5, 1914, and from March 2 to December 31, 1915. Difficulty has been experienced in securing gauge height records during the winter months.

DRAINAGE AREA.

The drainage area of the Saskatchewan river above the head of Grand Rapids is 155,100 square miles.

GAUGE.

A nine-foot vertical staff gauge has been placed at the end of the section and fastened to a crib which acts as a retaining wall for the bank. Prior to this gauge being placed, one was secured to the dock of the Hudson's Bay Co., about 500 feet above the section, and it is to this gauge that the records given are referred.

CHANNEL.

For 800 feet above and 500 feet below the section the channel is straight. The hydraulic gradient for this section is quite perceptible. The river is confined to one channel at all stages, the bed of the stream is of sand and gravel and fairly permanent. The banks are high, covered with scrub and are not liable to overflow.

DISCHARGE MEASUREMENTS.

Discharge measurements in open water seasons are made from a boat located on the section by range poles, the distances between stations being determined by stadia or triangulation.

ACCURACY.

The discharge curve is only fairly well defined between the extreme limits of gauge heights which are 786·0 and 789·4. Owing to the hydraulic gradient the section may be considered an open water one, as very little ice forms at this point during the winter season.

DISCHARGE MEASUREMENTS OF SASKATCHEWAN RIVER AT GRAND RAPIDS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 4...	E. B. Patterson....	1,196	979	10,605	0·66	85·09	6,999[1]
5...	"	1,196	979	10,712	0·65	85·12	6,963[1]
6...	"	1,196	979	10,575	0·73	85·04	7,720[1]
Sept. 18...	W. E. Weld........	1,940	1,068	17,268	4·42	89·69	76,367
Oct. 12...	"	1,940	1,059	15,546	3·50	88·07	54,397

[1] Ice measurement.

SESSIONAL PAPER No. 25f

DAILY GAUGE HEIGHT AND DISCHARGE OF SASKATCHEWAN RIVER AT GRAND RAPIDS,
FOR 1915.

[Drainage area 155,100 square miles.]

Day.	January. Gauge Height.	January. Discharge.	February. Gauge Height.	February. Discharge.	March. Gauge Height.	March. Discharge.	April. Gauge Height.	April. Discharge.	May. Gauge Height.	May. Discharge.	June. Gauge Height.	June. Discharge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1							3·25	5,660	5·67	19,866	5·43	17,682
2					5·28	7,432	3·23	5,690	5·68	19,964	5·47	17,978
3					5·25	7,360	3·18	5,808	5·75	20,650	5·50	18,200
4					5·09	7,000	3·40	5,872	5·86	21,728	5·53	18,494
5					5·12	7,024	3·64	5,936	5·88	21,924	5·88	21,924
6					5·04	6,906	3·71	6,000	5·89	22,022	5·83	21,434
7					5·09	6,976	3·75	6,064	5·91	22,018	5·80	21,140
8					4·84	6,808	3·83	6,128	5·90	22,120	5·76	20,928
9					4·79	6,640	3·77	6,192	5·93	22,414	5·79	21,042
10					4·82	6,688	3·80	6,384	5·80	21,140	5·82	21,336
11					4·41	5,936	3·78	6,664	5·63	19,474	5·87	21,826
12					4·30	5,600	3·82	6,952	5·54	18,952	6·00	23,100
13					4·17	5,470	3·87	7,240	5·51	18,298	6·06	23,820
14					4·06	5,360	3·90	7,528	5·62	19,376	6·10	24,300
15					3·85	5,150	4·08	7,096	5·53	18,494	6·29	25,500
16					3·78	5,080	4·17	8,314	5·45	17,830	6·17	25,140
17					3·77	5,070	4·30	8,722	5·49	18,156	6·20	25,500
18					3·83	5,130	4·35	9,130	5·46	17,904	6·13	24,660
19					3·78	5,080	4·29	9,622	5·47	17,978	6·18	25,260
20					3·80	5,200	4·33	10,174	5·45	17,830	6·15	24,900
21					3·82	5,240	4·30	10,680	5·45	17,830	6·30	26,700
22					3·83	5,220	4·53	11,774	5·41	17,534	6·47	28,740
23					3·80	5,300	4·70	12,760	5·28	16,572	6·55	29,830
24					3·78	5,340	4·94	14,152	5·34	17,016	6·57	30,122
25					3·67	5,380	5·13	15,462	5·30	16,720	6·66	31,436
26					3·61	5,420	5·24	16,276	5·32	16,868	6·78	23,188
27					3·54	5,460	5·40	17,460	5·30	16,720	6·83	33,918
28					3·50	5,500	5·69	20,062	5·28	16,572	6·91	35,086
29					3·41	5,540	5·70	20,160	5·35	17,090	6·99	36,254
30					3·33	5,580	5·73	20,454	5·39	17,416	6·13	38,298
31					3·30	5,620			5·50	18,200		

Day	July. Gauge	July. Disch.	August. Gauge	August. Disch.	September. Gauge	September. Disch.	October. Gauge	October. Disch.	November. Gauge	November. Disch.	December. Gauge	December. Disch.
1	7·20	39,320	9·07	66,622	9·80	72,280	8·98	65,308	6·61	30,706	6·14	....
2	7·25	40,050	9·09	66,914	9·91	78,886	8·95	64,780	6·60	30,560	6·01	....
3	7·29	40,634	9·10	67,060	9·99	80,054	8·89	63,994	6·47	28,740	6·38	....
4	7·31	40,926	9·05	66,330	10·00	80,200	8·80	62,680	6·39	27,780	6·41	....
5	7·36	41,656	9·21	68,666	10·04	80,784	8·77	62,242	6·35	27,300	6·43	....
6	7·42	42,532	9·27	69,542	9·98	79,908	8·51	58,446	6·36	27,420	5·79	....
7	7·49	43,554	9·30	69,980	10·02	80,492	9·46	57,722	6·33	27,060	5·63	....
8	7·53	44,038	9·33	70,418	10·09	81,514	9·40	56,840	6·26	26,220	4·97	....
9	7·61	45,306	9·38	71,148	10·13	82,098	9·28	55,088	6·08	24,060	5·90	....
10	7·65	45,890	9·42	71,732	10·15	82,390	9·23	54,358	5·95	22,610	5·63	....
11	7·80	48,080	9·47	72,462	10·19	82,974	8·20	53,920	5·99	21,434	5·71	....
12	7·91	49,686	9·53	73,338	10·21	83,266	8·09	52,314	6·10	20,258	5·32	....
13	8·03	51,438	9·58	74,068	9·87	78,302	7·99	50,854	5·59	19,090	5·25	....
14	7·99	50,854	9·61	74,506	9·75	76,550	7·82	48,372	5·72	18,690	5·22	....
15	8·02	51,292	9·52	73,192	9·74	76,404	7·77	47,642	5·95	18,298	6·05	....
16	8·11	52,606	9·50	72,900	9·70	75,820	7·72	46,912	6·30	17,534	5·70	....
17	8·19	53,774	9·55	73,630	9·65	75,090	7·64	45,744	6·30	17,608	5·77	....
18	8·32	55,672	9·63	74,798	9·69	75,674	7·58	44,768	6·61	17,312	5·83	....
19	8·40	56,840	9·76	76,696	9·63	74,798	7·60	45,160	5·92	17,016	5·90	....
20	8·61	59,906	9·79	77,134	9·58	74,068	7·71	46,766	5·30	16,720	6·10	....
21	8·67	60,782	9·84	77,864	9·55	73,630	7·45	42,970	5·57	16,646	5·85	....
22	8·72	61,512	9·89	78,954	9·47	72,462	7·17	38,882	6·05	16,498	6·03	....
23	8·68	60,928	9·95	79,470	9·42	71,732	6·96	35,816	6·34	16,424	6·15	....
24	8·70	61,220	10·00	80,200	9·25	69,250	6·99	36,254	6·49	16,286	6·13	....
25	8·79	62,534	9·93	79,178	9·19	68,374	6·93	35,378	6·81	16,202	6·23	....
26	8·91	64,286	9·80	77,280	9·15	67,790	6·97	35,962	6·88	16,054	6·15	....
27	8·95	64,870	9·95	79,470	9·10	67,060	6·84	34,064	5·55	15,908	6·29	....
28	8·99	65,454	10·03	80,638	9·14	67,644	6·88	34,648	5·63	15,832	6·25	....
29	9·01	65,746	9·98	79,908	9·09	66,914	6·79	33,344	5·80	15,758	6·27	....
30	9·10	67,060	9·89	78,594	9·07	66,622	6·71	32,166	6·05	15,610	6·55	....
31	9·05	66,330	9·76	76,696	....	....	6·63	30,998			6·53	....

Ice conditions from January 1 to April 29 and November 10 to December 31.

MONTHLY DISCHARGE OF SASKATCHEWAN RIVER AT GRAND RAPIDS FOR 1915.

[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.
January...............	....	....	¹4,500	0·029	0·033	276,700
February..............	....	....	¹5,000	0·032	0·033	277,700
March................	....	5,080	5,850	0·038	0·044	359,700
April................	20,454	5,660	10,041	0·065	0·073	597,500
May.................	22,414	16,572	18,913	0·122	0·141	1,162,900
June.................	38,298	17,682	25,621	0·165	0·184	1,524,600
July.................	67,060	39,320	53,380	0·344	0·397	3,282,200
August...............	80,638	66,330	74,162	0·478	0·551	4,560,000
September............	83,266	66,622	75,601	0·487	0·543	4,499,100
October..............	65,308	30,998	47,563	0·307	0·354	2,924,600
November.............	30,706	15,610	20,590	0·133	0·148	1,225,200
December.............	....	....	¹8,000	0·052	0·060	491,900
The Year......	83,266	....	29,102	0·188	2·561	21,182,100

NOTE.—Marked thus(¹) estimated.

FAIRFORD RIVER.

The Fairford river forms the outlet of lake Manitoba. It empties into lake St. Martin, which in turn is drained by the Dauphin river. The Fairford river is quite short, a lake-like expanse known as lake Pinemuta occurring between lake Manitoba and lake St. Martin.

Lake Manitoba, which has an area of 1,711 square miles, forms the basin into which practically all the territory, lying between the Assiniboine and the Saskatchewan rivers and to the east of the Riding, Duck and Porcupine mountains, drains. The soil is generally clay and suitable to agriculture. A considerable proportion of the area is timbered and in certain sections rock outcrops occur. Numerous lakes are also to be found; among these are lake Winnipegosis, lake Dauphin, Red Deer lake, Swan lake and many others varying in size from mere ponds to lakes of the size mentioned.

The banks of the Fairford river vary from three to ten feet in height. At the upper or lake Manitoba end they are well defined, gradually flattening out below Fairford until they open out into wide, low lying marshy ground in the vincinity of lake Pinemuta. Below this lake they are somewhat higher but again change until they merge with the low swampy shores of lake St. Martin.

The Fairford river varies in width from 500 to 900 feet and at two points, one about one half mile below the outlet of lake Manitoba, flows over a low limestone ridge or bar.

Some surveys of the river have been made by the Department of Public Works, with a view to improving it for navigation purposes. In addition to this a water power reconnaissance survey was made in 1913 by the Manitoba Hydrometric Survey.

FAIRFORD RIVER AT FAIRFORD.

HISTORY.

This 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 downstream side of the C.N.R. bridge, which crosses the Fairford river at Fairford and is 2½ miles below lake Manitoba. The I.P. is located on the north abutment of the bridge on the downstream side.

RECORDS AVAILABLE.

Records of daily gauge height have been obtained from June 27, 1912, till the end of December, 1915. A number of meterings have been taken during the same period. Owing to the change in slope due to rising and falling of lake Manitoba caused by the wind, it has not been possible to define a discharge curve for the station.

DRAINAGE AREA.

The area tributary to the Fairford river above this station includes the total drainage area of lake Manitoba and lake Winnipegosis, and is 31,900 square miles.

GAUGE.

A six-foot vertical staff enamelled gauge is fastened to the first bridge pier from the left bank and is referred to C.N.R. datum.

CHANNEL.

The channel is straight for 400 feet above and 500 feet below the section. It was originally divided by the fifteen bridge piers into sixteen sections at all stages. In 1914 the bridge was replaced by a steel structure resting upon piers which divided the channel into four sections, the old pile bents being removed. The bed of the stream is gravel and not subject to shifting. The banks are high though subject to overflow at high stages.

DISCHARGE MEASUREMENTS.

The meterings are made from the downstream side of the C.N.R. bridge, the station being an open water station the year around.

ACCURACY.

Owing to the wind effect on lake Manitoba and the consequent range in stage and its effect upon the slope of the river, it has not been possible to define a discharge curve for this section.

DISCHARGE MEASUREMENTS OF FAIRFORD RIVER AT FAIRFORD, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 12...	C. O. Allen........	1,912	243	1,739	2·19	802·44	3,824
7...	"	1,912	221	1,503	1·95	801·76	2,925
8...	"	1,912	221	1,501	2·03	801·78	3,041
9...	"	1,912	221	1,501	1·95	801·79	2,919
May 10 ...	T. J. Moore........	1,197	223	1,434	1·90	801·51	2,726

TRIBUTARIES OF LAKE WINNIPEG FROM THE EAST.

GENERAL.

The rivers of importance entering lake Winnipeg from the east are:—
Brokenhead,
Winnipeg,
Manigotagan,
Bloodvein,
Pigeon,
Berens.

These tributaries drain the territory to the west of the watershed of the Great Lakes and Hudson's Bay. Practically all of this country is unsurveyed, so that it is not possible to delimit accurately their actual drainage basins. Practically all the drainage area lies in the Laurentian formation, small lakes and ponds abound and a considerable portion of the surface is covered by muskeg. The rivers are generally in the nature of a series of pools or small lake-like expanses, connected by short narrow channels which are interrupted by falls and rapids. Small stands of merchantable timber are to be found throughout the district, being composed of spruce, jack pine, poplar and birch.

Of the above rivers the Winnipeg is dealt with separately, and of the remainder, continuous records of discharge are available for the Brokenhead and Manigotagan; for the Berens and Pigeon rivers, individual meterings have been obtained.

BROKENHEAD RIVER.

The drainage basin of the Brokenhead river lies in the narrow strip of country between the basin of the Winnipeg and Whitemouth rivers on the east and of the Red river on the west. The river flows northwesterly and empties into lake Winnipeg.

The drainage area is 910 square miles, the basin being 22 miles in width at the widest point and apprxoimately 75 miles long. The greater portion is low lying and empty, though at the lower end part has been placed under cultivation by the aid of drainage work. The whole area can be reclaimed.

The banks are low and the stream bed is of clay, with boulders occurring in some sections

BROKENHEAD RIVER AT SINNOT.

HISTORY.

The station on the Brokenhead at Sinnot was established by G. H. Burnham on May 30, 1912.

LOCATION OF SECTION.

The section is located on the downstream side of the traffic bridge and is nine hundred feet northeast of the C.P.R. station at Sinnot. The I.P. is marked by a group of nails driven into the floor of the bridge on the downstream side and vertically above the face of the south abutment.

RECORDS AVAILABLE.

Records of daily gauge height have been secured for the periods June 8 to November 30, 1912, April 29 to November 30, 1913, and April 13 to December 31, 1914, and from January 1 to December 31, 1915. A number of meterings have also been secured and estimates of daily discharge have been prepared for the above periods, with the exception of the winter periods of 1915, when sufficient information is not available to allow the estimating of daily discharges.

DRAINAGE AREA.

The drainage area tributary to the Brokenhead above Sinnot is 530 square miles.

BROKENHEAD RIVER—SINNOT—STATION AND I.P. FROM BELOW, RIGHT BANK.

GAUGE.

A vertical staff gauge is secured to a pile of the bridge opposite station 12.5 on the meter section. This gauge is referred to a permanent M.H.S. B.M. located twenty-three feet southwest of I.P. on the section. This B.M. is set to an arbitrary datum.

CHANNEL.

For three hundred feet above and three hundred feet below the meter section the channel is straight. The river is confined to the channel at all stages but is divided into four sections by the three pile bents supporting the bridge. The bed of the stream is of gravel and boulders, and permanent. The banks are fairly high and comparatively free from overflow.

DISCHARGE MEASUREMENTS.

The discharge measurements are made from the downstream side of the traffic bridge.

ACCURACY.

For the open water season the discharge curve is well defined between gauge heights 91·2 and 92·5, between gauge heights 92·5 and 94·2 the curve is fairly well defined. For winter conditions a fairly well defined curve has been obtained for the range in gauge height 89·8 to 91·0.

DEPARTMENT OF THE INTERIOR

DISCHARGE MEASUREMENTS OF BROKENHEAD RIVER AT SINNOT, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 19...	C. O. Allen........	1,912	65·0	29·8	0·26	90·86	7·8[1]
Mar. 18...	"	1,912	25·0	7·5	0·32	91·19	2·4[1]
April 15...	M. S. Madden....	1,462	83·5	232·3	1·18	92·43	274·5
May 5...	C. O. Allen........	2,018	87·5	341·7	1·58	93·65	539·9
May 12...	M. S. Madden....	1,462	87·5	387·5	2·00	94·03	774·9
June 2...	"	1,462	78·0	178·4	0·84	91·96	151·2
June 22...	C. O. Allen........	2,018	82·8	221·2	1·04	92·53	230·0
July 14...	T. H. Boyd........	1,197	79·0	163·0	0·71	91·76	115·7
Aug. 5...	H. H. Pratt........	1,496	76·0	122·4	0·28	90·95	34·1
Aug. 11...	"	1,496	71·3	83·4	0·17	90·71	14·6
Aug. 17...	"	1,496	69·5	75·2	0·09	90·55	6·4
Aug. 17...	"	1,496	39·0	27·4	0·22	90·55	6·1[2]
Aug. 21...	"	1,496	33·7	24·9	0·13	90·41	3·3[2]
Aug. 21...	"	1,496	65·6	60·9	0·03	90·41	2·0[3]

[1] Ice measurement.
[2] Below regular section.
[3] Regular section.

DAILY GAUGE HEIGHT AND DISCHARGE OF BROKENHEAD RIVER AT SINNOT FOR 1915.
[Drainage area 530 square miles.]

Day.	January. Gauge Height.	Dis-charge.	February. Gauge Height.	Dis-charge.	March. Gauge Height.	Dis-charge.	April. Gauge Height.	Dis-charge.	May. Gauge Height.	Dis-charge.	June. Gauge Height.	Dis-charge.
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	90·93	......	91·41	......	90·92	......	91·55	......	93·95	735	92·08	169
2	90·90	......	91·43	......	90·90	......	91·65	......	93·85	690	91·97	151
3	90·90	......	91·43	......	90·88	......	91·82	......	93·83	681	91·91	142
4	90·89	......	91·48	......	90·87	......	92·50	......	93·76	651	91·82	129
5	90·89	......	91·48	......	90·87	......	92·94	......	93·66	610	91·80	126
6	90·89	......	91·28	......	90·86	......	93·36	......	93·60	586	91·83	130
7	90·88	......	91·28	......	90·86	......	93·47	......	93·74	643	91·77	122
8	90·88	......	91·23	......	90·88	......	94·24	......	93·90	712	91·84	132
9	90·88	......	91·23	......	90·90	......	94·32	......	94·09	801	92·02	159
10	90·88	......	91·18	......	90·92	......	93·86	......	94·13	821	92·23	194
11	90·88	......	91·16	......	90·95	......	92·96	365	94·17	841	92·50	247
12	90·87	......	91·16	......	90·98	......	92·75	308	94·05	782	92·56	261
13	90·87	......	91·17	......	91·08	......	92·73	303	93·96	740	92·60	270
14	90·87	......	91·15	......	91·08	......	92·58	265	93·85	690	92·67	288
15	90·86	......	91·08	......	91·08	......	92·45	237	93·74	643	92·70	295
16	90·86	......	91·03	......	91·12	......	92·36	218	93·62	594	92·67	288
17	90·86	......	90·98	......	91·17	......	92·30	207	93·64	602	92·64	280
18	90·80	......	91·06	......	91·17	2	92·26	200	93·35	493	92·62	275
19	90·75	8	91·07	......	91·13	......	92·24	196	93·18	434	92·61	273
20	90·73	......	91·03	......	91·09	......	92·23	194	93·10	408	92·60	270
21	90·73	......	91·03	......	91·05	......	92·22	193	93·03	386	92·57	263
22	90·73	......	90·98	......	91·04	......	92·22	193	92·93	357	92·52	252
23	90·73	......	90·96	......	91·23	......	92·35	217	92·86	337	92·51	249
24	90·72	......	90·95	......	91·46	......	92·70	295	92·75	308	92·32	211
25	90·72	......	90·98	......	91·76	......	93·46	532	92·67	288	92·55	259
26	90·76	......	90·96	......	91·77	......	93·77	655	92·56	261	92·62	275
27	90·88	......	90·93	......	91·65	......	93·95	735	92·48	243	92·70	295
28	91·03	......	90·92	......	91·61	......	94·09	801	92·40	226	92·69	293
29	91·17	......			91·47	......	94·04	777	92·34	215	92·62	275
30	91·27	......			91·43	......	94·00	758	92·24	196	92·52	252
31	91·40	......			91·47	......			92·15	181		......

Day	July.		August.		September		October.		November.		December.	
1	92·44	234	91·16	51	90·34	2	90·95	32	91·21	56	91·09	......
2	92·32	211	91·10	45	90·34	2	90·97	33	91·16	51	91·05	......
3	92·22	193	91·04	40	90·33	2	91·21	51	91·11	46	91·05	......
4	92·16	182	90·97	33	90·33	2	91·21	56	91·08	43	91·01	......
5	92·00	156	90·95	32	90·33	2	91·25	60	91·07	42	90·98	......
6	91·92	143	90·90	27	90·33	2	91·30	65	91·06	41	90·95	......
7	91·86	134	90·86	24	90·32	2	91·43	60	91·11	46	90·95	......
8	91·82	129	90·81	21	90·40	3	91·46	83	91·15	50	90·94	......
9	91·81	127	90·77	18	90·37	3	91·51	89	91·19	54	90·91	......
10	91·81	127	90·75	17	90·37	3	91·56	95	91·41	......	90·89	......
11	91·77	122	90·71	15	90·36	3	91·55	94	91·58	......	90·89	......
12	91·72	116	90·66	12	90·36	3	91·53	92	91·58	......	90·89	......
13	91·72	116	90·64	11	90·37	3	91·52	90	91·60	......	90·88	......
14	91·77	122	90·60	9	90·38	3	91·43	80	91·63	......	90·86	......
15	91·68	110	90·57	8	90·41	3	91·37	73	91·58	......	90·86	......
16	91·76	121	90·56	8	90·39	3	91·35	71	91·55	......	90·85	......
17	91·94	146	90·55	8	90·38	3	91·30	65	91·52	......	90·84	......
18	91·86	134	90·54	7	90·37	3	91·27	62	91·48	......	90·83	......
19	91·85	133	90·53	7	90·37	3	91·26	61	91·38	......	90·76	......
20	91·78	123	90·51	6	90·38	3	91·25	60	91·35	......	90·75	......
21	91·74	118	90·47	5	90·41	3	91·23	58	91·31	......	90·72	......
22	91·74	118	90·46	5	90·39	3	91·20	55	91·29	......	90·72	......
23	91·75	120	90·46	5	90·38	3	91·18	53	91·25	......	90·73	......
24	91·69	112	90·45	5	90·38	3	91·15	50	91·21	......	90·73	......
25	91·66	108	90·44	4	90·53	7	91·16	51	91·18	......	90·73	......
26	91·62	103	90·43	4	90·58	8	91·19	54	91·17	......	90·73	......
27	91·56	95	90·42	4	90·58	8	91·24	59	91·17	......	90·73	......
28	91·47	84	90·39	3	90·57	8	91·26	61	91·16	......	90·72	......
29	91·46	83	90·36	3	90·64	11	91·16	61	91·16	......	90·72	......
30	91·27	62	90·35	3	90·89	26	91·27	62	91·11	......	90·72	......
31	91·20	55	90·34	2			91·25	60			90·72	......

NOTE.—Ice conditions from January 1 to April 10 and November 10 to December 31.
Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF BROKENHEAD RIVER AT SINNOT FOR THE YEAR 1915.

[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.
January	....	....	¹6	0·011	0·013	369
February	....	....	¹4	0·008	0·008	222
March	....	....	¹3	0·006	0·007	184
April	....	....	¹285	0·538	0·600	17,000
May	841	181	521	0·983	1·133	32,000
June	295	122	227	0·428	0·477	13,500
July	234	55	127	0·240	0·277	7,800
August	51	2	14	0·026	0·030	860
September	26	2	4	0·008	0·009	238
October	95	32	65	0·123	0·142	4,000
November	....	....	¹40	0·076	0·085	2,380
December	....	....	¹15	0·028	0·032	922
The Year	841	¹0	109	0·206	2·813	79,475

NOTE.—Marked thus (¹) estimated.

MANIGOTAGAN RIVER.

The Manigotagan river, also known as the Bad Throat river, empties into lake Winnipeg from the east about fifty miles north of Fort Alexander. The drainage area is approximately three hundred square miles, though it cannot be definitely determined, as the river lies almost entirely in unsurveyed territory. The general course of the river from source to mouth is northwest. There are a number of lake-like expanses in the river between Long lake and Turtle lake, these are known as Caribou, Musk Rat, Moose and Bull Frog lakes.

At the mouth of the river the land is adapted to agriculture, being good clay land. Above Wood falls the country changes and rock outcrops occur; these form barriers across the river, causing falls or rapids; between these the banks are high and rocky, or low, with valleys leading back into muskegs.

The river above Wood falls, for a distance of twenty-five miles has an average width of 175 feet. Above this point it is a series of small lake-like expanses or pools of several hundred feet in width joined by narrow stretches, which in the majority of cases are broken by falls or rapids.

The entire drainage area is more or less covered with timber growth; this is not of merchantable size and is of inferior quality, consisting of spruce, scrub oak, birch and poplar. In the upper part a fringe of good spruce timber is to be found bordering the lakes.

In 1913 a reconnaissance survey of the power possibilities of the river was made by a party sent out by the Manitoba Hydrometric Survey.

MANIGOTAGAN RIVER AT WOOD FALLS.

HISTORY.

The station on the Manigotagan was established on December 21, 1912, by G. J. Lamb, and has been operated since that date.

LOCATION OF SECTION.

The meter section is located two hundred feet above the first falls, known as Wood falls. It is about one mile northeast of the **Manigotagan** post office and three miles from the large island at the mouth of the river. The I.P. is marked by a spike driven into a 12-inch tree which is blazed and stands near the water's edge on the left bank.

RECORDS AVAILABLE.

A record of daily gauge height has been secured for the periods April 19 to October 31, 1913, April 18 to November 15, 1914, and from December 12, 1914, to December 31, 1915. Estimates of daily discharge have been computed for the same period, with the exception of periods of ice cover conditions, during which periods the information at hand is not sufficient to allow the computation of daily discharges.

DRAINAGE AREA.

The drainage area tributary to the Manigotagan above the section is 375 square miles.

GAUGE.

Two gauges are in operation at this point. The first is a three-foot vertical staff enamelled gauge fastened to a two by four inch scantling which is driven into the river bed 135 feet below the meter section and in a small bay near the right bank above the falls. The second is a three foot vertical staff enamelled gauge fastened to a two by four inch scantling which is secured to the perpendicular rock face on the right shore one hundred feet below and facing Wood falls. Both gauges are referred to a B.M. which is located on a horizontal ledge of rock ten feet from the gauge below the falls, and is marked by means of paint on the rock face, " W.P.S. B.M."

CHANNEL.

The river occupies one channel at all stages, it is straight for three hundred feet above and one hundred feet below the section. The banks are high and wooded and not liable to overflow.

DISCHARGE MEASUREMENTS.

Discharge measurements have been taken at this point by means of a canoe kept on the section line with the aid of a tagged line stretched across the river.

ACCURACY.

On account of the small number of discharge measurements taken at this point the discharge curve is not well defined.

DISCHARGE MEASUREMENTS OF MANIGOTAGAN RIVER ABOVE WOOD FALLS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 10	C. O. Allen	1,912	42	59·1	0·86	729·73	50·8[1]

[1] Ice measurement.

DAILY GAUGE HEIGHT AND DISCHARGE OF MANIGOTAGAN RIVER ABOVE WOOD FALLS, FOR 1915.

[Drainage area 375 square miles.]

Day	January Gauge Height	January Discharge	February Gauge Height	February Discharge	March Gauge Height	March Discharge	April Gauge Height	April Discharge	May Gauge Height	May Discharge	June Gauge Height	June Discharge
	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.	Feet.	Sec. ft.
1	730·05		729·75		729·75		729·65		732·15	1,066	731·15	626
2	730·05		729·75		729·75		729·65		732·10	1,044	731·15	626
3	730·05		729·75		729·75		729·70		732·05	1,022	731·15	626
4	730·00		729·75		729·75		729·75		732·05	1,022	731·15	626
5	730·00		729·75		729·75		729·80		732·00	1,000	731·15	626
6	730·00		729·75		729·75		729·85		731·95	978	731·15	626
7	730·00		729·75		729·75		729·90		731·90	956	731·10	604
8	730·00		729·75		729·75		729·95		731·75	890	731·10	604
9	729·95		729·75		729·75		730·00		731·70	868	731·10	604
10	729·95		729·75		729·75		730·05		731·65	846	731·10	604
11	729·95		729·75		729·75		730·10		731·60	824	730·95	538
12	729·95		729·75		729·75		730·25		731·55	802	730·95	538
13	729·95		729·75		729·75		730·35		731·55	802	730·95	538
14	729·95		729·75		729·75		730·45		731·45	758	730·95	538
15	729·95		729·75		729·75		730·55	362	731·45	758	731·90	516
16	729·95		729·75		729·75		730·65	406	731·45	758	731·90	516
17	729·95		729·75		729·75		730·75	450	731·45	758	731·90	516
18	729·95		729·75		729·75		730·85	494	731·45	758	731·90	516
19	729·90		729·75		729·75		730·95	538	731·40	736	731·90	516
20	729·90		729·75		729·75		731·25	670	731·40	736	731·75	450
21	729·85		729·75		729·75		731·25	670	731·40	736	731·75	450
22	729·85		729·70		729·70		731·25	670	731·35	714	731·75	450
23	729·85		729·70		729·70		731·25	670	731·35	714	731·70	428
24	729·85		729·75		729·70		731·55	802	731·35	714	731·70	428
25	729·85		729·75		729·70		731·65	846	731·35	714	731·70	428
26	729·85		729·75		729·70		731·80	912	731·35	714	731·55	362
27	729·85		729·70		729·70		732·05	1,032	731·30	692	731·55	362
28	729·80		729·75		729·65		732·25	1,110	731·30	692	731·55	362
29	729·80				729·65		732·25	1,110	731·30	692	731·50	340
30	729·80				729·65		732·20	1,088	731·30	692	731·50	340
31	729·80				729·65				731·30	692		

Day	July Gauge Height	July Discharge	August Gauge Height	August Discharge	September Gauge Height	September Discharge	October Gauge Height	October Discharge	November Gauge Height	November Discharge	December Gauge Height	December Discharge
1	730·50	340	729·90	153	729·75	130	729·90	153	730·40	296	731·05	350
2	730·50	340	729·90	153	729·70	123	729·90	153	730·45	318	731·05	
3	730·50	340	729·85	145	729·70	123	729·95	162	730·50	340	731·05	
4	730·45	318	729·85	145	729·70	123	729·95	162	730·50	340	731·05	
5	730·45	318	729·85	145	729·70	123	730·00	171	730·50	340	731·05	
6	730·45	318	729·85	145	729·65	117	730·00	171	730·50	340	731·05	
7	730·45	318	729·85	145	729·65	117	730·05	182	730·55	362	731·05	
8	730·40	296	729·80	137	729·65	117	730·05	182	730·55	362	731·05	
9	730·40	296	729·80	137	729·65	117	730·05	182	730·75	450	731·05	
10	730·40	296	729·80	137	729·60	111	730·10	193	730·80	472	731·00	
11	730·40	296	729·80	137	729·60	111	730·10	193	730·80	472	731·00	
12	730·35	274	729·80	137	729·60	111	730·10	193	730·85	494	731·00	
13	730·35	274	729·75	130	729·60	111	730·15	206	730·85	494	731·00	
14	730·35	274	729·75	130	729·65	117	730·15	206	730·85	494	731·00	
15	730·35	274	729·75	130	729·65	117	730·15	206	730·85	494	731·00	270
16	730·35	274	729·75	130	729·65	117	730·20	220	730·90		731·00	
17	730·35	274	729·75	130	729·65	117	730·20	220	730·90		730·95	
18	730·35	274	729·70	123	729·70	123	730·20	220	730·90		730·95	
19	730·30	252	729·70	123	729·70	123	730·20	220	730·95		730·95	
20	730·30	252	729·70	123	729·70	123	730·25	236	730·95		730·95	
21	730·20	220	729·70	123	729·70	123	730·25	236	730·95		730·95	
22	730·20	220	729·70	123	729·75	130	730·25	236	730·95		730·95	
23	730·15	206	729·80	137	729·75	130	730·30	252	731·00		730·95	
24	730·15	206	729·80	137	729·75	130	730·30	252	731·00		730·95	
25	730·15	206	729·80	137	729·80	137	730·30	252	731·00		730·95	
26	730·10	193	729·85	145	729·80	137	730·30	252	731·05		730·95	
27	730·10	193	729·85	145	729·80	137	730·35	274	731·05		730·95	
28	729·95	162	729·70	123	729·80	137	730·35	274	731·05		730·95	
29	729·95	162	729·80	137	729·85	145	730·35	274	731·05		730·95	
30	729·95	162	729·80	137	729·85	145	730·40	296	731·05		730·95	
31	729·90	153	729·80	137			730·40	296			730·95	130

NOTE.—Ice conditions from January 1 to April 14 and November 16 to December 31. Information insufficient to compute daily discharges.

MONTHLY DISCHARGE OF MANIGOTAGAN RIVER ABOVE WOOD FALLS, FOR THE YEAR 1915.

[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.
January			¹50	0·133	0·153	3,000
February			¹50	0·133	0·139	2,800
March		51	¹50	0·133	0·153	3,000
April	1,110		¹470	1·253	1·398	28,000
May	1,066	692	811	2·163	2·494	49,900
June	626	340	510	1·360	1·517	30,300
July	340	153	257	0·685	0·790	15,800
August	153	123	136	0·363	0·419	8,400
September	145	111	124	0·331	0·369	7,400
October	296	153	217	0·579	0·668	13,300
November			¹360	0·960	1·071	21,400
December			¹180	0·480	0·553	11,100
The Year	1,110	50	268	0·714	9·724	194,400

NOTE.—Marked thus (¹) estimated.

BERENS RIVER.

The Berens river enters lake Winnipeg from the east, about one hundred and forty miles north of Fort Alexander. It is the most important tributary of the lake entering from the east, with the exception of the Winnipeg river. It has a drainage area estimated to be 7,800 square miles and a length of approximately 300 miles. The headwaters lie near the height of land which forms the south and west limits of the Severn and Albany drainage basins. Many lakes are to be found in the district, though their areas are not well defined, as they are in unsurveyed territory.

The country drained is typical of the Laurentian formation, abounding in muskegs and swamps with frequent rock outcrops. These rock outcrops form barriers across the river, and are the reason for the numerous falls and rapids. Some fifty-two falls and rapids occur between the first fall which is five miles from the mouth, and Family lake, and these vary in height between three and forty feet.

Family Lake also forms the source of the Pigeon river, which parallels the course of the Berens and empties into lake Winnipeg a few miles south of the mouth of the former river.

The Berens river was examined by a party sent out by the Manitoba Hydrometric Survey to determine its power possibilities. This survey revealed the fact that there are a number of feasible sites on the river.

The country is not heavily timbered but is covered with a growth of small spruce, poplar, birch and scrub oak. There is little merchantable timber to be found along the river.

BERENS RIVER—PARTY METERING BERENS RIVER.

DISCHARGE MEASUREMENTS OF BERENS RIVER AT LITTLE GRAND RAPIDS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Feb. 27 ...	C. O. Allen.......	1,912	194	3,285	0·48	93·50	1,570

[1] Ice cover.

DISCHARGE MEASUREMENTS OF BERENS RIVER 8½ MILES FROM MOUTH, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 2 ...	C. O. Allen.......	1,912	94	926	0·68	716·72	627·0

[1] Ice cover.

NELSON RIVER.

GENERAL.

The Nelson river forms the outlet of lake Winnipeg, flowing through the central portion of northern Manitoba and emptying into Hudson's Bay at Port Nelson. The Nelson river discharges all the water collected by lake Winnipeg from an immense drainage area, and it forms one of the principal systems of the North American Continent, the basin comprising an area of 450,000 square miles.

The territory drained varies from the open prairie forming the great central plain to the rugged and magnificent country found in the Rockies, between these extremes of physical characteristics all gradations may be found in the basin. The vegetation to be found covers as wide a range.

The western part of the drainage area is practically devoid of lakes, but in the south and eastern portions are to be found some of the largest fresh water bodies on the continent. These lakes are so situated in relation to the Nelson river that the maximum natural storage effect is exerted upon the flow of that river; in consequence the maximum discharge may be expected to approximate closely to the mean discharge.

The river has a length of 430 miles, and in this distance the drop aggregates 712 feet. The potential power possibilities of the river are therefore apparent. In the upper reaches the river has the appearance of a chain of lakes connected by short stretches of river which are interrupted by falls and rapids. These characteristics which hold for the upper 250 miles of river gradually change as the mouth is approached, the drop in the river not being as distinct but more in the nature of swifts and flat rapids, though the banks become high as the Bay is approached.

The first expanse below the lake Winnipeg outlet is known as Playgreen lake, below which there are two channels known as East and West rivers. Sea falls is to be found on East river and the latter then expands into Pipestone lake. The junction of these two branches occurs in Cross lake. Below that point are Sepewesk, Split lake and Gull lake. The rapids and falls in order are Ebb and Flow rapids, Whitemud falls, Bladder rapids, Over the Hill, Red Rock and Chain of Rocks rapids; Manitou or Devil's rapids, Grand Rapids, Chain of Islands rapids, all being above Split lake. Below Split lake are Gull, Kettle, Long Spruce and Limestone rapids.

The country adjacent to the Nelson river is practically unsettled, though on account of the building of the Hudson's Bay railway there has been considerable activity along the river. The timber growth is scattered, including spruce, birch and poplar, and the clay soil to be found is very fertile.

A reconnaissance survey of the river was made by the late William Ogilvie in 1910 for the Dominion Water Power Branch, also discharge measurements were obtained. After gathering miscellaneous records in 1912-13, a metering station was established in 1914 by the Manitoba Hydrometric Survey above Manitou Rapids, and this has been operated since that date.

NELSON RIVER AT WARREN'S LANDING.

HISTORY.

A gauge was set at this point on September 28, 1913, by A. Pirie, and since that time records have been obtained at this station.

LOCATION OF GAUGE.

Warren's Landing is located at the head of the Nelson, where it flows from lake Winnipeg, and the gauge located here registers lake Winnipeg water level. The gauge is a six-foot vertical staff gauge and is secured to the side of dock of the Northern Fish Co.

RECORDS AVAILABLE.

Gauge records at this point are available from September 28 to December 31 of 1913; from January 1 to February 28, and from March 3 to December 31, of 1914, and from January 1 to October 13, 1915.

NELSON RIVER AT NORWAY HOUSE.

HISTORY.

A gauge was established on the Nelson river at Norway House on September 13, 1913, by A. Pirie, and gauge readings have been obtained at intervals since that time.

LOCATION OF GAUGE.

Norway House is located on the south channel of the Nelson river at the upper end of Little Playgreen lake and twenty miles below Warren's Landing. The gauge is a six-foot vertical staff gauge bolted to the rock in front of the Hudson's Bay Co. warehouse.

RECORDS AVAILABLE.

Since the installation of the gauge records have been obtained intermittently to the end of 1915.

NELSON RIVER ABOVE SHELL RAPIDS.

HISTORY.

This station was established by G. J. Lamb on July 18, 1914.

LOCATION OF SECTION.

The meter section is located at a point three and one-half miles upstream from Manitou landing and four miles above the Shell rapids. The I.P. is marked on a sloping face of rock northeast of the gauge and is a wooden plug driven in a $1\frac{1}{2}$-inch hole drilled in the rock.

RECORDS AVAILABLE.

Records of daily gauge height were secured from July 2 to October 14, 1914, and from February 7 to April 10 and June 27 to October 9, 1915. A number of discharge measurements were taken over the same period.

DRAINAGE AREA.

The drainage area tributary to the Nelson river is 450,000 square miles, of which 24,000 square miles lies below Shell rapids. The river drains lake Winnipeg into Hudson's Bay. Practically all Canadian territory lying south of latitude 53 and between the summit of the Rockies and lake Superior is tributary to this river.

GAUGE.

The gauge is a vertical staff enamelled gauge fastened to a six-inch spruce post driven in the bed of the river and braced; it is further strengthened by being weighted with large boulders. The gauge is referred to a B.M. which is marked by a triangle painted in red on the face of the rock near the I.P. and marked "M.H.S. B.M." The datum of the B.M. is an assumed elevation.

Taken by G. J. Lamb.

NELSON RIVER—METER SECTION FOUR MILES ABOVE SHELL RAPIDS.

CHANNEL.

For fifteen hundred feet above the section and eight thousand feet below, the channel is straight. The river is confined to the channel at all stages, and has a depth on the section varying between twenty and sixty-nine feet. The bed of the stream is of gravel and boulders and not liable to shift. The current is swift and the banks are high and wooded and not liable to overflow.

DISCHARGE MEASUREMENTS.

The meterings are made from a canoe held on the section by means of a stay line stretched across the river and supported on floats.

ACCURACY.

No daily discharge estimates have been arrived at from the gauge heights and discharge measurements, as it has been found impossible to define a regular rating curve on account of the varying slope in the river due to the prevalence of high winds.

DISCHARGE MEASUREMENTS OF NELSON RIVER AT 4 MILES ABOVE SHELL RAPIDS, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Feb. 11	A. Pirie	1,939	894	30,246	1·64	90·69	49,777
13	"	1,939	894	30,159	1·64	90·60	49,422
16	"	1,939	894	30,159	1·63	90·57	49,047
22	"	1,939	894	30,159	1·62	90·55	48,955
Mar. 3	"	1,939	894	29,840	1·49	90·31	44,418
6	"	1,939	890	29,743	1·52	90·13	45,322
8	"	1,939	890	29,570	1·59	89·99	46,977
9	"	1,939	890	29,395	1·53	89·77	45,017
12	"	1,939	890	29,132	1·60	89·50	46,600
15	"	1,939	890	28,957	1·62	89·30	47,014
16	"	1,939	890	28,870	1·63	89·22	47,187
22	"	1,939	890	28,432	1·64	88·65	46,546
26	"	1,939	890	27,923	1·61	88·35	44,888
29	"	1,939	890	27,923	1·60	88·31	44,566
30	"	1,939	890	27,835	1·62	88·21	45,245
31	"	1,939	890	27,835	1·52	88·14	42,284
April 7	"	1,939	890	27,111	1·66	87·36	45,064
July 14	M. S. Madden	1,469	899	31,917	2·13	89·88	68,084
15	"	1,469	899	32,005	2·16	90·00	69,485
16	"	1,469	899	31,917	2·16	89·86	69,034
19	"	1,469	899	32,181	2·17	90·13	69,977
20	"	1,469	899	32,193	2·08	90·14	67,428
23	"	1,469	899	32,193	2·19	90·15	70,469
26	"	1,469	899	32,093	2·26	90·04	72,501
27	"	1,469	899	32,181	2·20	90·11	70,773
28	"	1,469	899	32,181	2·22	90·09	71,752
29	"	1,469	899	32,092	2·21	90·08	70,954
30	"	1,469	899	32,092	2·24	90·07	71,879
Aug. 2	"	1,469	899	32,181	2·24	90·15	72,303
3	"	1,469	899	32,181	2·20	90·16	70,923
5	"	1,469	899	32,181	2·28	90·13	73,329
6	"	1,469	899	32,181	2·26	90·09	72,690
9	"	1,469	899	32,269	2·26	90·27	72,850
10	"	1,469	899	32,269	2·21	90·23	71,417
11	"	1,469	899	32,269	2·26	90·28	72,814
12	"	1,469	899	32,269	2·30	90·26	74,027
13	"	1,469	899	32,367	2·28	90·33	73,819
16	"	1,469	899	32,269	2·29	90·29	73,930
17	"	1,469	899	32,447	2·28	90·45	73,946
18	"	1,469	899	32,447	2·34	90·47	75,976
19	"	1,469	900	32,438	2·28	90·48	73,819
25	"	1,469	900	32,447	2·30	90·48	74,647
30	"	1,469	900	32,535	2·30	90·53	74,463
31	"	1,469	900	32,447	2·29	90·46	74,294
Sept. 2	"	1,469	900	32,535	2·36	90·48	76,823
3	"	1,469	900	32,535	2·27	90·52	73,850
6	"	1,469	900	32,447	2·29	90·45	74,247
7	"	1,469	900	32,447	2·31	90·44	75,019
13	"	1,469	900	32,447	2·33	90·38	75,720
14	"	1,469	900	32,369	2·33	90·36	75,499
16	"	1,469	900	32,369	2·31	90·38	74,820
17	"	1,469	900	32,369	2·31	90·34	74,700
20	"	1,469	900	32,369	2·26	90·38	73,206
24	"	1,469	900	32,369	2·32	90·39	75,047
27	"	1,469	900	32,535	2·32	90·50	75,427
30	"	1,469	900	32,535	2·29	90·50	74,432

Note:—Ice cover conditions.

MISCELLANEOUS RECORDS.

In a number of cases where stations have been established after one or several meterings have been taken, it has been found that the location was not a desirable one, either on account of the difficulty in 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 is 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 headings, "Miscellaneous Records."

DISCHARGE MEASUREMENTS OF CYPRESS RIVER AT CYPRESS RIVER, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 19...	M. S. Madden.....	1,462	2·8	0·6	0·33	92·57	0·2

DISCHARGE MEASUREMENTS OF CLEAR CREEK AT OUTLET OF CLEAR LAKE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Jan. 28...	W. J. Ireland......	1,939	12·0	13·8	1·25	95·35	17·3

DISCHARGE MEASUREMENTS OF GRASS RIVER AT STANDING ROCK FALLS, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Aug. 5...	H. O. Leach.......	1,186	92	538	2·07	564·20	1,112
Sept. 15...	"	1,186	115	707	1·22	563·86	861

DISCHARGE MEASUREMENTS OF GRASS RIVER AT PAINT LAKE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
July 31...	D. B. Gow........	1,186	121	1,053	0·78	..·......	818
Sept. 13...	"	1,186	115	989	0·81	580·7	806

Taken by D. B. Gow.

GRASS RIVER—LYNX FALLS—FROM RIGHT BANK.

Taken by D. B. Gow.

GRASS RIVER—HEAD OF STANDING ROCK FALLS SHOWING STANDING ROCK.

DISCHARGE MEASUREMENTS OF GRASS RIVER, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per Sec.	Feet.	Sec. ft.	
June 23.	D. B. Gow.......	1,186	121	279	1·04	785·88	292	Above Sixth Rapids.
June 29.	H. O. Leach.....	1,186	43	74	2·05	857·76	151	Above Ninth Rapids.
July 1.	"	1,186	38	81	1·05	......	85	First Rapids above Reed Lake.
July 21.	D. B. Gow......	1,186	72	632	0·98	655·80	618	Below Lynk Falls.
July 24.	"	1,186	71	381	1·70	603·20	648	Above Second Rapids.

DISCHARGE MEASUREMENTS OF HERON CREEK AT JUNCTION WITH LITTLE SASKATCHEWAN RIVER, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
May 8.	E. B. Patterson..	1,920	15·0	6·3	0·63	......	3·9	At mouth.
May 17.	" ...	1,920	18·5	7·9	0·86	......	6·7	"
May 28.	" ...	1,920	17·0	5·7	0·63	......	3·6	"
June 3.	" ...	1,920	14·5	5·1	0·37	......	1·9	150 yards from mouth.
June 16.	" ...	1,920	10·8	5·2	0·99	......	5·1	" " "
July 24.	G. K. Gainsford..	1,435	23·0	31·3	0·04	......	0·9	400 yards from mouth.

DISCHARGE MEASUREMENTS OF LA SALLE RIVER AT SANFORD, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 3 ...	A. Pirie..........	1,939	16	8·2	0·33	89·21	2·7

DISCHARGE MEASUREMENTS OF MORRIS RIVER AT ROSENORT BRIDGE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
May 13...	A. Pirie..........	1,939	34	50·1	0·18	85·39	8·9
May 27...	T. J. Moore.......	1,196	29	37·8	0·03	84·85	1·2
June 30...	E. B. Patterson....	1,920	54	196·9	0.00	88·67	0.0

DISCHARGE MEASUREMENTS OF McDONALD CREEK AT JUNCTION WITH LITTLE SASKATCHEWAN, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 18...	E. B. Patterson....					96·87	0·33[1]
May 19...	"					96·87	0·33[1]
July 24...	G. K. Gainsford....					96·90	0·27[1]
Aug. 24...	H. H. Pratt........					96·91	0·29[1]
Sept. 25...	G. K. Gainsford....					96·91	0·29[1]

[1] Weir measurements.

DISCHARGE MEASUREMENTS OF MANAZO RIVER AT FIRST RAPIDS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Aug. 26...	H. O. Leach........	1,186	31	173·5	0·45	....	78·6

DISCHARGE MEASUREMENTS OF OAK CREEK AT TREESBANK, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
April 20...	M. S. Madden.....	1,462	4	1·2	0·36	[1]........	0·4

[1] No gauge.

DISCHARGE MEASUREMENTS OF OTTER CREEK NEAR SCANDINAVIA, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
May 22...	E. B. Patterson....	1,920	4	0·93	0·44	87·91	0·41
June 10...	"	1,920	16	18·40	0·36	88·85	6·6
21...	"	1,920	16	17·7	0·19	88·75	3·38
July 21...	G. K. Gainsford....	1,435	14	10·5	....	88·41	No flow.[1]
Aug. 20...	H. H. Pratt........					88·21	No flow.[1]

[1] Beaver dams blocking flow.

DISCHARGE MEASUREMENTS OF ODEI RIVER ABOVE FIRST FALLS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Aug. 21...	D. B. Gow.........	1,186	64	264	2·25	....	596

DISCHARGE MEASUREMENTS OF PEMBINA RIVER AT LA RIVIERE, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
April 28...	M. S. Madden.....	1,462	14	17·6	0·73	91·71	12·8
May 26...	T. J. Moore........	1,196	14	9·4	0·41	91·42	3·8
June 29...	T. H. Boyd........	1,196	12	7·5	0·63	91·42	4·7
June 29...	"	1,196	12	5·5	0·66	91·40	3·7
June 30...	"	1,196	12	5·7	0·57	91·39	3·2

DISCHARGE MEASUREMENTS OF PEMBINA RIVER 3 MILES NORTH OF KILLARNEY, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
April 26...	M. S. Madden.....	1,462	5	1·2	1·3	89·83	1·6

DISCHARGE MEASUREMENTS OF PIGEON RIVER BELOW STURGEON FALLS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
Mar. 5...	C. O. Allen........	1,912	210	3,439	0·34	726·99	1,163[1]

[1] Ice measurement.

DISCHARGE MEASUREMENTS OF PIGEON RIVER ABOVE FIRST FALLS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 4...	C. O. Allen........	1,912	93	805	1·81	89·33	1,458[1]

[1] Ice measurement.

DISCHARGE MEASUREMENTS OF QU'APPELLE RIVER NEAR WELBY (SASK.), 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
June 1...	C. O. Allen........	2,018	41	73·4	1·07	1·15	79·1

DISCHARGE MEASUREMENTS OF QU'APPELLE RIVER AT DeCORBY'S FARM, ST. LAZARE, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
July 30...	T. H. Boyd........	1,197	45	55·8	1·13	....	63·1
Sept. 6...	"	1,197	39	21·5	0·87	91·65	18·7
Oct. 27...	C. O. Allen........	1,374	44	38·5	0·89	92·05	34·4

DISCHARGE MEASUREMENTS OF WHITEMUD RIVER AT HOLMFIELD, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
April 26...	M. S. Madden.....	1,462	25·0	38·6	0·05	86·47	2·0

DISCHARGE MEASUREMENTS OF WINNIPEG RIVER AT DALLES, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge. Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
May 22...	S. C. O'Grady.....	1,469	252	7,246	2·65	1,035·60	19,201

DISCHARGE MEASUREMENTS OF WINNIPEG RIVER AT THROAT RAPIDS, 1915.

Date.	Engineer.	Meter No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec.-ft.
May 23...	S. C. O'Grady.....	1,469	111	628	3·74	1,037·77	2,350

DISCHARGE MEASUREMENTS OF WINNIPEG RIVER BELOW LAKE OF THE WOODS OUTLETS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 22...	S. C. O'Grady......	1,718	179·8	2,184	2·28	34·62	4,983

DISCHARGE MEASUREMENTS OF BLOODVEIN RIVER 8 MILES FROM MOUTH, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Mar. 7...	C. O. Allen........	1,912	51	237	1·63	715·57	386[1]

[1] Ice cover.

DISCHARGE MEASUREMENTS OF BOYNE RIVER AT CARMAN, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
April 30...	M. S. Madden.....	1,462	27·0	43·5	0·44	84·04	19·3
May 28...	T. J. Moore........	1,196	22·8	12·5	0·37	83·28	4·6
June 28...	T. H. Boyd........	1,197	10·1	8·6	0·27	83·17	2·3
Aug. 6...	"	1,197	15·3	9·6	....	82·56	0·0[1]

[1] No discharge.

DISCHARGE MEASUREMENTS OF BURNTWOOD RIVER AT MANAZO FALLS, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.
Aug. 26...	D. B. Gow........	1,186	183	2,530	0·78	55·70	1,985
Sept. 11...	H. O. Leach.......	1,186	179	2,439	0·67	....	1,633

Taken by D. B. Gow.

BURNTWOOD RIVER—MANAZO FALLS—FROM LEFT BANK NEAR FOOT.

Taken by D. B. Gow.

BURNTWOOD RIVER—ROCK BANK.

Taken by D. B. Gow.

BURNTWOOD RIVER—TASKINIGAP FALLS—PARTIAL VIEW FROM HIGH RIDGE BELOW.

DISCHARGE MEASUREMENTS OF BURNTWOOD RIVER, 1915.

Date.	Engineer.	Meter. No.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.	Remarks.
			Feet.	Sq. ft.	Ft. per sec.	Feet.	Sec. ft.	
Aug. 19.	D. B. Gow.......	1,186	261	1,636	1·51	517·30	2,473	Above First Rapids.
Sept. 3.	H. O. Leach.....	1,186	90	337	1·14	739·80	386	One mile below Gate Rapids.
Sept. 6.	D. B. Gow.......	1,186	132	865	1·67	....	1,448	Three miles below Three Point Lake.

MA

PROGRESS REPORT

OF THE

MANITOBA HYDROMETRIC SURVEY

FOR

THE CALENDAR YEAR, 1915

———

PART III

LAKE OF THE WOODS DATA

LAK

T
menc
in Ja

T
from
readi

F
taken
of th

PART III.

LAKE OF THE WOODS DATA

LAKE OF THE WOODS MILLING CO. MILL "A" HEADRACE AND TAILRACE GAUGES.

HISTORY.

The recording of the water levels in the forebay and tailrace of Mill "A" was commenced by the Lake of the Woods Milling Company in May of 1896 and was discontinued in January of 1912.

LOCATION

There were no gauges set at these locations, the readings were taken by measuring down from the floor of the power house, the elevation of which was 1063.00 W.P.S. Datum. The readings were recorded in feet and inches below this elevation.

RECORDS AVAILABLE.

From the time of the commencement of the record on May 3, 1896, readings were taken at irregular intervals each year until January 12, 1912, at which time the reading of these water levels was discontinued.

Mean Daily Gauge Height, in Feet, of Forebay Mill "A," Keewatin, for 1896 and 1897.

1896

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						3' 6"						
2							2' 8"		3' 7½"			
3												
4					6' 0"			2'11"				
5												
6						3' 4"	2' 9½"					
7										4' 4"		
8									3' 8"			
9							2' 5½"					
10												
11						3' 0"	2' 4"					5' 4"
12												
13					5' 6"							
14										4' 6"		
15									3'10"			
16						2'11"	2' 7½"					
17							2' 3½"					
18						2'11"		2'11"				
19					4'10"							
20							2'11"					
21											5' 1½"	
22						2'11"				4' 9"		
23					4' 4"				3' 8"			
24							2' 8½"	3' 0"				
25						2'11"						
26					4' 2"							
27						2'10½"						
28												
29					3'11"	2' 8"						
30										4' 2"	5' 4½"	
31							2' 9½"					

1897.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2						3'11"						
3												
4					4' 6"		3' 4"					
5										4' 8½"	4' 8½"	
6								2' 8"				
7					4' 4½"							
8							3' 3"					
9						3' 7"						
10					6' 6"							
11												
12					6' 3"							
13			6' 7½"				2' 9½"					
14												
15												
16					5'10½"							
17						3' 7"						
18					4' 4"					5' 1"		
19												
20					5' 6"							
21							2' 8"					
22												
23					5' 2"		2' 7"		3'10"			
24						4' 0"		3' 0"				
25												
26					5' 0"							
27												
28						3' 4"	2' 6"			5'10½"		
29							2' 5"			4' 6½"		
30				4' 8½"								
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF FOREBAY MILL "A", KEEWATIN, FOR 1898 AND 1899.

1898.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1										4' 11"		
2												
3					7' 7½"	7' 7"		5' 9"				
4						6' 3½"						
5												
6												
7												
8				7' 7"								
9						6' 2"						
10						7' 2½"						
11				7' 7"								
12										5' 1"		
13								5' 6"				
14						5' 11"						
15			7' 3"			7' 2½"				4' 9"		
16					7' 8"							
17												
18										5' 3"		
19				7' 3"								
20						6' 0"				5' 0"		
21												
22		6'11"				7' 2"						
23									5' 0½"			
24												
25					7' 7"						4' 7"	
26						5' 8½"						
27												
28						6' 7"				4' 8½"		
29												
30								5' 5"				
31										4' 4"		

1899.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2					4' 9"					4' 2"		3' 8"
3												
4										4' 3"		
5						3' 9"		2'10"	3' 5"	4' 4"		
6										4' 1½"	3' 9"	
7										4' 3½"		
8												
9						3' 7"						
10												
11												
12												3' 10"
13				5' 0"								
14						2' 8"				4' 2"		
15												
16		4' 6"										3'10"
17												
18							2' 7"		3'11"			
19												
20					4' 1"							
21					5' 0½"			3' 0"				3'10"
22												
23									3'10"			
24												
25												
26					4' 1"						3' 4"	
27							2' 7"		3'11"			3'11"
28									5' 3½"			
29					2'11"							
30												
31												

Relation between gauge reading and datum:—
    Zero of gauge = 1,063·0 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF FOREBAY MILL "A", KEEWATIN, FOR 1900 AND 1901.

1900.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2								6' 5"		4' 4"		
3											2' 8"	
4											2' 2"	
5						5' 8"						
6							6' 0"				2'11"	
7				5' 6"	5' 5"							
8	4' 3"		5'0½"							3' 8½"	2' 9"	
9						5' 8"	6' 1½"				2' 4"	
10											2'11"	
11										3' 6"		
12					5' 7"				5' 2"		2'11"	
13										3' 4"		2'10"
14				5'5½"							2' 9"	
15												
16						6' 0"		6' 2½"		3' 4"	2' 8"	
17									5' 0"	3' 2"	2' 8"	
18	4' 2"											
19			5' 3"		5' 8"					3' 2"		
20										3' 2"	2' 8"	
21				5'5½"			6' ."					
22									4' 5"		2' 7"	
23										3' 1"		
24										3' 2"	2' 7"	
25							6' 2"		4' 0"	3' 2"		
26												
27										3' 0"		
28						6' 3"			4' 0"			
29											2' 7"	
30					5' 9"					2'10½"		
31			5'5½"							2'11"		

1901.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					5' 2"		3'9½"		3'10"			
2								3' 9"			4' 7"	
3							3' 8"	3' 9"		4' 1½"		
4								3' 9"				
5							3' 8½"			4' 1"		5' 1"
6						4' 2"	3' 9"	4' 2½"				
7										4' 8"		
8				5' 0"	3'10½"	3'10½"	3' 6"					
9					3' 9"		3' 9"					
10					3' 6"		3' 7¾"					
11												
12				4' 7"		4' 0"		4' 4½"				5' 1½"
13						3'10"	3' 6¾"					
14					3' 6"							
15					3' 6½"							
16					3' 7"				4'10"			
17					3' 6"	3' 9"		4' 7"				5' 3"
18						3' 9"		4' 5"		4'11"		
19							4' 4½"					
20					3' 8"	3'11"						
21					3' 8"			4' 7"				
22			4' 2"		3'11"	3'11"	3' 9"	4' 3"				
23					4' 0"		3'11"	4' 3"		4' 7½"		
24					3'10	3'10½"		4' 8"				
25					3'8½"							
26						3' 9"		4' 2"			5' 1"	
27					3' 8½"							
28					3' 9"	3' 9"		4' 1"		4' 8"		5' 3"
29					3' 9½"		3'10"					
30					3'10"							
31					3'11"			4' 1"				

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

SESSIONAL PAPER No. 25f

MEAN DAILY GAUGE HEIGHT, IN FEET, OF FOREBAY MILL "A", KEEWATIN, FOR 1902
AND 1903.

1902.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
1									4' 6½"			
2						4' 2"	4' 1"		4' 4½"			
3									4' 9"			
4				6' 2"				4' 3"	4' 4½"		5' 6"	
5							3'10"		4' 1"			
6					3'11"						5' 4"	
7						4' 1"					5' 0"	
8					5' 8"		3' 9¾"	4'10"				
9						4' 0"		3' 9"				
10			6' 1"				3'11"					
11						4' 1"		4' 1½"				
12												
13		5'10"			5' 0"							
14						4' 0"	4' 1½"					
15												
16					3'11"	3'11½"		4' 0½"				
17					3'10½"					5' 2½"		
18					3' 9"		4' 0½"					
19					4' 2"							
20	5'8"				4' 8"							
21						4' 1½"	4' 0¾"					
22								4' 2½"				
23						4' 1"	4' 0"					
24				6' 0"			4' 0"					
25						4' 4"						
26						4' 1½"	3'10½"					
27							3'11"					
28												
29												
30				5' 9"								
31										5' 1½"		

1903.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
1						3' 3½"						
2												
3												
4					3' 8"							
5					3' 7"							
6					3' 9"							
7					3' 7"							
8					3' 6½"	3' 5"	3' 5½"	4' 6½"				
9						3' 7"						
10								4' 8½"				
11				4' 6"	3' 7½"							
12	5' 1"				3' 7"	3' 2"	3'10"					
13												
14								4' 4"	4' 9"			
15												
16						3' 6"						
17												
18				4' 3"	3' 5½"			4' 6"				
19												
20					3' 7½"	3'11"	4' 3"					
21				4' 1"								
22					3' 5"							
23					3' 4"	3' 7"						
24												
25					3' 3½"							
26		5' 3"						4' 7"				
27							4' 0"					
28					3' 4"							
29												
30				3' 8"	3' 2½"		4' 3"					
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

Mean Daily Gauge Height, in Feet, of Forebay Mill "A", Keewatin, for 1904 and 1905.

1904.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						5 0″						6′ 10″
2												
3					5′10″							
4												
5												
6												
7												
8					6′ 8″					5′ 8″	6′ 2″	
9												
10												6′10″
11					5′ 5″	4′ 6″						
12				6′ 8″								
13												
14											6′ 0″	
15											6′ 5″	
16					6′ 8″		4′ 0″				6′ 2″	
17												
18			6′ 7½″		5′ 1″							
19											6′ 7″	
20												
21											6′ 4″	
22										6′ 1″		
23								4′ 7″				
24												
25												
26												
27												
28												
29												
30												
31												

1905.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1								3′ 1″	3′ 1½″	1′11″		
2												
3	6′ 6″				7′ 5″		3′11½″				3′ 6″	
4						5′1½″				3′ 3½″		
5								3′ 0½″		3′ 2½″		
6									3′ 3″			
7										3′ 3″		
8												
9					7′ 2″				3′ 5″	3′ 3″		
10				7′2½″			3′ 5″	2′11″				
11			6′11½″						3′ 5″	3′ 7″		
12								3′ 0½″	3′ 7½″			3′ 4″
13					6′ 9″		3′ 6″					
14									3′ 5″	3′ 5½″		
15							3′ 3″	2′11½″	3′ 4½″			
16									3′ 5″	3′ 6″		
17								2′ 8½″				
18									3′ 5″			
19									3′ 1½″			
20						4′ 8″	3′ 2½″	2′ 2½″	2′11″			
21							3′ 0½″					
22		6′11″					3′ 2″			3′ 3″		
23										3′ 1″	3′ 9″	
24							3′ 0″				3′ 7″	
25										3′ 1″	3′ 1½″	
26	6′ 7″											
27							3′ 1″			3′ 7″		3′ 3½″
28		7′ 1″							3′ 1″			
29							3′ 1″	3′ 0½″				
30								3′ 3″		3′ 4″		
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

Mean Daily Gauge Height, in Feet, of Forebay Mill "A", Keewatin, for 1906 and 1907.

1906.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3' 4"				3' 7½"	3' 8½"					5' 3"	
2				4' 1"	3' 7"	3' 8"				4'11"	5' 4"	
3			3'9½"		3'6½"	3' 3½"	3'7½"				5' 5"	
4					3' 9"	3' 8"				5' 4"		
5					3' 9"						5' 6"	
6	3' 4½"					3' 8"						
7				4' 2"		3' 6"					5'5½"	
8											5'2½"	
9							3' 8"			5'10"	5'4½"	
10					3' 6"				4' 7"		5'6½"	
11					3' 6"	3' 8"		4' 1"		5' 0"		
12									4' 8½"	5' 1"	5' 5"	
13						3' 6"	3' 9"			5' 4"		
14										5' 0"		
15					3' 6"	3' 9"				5' 6"		
16					3' 6"	3' 8"	3'11"			4'11"		
17			3' 10⁵						4' 9"	4'11"	5' 8½"	
18				3'10"	3' 3½"				4' 9"	5' 1½"		
19									4' 9½"	5' 3½"		
20						3'11"			4' 9⁵	5' 4½"		
21					3' 7½"							
22					3'10⁵					5' 4"		
23					3' 9"					5' 4"		
24				3' 7"	3'10"					5' 2½"		
25				3' 7"	3'11"	3' 9"	4' 0"			5' 1½"		
26				3' 7"	4' 2"	3' 8"				5' 3½"		
27	3' 3"			3'7½"	3' 5"			4' 3"		5' 8⁵		
28				3' 7"	3'10"						5' 6"	
29										5' 6½"		
30				3' 8"						5' 5⁵		
31										5' 2"		

1907.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2						4'10"	5' 0"		4' 1"			
3												
4										3' 2"		
5												
6												
7					5' 3"	4'11"					3' 3"	
8												
9									4' 0"			3' 6"
10					5' 2"							
11					5' 2"					3' 8"		
12							4' 6"					
13												
14					6' 1"					3' 5"		
15							4' 0"					
16										3' 8"		
17												
18				6' 4"								
19								4' 1"				
20							4' 9"					
21												
22					5' 7"		5' 0"					
23			6' 4"									
24						4'11"						
25											3' 6"	
26							4' 2"					
27								3' 4"				
28										3' 5"		
29					5' 5"			4' 1"				
30				6' 4"								
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

Mean Daily Gauge Height, in Feet, of Forebay Mill "A", Keewatin, for 1908 and 1909.

1908.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2							3' 0"		4' 2"			
3												
4												
5												
6								3' 8"				
7									4' 4"			4'11"
8												
9									4' 6"			
10			3' 2"							5' 4"		
11												
12		3' 5"										
13										4' 4"		
14					3' 1"					4' 7"		
15												
16						3' 0"						
17												
18									4'10"			
19												
20						3' 2"						
21												
22												
23											5' 1"	
24												
25	3' 7"											
26												
27												
28									4' 8"		4'11"	
29												
30												
31												

1909.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1							5' 5"					
2											4' 7"	
3		5' 4"										4' 6"
4												
5										4'10"		
6							5' 0"					
7												
8									5' 1"			
9											4' 2"	
10												
11							5' 3"					
12												
13										5' 1"		
14												
15												
16									5' 0"			
17					5' 8"							
18											4' 5"	
19					5' 7"							
20												
21							5' 0"					
22			5'10"									
23				6' 2"								
24												
25												
26								4' 8"				
27												
28									4'11"			
29	5' 2"											
30												
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF FOREBAY MILL "A", KEEWATIN, FOR 1910 AND 1911.

1910.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				3' 5"							6' 7"	
2				3' 5"								
3					2'10"							
4											6' 5"	
5			3' 9"									
6										6' 3"		
7				3' 1"								
8												
9											6'11"	
10						4' 6"						
11							5' 1"					
12			3' 9"									7' 0"
13					3' 0"		4' 5"					
14						3' 7"						
15									5' 9"		6' 9"	
16												
17												
18		4' 3"										
19										7' 3"		
20												
21					3' 2"							
22							4'10"					
23			3' 9"									
24								5' 6"				
25				2' 9"	3' 3"							
26												
27							4'11"					
28												
29				2'11"								
30			3' 6"									
31												

1911.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2											..	8' 4"
3											..	
4							7' 6"					
5							7' 9"					
6												
7												
8												
9												
10							7' 4"					
11												
12												
13							8' 0"					
14											8' 8"	8' 3"
15		7' 7"				7' 9"						
16												
17												
18							8' 4"					
19												
20												
21			8' 1"									
22											8' 6"	
23	7' 6"											
24												
25							9' 0"	8' 6"				
26					8' 4"							
27												
28												
29						7' 4"						
30												
31	7' 9"											

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

Mean Daily Gauge Height, in Feet, of Tailrace Mill "A", Keewatin, for 1896 and 1897.

1896.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec..
1						20' 6"						
2							18' 4½"		19' 7½"			
3												
4					24' 2"			18'10"				
5												
6						20' 0"	18' 7"					
7												
8									19' 9"	20' 9		
9							18' 5½"					
10												
11						19' 8"	18' 5"					22' 5½"
12												
13					23' 4"							
14										20'11"		
15									20' 0"			
16						19' 6"	18' 6½"					
17							18' 5"					
18						19' 0"		19' 0"				
19					22' 5"							
20							18' 8"					
21											22' 1"	
22						18'11"				21' 5½"		
23					21' 9"				20' 2"			
24							18' 8½"	19' 2½"				
25						18' 9"						
26					21' 4"							
27						18'7½"						
28												
29			..		21' 0"	18'7½"						
30			..						20' 6"	22' 1"		
31			..			18'9½"						

1897.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec..
1						20' 4"						
2												
3												
4					21' 4"		19'4½"					
5										'19 11½"	21' 4½"	
6								18' 3"				
7					21'2½"							
8			.				19' 2"					
9						20' 1½"						
10				24' 6"								
11												
12					24' 4"							
13			24' 9½"				18'11½"					
14												
15												
16					23' 8"							
17						19'8½"						
18					20'10"					20' 6½"		
19					23' 0"							
20												
21							18' 4½"					
22					22' 6"							
23							15' 4"		19' 5"			
24												
25					20' 7"			18' 6"				
26					22'1½"							
27												
28						19'5½"	18' 3"			21' 0"		
29							18'2½"			21' 1"		
30					21'8½"							
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

SESSIONAL PAPER No. 25f

MEAN DAILY GAUGE HEIGHT, IN FEET, OF TAILRACE MILL "A", KEEWATIN, FOR 1898 AND 1899.

1898.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1										21'10"		
2												
3					26' 5"	26'4½"		23' 0"				
4							24' 5"					
5												
6												
7												
8				26' 8"								
9							24' 0"					
10						26' 1"						
11				26' 8"								
12										21'11"		
13								22' 8"				
14							23' 6"					
15			26' 0"			26' 0"				22' 4"		
16					26' 6"							
17												
18										23' 6"		
19				26' 8"								
20							23' 5½"			23'10"		
21												
22		25' 5"				25' 9"						
23									22' 1½"			
24												
25					26'5½"						26' 3"	
26						23' 2"						
27												
28					25' 1"					23'10½"		
29												
30								22' 5"				
31										23'11"		

1899.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2					21' 3"					20' 2"		25'10"
3												
4										21' 6"		
5						19'6"		18' 0"	18'7½"	22' 1"		
6										22' 6"	25'10"	
7										22' 9"		
8												
9					19' 3"							
10												
11												
12												26' 0"
13				25' 9"								
14							18' 1"			25' 3"		
15												
16		25' 0"										23' 9"
17												
18							18' 0"		19' 2"			
19												
20					20' 3"							
21				23'3½"				18' 5"				23' 4"
22												
23										25'10"		
24												
25												
26					20' 1"					25'10"		
27						17'11"			19' 5"			23' 4"
28									19' 8½"			
29					18' 8"							
30												
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

Mean Daily Gauge Height, in Feet, of Tailrace Mill "A", Keewatin, for 1900 and 1901.

1900.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2								27' 4"		25' 0"		
3											18' 0"	
4						27' 5"					18' 2"	
5												
6							27' 5"				18' 1"	
7												
8	23' 8"	24' 9"		26' 6"	27' 3"					23'11½"	18' 1"	
9						27' 5"	27' 5"				17'11"	
10											18' 0"	
11										22' 6"		
12					27' 2"				26'10"		18' 0"	
13										20' 7"	18' 0"	17'10"
14				26'11½"							18' 0"	
15												
16						27' 5"		27' 1"		19' 9"	17'11"	
17									26' 7"	19' 5"	17'10"	
18	23' 8"											
19			24'11½"		27' 3"					19' 0"		
20										19' 0"	17'11"	
21				27' 2½"			27' 3"					
22									26' 4"		17'10"	
23										18' 8"		
24										18' 8"	17'10"	
25								27' 1"	26' 1"	18' 6½"		
26												
27										18' 5"		
28						27'4½"			25' 0"			
29											17'9½"	
30					27' 5"					18' 5"		
31			25' 3"							18' 3"		

1901.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				21' 4"		20'10"		20' 8"				
2							20' 9"				26' 1"	
3									24' 8"			
4						20' 9"	20' 9"					
5							20'7½"		24' 8"			26' 6"
6						20'11"	20' 7"	20'10"				
7										25' 6"		
8			25' 0"		23'10"	20'11"	20' 6"					
9					23' 5"		20' 6"					
10					23' 2"		20'5½"					
11						20'10"				25' 0"		26' 6"
12			26' 6"									
13						20'10"	20' 4½"					
14					23' 0"							
15					22'11"							
16					22'10"					25'10"		
17					22'8½"				25' 2"			26' 6"
18						20' 9"	20' 5"		25' 3"			
19								21' 1"			26' 5"	
20					21' 3"	20' 9"						
21					21' 1"				25' 3"			
22					21' 0"	20'9½"	20' 5"	21' 7"				
23		20' 0"			21' 0"			23' 1"	25'11"			
24					20'11"	20'9½"	20' 7"	23' 1"				
25					20'10"				25' 4"			
26						20' 9"		23'11"			26' 6"	
27					20'11"							
28					20'10"	20'8½"		24' 2"	26' 1"			26' 6"
29					20'10"		20' 8"					
30					20'10"							
31					20'10"			24' 6"				

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

SESSIONAL PAPER No. 25f

MEAN DAILY GAUGE HEIGHT, IN FEET, OF TAILRACE MILL "A", KEEWATIN, FOR 1902 AND 1903.

1902.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1									23' 2"			
2						26' 1"	19' 7"		23' 1½"			
3									23' 1"			
4				27' 0"				23' 0"	23' 9"		25' 0"	
5							19' 5"		24' 0"			
6						25' 2"		23' 0"			25' 0"	
7						23'11"					25' 0"	
8					26' 4"		19'4½"		25' 0"			
9						22' 7"		22'11"				
10			27'1"				19'4½"					
11						21'11"		23'0½"				
12												
13		26'10"			26' 4"							
14						21' 0"	19'5½"					
15												
16						20' 7"	19'5½"	23' 0"				
17						20' 3½"				25'1½"		
18						19' 9"	19'5½"					
19						19' 9"						
20	26' 8"				26' 2"							
21						19'7½"	19'7¾"					
22								23' 1"				
23						19' 7"	19'11½"					
24				26'10"			20' 7"					
25						19' 6½"						
26						19' 6½"	21'10½"					
27												
28							22' 5"					
29												
30				26'10"								
31										25' 0"		

1903.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						19' 5½"						
2												
3												
4					24'10"							
5					23'10"							
6					22'11"							
7					21'10½"							
8					21' 3½"	19' 8"	20' 0"	20' 11"				
9						19' 8"						
10								21' 3½"				
11				25' 8"	20' 7½"							
12	25' 2"				20' 5½"	19' 7"	20' 1½"					
13												
14								23' 5"	24' 7"			
15												
16						19'10"						
17												
18				25' 4"	19'10"			23'10"				
19												
20						19'10½"	20' 6½"	24' 1"				
21				25' 1"								
22					19' 6"							
23					19' 5"	20'00"						
24												
25					19' 5"							
26		25' 3"					24' 5"					
27						20' 7"						
28					19' 5"							
29												
30				24'10"	19' 5"	20' 8"						
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF TAILRACE MILL "A," KEEWATIN, FOR 1904 AND 1905.

1904.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						24' 8"						26' 0"
2												
3					25' 2"							
4												
5												
6												
7												
8					25' 8"					24' 8"	22' 2"	
9												
10												26' 2"
11					24'11"	24' 4"						
12				25' 8"								
13												
14											25' 4"	
15											25' 5"	
16				25' 8"			21' 0"				25' 5"	
17												
18			25' 8"		24' 9"							
19											25' 8"	
20												
21											25'10"	
22										24' 9½"		
23							24' 1"					
24												
25												
26												
27												
28												
29												
30												
31												

1905.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1								19' 5"	18' 8½"	20' 2"		
2												
3	26' 2"				26' 2"		24'10"				24' 6"	
4						25' 7½"				20' 4½"		
5							19' 1"			20' 5½"		
6									18' 11"			
7										20' 5½"		
8												
9					26' 2"				18'10"	20' 8"		
10				26' 4"			23' 11"	18' 8"				
11			26'6½"						19' 0"	20'10"		
12								18' 8"	19' 0½"			24'10"
13					25'11"		23' 0"					
14									19' 1"			
15							22' 2"	18' 4½"	19' 1½"	20'11"		
16									19' 6"	21' 2"		
17								18' 1½"				
18									19'11"			
19									19' 9½"			
20						25' 3"	21' 5"½	18' 1"	19' 11"			
21							21' 1½"					
22		26' 5"					20' 11"		20' 0"			
23									20' 1"	21' 3"		
24							20' 9½"			21' 7"		
25									20' 2"	22' 6½"		
26	26' 4"											
27							19' 9½"			23' 7"		24' 7¼"
28		26' 5"							20' 2"			
29							19' 7"	18' 1"				
30								18' 1"		24' 3"		
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

SESS

ME

Day.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

SESSIONAL PAPER No. 25f

Mean Daily Gauge Height, in Feet, of Tailrace Mill "A," Keewatin, for 1906 and 1907.

1906.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.
1	24' 7"				20' 8"	20'10"					25' 1"	
2				24' 8"	20' 7"	20'10"				25'11"	25' 1"	
3			24'10"		20' 4½"	20'11½"	21'10½"				25' 2"	
4					20' 3"	21' 1"				25'11½"		
5					20' 2½"						25' 3"	
6	24'7½"					21' 2"						
7				24'6½"		21' 3"					25' 2½"	
8											25' 2½"	
9							21'10½"			25' 6½"	25' 5½"	
10					20' 1½"				22' 9"		25' 5½"	
11					20' 1"	21' 8"		22' 2"		25' 3½"		
12									22'10½"	25' 3"	25' 9"	
13						21' 8"	21'11 "			23'10"		
14												
15					20' 2"	21' 9"				24' 7½"	25'10"	
16						21' 9½"	22' 1"			24' 6½"		
17			24' 8"						23' 2"	24' 4½"	25'10½"	
18				24'0½"	20' 1½"				23' 5"	24' 7½"		
19									23'10½"	24'10"		
20						21' 9"			25' 1"	24' 9½"		
21					20' 3½"							
22					20' 4"					24'11"		
23					20' 5"					24'11½"		
24				23' 0"	20' 6"					24'11½"		
25				22' 9"	20' 7"	21'10½"	22' 1"			24'11½"		
26				22' 4"	20' 9"	21'10½"			25' 8"	24'11½"		
27	24' 3"			21'8½"	20' 9"			22' 6½"		25' 1"		
28				21'5½"	20'10"						26' 1"	
29										25' 2½"		
30				21' 0"						25' 2"		
31										25' 0"		

1907.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.
1								26' 5"				
2							25' 7"		24' 9"			
3												
4										23' 0"		
5												
6												
7						26' 9"	25' 6"				22'10"	
8												
9									24' 8"			23'1½"
10						26' 5"						
11										23' 0"		
12						26' 0"	26' 1"					
13												
14					26' 7"					22'11"		
15							25' 7"					
16										22'10"		
17												
18				26'10"								
19							25' 6"					
20						25' 8"						
21												
22					26' 5"		26' 2"					
23			26'10"									
24						25' 7"						
25											22' 10"	
26							24'11"					
27									23' 4"			
28										22'10"		
29					26' 5"		24' 9"					
30				26'10"								
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF TAILRACE MILL "A," KEEWATIN, FOR 1908 AND 1909.

1908.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2							21' 0"		22' 1"			
3												
4												
5												
6								21' 6"				
7									23' 0"			27' 5"
8												
9									23' 5"			
10				23' 0"						24' 1"		
11												
12			23'6"							24' 1"		
13												
14					22' 6"					24' 7"		
15												
16						21' 0"						
17												
18									23'11"			
19												
20						21' 4"						
21												
22												
23											26' 9"	
24												
25	23' 7"											
26												
27												
28									23'11"		26'10"	
29												
30												
31												

1909.

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						27' 0"						
2											26' 9"	
3		27' 0"										26' 9"
4												
5										26'10"		
6							26'11"					
7												
8									26'10"			
9										26' 6"		
10												
11							26'11"					
12												
13										26'10"		
14												
15												
16												
17					27' 1"				26' 9"			
18											26' 9"	
19												
20					26' 9"							
21						27' 2"						
22			27' 2"									
23				27' 3"								
24												
25												
26								27' 0"				
27												
28									26' 9"			
29	27' 2"											
30												
31												

Relation between gauge reading and datum:—
Zero of gauge = 1,063·0 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF TAILRACE MILL "A," KEEWATIN, FOR 1910 AND 1911.

1910.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				23' 9"							27'11"	
2				23' 2"								
3					20' 9"							
4											27'11"	
5			26' 4"									
6										27' 1"		
7				22' 0"								
8												
9											28' 1"	
10							24' 1"					
11								26'10"				28' 0"
12			25'11"									
13					20'10"		21' 9"					
14						22' 8"						
15										27' 3"	28' 0"	
16												
17												
18		26' 8"										
19										27' 4"		
20												
21					21' 0"	21' 0"						
22												
23			26' 5"				25'10"					
24								27' 0"				
25				21' 9"	21' 2"							
26												
27							26' 5"					
28												
29				20' 9"								
30			25' 6"									
31												

1911.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2												29' 2"
3												
4							28' 0"					
5							28' 0"					
6												
7												
8												
9												
10							28' 1"					
11												
12												
13							27'10"					29' 3"
14											28' 8"	
15		28' 3"			27'10"							
16												
17												
18							28' 0"					
19												
20												
21			28' 3"									
22												
23	28' 0"										29' 0"	
24												
25							28' 0"	27'11"				
26				28' 0"								
27												
28												
29					28' 0"							
30												
31	28' 0"											

Relation between gauge reading and datum:—
    Zero of gauge = 1,063·0 W.P.S. datum.

DEPARTMENT OF THE INTERIOR

WINNIPEG RIVER—BELOW FORT ISLAND.

HISTORY.

In 1914, on October 8, a staff gauge was established on the Winnipeg river directly below Old Fort island, by S. C. O'Grady.

RECORDS AVAILABLE.

From the time of installation of this gauge records of gauge readings are available up to December 4 of the same year, when the station was abandoned.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF WINNIPEG RIVER BELOW OLD FORT ISLAND, FOR 1914.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1											98·50	98·54
2											98·35	98·64
3											98·43	98·65
4											98·44	98·64
5											98·40	
6											98·39	
7											98·44	
8											98·30	
9										99·96	98·29	
10										100·00	98·51	
11										100·00	98·55	
12										99·94	98·52	
13										99·96	98·54	
14										99·96	98·59	
15										99·57	98·49	
16										99·30	98·37[1]	
17										99·16	98·56	
18										98·90	98·63	
19										98·77	98·62	
20										98·82	98·62	
21										98·84	98·65	
22										98·86	98·50	
23										98·87	98·42	
24										98·73	98·51	
25										98·65	98·53	
26										98·41	98·65	
27										98·52	98·61	
28										98·45	98·62	
29										98·68	98·47	
30										98·78	98·37	
31										98·78		

Relation between gauge reading and datum:—
Zero of gauge = 936·61 W.P.S. datum, Oct. 8.
 Zero of gauge = 936·61 W.P.S. datum, Nov. 3.
 Zero of gauge = 936·53 W.P.S. datum, Nov. 25.
  [1] Frozen at gauge.
  [2] Ice 6 inches thick at gauge, and frozen 400 feet out from gauge, channel still open.
   On Feb. 15, 1915, channel was still open.

LAKE OF THE WOODS, ONTARIO D.P.W. GAUGE AT KEEWATIN.

HISTORY.

This gauge was originally set by the Ontario Department of Public Works. In 1911 it was tied in to W.P.S. datum in connection with Winnipeg River Power Surveys, and from May 1, 1913, gauge readings have been obtained by members of this Survey.

LOCATION.

This staff gauge is secured to a pile on the west side and near the south end of the Keewatin Lake bridge.

RECORDS AVAILABLE.

From May 1, 1913, continuous daily record of gauge readings at this point are available.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF ONT. D.P.W. LAKE GAUGE, KEEWATIN, FOR 1913.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					99·85	99·90	99·54	99·89	99·55	98·94	99·16	99·06
2					99·85	99·90	99·62	99·87	99·45	98·90	99·20	99·02
3					99·95	99·80	99·78	99·77	99·40	99·00	98·92	99·10
4					100·10	100·00	99·49	99·79	99·45	98·79	99·10	99·18
5					100·00	99·90	99·38	99·63	99·40	98·44	99·26	99·03
6					100·00	99·50	99·62	99·71	99·32	98·82	99·03	99·03
7					100·00	99·80	99·62	99·97	99·35	99·07	98·88	98·78
8					99·80	99·90	99·63	99·83	99·30	98·81	98·88	98·80
9					99·95	100·00	99·23	99·71	99·64	98·88	....	99·06
10					100·00	100·06	99·63	99·67	99·33	99·08	98·91	99·02
11					100·20	100·08	99·87	99·87	99·30	99·04	99·18	99·03
12					100·00	99·98	99·69	99·81	99·19	99·00	98·99	99·01
13					99·90	99·89	99·72	99·74	99·15	99·03	99·06	99·03
14					100·00	99·90	99·74	99·70	99·47	99·10	99·00	99·05
15					99·90	99·88	99·88	99·65	99·20	99·00	99·01	99·02
16					100·00	99·90	99·88	99·63	99·10	99·00	99·23	99·04
17					99·85	99·72	99·83	99·60	99·12	99·17	99·05	99·01
18					99·90	99·81	99·83	99·69	99·30	99·03	98·90	99·02
19					99·95	99·69	99·79	99·86	99·37	98·86	99·10	99·00
20					99·95	99·69	99·99	99·73	98·60	98·83	99·07	99·00
21					99·85	99·70	100·00	99·78	98·52	99·02	98·96	99·04
22					99·95	99·78	99·92	99·72	98·98	99·15	98·99	99·02
23					100·00	99·98	99·99	99·75	99·00	99·03	99·19	98·99
24					99·80	99·85	99·91	99·73	98·71	98·99	99·02	99·01
25					100·00	99·77	100·04	99·85	99·90	99·02	98·99	99·00
26					100·05	99·58	99·76	99·48	99·98	99·00	98·97	98·99
27					99·90	99·43	99·78	99·63	99·02	99·18	99·09	98·98
28					99·90	99·70	99·99	99·46	99·08	98·58	99·00	99·04
29					99·95	99·81	99·88	99·45	98·85	99·96	98·04	99·03
30					99·80	99·84	99·88	99·53	98·99	99·04	99·05	99·00
31					100·00	....	99·84	99·48	....	99·12	....	98·99

Relation between gauge reading and datum:—
Zero of gauge = 959·77 W.P.S., May 1—Dec. 31.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF ONT. D.P.W. LAKE GAUGE, KEEWATIN, FOR 1914 AND 1915

1914.

Day.	Jan.	Feb.	Mar	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	98·98	99·03	99·01	98·87	99·11	99·95	100·00	99·85	99·29	99·44	99·52	99·62
2	98·98	99·01	99·03	98·85	99·15	100·00	100·12	99·85	99·32	99·43	99·79	99·68
3	98·99	99·01	98·98	98·88	99·18	99·93	100·15	99·96	98·91	99·40	99·69	99·65
4	99·02	99·01	98·98	98·87	99·22	99·83	100·15	99·82	99·20	99·35	99·46	99·62
5	99·01	99·02	98·94	98·90	99·23	100·00	100·01	99·13	99·32	99·52	99·68
6	98·98	99·05	98·93	98·90	99·29	99·92	100·18	99·55	99·09	99·35	99·76	99·70
7	98·99	99·02	98·95	98·84	99·30	99·98	99·80	99·68	99·14	99·28	99·41	99·69
8	98·98	99·06	98·99	98·84	99·40	99·99	100·06	99·63	99·15	99·30	99·74	99·62
9	98·99	99·05	98·99	98·87	99·45	100·10	100·08	99·69	99·28	99·35	99·80	99·68
10	98·99	99·00	98·90	98·80		100·20	99·91	99·35	99·25	99·27	99·61	99·70
11	99·04	99·01	98·93	98·83	99·38	100·15	100·00	99·53	99·21	99·40	99·52	99·70
12	98·99	99·02	98·93	98·79	99·45	100·20	100·20	99·58	99·36	99·34	99·59	99·72
13	98·91	99·02	98·95	98·85	99·43	100·20	100·00	99·44	99·55	99·46	99·60	99·69
14	98·98	99·02	98·90	98·82	99·43	100·22	100·02	99·39	99·30	99·69	99·52	99·69
15	98·99	99·05	98·98	98·80	99·50	100·20	100·22	99·50	99·35	99·45	99·50	99·70
16	98·97	99·04	98·90	98·77	99·53	100·25	100·30	99·46	99·31	99·60	99·51	99·72
17	98·99	99·00	98·88	98·80	99·63	100·32	99·82	99·41	99·34	99·47	99·60	99·72
18	99·01	99·01	98·85	98·82	99·63	100·02	100·15	99·35	99·44	99·72	99·58	99·72
19	98·99	99·01	98·86	98·91	99·50	100·18	100·18	99·34	99·49	99·59	99·57	99·73
20	98·97	99·02	98·88	98·92	99·62	100·40	100·18	99·31	99·48	99·58	99·65	99·70
21	98·99	99·01	98·85	98·90	100·10	100·10	100·10	99·30	99·36	99·55	99·49	99·75
22	98·99	99·01	98·87	98·88	99·65	100·30	99·98	99·30	99·20	99·61	99·67	99·72
23	99·00	99·03	98·88	98·93	99·66	100·32	100·04	99·06	99·39	99·33	99·72	99·75
24	99·01	99·02	98·85	98·95	99·79	100·10	100·01	99·19	99·23	99·68	99·65	99·70
25	99·00	99·00	98·80	98·95	99·85	100·01	100·01	99·14	99·42	99·45	99·68	99·72
26	99·00	99·00	98·85	99·08	99·81	100·05	100·10	99·20	99·35	99·36	99·60	99·70
27	98·99	99·01	98·87	99·03	99·80	99·92	99·98	99·28	99·43	99·75	99·65	99·73
28	98·98	98·99	98·87	98·95	99·80	100·10	100·00	99·38	99·40	99·48	99·65	99·73
29	99·01			98·95	99·80	100·10	100·08	99·35	99·32	99·57	99·69	99·70
30	99·01		98·87		99·91	100·10	100·00	99·30	99·40	99·67	99·65	99·70
31	99·02		98·86				99·83	99·30		99·65		99·69

Relation between gauge reading and datum:—
    Zero of gauge = 959·77 W.P.S., Jan. 1— July 3.
    Zero of gauge = 959·76 W.P.S., July 4—Dec. 31.

1915.

	Jan.	Feb.	Mar	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	99·72	99·65	99·70	99·61	99·67	99·95	100·63	100·14	99·52	99·28	98·95	99·10
2	99·69	99·67	99·67	99·62	99·76	99·88	100·62	100·13	99·51	99·37	98·97	99·13
3	99·74	99·67	99·68	99·61	99·60	99·84	100·61	100·17	99·60	99·15	99·10	99·08
4	99·74	99·66	99·64	99·61	99·60	99·90	100·47	100·06	99·50	98·85	98·95	99·08
5	99·68	99·68	99·61	99·63	99·77	100·12	100·53	100·04	99·66	99·20	99·11	99·08
6	99·69	99·69	99·60	99·65	99·64	99·75	100·65	100·03	99·50	99·06	99·05	99·08
7	99·67	99·75	99·67	99·67	99·82	99·75	100·65	99·98	99·45	98·75	98·93	99·12
8	99·67	99·75	99·69	99·67	99·39	99·65	100·62	100·00	99·58	98·87	99·05	99·10
9	99·67	99·71	99·65	99·69	99·97	99·85	100·68	100·01	99·47	99·40	99·05	99·13
10	99·75	99·68	99·65	99·70	99·86	99·94	100·73	99·80	99·34	99·20	98·37	99·10
11	99·71	99·67	99·65	99·68	99·94	99·82	100·73	100·02	99·32	99·14	98·02	99·12
12	99·68	99·67	99·65	99·70	99·88	99·88	100·68	99·93	99·46	99·29	98·32	99·13
13	99·71	99·67	99·62	99·65	99·95	99·62	100·69	99·92	99·30	99·18	98·10	99·10
14	99·66	99·72	99·64	99·61	99·94	100·08	100·50	99·85	99·22	99·18	98·05	99·10
15	99·62	99·75	99·63	99·62	99·85	99·90	100·60	99·80	99·43	99·26	98·10	99·12
16	99·61	99·67	99·67	99·67	99·75	99·67	100·60	99·65	99·45	99·18	98·13	99·15
17	99·70	99·68	99·67	99·65	99·85	100·08	100·41	99·80	99·31	99·21	98·20	99·15
18	99·75	99·70	99·58	99·70	99·95	99·98	100·53	99·78	99·14	99·20	98·26	99·15
19	99·67	99·69	99·62	99·70	99·97	100·02	100·50	99·70	99·39	99·28	98·96	99·17
20	99·68	99·69	99·61	99·63	99·93	100·25	100·47	99·69	98·68	99·10	99·10	99·17
21	99·71	99·75	99·65	99·63	99·93	100·28	100·49	99·61	99·22	99·11	98·90	99·17
22	99·69	99·75	99·65	99·61	100·00	100·02	100·53	99·68	99·34	99·10	99·14	99·17
23	99·71	99·67	99·62	99·62	100·07	100·25	100·37	99·75	99·21	99·05	99·10	99·17
24	99·75	99·65	99·65	99·70	99·98	100·23	100·44	99·45	99·10	99·18	99·10	99·17
25	99·75	99·65	99·61	99·86	99·82	100·32	100·45	99·41	99·19	99·25	99·00	99·20
26	99·68	99·65	99·63	99·73	99·98	100·25	100·41	99·61	99·00	98·92	99·10	99·20
27	99·70	99·66	99·61	99·75	100·09	100·48	100·35	99·76	99·22	99·32	99·08	99·20
28	99·65	99·70	99·63	99·75	99·98	100·53	100·35	99·63	99·30	98·95	99·15	99·16
29	99·67		99·65	99·69	99·93	100·45	100·40	99·48	99·27	99·07	99·05	99·16
30	99·67		99·61	99·68	99·94	100·57	100·31	99·66	99·27	99·08	99·10	99·16
31			99·61		99·93		100·21	99·60		99·15		99·16

Relation between gauge reading and datum:—
    Zero of gauge = 959·76 W.P.S., Jan. 1—Dec. 31.

WINNIPEG RIVER ONTARIO D.P.W. GAUGE AT MILL "A" KEEWATIN.

HISTORY.

This gauge was originally set in place by the Ontario Department of Public Works but was tied in to W.P.S. datum on June 25, 1912, and from June 1, 1913, gauge readings have been taken at this point by members of this Survey.

LOCATION.

This gauge is located on the arm of the Winnipeg river known as Darlington bay and is about 50 feet north of the power house head gates of Mill "A" of the Lake of the Woods Milling Co. at Keewatin.

RECORDS AVAILABLE.

From the 1st of June, 1913, continuous records of gauge readings at this point are available.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF ONT. D.P.W. RIVER GAUGE MILL "A", KEEWATIN, FOR 1913.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1						80·70	80·67	79·34	78·80	76·21	75·66	75·20
2						80·65	80·51	79·39	78·80	76·13		75·52
3						80·90	80·75	79·20	78·80	76·06	75·12	75·59
4						81·00	80·75	79·06	78·85	76·02	75·50	75·63
5						81·00	80·79	79·30	78·80	75·75	75·55	75·63
6						81·00	80·39	79·29	78·85	75·61	75·59	75·62
7						81·00	80·39	79·34	78·65	75·72	75·63	75·50
8						81·00	80·35	79·35	78·70	75·80	75·68	75·35
9						80·80	79·94	79·36	78·81	75·81		75·56
10						80·99	79·14	79·12	78·98	75·85	75·20	75·58
11						81·07	78·98	79·16	78·97	75·85	75·52	75·56
12						81·11	78·83	79·25	79·90	75·58	75·56	75·61
13						81·01	78·51	79·28	78·91	75·43	75·60	75·63
14						80·90	78·25	79·27	78·80	75·65	75·65	75·35
15						80·70	78·46	79·36	78·76	78·71	75·63	75·15
16						80·70	78·48	79·39	78·85	75·72	75·11	75·38
17						80·78	78·45	79·17	78·55	75·72	75·50	75·40
18						80·92	78·44	79·01	78·87	75·23	75·55	75·56
19						80·96	78·44	79·08	78·91	75·45	75·61	75·53
20						80·96	78·43	79·09	78·81	75·25	75·65	75·50
21						80·95	78·30	79·08	78·55	75·23	75·63	75·24
22						80·77	78·19	79·05	78·42	75·05	75·67	75·17
23						80·58	78·19	79·09	78·05	75·58	75·40	75·42
24						80·75	78·67	78·93	77·60	75·61	75·15	75·50
25						80·85	78·09	78·98	77·45	75·65	75·50	75·45
26						80·94	79·21	78·96	77·36	75·50	75·58	75·16
27						80·81	79·11	78·98	77·18	75·21	75·56	75·52
28						80·90	78·99	78·99	76·50	75·53	75·60	76·30
29						80·74	79·24	78·91	76·12	75·61	75·62	75·10
30						80·75	79·32	79·98	76·30	75·64	75·48	75·50
31							79·36	78·83		75·61		75·55

Relation between gauge reading and datum:—
Zero of gauge =959·02 W.P.S., June 1—Dec. 31.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF ONT. D.P.W. RIVER GAUGE MILL "A",
KEEWATIN, FOR 1914 and 1915

1914

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	75·55	75·33	76·70	76·88	76·97	79·38	80·98	80·85	78·65	78·33	76·50	76·63
2	75·60	75·05	76·48	76·80	76·99	79·64	80·80	80·70	78·58	78·39	76·42	76·72
3	75·60	75·35	76·77	76·80	76·80	80·00	80·90	80·72	78·45	78·31	76·51	76·72
4	75·32	75·45	76·82	76·89	76·76	79·95	80·90	80·84	78·37	78·15	76·55	76·71
5	75·15	75·52	76·84	76·54	77·01	80·00	80·80	80·93	78·37	77·98	76·30	76·73
6	75·37	75·35	76·85	76·42	77·14	80·10	80·80	80·80	78·24	78·20	76·50	76·65
7	75·40	75·35	76·85	76·70	77·25	79·80	80·93	80·81	78·28	78·20	76·53	76·33
8	75·42	75·25		76·76	77·32	79·90	80·98	90·83	78·25	78·19	76·40	76·00
9	75·51	75·12	76·60	76·72	77·38	80·20	81·08	80·65	78·31	78·21	76·40	76·50
10	75·55	75·43	76·84	76·55		80·40	81·02	80·43	78·38	78·23	76·72	76·55
11	75·35	75·50	76·92	76·60	77·05	80·41	81·03	80·59	78·32	78·32	76·50	76·63
12	75·23	75·51	76·93	76·42	77·34	80·40	80·98	80·62	78·31	78·11	76·65	76·50
13	75·54	75·49	76·93	76·32	77·35	80·42	80·83	80·65	78·21	78·12	76·73	76·35
14	75·63	75·52	76·94	76·47	77·40	90·32	81·03	80·58	78·14	78·31	76·73	76·38
15	75·46	75·40	76·57	76·65	77·42	80·12	81·03	80·60	78·34	77·62	76·30	76·58
16	75·60	75·15	76·39	76·67	77·46	80·40	81·15	80·41	78·42	77·31	76·32	76·52
17	75·52	75·42	76·85	76·57	77·30	80·45	81·14	80·29	78·42	77·22	76·55	76·57
18	75·28	75·48	76·90	76·58	77·23	80·45	81·08	80·48	78·42	77·00	76·55	76·55
19	75·10	75·50	76·93	76·53	77·40	80·60	81·00	80·50	78·49	76·82	76·60	76·54
20	75·33	75·51	76·90	76·60	77·50	80·75	80·94	80·50	78·41	76·98	76·72	76·35
21	75·41	75·65	76·90	76·85	77·52	80·52	81·00	80·55	78·21	77·00	76·72	76·36
22	75·32	75·64	76·64	76·89	78·10	80·45	81·04	80·55	78·39	77·00	76·57	76·55
23	75·27	75·55	76·51	80·83	78·33	80·72	81·08	80·25	78·48	77·00	76·32	76·55
24	75·27	76·10	76·79	76·73	78·17	80·83	81·04	80·38	78·42	76·90	76·62	76·59
25	75·14	76·34	76·85	76·72	78·26	81·02	81·05	80·09	78·49	76·60	76·65	76·35
26	75·09	76·62	76·88	76·63	78·45	81·10	80·98	79·67	78·48	76·28	76·69	76·59
27	75·35	76·70	76·88	76·57	78·60	81·07	80·87	79·20	78·23	76·65	76·72	76·30
28	75·42	76·80	76·88	76·85	79·10	80·92	81·05	79·03	78·10	76·58	76·71	76·35
29	75·45			76·90	79·40	80·82	81·02	78·85	78·28	76·68	76·60	76·50
30			76·58	76·90	79·55	81·05	81·07	78·78	78·31	76·80	76·34	76·52
31			76·84				81·01			76·82		76·59

1915

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	76·35	76·47	76·38	76·38	79·43	80·64	81·90	82·50	77·90	77·29	76·00	76·63
2	76·40	76·76	76·65	76·30	79·20	80·64	81·95	82·39	78·05	77·15	76·60	76·63
3	76·36	76·75	76·69	76·28	79·10	80·63	82·03	82·50	78·08	76·78	76·61	76·63
4	76·30	76·74	76·69		79·43	80·62	82·00	82·48	78·03	76·58	76·60	76·61
5	76·57	76·80	76·69	76·14	79·43	80·67	82·00	82·47	77·90	76·84	76·63	76·35
6	76·62	76·81	76·70	76·15	79·38	80·45	82·06	82·45	77·72	76·90	76·63	76·16
7	76·68	76·55	76·46	76·15	79·52	80·43	82·07	82·45	77·92	76·80	76·55	76·48
8	76·70	76·45	76·32	76·49	79·45	80·57	82·28	82·37	77·96	76·73	76·62	76·49
9	76·70	76·75	76·62	77·78	79·40	80·60	82·35	82·30	77·95	76·80	76·70	76·46
10	76·43	76·76	76·68	78·22	79·10	80·67	82·42	82·05	77·95	76·59	76·65	76·54
11	76·35	76·80	76·57	78·31	79·17	80·70	82·31	82·00	77·92	76·50	76·65	76·57
12	76·63	76·79	76·48	78·33	79·24	80·72	82·25	81·98	77·74	76·65	76·70	76·56
13	76·66	76·81	78·42	78·69	79·53	80·54	82·40	81·91	77·59	76·70	76·65	76·57
14	76·73	76·53	76·23	78·77	79·55	80·55	82·35	81·95	77·80	76·70	76·65	76·63
15	76·74	76·47	76·19	78·87	79·53	80·65	82·33	81·84	77·90	76·71	76·66	76·63
16	76·74	76·78	76·28	78·99	79·45	80·67	82·35	81·75	77·98	76·70	76·70	76·65
17	76·53	76·78	76·29	79·02	79·24	80·70	82·31	81·80	77·90	76·46	76·70	76·65
18	76·41	76·78	76·29	78·90	79·80	80·73	82·22	81·80	77·85	76·47	76·70	76·68
19	76·67	76·83	76·29	78·75	80·42	80·77	82·16	81·71	77·72	76·56	76·65	76·67
20	76·76	76·79	76·30	79·05	81·17	80·65	82·27	81·60	77·65	76·60	76·67	76·58
21	76·78	76·55	76·12	79·22	81·50	80·76	82·28	81·11	77·78	76·60	76·60	76·65
22	76·81	76·45	76·11	79·18	81·40	80·70	82·27	80·00	77·80	76·61	76·62	76·68
23	76·82	76·75	76·22	79·28	80·87	81·11	82·25	79·68	77·78	76·60	76·65	76·70
24	76·56	76·80	76·22	79·33	80·76	80·95	82·22	79·33	77·78	76·90	76·63	76·65
25	76·45	76·78	76·28	79·28	80·77	81·01	82·32	79·21	77·89	76·67	76·65	76·39
26	76·73	76·80	76·35	79·20	80·77	81·05	82·32	78·58	77·66	76·64	76·65	76·12
27	76·83	76·83	76·35	79·39	80·79	80·98	82·52	78·40	77·58	76·67	76·65	76·40
28	76·84	76·45	76·18	79·38	80·77	81·00	82·59	78·27	77·80	76·65	76·63	76·55
29	76·85			79·42	80·75	81·20	82·65	78·03	77·85	76·67	76·50	76·60
30	76·82		76·45	79·42	80·67	81·67	82·65	77·98	77·87	76·67	76·65	76·65
31			76·51		80·56		82·61	77·90		76·65		76·65

Relation between gauge reading and datum:—
Zero of gauge = 959·02 W.P.S., Jan. 1—Dec. 31, 1914.
Zero of gauge = 959·03 W.P.S., Jan. 1—Dec. 31, 1915.
Gauge moved on 13th April, carried away on 9th May, replaced on 10th May, 1915.

WEST BRANCH WINNIPEG RIVER, TAILRACE NORMAN DAM.

HISTORY.

The staff gauge in the tailrace of the Norman dam was originally set in place by the Ontario Department of Public Works, but the taking of records on same was discontinued in 1907 or 1908. In October of 1913 the gauge was tied in to W.P.S. datum, and records have been taken since that time by this Survey.

LOCATION.

This staff gauge is secured to the north side of a timber crib at the lower end of the fish-way at the southerly end of the rock fill section of the Norman dam.

RECORDS AVAILABLE.

Records of daily readings on this gauge are available for the year 1913 from October 8 to the end of the year, with the exception of one day in October and six days in November. For the year 1914 the record is complete with the exception of ten days in September, and for 1915 with the exception of four days in December.

MEAN DAILY GAUGE HEIGHT IN FEET, OF WEST BRANCH WINNIPEG RIVER AT TAILRACE, NORMAN DAM, FOR 1913.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1											34·79	34·50
2												34·72
3											34·40	34·75
4											34·68	34·77
5											34·72	34·77
6											34·71	34·74
7												34·57
8										35·00	34·78	34·47
9										34·97		34·59
10										34·99	34·38	34·67
11											34·62	34·70
12										34·77	34·69	34·77
13										34·62	34·72	34·77
14										34·82	34·74	34·38
15										34·90	34·72	34·37
16										34·92	34·00	34·47
17										34·90	34·71	34·52
18										34·92	34·67	34·67
19										34·92	34·70	34·65
20										34·40	34·73	34·38
21										34·49	34·76	34·41
22										34·75	34·82	34·48
23										34·77		34·53
24										34·79	34·44	34·61
25										34·82	34·69	34·59
26										34·61	34·72	34·45
27										34·69	34·76	34·64
28										34·68	34·69	34·35
29										34·75	34·83	34·40
30										34·77		34·57
31										34·78		34·6'

Relation between gauge reading and datum:—
Zero of gauge = 1,000·00 W.P.S., datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF WEST BRANCH WINNIPEG RIVER AT TAILRACE, NORMAN DAM, FOR 1914 AND 1915.

1914

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	34·64	34·24	35·62	35·92	36·10	38·62	40·11	40·00	37·80	37·46	35·67	35·92
2	34·72	34·30	35·69	35·94	36·10	38·79	40·11	39·76	37·85	37·50	35·86	35·97
3	34·67	34·50	35·92	35·96	35·94	39·10	40·11	39·86	37·79	37·50	35·74	36·00
4	34·52	34·55	36·02	35·90	35·90	39·16	40·07	40·06	37·77	37·21	35·81	35·97
5	34·39	34·51	36·03	35·57	36·15	39·19	39·88	40·11	37·73	37·27	35·82	35·79
6	34·55	34·33	36·02	35·61	36·33	39·12	39·89	40·08	37·50	37·31	35·75	·35·56
7	34·54	34·47	36·02	35·80	36·43	39·17	39·97	40·08	37·64	37·27	35·68	35·80
8	34·56	34·50	35·80	35·88	36·50	39·27	40·03	40·08	37·54	37·18	35·51	35·72
9	34·65	34·45	35·87	35·84	36·58	39·50	40·07	39·71	....	37·10	35·77	35·72
10	34·70	34·60	36·02	35·82	36·47	39·56	40·11	39·78	....	36·95	35·82	35·73
11	34·47	34·67	36·07	35·82	36·49	39·59	40·11	39·86	....	36·81	35·82	35·72
12	34·42	34·70	36·07	35·47	36·58	39·86	39·86	39·90	....	36·73	35·82	35·72
13	34·60	34·64	36·08	35·44	36·69	39·59	39·96	39·87	....	36·70	35·82	35·97
14	34·58	34·58	36·07	35·55	36·70	39·47	40·15	39·78	....	36·67	35·82	35·97
15	34·63	34·38	35·82	35·67	36·68	39·44	40·26	39·69	37·66	36·61	35·72	35·77
16	34·67	34·43	35·82	35·71	36·65	39·67	40·30	39·47	37·64	36·60	35·80	35·72
17	34·64	34·64	35·95	35·67	36·42	39·72	40·31	39·49	37·61	36·33	35·92	35·77
18	34·40	34·68	36·07	35·68	36·44	39·79	40·29	39·61	37·62	36·07	36·12	35·67
19	34·40	34·72	36·07	35·77	36·59	39·78	40·06	39·61	37·63	36·18	35·97	35·75
20	34·48	34·74	36·03	35·89	36·73	39·73	40·08	39·57	....	36·20	36·07	35·85
21	34·47	34·87	36·02	35·89	36·89	39·69	40·12	39·55	....	36·41	35·95	35·65
22	34·42	34·87	35·80	35·90	37·40	39·67	40·12	39·54	....	36·45	35·70	35·70
23	34·55	34·79	35·77	35·90	37·50	39·85	40·11	39·45	....	36·20	35·71	35·70
24	34·46	35·24	35·90	35·87	37·30	40·02	40·08	39·51	37·52	36·20	35·82	35·67
25	34·37	35·67	35·97	35·82	37·45	40·12	39·97	39·53	37·63	35·85	35·86	35·75
26	34·33	35·84	35·98	36·00	37·62	40·14	39·88	39·29	37·65	35·77	35·82	35·70
27	34·47	35·87	36·03	36·00	37·85	40·08	39·92	38·98	37·25	35·87	35·82	35·63
28	34·50	35·97	36·01	36·00	38·22	40·13	40·11	38·53	37·25	35·83	35·82	35·56
29	34·60	....	35·82	36·00	38·57	40·13	40·11	38·36	37·37	35·85	35·60	35·74
30	34·62	....	35·77	36·00	38·76	40·09	40·08	37·96	37·41	35·90	35·62	35·70
31	34·47	....	35·92	....	38·66	....	40·05	38·12	....	35·90	....	35·70

1915

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	35·65	35·76	35·74	35·60	38·45	39·70	40·95	41·37	37·30	36·40	35·86	35·77
2	35·70	35·90	35·85	35·60	38·22	39·70	40·98	41·39	37·20	36·45	35·80	35·77
3	35·62	35·90	35·89	35·50	38·24	39·78	41·10	41·50	37·10	36·11	35·75	35·77
4	35·57	35·90	35·90	35·35	38·30	39·80	40·95	41·55	37·15	36·15	35·77	35·77
5	35·68	35·95	35·93	35·32	38·35	39·80	41·04	41·60	37·00	36·20	35·80	....
6	35·70	36·00	35·95	35·40	38·40	39·55	41·15	41·60	37·04	36·17	35·83	....
7	35·80	35·64	35·59	35·50	38·45	39·56	41·20	41·60	37·12	36·13	35·82	....
8	35·85	35·71	35·75	36·50	38·45	39·60	41·25	41·45	37·15	36·08	35·80	....
9	35·90	35·90	35·80	37·10	38·23	39·60	41·28	41·53	37·15	36·00	35·80	35·55
10	35·92	35·92	35·85	37·45	38·29	39·65	41·40	41·35	37·12	35·83	35·80	35·65
11	35·65	35·95	35·90	37·45	38·35	39·70	41·22	41·10	37·10	35·88	35·81	35·68
12	35·80	35·95	35·80	37·57	38·45	39·75	41·43	41·00	36·99	35·88	35·83	35·68
13	35·86	36·00	35·70	37·80	38·55	39·52	41·45	41·00	36·99	35·84	35·82	35·69
14	35·90	35·68	35·45	37·90	38·50	39·59	41·45	41·00	37·00	35·80	35·81	35·75
15	35·90	35·82	35·44	38·00	38·50	39·60	41·45	40·87	37·00	35·78	35·80	35·77
16	35·90	35·92	35·40	38·10	38·31	39·60	41·45	40·83	37·00	35·78	35·80	35·80
17	35·68	35·95	35·45	38·10	38·25	39·60	41·40	40·75	37·00	35·54	35·80	35·80
18	35·70	36·00	35·50	37·50	39·35	39·60	41·15	40·65	37·00	35·62	35·80	35·80
19	36·00	36·00	35·55	37·80	40·00	39·60	41·20	40·60	36·87	35·68	35·80	35·75
20	35·90	36·00	35·50	38·10	40·15	39·44	41·40	40·30	36·95	35·70	35·80	35·75
21	35·95	35·72	35·30	38·20	40·00	39·71	41·50	39·55	36·95	35·70	35·77	35·75
22	36·00	35·78	35·27	38·30	39·90	39·70	41·40	39·12	36·90	35·72	35·76	35·77
23	35·95	35·90	35·35	38·42	39·82	40·20	41·42	38·56	36·90	35·80	35·75	35·77
24	35·71	35·95	35·37	38·48	39·74	40·15	41·25	38·10	36·90	35·59	35·75	35·75
25	35·71	35·95	35·38	38·22	39·80	40·15	41·25	37·80	36·90	35·68	35·77	35·35
26	35·90	36·00	35·40	38·30	39·90	40·10	41·45	37·60	36·67	35·85	35·77	35·25
27	36·05	36·00	35·43	38·38	39·80	39·95	41·57	37·32	36·66	35·85	35·77	35·58
28	36·00	35·60	35·34	38·45	39·80	40·02	41·60	37·15	36·75	35·85	35·77	35·70
29	36·00	....	35·50	38·50	39·80	40·40	41·62	37·03	36·55	35·85	35·77	35·75
30	36·00	....	35·65	38·50	39·63	40·95	41·62	37·27	....	35·85	35·77	35·77
31	35·67	....	35·70	....	39·67	....	41·62	37·40	....	35·85	....	35·77

Relation between gauge reading and datum.—
Zero of gauge = 1,000·00 W.P.S. datum.

WESTERN OUTLET, LAKE OF THE WOODS (FOREBAY, NORMAN DAM).

HISTORY.

The staff gauge in the forebay of the Norman dam was originally set by the Ontario Department of Public Works. In June of 1913 the gauge was tied in to W.P.S. datum, and observations have been made on this gauge since that time by this Survey.

LOCATION.

This gauge is secured to the upstream side of the crib at the head of the fishway located at the southerly end of the rock fill section of the Norman dam.

RECORDS AVAILABLE.

During the year 1912, dating from June 6 and in 1913 to September 20, the readings available for this gauge are scattered, but from this latter date to the end of 1915 practically continuous daily readings are available.

DEPARTMENT OF THE INTERIOR

MEAN DAILY GAUGE HEIGHT, IN FEET, OF WESTERN OUTLET, LAKE OF THE WOODS FOREBAY, NORMAN DAM, FOR 1912 AND 1913.

1912

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1												
2												
3												
4										98·67		
5												
6						97·00						
7												
8												
9												
10									98·02			
11									98·16	98·80		
12									98·22	98·83		
13								97·82	98·22		98·65	
14								97·68			98·83	
15												
16									98·23		98·70	
17									98·22			
18										98·81		
19									98·27			
20												
21						97·03						
22									98·32			
23												
24												
25												
26									98·40			
27							97·53					
28							97·49					
29								97·92				
30							97·48					
31												

1913

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			98·76					98·06	58·06	58·42	58·73	58·67
2							97·00			58·51		58·69
3									57·92	58·46	58·57	58·71
4										58·33	58·74	58·73
5									57·92	58·03	58·79	58·63
6							97·92			58·44	58·63	58·58
7												58·55
8							98·00			58·48	58·56	58·65
9									58·11	58·42		58·64
10										58·75	58·52	58·62
11							98·53			58·68	58·75	58·64
12		98·38								58·54	58·52	58·61
13										58·73	58·57	58·62
14										58·69	58·62	58·63
15										58·56	58·65	58·61
16			98·95							58·60		58·63
17			99·00							58·71	58·63	58·64
18										58·61	59·49	58·61
19										58·48	58·66	58·64
20									57·32	58·40	58·67	58·59
21					97·00				57·42	58·59	58·57	58·60
22									57·87	58·75	58·56	58·60
23									58·29	58·69		58·59
24									58·25	58·55	58·53	58·60
25									58·27	58·58	58·46	58·59
26						96·82		58·00	58·26	58·53	58·53	58·58
27								58·12	58·54	58·75	58·67	58·59
28								57·96	58·52	58·77	58·57	58·61
29								57·98	58·37	58·52	58·65	58·59
30								58·06	58·50	58·62		58·59
31										58·73		58·59

Relation between gauge reading and datum:—
Zero of gauge = 960·27 W.P.S., June 6, 1912.
Zero of gauge = 960·28 W.P.S., Nov. 14, 1912.
Zero of gauge = 960·28 W.P.S., March 5, 1913.
Zero of gauge = 960·29 W.P.S., June 12, 1913.
Zero of gauge = 1,000·00 W.P.S., Aug. 26—Dec. 31.

MEAN DAILY GAUGE HEIGHT, IN FEET, OF WESTERN OUTLET, LAKE OF THE WOODS
FOREBAY, NORMAN DAM, FOR 1914 AND 1915.

1914

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	58·59	58·55	58·20	58·13	58·38	58·18	57·60	57·38	58·24	58·40	58·87	59·00
2	58·57	58·50	58·24	58·14	58·42	58·21	57·60	57·38	58·28	58·39	58·85	58·99
3	58·54	58·55	58·20	58·13	58·44	58·23	57·53	57·36	58·30	78·35	58·85	58·97
4	58·56	58·60	58·18	58·13	58·47	58·27	57·48	57·32	58·35	58·31	58·85	58·93
5	58·59	58·58	58·20	58·15	58·50	58·29	57·42	57·30	58·41	58·30	58·87	58·97
6	58·59	58·59	58·21	58·14	58·54	58·23	57·40	57·30	58·46	58·31	58·86	59·00
7	58·57	58·59	58·23	58·13	58·57	58·22	57·39	57·29	58·51	58·32	58·82	58·00
8	58·58	58·62	58·09	58·13	58·59	58·22	57·43	57·25	58·54	58·47	58·87	58·95
9	58·58	58·59	58·24	58·13	58·63	58·24	57·46	57·25	57·59	58·64	59·15	58·97
10	58·57	58·58	58·25	58·13	58·63	58·34	57·50	57·24	57·62	58·82	59·13	59·00
11	58·58	58·59	58·28	58·15	58·61	58·34	57·50	57·21	58·65	58·90	59·10	59·00
12	58·56	58·57	58·28	58·10	58·60	58·33	57·50	57·20	57·62	58·93	59·07	59·00
13	58·54	58·59	58·23	58·12	58·60	58·36	57·53	57·20	57·53	58·95	59·05	59·00
14	58·57	58·59	58·28	58·10	58·66	58·39	57·59	57·20	57·45	59·00	59·12	59·00
15	58·50	58·58	58·23	58·10	58·73	58·31	57·61	57·20	57·39	59·05	59·17	59·00
16	58·51	58·58	58·10	58·10	58·77	58·26	57·60	57·20	58·32	59·05	59·13	59·00
17	58·54	58·59	58·25	58·11	58·80	58·16	57·58	57·23	58·28	58·88	58·95	59·05
18	58·57	58·58	58·21	58·17	58·77	58·11	57·57	57·03	58·29	58·98	58·87	59·01
19	58·54	58·58	58·18	58·18	58·77	58·17	57·57	57·01	58·29	58·93	59·10	58·95
20	58·53	58·57	58·20	58·20	58·80	58·19	57·58	57·01	58·31	58·98	59·00	59·17
21	58·60	58·54	58·18	58·17	58·66	58·20	57·57	56·97	58·31	58·93	58·95	59·10
22	58·59	58·45	58·18	58·16	58·50	58·20	57·54	56·94	58·32	58·92	59·05	59·10
23	58·57	58·42	58·18	58·16	58·54	58·15	57·52	56·91	58·34	58·83	59·03	59·10
24	58·60	58·39	58·18	58·17	58·59	57·90	57·50	56·87	58·35	59·00	59·00	59·00
25	58·59	58·30	58·18	58·19	58·59	57·66	57·50	56·86	58·37	58·80	59·00	59·10
26	58·57	58·26	58·17	58·26	58·57	57·55	57·46	57·25	58·38	58·83	59·00	59·10
27	58·53	58·27	58·14	58·36	58·45	57·58	57·42	57·06	58·40	58·92	59·00	59·10
28	58·54	58·23	58·14	58·37	58·28	57·60	57·39	58·27	58·40	58·98	59·00	59·11
29	58·55	......	58·14	58·37	58·23	57·60	57·39	58·64	58·40	58·97	59·00	59·14
30	58·59	......	58·13	58·36	58·20	57·60	57·38	58·23	58·49	58·99	59·00	59·10
31	58·60	......	58·13	......	58·13	......	57·38	58·23	......	59·01	......	59·10

1915

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	59·10	59·08	59·00	58·90	58·25	57·50	56·85	55·70	58·32	58·70	58·68	58·56
2	59·06	59·10	59·05	58·90	58·25	57·50	56·85	55·70	58·38	58·87	58·62	58·56
3	59·05	59·07	59·03	58·90	58·27	57·50	56·85	55·70	58·45	59·00	58·59	58·56
4	59·01	59·10	59·00	59·00	58·30	57·48	56·81	55·68	58·50	59·00	58·63	58·56
5	59·00	59·12	59·00	59·02	58·30	57·45	56·87	55·68	58·50	59·00	58·68	
6	59·00	59·15	59·00	59·10	58·40	57·41	56·90	55·65	58·50	58·95	58·72	
7	59·03	59·13	59·00	59·00	58·45	57·40	56·95	55·65	58·48	59·90	58·75	
8	59·11	59·10	59·02	58·25	58·50	57·40	56·95	55·57	58·46	58·83	58·77	
9	59·09	59·15	59·08	58·25	58·50	57·40	56·98	55·97	58·48	58·79	58·78	58·56
10	59·10	59·12	59·03	58·30	58·46	57·45	56·98	56·20	58·50	58·72	58·78	58·54
11	59·11	59·10	59·00	58·22	58·40	57·50	56·99	56·40	58·52	58·69	58·75	58·54
12	59·11	59·10	59·00	58·25	58·45	57·55	56·99	56·35	58·55	58·65	58·61	58·57
13	59·13	59·10	59·00	58·25	58·50	57·55	57·00	56·35	58·55	58·62	58·60	58·58
14	59·05	59·10	59·00	58·25	58·48	57·60	57·00	56·10	58·45	58·65	58·58	58·58
15	59·10	59·10	58·92	58·20	58·45	57·60	57·03	56·00	58·33	58·65	58·57	58·56
16	59·10	59·12	58·95	58·20	58·41	57·60	56·93	55·87	58·20	58·63	58·58	58·61
17	59·10	59·15	58·95	58·20	58·37	57·80	56·90	56·10	58·25	58·60	58·58	58·63
18	59·10	59·15	58·95	58·20	57·50	57·90	56·88	56·20	58·28	58·57	58·56	58·63
19	59·10	59·15	58·95	58·20	56·25	57·60	56·90	56·30	58·31	58·52	58·56	58·63
20	59·10	59·12	58·95	58·25	55·90	57·61	56·90	56·50	58·35	58·48	58·56	58·62
21	59·05	59·11	58·95	58·30	56·50	57·65	56·90	57·72	58·35	58·45	58·56	58·61
22	59·02	59·11	58·95	58·32	56·90	57·55	56·94	58·28	58·40	58·49	58·55	58·61
23	59·02	59·10	58·95	58·35	57·57	57·55	56·95	58·47	58·10	58·55	58·54	58·61
24	59·00	59·12	58·95	58·37	57·52	57·55	56·60	58·55	58·12	58·63	58·55	58·63
25	59·06	59·12	59·95	58·39	57·50	57·55	56·26	58·58	58·15	58·71	58·55	58·55
26	59·10	59·12	58·95	58·35	57·60	57·68	55·90	58·60	58·19	58·77	58·56	58·65
27	59·15	59·12	58·95	58·28	57·60	57·80	55·78	58·55	58·27	58·78	58·56	58·66
28	59·10	59·00	58·95	58·25	57·50	57·96	55·75	58·50	58·35	58·77	58·56	58·61
29	59·10	......	59·02	58·20	57·50	57·25	55·73	58·42	58·48	58·76	58·56	58·63
30	59·10	......	59·05	58·25	57·50	56·85	55·70	58·34	58·58	58·75	58·56	58·63
31	59·09	......	59·05	......	57·50	......	55·70	58·25	......	58·75	......	58·66

Relation between gauge reading and datum:—
Zero of gauge = 1,000·00 W.P.S., datum.

KEEWATIN RIVER BRIDGE.

HISTORY.

The gauge at Keewatin river bridge was established on June 28, 1912, by S. S. Scovil, at the time of the establishment of a metering section on the Winnipeg river at north side of Tunnel island.

LOCATION.

This gauge is located on an upstream pile at the south end of the Keewatin river bridge, which is located one mile west of the metering section above referred to.

RECORDS AVAILABLE.

From the time of the installation of the gauge, daily readings have been taken, with the exception of December, 1912, and January, February and part of March, 1913, when readings were taken once a week.

SESSIONAL PAPER No. 25f

Mean Daily Gauge Height, in Feet, of West Branch Winnipeg River at Keewatin River Bridge, for 1912 and 1913.

1912

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1							72 28	72 87	73 03	73 57	76 09	76 06
2							72 23	72 88	72 98	73 60	76 06	75 62
3							72 55	72 91	73 13	73 63	76 01	76 08
4							72 62	72 66	73 25	73 92	75 94	
5							72 62	72 60	73 32	74 52	76 12	
6							72 67	72 81	73 28	74 61	76 04	
7							72 48	72 94	73 27	74 76	75 91	76 15
8							72 51	72 97	73 08	75 01	75 45	
9							72 57	72 99	73 03	75 05	75 33	
10							72 58	73 00	73 18	75 16	74 85	
11							72 61	72 82	73 23	75 28	74 83	
12							72 67	72 75	73 24	75 36	75 28	
13							72 72	72 95	73 31	75 21	75 65	
14							72 45	73 01	73 40	75 18	75 83	76 12
15							72 47	73 07	73 28	75 37	75 88	
16							72 60	73 09	73 21	75 48	75 91	
17							72 68	73 10	73 31	75 62	75 81	
18							72 72	72 95	73 34	75 88	75 82	
19							72 72	72 88	73 36	75 98	75 88	
20							72 76	73 48	73 37	75 84	75 90	
21							72 50	73 78	73 40	75 83	75 97	76 10
22							72 46	73 12	73 28	76 02	76 04	
23							72 65	73 17	73 22	76 04	76 14	
24							72 75	73 20	73 33	76 12	75 53	
25							72 82	73 02	73 39	76 07	75 51	
26							72 84	73 18	73 46	76 06	76 09	
27							72 70	73 08	73 52	75 93	76 15	
28							72 50	73 11	73 57	75 83	76 29	76 12
29						72 77	72 74	72 16	73 47	76 00	76 25	
30						72 47	72 85	73 21	73 47	76 04	76 24	
31							72 87	73 23		76 12		

1913

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		76 08		73 75	78 23	79 94	79 87	78 58	78 03	75 40	74 82	74 50
2				73 80	78 29	79 93	79 78	78 61	78 02	75 30	74 57	74 71
3				73 78	78 37	80 09	79 97	79 42	78 03	75 24	74 49	74 77
4	76 15			73 72	78 28	80 16	79 98	78 40	78 03	75 19	74 69	74 80
5				73 72	78 24	80 22	79 94	78 50	78 01	74 95	74 75	74 82
6				73 60	78 44	80 25	79 74	78 02	78 02	74 76	74 75	74 81
7				73 68	78 56	80 22	79 64	78 53	77 92	74 96	74 79	74 55
8		75 90		73 70	78 56	80 09	79 45	78 59	77 88	74 99	74 82	74 53
9				73 80	78 59	80 02	78 94	78 56	77 99	74 98	74 60	74 69
10			73 70	73 84	78 64	80 16	78 27	78 36	78 02	75 01	74 52	74 75
11	76 00		74 00	73 82	78 45	80 22	78 14	78 36	78 05	74 98	74 70	74 79
12			74 05	73 80	78 42	80 29	78 01	78 46	78 02	74 76	74 77	74 80
13			74 08	73 69	78 80	80 28	77 73	78 48	78 02	74 63	74 80	74 80
14			71 10	73 65	79 14	80 19	77 54	78 45	77 94	74 83	74 82	74 52
15		75 42	74 10	73 75	79 56	79 98	77 62	78 55	77 93	74 89	74 82	74 47
16			73 81	73 81	79 70	79 97	77 64	78 57	78 01	74 90	74 60	74 67
17			73 72	73 93	79 74	80 10	77 62	78 39	78 02	74 90	74 70	74 68
18	76 00		73 98	74 05	79 69	80 13	77 61	78 25	78 07	74 92	74 73	74 70
19			74 02	74 11	79 72	80 15	77 57	78 26	78 14	74 69	74 79	74 70
20			74 10	73 95	79 79	80 15	77 32	78 29	78 03	74 82	74 82	74 69
21			74 12	73 94	79 84	80 11	77 29	78 32	77 74	74 53	74 82	74 47
22			74 12	75 08	79 93	80 02	77 39	78 30	77 55	74 74	74 82	74 46
23			73 90	75 84	80 26	79 86	77 47	78 27	77 14	74 79	74 59	74 67
24			73 73	76 65	79 96	79 98	77 96	78 16	76 77	74 80	74 49	74 70
25	76 90		73 90	77 28	79 80	80 08	78 37	78 11	76 63	74 84	75 70	74 48
26			73 88	77 66	79 82	80 09	78 43	78 14	76 56	74 59	74 77	74 46
27			73 88	77 55	79 92	80 07	78 27	78 16	76 24	74 52	74 78	74 67
28			73 87	77 66	79 94	80 08	78 25	78 17	75 69	74 73	74 79	74 42
29			73 84	77 99	79 99	79 96	78 42	78 13	75 40	74 79	74 82	74 47
30			73 72	78 14	80 04	79 92	78 52	78 14	75 48	74 80	74 57	74 63
31			73 62		80 08		78 58	78 03		74 81		74 72

Relation between gauge reading and datum:—
   Zero of gauge = 959·86 W.P.S. datum, July 1—December 31.
   Zero of gauge = 959·86 W.P.S. datum, Jan. 1—July 17.
   Zero of gauge = 959·88 W.P.S. datum, July 17—Dec. 31.

Mean Daily Gauge Height, in Feet, of West Branch Winnipeg River at Keewatin River Bridge, for 1914 and 1915.

1914.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	34·62	34·31	35·68	35·79	35·96	38·55	40·01	39·99	37·69	37·39	35·57	35·70
2	34·65	34·25	35·65	35·84	36·00	38·72	39·85	39·76	37·65	37·38	35·49	35·75
3	34·67	34·43	35·79	35·88	35·86	39·05	39·90	39·80	37·48	37·38	35·57	35·77
4	34·48	34·51	35·80	35·90	35·86	39·07	39·90	39·95	37·41	37·23	35·55	35·77
5	34·36	34·56	35·82	35·73	36·04	39·10	39·87	40·00	37·37	37·11	35·51	35·79
6	34·45	34·41	35·70	35·79	36·15	39·06	39·86	39·91	37·32	37·21	35·52	35·73
7	34·47	34·38	35·88	35·79	36·32	38·89	39·93	39·88	37·31	37·23	35·51	35·56
8	34·51	34·30	35·74	35·82	36·40	38·99	40·07	39·88	37·32	37·23	35·42	35·64
9	34·58	34·33	35·72	35·77	36·38	39·33	40·14	39·70	37·35	37·26	35·46	35·62
10	34·65	34·50	35·90	35·64	36·23	39·48	40·12	39·60	37·41	37·33	35·63	35·61
11	34·47	34·55	35·96	35·64	36·22	39·48	40·11	39·69	37·35	37·34	35·65	35·61
12	34·40	34·58	36·01	35·53	36·40	39·50	40·00	39·71	37·36	37·16	35·67	35·68
13	34·52	34·59	36·03	35·50	36·47	39·54	39·98	39·71	37·25	37·18	35·71	35·53
14	34·62	34·60	36·03	35·64	36·50	39·39	40·14	39·68	37·24	37·22	35·73	35·51
15	34·63	34·43	35·82	35·77	36·52	39·35	40·19	39·67	37·37	36·63	35·59	35·63
16	34·64	34·34	35·76	35·73	36·45	39·50	40·23	39·53	37·42	36·40	35·53	35·64
17	34·58	34·49	35·92	35·58	36·21	39·52	40·28	39·43	37·42	36·24	35·68	35·65
18	34·35	34·53	35·98	35·61	36·31	39·55	40·30	39·55	37·42	36·02	35·70	35·60
19	34·24	34·58	35·98	35·55	36·47	39·68	40·00	39·60	37·49	35·89	35·67	35·61
20	34·42	34·59	36·00	35·61	36·57	39·83	40·07	39·62	37·45	36·03	35·69	35·49
21	34·48	34·69	36·00	35·83	36·79	39·73	40·19	39·66	37·38	36·05	35·69	35·47
22	34·41	34·69	35·79	35·91	37·25	39·59	40·22	39·67	37·43	36·06	35·56	35·60
23	34·35	34·81	35·72	35·83	37·33	39·79	40·24	39·44	37·47	36·01	35·49	35·60
24	34·34	35·31	35·86	35·74	37·20	39·90	40·24	39·34	37·48	35·92	35·62	35·61
25	34·19	35·44	35·92	35·72	37·30	40·02	40·13	39·43	37·48	35·73	35·68	35·55
26	34·21	35·58	35·95	35·64	37·53	40·15	39·92	39·12	37·48	35·52	35·70	35·51
27	34·45	35·73	35·95	35·65	37·87	40·13	39·88	38·64	37·23	35·69	35·71	35·42
28	34·50	35·85	35·92	35·80	38·25	40·02	40·06	38·24	37·10	35·72	35·70	35·45
29	34·53	......	35·78	35·87	38·48	39·98	40·10	38·09	37·28	35·76	35·50	35·56
30	34·54	......	35·67	35·95	38·66	40·05	40·12	37·89	37·31	35·86	35·51	35·63
31	34·55	......	35·77	......	38·66	......	40·12	37·77	......	35·86	......	35·65

1915

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	35·48	35·61	35·56	35·41	38·47	39·71	40·92	41·53	37·00	36·30	35·65	35·67
2	35·48	35·78	35·74	35·34	38·42	39·72	40·98	41·47	37·09	36·16	35·63	35·66
3	35·52	35·82	35·75	35·35	38·20	39·69	41·09	41·56	37·10	35·83	35·64	35·67
4	35·49	35·82	35·76	35·24	38·38	39·67	41·09	41·53	37·05	35·62	35·66	35·65
5	35·61	35·84	35·77	35·17	38·41	39·65	41·17	41·51	36·94	35·84	35·66	35·39
6	35·66	35·84	35·77	35·20	38·44	39·55	41·20	41·49	36·78	35·91	35·65	35·28
7	35·71	35·65	35·61	35·29	38·53	39·55	41·29	41·47	36·93	35·87	35·63	35·51
8	35·75	35·60	35·51	35·96	38·50	39·62	41·40	41·38	36·97	35·85	35·64	35·51
9	35·76	35·81	35·72	36·91	38·36	39·69	41·45	41·30	36·96	35·84	35·69	35·49
10	35·62	35·82	35·76	37·32	38·29	39·75	41·48	41·14	36·97	35·62	35·72	35·55
11	35·53	35·85	35·60	37·38	38·43	39·75	41·40	41·04	36·94	35·55	35·71	35·60
12	35·70	35·85	35·53	37·50	38·53	39·73	41·36	40·99	36·78	35·69	35·70	35·57
13	35·75	35·85	35·50	37·74	38·58	39·59	41·44	40·97	36·70	35·73	35·67	35·60
14	35·79	35·65	35·34	37·86	38·62	39·61	41·41	40·98	36·84	35·74	35·65	35·67
15	35·79	35·62	35·30	37·95	38·61	39·69	41·40	40·89	36·72	35·74	35·69	35·69
16	35·80	35·83	35·35	38·03	38·41	39·72	41·39	40·79	36·95	35·73	35·71	35·73
17	35·62	35·84	35·33	38·09	38·40	39·74	41·37	40·83	36·95	35·52	35·72	35·77
18	35·56	35·85	35·33	37·96	39·03	39·77	41·28	40·79	36·93	35·51	35·73	35·77
19	35·76	35·88	35·34	37·94	39·70	39·77	41·26	40·74	36·75	35·61	35·73	35·70
20	35·81	35·84	35·35	38·15	40·28	39·70	41·38	40·55	36·66	35·61	35·72	35·66
21	35·84	35·67	35·22	38·18	40·54	39·76	41·33	39·91	36·77	35·62	35·69	35·73
22	35·83	35·60	35·18	38·24	40·35	39·90	41·31	39·07	36·86	35·64	35·69	35·74
23	35·83	35·80	35·26	38·33	39·94	39·99	41·29	38·66	36·93	35·66	35·69	35·74
24	35·66	35·83	35·31	38·44	39·80	40·01	41·27	38·35	36·85	35·65	35·67	35·69
25	35·62	35·83	35·35	38·28	39·82	40·05	41·37	38·02	36·89	35·69	35·67	35·42
26	35·82	35·86	35·38	38·24	39·82	40·02	41·45	37·58	36·71	35·69	35·65	35·15
27	35·84	35·86	35·38	38·42	39·84	39·99	41·57	37·41	36·63	35·69	35·65	35·45
28	35·86	35·64	35·24	38·46	39·82	40·09	41·65	37·24	36·84	35·70	35·63	35·59
29	35·87	......	35·29	38·48	39·81	40·35	41·69	37·07	36·88	35·71	35·63	35·64
30	35·86	......	35·50	38·49	39·67	40·67	41·68	37·08	36·73	35·71	35·65	35·72
31	35·67	......	35·53	......	39·65	......	41·65	36·98	......	35·67	......	35·74

Relation between gauge reading and datum:—
Zero of gauge = 1,000·00 W.P.S. datum, Jan. 1 —Dec. 31, 1914, 1915.

KENORA POWER HOUSE, EAST BRANCH WINNIPEG RIVER HEAD AND TAILRACE GAUGES.

HISTORY.

The present tailrace gauge of the Kenora Power House was set in place by the employees of the Power House in the Fall of 1910.

The headrace gauge was set in place in August of 1907, though the location has been slightly changed since that time.

On June 24, 1912, both of these gauges were tied in to W.P.S. datum and records of daily gauge height have been taken since May 1, 1913, by members of this Survey.

LOCATION.

The tailrace gauge at the Kenora Power House is located about fifty feet downstream from the easterly end of the generator room.

The headrace gauge is placed at the easterly end of the forebay about thirty feet above the rocks at the head gates of the plant.

RECORDS AVAILABLE.

From May 1, 1913, continuous daily dauge readings on these two gauges are available.

MEAN DAILY GAUGE HEIGHT, IN FEET, AND MEAN DAILY DISCHARGE, IN FEET PER SEC.,
OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE,
FOR MAY, JUNE, JULY AND AUGUST, 1913.

MAY / JULY

Day.	Headrace Gauge.	Tailrace Gauge	Head in feet.	Discharge c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge c. f. s.
1	98·27	76·35	21·92	1,230	98·35	77·86	20·49	713
2	98·28	76·39	21·89	1,217	98·15	77·66	20·49	930
3	98·31	76·41	21·90	1,219	98·20	78·01	20·19	1,369
4	98·54	76·18	22·36	679	97·90	77·98	19·92	1,353
5	98·41	76·16	22·25	898	97·80	77·81	19·99	820
6	98·36	76·54	21·82	1,170	98·02	77·66	20·36	701
7	98·40	76·69	21·71	1,206	98·07	77·50	20·57	738
8	98·20	76·69	21·51	1,192	98·03	77·61	20·42	1,211
9	98·33	76·72	21·61	1,202	97·68	77·30	20·38	1,296
10	98·42	76·78	21·64	1,197	98·07	77·18	20·89	1,267
11	98·61	76·52	22·09	725	98·23	76·49	21·74	1,233
12	98·39	76·41	21·98	945	98·13	76·33	21·80	1,233
13	98·21	76·81	21·40	1,257	98·17	75·92	22·25	726
14	98·37	77·17	21·20	1,267	98·14	75·87	22·27	1,009
15	98·33	77·52	20·81	1,280	98·29	76·00	22·29	1,207
16	98·40	77·70	20·70	1,287	98·25	76·01	22·24	1,216
17	98·30	77·82	20·48	1,301	98·23	75·98	22·25	1,216
18	98·31	77·68	20·63	763	98·25	76·00	22·25	1,238
19	98·36	77·60	20·76	708	98·18	75·98	22·20	925
20	98·34	77·60	20·74	744	98·28	74·40	23·88	602
21	98·16	77·81	20·35	1,110	98·43	75·30	23·13	653
22	98·34	77·90	20·44	1,290	98·38	75·29	23·09	657
23	98·41	77·95	20·46	1,304	98·21	75·37	22·84	658
24	98·15	77·81	20·34	783	98·29	76·05	22·24	861
25	98·90	77·68	21·22	685	98·46	76·39	22·07	846
26	98·46	77·71	20·75	718	98·33	76·53	21·80	890
27	98·46	77·77	20·69	735	98·23	76·20	22·03	643
28	98·28	77·89	20·39	1,045	98·38	76·40	21·98	848
29	98·28	77·91	20·37	1,278	98·31	76·60	21·71	927
30	98·22	77·97	20·25	1,330	98·34	76·69	21·65	909
31	98·35	78·00	20·35	1,274	98·30	76·70	21·60	821

JUNE / AUGUST

Day.	Headrace Gauge.	Tailrace Gauge	Head in feet.	Discharge c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge c. f. s.
1	98·24	77·86	20·38	771	98·32	76·70	21·62	845
2	98·36	77·78	20·58	879	98·30	76·60	21·70	874
3	98·16	78·08	20·08	1,314	98·18	76·37	21·81	665
4	98·42	78·20	20·22	1,300	98·20	76·50	21·70	860
5	98·31	78·20	20·11	1,314	98·04	76·40	21·64	711
6	97·92	78·26	19·66	1,352	98·15	76·37	21·78	697
7	98·23	78·21	20·02	1,326	98·37	76·36	22·01	689
8	98·37	78·05	20·32	767	98·29	76·50	21·79	682
9	98·48	77·87	20·61	907	98·14	76·49	21·65	715
10	98·52	78·20	20·32	1,291	98·11	76·23	21·88	681
11	98·49	78·26	20·23	1,297	98·31	76·20	22·11	714
12	98·58	78·15	20·23	834	98·15	76·38	21·77	700
13	98·31	78·10	20·21	742	98·21	76·32	21·89	690
14	98·37	78·02	20·35	728	98·12	76·37	21·75	697
15	98·33	77·93	20·40	699	98·03	76·49	21·54	709
16	98·28	77·80	20·48	734	98·07	76·48	21·59	713
17	98·12	77·99	20·13	1,115	98·02	76·33	21·69	697
18	98·22	78·10	20·12	1,319	98·01	76·18	21·83	697
19	98·16	78·18	19·98	1,325	98·17	76·20	21·97	702
20	98·11	78·12	19·99	1,331	98·10	76·21	21·89	694
21	98·08	78·14	19·94	1,331	98·09	76·21	21·88	687
22	98·17	77·92	20·25	785	98·02	76·29	21·73	706
23	98·32	77·87	20·45	1,104	98·07	76·20	21·87	697
24	98·24	77·98	20·26	1,227	98·09	76·05	22·04	677
25	98·18	78·10	20·08	1,316	98·14	76·09	22·05	688
26	97·96	78·11	19·85	1,342	97·94	76·10	21·84	694
27	97·81	78·07	19·74	1,400	98·06	76·03	22·03	705
28	98·07	78·11	19·96	1,348	97·90	76·11	21·79	695
29	98·08	77·92	20·16	782	97·90	76·08	21·82	701
30	98·30	77·91	20·39	737	98·01	76·06	21·95	699
31					97·90	75·95	21·95	666

Relation between gauge reading and datum:—
Zero of headrace and tailrace guages = 961·365 W.P.S. datum.

SESSIONAL PAPER No. 25f

MEAN DAILY GAUGE HEIGHT, IN FEET, AND MEAN DAILY DISCHARGE, IN FEET PER SEC.,
OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE,
FOR SEPTEMBER, OCTOBER, NOVEMBER AND DECEMBER, 1913.

Day.	SEPTEMBER				NOVEMBER			
	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge c. f. s.
1	98·04	75·89	22·15	672	58·87	36·32	22·55	1,345
2	97·83	75·95	21·88	689	58·64	35·54	23·10	715
3	97·77	75·94	21·83	699	58·73	35·90	22·83	1,130
4	97·98	75·98	22·00	704	58·85	36·32	22·53	1,315
5	97·98	75·95	22·03	702	58·95	36·32	22·63	1,310
6	97·80	75·98	21·82	695	58·74	36·32	22·42	1,330
7	97·71	75·88	21·83	661	58·53	36·44	22·09	1,370
8	97·72	75·80	21·92	692	58·58	36·42	22·16	1,375
9	98·06	75·88	22·18	697	58·71	35·46	23·25	735
10	97·87	76·03	21·84	703	58·66	35·82	22·84	1,135
11	97·77	76·05	21·72	717	58·92	36·31	22·61	1,355
12	97·63	76·03	21·60	727	58·71	36·31	22·40	1,335
13	97·62	76·00	21·62	728	58·80	36·33	22·47	1,370
14	97·83	75·90	21·93	674	58·72	36·40	22·32	1,350
15	97·68	75·82	21·86	698	58·80	36·33	22·47	1,370
16	97·56	75·95	21·61	727	59·02	35·49	23·53	695
17	97·61	75·99	21·62	733	58·71	36·42	22·29	1,390
18	97·74	75·98	21·76	720	58·82	36·32	22·50	1,350
19	97·81	76·12	21·69	813	58·82	36·38	22·44	1,385
20	97·00	76·29	20·71	1,210	58·62	36·38	22·24	1,370
21	96·94	75·85	21·09	786	58·82	35·74	23·08	1,055
22	97·30	75·98	21·32	1,159	58·88	35·64	23·24	1,330
23	97·39	75·77	21·62	1,339	58·97	35·40	23·57	720
24	97·29	75·50	21·79	1,348	58·75	36·34	22·41	1,225
25	97·30	75·40	21·90	1,325	58·70	36·34	22·36	1,360
26	97·38	75·30	22·08	1,320	58·73	36·42	22·31	1,390
27	97·42	75·20	22·22	1,313	58·79	36·41	22·38	1,395
28	58·91	35·65	23·26	709	58·71	36·38	22·33	1,375
29	58·53	36·32	22·21	1,120	58·79	36·44	22·35	1,400
30	58·70	36·38	22·32	1,241	58·80	35·45	23·35	740

Day.	OCTOBER				DECEMBER			
1	58·59	36·35	22·24	1,305	58·75	36·34	22·41	1,235
2	58·62	36·38	22·24	1,310	58·73	36·43	22·30	1,380
3	58·68	36·34	22·34	1,300	58·78	36·45	22·33	1,405
4	58·52	36·33	22·19	1,335	58·80	36·40	22·40	1,390
5	58·27	35·40	22·87	735	58·74	36·38	22·36	1,375
6	58·57	35·76	22·81	1,065	58·75	36·43	22·32	1,415
7	58·91	36·31	22·60	1,305	58·51	35·54	22·97	825
8	58·52	36·32	22·20	1,350	58·80	36·45	22·35	1,275
9	58·58	36·33	22·25	1,335	58·76	36·32	22·44	1,390
10	58·85	36·33	22·52	1,240	58·72	36·47	22·25	1,410
11	58·83	36·36	22·47	1,310	58·72	36·40	22·32	1,405
12	58·74	35·31	23·43	690	58·71	36·38	22·33	1,405
13	58·88	36·30	22·58	1,145	58·71	36·40	22·31	1,270
14	58·81	36·31	22·50	1,340	58·82	35·52	23·30	710
15	58·71	36·36	22·35	1,350	58·77	35·90	22·87	835
16	58·71	36·38	22·33	1,350	58·84	35·51	23·33	805
17	58·92	36·35	22·57	1,290	58·78	35·94	22·84	1,130
18	58·73	36·42	22·31	1,355	58·72	36·42	22·30	1,355
19	58·64	35·40	23·24	720	58·73	35·93	22·80	945
20	58·54	35·88	22·66	1,160	58·75	35·90	22·85	1,015
21	58·71	36·38	22·33	1,395	58·78	35·68	23·10	930
22	58·92	36·33	22·59	1,345	58·70	35·94	22·76	990
23	58·74	36·40	22·34	1,375	58·70	36·42	22·28	1,330
24	58·72	36·36	22·36	1,345	58·70	36·54	22·16	1,480
25	58·72	36·46	22·26	1,370	58·71	35·76	22·95	1,070
26	58·73	35·36	23·37	765	58·70	36·43	22·27	1,350
27	58·76	35·92	22·84	1,150	58·68	36·42	22·26	1,455
28	58·30	36·45	21·85	1,415	58·73	35·71	23·02	1,000
29	58·67	36·43	22·24	1,375	58·72	35·94	22·78	1,290
30	58·78	36·42	22·36	1,380	58·71	36·47	22·24	1,440
31	58·82	36·34	22·48	1,355	58·67	36·53	22·14	1,495

Relation between gauge reading and datum:
Zero of headrace and tailrace gauges = 961·365 W.P.S. datum Sept. 27 and 1,000·00 W.P.S. datum
Sept. 28 and October.

MEAN DAILY GAUGE HEIGHT, IN FEET, AND MEAN DAILY DISCHARGE, IN FEET PER SEC.,
OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE,
FOR JANUARY, FEBRUARY, MARCH AND APRIL, 1914.

JANUARY / MARCH

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s
1	58·64	36·49	22·15	1,430	58·76	35·80	22·96	940
2	58·66	36·46	22·20	1,420	58·76	36·40	22·37	1,205
3	58·64	36·42	22·22	1,395	58·78	36·50	22·28	1,145
4	58·60	35·60	23·00	935	58·75	36·50	22·25	1,115
5	58·72	35·98	22·74	920	58·60	36·52	22·08	1,130
6	58·70	35·81	22·89	880	58·62	36·50	22·12	1,100
7	58·73	35·68	23·05	840	58·63	36·52	22·11	1,140
8	58·68	36·32	22·36	1,225	58·66	35·84	22·82	810
9	58·68	36·41	22·27	1,395	58·62	36·52	22·10	1,230
10	58·70	36·43	22·27	1,380	58·58	36·52	22·06	1,255
11	58·72	35·85	22·87	1,080	58·63	36·57	22·06	1,260
12	58·70	36·43	22·27	1,330	58·59	36·52	22·07	1,230
13	58·68	36·48	22·20	1,515	58·63	36·51	22·12	1,180
14	58·68	36·41	22·27	1,385	58·64	36·47	22·17	1,135
15	58·68	36·30	22·38	1,315	58·70	35·74	22·96	700
16	58·68	35·91	22·77	1,045	58·62	36·07	22·55	830
17	58·71	35·81	22·90	910	58·55	36·51	22·04	1,180
18	58·73	35·52	23·21	810	58·56	36·38	22·18	1,130
19	58·72	35·71	23·01	795	58·58	36·10	22·48	890
20	58·67	35·80	22·87	895	58·53	36·48	22·05	1,125
21	58·73	35·87	22·86	945	58·53	36·50	22·03	1,135
22	58·68	35·83	22·85	970	58·61	35·84	22·77	800
23	58·67	35·79	22·88	945	58·55	36·46	22·00	1,085
24	58·60	35·50	23·10	1,005	58·54	36·50	22·04	1,075
25	58·73	35·62	23·11	925	58·47	36·54	21·93	980
26	58·70	35·90	22·80	965	58·57	36·03	22·54	880
27	58·72	35·79	22·93	965	58·56	35·98	22·58	865
28	58·69	35·90	22·79	965	58·60	35·97	22·63	815
29	58·76	35·93	22·83	995	58·60	35·73	22·87	710
30	58·76	35·90	22·86	1,025	58·59	35·84	22·75	720
31	58·80	35·88	22·92	1,025	58·60	35·70	22·90	710

FEBRUARY / APRIL

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s
1	58·78	35·83	22·95	945	58·61	35·72	22·89	710
2	58·74	35·76	22·98	885	58·61	35·72	22·89	740
3	58·74	35·78	22·96	960	58·64	35·83	22·81	775
4	58·77	35·94	22·83	985	58·62	35·86	22·76	805
5	58·74	35·92	22·82	1,030	58·62	35·72	22·90	735
6	58·75	35·93	22·82	1,005	58·63	35·72	22·91	790
7	58·75	35·93	22·82	1,060	58·53	35·88	22·65	855
8	58·80	35·72	23·08	955	58·57	35·87	22·70	830
9	58·76	35·93	22·83	1,045	58·61	35·83	22·78	765
10	58·74	35·90	22·84	1,075	58·61	35·58	23·03	700
11	58·76	35·92	22·84	1,100	58·62	35·78	22·84	770
12	58·74	35·94	22·80	1,085	58·51	35·67	22·84	735
13	58·76	35·87	22·89	1,070	58·56	35·70	22·86	750
14	58·76	35·92	22·84	1,045	58·55	35·71	22·84	725
15	58·73	35·67	23·06	960	58·52	36·20	22·32	800
16	58·75	35·88	22·87	995	58·53	36·42	22·11	920
17	58·74	35·81	22·93	1,000	58·50	36·35	22·15	935
18	58·76	35·81	22·95	955	58·50	36·29	22·21	970
19	58·76	35·85	22·91	1,010	58·64	35·60	23·04	685
20	58·76	35·91	22·85	1,035	58·64	36·37	22·27	935
21	58·77	35·87	22·90	1,015	58·67	36·37	22·30	855
22	58·75	35·82	22·93	1,000	58·71	35·76	22·95	685
23	58·75	35·90	22·85	1,050	58·71	35·72	22·99	690
24	58·80	35·86	22·94	995	58·74	35·70	23·04	685
25	58·74	35·89	22·85	935	58·78	35·66	23·12	695
26	58·75	35·84	22·91	890	58·82	35·51	23·31	640
27	58·78	35·95	22·83	880	58·78	35·71	23·07	685
28	58·78	36·45	22·33	1,180	58·71	35·78	22·93	710
29					58·80	35·84	22·96	690
30					58·84	35·74	23·10	680

Relation between gauge reading and datum:—
Zero of headrace and tailrace gauges = 1,000·00 W.P.S. datum.

SESSIONAL PAPER No. 25f

MEAN DAILY GAUGE HEIGHT, IN FEET, AND MEAN DAILY DISCHARGE, IN FEET PER SEC.
OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE,
FOR MAY, JUNE, JULY AND AUGUST, 1914.

MAY — JULY

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge c. f. s.
1	58.88	35.75	23.13	670	59.75	39.41	20.34	705
2	58.92	35.66	23.26	660	59.95	39.27	20.68	710
3	58.92	35.64	23.28	650	59.90	39.31	20.59	720
4	58.93	35.57	23.36	645	59.81	39.33	20.48	765
5	58.96	35.74	23.22	670	59.84	39.36	20.48	800
6	59.02	36.50	23.52	840	59.98	39.28	20.70	760
7	59.03	36.52	23.51	845	59.59	39.36	20.23	760
8	59.12	36.54	23.58	805	59.83	39.50	20.33	940
9	59.15	36.64	23.51	850	59.84	39.50	20.34	725
10	59.05	35.92	23.13	645	59.68	39.58	20.10	965
11	59.10	36.53	22.57	915	59.72	39.62	20.10	805
12	59.17	36.60	22.57	960	59.87	39.43	20.44	675
13	59.16	36.69	22.47	955	59.73	39.30	20.43	715
14	59.14	36.68	22.46	940	59.85	39.43	20.42	720
15	59.27	36.22	23.05	690	59.98	39.50	20.48	725
16	59.24	36.71	22.53	915	60.07	39.60	20.47	735
17	59.40	35.87	23.53	630	59.61	39.57	20.04	760
18	59.37	36.04	23.33	655	59.88	39.73	20.15	1,005
19	59.30	36.57	22.73	870	59.87	39.50	20.37	675
20	59.34	36.72	22.62	865	59.87	39.58	20.29	900
21	59.33	36.73	22.60	890	59.91	39.50	20.41	740
22	59.36	37.08	22.28	895	59.77	39.53	20.24	750
23	59.40	37.23	22.17	915	59.86	39.56	20.30	740
24	59.54	36.66	22.88	625	59.82	39.54	20.28	740
25	59.58	36.72	22.86	645	59.85	39.54	20.31	725
26	59.52	37.31	22.21	895	59.87	39.33	20.54	675
27	59.54	37.45	22.09	890	59.72	39.32	20.40	730
28	59.57	37.73	21.84	860	59.85	39.54	20.31	740
29	59.54	38.06	21.48	870	59.88	39.45	20.43	750
30	59.65	38.23	21.42	895	59.75	39.50	20.25	770
31	59.66	38.02	21.64	650	59.63	39.47	20.16	755

JUNE — AUGUST

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge c. f. s.
1	59.67	38.10	21.57	860	59.71	39.46	20.25	755
2	59.72	38.34	21.38	910	59.58	39.17	20.41	690
3	59.68	38.68	21.00	915	59.78	39.17	20.61	750
4	59.56	38.68	20.88	880	59.58	39.31	20.27	955
5	59.74	38.71	21.03	935	59.54	39.54	20.00	975
6	59.71	38.71	21.00	900	59.31	39.50	19.81	990
7	59.73	38.33	21.40	630	59.46	39.27	20.19	750
8	59.71	38.54	21.17	870	59.50	39.28	20.22	750
9	59.87	38.91	20.96	880	59.46	39.11	20.35	685
10	59.98	39.10	20.88	885	59.10	38.95	20.15	745
11	59.88	39.10	20.78	915	59.30	39.07	20.23	755
12	59.94	39.10	20.84	880	59.34	39.10	20.24	755
13	59.94	39.12	20.82	965	59.23	39.10	20.13	760
14	60.02	38.88	21.14	635	59.13	39.07	20.06	755
15	59.91	38.90	21.01	870	59.13	39.06	20.07	755
16	60.02	39.07	20.95	860	59.12	38.92	20.20	705
17	60.09	39.12	20.97	860	59.12	38.92	20.20	765
18	59.74	39.14	20.60	885	59.11	38.93	20.18	785
19	59.94	39.23	20.71	885	59.06	39.12	19.94	990
20	60.16	39.32	20.84	865	59.07	39.20	19.87	1,245
21	59.88	39.08	20.80	660	59.02	39.24	19.78	1,255
22	60.03	39.13	20.90	925	59.07	39.20	19.87	1,010
23	60.10	39.30	20.80	1,045	58.72	38.90	19.82	720
24	59.90	39.48	20.42	1,000	58.92	38.90	20.02	1,260
25	59.73	39.64	20.09	1,000	58.82	39.07	19.75	1,340
26	59.78	39.70	20.08	1,015	58.88	38.89	19.99	1,090
27	59.63	39.68	19.95	995	58.98	38.52	20.46	1,240
28	59.84	39.45	20.39	675	59.07	38.13	20.94	1,220
29	59.87	39.30	20.57	720	59.14	37.77	21.37	725
30	59.87	39.44	20.43	735	59.02	37.49	21.53	675
					59.07	37.48	21.59	725

Relation between gauge reading and datum:—
  Zero of headrace and tailrace gauges = 1,000.00 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, AND MEAN DAILY DISCHARGE, IN FEET PER SEC., OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE, FOR SEPTEMBER, OCTOBER, NOVEMBER AND DECEMBER, 1914.

SEPTEMBER — NOVEMBER

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s
1	58·98	37·58	21·40	990	59·26	35·52	23·74	651
2	58·94	37·28	21·66	710	59·50	35·78	23·72	867
3	58·68	37·12	21·56	710	59·44	36·30	23·14	927
4	58·98	36·98	22·00	700	59·30	36·29	23·01	940
5	58·88	37·30	21·58	990	59·28	36·28	23·00	934
6	58·80	36·82	21·98	665	59·41	36·31	22·10	945
7	58·85	37·28	21·57	940	59·12	36·39	22·73	958
8	58·88	37·28	21·60	1,180	59·48	35·57	23·91	702
9	59·03	37·29	21·74	980	59·45	35·87	23·58	744
10	59·01	37·30	21·71	1,090	59·37	36·31	23·06	983
11	59·00	36·93	22·07	720	59·27	36·34	22·93	957
12	59·10	37·27	21·83	890	59·32	36·36	22·96	970
13	59·26	36·80	22·46	650	59·32	36·37	22·95	955
14	58·94	37·16	21·78	1,180	59·25	36·34	22·91	963
15	59·11	37·28	21·83	990	59·50	35·71	23·79	747
16	59·13	37·30	21·83	1,150	59·32	35·89	23·43	938
17	59·03	37·30	21·73	940	59·31	36·34	22·97	1,015
18	59·18	37·32	21·86	1,160	59·28	36·39	22·89	1,044
19	59·25	37·32	21·93	860	59·31	36·37	22·94	1,035
20	59·20	36·90	22·30	635	59·36	36·39	22·97	1,034
21	59·18	37·15	22·03	900	59·30	36·37	22·93	984
22	58·92	37·37	21·55	1,115	59·41	35·70	23·71	745
23	59·14	37·34	21·80	875	59·47	35·88	23·59	944
24	58·90	37·34	21·56	1,100	59·42	36·26	23·16	964
25	59·12	37·35	21·77	890	59·41	36·21	23·20	1,102
26	59·14	37·32	21·82	810	59·36	36·31	23·05	948
27	59·14	36·77	21·37	655	59·34	36·35	22·99	995
28	59·10	37·10	22·00	885	59·38	36·31	23·07	956
29	59·02	37·25	21·77	895	59·47	35·36	24·11	672
30	59·13	37·26	21·87	905	59·41	35·77	23·64	909

OCTOBER — DECEMBER

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s
1	59·18	37·24	21·94	870	59·38	36·33	23·05	959
2	59·25	37·25	22·00	870	59·44	36·39	23·05	999
3	59·14	37·27	21·87	910	59·42	36·34	23·08	1,003
4	59·14	36·72	22·42	630	59·42	36·36	23·06	972
5	59·02	37·02	22·00	1,090	59·44	36·34	23·10	974
6	59·08	37·15	21·93	1,295	59·48	35·68	23·80	706
7	58·98	37·13	21·83	1,295	59·42	35·77	23·65	893
8	59·02	37·17	21·85	1,315	59·34	36·32	23·02	1,007
9	59·08	37·14	21·94	1,305	59·37	36·30	23·07	1,013
10	58·92	37·24	21·68	1,360	59·41	36·30	23·11	1,122
11	59·24	36·89	22·35	695	59·42	36·33	23·09	1,026
12	59·02	36·74	22·28	645	59·40	36·35	23·05	1,010
13	59·19	36·81	22·38	1,000	59·48	35·67	23·81	779
14	59·36	37·29	22·07	1,330	59·42	36·39	23·03	1,098
15	59·28	36·86	22·42	1,260	59·45	36·42	23·03	1,116
16	59·34	36·67	22·67	1,265	59·46	36·43	23·03	1,232
17	59·16	36·64	22·52	1,280	59·47	36·42	23·05	1,086
18	59·49	35·82	23·67	680	59·44	36·43	23·01	1,062
19	59·34	35·90	23·44	960	59·43	36·40	23·03	1,068
20	59·32	36·48	22·84	1,256	59·49	35·70	23·79	817
21	59·02	36·02	23·24	1,030	59·43	36·31	23·12	1,216
22	59·30	36·50	22·80	1,255	59·44	36·46	22·98	1,124
23	59·08	35·90	23·18	725	59·43	36·40	23·03	1,234
24	59·36	35·74	23·62	650	59·43	36·43	23·00	1,147
25	59·32	35·66	23·66	615	59·48	35·85	23·63	881
26	59·03	35·69	23·34	680	59·46	35·89	23·57	921
27	59·48	35·76	23·72	710	59·52	35·71	23·81	814
28	59·23	35·76	23·47	690	59·41	36·40	23·01	1,121
29	59·32	36·30	23·02	1,020	59·43	36·37	23·06	1,198
30	59·37	36·34	23·03	1,035	59·44	36·42	23·02	1,224
31	59·42	36·37	23·05	870	59·44	36·37	23·07	1,093

Relation between gauge reading and datum:—
Zero of headrace and tailrace gauges = 1,000·00 W.P.S. datum.

Mean Daily Gauge Height, in Feet, and Mean Daily Discharge, in Feet per Sec., of East Branch Winnipeg River at Kenora Power House, for January, February, March and April, 1915.

JANUARY   MARCH

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.
1	59·44	35·79	23·65	836	59·46	35·75	23·71	897
2	59·44	35·95	23·49	869	59·40	36·34	23·06	1,040
3	59·49	35·69	23·80	824	59·38	36·35	23·03	1,020
4	59·48	35·98	23·50	837	59·39	36·34	23·05	980
5	59·48	35·89	23·59	829	59·36	36·35	23·01	1,109
6	50·40	36·32	23·08	1,034	59·37	36·33	23·04	1,000
7	59·41	36·33	23·08	1,076	59·39	35·61	23·78	672
8	59·43	36·32	23·11	1,051	59·40	36·27	23·13	1,107
9	59·42	36·34	23·08	1,020	59·37	36·35	23·02	1,109
10	59·47	35·72	23·75	773	59·37	36·35	23·02	1,092
11	59·46	36·28	23·18	1,032	59·37	36·29	23·08	925
12	59·46	36·33	23·13	1,014	59·37	36·31	23·06	919
13	59·47	36·34	23·13	1,155	59·36	36·28	23·08	880
14	59·45	36·39	23·06	1,061	59·40	35·37	24·03	664
15	59·41	36·40	23·01	1,072	59·39	35·39	24·00	658
16	59·40	36·39	23·01	1,030	59·41	35·34	24·07	652
17	59·48	35·75	23·73	793	59·42	35·35	24·07	652
18	59·47	35·99	23·48	1,010	59·33	35·38	23·95	658
19	59·43	36·40	23·03	1,154	59·43	35·40	24·03	672
20	59·42	36·49	22·93	1,174	59·40	35·43	23·97	681
21	59·45	36·44	23·01	1,208	59·39	35·40	23·99	668
22	59·43	36·48	22·95	1,206	59·40	35·37	24·03	668
23	59·45	36·43	23·02	1,113	59·43	35·50	23·93	664
24	59·47	35·80	23·67	824	59·38	35·50	23·88	684
25	59·43	36·44	22·99	1,208	59·37	36·24	23·13	961
26	59·44	36·46	22·98	1,146	59·42	36·28	23·14	960
27	59·42	36·52	22·90	1,252	59·37	36·23	23·14	789
28	59·42	36·49	22·93	1,245	59·41	35·49	23·92	672
29	59·42	36·46	22·96	1,213	59·38	35·70	23·68	871
30	59·42	36·49	22·93	1,185	59·38	35·60	23·78	693
31	59·47	35·71	23·76	730	59·34	36·33	23·01	875

FEBRUARY   APRIL

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.
1	59·38	36·39	22·99	1,162	59·37	35·64	23·73	678
2	59·43	36·43	23·00	1,180	59·38	35·48	23·90	642
3	59·42	36·39	23·03	1,024	59·36	36·39	22·97	910
4	59·43	36·40	23·03	1,122	59·43	35·34	24·09	626
5	59·41	36·43	22·98	1,156	59·38	36·28	23·10	873
6	59·45	36·43	23·02	982	59·42	36·33	23·09	868
7	59·47	35·71	22·76	720	59·41	36·27	23·14	873
8	59·43	36·35	22·08	1,451	59·41	36·29	23·12	870
9	59·43	36·40	22·03	1,067	59·41	36·49	22·92	1,009
10	59·44	36·39	22·05	1,120	59·43	36·98	22·45	889
11	59·40	36·38	22·02	998	59·47	36·65	22·82	625
12	59·41	36·38	22·03	1,131	59·45	36·87	22·58	839
13	59·44	36·39	22·05	945	59·43	37·38	22·05	885
14	59·50	35·72	22·78	689	59·41	37·47	21·94	1,029
15	59·47	36·27	22·20	1,099	59·39	37·62	21·77	1,042
16	59·46	36·34	22·12	991	59·39	37·68	21·71	1,064
17	59·42	36·34	22·08	1,092	59·43	37·72	21·71	893
18	59·46	36·38	22·08	1,082	59·44	37·41	22·03	635
19	59·43	36·43	22·00	1,063	59·41	37·63	21·78	1,078
20	59·47	36·35	22·12	965	59·37	37·82	21·55	1,131
21	59·49	35·70	22·79	680	59·42	37·87	21·55	1,113
22	59·44	35·81	22·63	1,012	59·37	37·94	21·43	1,121
23	59·41	36·34	22·07	1,084	59·39	37·99	21·40	1,116
24	59·40	36·34	22·06	946	59·39	37·87	21·52	910
25	59·37	36·36	22·01	1,085	59·49	37·74	21·75	652
26	59·39	36·40	22·99	1,104	59·38	37·92	21·46	1,112
27	59·37	36·41	22·96	957	59·50	38·08	21·42	1,107
28	59·45	35·64	23·81	675	59·51	38·21	21·30	1,119
29					59·48	38·18	21·30	1,094
30					59·42	38·18	21·24	1,145

Relation between gauge reading and datum:—
    Zero of headrace and tailrace gauges = 1,000·00 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, AND MEAN DAILY DISCHARGE, IN FEET PER SEC., OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE, FOR MAY, JUNE, JULY AND AUGUST, 1915.

MAY   JULY

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.
1	59·42	38·17	21·25	810	60·43	40·09	20·34	679
2	59·52	37·73	21·79	636	60·35	40·31	20·04	940
3	59·43	37·64	21·79	1,014	60·32	40·43	19·89	879
4	59·51	38·06	21·45	1,080	60·28	40·28	20·00	693
5	59·53	38·07	21·46	1,083	60·30	40·26	20·04	853
6	59·40	38·09	21·31	1,097	60·35	40·50	19·85	943
7	59·56	38·24	21·32	897	60·34	40·52	19·82	896
8	59·15	38·22	20·93	919	60·37	40·65	19·72	957
9	59·73	37·89	21·84	634	60·42	40·70	19·72	961
10	59·62	37·75	21·87	646	60·48	40·79	19·69	885
11	59·72	37·84	21·88	660	60·52	40·62	19·90	685
12	59·65	38·16	21·49	771	60·45	40·56	19·89	776
13	59·73	38·04	21·69	796	60·47	40·66	19·81	729
14	59·69	38·27	21·42	878	60·26	40·63	19·63	755
15	59·60	38·27	21·33	888	60·41	40·61	19·80	746
16	59·56	37·89	21·67	650	60·41	40·64	19·77	718
17	59·56	38·02	21·54	779	60·14	40·72	19·42	959
18	59·67	38·44	21·23	902	60·28	40·51	19·77	687
19	59·73	38·96	20·77	1,052	60·22	40·59	19·63	883
20	59·70	39·46	20·24	953	60·21	40·66	19·55	962
21	59·65	39·90	19·75	1,148	60·27	40·54	19·73	741
22	59·75	39·90	19·85	888	60·32	40·52	19·80	714
23	59·83	39·30	20·53	676	60·05	40·66	19·39	947
24	59·74	39·27	20·47	1,108	60·26	40·48	19·78	720
25	59·54	39·32	20·22	962	60·24	40·57	19·67	693
26	59·73	39·33	20·40	926	60·15	40·69	19·46	945
27	59·83	39·34	20·49	904	60·13	40·73	19·40	754
28	59·73	39·33	20·40	922	60·09	40·95	19·14	974
29	59·68	39·31	20·37	868	60·13	40·98	19·15	947
30	59·72	39·06	20·66	674	60·08	40·91	19·17	757
31	59·71	39·02	20·69	834	59·93	40·98	18·95	990

JUNE   AUGUST

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.
1	59·72	39·22	20·50	919	59·92	40·78	19·14	720
2	59·64	39·21	20·43	909	59·85	40·78	19·07	989
3	59·57	39·20	20·37	898	59·88	40·87	19·01	932
4	59·65	39·19	20·46	890	59·82	40·72	19·10	758
5	59·85	39·26	20·59	903	59·81	40·70	19·11	753
6	59·50	38·94	20·56	677	59·81	40·70	19·11	753
7	59·53	38·86	20·67	841	59·75	40·68	19·07	843
8	59·34	39·14	20·20	954	59·75	40·68	19·07	976
9	59·59	39·19	20·40	916	59·79	40·69	19·10	801
10	59·67	39·22	20·45	924	59·77	40·44	19·33	737
11	59·55	39·27	20·28	897	59·82	40·32	19·50	742
12	59·60	39·26	20·34	892	59·73	40·28	19·45	735
13	59·47	39·01	20·46	670	59·72	40·23	18·49	738
14	59·90	38·90	21·00	669	59·62	40·23	19·39	735
15	59·73	39·00	20·73	680	59·62	40·23	19·39	705
16	59·45	39·05	20·40	695	59·43	40·06	19·37	746
17	59·85	39·03	20·82	693	59·62	40·08	19·54	736
18	59·69	39·26	20·43	910	59·55	40·10	19·45	748
19	59·75	39·32	20·43	847	59·55	40·08	19·47	740
20	59·92	39·04	20·88	651	59·62	40·06	19·56	743
21	60·04	39·14	20·90	692	59·42	39·54	19·88	719
22	59·80	39·24	20·56	723	59·47	38·74	20·73	671
23	60·14	39·46	20·68	829	59·52	38·30	21·22	704
24	59·94	39·46	20·48	880	59·23	38·00	21·23	700
25	60·12	39·38	20·74	68·	59·14	37·84	21·30	685
26	60·05	39·35	20·70	682	59·40	37·28	22·12	673
27	60·20	39·26	20·94	647	59·55	37·08	22·47	662
28	60·32	39·34	20·98	795	59·39	36·94	22·45	638
29	60·21	39·66	20·55	895	59·27	36·64	22·63	631
30	60·30	40·02	20·28	910	59·43	36·59	22·84	642
31					59·38	36·54	22·84	649

Relation between gauge reading and datum:—
Zero of headrace and tailrace gauges = 1,000·00 W.P.S. datum.

MEAN DAILY GAUGE HEIGHT, IN FEET, AND MEAN DAILY DISCHARGE, IN FEET PER SEC.,
OF EAST BRANCH WINNIPEG RIVER AT KENORA POWER HOUSE,
FOR SEPTEMBER, OCTOBER, NOVEMBER AND DECEMBER, 1915.

SEPTEMBER / NOVEMBER

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.
1	59·28	36·53	22·75	639	58·68	36·54	22·14	1,453
2	59·27	36·58	22·69	646	58·68	36·49	22·19	1,472
3	59·35	36·59	22·76	636	58·78	36·51	22·27	1,460
4	59·28	36·54	22·74	663	58·64	36·52	22·12	1,501
5	59·37	36·38	22·99	615	58·98	36·53	22·45	1,466
6	59·27	36·31	22·96	618	58·74	36·58	22·16	1,502
7	59·27	36·41	22·86	631	58·68	35·66	23·02	802
8	59·32	36·51	22·81	673	58·74	36·49	22·25	1,140
9	59·23	36·54	22·69	705	58·79	36·60	22·19	1,060
10	59·11	36·59	22·52	729	59·18	35·84	23·34	982
11	59·10	36·55	22·55	717	58·76	36·62	22·14	1,419
12	59·12	36·33	22·79	636	59·10	35·92	23·18	927
13	58·98	36·76	22·22	882	58·80	36·56	22·24	1,547
14	58·96	36·86	22·10	930	58·81	35·81	23·00	1,094
15	59·21	36·92	22·29	923	58·80	36·56	22·24	1,555
16	59·17	36·98	22·19	932	58·84	36·61	22·23	1,551
17	59·08	36·94	22·14	949	58·97	36·59	22·38	1,522
18	58·88	36·94	21·94	945	58·93	36·60	22·33	1,513
19	59·13	36·31	22·82	649	58·61	36·58	22·03	1,488
20	58·46	36·85	21·61	1,198	58·79	36·62	22·17	1,536
21	58·95	36·88	22·07	970	58·67	35·92	22·75	1,147
22	59·07	36·89	22·18	1,143	58·87	36·60	22·27	1,482
23	58·93	36·91	22·02	914	58·83	36·59	22·24	1,516
24	58·79	36·85	21·94	1,139	58·81	36·57	22·24	1,507
25	58·91	36·92	21·99	967	58·67	36·60	22·07	1,458
26	58·74	36·31	22·43	666	58·80	36·63	22·17	1,510
27	58·95	36·76	22·19	1,161	58·78	36·66	22·12	1,493
28	59·02	36·89	22·13	1,191	58·90	35·71	23·19	842
29	58·98	36·92	22·06	1,205	58·77	36·50	22·27	1,281
30	59·00	36·96	22·04	1,016	58·80	36·60	22·20	1,511

OCTOBER / DECEMBER

Day.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.	Headrace Gauge.	Tailrace Gauge.	Head in feet.	Discharge. c. f. s.
1	58·98	36·69	22·29	1,143	58·80	36·66	22·14	1,533
2	59·11	36·57	22·54	967	58·80	36·64	22·16	1,540
3	58·93	35·71	23·22	659	58·77	36·65	22·12	1,552
4	58·58	36·40	22·18	1,129	58·78	36·59	22·19	1,498
5	59·03	36·44	22·59	1,375	58·85	35·74	23·11	826
6	58·83	36·54	22·29	1,397	58·78	36·46	22·32	1,235
7	58·48	36·56	21·92	1,460	58·83	36·58	22·25	1,266
8	58·62	36·51	22·11	1,437	58·87	35·76	23·11	759
9	59·15	36·53	22·62	1,424	58·84	35·74	23·10	1,072
10	59·00	35·59	23·41	744	58·80	36·61	22·19	1,535
11	58·85	36·41	22·44	1,205	58·84	36·66	22·18	1,543
12	59·01	36·51	22·50	1,419	58·89	35·83	23·06	1,042
13	58·90	36·52	22·38	1,431	58·84	36·63	22·21	1,537
14	58·92	36·48	22·44	1,401	58·81	36·70	22·11	1,576
15	58·98	36·47	22·51	1,411	58·82	36·66	22·16	1,564
16	58·90	36·46	22·44	1,419	58·84	36·69	22·15	1,483
17	58·95	35·67	23·28	730	58·84	36·69	22·15	1,560
18	58·91	36·40	22·51	1,130	58·85	36·65	22·20	1,576
19	59·08	35·74	23·34	661	58·92	35·92	23·00	898
20	58·88	35·69	23·19	1,017	58·86	36·58	22·28	1,058
21	58·82	36·44	22·38	1,240	58·87	36·66	22·21	1,504
22	58·80	36·46	22·34	1,424	58·85	36·66	22·19	1,529
23	58·75	36·46	22·29	1,413	58·82	36·66	22·16	1,542
24	58·89	36·39	22·50	1,391	58·82	35·96	22·86	849
25	59·07	36·49	22·58	1,422	58·94	35·73	23·21	767
26	58·64	36·54	22·10	1,459	58·94	35·54	23·40	741
27	59·03	36·47	22·56	1,418	58·89	36·53	22·36	1,345
28	58·68	36·49	22·19	1,438	58·84	36·66	22·18	1,530
29	58·78	36·46	22·32	1,394	58·83	36·61	22·22	1,552
30	58·80	36·46	22·34	1,417	58·92	36·68	22·24	1,569
31	58·91	35·75	23·16	1,006	58·87	36·63	22·24	1,562

Relation between gauge reading and datum:—
Zero of headrace and tailrace gauges = 1,000·00 W.P.S. datum.

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.

The equipment of the station consists of:—

(1) A galvanized iron evaporation tank supported on a raft on the surface of the lake, and provided with brass pointer and measuring cups.

(2) One Howard rain gauge.

(3) One thermometer for water temperatures.

(4) One recording thermometer.

(5) One recording barometer.

(6) Wing gauge of the Robertson type.

(7) One hygrometer.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR MAY, 1913.

Day	Temperature				Velocity Wind	Direc-tion Wind	Baro-meter	Evapo-ation	Rain	Humi-dity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1											
2								Set tank			
3			47		3·46			0·00	·015		
4			47		3·54			0·01	·195		
5					3·54						
6					3·77			Set tank			
7					5·70						
8			44		5·70			·14			
					6·98						
9			50		3·48			·11			
10			50		2·62			·24			
11					5·82						
12			44		5·82			·07	·15		S
13			32		6·32			·00	·16		S
14			37		4·15			·05			P
15			38		3·88			·00	·03		S
16					3·88			·01	·16		S
17			40		3·22			·00	·065		S
18	44		44		6·97			·06	·02		S
19	42		43		6·97			·00	·005		S
20	43		48		2·50			·07			P
21	46		50		5·48			·10	·03		S
22	47		59		5·48			·05			S
					1·80						
23	46	47	50·5		3·25			·005	·285		P
											S
24	48	50	51		4·41			·09			P
25	47	48	58					·16			P
26	49	52	63					·05			P
27	50	54	75					·04	·02		P
											S
28	51	53	65					·03	·01		S
29	54	56	66					·00	·04		S
30	55	56	57					·02			P
31	51	53	60					·06	·10		S

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR JUNE, 1913.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity.	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	52	54	66	55·5	8·00			·04			P
2	51	52	56	52	2·83			·09	·20		P
3	50	51	56	49	4·93			·04			Q
4	52	53	60	51·5	6·45			·11			Q
5	52	53	58	52	3·00				·34		S
6	51	52	50	43	7·39			·07			Q
7	52	54	58	46·5	2·84			·13			P
8	54	55	65	51	2·14	SE. / NW.		·10			P / P
9	56	57	70	59	3·49	SE. / NW.	29·81	·10		48	P / P
10	54	55	61	58	4·92	SW. / SW.	29·71 / 29·47	·10		54 / 68	P / P
11	55	57	68	61	6·07	SW. / SW.	29·41	·10		53	P / P
12	56	58	75	67	3·88	S / NW.	29·26	·04		61	P / P
13	60	61·5	69	70	3·81	SW. / NE.	29·24 / 29·16	·02	·38	77 / 81	S / S
14	63	64	72	66	3·27	E. / SE.	29·06 / 28·96	·03		74 / 81	P / S
15	66	68	80	68·5	5·59	SW. / W.	29·21	·08	·01	47	Q / Q
16	61	61·5	68	61	8·76	N. / N.	29·36 / 29·46	·11		71 / 60	Q / P
17	60	60·5	63	51·5	2·33		29·46 / 29·46	·13		64 / 75	P / Q
18	62·5	62·5	71·5	59	1·06	SE. / SW.	29·41 / 29·40	·07		63 / 76	P / Q
19	63	63·5	78·5	65	1·36	SW.	29·35 / 29·41	·06		65 / 56	P / P
20	61·5	62	80	61·5	3·44	NE. / N.	29·32 / 29·31	·09		44 / 34	P / P
21	65	64·5	72·5	60·5	1·31	NW. / SW.	29·40 / 29·36	·13		34 / 84	P / P
22	68	69	90	63	1·90	SE. / S.	29·31	·05		37	P / P
23	66	67·5	72·5	67·5	4·54	S.W. / E.	29·01 / 28·99			53 / 90	P / P
24	65·5	66	81	72·5	4·45	E. / S.	28·91 / 28·86	·13		42·5 / 63	P / P
25	66	67	75	70	5·93	SW. / SW.	28·76 / 28·86	·08	·27	63 / 66	S / S
26	65·5	66	76	61	5·65	N. / N.	29·11 / 29·26	·18		42 / 38	Q / Q
27	65	64·5	58	53·5	5·85	NE. / NE.	29·10 / 29·26	·03	·55		S / S
28	67	67	71	67·5	1·57	E. / E.	29·15 / 29·16	·06	·28	85 / 78	S / P
29	70	70	94	69	4·58	SE. / SE.	29·11	·02		39	P / P
30	68·5	69	73	64·5	8·26	SW. / SW.	28·90 / 28·96	·16	·06	62 / 54	P / S

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR JULY, 1913.

Day	Temperature				Velocity Wind	Direc-tion Wind	Baro-meter	Evapor-ation	Rain	Humi-dity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1......	66·0	66·0	59·0	57·0	6·17	N.	29·20	·08	......	......	S
	69·0	69·0	73·0	......	6·13	N.	29·31	·05		58·0	S
2......	67·0	67·0	68·0	......	0·52	SW.	29·30	·06		55·0	S
	68·0	67·0	67·0	56·5	3·79	SE.	29·06	·07		76·0	Q
3......	67·0	67·0	75·0	......	5·09	SW.	28·99	·06	·01	48·0	Q
	66·0	66·0	60·0	57·5	2·72	S.E	29·16	·08	......	100·0	P
4......	66·0	65·0	58·0	......	2·72	N.	29·31	·06		89·0	Q
	66·0	66·0	59·0	56·5	11·14	SW.	29·22	·07			Q
5......	65·0	65·0	61·0	......	6·36	N.	29·06	·01	·73	94·0	S
	66·0	66·0	52·0	53·0	7·07	N.	29·26	·01	·08	84·0	S
6......	......	......	......	......	3·07	SW.	......			29·0	P
	70·0	71·0	80·0	60·5	2·19	SW.	29·54	·08	·01		P
7......	69·0	68·0	78·0	......	1·50	W.	29·28	·07		60·0	P
	67·0	68·0	66·0	61·0	3·14	SW.	29·16	·07	......	80·0	P
8......	66·9	66·0	76·0	......	5·95	W.	29·01	·01		45·0	P
	65·0	65·0	62·5	65·0	23·00	W.	28·91	·17	·01	79·0	S
9......	65·0	63·8	56·0	......	5·23	NW.	29·26	·10		65·0	P
	65·5	66·0	63·0	58·0	5·72	NW.	29·37	·14		56·0	P
10......	65·8	65·0	62·5	......	1·71	S.	29·31			65·0	P
	66·0	66·5	68·5	56·5	5·68	E.	29·15	·06		57·0	S
11......	65·6	64·8	63·0	......	8·56	S.	28·86	·05	·99	90·0	S
	65·5	64·5	60·0	54·7	8·42	S.	28·76	·02	·22	89·0	S
12......	65·0	63·6	58·5	......	8·41	SE.	28·65	·05	·62	89·0	S
	64·6	63·5	56·0	49·0	10·31	SE.	28·80	·04	·23	88·0	S
13......	65·6	66·0	63·0	......	4·51	NW.	29·17	·04		58·0	Q
	68·0	68·5	67·0	58·5	3·19	NW.	29·21	·08	·02	46·0	P
14......	64·5	63·5	58·0	......	3·19	SE.	29·31	·05		77·0	P
	68·5	69·5	73·0	58·5	2·91	SE.	29·35	·05		68·0	P
15......	66·0	66·0	63·0	......	4·30	S.	29·43	·09		72·0	Q
	67·0	67·5	69·5	63·0	3·74	S.	29·44	·03	......	79·0	Q
16......	66·0	66·0	65·0	......	2·75	SE.	29·45	·03	·18	80·0	S
	69·0	70·0	72·0	66·5	1·31	S.	29·40	·03	·01	86·0	Q
17......	66·0	65·5	64·8	......	2·45	S.	29·45	·02		75·0	Q
	67·9	69·0	75·0	64·5	5·89	NW.	29·42	·08		44·0	Q
18......	65·8	65·6	69·7	......	4·30	SW.	29·40	·02		75·0	P
	66·0	66·5	65·5	66·0	9·48	NW.	29·37	·08		62·0	P
19......	66·0	65·0	62·0	......	6·40	NW.	29·39	·03		79·0	Q
	66·5	66·0	58·0	63·0	6·99	N.	29·43	·05	·09	61·0	Q
20......					1·99	N.		·02			Q
	68·0	68·5	68·0	62·0	2·96	SW.	29·52	·00	·01	65·5	Q
21......	67·5	67·0	64·5	......	4·97	NW.	29·22	·13		82·0	S
	67·4	68·5	74·5	67·0	7·03	NW.	29·20	·05	·43	54·5	Q
22......	67·0	66·2	65·5	......	4·98	NW.	29·15	·04		64·0	Q
	67·5	67·5	60·5	60·2	10·80	NE.	29·15	·06	·14	78·5	Q
23......	66·0	65·0	57·0	......	5·18	N.	29·30	·05		74·0	P
	66·0	66·0	56·5	59·5	4·33	N.	29·36	·10		66·0	P
24......	66·5	65·5	59·0	......	6·77	W.	29·38	·03		75·0	P
	67·0	67·0	67·0	59·0	5·00	N.	29·30	·08		50·0	P
25......	66·5	66·0	66·0	......	3·52	SW.	29·20	·04		66·0	P
	68·0	69·2	77·0	67·0	5·23	SW.	29·15	·08	......	52·0	P
26......	66·0	65·0	64·5	......	3·73	S.	29·00	·04		82·0	P
	66·5	67·0	71·0	67·0	3·63	S.W.	29·00	·06		73·0	S
27......	67·0	67·0	62·0	......	8·74	NW.	29·20	·06		57·0	S
	67·0	66·5	63·0	61·0	10·58	NW.	29·30	·06	·06	62·5	Q
28......	66·0	65·0	62·5	......	2·41	W.	29·36	·04		72·0	Q
	67·0	67·0	68·5	59·0	5·99	SW.	29·33	·04		59·0	Q
29......	66·0	66·0	69·0	......	3·30	S.	29·24	·06		72·0	Q
	70·0	71·0	79·0	75·0	3·75	SW.	29·20	·05		57·0	P
30......	67·0	68·0	72·0	......	3·66	SE.	29·10	·01		82·0	P
	70·5	71·5	78·0	74·5	5·35	W.	29·16	·00		57·0	P
31......	65·5	65·5	62·0	......	8·93	W.	29·18	·07		60·0	P
	67·0	67·0	72·0	63·0	11·11	W.	29·25	·12	......	46·0	P

Average time of observation:—7.15 a.m. and 6.30 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR AUGUST, 1913.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1.......	69·0	69·5	72·0	.....	6·08	W.	29·38	·08	.....	61·0	P
	68·0	69·2	78·0	68·0	3·13	NW.	29·37	·07	.....	40·0	P
2.......	67·0	67·0	72·0	.....	6·46	W.	29·35	·08	.....	57·0	P
	68·0	70·5	81·0	71·0	7·56	NW.	29·37	·05	.....	39·0	Q
3.......	68·5	69·0	68·0	.....	7·44	NW.	29·45	·08	.....	47·0	P
	70·5	72·0	76·0	66·0	6·88	W.	29·45	·06	.....	37·0	P
4.......	67·5	67·0	63·0	.....	0·89	W.	29·34	·08	.....	65·0	P
	68·5	68·5	70·0	61·0	2·56	W.	29·25	·08	.....	60·0	Q
5.......	67·5	67·0	65·0	.....	2·08	N.	29·27	·05	.....	70·0	Q
	68·0	69·0	70·0	65·5	4·08	N.	29·40	·10	.....	48·0	Q
6.......	67·0	66·0	59·0	.....	1·20	N.	29·38	·03	.....	78·0	S
	70·0	70·0	69·0	62·0	2·06	S.	29·35	·09	.....	55·0	Q
7.......	67·5	66·0	61·0	.....	2·22	S.	29·10	·09	.....	68·0	S
	66·0	67·0	65·0	63·5	6·88	S.	28·90	·03	·69	90·0	S
8.......	66·0	65·0	58·0	.....	4·34	W.	28·87	·01	·51	77·0	S
	67·0	67·0	64·5	60·0	7·89	W.	28·97	·02	·21	82·0	S
9.......	67·0	66·0	64·0	.....	1·92	N.	29·15	·08	.....	79·0	S
	67·0	65·5	54·0	52·5	5·00	N.	29·45	·08	·01	74·0	S
10.......	66·0	65·5	59·0	.....	7·22	SE.	29·54	·08	.....	53·0	S
	65·0	64·8	59·0	52·0	7·25	SE.	29·45	·10	.....	73·0	S
11.......	65·0	64·0	54·5	.....	7·05	SE.	29·35	·01	·23	94·0	S
	65·8	66·8	64·2	56·0	1·33	S.	29·37	·01	·01	81·5	S
12.......	65·6	65·8	68·0	.....	1·56	SW.	29·33	·01	.....	88·0	S
	68·8	71·4	67·0	69·0	0·07	S.	29·31	·04	.....	67·0	P
13.......	67·2	68·0	77·0	.....	0·64	S.	29·26	·02	.....	88·0	P
	71·0	72·6	75·0	73·0	4·18	S.	29·30	·02	.....	82·0	P
14.......	70·0	70·0	74·0	.....	1·67	S.	29·06	·02	.....	86·0	Q
	74·0	76·0	81·0	74·0	3·93	S.	29·30	·05	.....	86·0	Q
15.......	70·0	69·0	69·0	.....	6·00	S.	29·20	·00	.....	61·0	Q
	74·0	70·0	78·0	67·5	2·98	W.	29·50	·02	1·78	86·0	S
16.......	68·0	69·0	64·0	.....	2·86	SW.	29·25	·04	.....	75·0	S
	71·0	71·0	64·0	64·5	2·32	W.	29·35	·02	.....	79·0	S
17.......	71·0	71·0	64·0	.....	.....		29·40	·02	.....	61·0	P
	73·0	72·0	64·0	54·0	3·30	NW.	29·52	·16	.....	55·0	P
18.......	68·0	67·0	66·0	.....	4·14	E.	29·51	·09	.....	71·0	P
	70·8	70·0	71·8	63·0	3·85	S.	29·55	·04	.....	65·0	P
19.......	68·0	68·0	66·0	.....	7·37	SE.	29·50	·075	.....	76·0	S
	69·2	70·0	68·2	68·0	4·62	SW.	29·46	·01	·035	85·0	S
20.... ..	69·0	69·0	71·0	.....	2·48	N.	29·45	·05	.....	86·0	S
	74·3	73·0	68·5	72·0	3·46	W.	29·36	·05	.....	62·0	S
21.......	69·0	68·0	63·0	.....	7·22	W.	29·25	·05	·20	74·0	Q
	66·0	67·0	61·0	61·5	11·93	N.	29·40	·12	·11	79·0	Q
22.......	67·0	66·0	60·0	.....	5·34	NE.	29·49	·04	.....	89·0	P
	71·0	70·0	68·0	61·0	1·57	NW.	29·40	·05	.....	66·0	P
23.......	68·0	68·0	66·8	.....	6·08	W.	29·35	·07	.....	71·0	P
	68·0	68·0	66·5	59·0	6·42	N.	29·40	·09	.....	55·0	P
24.......	69·0	69·0	65·0	.....	3·36	SW.	29·38	·09	.....	62·0	Q
	68·0	68·0	65·0	55·0	6·00	NW.	29·20	·04	.....	75·0	S
25.......	68·0	66·0	66·0	.....	6·00	NW.	29·05	·075	·015	76·0	P
	69·0	71·0	72·5	58·0	17·17	NW.	29·24	·08	.....	46·0	P
26.......	66·0	66·0	62·0	.....	9·48	N.	29·25	·09	.....	69·0	S
	67·0	67·0	60·0	60·5	6·30	N.	29·36	·06	.....	94·0	P
27.......	67·0	66·0	62·0	.....	1·94	SE.	29·35	·04	.....	84·0	Q
	67·0	67·0	63·0	58·5	5·88	SE.	29·30	·03	·08	90·0	Q
28.......	66·0	65·0	58·0	.....	4·73	W.	29·36	·07	·30	83·0	S
	67·0	67·0	59·0	58·0	15·60	NW.	29·18	·08	·09	89·0	S
29.......	66·0	64·0	58·0	.....	8·98	NW.	29·22	·04	.....	83·0	S
	66·0	66·0	60·0	60·5	6·72	NW.	29·17	·07	.....	84·0	P
30.......	65·0	65·0	63·0	.....	2·46	SW.	29·10	·02	.....	79·0	Q
	68·0	70·0	72·0	61·5	2·49	SW.	29·13	·04	.....	65·0	P
31.......					33·00	SE.					P
	67·0	68·0	65·0	54·5	3·30	SE.	29·26	·08	.....	57·0	P

Average time of observation:—7.15 a.m. and 6.30 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR SEPTEMBER, 1913.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	67·0	68·0	71·0	.....	6·6	SE.	29·00	·13	.....	69	P
	67·0	68·0	70·0	68.5	5·14	S.	29·05	·06	·03	81	P
2	64·0	63·0	60·0	.....	7·46	NW.	29·39	·04	.....	78	P
	66·5	68·0	60·0	60·0	6·67	NW.	29·50	·06	.....	71	P
3	66·0	64·0	58·0	.....	2·48	SE.	29·57	·05	.....	72	S
	66·0	66·0	62·0	56.5	6·88	SE.	29·46	·05	.....	79	Q
4	66·0	64·0	58·0	.....	7·91	SE.	29·34	·13	.....	*80	S
	66·0	66·0	64·0	59.5	6·74	SE.	29·35	·04	.....	90	P
5	66·0	65·0	64·5	.....	4·36	SE.	29·34	·04	.....	87	Q
	68·0	70·5	74·0	67·0	3·28	SE.	29·29	·02	.....	80	P
6	66·0	67·0	69·0	.....	2·05	SE.	29·25	·01	.....	90	Q
	72·0	76·0	79·0	74.5	1·76	SE.	29·25	·10	·02	88	P
7	66·0	64·0	58·0	.....	5·83	NW.	29·41	·01	.....	89	P
	66·0	66·0	60·0	62.5	10·76	NW.	29·60	·07	·23	68	P
8	66·0	64·0	60·0	.....	2·52	S.	29·70	·07	.....	68	P
	66·0	65·0	61·0	54.5	2·76	S.	29·60	·08	.....	68	P
9	65·0	64·0	58·0	.....	6·86	SE.	29·45	·08	.....	67	S
	66·0	68·0	69·0	62·0	9·48	SE.	29·24	·10	.....	68	Q
10	65·0	64·0	61·0	.....	5·22	NW.	29·36	·13	.....	89	S
	66·0	68·0	66·0	63·0	2·45	NW.	29·40	·07	·47	66	P
11	63·0	62·0	50·0	.....	4·02	NW.	29·45	·07	.....	81	P
	64·0	63·0	56·0	55·0	1·31	NW.	29·50	·15	.....	55	P
12	64·0	60·0	50·0	.....	7·24	N.	29·51	·09	.....	77	Q
	63·0	65·0	59·0	50·0	2·98	N.	29·52	·09	.....	53	P
13	62·0	58·0	41·0	.....	3·37	E.	29·46	·06	.....	92	P
	64·0	64·0	55·0	61.5	4·98	E.	29·40	·11	.....	60	P
14	.....	.....	.....	.....	7·38	SE.	.....	.....	.....	.....	P
	63·0	61·0	56·0	59·0	7·51	S.	29·17	·10	.....	77	P
15	64·0	63·0	58·0	.....	5·21	NW.	29·34	·155	·175	83	P
	64·0	64·0	58·0	55.5	3·31	SW.	29·45	·07	.....	83	P
16	63·0	61·0	54·0	.....	0·39	SW.	29·47	·025	.....	94	Q
	65·0	63·0	60·0	57·0	0·84	SW.	29·50	·06	·005	68	P
17	63·0	61·0	54·0	.....	0·63	SW.	29·45	·04	.....	88	P
	64·0	64·0	62·0	61·0	2·17	SW.	29·36	·05	.....	79	P
18	63·0	63·0	62·0	.....	*0·51	SW.	29·20	·04	.....	69	P
	64·0	64·0	66·0	61·0	7·06	S.	29·00	·08	.....	71	S
19	64·0	61·0	60·0	.....	7·39	W.	29·32	·01	.....	92	P
	63·0	60·0	60·0	47.5	7·56	W.	28·80	·13	·06	84	S
20	61·0	57·0	40·0	.....	14·3	NW.	29·12	·15	.....	84	S
	60·0	57·0	38·0	41.5	21·96	N.W	29·21	·12	·015	67	Q
21	.....	.....	.....	.....	27·5	N.	29·26	.....	.....	62	Q
	60·0	59·0	42·0	39.5	13·5	NE.	.....	·12	.....	.....	Q
22	59·0	57·0	38·0	.....	1·98	NE.	29·25	·10	.....	91	P
	59·0	57·0	43·0	35·0	3·29	S.W	29·25	·08	.....	49	P
23	59·0	54·0	43·0	.....	4·52	SE.	29·35	·08	.....	78	P
	59·0	54·0	43·0	38·0	3·41	SE.	29·35	·08	.....	78	P
24	58·0	54·0	43·0	.....	3·31	NE.	29·30	·07	·01	85	S
	58·0	54·0	41·5	41·5	2·34	NE.	29·30	·03	.....	84	S
25	57·0	53·0	44·0	.....	0·62	SW.	29·25	·04	.....	85	S
	57·0	56·0	50·0	43·0	4·37	W.	29·20	·04	.....	62	S
26	56·0	52·0	41·0	.....	2·99	NW.	29·15	·06	.....	84	Q
	58·0	60·0	61·0	49 0	21·37	NW.	29·32	·08	.....	50	P
27	57·0	55·0	52·0	.....	4·06	SW.	29·25	·05	.....	75	P
	58·0	56·0	72·0	57·0	9·13	SW.	29·22	·09	.....	42	P
28	58·0	58·0	59·0	.....	4·48	W.	29·10	·05	.....	68	P
	.....	.....	.....	59.5	2·02	NE.	.....	.....	.....	.....	P
29	56·0	54·0	48·0	.....	.....	SE.	29·18	·08	.....	87	P
	59·0	61·0	62·0	.....	3·18	SE.	29·25	·04	.....	60	P
30	56·0	58·0	54·0	.....	.....	SE.	29·19	·03	.....	88	P
	60·0	63·0	74·0	.....	2·87	SW.	29·20	·01	.....	47	P

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR OCTOBER, 1913.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity.	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	57	57	56	.....	....	N.W	....	·02	.....	.....	R
	57	57	62	55	10·3	......	28·85	·065	.....	85	R
2	57	56	50	.....	5·5	SW.	....	·06	.....	.....	P
	58	59	62	53	4·4	SW.	28·80	·05	·015	63	R
3	57	56	50	.....	4·1	SW.	....	·07	.....	.....	P
	57	57	56	55	2·9	NW.	28·62	·07	.....	80	P
4	56	55	46	.....	2·5	NE.	....	·05	.....	.....	R
	57	54	49	45	2·8	NE.	28·87	·05	.....	79	R
5	55	54	42	.....	6·7	NE.	....	·03	·64	.....	S
	55	54	42	40	6·6	NE.	28·77	·04	·32	81	S
6	54	53	40	.....	4·4	NE.	....	·04	·01	.....	S
	54	53	43	38	9·4	NE.	28·73	·03	.....	80	S
7	54	52	44	.....	2·7	SW.	....	·03	.....	.....	P
	54	52	54	43	11·8	SW.	28·80	.....	·73	89	S
8	55	57	53	.....	3·8	NE.	....	·03	.....	.....	Q
	55	56	55	42	2·0	NE.	28·90	.....	.....	70	R
9	55	56	55	.....	2·7	NE.	....	·02	.....	.....	S
	56	55	59	47	3·5	NE.	28·85	·02	·08	85	R
10	55	56	59	.....	1·4	S.	....	·02	.....	.....	S
	55	54	45	46	4·1	SE.	28·41	·03	98	91	S
11	54	53	48	.....	1·7	SW.	....	·06	.....	.....	S
	54	52	50	40	1·0	NW.	28·55	·08	.....	.....	S
12	52	50	48	.....	1·8	SW.	28·85	·11	.....	.....	R
	52	53	48	40	1·6	SW.	28·95	·02	·02	90	Q
13	52	51	52	.....	5·9	SE.	28·80	·03	.....	.....	P
	54	57	62	52	11·0	SE.	28·73	·01	.....	83	Q
14	53	52	55	.....	6·4	SW.	28·65	·11	.....	.....	R
	52	52	46	49	7·9	NW	28·82	·06	.....	74	S
15	52	50	39	.....	0·4	NW.	29·15	·08	.....	.....	Q
	52	52	45	37	4·6		29·19	·05	.....	62	P
16	52	49	39	.....	2·8	NE.	29·25	.....	.....	.....	P
	51	51	42	37	2·5	NE.	29·25	·07	.....	64	P
17	50	48	41	.....	0·8	S.	29·17	·04	.....	.....	P
	50	50	44	42	8·4	SE.	29·06	·08	.....	74	S
18	50	49	40	.....	5·8	NW.	28·94	·05	.....	.....	R
	50	50	38	38	5·6	NW.	28·90	·06	.....	72	Q
19	49	47	27	.....	5·6	N.	28·96	·04	.....	.....	S
	48	45	28	30	8·6	N.	28·99	·05	.....	70	R
20	48	44	26	.....	5·6	N.	28·70	·04	.....	.....	R
	47	43	20	30	4·6	N.	28·72	·06	.....	73	S
21	46	43	20	.....	2·6	NW.	28·70	·03	.....	.....	S
	46	44	22	19	3·3	N.	28·67	·03	.....	71	R
22	46	44	30	.....	3·0	SE.	28·67	·06	.....	.....	S
	46	45	35	27	3·9	S.	28·67	·01	.....	100	S
23	46	45	36	.....	3·1	S.	28·50	·02	.....	.....	S
	46	45	38	33	5·9	S.	28·40	·02	·16	95	S
24	46	45	38	.....	3·7	NW.	28·73	·07	.....	.....	S
	46	46	41	37	5·5	NW.	28·80	·03	·02	84	Q
25	46	45	37	.....	3·9	NW.	28·84	·04	·03	.....	S
	46	45	37	40	4·4	NW.	28·92	·01	·06	91	S
26	45	43	32	.....	1·9	NW.	29·00	·04	.....	.....	Q
	45	43	32	33	4·9		28·95	·01	.....	100	S
27	44	43	34	.....	5·5	NW.	28·72	·02	.....	.....	S
	44	43	35	30	1·2	NW.	28·70	·01	.....	77	S
28	43	40	34	.....	5·4	NW.	29·08	.....	.....	.....	P
	43	41	21	20	7·2	NW.	29·13	.....	·14	88	R
29	43	40	17	.....	2·2	NE.	29·10	.....	.....	.....	S
	43	40	21	19			29·13	.....	.....	97	S
30	42	40	21	.....	.....	SW.	29·10	.....	.....	.....	R
	42	40	27	24	4·7	SW.	29·16	.....	.....	87	S
31	41	40	26	.....	4·6	SW.	29·20	.....	.....	.....	R
	41	42	37	31	10·2	SW.	29·16	.....	.....	63	Q

Average time of observation:—7.15 a.m. and 6.30 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR NOVEMBER, 1913.

Day	Temperature				Velocity Wind	Direction Wind	Baro-meter	Evapor-ation	Rain	Humi-dity.	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1......	41	39	33	.....	3·6	SW.	28·97	·03	.....	.....	Q
	41	41	41	37	6·7	SW.	29·27	·05	.....	74	Q
2......	41	43	38	.....	1·5	S.	28·79	·02	.....	.....	Q
	42	44	43	41	18·3	Calm	29·09	·05	.....	76	S
3......	41	40	34	.....	2·2	NW.	28·96	.....	.....	.....	R
	41	39	28	30	7·8	NW.	29·26	·06	.....	79	R
4......	41	40	37	.....	4·0	SW.	29·02	·05	.....	.....	P
	41	42	49	28	8·7	SW.	29·32	·09	.....	67	P
5......	41	41	42	.....	2·6	SW.	28·70	·03	.....	.....	Q
	41	42	44	44	3·5	SW.	29·00	·04	.....	63	Q
6......	41	40	41	.....	2·7	SE.	28·49	·03	.....	.....	S
	41	44	45	41	1·1	SE.	28·79	·02	.....	88	S
7......	41	40	33	.....	2·9	NW.	28·73	·02	.....	.....	S
	41	40	20	41	12·9	NW.	29·03	Ice	·75	95	Q
8......	.....	.....	20	.....	1·7	NW.	29·03	.....	.....	.....	.....
	.....	.....	29	26	5·6	NW.	29·33	.....	.....	87	.....
9......	.....	.....	22	.....	1·7	NW.	29·10	.....	.....	.....	.....
	.....	.....	14	27	6·2	NW.	29·40	.....	.....	72	.....
10......	.....	.....	10	.....	2·4	NW.	29·08	.....	.....	.....	R
	.....	.....	18	11	2·5	NW.	29·38	.....	.....	.....	R
11......	.....	.....	26	.....	2·5	S.	28·70	.....	.....	.....	R
	.....	.....	33	24	5·0	S.	29·00	.....	·05	84	R
12......	.....	.....	30	.....	4·3	SW.	28·66	.....	.....	.....	R
	.....	....	35	33	5·0	S.	28·96	.....	.....	95	R
13......	.....	.....	25	.....	5·2	W.	28·85	.....	.....	.....	S
	.....	.....	24	27	9·1	NW.	29·15	.....	.....	87	S
14.....	.....	.....	14	.....	5·5	S.	29·13	.....	.....	.....	P
	.....	.....	25	21	3·0	SW.	29·43	.....	.....	96	P
15......	.....	.....	32	.....	2·6	W.	28·95	.....	.....	.....	S
	.....	.....	35	28	9·2	W.	29·25	.....	.....	100	S
16......	.....	.....	36	.....	3·9	SW.	28·64	.....	.....	.....	R
	.....	.....	.....	35	6·1	S.	28·94	.....	.....	91	R
17......	.....	.....	41	.....	2·5	S.	28·60	.....	.....	.....	P
	.....	.....	46	40	3·8	SW.	28·90	.....	.....	80	P
18......	.....	.....	25	.....	6·5	NW.	28·85	.....	.....	.....	R
	.....	.....	28	30	6·1	W.	29·15	.....	.....	88	Q
19......	.....	.....	36	.....	2·7	SW.	28·55	.....	.....	.....	S
	.....	.....	28	29	10·1	W.	28·85	.....	.....	85	R
20......	.....	.....	35	.....	3·0	SW.	28·58	.....	.....	.....	S
	.....	.....	39	34	7·3	SW.	28·88	.....	.....	79	S
21......	.....	.....	38	.....	1·3	Calm	28·48	·03	.....	.....	S
	.....	.....	33	35	7·2	NW.	28·78	·01	·02.	95	S
22......	.....	.....	27	.....	11·4	NW.	28·82	.....	.....	.....	R
	.....	.....	28	27	13·5	NW.	29·12	.....	.....	89	R
23......	.....	.....	30	.....	1·2	NW.	28·92	.....	.....	.....	Q
	.....	.....	35	32	3·3	W.	29·22	.....	·05	69	P
24......	.....	.....	34	.....	9·4	SE.	28·92	.....	.....	.....	Q
	.....	.....	35	32	3·7	W.	29·22	.....	.....	72	S
25......	.....	.....	30	.....	2·8	NW.	28·82	.....	.....	.....	S
	.....	.....	30	24	7·5	NW.	29·12	.....	.....	73	Q
26......	.....	.....	24	.....	3·4	NW.	29·05	.....	.....	.....	R
	.....	.....	29	30	5·8	SE.	29·35	.....	.....	76	Q
27......	.....	.....	32	.....	5·9	SE.	29·02	.....	.....	.....	S
	.....	.....	37	35	4·2	SE.	29·32	.....	.....	86	R
28......	.....	.....	36	.....	2·3	SE.	29·00	.....	.....	.....	S
	.....	.....	39	38	2·6	SW.	29·30	.....	.....	96	S
29......	.....	.....	39	.....	4·3	SW.	28·94	.....	.....	.....	S
	.....	.....	36	35	4·9	SW.	29·24	.....	·46	100	S
30......	.....	.....	33	.....	4·2	NW.	29·03	.....	.....	.....	S
	.....	.....	32	33	1·4	SE.	29·33	.....	·02	95	S

Average time of observation:—7.45 a.m. and 5.00 p.m.
R = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR DECEMBER, 1913.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1....			32	....	2.2	SE.					S
			32	32	1.3	NW.	29.10			95	S
2....			32		1.6	NW.					S
			32	33	2.7	W.	29.28			90	S
3....			29		3.9	SW.					S
			35	31	3.9	SW.	29.27			95	S
4....			32		7.4	SW.					P
			41	37	5.0	SW.	29.09			86	P
5....			28		3.1	NW.					P
			35	34	1.5	NW.	28.95			85	P
6....			28		4.5	NW.					Q
			20	24	17.0	NW.	28.96			68	Q
7....						NW.					P
			12	12	5.3	NW.	29.11				P
8....			22		4.1	SW.					S
			27	25	7.1	SW.	28.95			94	P
9....			29		2.9	SW.					P
			32	29	10.1	NW.	28.81			89	P
10....			23		6.0	NW.					Q
			31	27	2.4	S	28.92			88	P
11....			27		2.8	SW.					P
			34	31	2.6	W.	28.75			89	P
12....			22		2.5	SE.					Q
			29	26	1.0	Calm	28.83			88	P
13....			22		0.7	SW.					P
				26	4.5		28.88			86	P
14....											......
				19			29.05				
15....			27			S					S
			28	27	4.2	SE.	28.82			88	P
16....			25		2.1	SW.					Q
			35	30	10.0	SW.	28.71			78	Q
17....			27		10.2	N.					S
			25	25	7.4	N.	28.89			75	P
18....			14		0.9	N.					P
			25	19	4.7	NE.	28.90				P
19....			12		3.3	N.					R
			12	13	5.8	N.W.	28.81				R
20....			0		6.4	NW.					Q
			12	8			28.73				P
21....			−1		6.3	NW.					P
			5	5	2.5	NW.	28.82				P
22....			9		1.7	SE.					S
			17	12	2.2	SE.	28.86				P
23....			18		3.2	SE.					P
			20	16	1.6	SE.	28.78				P
24....			10		6.0	NW.					R
			3	5	....		28.92				P
25....			−9		3.0	SE.					P
				−2			29.01				P
26....			13		3.1	SE.					R
			14	10	2.2	E.	28.90				S
27....			10		1.5	NE.					S
			13	9	1.4	NW.	28.97				P
28....			10		1.4	NW.					S
			19	10	7.2	S	28.85				P
29....			16		10.0	NW.					S
			17	18	4.4	SW.	28.82				P
30....			22		4.0	NW.					S
			17	20	2.9	N.	28.87				P
31....			9		3.1	S					S
			21	16	5.1	S	28.75				S

Average time of observation:—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 FOR M.H.S. STATION AT KEEWATIN, ONT., FOR JANUARY, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day	Miles per hour.		Inches	Inches	Inches	%	
1					6·3	SW.					S
	32		25	24	2·8	S.					S
2					1·2	N.					S
	32		23	21	2·7	N.					S
3					3·3	N.					S
	32		13	14	1·0	N.					S
4					2·0	SE.					P
	32		8	9	3·2	SE.					P
5					1·7	S					S
	32		18		14·1	SW.					S
6					8·2	W.					S
	32		27		6·1	W.					S
7					2·3	SE.					S
	32		30		4·1	NW.					S
8					2·6	N.					S
	32		23		3·1	N.			·42		S
9					4·0	N.					R
	32		7		3·7	N.			·27		S
10					1·4	SW.					R
	32		3		1·8	SW.					S
11						W.					P
	32		− 8		9·7	W.					P
12						SE.					P
	32		−13		1·1	SE.					P
13					3·9	SE.					P
	32		9		7·3	SE.					Q
14					5·5	S					P
	32		19		8·0	NW.					S
15					6·6	E.					P
	32		18		4·0	E.					P
16					4·1	NW.					R
	32		17		4·5	NW.			·18		P
17					1·6	S					P
	32		18	15	3·9	E.					Q
18						SE.					S
	32		30	22	5·0						S
19					1·9	N.					S
	32		30	26	5·2	NE.					S
20					6·0	NW.					P
	32		4	5	4·8	W.					P
21					3·7	S					P
	32		− 8	− 7	5·6	SE.					P
22					2·0	S					R
	32		− 7	− 4	3·3	SE.					P
23					3·5	W.					P
	32		+ 4	− 2	9·2	W.			·105		P
24					5·3	SW.					P
	32		−17	−16	3·8	S.		..			P
25					2·0	SE.					P
	32		− 9	−10	2·3	S					S
26					2·3	E.					S
	32		+2	− 3	6·2	N.					P
27					3·2	N.					Q
	32		− 2	− 3	1·1	E.			·104		R
28					3·2	E.					S
	32		20	+ 5	8·8	SE.					Q
29					5·0	W.					P
	32		− 9	− 5	20·0	W.			⁄·		P
30					5·9	SE.		..	..		P
	32		− 9	+ 2	2·4	E.		..	..		Q
31					7·2	W.					P
	32		+ 2	− 6	14·7	NW.			·26		P

Average time of observation:—7.45 a.m. and 5.00 p.m.
Precipitation measurement on the 8th includes snowfall of season to date.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR FEBRUARY, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1			−10								P
				5			28·75				P
2			10		4·4	NE.					S
			13	10	6·6	N.	28·75		·11		S
3			−1		4·3	NW.					P
			4	−1	2·5	N.	28·95				Q
4			−5		1·6	N.					S
			−2	−4	1·7	N.	29·05				R
5			−29		0·8	W.					P
			−10	−20	7·0	W.	29·10				Q
6			−32		1·5	SW.					P
			−6	−20	1·0	S	29·00				P
7			−34		0·9	S					P
			−9	−20	0·5	S	28·80				Q
8			−20		5·4	SE.					R
			−10	−15	5·5	W.	28·70				R
9			−31		6·3	W.					P
			−16	−22	7·0	W.	28·75				P
10			−36		1·9	N.					P
			−16	−23	1·3	NW.	29·15				P
11			−40		3·5	W.					P
			−14	−20	0·9	S	29·40				P
12			−36		0·1	S					P
			6	−15	3·3	SE.	29·35				P
13			−3		5·0	S					Q
			2	0	8·2	W.	29·00				Q
14			−17		6·7	W.					P
			4	−5	2·7	W.	29·10				P
15			1	−8	3·5	S.	28·75				
16			−18		6·4	E.					P
			4	−6	0·7	E.	28.80		·09		S
17			−22		1·5	NW.					P
			8	−2	1·3	SE.	28·85				Q
18			−2		4·0	W.					Q
			1	−4	14·7	NW.	28·85				P
19			−26		5·2	SW.					P
			−3	−12	1·7	E.	29·00				P
20			−20		1·6	S					P
			+11	0			28·85				S
21			−6		7·4	W.					P
			−9	−10	9·0	N.	28·75				P
22			−26		3·9	NW.					P
			−4	−20	2·7	W.	28·20				P
23			−22		1·8	S					P
			8	−6	3·0	SE.	28·25				Q
24			8		5·0	SW.					S
			18	11	6·6	S	28·95				Q
25			20		3·1	SE.					Q
			31	20	3·0	SE.	28·75				P
26			22		3·4	S					P
			36	24	2·9	S.	28·90				P
27			34		5·1	S					P
			40	32	14·2	S	28·45				Q
28			−1		14·0	W.					S
			−1	2			28·70		·22		P

Average time of observation:—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 FOR M.H.S. STATION AT KEEWATIN, ONT., FOR MARCH, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1			−20		11·4	S					P
			8	4	·		28·72				P
2			12		20·1	SE.					R
			20	21	6·9	SE.	28·31				Q
3			22		3·9	W.					Q
			33	24	9·2	W.	28·42				P
4			22		3·4	SE.					R
			35	21	5·9	E.	28·04		·09		Q
5			30		4·0	NE.					R
			34	30	2·2	NE.	28·21				S
6			27		0·9	N.					Q
			32	28	4·5	NE.	28·51		·26		
7			14		2·3	N.					P
			30	20	1·8	NE.	28·70				
8			0								
			26	12			29·05				
9			0		1·3	NE.					
			20	10	2·2	NE.	28·92				
10			6		2·8	NE.					
			25	15	2·0	NE.	29·27				
11			− 4		4·8	SE.					P
			25	12	6·4	SW.	28·65				P
12			13		4·7	W.					P
			33	24	5·7	NW.	28·52				Q
13			26		3·5	S.					P
			42	32	3·7	S.	28·14				Q
14			20		4·1	NW.					P
			40	31	2·8	S.	28·28				Q
15			38								
			40	36	8·5	W.	27·82		·01		Q
16			13		16·3	NW.					
			20	16	18·8	NW.	28·26				
17			8		4·2	NW.					P
			22	10	19·3	NW.	28·63				P
18			2		3·4	N.					P
			18	7	3·6	N.	28·80				P
19			− 1		1·7	E.					P
			18	4	1·7	SE.	28·82				Q
20			9		1·7	SE.					Q
			27	12	1·4	NW.	28·70			65	R
21			0		5·1	NW.					P
			19	7	0·9	SW.	28·89				
22			16		0·1	N.					
			20	17	7·2	NW.	28·65				
23			12		9·0	W.					P
			32	22	11·3	SW.	28·26			79	P
24			24		2·8	W.				87	Q
			26	23	4·2	N.	28·28			64	Q
25			8		6·3	N.					Q
			20	13	6·4	N.	28·15				Q
26			12		2·6	S.					R
			17	14	1·6	N.	28·38				R
27			12		3·3	NE.					P
			27	14	2·7	SE.	28·68			76	Q
28			29		4·3	S.				89	Q
			35	30	2·8	N.	28·48			91	Q
29			30								
			37	32	2·4	SE.	29·15				
30			28		3·7	S.				77	P
			47	32	2·4	S.	28·76			73	P
31			32		3·3	S.				79	Q
			40	33	2·4	N.	28·34			76	R

Average time of observation:—7.45 a.m. and 5.00 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR APRIL, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1			36		1·1	N.				82	R
	34		39	34	1·9	NW.	28·64		·23	84	R
2			28		5·5	N.				77	R
	34		26	26	6·9	N.	28·70		·08	88	R
3			20		5·9	NW.					Q
	34		29	22	7·8	W.	28·85			89	Q
4			20		6·2	NW.					Q
	34		29	22	11·1	NW.	28·80			35	Q
5			32		5·0	SW.				74	Q
	34		32	24	5·0	S.	28·65			79	Q
6			32		3·7	W.				90	R
	34		28	26	1·2	N.	28·57			77	R
7			10		4·9	N.					Q
	34		26	14	6·8	NW.	28·95		·23	75	Q
8			20		4·6	N.					Q
	34		34	22	4·3	NW.	28·90			81	P
9			26		4·2	S.				88	P
	35		41	24	8·4	S.	28·40			84	Q
10			34		5·2	NW.				90	R
	34		27	27	1·3		27·97			65	R
11			20		8·1	S.					Q
	32		49	26	1·1	W.	28·27			77	Q
12			15		3·2	NW.					
	33			20	2·2		28·70				
13			29		2·8	SE.				89	Q
	33		50	40	2·7	S.	28·67			71	Q
14			35		1·8	N.				82	P
	35		49	39	2·0	N.	28·58			67	
15			43		4·5	W.				78	P
	35		57	44	1·4	NW.	28·47			77	P
16			42		1·6	W.				85	Q
	36			43	3·6	E.	28·62				
17			47		2·6	N.				89	Q
	36		49	45	2·3	N.	28·60		·05	80	R
18			37		5·6	NW.				91	Q
	36		30	33	9·1	N.	28·47		·29		Q
19					12·3	NE.					Q
			32	24		S.	28·65		·87	90	Q
20			28		1·4	S.					Q
	34		38	32	10·3	S.	28·35	·13		83	Q
21			36		1·8	NW.				56	Q
	35		40	34	15·0	W.	28·65	·06	·01	84	P
22			32		3·1	S.				90	P
	35		51	34	2·7	S.	28·90			75	P
23			39		4·4	S.		·01		92	R
	36		47	40	7·0	SE.	28·70	·03		86	Q
24			45		4·4	SE.				89	R
	36		49	42	4·1	SE.	28·60	·01	·02	74	R
25			44		1·4	S.				85	R
	36		49	43	2·0	S.	28·37	·02	·01	87	R
26			53		2·0	S.				75	R
			56	48			28·47	·05		82	R
27			36		5·1	N.				73	R
	37		36	32	6·7	NE.	28·75	·01		65	R
28			30		10·0	NE.				89	Q
	35		38	30	13·2	N.	28·80			83	P
29			36		7·5	N.				91	R
	35		54	37	3·6	SE.	28·95	·18		48	R
30			41		4·2	S.				69	Q
	36		45	35	3·4	S.	28·95	·01		79	Q

Average time of observation:—7.45 a.m. and 5.00 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, thr atening.

Meteorological Data for M.H.S. Station at Keewatin, Ont., for May, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1			43		4·0	S.		·01	·02	88·0	Q
	37		63	50	4·1	SW.	28·65	·02		51·0	Q
2			54		4·2	SW.				76·0	Q
	38		64	52	2·6	S.	28·41			77·0	Q
3			51		3·0	SE.				94·0	
	38			48	4·8	SW.	28·35				
4			52		2·1	NE.				94·0	P
	38		67	56	1·8	NE.	28·30			67·0	P
5			50		3·8	S.				77·0	P
	38		70	54	5·4	S.	28·40				R
6			43		3·2	S.				92·0	R
	38		42	40	6·5	NE.	28·45			88·0	R
7			46		3·8	E.				93·0	P
	38		64	44	4·3	N.	28·70			57·0	P
8					2·7	S.					Q
	40		60	44	7·9	SW.	28·65			63·0	Q
9					3·5	S.					
	40		56	45	2·8	NW.	28·40	·02		77·0	Q
10			48							79·0	
	39			40	5·1	N.	28·75				
11			44		2·2	NE.				78·5	P
	39	38			4·0	NE.	28·95				
12			44		2·2	S.				85·0	P
	38	38		48	7·2	W.	29·00				
13			53		5·0	NE.		·08		75·0	Q
	40	40	55	44	5·3	NE.	28·95	·01		49·0	Q
14			48		2·6	N.		·08		87·0	P
	42	42	66	43	4·7	W.	29·00	·01		62·0	P
15			52		2·2	S.		·02		63·0	P
	42	42	55	44	3·6	S.	28·90	·00		52·0	P
16			60		2·8	N.		·06		67·0	Q
	42	42	72	52			28·80	·00		45·0	Q
17			62		5·4	S				60·0	
	43	44	63	58	8·3	S.	28·75			60·0	Q
18			58		5·7	S.				73·0	
	42	42	60	56	6·2	W.	28·75		·04	76·0	Q
19			63		1·8	S.			·29	74·0	R
	46	46	58	54	3·0	S .	28·70		·25	72·0	R
20			56		2·4	S .				83·0	Q
	48	48	72	55	2·0	S.	28·70		·01	72·0	Q
21			50		1·0	W.				87·0	Q
	44	44	56	49	19·8	NW.	28·75		·01	77·0	Q
22			46		1·8	S .				87·0	Q
	43	43	52	45	9·5	S.	28·80	·03	·02	50·0	R
23			50		4·3	W.		·06		50·0	Q
	46	46	61	45	3·5	W.	28·72	·02		49·0	Q
24			59		3·6	SE.		·05		67·0	R
	48	48	67	55	4·8	S.	28·45			71·0	P
25			61		4·4	S.				89·0	R
	47	48	77	60	19·4	W.	28·20		·38	53·0	R
26			63		15·0	W.				84·0	P
	47	48	75	60	32·2	W.	28·47	·02		63·0	P
27			64		5·0	S.				70·0	P
	48	48	74	58	3·6	S.	28·78	·02		54·0	P
28			63		2·5	S.				74·0	Q
	50	50	59	56	6·8	S.	28·60	·03	·13	89·0	Q
29	49	50	56		34·2	W.				88·0	P
	50	52	64	55	21·1	W.	28·57		·72	52·0	Q
30	49	49	60		4·8			·05		58·0	Q
	51	53	73	57	9·0	S.	28·73	·03		44·0	R
31				55			28·80				

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR JUNE, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	52	52	57·5		6·7	S.				91	P
	57	58	70·5	60	2·2	W.	28·80	·18		86	Q
2	53	53	64·6		2·7	S.				87	P
	57	58	74·0	60	4·0	S.	28·63	·04		78	R
3	53	54	64·0		4·4	S.			1·72	90	Q
			65·0	62	8·0	S.	28·50	·05		80	Q
4	53	54	58·0		13·2			·04		88	Q
			68·0	55	11·4	E.	28·65	·03		67	Q
5	52	52	54·0		13·3	E.		·06		88	P
	55	56	68·0	56	14·2	S.E.	28·65	·06		71	P
6	54	54	56·0		13·3	S.				82	R
			70·0	60	8·3	E.	28·45			81	Q
7		60	74·0		6·2	SE.				74	P
			77·0	70			28·42			63	Q
8	61	62	67·0		4·7	SW.			·42	75	Q
	64	64	79·0	76	3·6	SE.	28·87		1·25	79	Q
9	58	59	63·0		6·6	W.			1·12	84	R
			76·0	64	7·7	SW.	28·53			59	Q
10	57	57	66·0		10·4			·04		90	P
	60	61	72·0	63	13·0	W.	28·45	·03		86	P
11	56	56	58·0		3·9	N.W		·03		88	R
			64·0	55	7·7	W.	28·70	·03	·02	70	Q
12	57	57	61·0		4·7	W.		·04		88	P
	60	60	74·0	55	10·1	NW.	28·73	·05		74	P
13	58	58	60·0		4·5	SE.		·05		83	P
	59	60	70·0	58	12·2	SW.	28·90	·05		48	P
14	60	60	78·0		27·2	N.		·06		46	R
	60	60	66·0	60	10·6	N.	28·94	·02		44	P
15	59	58	63·0		3·3	S.		·05		64	P
	64	64	76·0	60	4·4	SW.	29·00	·05		82	P
16	60	60	68·0		5·3	SW.		·05		85	P
	60	60	76·0	60	11·2	SW.	29·13			66	P
17	60	60	67·0					·03		90	P
	66	68	73·0	65	7·9	SW.	28·65			86	P
18	58	58	48·0		5·9	NE.		·05		86	R
	60	60	64·0	56	11·1	NE.	28·65	·08		65	P
19	58	57	54·0		10·9	NE.		·06		76	P
			62·0	50	4·4	SW.	28·70			64	R
20	61		64·0							90	P
	63	63	79·0	72	6·8	W.	28·70	·05		57	P
21	66	66	74·0		8·7	NE.		·08		61	P
	64	64	73·0	62			28·85	·03		57	P
22	62	62	61·0		5·0	S.		·03	·09	89	Q
	63	63	70·0	60	5·2	W.	28·60		·05	81	Q
23	62	62	70·0		9·3	SW.				86	P
				62			28·55				
24	62	62	68·0		6·9	W.		·12		85	P
	64	64	69·0	60	12·3	NW.	28·85	·08		95	P
25	61	61	62·0		6·4	N.		·06		79	Q
	63	63	63·0	54	4·5	N.	28·85			55	R
26	61	60	62·0		2·4	SE.		·06		74	P
	64	63	74·0	56	10·3	SE.	28·76	·26		43	P
27	61	60	61·0		12·8	E.		·03		89	R
	62	62	66·0	62	14·2	E.	28·65	·09		61	R
28	64	64	68·0		3·3	S.		·09		62	Q
	63	63	66·0	58			28·76	·03		61	Q
29	63	62	67·0		1·7	S.		·05		71	P
	63	63	71·0	60	3·7	NW.	28·85	·09		64	Q
30			65·0		2·7	SW.		·03			Q
				58	1·7	S.	28·75				

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR JULY, 1914.

Day	Lake	Tank	Air	Day	Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	°	°	°	°"	Miles per hour		Inches	Inches	Inches	%	
1						N.					P
	65	65	75	65	2·3	NW.	28·53	·16	·02	78	P
2	61	61	68		5·5	SW.				81	S
	66	66	75	64	5·8	SW.	28·55	·05	·00	70	S
3	64	64	69		5·0	SW.		·02		85	Q
	68	70	73	68	2·9	W.	28·45	·06	·07	73	
4	66	66	72		1·2	S.				77	
	73	74	78	62	2·9	S.	28·59	·00	·04	60	
5	68	68	74		2·8	S.		·03	·00	78	
	70	70	78	70	6·1	S.	28·52	·04		75	
6	70	70	72		7·3	W.		·00	·01	86	
	67	67	67	65	12·7	W.	28·35	·02	·00	75	
7	66	66	64		11·5	N.			·00	70	
				68	5·1	N.	28·75		·00		
8	68	68	66		2·8	S.		·18	·00	73	Q
	69	69	71	64	6·3	SE.	28·59		·00		
9	69	69	71		5·2	SE.			·43	86	P
				76	5·7	SE.	28·53	·00	·00		P
10	69	69	70		4·8	SW.		·02	·01	83	S
	69	70	73	68	1·0	SW.	28·53	·06	·03	84	S
11					6·8	SE.		·02	·00	95	Q
				65	8·0	E.	28·48				
12	70	70	69	66	4·7	N.					
							28·44		1·05	95	S
13	70	71	74		10·6	N.		·04	·01	86	P
	73	74	80		7·5	SW.	28·52	·05	·00	79	P
14	73	73	77		4·7	SW.		·03	·00	87	P
	75	76	79	70	24·0	S.	28·33				R
15	72	72	71		22·9	SW.		·10	·46	100	R
	73	73	70	71			28·60	·05	·00	95	R
16	69	69	61		8·7	W.		·00	·00	94	Q
	70	70	66	58	14·8	W.	28·83	·07	·07	90	Q
17	68	68	49		11·5	N.		·01	·19	100	R
	70	70	66	55	9·6	SW.	28·45	·13	·01	80	P
18	68	68	63		3·5	SW.		·09	·00	79	P
	70	71	70	63	7·0	SW.	28·57	·05	·01	72	P
19	70	70	65		4·7			·05	·00	90	P
	70	71	70	64	1·9		28·69	·08	·00	90	P
20	68	69	72		4·7	E.		·04	·00	75	P
	76	77	84	73	1·9		28·60	·02	·00	84	P
21	71	71	75		3·9	S.		·05	·00	74	P
	73	73	77	76	8·6	W.	28·66		·00	79	P
22	69	69	65		5·2	W.		·08	1·00	80	P
	71	71	73	66			28·47	·03		65	P
23	69	69	65		3·8	SW.		·03		85	P
	68			67	4·6	SW.	28·50			85	P
24	70	70	69		2·3	SW.		·09		81	P
	73	73	74	71	10·7	SW.	28·52	·06	·02	74	R
25	74	74	78		13·9	SW.		·01	·02	87	P
	73	73	79	72	14·6	SW.	28·44			68	P
26	75	76	82			S.		·12	·12	76	P
	74	74	82	77	7·5	S.	28·60	·01		80	P
27	73	73	74		6·3	S.		·03	·01	86	P
	76	76	83	75	9·5	S.	28·58	·09		49	P
28	74	74	72		7·7	SW.		·09		82	P
	73	73	77	73		SW.	28·72	·02		74	P
29	73	73	65		6·4	S.		·10		85	P
	73	74	72	71	4·6	S.	28·68	·04		86	P
30	72	72	68		3·2	SW.		·06	·22	95	S
	75	75	77	72	1·5	SW.	28·56	·04		96	P
31	71	71	62		6·0	W.		·04		94	P
	75	75	75	72	4·6	W.	28·65			100	R

Average time of observation:—7.15 a.m. and 6.30 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR AUGUST, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	73	73	71	....	.....			·03	....	60	P
	75	75	76	....	0·8	W.	28·45	·04	....	70	P
2	76	76	76	....	4·1	N.E		·06	....	48	P
	73	73	70	....	.....		28·64	·15	....	68	Q
3	72	72	66	....	3·3	W.		·02	·05	90	P
	75	75	82	....	10·3	NW.	28·47	....	....	61	P
4	....	....	....	....	1·9	SE.					
	77	77	83	....	4·5	SW.	28·50	·04	....	80	Q
5	72	72	67	....	9·3	NW.		·04	....	95	R
	72	72	72	....	12·0	NW.	28·29	·18	....	77	R
6	71	71	62	....	6·1	NW.		·16	....	84	Q
	72	72	68	....	1·2	W.	28·48	·12	....	58	P
7	69	69	62	....	4·3	SE.		·12	....	74	P
	73	73	78	....	6·1	SE.	28·43	·16	....	60	Q
8	71	71	68	....	.....			·08	....	81	Q
	71	71	70	....	5·8	S.	28·15	·06	....	71	P
9	70	70	66	....	2·8	W.				66	Q
	71	71	66	....	.....		28·30	·12	....	90	P
10	71	70	62	....	1·0	N.		·08	....	71	Q
	71	71	64	....	.....		28·51	·12	....	74	....
11	68	68	64	....	5·3	NW.	28·68	·05	....	79	P
	70	70	67	....	3·1	W.		·06	....	75	P
12	70	70	65	....	3·1	SW.		·08	....	75	P
	69	69	62	....	6·9	S.	28·57	·06	....	79	P
13	68	68	62	....	4·5	W.		·02	....	59	P
	68	68	62	....	11·3	NW.	28·51	·09	....	50	P
14	68	68	60	....	9·7	N.		·09	....	83	P
	69	69	66	....	6·2	NW.	28·52	·06	....	71	Q
15	67	67	62	....	1·8	S.		·02	·01	89	Q
	68	68	62	....	5·4	E.	28·41	·05	·23	69	P
16	73	74	82	....	1·1	S.		·09	....	48	Q
							28·28				P
17	68	68	65	....	4·3	N.		·07	·16	80	P
	69	70	79	....	3·8	N.	28·46	·06	....	85	P
18	69	69	62	....	1·8	N.		·05	....	89	P
	72	72	75	....	1·2	N.	28·61	·05	....	58	Q
19	69	68	62	....	2·3	N.		·02	....	89	P
	72	72	72	....	2·3	S.	28·64	·02	....	65	P
20	68	68	66	....	0·7	W.		·03	....	80	Q
	70	70	69	....	5·4	NW.	28·61	·05	....	43	P
21	....	....	....	....	2·9	N.					
	....	....	....	....	2·4	N.					
22	68	68	65	....	2·7	SE.		·12	....	85	R
	68	68	60	....	.....		28·55	·07	·25	89	R
23	68	68	58	....	9·6	N.		....	·15	83	P
	66	66	55	....	.....		28·63	·04	....	88	P
24	66	64	50	....	5·7	E.		·15	....	74	P
	68	68	56	....	4·3	NE.	28·76	·03	....	77	R
25	64	64	52	....	6·5	E.		·12	....	75	P
	64	64	52	....	9·5	NE.	28·84	·03	·21	88	R
26	65	65	54	....	5·2	NE.		·08	·14	76	P
	64	64	59	....	4·0	N.	28·72	·03	....	89	R
27	64	64	54	....	0·2	E.		·03	....	88	R
	64	64	62	....	1·2	S.	28·77	·06	....	79	R
28	64	64	59	....	3·9	S.		·09	....	89	P
	64	64	64	....	6·8	S.	28·54	....	....	79	R
29	64	64	58	....	6·5	W.		....	·47	89	R
	66	66	65	....	3·5	S.	28·28	·04	·07	90	R
30	64	64	59	....	1·5	....		·03	·03	89	R
	66	66	64	....	.....		28·43	·09	....	90	P
31	64	64	62	....	5·1	S.		·03	·30	89	....
	66	66	72	....	5·5	W.	28·60	·03	....	82	....

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy .overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR SEPTEMBER, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1......	64	64	56	......	4·8	W.	....	·06	......	88	R
	62	62	58	......	4·9	W.	28·32	·09	......	89	R
2......	62	62	52	......	8·4	W.	....	·03	......	88	R
	63	63	54	......	9·0	W.	28·34	·05	·10	88	R
3......	60	60	48	......	14·1	NW.	....	....	......	87	R
	63	63	64	......	12·6	NW.	28·49	1·05	......	70	P
4......	63	63	52	......	4·4	W.	....	·12	......	88	P
	64	64	64	......	3·5	SE.	28·52	·06	......	75	P
5......	62	62	56	......	2·8	E.	....	·02	......	77	R
	62	60	55	......	9·4	E.	28·34	·05	·14	82	R
6......					3·6	NE.					
	60	59	50	......			28·50	·14	·17	74	R
7......					7·8	E.					
							28·05				
8......		59	53	......	3·2	E.	....	·16	......	82	P
	60				2·6	E.	28·90				
9......	60	60	57	......	7·6	S.	....	·06	......	83	Q
	59	58	55	......	12·0	S.	28·75	....	·06	94	S
10.....	59	59	57	......	5·0	SW.	....	....	·53	83	S
	62	62	65	......	3·6	S.	28·52	·02	......	78	P
11.....					2·1	S.					
	65	66	67	......	2·5	S.	28·54	·08	......	76	P
12.....	62	62	63	......	6·6	S.	....	·02	......	84	P
							28·71				
13.....					16·7	S.					P
							28·60				R
14.....					10·2	W.			·87		
					13·8	S.	28·52				
15.....	60	60	56	......	4·9	S.	....			82	R
	62	62	59	......	8·5	S.	28·52			68	P
16.....	60	60	59	......	11·5	W.	....		·92	81	P
	60	60	60	......	11·2	W.	28·33			65	R
17.....	59	59	52	......	1·5	S.	....			88	R
	63	63	66	......	8·0	S.	28·83	·07	......	58	P
18.....	59	59	59	......	9·7	S.	....	·05	·05	89	S
	61	61	64	......	9·7	SE.	28·63	....	......	90	S
19.....					7·4	S.					
					9·2	SW.	28·75		1·11		
20.....					3·9	NW.					
							28·62		·12		
21.....					4·8	W.		·05			
	60	60	51	......	9·7	N.	28·11	·04	......	87	S
22.....	58	58	44	......	13·9	NW.	....	·04	......	79	R
	59	59	46	......	13·1	NW.	28·44			89	Q
23.....	59	59	51	......	3·1	W.	....	·07	......	84	Q
	60	60	56	......	1·7	E.	28·48	·06	......	69	P
24.....	56	56	44	......	8·1	N.	....	·06	......	82	Q
	57	57	50	......	8·1	N.	28·54	·04	......	59	P
25.....	56	56	53	......	2·4	S.	....	·05	......	78	P
	59	59	61	......	5·5	S.	28·73	·06	......	71	P
26.....	58	58	55	......	3·3	S.	....	·12	......	91	P
	60	60	63	......	3·0	NE.	28·61			70	P
27.....	62	62	62	......	10·5	SE.	....			79	P
							28·67	·09			
28.....					13·2	S.	....				
	58	58	55	......	4·5	S.	28·52	·10	......	82	P
29.....	58	58	51	......	5·9	NW.	....	·02	......	94	P
	58	58	55	......	3·1	NW.	28·67	·08	......	82	P
30.....	57	57	56	......	4·4	S.	....			79	P
	60	60	65	......	4·8	S.	28·64			64	P

Average time of observation:—7.15 a.m. and 6.30 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR OCTOBER, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	57	57	58	.....	5·0	SE.	....	·08	.....	83	P
	58	58	70	.....	8·0	SE.	28·47	·06	.....	70	P
2	60	60	64	.....	6·3	S.	....	·06	.....	77	P
	61	61	68	65	....	....	28·32	·00	.....	74	P
3	59	59	64	.....	7·3	SE.	....	·08	.....	75	S
	58	58	65	66	10·7	S.	28·25	·06	.....	75	P
4	60	60	64	.....	10·1	SE.	....	·00	.....	79	R
	62	62	69	65	....	....	28·24	·02	.....	72	R
5	60	62	64	.....	4·6	SE.	....	·00	.....	85	S
	59	58	58	58	3·3	S.	28·50	·08	·32	83	S
6	58	58	51	.....	0·3	E.	....	·03	·03	94	Q
	.....	.....	.....	55	2·1	S.	28·67	....	....	.....	.....
7	58	58	44	.....	2·0	NE.	....	·06	.....	71	P
	.....	.....	.....	54	....	....	28·55	....	....	.....	.....
8	57	57	48	.....	4·3	E.	....	·08	.....	.....	P
	.....	.....	.....	52	....	....	28·37	....	....	.....	.....
9	58	58	57	.....	3·0	W.	....	·03	·07	94	S
	.....	.....	.....	53	....	....	28·37	....	....	.....	.....
10	56	56	50	.....	5·1	SW.	....	·01	·55	87	.....
	58	58	48	47	8·4	SW.	28·30	·28	1·64	87	S
11	56	56	42	.....	4·8	NW.	....	·05	·11	85	S
	56	56	42	41	....	....	28·48	·02	·16	92	.....
12	54	54	36	.....	9·8	NE.	....	·02	.....	91	R
	54	54	38	40	6·3	NE.	28·86	·10	.....	91	P
13	54	54	40	.....	1·7	NE.	....	·04	.....	76	P
	56	56	48	39	1·4	NW.	29·20	·02	.....	87	P
14	54	54	44	.....	5·5	W.	....	·10	.....	85	P
	54	54	52	47	7·4	W.	28·70	·04	.....	88	Q
15	54	54	46	.....	6·1	N.	....	·06	.....	93	P
	56	56	56	53	5·5	E.	28·54	·02	.....	77	P
16	54	54	52	.....	5·6	SW.	....	·04	.....	88	P
	56	56	62	54	7·4	SW.	28·32	·04	.....	89	P
17	54	54	44	.....	2·0	NE.	....	·04	.....	93	P
	56	56	58	54	3·7	E.	28·33	....	....	89	P
18	56	56	56	.....	11·5	SE.	....	·04	.....	82	S
	.....	.....	.....	57	....	....	28·18	....	....	.....	.....
19	54	54	54	.....	10·2	SW.	....	·02	.....	88	S
	56	56	58	56	5·1	SW.	28·16	·02	.....	77	P
20	54	54	54	.....	2·4	SW.	....	·04	.....	88	P
	56	56	62	58	9·2	SW.	28·31	·02	.....	84	P
21	56	56	46	.....	3·8	N.	....	·02	.....	86	P
	56	56	58	52	2·1	E.	28·73	·02	.....	83	P
22	54	54	54	.....	8·4	SE.	....	·04	.....	88	R
	56	56	60	55	9·6	SE.	28·65	·02	.....	89	S
23	54	54	42	.....	11·6	N.	....	·08	·20	92	S
	54	54	48	49	14·1	NW.	28·73	·04	.....	80	P
24	52	52	42	.....	4·8	SW.	....	·03	·01	92	R
	52	52	50	46	13·5	W.	28·71	·06	.....	87	R
25	52	52	42	.....	10·6	N.W.	....	·04	·02	92	S
	50	50	38	40	....	....	28·53	·02	.....	83	.....
26	46	46	20	.....	15·1	NW.	....	·08	.....	85	P
	46	46	30	24	11·1	NW.	28·83	·06	.....	89	P
27	48	48	34	.....	8·1	W.	....	·14	.....	90	S
	48	48	44	35	12·9	W.	28·43	·06	.....	85	P
28	48	48	38	.....	7·0	N.	....	·04	.....	83	S
	48	48	42	40	6·7	N.W	28·34	·04	.....	85	S
29	48	48	38	.....	8·6	W.	....	·06	.....	91	P
	48	48	48	43	11·2	NW.	28·49	·04	.....	87	P
30	48	48	42	.....	1·8	S.	....	·04	.....	92	R
	48	48	54	45	5·2	S.	28·39	·04	.....	82	P
31	48	48	46	.....	3·5	S.	....	·06	.....	93	S
	50	50	52	53	4·8	S.	28·10	·02	.....	88	P

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small, fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR NOVEMBER, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	48	48	40·0		8	N.		·01	·01	84	S
	48	48	40·0	43			28·36	·04		76	P
2	47	48	40·0		9·2	SE.		·08		88	S
	46	46	40·0	41	14·5	SE.	28·37	·04		89	P
3	47	47	44·0		7·3	W.		·04		85	S
	48	48	45·0	44	10·3	W.	28·05	·05	·02	79	S
4	46	46	35·0		12·4	NW.		·03	·19	91	R
	47	46	36·0	36	16·7	NW.	28·51	·03	·03	91	S
5					8·5	N.					
	46	46	32·0	31	2·9	NW.	28·58	·14		74	P
6					4·5	E.					
	46	44	33·0	35			28·39	·04		52	R
7					12·8	NW.					
	45	44	32·0	34	4·6	W.	28·53	·10		79	Q
8	44	44	38·0		11·6	W.		·06	·02	71	P
	44	44	35·0	35		SW.	28·55	·03	·02	95	Q
9	43	42	33·0		5·0	SE.		·02		95	P
				37		SE.	28·25				
10	43	42	34·0		10·4	W.		·06		90	R
	44	44	41·0	38	10·5	W.	28·31	·02		62	R
11	42	41	22·0		11·2	NW.		·05		93	P
	41	40	28·0	27	7·3	NW.	28·62			44	P
12	36	32	15·0		6·9	E.					Q
	38	37	25·0	22	5·8	E.	28·60	·18		50	Q
13	38	36	27·0		3·9	W.				82	S
	36	34	26·0	26	4·3	W.	28·48	·02		82	S
14	34	33	22·0		10·4	E.				79	R
				24			28·25				
15											
				25	8·6	NW.	28·36		·01		R
16	32		12·0		15·3	NW.					R
	32		9·0	16	14·4	NW.	28·59				S
17					9·9	W.					P
	34		4·0	2	9·9	N.W	28·68				P
18			8·0		8·9	N.					Q
	33		1·0	5	16·2	NW.	28·71		·01		P
19			10·0		9·3	W.					P
	33		12·0	8	2·9	S.	28·45				P
20			20·0		8·3	S.					P
	33		24·0	22	3·9	W.	28·26			94	P
21			23·0		9·4	NW.					P
	34			19	16·2	NW.	28·51			85	P
22			8·0		8·4						P
	33		13·0	12	2·1		28·75				P
23			22·0		5·7	S.					P
			31·0	26			28·49			100	P
24			23·0		6·2	SW.				59	P
	34			32	6·6	SW.	28·49				
25			30·0		9·1	SW.				95	P
	34		39·5	35	2·2	S.	28·17			92	R
26			36·0		9·4	NW.					R
	33		19·0	30	15·9	N.	28·32			100	P
27			9·5		4·6	S.					Q
	33		23·0	17	5·1	S.	28·69			100	P
28			27·0		6·9	S.					P
	33		39·5	35	8·9	S.	28·35			88	P
29			41·0							80	P
	34		36·5	38			28·32			81	P
30			36·0		5·0	N.				91	Fog
	34		33·0	37	6·1	N.	28·48			76	R

Average time of observation:—7.45 a.m. and 5.00 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR DECEMBER, 1914.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1			33		7·2	E.				95	R
	33		23	29·0	5·9	W.	28·43		·10	73	R
2			18		7·4	NW.				92	S
			19	20·0			28·70		·10	77	Q
3			22		6·2	S.	28·78				
	34			26·0							·
4					6·5	S.					
	32		28	27·0	4·7	S.	28·76			100	P
5					13·9	S.					
			28	28·0	4·4	S.	28·84			100	P
6			22								P
			29	28·0			28·89			94	R
7			23							87	Q
	33			27·0			29·03				
8			20								Q
			16	17·0	11·1	N.	29·12				P
9			1		4·9	N.					P
			8	6·0	6·4	N.	29·15				P
10			1		1·1	S.					Q
	32		15	9·5	1·9	SW.	28·88				P
11			13		4·8	W.					P
	32		15	10·0	3·0	S.	28·58				P
12			3			W.					Q
	32		10	7·0	1·0	W.	28·42				P
13			−12								P
			−11	− 3·0	1·1		28·59				P
14			−20		2·1	N.					P
			−12	−12·0	21·9	W.	28·64				P
15			−19								P
			− 8	−12·0			28·86				P
16			− 2								P
			0	− 4·0			28·74				P
17			2								P
			13	+ 6·0			28·33				P
18			12								Q
			13	13·0			28·21				Q
19			13								R
			9	10·0			28·48				P
20			10								Q
			11	7·0			28·41		·20		Q
21			− 2								Q
			−22	−14·0			28·29				P
22			− 4								P
			−22	−18·0			28·48				P
23			−19								P
				−15·0			28·55				
24			−28								P
				−28·0			28·70				
25			−24								P
			− 7	−14·0			28·75				P
26			− 8								Q
			3.	− 4·0			28·42				Q
27			2								P
				− 3·0			28·68				
28			− 7								R
			9	+ 3·0			28·28				P
29			− 9								P
			− 7	− 6·0			28·67				P
30			−20								P
				−14·0			28·32				P
31			7								R
			13	+ 8·0			28·30				R

Average time of observation:—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 FOR M.H.S. STATION AT KEEWATIN, ONT., FOR JANUARY, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	P
1	32		7	2			28·47		·30		P
2			−21								P
			0	− 6			28·83				P
3			10								P
			13	9			28·53				Q
4			15								R
			24	18			28·05				Q
5			12								P
			24	23			28·09				R
6			12								R
			14	20			28·22				P
7			2								P
			4	7			28·65				P
8			8								P
			8	8			28·40				P
9			4								P
			11	11			28·46				P
10			26								R
			27	22			28·38				R
11			3								Q
			21	10	2·8		28·40				P
12			20								R
			30	18	7·3		28·01				Q
13			24		11·1	SW.					R
			12	14	11·0	W.	27·83				Q
14			6		6·2	SW.					Q
			6	6	2·7	W.	28·33		·08		R
15			3		2·4	NE.					P
			6	4	1·6	NE.	28·60				P
16			− 6		1·2	N.					P
			6	0	7·9	N.	28·57				P
17			6								R
			9	8	5·9	E.	28·33				R
18			6		1·0	S.					R
			10	10	1·7	S.	28·20		·13		R
19			9		4·6	N.					R
			14	13	3·7	N.	28·28				P
20			−10		3·9	N.					P
			− 4	− 5	4·6	N.	28·65				P
21			−18		3·5	N.					P
			− 4	− 8		NW.	28·85				P
22			− 4		0·9	S.					P
			− 6	− 5		S.	28·75				Q
23			−11		4·6	SW.					P
			−14	−12	2·5		28·57				P
24			−23								
			−23	−19	1·0		28·68				P
25			−33		2·4	S.					P
			−16	−25	1·5	S.	28·51				P
26			−25		1·7	W.					P
			−14	−23	3·9	W.	28·49				P
27			−35			W.					P
			−24	−30	3·9	W.	28·76				Q
28			−24			S.					P
			−16	−25	5·5	S.	28·58				P
29			−33			S.					P
			−14	−23	1·2		28·75				P
30			− 8		2·9	S.					P
			+14	− 4	1·1	S.	28·55		·07		P
31			15								R
			8	+ 7			28·59				P

Average time of observation:—7.45 a.m. and 5.00 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR FEBRUARY, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1			− 9								P
	32		2	− 2			28·69				P
2			17								Q
			19	8	5·8	S.	28·45				Q
3			19		5·1	S.					R
			24	21			28·30		·40		R
4			24		4·3	E.					R
			26	24	0·7	NE.	28·25				P
5			12		1·2	N.					Q
			15	15	9·2	N.	28·36				P
6			1		5·2	NW.					P
			10	9	7·1	NW.	28·51				P
7			− 6								P
			15	8	3·8	W.	28·76				P
8			10		0·4	NE.					R
			8	11	1·8	NW.	28·79		·10		P
9			25		0·8	S.					P
			21	14	3·7	S.	28·54				R
10			25		3·4	S.					
			20	22	1·7	S.	28·27				Q
11			22		0·5	N.					R
			24	19	2·4	N.	28·52				P
12			0		0·6	S.					P
			16	11	2·4	S.	28·30				P
13			20		0·3	SE.					R
			26	21			28·38				R
14			25								R
			24	23	0·2		28·04		·60		R
15			16		3·9	NW.					R
			12	16			28·48		·30		R
16			4		4·2	SE.					P
			12	9			28·64				P
17			16		0·5	S.					P
			34	22	12·2	S.	28·47				P
18			35		3·7	S.					R
			35	33	3·8	S.	28·47		·06		R
19			31								R
			32	31	0·3	NE.	28·63				R
20			34		0·5	N.					
			34	33	5·0	S.	28·63				R
21			30		7·8	S.					
			28	28		S.	28·68				R
22			20		2·1	NE.					
			25	24	7·9	N.	28·82				P
23			6		4·6	N.					
			28	18	2·7	N.	28·69				P
24			6		2·9	N.					P
			23	16	0·4	N.	28·62				P
25			10		4·7	E.					P
			18	14	3·4	NE.	28·75				P
26			3		3·9	S.					P
			17	10	3·4	S.	28·87				P
27			3		1·0	S.					P
			17	11	2·9	S.	28·89				Q
28			14								
			15	15	2·8		28·65				R

Average time of observation:—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 FOR M.H.S. STATION AT KEEWATIN, ONT., FOR MARCH, 1915.

Day	Temperature				Velocity Wind	Direc-tion Wind	Baro-meter	Evapor-ation	Rain	Humi-dity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1					4·5	W.					R
			+7·0	+16·0	4·3	NW.	28·56		·03		Q
2			−7·0								P
			+6·0	0·0	20·8	SE.	28·80				P
3			+1·0		0·2	S.	28·92				P
			+15·0	+7·0							P
4			+14·0		1·0	S.	28·99				R
			+27·0	+17·0	0·8	NE.					P
5			+19·0		1·8	N.					Q
			+29·0	+23·0	3·9	N.E	28·80				Q
6			+17·0		4·6	N.					P
			+30·0	+23·5			28·76			89	P
7			+17·0		1·6	N.					P
			+30·0	+23·0			28·85			95	P
8			+17·0		0·3	S.					P
	34		+34·0	+24·0	···		28·73			69	P
9			+30·0	+24·0	0·3	S.	28·67			58	P
			+19·0		1·4	S.					P
10			+35·0	+26·0			28·67			82	P
			+20·0								P
11	35		+36·0	+29·0			28·65			50	P
			+22·0								P
12			+35·0	+29·0			28·62			77	P
			+28·0		3·4	S.					R
13	33		+31·0	+28·0	2·7	S.	28·61				R
			+30·0								R
14			+33·0	+31·0			28·54			85	P
			+32·0		5·0	N.					P
15	34		+34·0	+31·0	7·5	N.	28·64			58	P
			+24·0		1·9	S.					P
16	35		+34·0	+30·0	4·2	W.	28·65			77	P
			+30·0		4·2	W.					P
17			+34·0	+32·0			28·40			81	P
			+16·0		4·0	N.					P
18	33		+23·0	+21·0	24·5	N.	28·49				P
			+20·0		12·4	N.					R
19			+20·0	+19·0	15·5	N.	28·51		·17		P
			+22·0		8·1	N.					P
20	34		+31·5	+24·0			28·66			89	P
			+28·0							94	P
21			+36·0	+29·0			28·57			82	P
					4·6	N.					
22				+32·0							
			+32·0		5·4	S.					R
23			+38·0	+34·0	3·5	S.	28·15		·20	83	R
	35		+26·0		9·2	N.					R
24			+18·0	+24·0			28·33				R
			+3·0		14·1	N.					R
25				+18·0	10·2	N.	28·83				P
			+23·0								P
26			+32·0	+21·0	10·4	W.	28·64				P
			+30·0								S
27			+20·0	+22·0	9·2	N.	28·39			84	P
28			+18·0	+11·0	6·0	N.	28·61				P
			+10·0		12·9	N.					P
29			+24·0	+14·0	7·3	NW.	28·59			55	P
			+19·0		6·8	N.					R
30			+32·0	+22·0	7·9	N.	28·69			60	P
			+28·0		5·6	N.				71	Q
31			+38·0	+29·0			28·73			67	P

Average time of observation:—7.45 a.m. and 5.00 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR APRIL, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1......	......	28·0	28	......	6·8	N.	......	......	......	94	P
	......	......	......	28·5	9·7	N.	28·76	......	......	......	......
2......	......	......	......	......	6·7	S.	......	......	......	......	......
	35·0	......	35	30·0	3·2	S.	28·77	......	......	55	P
3......	......	......	36	......	6·6	S.	......	......	......	......	R
	36·0	......	44	39·0	8·3	S.	28·37	......	......	57	R
4......	......	......	44	......	......	......	......	......	......	78	R
	......	......	44	40·0	......	......	28·19	......	......	78	S
5......	......	......	36	......	5·0	E.	......	......	......	91	S
	36·0	......	39	36·0	......	......	28·41	......	·14	92	R
6......	......	......	34	......	3·0	W.	......	......	......	......	Q
	37·0	......	42	37·5	......	......	28·65	......	......	62	P
7......	......	...·...	36	......	2·9	W.	......	......	......	79	P
	37	......	48	42·0	3·2	W.	28·66	......	......	51	Q
8......	......	......	41	......	2·8	S.	......	......	......	88	S
	37·5	......	47	46·0	2·7	S.	28·51	......	......	63	S
9......	36·0	......	42	......	1·6	S.	......	......	......	96	Fog
	......	......	......	40·5	......	......	28·29	·025	......	......	......
10......	37·0	37·0	42	......	7·8	SW.	......	......	......	77	S
	36·5	......	43	46·0	......	......	28·10	·025	......	70	
11......	38·0	38·0	43	39·0	1·3	......	28·57	·015	......	71	......
12......	......	......	......	......	6·2	S.	......	......	......	......	P
	......	......	47	39·0	5·7	S.	28·70	......	......	......	P
13......	......	......	......	......	5·7	S.	......	......	......	......	P
	38·0	......	52	44·0	6·6	S.	28·59	......	......	76	P
14......	37·5	37·5	43	......	5·4	S.	......	......	......	85	P
	38·0	38·0	60	50·0	4·6	S.	28·50	......	......	66	P
15......	39·5	39·5	51	......	6·7	N.	......	·02	......	90	S
	......	......	......	53·0	8·5	N.	28·61	......	......	......	P
16......	41·0	41·0	66	......	4·3	S.	......	·02	......	......	P
	44·5	44·5	67	51·0	2·9	S.	28·69	......	......	......	P
17......	40·0	40·0	48	......	5·8	S.	......	·05	......	60	S
	44·0	46·0	58	48·0	6·4	S.	28·29	·07	·07	72	Q
18......	44·5	44·5	56	......	4·7	NW.	......	·03	......	74	P
	......	......	......	51·0	......	......	28·23	......	......	......	......
19......	44·0	44·0	51	......	13·2	NW.	......	·12	......	90	P
	44·5	44·5	60	52·0	1·4	NW.	28·40	·11	......	73	P
20......	41·5	40·0	40	......	6·0	SE.	......	·03	......	......	P
	44·0	46·0	58	45·0	3·3	SE.	28·61	·07	......	67	P
21......	......	......	......	......	10·2	S.	......	......	......	......	......
	44·5	44·5	61	51·5	7·1	S.	28·22	·08	......	77	P
22......	44·0	42·0	49	......	6·6	S.	......	·03	......	93	R
	......	......	......	52·0	......	......	28·26	......	......	......	......
23......	44·0	43·0	47	......	9·1	N.	......	·04	·50	89	R
	......	......	......	47·0	15·1	......	28·36	......	......	......	......
24......	44·0	43·0	48	......	2·9	N.	......	......	·71	......	Fog
	45·0	45·0	60	55·0	1·6	N.	28·29	......	......	63	Q
25......	46·0	46·0	58	......	2·2	W.	......	......	·07	77	Q
	......	......	......	51·0	......	......	28·27	......	......	......	......
26......	43·5	43·5	44	......	8·0	W.	......	......	......	......	P
	47·0	46·5	57	50·5	1·2	S.	28·41	·02	......	85	R
27......	44·0	44·0	52	......	2·5	N.	......	......	·26	91	Fog
	45·0	45·0	63	53·0	1·7	NW.	28·11	·02	......	67	Q
28......	......	......	......	......	6·3	NW.	......	......	......	......	......
	47·0	47·0	56	49·0	24·5	NW.	28·16	......	......	71	Q
29......	46·5	46·5	49	......	15·2	NW.	......	·05	......	93	P
	47·0	47·0	62	52·0	17·7	N.	28·44	·07	......	74	P
30......	43·0	43·0	45	......	11·6	NE.	......	·01	......	93	Q
	......	......	......	46·5	13·0	NE.	28·45	......	......	......	......

Average time of observation:—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 FOR M.H.S. STATION AT KEEWATIN, ONT., FOR MAY, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1......	45·0	45·0	47·0	....	9·8	NE.	....	·05	.....	.....	R
	....	....	....	50	15·1	NE.	28·59				
2......				43	10·7	E.	....				
3......	44·5	44·0	48·0	....	11·2	E.	....	·13	.....	87	R
	46·0	46·0	54·0	47	10·3	E.	28·40	·03	·03	94	R
4......	45·0	45·0	49·0	....	4·2	N.	....	·04	·07	87	Q
	47·0	47·0	58·0	53	4·0	N.	28·28	·03	.....	83	Q
5......	45·0	46·0	48·0	....	3·2	W.	....	·01		93	R
	43·0	43·0	45·0	47	9·4	NW.	28·18			82	R
6......	41·0	41·0	40·0	....	7·9	N.	....	·02	·12	92	S
	42·5	42·5	45·0	42	3·3	N.	28·13	·02	·36	86	....
7......	41·0	41·0	38·0	....	7·6	NW.	....		·35		S
				39	15·0	N.	28·05			69	P
8......	40·0	40·0	34·0	....	13·9	N.	....		·42	90	S
	44·0	44·5	51·0	41	15·1	N.	28·17	·07			
9......	45·0	47·0	61·0	....	7·9	N.	....	·035	·005	50	P
	45·0	48·0	62·0	48			....	·05	.....	39	P
10......	47·0	47·0	48·0	....	7·3	E.	....	·03		87	P
	48·0	49·0	65·0	55			28·29	·06		70	P
11......	47·0	47·0	55·0	....	11·3	S.	....		·32	94	R
				57	5·1	W.	28·20				
12......	47·0	48·0	52·0	....	4·0	N.	....		·22	91	S
	46·0	45·5	52·0	51			28·49		·03	81	S
13......	45·0	45·0	48·0	....	3·8	E.	....				S·
	50·0	50·5	59·0	52			28·59			81	P
14......	48·0	48·0	55·0	....	2·5	W.	....	·02		76	P
	48·0	49·0	72·0	56	7·2	E.	28·52	·07		32	Q
15......	47·0	47·0	51·0	....	10·9	E.	....	·03		75	R
	47·0	47·0	50·0	49	14·1	E.	28·45	·05		87	R
16......	48·0	49·0	51·0	....			....	·04		94	Q
	47·0	47·0	43·0	44			28·61	·10		63	P
17......	46·0	43·0	43·0	....	1·2	E.	....	·04	·09	43	Q
				38			28·58				
18......					4·5	N.					
	47·0	45·0	46·0	48			....	·08		46	P
19......	50·0	51·0	58·0	....	3·1	S.	....			62	P
				50			28·73	·09			
20......	50·0	52·0	54·0	....	3·2	S.	....	·06		70	P
				55			28·51				
21......	52·0	54·0	69·5	....			....			61	Q
				53	3·4	E.	28·32	·10			
22......	50·0	60·0	60·0	....	5·3	W.	....	·05		84	P
	51·0	53·5	67·0	56	7·0	SW.	28·35	·03		71	P
23......	50·0	50·0	56·0	....	4·2	W.	....	·03		82	R
	52·0	54·0	61·0	54			28·42	·035	·005	74	R
24......	52·0	54·0	60·0	....	4·4	N.	....	·01		78	P
				54			28·45				
25......	52·0	52·0	54·0	....	6·6	E.	....	·04		88	R
	54·0	56·0	68·0	58	11·4	E.	28·48	·08		55	P
26......	51·0	52·0	51·0	....	3·5	S.	....	·02		97	P
	56·0	60·0	65·0	52	5·2	S.	28·68	·04		70	P
27......	53·0	53·0	53·0	....	1·1	S.	....	·03		94	Q
	60·0	56·0	67·0	55	3·9	SE.	28·63	·07		71	P
28......	53·0	54·0	55·0	....	2·6	SE.	....	·01		88	R
				57			28·47				
29......	54·0	54·0	58·5	....	3·3	E.	....	·04		94	Q
	57·0	59·0	75·0	62	6·4	E.	28·50	·10		51	P
30......	58·0	59·0	72·0	....	3·5	NE.	....	·06		59	P
	60·0	63·0	72·0	57			28·56	·03		57	P
31......	56·0	57·0	56·0	....	1·7	E.	....	·03		88	P
	62·0	64·0	71·0	59	1·8	S.	28·59	·04		67	P

Average time of observation:—7.15 a.m. and 6.30 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION AT KEEWATIN, ONT., FOR JUNE, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	58·0	59·0	61·0		4·2	SE.		·03		84	P
	61·0	64·0	69·0	63	4·3	N.	28·59	·01		81	R
2	61·5	60·5	64·0		2·0	S.		·01		95	P
	62·0	62·0	77·0	66			28·44	·04		75	P
3	61·0	60·5	60·0		2·0	E.		·02			P
	65·5	66·0	74·0	67	5·3	S.	28·55	·07		72	Q
4	61·0	61·0	64·0		5·2	S.		·03		85	P
				67	11·0	S.	28·44				
5	62·0	62·0	65·0		17·1	W.			·45	90	R
	61·5	61·0	62·0	63	5·5	W.	28·12	·05	·15	92	R
6	59·0	58·0	44·6		5·0	N.		·03	·10	93	
				45			28·31				
7	58·0	56·0	44·0		13·8	N.		·10		82	Q
	58·0	58·0	52·0	48	4·7	NE.	28·42	·08		79	Q
8	58·0	57·0	39·0		8·1	NE.		·02	·38	88	R
	59·5	60·5	52·5	48	7·9	NW.	28·50	·04	·17	88	P
9	58·0	58·0	52·5		2·6	S.		·04		70	P
	60·0	61·0	58·0	53	4·8	W.	28·53	·07		89	Q
10	59·0	58·0	52·0		7·6	SE.		·02	·05	85	S
	58·0	57·0	50·0	52	6·7	E.	28·34	·01	·53	73	S
11	57·0	57·0	52·0		3·2	N.		·02	·03	88	Q
	58·0	60·0	58·0	54	3·0	S.	28·35	·06		86	P
12					2·9	SE.				88	
	58·0	58·0	54·0	53	5·1	E.	28·32	·06			R
13	58·0	59·0	58·0		15·2	S.		·03		80	P
	59·0	60·0	59·0	58			28·39	·07		81	R
14	58·0	59·0	61·0		2·5	S.		·03	·30	86	Q
				51	11·5	W.	28·35				
15					7·2	W.			·13		
	58·0	58·0	56·5	60	9·0	W.	28·36			85	R
16	57·0	56·0	45·0		8·1	N.		·09	·44	65	Q
	58·0	59·0	58·0	51	11·3	N.	28·39			64	P
17	57·0	56·0	54·5		1·8	S.		·03		76	P
				50	6·4	SE.	28·49				
18	56·0	55·0	49·5		6·7	N.		·07	·15	55	R
	56·0	57·0	53·5	53	10·3	N.	28·44	·05		91	S
19	57·0	57·0	53·0		3·7	N.		·035	·005	88	P
	59·0	60·0	62·0	55	4·1	W.	28·51	·04		87	R
20	59·0	59·0	59·0					·02		89	P
				57			28·55				
21	58·0	58·0	56·5		6·1	S.		·04	·68	94	P
				58	22·3	W.	28·21				
22	55·0	55·0	46·0		6·5	N.		·07	·06	87	Q
	58·5	58·5	61·0	56	5·8	W.	28·55	·08		74	P
23	56·0	56·0	53·0					·01	·34	88	R
	58·0	58·5	65·0	57	5·9	N.	28·45		·02	78	Q
24	56·0	56·0	65·0		3·7	SW.		·02			P
	57·5	58·0	62·0	58	6·0	SW.	28·51	·04		74	P
25	55·0	55·0	55·0		5·3	S.		·01	·40		R
	62·5	62·5	68·0	60	3·4	S.	28·40			76	P
26	59·2	59·5	58·0		3·2	SE.		·02		84	P
				63	10·7	S.	28·39				
27	59·5	60·0	64·0		6·2	S.		·05	·28	95	S
				67			28·38				
28	59·5	59·5	61·0		4·5	W.		·01		84	S
	65·0	65·0	71·0	66	5·5	SW.	28·52	·02	·01	77	S
29	62·0	62·5	60·0		5·7	W.				84	P
	55·5	55·5	68·0	64			28·47	·05		90	P
30	61·0	61·0	61·0		5·7	N.		·06		74	P
	61·0	63·0	68·0	64	4·4	NW.	28·27	·04	·08	78	Q

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

25f—17

METEOROLOGICAL DATA FOR M.H.S. STATION, KEEWATIN, ONT., FOR JULY, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day	Miles per hour		Inches	Inches	Inches	%	
1	60·0	60·5	60	59	5·6	W.		·02		73	S
							28·32				
2	59·0	59·0	49		4·9	W.		·11	·09	90	Q
	60·5	61·0	62	53	5·8	W.	28·25	·04	·02	55	Q
3	60·0	60·0	49		1·1	W.		·03		70	P
	62·0	63·0	63	54	2·1	S.	28·22	·05		65	S
4					7·1	N.					
	60·0	61·0	62	53			28·34	·07		56	Q
5	59·0	58·5	47		9·2	N.		·03		90	P
	63·0	63·5	68	58			28·40	·07		72	P
6	62·5	62·5	59		2·0	W.		·03		68	P
	67·0	68·0	72	64	2·9	S.	28·37	·05		82	P
7					0·7	W.					
8	69·0	69·0	70	66	1·0	S.	28·41	·07		90	P
	63·0	63·0	63		1·0	SW.		·04			P
	68·0	68·5	77	67	5·9	S.	28·48	·06		75	P
9	63·0	63·0	65		5·2	S.		·03		90	R
				64	12·4	S.	28·32				
10	63·0	62·5	64		9·5	S.			·39	95	S
	64·0	65·0	72	67	7·2	S.	28·14	·01		93	S
11	65·0	65·0	69		8·4	SE.		·02		93	R
				67			28·18				
12	65·0	65·0	64		3·4	S.		·01	·15	90	P
	67·0	67·5	74	67	7·1	S.	28·31	·31		70	P
13	65·0	65·5	66		1·3	S.		·03	·27	92	Q
	71·0	70·0	76	70	4·9	N.	28·36	·03		74	Q
14	65·0	65·0	63		5·4	NE.		·03		83	P
	64·0	64·5	71	66	11·2	E.	28·39	·03		86	Q
15	65·0	65·0	64		6·1	SE.		·02		95	R
	65·5	65·5	67	66	6·3	SE.	28·30	·02		85	R
16	65·0	64·0	60		6·0	NW.		·05	·15	89	R
	66·0	66·0	66	65	9·6	W.	28·19	·05		80	S
17	64·5	64·0	56		9·0	N.		·10	·05	79	R
	64·5	64·0	61	59	6·6	E.	28·42	·01		83	R
18	64·5	64·0	63		0·9	E.		·03		68	Q
	64·0	64·5	60	58			28·46	·04	·01	83	S
19	64·0	64·5	55		6·7	N.		·04		74	P
	64·5	65·5	67	62	1·0	W.	28·57	·06		73	R
20	64·5	64·5	58		6·3	N.		·03		94	P
	64·5	64·5	61	62	4·4	NW.	28·67	·05	·14	84	S
21	64·5	64·5	58		4·1	W.		·03		84	P
	66·0	67·5	70	64	3·1	W.	28·64	·07		68	P
22	65·5	66·0	63		4·1	S.		·04		84	P
	66·5	67·0	71	67	7·2	S.	28·49	·04		73	R
23	64·0	63·5	56		5·3	NE.		·04	·04	82	S
	64·5	65·0	66	62	10·2	E.	28·55	·08		51	P
24	64·0	63·5	50		4·2	S.		·05		67	P
	69·0	69·5	69	59	2·3	S.	28·70	·05		44	Q
25	67·5	69·0	68		2·7	S.		·07		83	P
				61			28·73				
26	67·0	67·0	58		2·5	S.		·10		94	P
	67·0	67·0	69	64	3·8	S.	28·68	·07		59	Q
27	66·5	66·0	62		0·9	N.		·03		79	Q
	67·5	68·5	76	66	5·1	W.	28·56	·07		45	P
28	66·0	66·5	61		2·9	S.		·04		84	P
				69	8·1	S.	28·44				
29	65·5	65·0	66		6·9	S.		·05	·03	85	S
	65·5	66·5	70	68	8·6	NW.	28·42	·02		56	Q
30	65·0	64·5	60		2·7	W.		·03		84	S
	66·0	66·5	70	64	6·7	NW...	28·45	·06		55	Q
31	65·5	65·0	52		3·5	N.		·04		88	P
	65·0	66·0	63	59	4·0	N.	28·56	·04		52	S

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

METEOROLOGICAL DATA, FOR M.H.S. STATION, KEEWATIN, ONT., FOR AUGUST, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	66·5	67·0	63	....	5·7	N.	....	·07	·18	58	Q
	....	....	....	61			28·67				
2	65·5	64·5	53	....	6·9	E.	....	·14	....	94	P
	....	....	....	60	5·3	E.	28·77				
3	66·0	65·0	54	....	2·9	S.	....	·15	....	75	Q
	69·0	68·5	70	62	3·8	S.	28·70	·08	....	72	P
4	67·0	66·0	54	....	0·4	N.	....	·07	....	....	P
	69·5	70·5	79	66	1·8	W.	28·57	·05	....	72	Q
5	67·0	67·0	59	....	3·7	N.	....	·05	....	....	P
	70·0	70·0	80	71	2·0	W.	28·44	·06	....	47	P
6	67·0	68·0	68	....	4·9	W.	....	·05	....	81	S
	66·5	66·0	77	70	7·4	W.	28·41	·04	·04	58	S
7	67·0	66·5	63	....	4·1	N.	....	·04	·12	90	S
	68·0	69·0	77	70	3·5	W.	28·45	·05	....	59	S
8	70·5	73·0	75	....	2·5	S.	....	·05	....	59	P
	....	....	....	71			28·55				
9	71·5	71·5	67	....	1·3	S.	....	·10	....	....	P
	74·5	75·0	81	74	3·0	S.	28·61	·04	....	66	P
10	70·5	70·5	69	....	0·7	S.	....	·05	....	93	P
	74·5	75·0	79	74	4·2	SW.	28·58	·04	....	79	P
11	70·5	70·5	71	....	1·9	S.	....	·06	....	86	P
	72·0	73·0	78	75	4·8	S.	28·43	·03	....	73	R
12	71·0	70·5	69	....	1·7	S.	....	·02	....	86	P
	72·5	73·5	84	76	4·4	SW.	28·42	·04	....	68	P
13	70·5	70·5	68	....	2·1	S.	....	·03	....	95	P
	....	....	....	76	3·2	W.	28·44				
14	71·0	71·0	67	....	1·7	SW.	....	·06	....	95	Q
	....	....	....	75	4·4	SW.	28·43				
15	71·0	71·0	69	....	3·1	S.	....	·07	·02	81	P
	....	....	....	70			28·45				
16	70·0	69·0	59	....	4·7	NE.	....	·11	·19	83	S
	....	....	....	58	8·5	E.	28·71				
17	69·0	68·0	58	....	6·1	S.	....	·13	....	86	R
	71·0	72·0	72	62	3·1	S.	.28·83	·05	....	60	P
18	69·5	68·5	60	....	0·6	S.	....	·07	....	86	P
	71·0	72·0	76	64	1·6	S.	28·75	·04	....	40	Q
19	69·5	69·0	56	....	2·0	S.	....	·07	....	....	P
	72·0	71·5	75	67	3·3	S.	28·61	·07	....	48	P
20	70·0	69·5	64	....	2·3	S.	....	·06	....	90	P
	72·0	72·5	76	69	3·5	S.	28·44	·06	....	65	P
21	66·0	64·5	73	....	2·9	N.	....	·04	....	83	R
	73·0	72·0	76	69	1·2	S.	28·41	·05	....	69	P
22	71·0	71·5	68	....			....	·04	....	67	P
	....	....	....	70			28·30				
23	69·5	69·5	62	....	2·3	W.	....		·17	89	S
	....	....	....	58	10·7	NW.	28·24				
24	67·0	66·5	56	....	13·7	N.	....		·23	61	R
	68·0	68·0	63	56	5·4	SW.	28·40	·10	....	56	Q
25					12·6	N.					
	68·0	67·0	55	52	12·4	N.	28·58	·12	....	59	Q
26	65·0	63·0	48	....	5·9	S.	....	·12	....	87	P
	65·5	64·0	60	52	4·8	SW.	28·68	·12	....	58	Q
27	65·5	64·5	59	....	5·4	S.	....	·07	....	78	P
	67·0	67·5	73	67	5·2	S.	28·45	·06	....	63	Q
28					5·7	W.					
	65·0	65·0	60	60	16·4	NE.	28·45	·15	·29	67	S
29	63·5	63·0	48	....	7·2	W.	....	·04	....	80	R
	....	....	....	54			28·66				
30	63·0	61·0	58	....	5·5	S.	....	·14	·07	69	S
	65·0	65·5	70	63	5·6	S.	28·34	·05	....	65	P
31	64·5	64·0	62	....	4·1	SW.	....	·03	....	84	Q
	65·0	66·0	76	69	5·7	SW.	28·17	·06	....	96	R

Average time of observation:—7.15 a.m. and 6.30 p.m.
P = Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION, KEEWATIN, ONT., FOR SEPTEMBER, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	63·0	63·0	60	.....	8·3	W.	....	·01	.....	92	P
	66·5	66·5	72	69	3·3	S.	28·42	·07	.....	69	S
2	64·0	64·0	65	.....	6·3	N.E	....	·04	·02	82	S
	66·0	66·0	78	72	8·0	S.	28·47	·06	.....	42	Q
3	65·0	65·0	66	.....	5·5	S.	....	·03	.....	80	P
	68·0	69·0	72	72	3·1	S.	28·52	·04	.....	73	Q
4	66·5	67·0	66	.....	1·1	S.	....	·02	.....	90	P
	69·0	69·0	76	71	4·5	S.	28·47	·04	.....	63	P
5	67·0	67·5	76	.....	3·7	S.	....	·04	.....	63	P
	.....	.....	.....	74	.....		28·40				
6	67·0	67·0	68	.....	4·4	S.	....	·02	.....	85	Q
	68·0	69·0	76	73	.....		28·33	·05	.....	67	P
7	66·5	66·5	67	.....	1·9	S.	....	.....	.....	92	P
	68·5	69·0	73	73	3·1	S.	28·18	·03	.....	63	Q
8	.....	.....	.....	.....	4·1	W.	....				
	64·0	63·5	56	61	9·7	W.	28·15	.....	·27	88	S
9	63·0	62·0	52	.....	4·7	W.	....	·03	.....	84	R
	64·5	64·0	64	59	8·3	S.	28·27	·08	.....	60	P
10	63·0	63·0	52	.....	5·7	W.	....	·06	·35	91	S
	64·0	63·0	55	54	11·8	W.	28·42	·08	.....	71	Q
11	62·0	60·5	43	.....	8·9	W.	....	·07	.....	78	Q
	61·5	61·0	51	49	4·4	NW.	28·55	·12	.....	45	R
12	62·0	60·0	53	.....	2·2	S.	....	·06	.....	61	S
	.....	.....	.....	49	.....		28·41				
13	62·0	60·0	46	.....	5·2	N.	....	·08	·12	89	S
	62·0	62·0	54	52	1·1	NW.	28·26	·03	.....	76	S
14	.....	.....	.....	.....	5·6	W.	....				
	.....	.....	.....	49	4·9	W.	28·19				
15	60·0	59·0	48	.....	5·1	S.	....	·23	·40	93	P
	61·0	.....	60	57	11·3	S.	28·33	.....	.....	56	P
16	60·5	58·0	54	.....	9·8	W.	....	.....	.....	91	S
	59·5	60·0	57	56	6·8	N.	28·45	·07	.....	61	R
17	60·0	59·5	54	.....	3·5	S.	....	·06	.....	82	Q
	62·0	62·0	66	58	7·3	S.	28·46	·05	.....	76	Q
18	60·0	59·0	52	.....	5·6	NW.	....	·00	·36	94	S
	59·5	58·5	52	52	11·8	W.	28·50	·05	.....	69	R
19	59·0	58·0	51	.....	4·5	S.	....	·04	.....	87	S
	.....	.....	.....	49	.....		28·25				
20	.....	.....	.....	.....	15·1	N.	....				
	58·0	59·5	54	48	19·5	NW.	28·27	.....	·42	67	Q
21	58·0	57·0	43	.....	4·6	NW.	....	.....	.....		Q
	57·0	57·5	55	53	7·0	W.	28·50	·05	.....	55	P
22	58·0	57·0	53	.....	2·9	S.	....	·03	.....	73	Q
	58·5	59·0	64	58	7·6	S.	28·33	·05	.....	20	R
23	58·0	58·0	49	.....	3·1	W.	....	·00	.....	87	P
	.....	.....	.....	55	10·6	N.	28·42				
24	57·0	55·0	40	.....	7·9	E.	....	·13	.....	84	R
	56·0	55·0	46	45	8·0	E.	28·68	·06	.....	72	S
25	56·5	55·0	47	.....	8·3	N.	....	·00	·84	93	S
	.....	.....	.....	45	7·8	N.	28·34				
26	55·0	54·0	44	.....	.....		....	·00	·31	93	Q
	.....	.....	.....	42	.....		28·73	·00			
27	54·0	54·5	38	.....	10·3	E.	....	·10	.....	91	R
	.....	.....	.....	43	11·8	SE.	28·63				
28	54·0	53·0	44	.....	12·5	SE.	....	·14	.....	85	R
	54·0	53·0	50	48	10·7	SE.	28·64	·03	.....	71	R
29	54·0	53·0	47	.....	7·2	SE.	....	·06	·30	89	S
	53·5	53·0	49	49	7·9	SE.	28·62	·00	·04	87	S
30	53·5	52·5	47	.....	4·3	S.	....	·05	·08	86	S
	53·5	53·0	49	49	6·3	S.	28·50	·00	·08	87	S

Average time of observation:—7.15 a.m. and 6.30 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA FOR M.H.S. STATION, KEEWATIN, ONT., FOR OCTOBER, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	53·5	53·0	49		3·4	S.		·03	·05	87	S
	54·5	55·0	56	53	6·6	SE.	28·27	·02		82	P
2	54·5	54·5	56		5·5	S.		·02	·04	88	P
	54·5	53·0	54	57	6·2	NW.	28·06	·03		76	R
3	54·5	53·0	54		7·3	N.		·03		59	Q
				49			28·31				
4	53·0	51·0	38		12·2	N.		·06		83	Q
	52·0	50·0	39	40	13·1	N.	28·47	·04		68	Q
5	52·0	51·0	42		4·4	S.		·04		85	S
	52·0	51·5	47	43	6·2	S.	28·32	·01	·19	86	S
6	52·0	50·5	42		7·2	N.		·00	·13	88	S
	50·0	49·0	35	41	20·4	N.	28·28	·00		86	S
7					19·6	N.					
	44·0	46·0	32	34	17·6	N.	28·48	·05	·05		S
8	44·0	46·0	27		14·4	N.		·04		28	P
	48·0	47·0	34	35	6·2	N.	28·84	·06		62	P
9	47·0	46·0	36		8·8	S.		·04		78	Q
				41	13·5	S.	28·45				
10	48·5	49·0	47		5·4	N.				69	P
				44			28·27				
11	47·5	47·5	39		1·8	NW.		·03		37	R
				43			28·42				
12	48·0	47·5	44		3·8	S.		·06		85	P
	49·0	48·5	52	46	6·3	S.	28·29	·03		69	R
13	48·0	48·0	45		2·3	S.		·02		86	S
	49·5	50·0	54	49	0·6	S.	28·30	·01		59	S
14	48·0	48·0	43		4·5	S.		·02		92	P
				51	8·0	S.	28·55				
15	49·0	48·5	52		7·8	S.		·03		88	S
	49·5	49·0	56	55	4·3	S.	28·63	·02		71	P
16	47·0	46·5	38		2·1	S.		·01			Fog
	50·0	55·5	53	50	2·0	S.	28·71	·02		58	R
17	50·5	53·0	59		0·5	S.		·00		73	P
				51			28·47				
18	49·0	48·5	42		1·6	S.		·01			P
	50·0	51·0	58	51	3·0	S.	28·35	·02		67	Q
19	49·5	49·5	52		2·8	S.		·01		81	Q
				52	8·1	W.	28·12				
20	47·0	46·0	32		9·4	W.		·06	·05	81	P
	47·0	46·5	45	42	7·5	S.	28·29	·05		93	R
21	47·0	46·5	32		4·6	W.		·02		91	P
	47·5	47·5	47	41	8·4	NW.	28·53	·02		96	Q
22	47·0	45·0	30		5·0	E.		·04			P
	47·0	46·0	46	44	7·4	E.	28·66	·03		59	P
23	47·0	45·5	30		8·0	E.		·04		90	P
				42	8·4	E.	28·68				
24	47·0	46·0	46		10·6	S.		·15		72	R
				45			28·26	·00			
25	46·0	46·0	40		11·6	S.			·24	96	
				40	12·8	W.	27·81				S
26	45·5	44·5	33		13·3	W.		·00	·24	90	R
	46·0	45·0	36	36	10·0	N.	28·32	·01	·01	91	S
27	45·0	44·5	39		4·6	S.		·04		96	R
	46·0	46·0	52	48	12·1	SW.	28·23	·00		96	P
28	45·0	44·5	39		12·1	N.		·00	·01	84	S
	45·0	45·0	40	43	9·9	N.	28·32	·01		68	Q
29	45·5	45·0	44		4·8	W.		·03		93	P
	45·5	46·0	53	46	8·9	W.	28·37	·03		50	P
30	45·0	44·0	30		2·9	S.		·03		95	R
	45·5	45·0	49	44	8·6	SE.	28·28	·03		55	P
31					10·0	W.					
				46			27·89				

Average time of observation:—7.15 a.m. and 6.30 p.m.
P—Clear, no clouds.
Q = Small fleecy clouds.
R = Cumuli.
S = Heavy, overcast, threatening.

METEOROLOGICAL DATA FOR M.H.S. STATION, KEEWATIN, ONT., FOR NOVEMBER, 1915.

Day	Temperature				Velocity Wind	Direc- tion Wind	Baro- meter	Evapor- ation	Rain	Humi- dity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1......	44·5	43·5	32	.....	10·0	N.	......	·11	.....	.....	S
	.....	.....	.....	35	15·5	W.	28·05				
2......	43·0	42·0	29.	....	12·3	NW	......	·07			S
	44·0	43·5	40	36	6·6	NW.	28·58	·06		57	R
3......	44·0	43·0	38		1·4	S.		·02		83	P
	43·5	43·0	41	40	7·7	SE.	28·56	·02		65	S
4......	43·0	42·5	37		5·4	N.		·02		83	S
	44·0	43·5	39	39	2·8	S.	28·41	·02		76	R
5......	43·0	42·5	36		7·2	S.		·02		91	S
	43·5	43·0	45	42	10·1	S.	28·31			65	S
6......					5·3	W.					
	43·0	44·5	47	43	3·9	N.	28·41	·02		47	Q
7......	43·0	44·0	38		3·0	E.	......	·02		83	S
				38							
8......	41·5	40·5	34		13·1	W.		·00	1·43	95	S
				36	24·4	NW.	28·12				
9......	41·5	40·5	30		11·7	NW.		·02	·02		P
	41·5	41·0	34	34	2·5	SE.	28·76	·01		81	S
10......					15·9	S.		·01	·06		
	41·5	40·5	39	40	17·5	SE.	28·17			88	S
11......	42·0	40·5	34		6·3	N.W	......	·03	·16	86	S
	40·5	37·5	29	33	16·4	SW.	27·89	·01	·02	78	S
12......					17·1	W.					
	37·0		23	23	16·0	W.	28·18			87	S
13......	38·5		20		11·3	W.					R
	38·0		19	21	9·4	W.	28·44				S
14......	38·0		20		6·3	W.					P
				20			28·42				
15......	37·0		16		4·3	N.				83	S
	37·0		18	19	2·4	N.	28·39			84	Q
16......	37·0		19		3·6	E.				85	Q
	37·0		21	21	3·6	S.	28·41			78	P
17......	36·5		29		8·1	S.				83	Q
	36·5		33	32	8·1	S.	28·47			71	P
18......	36·5		33		3·4	S.				80	Q
	36·0		34	35	2·8	SE.	28·20			72	Q
19......	36·5		32		8·1	NW.				95	Q
	36·5		29	32	13·1	NW.	28·08			83	Q
20......	35·0		23		7·6	N.				93	Q
	36·0		18	23	9·4	N.	28·03		·10	84	P
21......	34·0		16		13·1	N.					R
				17			28·42				
22......	34·5		15		5·7	S.				82	Q
	34·9		20	18	4·9	E.	28·26			92	S
23......	33·5		21		3·1	SE.					Q
	34·0		27	26	3·0	S.	28·15		·15		P
24......	34·0		32		6·4	S.				95	Q
	34·5		35	34	1·6	N.	27·99			86	R
25......	34·5		26		7·6	N.					R
	34·5		28	29	7·5	N.	28·27				R
26......	34·0		25		2·2	E.					Fog
	34·0		29	29	3·2	SE.	28·17				R
27......	34·5		28		3·2	N.					Q
	34·5		30	30	1·4	N.	28·21			95	R
28......	33·5		18		8·0	W.					Q
				21			28·36				
29......	33·5		19		7·6	W.					R
	33·5		19	19	13·7	NW.	28·37				S
30......			11		5·8	W.					Q
	33·0		16	15	0·8	NW.	28·37				P

Average time of observation:—7.45 a.m. and 5.00 p.m.
P=Clear, no clouds.
Q=Small fleecy clouds.
R=Cumuli.
S=Heavy, overcast, threatening.

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA, FOR M.H.S. STATION, KEEWATIN, ONT., FOR DECEMBER, 1915.

Day	Temperature				Velocity Wind	Direction Wind	Barometer	Evaporation	Rain	Humidity	General
	Lake	Tank	Air	Day							
	°	°	°	°	Miles per hour		Inches	Inches	Inches	%	
1	33·0		7		7·0	N.					Q
	32·5		9	10	3·6	NW.	28·59				P
2	33·0		17		3·4	S.					Q
	33·0		25	21	5·4	E.	28·38				R
3	33·0		18		3·4	E.					P
	33·0		27	26	4·8	SE.	28·61				S
4	33·5		28		8·9	SE.				94	R
	33·0		30	29	7·0	SE.	28·58			84	R
5	34·0		32		7·9	S.				96	S
				31			28·71				
6	33·5		28		8·9	S.				94	P
			32	32	10·6	S.	28·54				S
7	33·5		33		7·1	W.				90	S
	33·5		30	33	11·6	NW.	28·19		·30		S
8	33·0		25		12·5	N.				94	S
	33·0		24	27	5·8	N.	28·46				S
9	33·0		15		3·6	E.					S
			13	18	4·0	E.	28·56				P
10	33·0		7		5·2	SE.					S
	33·0		18	16	9·5	SE.	28·57		·05		S
11	33·0		19		7·4	S.					S
	33·0		15	20	6·1	W.	28·42				S
12					1·7	W.					
			15	10			28·45				P
13	33·0		− 1		6·5	W.					Q
	33·0		2	2	8·1	N.W.	28·68				P
14	33·0		− 8		2·6	SE.					Q
			3	0	1·3	SE.	28·64				P
15			5		5·8	S.					Q
			20	13	9·5	SE.	28·50				R
16	33·0		22		9·1	SE.					S
			23	24	1·8	S.	28·31		·40		S
17			10		4·9	N.					P
			8	13	6·1	N.	28·20				S
18	33·0		5		4·6	N.					Q
			6	8	4·5	N.	28·30				P
19			1		1·1	N.					P
				3			28·46				
20			− 2		2·0	S.					Q
			11	9	4·0	S.	28·43				S
21			14		2·4	S.					S
			13	15	3·8	SE.	28·30				P
22			16		7·2	SE.					S
			22	20	4·4	N.	28·04				S
23	33·5		20		5·1	NW.					S
			22	23	5·0	N.	28·27		·05		S
24	33·5		17								S
			22	24	2·7	NW.	28·48				S
25			17								S
				20			28·22				S
26			19		7·1	N.					S
				15			28·22		·05		
27	33·0		−17		6·0	W.					Q
			− 1	− 3	2·8	S.	28·48				P
28			4		4·9	SE.					S
			14	8	10·4	E.	28·17				Q
29	33·0		13		7·8	NE.					Q
			13	14	5·9	N.	28·43		·20		P
30			− 2		3·1	W.					Fog
			2	2	1·4	SE.	28·71				Q
31	33·0		16		3·8	E.					S
			18	16	6·1	S.	28·36		·08		S

Average time of observation:—7.45 a.m. and 5.00 p.m.
P =Clear, no clouds.
Q =Small fleecy clouds.
R =Cumuli.
S =Heavy, overcast, threatening.

Daily Gauge Heights at Kenora Power House and Keewatin River Bridge from August 1, 1912, to February 19, 1913.

The Observations during the above period were made by members of the Manitoba Hydrometric Survey.

DAILY GAUGE HEIGHT, IN FEET, OF EAST AND WEST BRANCH WINNIPEG RIVER FOR AUGUST, SEPTEMBER, OCTOBER AND NOVEMBER, 1912.

AUGUST   OCTOBER

Day.	Kenora Power House.			Keewatin River Bridge.		Kenora Power House.			Keewatin River Bridge.	
	Hour.	Tailrace.	River.	Hour.	Gauge.	Hour.	Tailrace.	River.	Hour.	Gauge.
	a.m.			a.m.		a.m.			a.m.	
1	8·00	1,036·23	1,035·07	7·30	1,032·74	8·30	1,035·55	1,034·08	7·30	1,033·42
2	8·00	1,036·24	1,035·08	7·30	1,032·74	8·30	1,035·47	1,033·98	7·30	1,033·46
3	8·00	1,036·26	1,035·09	7·30	1,032·76	8·30	1,035·49	1,033·98	7·30	1,033·49
4	8·00	1,035·27	1,034·49	7·30	1,032·62	9·00	1,035·47	1,033·99	7·30	1,033·54
5	8·00	1,036·18	1,033·67	7·30	1,032·39	8·30	1,036·27	1,035·37	7·30	1,034·32
6	8·00	1,036·27	1,035·18	7·30	1,032·62	8·30	1,035·12	1,034·55	7·30	1,034·49
7	8·00	1,036·24	1,035·15	7·30	1,032·79	8·30	1,036·27	1,034·67	7·30	1,034·49
8	8·00	1,036·25	1,035·16	7·30	1,032·84	8·30	1,036·31	1,035·57	7·30	1,034·84
9	8·00	1,036·25	1,035·16	7·30	1,032·86	8·30	1,036·37	1,035·67	7·30	1,034·89
10	8·00	1,036·25	1,035·17	7·30	1,032·87	8·30	1,036·37	1,035·67	7·30	1,034·99
11	8·00	1,035·24	1,034·15	7·30	1,032·79	9·00	1,036·36	1,035·65	7·30	1,035·12
12	8·30	1,036·18	1,034·15	7·30	1,032·54	8·30	1,036·32	1,035·63	7·30	1,035·19
13	8·30	1,036·20	1,035·16	7·30	1,082·79	8·30	1,035·47	1,034·99	7·30	1,035·12
14	8·30	1,036·22	1,035·18	7·30	1,032·86	8·30	1,036·29	1,035·25	7·30	1,034·94
15	8·30	1,036·27	1,035·19	7·30	1,032·94	8·30	1,036·37	1,035·65	7·30	1,035·19
16	8·30	1,036·28	1,035·18	7·30	1,032·96	8·30	1,036·37	1,035·69	7·30	1,035·32
17	8·30	1,036·25	1,035·18	7·30	1,032·96	8·30	1,036·37	1,035·71	7·30	1,035·36
18	8·30	1,035·28	1,034·27	7·30	1,032·89	8·30	1,036·38	1,035·86	7·30	1,035·69
19	8·30	1,036·17	1,034·18	7·30	1,032·64	8·30	1,036·43	1,035·95	7·30	1,035·82
20	8·30	1,036·19	1,034·97	7·30	1,033·34	8·30	1,035·67	1,035·41	7·30	1,035·77
21	8·30	1,036·27	1,035·21	7·30	1,033·64	9·00	1,035·78	1,035·39	7·30	1,035·57
22	8·30	1,036·29	1,035·27	7·30	1,032·96	8·30	1,036·43	1,035·96	7·30	1,035·84
23	8·30	1,036·27	1,035·22	7·30	1,033·02	8·30	1,036·47	1,035·97	7·30	1,035·89
24	8·30	1,036·27	1,035·25	7·30	1,033·06	9·00	1,036·47	1,036·01	7·30	1,035·97
25	8·30	1,035·36	1,034·27	7·30	1,032·96	8·30	1,036·47	1,035·99	7·30	1,035·92
26	9·15	1,036·17	1,034·19	7·30	1,032·74	8·30	1,036·46	1,035·99	7·30	1,035·91
27	8·30	1,035·77	1,034·96	7·30	1,032·94	9·00	1,035·67	1,035·49	7·30	1,035·89
28	8·30	1,036·20	1,034·38	7·30	1,032·96	8·30	1,035·90	1,035·46	7·30	1,035·62
29	8·30	1,036·27	1,035·27	7·30	1,033·02	9·00	1,036·41	1,036·05	7·30	1,035·84
30	9·30	1,036·18	1,034·77	7·30	1,033·06	8·30	1,036·47	1,036·03	7·30	1,035·89
31	8·30	1,036·27	1,034·65	7·30	1,033·09	8·30	1,036·47	1,036·07	7·30	1,036·01

SEPTEMBER   NOVEMBER

Day.	Hour.	Tailrace.	River.	Hour.	Gauge.	Hour.	Tailrace.	River.	Hour.	Gauge.
1	8·30	1,035·27	1,033·75	7·30	1,032·99	9·00	1,036·48	1,036·08	7·30	1,035·98
2	8·30	1,036·15	1,034·37	7·30	1,032·76	8·30	1,036·47	1,036·07	7·30	1,035·97
3	8·30	1,035·35	1,035·29	7·30	1,032·96	8·30	1,035·79	1,035·59	7·30	1,035·89
4	8·30	1,036·27	1,034·90	7·30	1,033·09	8·30	1,035·94	1,035·59	7·30	1,035·69
5	8·30	1,036·26	1,035·14	7·30	1,033·16	8·30	1,036·48	1,036·03	7·30	1,036·01
6	8·30	1,035·47	1,034·07	7·30	1,033·14	8·30	1,036·48	1,036·07	7·30	1,036·04
7	8·30	1,035·47	1,033·72	7·30	1,033·14	8·30	1,036·48	1,036·07	7·30	1,036·89
8	8·30	1,035·28	1,034·27	7·30	1,033·02	9·00	1,036·45	1,035·92	7·30	1,036·34
9	8·30	1,035·47	1,033·97	7·30	1,032·84	9·00	1,036·35	1,035·74	7·30	1,036·19
10	8·30	1,035·77	1,033·87	7·30	1,033·02	9·00	1,035·53	1,034·98	7·30	1,036·06
11	8·30	1,035·47	1,033·77	7·30	1,033·09	8·30	1,035·67	1,034·87	7·30	1,034·66
12	8·30	1,035·27	1,033·77	7·30	1,033·09	8·30	1,036·36	1,035·62	7·30	1,034·84
13	9·00	1,036·17	1,034·67	7·30	1,033·16	8·30	1,036·45	1,035·80	7·30	1,035·46
14	8·30	1,036·27	1,034·65	7·30	1,033·24	8·30	1,036·46	1,035·88	7·30	1,035·66
15	8·30	1,035·27	1,033·84	7·30	1,033·22	8·30	1,036·44	1,035·91	7·30	1,035·72
16	8·30	1,036·33	1,034·49	7·30	1,033·02	8·30	1,036·49	1,036·01	7·30	1,035·76
17	8·30	1,036·32	1,034·49	7·30	1,033·16	8·30	1,035·68	1,035·45	7·30	1,035·69
18	8·30	1,035·58	1,033·95	7·30	1,033·20	9·00	1,035·77	1,035·37	7·30	1,035·64
19	8·30	1,035·57	1,033·96	7·30	1,033·22	9·00	1,036·46	1,035·95	7·30	1,035·72
20	8·30	1,035·59	1,033·97	7·30	1,033·22	9·00	1,036·39	1,035·95	7·30	1,035·74
21	8·30	1,035·47	1,033·97	7·30	1,033·26	9·00	1,036·48	1,035·99	7·30	1,035·79
22	8·30	1,035·31	1,033·79	7·30	1,033·19	9·00	1,036·48	1,035·99	7·30	1,035·88
23	8·30	1,035·57	1,033·95	7·30	1,033·04	9·00	1,036·57	1,036·12	7·30	1,035·96
24	8·30	1,035·67	1,034·17	7·30	1,033·16	9·00	1,035·85	1,035·59	7·30	1,035·86
25	8·30	1,035·49	1,034·16	7·30	1,033·24	8·30	1,035·99	1,035·56	7·30	1,034·86
26	8·30	1,035·58	1,034·16	7·30	1,033·29	9·00	1,036·49	1,036·10	7·30	1,035·94
27	8·30	1,035·60	1,034·18	7·30	1,033·37	9·00	1,036·59	1,036·12	7·30	1,035·98
28	8·30	1,035·59	1,034·17	7·30	1,033·42	9·00	1,036·49	1,036·08	7·30	1,036·16
29	8·30	1,035·34	1,033·88	7·30	1,033·36	9·00	1,036·52	1,036·22	7·30	1,036·16
30	8·30	1,035·59	1,034·07	7·30	1,033·26	9·00	1,036·55	1,036·08	7·30	1,036·14
31										

Gauge heights reduced to W.P.S. Datum.

SESSIONAL PAPER No. 25f

Daily Gauge Height, in Feet, of East and West Branch Winnipeg River for December, 1912, January and February, 1913.

December, 1912.   January, 1913

Day	Kenora Power House.			Keewatin River Bridge.		Kenora Power House.			Keewatin River Bridge.	
	Hour.	Tailrace.	River.	Hour.	Gauge.	Hour.	Tailrace.	River.	Hour.	Gauge.
	a.m.			a.m.		a.m.				
1	9·00	1,035·87	1,035·70	7·30	1,035·96	9·00	1,036·58	1,036·02		
2	9·00	1,035·97	1,035·57	7·30	1,034·94	9·00	1,036·60	1,035·99		
3	9·00	1,036·52	1,036·09	7·30	1,035·94	9·00	1,036·60	1,035·94		
4	9·00	1,036·58	1,036·13			9·00	1,036·64	1,036·12	9·00	1,036·01
5	9·00	1,036·57	1,036·15			9·00	1,036·04	1,035·73		
6	9·00	1,036·61	1,036·15			9·00	1,036·17	1,035·60		
7	9·00	1,036·62	1,036·16	9·00	1,036·01	9·00	1,036·67	1,036·03		
8	9·00	1,036·07	1,035·79			9·00	1,036·67	1,036·05		
9	9·00	1,036·16	1,035·75			9·00	1,036·65	1,035·99		
10	9·00	1,036·64	1,036·19			9·00	1,036·66	1,036·06		
11	9·00	1,036·68	1,036·22			9·00	1,036·64	1,036·01	10·00	1,035·86
12	9·00	1,036·65	1,036·19			9·00	1,036·06	1,035·62		
13	9·00	1,036·64	1,036·19			9·00	1,036·17	1,035·65		
14	9·00	1,036·52	1,036·09	9·30	1,035·98	9·00	1,036·62	1,036·06		
15	9·00	1,035·47	1,035·47			9·00	1,036·72	1,036·03		
16	9·00	1,036·13	1,035·69			9·00	1,036·72	1,036·15		
17	9·00	1,036·55	1,036·11			9·00	1,036·78	1,036·19		
18	9·00	1,036·62	1,036·15			9·00	1,036·78	1,036·20	10·00	1,035·86
19	9·00	1,036·67	1,036·29			9·00	1,036·19	1,035·84		
20	9·00	1,036·69	1,036·29			9·00	1,036·39	1,035·84		
21	9·00	1,036·70	1,036·32	9·00	1,035·96	9·00	1,036·72	1,036·14		
22	9·00	1,036·07	1,035·89			9·00	1,036·80	1,036·19		
23	9·00	1,036·31	1,035·95			9·00	1,036·77	1,036·21		
24	9·00	1,036·57	1,036·17			9·00	1,036·82	1,036·27		
25	9·00	1,035·87	1,035·57			9·00	1,036·77	1,036·18	10·00	1,035·91
26	9·00	1,036·37	1,035·97			9·00	1,036·20	1,035·87		
27	9·00	1,036·42	1,035·97			9·00	1,036·20	1,035·60		
28	9·00	1,036·53	1,036·09	9·00	1,035·98	9·00	1,036·69	1,036·15		
29	9·00	1,035·99	1,035·69			9·00	1,036·71	1,036·10		
30	9·00	1,036·09	1,035·63			9·00	1,036·17	1,035·84		
31	9·00	1,036·54	1,036·04			9·00	1,036·69	1,036·19		

February, 1913.

Day.	Kenora Power House.			Keewatin River Bridge.	
	Hour.	Tailrace.	River.	Hour.	Gauge.
	a.m.			a.m.	
1	9·00	1,036·72	1,036·17	10·00	1,035·94
2	9·00	1,036·17	1,035·84		
3	9·00	1,036·39	1,035·86		
4	9·00	1,036·70	1,036·15		
5	9·00	1,036·69	1,036·18		
6	9·00	1,036·72	1,036·15		
7	9·00	1,036·59	1,036·11		
8	9·00	1,036·51	1,036·02	10·00	1,035·76
9	9·00	1,036·01	1,035·69		
10	9·00	1,036·03	1,035·62		
11	9·00	1,036·51	1,036·09		
12	9·00	1,036·56	1,036·15		
13	9·00	1,036·55	1,036·15		
14	9·00	1,036·49	1,036·16		
15	9·00	1,036·59	1,036·14	10·00	1,035·28
16	9·00	1,035·97	1,035·25		
17	9·00	1,036·01	1,035·05		
18	9·00	1,036·47	1,035·86		
19	9·00	1,036·48	1,035·41		

Gauge heights reduced to W.P.S. Datum.
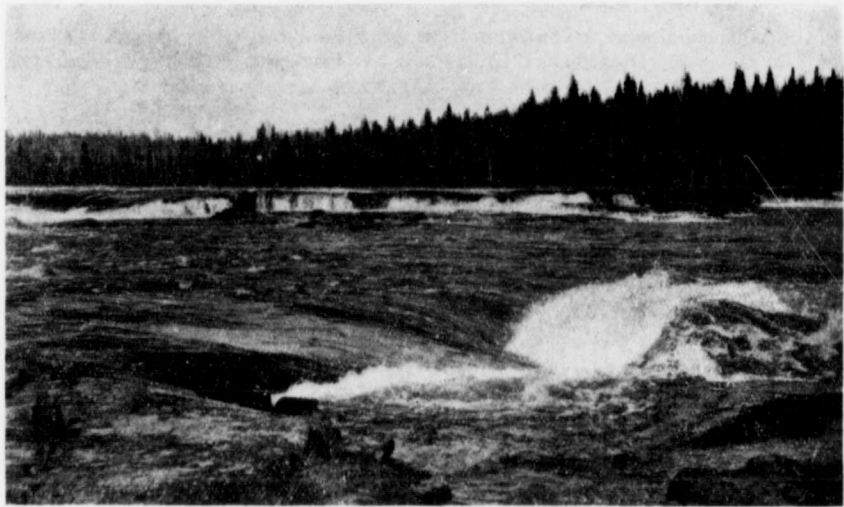
English River—Oak Falls—Pitch from Below—Looking Upstream.

English River—Ear Falls—Crest of Second Pitch from Below.

SESSIONAL PAPER No. 25f

Daily Gauge Height, Winnipeg River, at Eastern Outlet, from October 14, 1905, to May 18, 1906.

Obtained from the Ontario Hydro-Electric Commission.

DAILY GAUGE HEIGHT, IN FEET, OF WINNIPEG RIVER AT EASTERN OUTLET, FOR 1905 AND 1906.

<table>
<tr><td colspan="4">1905.</td><td colspan="10">1906.</td></tr>
<tr><th>Day.</th><th>Oct.</th><th>Nov.</th><th>Dec.</th><th>Jan.</th><th>Feb.</th><th>Mar.</th><th>April.</th><th>May.</th><th>June.</th><th>July.</th><th>Aug.</th><th>Sept.</th></tr>
<tr><td>1</td><td></td><td>604·1</td><td>604·3</td><td>604·35</td><td>604·25</td><td>604·0</td><td>603·55</td><td>604·05</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td>604·3</td><td>604·25</td><td>604·35</td><td>604·25</td><td>604·0</td><td>603·5</td><td>604·14</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td></td><td>604·1</td><td>604·3</td><td>604·35</td><td>604·25</td><td>603·9</td><td>603·5</td><td>604·15</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4</td><td></td><td>604·3</td><td>604·4</td><td>604·35</td><td>604·20</td><td>603·95</td><td>603·5</td><td>604·1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td></td><td>604·2</td><td>604·3</td><td>604·35</td><td>604·20</td><td>603·9</td><td>603·5</td><td>604·1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>6</td><td></td><td>604·2</td><td>604·35</td><td>604·35</td><td>604·20</td><td>603·9</td><td>603·45</td><td>604·05</td><td></td><td></td><td></td><td></td></tr>
<tr><td>7</td><td></td><td>604·1</td><td>604·4</td><td>604·35</td><td>604·20</td><td>603·9</td><td>603·45</td><td>604·05</td><td></td><td></td><td></td><td></td></tr>
<tr><td>8</td><td></td><td>604·2</td><td>604·3</td><td>604·35</td><td>604·20</td><td>603·85</td><td>603·45</td><td>604·0</td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td></td><td>604·3</td><td>604·4</td><td>604·35</td><td>604·15</td><td>603·85</td><td>603·45</td><td>603·95</td><td></td><td></td><td></td><td></td></tr>
<tr><td>10</td><td></td><td>604·3</td><td>604·4</td><td>604·3</td><td>604·15</td><td>603·85</td><td>603·45</td><td>604·05</td><td></td><td></td><td></td><td></td></tr>
<tr><td>11</td><td></td><td>604·2</td><td>604·4</td><td>604·3</td><td>604·15</td><td>603·85</td><td>603·45</td><td>603·8</td><td></td><td></td><td></td><td></td></tr>
<tr><td>12</td><td></td><td>604·2</td><td>604·4</td><td>604·3</td><td>604·15</td><td>603·8</td><td>603·45</td><td>603·8</td><td></td><td></td><td></td><td></td></tr>
<tr><td>13</td><td></td><td>603·9</td><td>604·4</td><td>604·3</td><td>604·15</td><td>603·8</td><td>603·5</td><td>603·85</td><td></td><td></td><td></td><td></td></tr>
<tr><td>14</td><td>604·2</td><td>604·3</td><td>604·4</td><td>604·3</td><td>604·15</td><td>603·8</td><td>603·55</td><td>603·8</td><td></td><td></td><td></td><td></td></tr>
<tr><td>15</td><td>604·2</td><td>604·2</td><td>604·4</td><td>604·3</td><td>604·15</td><td>603·8</td><td>603·6</td><td>603·8</td><td></td><td></td><td></td><td></td></tr>
<tr><td>16</td><td>604·2</td><td>604·3</td><td>604·4</td><td>604·25</td><td>604·15</td><td>603·8</td><td>603·65</td><td>603·8</td><td></td><td></td><td></td><td></td></tr>
<tr><td>17</td><td>604·0</td><td>604·2</td><td>604·4</td><td>604·25</td><td>604·1</td><td>603·8</td><td>603·65</td><td>603·75</td><td></td><td></td><td></td><td></td></tr>
<tr><td>18</td><td>604·1</td><td>604·2</td><td>604·4</td><td>604·25</td><td>604·1</td><td>603·8</td><td>603·75</td><td>603·75</td><td colspan="4">Reading discontinued</td></tr>
<tr><td>19</td><td>604·1</td><td>604·3</td><td>604·4</td><td>604·25</td><td>604·1</td><td>603·75</td><td>603·8</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>20</td><td>604·1</td><td>604·3</td><td>604·35</td><td>604·25</td><td>604·1</td><td>603·75</td><td>603·85</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>21</td><td>604·2</td><td>604·4</td><td>604·35</td><td>604·25</td><td>604·05</td><td>603·75</td><td>604·0</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>22</td><td>604·3</td><td>604·3</td><td>604·35</td><td>604·25</td><td>604·05</td><td>603·7</td><td>603·9</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>23</td><td>603·9</td><td>604·2</td><td>604·35</td><td>604·25</td><td>604·05</td><td>603·65</td><td>604·05</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>24</td><td>604·1</td><td>603·9</td><td>604·4</td><td>604·25</td><td>604·05</td><td>603·65</td><td>604·05</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>25</td><td>604·35</td><td>604·3</td><td>604·4</td><td>604·25</td><td>604·05</td><td>603·65</td><td>604·05</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>26</td><td>604·2</td><td>604·3</td><td>604·4</td><td>604·25</td><td>604·05</td><td>603·6</td><td>604·05</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>27</td><td>604·0</td><td>604·2</td><td>604·35</td><td>604·25</td><td>604·05</td><td>603·6</td><td>604·1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>28</td><td>604·2</td><td>603·9</td><td>604·35</td><td>604·25</td><td>604·0</td><td>603·6</td><td>604·1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>29</td><td>604·3</td><td>604·2</td><td>604·35</td><td>604·25</td><td></td><td>603·55</td><td>604·15</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>30</td><td>604·2</td><td>604·3</td><td>604·35</td><td>604·25</td><td></td><td>603·55</td><td>604·0</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>31</td><td>604·3</td><td></td><td>604·35</td><td>604·25</td><td></td><td>603·55</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Gauge Readings obtained from the Ont. Hydro.-Electric Commission.

Taken by S. C. O'Grady.

ENGLISH RIVER—VIEW UPSTREAM FROM THIRD PITCH AT MANITOU MIDDLE.

Estimated Daily Discharge, Mill "A", Lake of the Woods Milling Co., Keewatin. From May, 1913, to December, 1915.

ESTIMATED DAILY DISCHARGE IN FEET PER SEC. OF MILL "A," LAKE OF THE WOODS MILLING CO., KEEWATIN, FOR 1913-14.

1913.

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1					840	290	280			885	547	669
2					840	600	575			905	224	823
3					840	850	845			895	750	798
4					290	850	850			895	740	803
5					500	850	850				770	800
6					840	850	280			507	750	819
7					840	850	570			912	800	230
8					840	290	850			897	750	530
9					840	605	850			907	224	790
10					840	850	850		795	900	850	812
11					290	855	850		796	900	800	768
12					550	855	850		837		760	783
13					850	855	280		841	548	760	805
14					860	855	570			890	760	226
15					860	290	850		833	882	800	537
16					860	605	850		862	882	227	825
17					850	855	850		844	897	750	810
18					290	855	850		770	897	750	825
19					560	855	850		853		760	835
20					850	850	280		881		740	787
21					850	855	570			557	800	222
22					850	290	850		702	890	750	566
23					850	230	850		730	897	224	816
24					290	500	850		725	897	750	805
25					100	870	850		704	882	760	226
26					570	890	850		718		770	805
27					860	890	280		781	557	700	780
28					850	870	570			897	730	220
29					850	290	850		200	908	800	562
30					850	610	850		715	897	229	836
31					850		850			890		836

1914.

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	795	6	6	840	795	178	63	946	863	886	43	821
2	800	875	860	843	799	840	185	45	847	776	196	848
3	822	805	856	843	75	930	209	804	847	785	196	846
4	6	870	828	784	834	860	209	814	851	43	222	831
5	720	875	824	105	839	920	626	825	842	836	202	846
6	838	805	862	941	859	925	790	826	784	841	214	117
7	870	835	803	883	855	9	805	804	858	819	211	209
8	868	6	6	823	841	905	842	823	885	825	3	210
9	862	870	837	297	831	838	772	39	849	830	751	206
10	859	875	840	256	75	890	772	893	856	882	742	204
11	6	870	860	264	884	928	775	899	847	3	832	206
12	717	907	863	66	865	858	51	809	853	8	857	206
13	772	920	868	249	890	847	766	974	40	817	843	108
14	826	825	882	867	886	18	770	968	944	832	843	821
15	807	6	6	873	845	202	782	927	919	801	42	826
16	880	870	864	842	865	845	778	55	868	825	802	820
17	821	875	862	850	75	850	768	947	929	797	805	819
18	6	875	878	826	822	912	806	953	936	9	800	778
19	702	880	878	66	828	988	629	965	937	142	805	851
20	845	885	890	852	835	985	803	958	33	827	876	121
21	762	875	860	850	802	201	793	923	938	742	848	851
22	165	6	6	865	876	1,000	787	969	923	760	59	860
23	180	885	860	850	934	962	769	52	907	764	856	172
24	160	885	872	838	52	910	769	987	878	765	854	839
25	6	895	882	857	873	1,000	347	966	915	3	795	127
26	695	905	892	66	880	1,000	13	963	898	798	795	834
27	853	920	886	229	849	975	749	886	43	740	858	73
28	868	880	874	844	875	18	770	931	811	817	859	841
29	875		6	878	892	192	772	899	896	793	100	850
30	890		864	772	890	938	780	814	833	820	818	856
31	881		828		52		808	836		800		872

ESTIMATED DAILY DISCHARGE, IN FEET PER SEC. OF MILL "A," LAKE OF THE WOODS MILLING CO., KEEWATIN, FOR 1915.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1....	109	804	810	808	824	783	141	90	645	836	874	943
2....	859	802	817	803	102	787	254	238	717	837	884	908
3....	113	796	779	713	766	790	201	235	689	94	887	902
4....	714	799	775	109	794	766	144	237	723	869	893	910
5....	763	765	794	205	803	398	293	240	77	804	888	91
6....	823	778	796	213	790	89	292	250	618	875	868	904
7....	798	106	108	219	805	711	301	228	729	857	806	909
8....	780	833	775	221	792	813	312	93	738	844	906	988
9....	813	837	785	759	102	831	302	245	749	852	908	884
10....	113	876	788	799	714	797	316	241	730	300	884	926
11....	781	839	245	108	779	833	141	236	729	870	905	918
12....	853	845	186	754	810	834	263	240	70	864	921	857
13....	841	870	218	817	807	66	250	253	645	840	896	962
14....	798	111	97	796	767	718	255	244	738	844	827	939
15....	810	859	183	785	801	842	256	93	740	864	915	929
16....	816	870	191	795	89	837	254	241	796	868	936	930
17....	105	871	182	788	57	851	253	222	735	337	927	935
18....	756	845	186	109	10	815	96	231	734	898	934	908
19....	842	844	224	752	10	509	247	220	91	887	935	840
20....	824	881	203	835	150	82	257	214	854	877	901	910
21....	852	88	112	843	153	162	238	208	813	865	843	878
22....	806	884	678	832	167	162	244	92	810	896	933	908
23..	844	887	718	797	53	57	257	219	824	876	943	930
24....	99	893	806	921	168	10	233	136	821	796	903	932
25....	755	896	833	103	161	10	93	133	833	874	941	97
26....	810	871	839	833	170	177	233	126	91	888	984	553
27....	866	936	821	816	177	137	236	145	831	880	931	888
28....	838	85	121	933	174	297	234	198	846	901	856	938
29....	861	......	690	854	196	309	234	94	867	927	948	923
30....	808	......	780	887	17	316	235	224	862	912	937	892
31....	124	......	830	......	796	......	248	225	......	777	......	898

ESTIMATED DAILY DISCHARGE IN FEET PER SEC. OF MILL "C," LAKE OF THE WOODS MILLING CO., KEEWATIN, FOR 1913.

Day.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					700	205	210			650	650	450
2					700	505	515			650	95	730
3					700	715	725			650	360	735
4					200	715	730			650	685	730
5					510	715	730				655	725
6					710	715	210			680	685	695
7					710	715	515			650	720	90
8					710	205	725			735	685	445
9					710	505	725			685	95	712
10					710	725	725			630	300	670
11					200	730	725			665	650	680
12						730	735			90	650	700
13						730	215			440	685	695
14						730	520			725	685	100
15						215	735			690	610	465
16						520	735			680	95	700
17						725	735			685	430	725
18						725	735			246	742	715
19						725	735			396	720	710
20						725	215			680	680	705
21						725	520			680	720	150
22						210	725			680	725	480
23						510	735			650	95	650
24						715	735			685	355	700
25						715	735			650	730	150
26						725	730			232	740	700
27						725	215			318	660	730
28						725	510			735	735	200
29						210	735			680	705	490
30						505	735			680	100	740
31							735			685		710

ESTIMATED DAILY DISCHARGE, IN FEET PER SEC. OF MILL "C," LAKE OF THE WOODS MILLING CO., KEEWATIN, FOR 1914-15.

1914.

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	680	250	120	675	634	670	91	690	710	700	210	700
2	710	700	640	685	627	670	195	740	745	665	670	720
3	700	720	646	670	147	660	660	655	700	685	670	690
4	160	730	642	675	627	660	660	650	710	180	680	680
5	560	710	616	235	658	660	655	665	720	185	675	685
6	680	100	634	680	645	650	660	700	730	185	650	140
7	670	100	616	695	658	175	665	695	730	185	690	680
8	665	360	237	685	645	675	635	700	720	185	....	680
9	680	700	634	675	658	685	625	210	730	185	680	700
10	700	690	646	675	147	670	645	670	690	185	680	690
11	90	690	642	695	611	690	635	680	710	185	675	675
12	570	690	640	235	511	665	76	695	710	185	695	690
13	610	690	640	730	627	685	635	710	80	185	695	260
14	630	680	668	730	627	170	630	695	730	185	695	260
15	640	130	198	645	634	170	645	715	750	185	160	260
16	675	680	695	195	627	660	645	200	720	185	690	190
17	635	700	695	100	147	650	675	710	720	185	660	190
18	100	680	700	100	662	680	660	700	700	185	650	190
19	575	700	722	265	658	675	200	715	700	730	650	190
20	650	690	695	715	652	665	650	665	110	675	660	200
21	700	700	695	615	686	130	655	730	730	675	650	190
22	685	230	240	635	674	665	660	700	720	700	160	190
23	715	690	660	130	686	665	670	80	700	695	705	190
24	720	690	690	140	105	690	655	745	720	700	705	190
25	160	690	702	140	686	680	660	690	720	160	670	190
26	590	690	686	140	670	670	73	700	720	630	660	190
27	710	690	690	140	697	690	655	670	160	630	680	190
28	685	700	670	635	686	155	650	705	730	670	680	190
29	685	....	237	595	680	155	665	675	730	680	160	190
30	690	....	686	600	702	660	645	715	620	650	705	190
31	675	....	695	....	105	....	665	680	....	650	....	190

1915.

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	198	648	652	179	726	5	166	141	635	667	810	829
2	198	707	740	179	205	5	166	611	635	673	761	810
3	212	665	735	223	775	5	166	666	635	86	761	798
4	647	695	707	223	666	5	166	660	660	749	816	755
5	683	689	707	223	737	89	166	643	155	673	755	163
6	695	701	740	223	686	153	169	643	583	705	829	761
7	683	205	217	223	676	209	617	688	629	692	798	755
8	683	689	665	223	705	209	631	141	648	711	768	755
9	695	735	760	219	177	209	614	563	635	679	816	749
10	208	735	740	214	600	209	631	614	635	322	780	749
11	530	735	760	223	686	209	147	643	660	692	835	822
12	695	707	725	700	705	209	581	662	156	692	810	877
13	658	707	740	737	716	209	637	649	594	731	822	816
14	695	187	216	727	737	209	662	654	648	743	835	822
15	689	706	629	731	737	209	643	148	642	718	774	810
16	707	770	725	755	170	209	662	588	642	761	768	774
17	248	740	701	709	721	209	662	656	642	374	810	871
18	680	740	745	178	782	209	177	649	623	743	786	816
19	740	735	735	639	822	209	575	662	160	761	822	841
20	740	740	745	722	740	215	637	643	692	774	780	816
21	740	210	179	755	730	648	637	649	660	761	852	780
22	740	692	179	708	790	670	637	138	648	755	768	792
23	707	740	179	750	179	714	662	141	660	774	786	792
24	217	740	179	750	718	744	631	141	679	692	786	810
25	648	740	179	186	719	744	147	141	692	749	829	194
26	730	755	179	731	770	617	600	144	160	761	798	457
27	740	755	179	718	770	643	643	160	705	718	792	822
28	740	248	194	727	729	564	631	160	660	810	829	798
29	713	....	678	735	719	615	637	160	673	768	822	810
30	707	....	745	765	159	653	625	160	705	768	841	841
31	220	....	335	....	5	....	643	170	....	768	....	780

Tabulated Results of Discharge Measurements at Kenora Power House

No.	Date	Forebay Gauge	Discharge	Est. Weir	Net Discharge	Load	Head	Efficiency
1	February 24, 1913	97·67	1,047·8	19·8	1,028·0	1,059	22·89	53·2
2	24	97·65	1,329·7	19·1	1,310·6	1,323	22·74	52·6
3	25	97·65	1,312·0	19·1	1,292·9	1,389	22·58	56·2
4	25	97·65	1,242·1	19·1	1,223·0	1,359	22·58	58·4
5	25	97·65	1,282·0	19·1	1,262·9	1,340	22·58	55·5
6	25	97·65	1,309·0	19·5	1,289·5	1,359	22·65	55·0
7	26	97·66	1,394·5	19·5	1,375·0	1,444	22·50	55·3
8	March 2	97·67	711·3	19·5	691·8	810	23·35	59·4
9	2	97·64	776·7	18·8	757·9	836	23·29	55·9
10	3	97·68	1,393·3	20·2	1,373·1	1,454	22·59	55·4
11	3	97·68	1,463·9	20·2	1,443·7	1,610	22·47	58·6
12	3	97·68	1,506·4	20·2	1,486·2	1,668	22·43	59·1
13	7	97·65	1,259·4	19·1	1,240·3	1,372	22·60	57·8
14	7	97·65	1,312·3	19 1	1,293·2	1,357	22·60	54·8
15	7	97·64	1,236·4	18·7	1,217·7	1,316	22·59	56·5
16	7	97·69	1,253·7	20·6	1,233·1	1,282	22·74	54·0
17	7	97·68	1,242·2	20·2	1,222·0	1,267	22·68	54·0
18	7	97·68	1,200·4	20·2	1,180·2	1,265	22·68	55·8
19	7	97·69	1,255·6	20·5	1,235·1	1 284	22·70	54·0
20	8	97·71	1,249·8	21·3	1,228·5	1,253	22·78	53·0
21	8	97·70	1,204·9	20·9	1,184·0	1,263	22·77	55·3
22	8	97·68	1,239·3	20·2	1,219·1	1,236	22·73	52·8
23	8	97·69	1,223·7	20·6	1,203·1	1,250	22·74	54·0
24	8	97·67	1,249·3	19·8	1,229·5	1,266	22·76	53·5
25	8	97·66	1,266·4	19·5	1,246·9	1,307	22·69	54·5
26	8	97·66	1,262·6	19·5	1,243·1	1,275	22·64	53·5
27	9	97·75	815·6	22·8	792·8	717	23·29	45·8
28	9	97·75	771·5	22·8	748·7	767	23·29	51·9
29	9	97·76	776·6	23·2	753·4	727	23·31	48·9
30	9	97·77	765·4	23·6	741·8	710	23·42	48·2
31	9	97·78	719·0	24·0	695·0	70	23·52	50·8
32	9	97·77	748·8	23·6	725·2	696	23·49	48·2
33	9	97·76	613·0	23·2	589·8	672	23·46	57·2
34	10	97·70	1,454·4	20·9	1,433·5	1,567	22·59	57·2
35	10	97·71	1,538·0	21·3	1,516·7	1,607	22·52	55·5
36	10	97·70	1,468·8	20·9	1,447·9	1,622	22·48	58·8
37	15	97·70	1,441·7	20·9	1,420·8	1,613	22·69	59·2
38	15	97·70	1,541·2	20·9	1,520·3	1,689	22·62	56·2
39	15	97·69	1,439·2	20·5	1,418·7	1,607	22·54	59·4
40	19	97·68	1,303·8	20·2	1,283·6	1,351	22·68	54·7
41	19	97·68	1,270·2	20·2	1,250·0	1,354	22·68	56·3
42	19	97·68	1,279·7	20·2	1,259·5	1,354	22·68	56·1
43	19	97·69	1,202·9	20·6	1,182·3	1,337	22·71	58·8
44	20	97·74	1,265·6	22·4	1,243·2	1,321	22·76	55·1
45	20	97·74	1,318·2	22·4	1,295·8	1,340	22·76	53·6
46	20	97·74	1,317·7	22·4	1,295·3	1,343	22·76	53·8
47	20	97·74	1,269·6	22·4	1,247·2	1,338	22·76	55·6
48	April 4	97·80	693·5	24·7	668·8	520	23·54	39·0
49	4	97·81	729·3	25·1	704·2	536	23·54	38·4
50	4	97·82	754·6	25·5	729·1	549	23·54	37·9
51	4	97·82	712·8	25·5	687·3	519	23·59	37·8
52	4	97·82	643·7	25·5	618·2	428	23·63	34·7
53	4	97·80	687·4	24·7	662·7	496	23·55	37·5
54	4	97·81	702·9	25·1	677·8	501	23·57	37·0
55	5	97·80	657·2	24·7	632·5	547	23·55	43·3
56	5	97·82	671·7	25·5	646·2	519	23·61	40·1
57	5	97·82	666·5	25·5	641·0	552	23·57	43·1
58	5	97·82	710·6	25·5	685·1	529	23·56	38·7
59	5	97·82	691·4	25·5	665·9	527	23·56	39·7
60	5	97·83	618·5	25·9	592·6	394	23·62	33·3
61	5	97·83	668·1	25·9	642·2	505	23·60	39·4
62	5	97·83	562·6	25·9	536·7	527	23·58	49·1
63	5	97·83	719·8	25·5	694·3	525	23·59	37·8
64	5	97·83	620·4	25·9	594·5	527	23·54	44·6
65	5	97·81	709·0	25·1	683·9	506	23·57	37·1
66	24	98·26	1,376·6	44·7	1,331·9	1,176	23·10	45·1
67	24	98·26	1,259·0	44·7	1,214·3	1,204	23·05	50·8

SLOPE GAUGES ON WESTERN OUTLET, LAKE OF THE WOODS.

HISTORY.

In August of 1913, fourteen gauges were set on the western outlet of the Lake of the Woods. These gauges were set for the purpose of obtaining slope data in connection with discharge measurements taken on the western outlet at the Norman traffic bridge.

The upper of these gauges is set to head-lake level, while the lower is set in the tailwater of the Norman dam.

From the time of installation of these gauges, readings have been obtained during the time in which meterings have been taken at the Norman traffic bridge metering station.

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS.

DATE 1913	Discharge in Sec. Feet	1	2	2A	3	4	5	6	7	8	9	10	11	12	13
August 26	11,991	59·27	58·95	58·97	58·97	58·53	58·53	58·77	58·09	58·20	58·32	58·05	57·94	58·02	
	13,638	59·26	58·93	58·95	58·93	58·52	58·51	58·74	58·08	58·18	58·29	58·01	57·92	57·99	
		59·29	58·98	58·97	58·96	58·52	58·51	58·78	58·11	58·18	58·34	58·02	57·96	57·99	
27	13,424	59·39	59·12	59·15	59·08	58·65	58·64	58·98	58·20	58·29	58·41	58·15	58·06	58·08	
	13,411	59·47	59·12	59·16	59·14	58·71	58·69	58·96	58·33	58·33	58·50	58·17	58·08	58·12	
		59·49	59·14	59·19	59·10	58·69	58·68	58·97	58·27	58·32	58·50	58·20	58·10	58·15	
28	13,158	59·28	59·01	58·97	58·96	58·55	58·52	58·79	58·11	58·19	58·28	58·06	57·94	58·01	
	13,347	59·21	58·93	58·95	58·92	58·52	58·51	58·72	58·05	58·11	58·22	58·02	57·92	57·96	
		59·17	58·88	58·92	58·85	58·43	58·42	58·68	57·98	58·08	58·25	57·97	57·86	57·92	
29	12,941	59·27	58·92	58·97	58·93	58·51	58·50	58·75	58·09	58·16	58·25	58·02	57·93	57·98	
	13,558	59·28	58·91	58·93	58·89	58·48	58·47	58·72	58·04	58·15	58·32	58·12	57·91	57·96	
		59·27	58·94	58·95	58·93	58·51	58·49	58·75	58·05	58·16	58·35	58·02	57·91	58·00	
30	13,173	59·38	59·10	59·07	59·06	58·62	58·61	58·87	58·18	58·31	58·42	58·13	57·98	58·08	
	13,265	59·37	59·07	59·04	59·05	58·61	58·61	58·85	58·25	58·32	58·43	58·12	57·97	58·06	
		59·33	59·04	59·05	59·02	58·62	58·61	58·85	58·15	58·26	58·35	58·12	57·99	58·03	
Sept. 1	13,153	59·42	59·11	59·11	59·07	58·65	58·64	58·88	58·19	58·31	58·46	58·17	58·09	58·12	
	13,333	59·35	59·05	59·06	59·04	58·63	58·62	58·87	58·16	58·27	58·37	58·13	58·01	58·05	
		59·34	59·04	59·00	58·98	58·59	58·58	58·82	58·12	58·23	58·33	58·08	57·95	58·00	
3	12,531	59·16	58·87	58·88	58·84	58·42	58·41	58·64	57·97	58·11	58·17	57·96	57·85	57·92	
	12,687	59·17	58·88	58·87	58·85	58·42	58·41	58·67	57·98	58·12	58·23	57·97	57·86	57·92	
		59·22	58·90	58·89	58·89	58·47	58·46	58·72	58·03	58·17	58·27	57·99	57·89	57·92	
5	12,734	59·26	58·92	58·91	58·92	58·52	58·51	58·72	58·06	58·15	58·25	58·01	57·93	57·93	
	12,707	59·23	58·92	58·93	58·93	58·53	58·51	58·70	58·05	58·13	58·22	58·00	57·90	57·91	
		59·18	58·88	58·92	58·85	58·43	58·42	58·67	57·99	58·10	58·23	57·98	57·87	57·93	
9	13,213	59·42	59·10	59·17	59·04	58·61	58·62	58·95	58·22	58·35	58·45	58·13	58·05	58·08	
	13,182	59·47	59·15	59·19	59·12	58·71	58·69	58·96	58·24	58·33	58·49	58·16	58·07	58·11	
		59·47	59·23	59·23	59·16	58·72	58·70	58·57	58·25	58·37	59·01[1]	58·21	58·13	58·13	
20	11,677	58·44	58·18	58·15	57·94	57·79	57·80	58·00	57·40	57·50	57·60	57·22	57·35	57·34	
		58·43	58·19	58·15	57·95	57·80	57·81	58·02	57·38	57·51	57·59	57·31	57·22	57·30	
21	11,825	58·50	58·23	58·20	58·17	57·79	57·79	58·00	57·42	57·50	57·68	57·44	57·32	57·36	
		58·55	58·34	58·27	58·27	57·90	57·88	58·05	57·51	57·61	57·70	57·49	57·39	57·43	

Location of Gauges shown on plan of Western Outlet, dated November, 1913. Readings marked [1] are possibly in error.

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS—*Continued.*

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS—Continued.

DATE 1913	Discharge in Sec. Feet							GAUGE NUMBER							
		1	2	2A	3	4	5	6	7	8	9	10	11	12	13
Sept. 22	11,167	58·79	58·58	58·56	58·51	58·14	58·13	58·20	57·75	57·84	57·93	57·73	57·62	57·65	....
		58·83	58·63	58·63	58·60	58·34	58·34	58·51	58·20	58·00	58·21	58·15	58·09	58·08	....
23	8,526	58·85	58·71	58·74	58·70	58·51	58·50	58·62	58·35	58·40	58·42	58·32	58·26	58·27	....
	8,342	58·85	58·69	58·74	58·68	58·52	58·50	58·63	58·36	58·39	58·42	58·33	58·28	58·29	....
		58·82	58·68	58·71	58·67	58·50	58·48	58·60	58·38	58·41	58·42	58·37	58·31	58·32	....
24	7,200	58·75	58·57	58·61	58·61	58·45	58·46	58·50	58·34	58·37	58·39	58·32	58·25	58·27	....
		58·70	58·56	58·58	58·56	58·38	58·37	58·49	58·26	58·30	58·32	58·27	58·20	58·22	....
25	7,780	58·73	58·60	58·65	58·64	58·47	58·46	58·55	58·32	58·37	58·38	58·31	58·25	58·26	....
	7,615	58·76	58·61	58·63	58·65	58·48	58·47	58·53	58·32	58·35	58·37	58·32	58·24	58·27	....
		58·73	58·63	58·66	58·63	58·45	58·44	58·55	58·32	58·37	58·39	58·32	58·26	58·27	....
26	7,502	58·82	58·69	58·74	58·61	58·53	58·52	58·62	58·38	58·43	58·48	58·40	58·32	58·30	....
	7,584	58·77	58·63	58·70	58·56	58·48	58·47	58·57	58·34	58·39	58·43	58·36	58·29	58·26	....
		58·72	58·58	58·61	58·49	58·42	58·41	58·52	58·28	58·33	58·37	58·29	58·23	58·20	....
27	6,331	58·84	58·75	58·79	58·81	58·63	58·62	58·70	58·48	58·48	58·53	58·50	58·43	58·39	....
	5,812	58·85	58·78	58·83	58·77	58·71	58·68	58·76	58·62	58·63	58·68	58·68	58·66	58·62	....
		58·86	58·80	58·87	58·84	58·72	58·71	58·78	58·73	58·70	58·68	58·65	58·63	58·60	....
28	5,827	58·86	58·82	58·86	58·83	58·73	58·73	58·78	58·63	58·67	58·67	58·64	58·60	58·60	....
	5,835	58·82	58·72	58·80	58·77	58·66	58·66	58·71	58·57	58·60	58·60	58·57	58·50	58·52	....
		58·78	58·71	58·73	58·70	58·57	58·58	58·64	58·51	58·54	58·54	58·50	58·45	58·44	....
29	5,915	58·63	58·55	58·59	58·60	58·45	58·50	58·52	58·38	58·42	58·42	58·39	58·34	58·35	....
	5,743	58·67	58·58	58·61	58·61	58·46	58·45	58·53	58·40	58·38	58·38	58·41	58·36	58·37	....
		58·69	58·60	58·64	58·62	58·49	58·49	58·55	58·42	58·43	58·44	58·43	58·38	58·38	....
30	5,750	58·80	58·69	58·73	58·73	58·63	58·63	58·67	58·52	58·53	58·53	58·51	58·49	58·49	....
	5,385	58·78	58·70	58·67	58·73	58·62	58·61	58·67	58·54	58·60	58·59	58·50	58·48	58·48	....
		58·79	58·71	58·78	58·73	58·62	58·62	58·68	58·54	58·55	58·60	58·51	58·50	58·52	....

Location of Gauges shown on plan of Western Outlet dated November, 1913.

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS—Continued.

Date 1913	Discharge in Sec. Ft.	GAUGE NUMBER													
		1	2	2A	3	4	5	6	7	8	9	10	11	12	13
October 1	5,564 { 5,470	58·73	58·65	58·68	58·67	58·54	58·54	58·60	58·47	58·49	58·49	58·48	58·43	58·42	......
		58·70	58·62	58·69	58·65	58·51	58·51	58·59	58·45	58·47	58·48	58·46	58·42	58·42	......
		58·71	58·64	58·65	58·63	58·51	58·51	58·58	58·43	58·48	58·48	58·43	58·40	58·43	......
" 2	5,463 { 5,692	58·75	58·66	58·72	58·73	58·58	58·65	58·62	58·50	58·52	58·52	58·52	58·43	58·48	......
		58·76	58·70	58·74	58·73	58·59	58·59	58·66	58·52	58·54	58·54	58·55	58·48	58·51	......
		58·78	58·72	58·78	58·75	58·63	58·63	58·71	58·56	58·60	58·62	58·58	58·52	58·54	......
" 3	5,638 { 5,806	58·80	58·71	58·77	58·75	58·62	58·62	58·67	58·52	58·58	58·58	58·57	58·54	58·51	......
		58·75	58·66	58·73	58·67	58·57	58·56	58·63	58·50	58·50	58·49	58·49	58·45	58·48	......
		58·70	58·60	58·63	58·58	58·48	58·48	58·55	58·42	58·44	58·44	58·42	58·38	58·40	......
" 4	5,419	58·62	58·52	58·57	58·58	58·45	58·47	58·50	58·38	58·40	58·40	58·38	58·34	58·35	......
		58·61	58·54	58·59	58·55	58·43	58·43	58·50	58·35	58·39	58·40	58·37	58·32	58·31	......
" 5	5,559	58·28	58·20	58·20	58·21	58·09	58·09	58·13	58·00	58·03	58·03	58·02	57·97	57·99	......
		58·30	58·25	58·25	58·25	58·14	58·16	58·23	58·09	58·10	58·10	58·10	58·05	58·07	......
" 6	5,759 {	58·73	58·68	58·71	58·68	58·53	58·53	58·60	58·47	58·49	58·50	58·50	58·44	58·43	......
		58·73	58·68	58·71	58·68	58·56	58·56	58·62	58·52	58·51	58·52	58·49	58·44	58·45	......
" 23	5,841	58·96	58·88	58·95	58·90	58·79	58·79	58·82	58·72	58·74	58·74	58·71	58·66	58·69	34·77
" 25	5,540	58·84	58·76	58·79	58·78	58·68	58·68	58·71	58·60	58·62	58·62	58·61	58·55	......	34·73
" 28	5,235	58·40	58·33	58·41	58·36	58·25	58·22	58·29	58·17	58·20	58·20	58·19	58·13	58·17	34·68
" 30	5,530	58·87	58·79	58·85	58·82	58·73	58·70	58·74	58·61	58·65	58·65	58·64	58·60	58·62	34·77
November 1	5,515	58·96	58·91	58·92	58·94	58·81	58·82	58·85	58·72	58·75	58·78	58·76	58·71	58·73	34·79
" 4	5,540	58·94	58·88	58·92	58·93	58·82	58·82	58·85	58·73	58·74	58·78	58·79	58·72	58·74	34·68
" 6	5,503	58·88	58·81	58·83	58·83	58·71	58·71	58·75	58·62	58·65	58·68	58·66	58·61	58·63	34·71
" 10	5,492	58·75	58·68	58·71	58·70	58·60	58·61	58·65	58·53	58·53	58·53	58·55	58·50	58·52	34·43
" 12	5,388	58·74	58·70	58·70	58·73	58·61	58·60	58·67	58·54	58·55	58·59	58·56	58·50	58·52	34·69
" 14	5,651	58·86	58·80	58·78	58·82	58·70	58·70	58·74	58·61	58·62	58·67	58·65	58·60	58·62	34·74
" 17	5,438	58·86	58·80	58·80	58·83	58·71	58·71	58·75	58·62	58·65	58·69	58·66	58·61	58·63	34·71
" 19	5,515	58·88	58·83	58·85	58·85	58·74	58·74	58·80	58·65	58·70	58·70	58·68	58·63	58·66	34·70
" 21	5,612	58·77	58·71	58·70	58·74	58·62	58·62	58·69	58·54	58·53	58·59	58·60	58·53	58·57	34·76
" 24	5,725	58·85	58·79	58·80	58·82	58·69	58·70	58·74	58·62	58·61	58·66	58·64	58·59	58·61	34·45
" 26	5,303	58·76	58·70	58·70	58·70	58·61	58·60	58·65	58·52	58·56	58·56	58·54	58·51	58·53	34·72
" 27	5,335	58·88	58·81	58·84	58·86	58·73	58·73	58·79	58·68	58·67	58·71	58·70	58·63	58·67	34·76
" 28	5,527	58·79	58·73	58·73	58·76	58·65	58·64	58·68	58·58	58·58	58·61	58·61	58·53	58·57	34·69
" 29	5,522	58·89	58·82	58·82	58·85	58·73	58·72¹	58·79¹	58·67	58·67	58·69	58·68	58·62	58·65	34·83
December 2	5,239	58·84	58·77	58·78	58·80	58·68	58·73¹	58·69¹	58·61	58·60	58·63	58·62	58·58	58·60	34·67
" 5	5,467	58·82	58·78	58·75	58·78	58·68	58·68¹	58·73¹	58·59	58·59	58·69	58·63	58·58	58·60	34·28
" 29	5,355 { 5,458	58·79	58·76	58·75	58·73	58·67	58·66¹	......	58·56	......	......	58·58	58·58	58·59	34·57

Location of Gauges shown on plan of Western Outlet dated November, 1913.
Readings marked ¹ are possibly in error.

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS—Continued.

Date 1914	Discharge in Sec. Ft.	1	2	2A	3	4	5	6	7	8	9	10	11	12	13
								GAUGE NUMBER							
January 6	5,554	58·79	58·69	58·74	58·73	58·64	58·69[1]	58·63[1]	58·55	58·52	58·63	58·57	58·60	58·55	34·78
" 9	5,272	58·85	58·78	58·70	58·79	58·70	58·70[1]	58·76[1]	58·61	58·64	58·64	58·60	58·64	58·58	34·39
" 13	5,154	.....	58·71	58·70	58·71	58·63	58·65[1]	58·61[1]	58·54	58·53	58·60	58·55	58·57	58·53	34·40
" 28	5,458 / 5,297	58·72	58·66	58·68	58·68	58·61	58·70[1]	58·63[1]	58·55	58·59	58·61	58·56	58·55	58·50	34·42
February 4	5,461 / 5,390	58·86	58·79	58·78	58·79	58·70	58·70	58·75	58·60	58·64	58·65	58·62	.....	58·60	34·63
" 9	5,421 / 5,385	58·83	58·78	58·78	58·79	58·70	58·70	58·76	58·61	58·62	58·64	58·60	58·64	58·58	34·53
" 17	5,582 / 5,280	58·86	58·80	58·75	58·79	58·72	58·71	58·76	58·61	58·60	58·68	58·62	58·66	58·60	34·62
" 24	6,859 / 7,172	58·81	58·76	58·70	58·71	58·60	58·59	58·65	58·42	58·47	58·54	58·41	58·42	58·37	35·32
" 26	8,350 / 8,207	58·80	58·67	58·67	58·69	58·51	58·50	58·61	58·30	58·33	58·42	58·35	58·32	58·28	35·82
March 3	8,273 / 7,962	58·78	58·63	58·59	58·65	58·49	58·48	58·56	58·30	58·42	58·42	58·27	58·16	58·24	35·97
" 5	7,824	58·75	58·65	58·60	58·62	58·45	58·44	58·55	58·25	58·36	58·36	58·26	58·15	58·21	36·05
" 20	7,930 / 8,097	58·65	58·55	58·51	58·54	58·40	58·36	58·44	58·20	58·26	58·26	58·22	58·17	58·12	36·11
" 24	7,774	.....	.....	58·51	58·51	58·36	58·37	58·41	58·15	58·22	58·28	58·17	58·10	58·13	36·02
" 27	7,954 / 7,610	58·62	58·54	58·49	58·51	58·37	58·37	58·41	58·14	58·22	58·27	58·17	58·11	58·13	36·04
" 31	7,652 / 7,837	.....	58·53	58·50	58·50	58·37	58·38	58·42	58·14	58·24	58·25	.....	.....	.....	.....
April 2	7,893 / 7,945	58·65	58·55	58·50	58·55	58·40	58·39	58·40	58·20	58·25	58·29	58·16	.....	58·13	35·97
" 9	7,979 / 7,762	58·65	58·58	58·52	58·54	58·41	58·39	58·45	58·18	.....	58·27	58·19	.....	58·16	35·89
" 15	8,111 / 7,407	58·57	58·49	58·46	58·40	58·32	58·32	58·41	58·15	.....	58·26	58·11	58·15	58·13	35·93
" 17	7,527 / 6,949	58·61	58·46	58·44	58·37	58·30	58·30	58·37	58·13	58·08	58·21	58·12	58·13	58·11	35·73
" 22	7,678 / 8,074	58·76	58·62	58·60	58·61	58·43	58·43	58·54	58·30	58·31	58·38	58·25	58·30	58·24	36·03
" 25	8,437 / 8,304	58·83	58·62	58·67	58·67	58·52	58·52	58·60	58·35	58·38	58·42	58·30	58·32	58·32	35·95
" 27	8,118 / 8,281	58·83	58·64	58·65	58·64	58·50	58·51	58·56	58·31	58·35	58·40	58·25	58·31	58·28	35·95
29	8,321 / 8,573	58·87	58·71	58·70	58·67	58·55	58·55	58·60	58·40	58·41	58·46	58·40	58·38	58·33	36·10

Location of Gauges shown on plan of Western Outlet, dated November, 1913.   Readings marked [1] are possibly in error.

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS—Continued.

Date 1914	Discharge in Sec. Ft.	_GAUGE NUMBER_ 1	2	2A	3	4	5	6	7	8	9	10	11	12	13
May 1	8,272 8,618	......	58·79	58·72	58·76	58·61	58·61	58·70	58·42	58·45	58·51	58·39	58·42	58·38	36·11
" 9	8,929 8,751	59·20	59·04	59·06	59·05	58·89	58·88	58·96	58·65	58·70	58·77	58·63	58·66	58·63	36·60
" 15	8,873 8,936	59·32	59·19	59·14	59·13	58·98	58·99	59·10	58·77	58·80	58·88	58·73	58·75	58·73	36·67
" 19	9,208	59·24	59·22	59·19	59·18	59·00	59·03	59·13	58·80	58·83	58·92	58·77	58·80	58·77	36·70
" 23	12,112 11,963	59·49	59·31	59·24	59·26	58·96	58·96	59·16	58·63	58·71	58·79	58·56	58·57	58·56	37·55
" 27	13,113 13,526	59·59	59·31	59·29	59·23	58·91	58·91	59·10	58·55	58·56	58·65	58·45	58·33	58·37	38·10
June 5	15,217 14,991	59·77	59·41	59·34	59·35	58·90	58·90	59·18	58·35	58·48	58·62	58·26	58·25	58·23	39·22
" 12	15,749 15,545	60·00	59·60	59·58	59·59	59·10	59·11	59·42	58·51	58·48	58·75	58·37	58·35	58·35	39·67
" 19	17,045 16,993	60·05	59·65	59·58	59·60	59·05	59·05	59·40	58·35	58·45	58·61	58·19	......	58·12	39·84
" 26	18,447 18,236	59·82	59·34	59·30	59·20	58·60	58·45	58·99	57·73	57·88	58·07	57·59	......	57·50	39·29
" 30	18,436 18,602	59·89	59·39	59·32	59·31	58·62	58·62	59·10	57·75	57·90	58·08	57·58	......	57·50	39·30
July 10	18,155 18,287	59·77	59·31	59·22	59·21	58·56	58·55	58·93	57·72	57·90	58·14	57·52	......	57·50	40·19
" 27	17,686 17,604	59·76	59·17	59·15	59·10	58·41	58·35	58·80	57·57	57·72	57·92	57·45	......	57·34	40·03
August 8	16,396 16,507	59·52	59·01	59·00	58·85	58·30	58·09	58·60	57·40	57·45	57·75	57·30	......	57·20	39·95
" 15	16,720 16,731	......	58·84	58·75	58·73	58·06	58·05	58·54	57·30	57·42	57·63	57·18	......	57·02	39·80
" 21	16,399 16,110	59·14	58·59	58·67	58·53	57·91	57·92	58·24	57·18	57·28	57·44	57·05	......	56·94	39·74
September 12	11,151	59·26	59·04	58·97	59·00	58·74	58·75	58·90	58·45	58·50	58·55	58·42	58·38	58·35	39·55
" 22	10,468	......	58·75	58·70	58·72	58·50	58·48	58·55	58·22	58·28	58·32	58·19	......	58·13	37·55
" 29	10,622	59·16	58·91	58·81	58·89	58·61	58·63	58·81	58·36	58·42	58·53	58·29	......	58·27	37·50
October 3	11,125 10,905	59·19	......	58·98	58·98	58·70	58·67	58·89	58·42	58·30	58·57	58·37	......	58·33	37·67
November 9	7,713	59·59	59·49	59·50	59·42	59·30	59·32	59·40	59·18	59·19	59·26	59·16	59·17	59·10	35·74
" 11	7,395	59·36	59·22	59·19	59·22	59·11	59·11	59·20	59·00	59·05	58·98	58·99	58·92		35·87
" 27	7,203	59·59	59·34	59·32	59·35	59·24	59·24	59·31	59·12	58·88	59·19	59·10	59·12	59·10	35·90
December 12	7,517	59·46	59·40	59·39	59·45	59·31	59·30	59·38	59·20	59·22	59·28	59·15	......	59·11	35·70
" 29	7,375 7,339	59·50	59·42	59·37	59·33	59·26	59·28	59·35	59·07	59·15	59·19	59·13	......	59·10	35·75

Location of Gauges shown on plan of Western Outlet, dated November, 1913.   Readings marked [1] are possibly in error.

Table of Discharges and Slope Gauge Readings at Western Outlet, Lake of the Woods—Continued.

Date 1915	Discharge in Sec. Ft.	1	2	2A	3	4	5	6	7	8	9	10	11	12	13
									GAUGE NUMBER						
January 8	7,535 / 7,501	59·53	59·44	59·40	59·35	59·29	59·29	59·35	59·12	59·18	59·20	59·14	......	59·11	35·85
" 14	7,665	59·53	59·46	59·41	59·40	59·30	59·29	59·38	59·17	59·17	59·23	59·15	59·14	59·09	35·97
" 22	7,713 / 7,688	59·53	59·46	59·41	59·38	59·30	59·34	59·39	59·18	59·19	59·22	59·16	59·14	59·11	36·03
February 6	7,434	59·55	59·48	59·43	59·41	59·31	59·33	59·40	59·19	59·20	59·23	59·16	59·15	59·12	36·03
" 16	7,725 / 7,621	59·52	59·45	59·41	59·38	59·28	59·31	59·38	59·16	59·19	59·25	59·16	59·22	59·11	36·00
March 9	7,418 / 7,578	59·47	59·41	59·36	59·32	59·23	59·25	59·33	59·10	59·15	59·18	59·10	......	59·06	35·85
" 18	7,379 / 7,471	59·39	59·27	59·29	59·24	59·16	59·17	59·25	59·07	59·09	59·09	59·02	......	59·00	35·48
April 6	7,459 / 7,768	59·50	59·43	59·40	59·36	59·26	59·28	59·35	59·13	59·10	59·21	59·13	......	59·03	35·40
" 10	13,824 / 13,128	59·51	59·25	59·19	59·15	58·80	58·82	59·05	58·45	58·47	58·63	58·25	......	58·27	37·45
" 22	13,025 / 13,258	......	59·16	59·11	59·08	58·76	58·72	59·01	58·30	58·45	58·50	58·27	......	58·25	38·25
May 11	14,028 / 13,300	......	59·50	59·42	59·37	59·02	59·05	59·28	59·59	58·70	58·87	58·51	......	58·50	38·40
		59·94	59·32	59·24	59·14	58·50	58·60	58·90	57·72	57·80	58·10	57·55	57·45	57·55	39·10
	17,660	59·94	59·30	59·21	......	......	......	......	......	......	......	......	......	......	......
" 18	17,907	59·94	59·30	59·13	59·10	58·53	58·55	58·91	57·66	57·95	58·00	57·48	57·41	57·45	39·15
	19,226	59·94	59·25	59·10	59·05	58·35	58·20	57·80	57·28	57·55	57·80	57·15	57·05	57·23	39·33
		59·95	59·24	59·10	59·05	58·38	58·23	57·78	57·37	57·50	57·80	57·18	57·08	57·14	39·40
	20,863	......	......	59·02	58·98	58·10	57·95	58·60	56·91	57·00	57·25	56·68	56·52	56·45	39·80
" 19	20,907	......	......	59·01	58·91	58·02	57·80	58·55	......	......	57·25	......	56·32	......	......
		59·97	59·11	58·99	58·93	57·99	57·79	58·55	56·60	56·90	......	56·37	56·21	56·30	40·05
" 20	22,804	......	58·98	58·87	58·82	57·75	57·35	58·35	56·07	56·30	55·67	55·76	55·62	55·81	40·40
		......	......	58·87	58·80	57·80	57·30	58·31	56·00	56·30	56·57	......	......	......	......
	22,481	59·94	58·95	58·83	58·77	57·70	57·30	58·24	55·95	56·11	56·48	55·70	55·42	55·60	40·75
" 21	21,778	59·94	59·00	58·84	58·75	57·72	57·27	58·25	56·00	56·45	56·80	56·00	55·85	56·02	40·70
	21,554	......	59·00	58·86	58·87	57·85	57·58	58·35	56·37	......	......	......	......	......	......
		59·89	59·00	58·86	58·85	57·87	57·55	58·35	56·40	56·50	56·85	56·25	56·05	56·15	40·60
" 31	17,325 / 17,833	59·71	59·23	59·20	59·17	58·53	58·55	59·88	57·75	57·90	58·07	57·61	57·48	57·52	39·79
June 7	17,435 / 17,397	59·62	59·11	59·07	59·03	58·41	58·35	58·79	57·64	57·75	58·01	57·51	57·41	57·45	39·59
" 25	18,659 / 18,706	60·15	59·56	59·47	59·41	58·82	58·80	59·84	57·97	58·13	58·23	57·79	57·70	57·73	40·19
" 30	22,340	60·34	59·61	59·50	59·48	58·65	58·53	59·09	57·14	56·47	57·82	56·91	56·74	56·78	40·94

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS—Continued.

Date 1915	Discharge in Sec. Ft.	GAUGE NUMBER													
		1	2	2A	3	4	5	6	7	8	9	10	11	12	13
July 5	23,323 / 23,427	60·39	59·71	59·67	59·61	58·60	58·58	59·30	57·24	57·60	57·92	56·95	56·85	56·83	41·24
" 12	23,111 / 23,733	60·35	59·78	59·71	59·69	58·74	58·63	59·39	57·36	57·75	57·84	57·13	56·94	56·96	41·49
" 16	23,488 / 23,345	60·41	59·79	59·67	59·68	58·75	58·58	59·35	57·29	57·67	57·94	57·13	56·93	57·01	41·49
" 22	22,845 / 22,794	60·34	59·67	59·60	59·53	58·65	58·48	59·16	57·19	57·55	57·92	57·02	56·88	56·92	41·44
" 28	24,478 / 24,681	60·14	59·37	59·27	59·21	58·12	57·68	58·78	56·34	56·64	57·92	56·00	55·78	55·80	41·74
August 2	23,746 / 23,597	59·93	59·16	58·98	58·95	57·90	57·48	58·45	56·11	56·45	56·72	55·81	55·59	55·62	41·60
" 5	23,379 / 23,317	59·85	59·08	58·94	58·91	57·80	57·51	58·44	55·99	56·43	56·70	55·77	55·55	55·59	41·70
" 11	21,142	59·85	59·16	59·05	59·02	58·10	57·83	58·59	56·71	57·00	57·32	56·55	56·38	56·48	41·15
" 16	21,567 / 21,576	59·47	58·79	58·61	58·54	57·57	57·38	58·08	56·25	56·42	56·77	55·95	55·80	55·83	40·90
" 27	11,492 / 11,119	59·60	59·30	59·29	59·25	59·05	59·06	59·17	58·77	58·84	58·93	58·70	58·70	58·63	37·70
" 30	11,052 / 11,168	59·50	59·28	59·30	59·20	59·02	59·01	59·14	58·72	58·80	58·87	58·68	58·64	58·48	37·20
September 3	10,760 / 10,811	59·38	59·07	59·08	59·02	58·82	58·81	58·95	58·51	58·62	58·66	58·50	58·47	58·43	37·15
" 8	10,824 / 11,027	59·40	59·09	59·11	59·02	58·81	58·77	58·89	58·53	58·63	58·72	58·53	58·48	58·44	37·20
" 13	10,339 / 10,409	59·08	58·89	58·85	58·83	58·65	58·61	58·75	58·39	8·45	58·52	58·36	58·33	58·28	36·90
" 17	10,314	59·15	59·06	58·98	59·04	58·81	58·80	58·91	58·54	58·63	58·72	58·54	58·56	58·45	37·10
" 22	10,767 / 10,411	59·18	59·01	58·98	58·95	58·81	58·83	58·89	58·52	58·62	58·72	58·53	58·48	58·43	37·05
" 27	10,005	59·02	58·90	58·84	58·84	58·66	58·62	58·75	58·51	58·47	58·53	58·38	58·36	58·33	36·90
October 1	7,148 / 7,128	59·08	58·96	58·94	58·91	58·82	58·80	58·87	58·71	58·75	58·79	58·70	58·69	58·66	36·45
" 4	6,746 / 6,805	58·68	58·62	58·57	58·56	58·49	58·48	58·54	58·38	58·45	58·50	58·39	58·38	58·36	35·87
" 8	7,218 / 6,957	58·79	58·79	58·67	58·72	58·66	58·66	58·70	58·54	58·60	58·62	58·55	58·54	58·51	35·95
" 13	7,074 / 7,246	59·00	58·87	58·86	58·82	58·76	58·73	58·78	58·61	58·69	58·71	58·63	58·63	58·58	35·87
" 18	7,099 / 7,289	59·05	58·96	58·92	58·89	58·81	58·80	58·85	58·70	58·75	58·82	58·70	58·68	58·65	35·70

TABLE OF DISCHARGES AND SLOPE GAUGE READINGS AT WESTERN OUTLET, LAKE OF THE WOODS—Continued.

Date 1915	Discharge in Sec. Ft.	GAUGE NUMBER													
		1	2	2A	3	4	5	6	7	8	9	10	11	12	13
October 22	6,967 7,061	58·95	58·75	58·74	58·80	58·62	58·62	58·65	58·51	58·55	58·60	58·52	58·50	58·47	35·77
" 27	7,598 7,170	59·20	59·04	59·24	59·00	58·91	58·90	58·96	58·79	58·85	58·90	58·79	58·77	58·75	35·90
November 3	6,932 6,988	58·95	58·86	58·80	58·82	58·74	58·72	58·77	58·61	58·67	58·72	58·64	58·62	58·59	35·80
" 10	7,120 7,221	59·20	59·06	59·04	58·97	58·91	58·91	58·97	58·79	58·85	58·91	58·78	58·79	58·78	35·85
" 13	6,698 6,798	58·90	58·87	58·82	58·83	58·77	58·75	58·79	58·64	58·68	58·74	58·65	58·64	58·61	35·85
" 15	6,689 6,939	58·95	58·85	58·79	58·82	58·71	58·71	58·76	58·60	58·67	58·71	58·61	58·60	58·56	35·85
" 22	6,689 6,789	58·82	58·80	58·79	58·74	58·69	58·72	58·71	58·59	58·52	58·65	58·58	58·57	58·54	35·80
" 26	6,936 6,886	58·94	58·81	58·78	58·80	58·71	58·71	58·75	58·61	58·65	58·70	58·60	58·60	58·57	35·82
December 1	6,660 6,586	58·94	58·83	58·78	58·78	58·70	58·70	58·76	58·59	58·57	58·72	58·61	58·59	58·56	35·82
" 6	6,630 6,630	58·95	58·83	58·77	58·79	58·69	58·69	58·75	58·59	58·64	58·70	58·60	......	58·56	35·55
" 10	6,625 6,625	58·93	58·81	58·78	58·73	58·70	58·68	58·76	58·59	58·65	58·67	58·60	58·52	58·56	35·73
" 15	6,812 6,830	58·90	58·81	58·77	58·75	58·69	58·68	58·72	58·58	58·64	58·77	58·59	58·51	58·56	35·82
" 21	6,931	59·00	58·87	58·84	58·79	58·75	58·71	58·70	58·62	58·71	58·72	58·65	58·57	58·61	35·85
" 24	6,857 6,835	59·00	58·90	58·86	58·82	58·79	58·79	58·82	58·67	58·72	58·73	58·67	58·60	58·63	35·75
" 28	6,743 6,694	59·00	58·87	58·85	58·84	58·78	58·76	58·79	58·66	58·67	58·72	58·65	58·60	58·61	35·75

PROGRESS REPORT

OF THE

MANITOBA HYDROMETRIC SURVEY

FOR
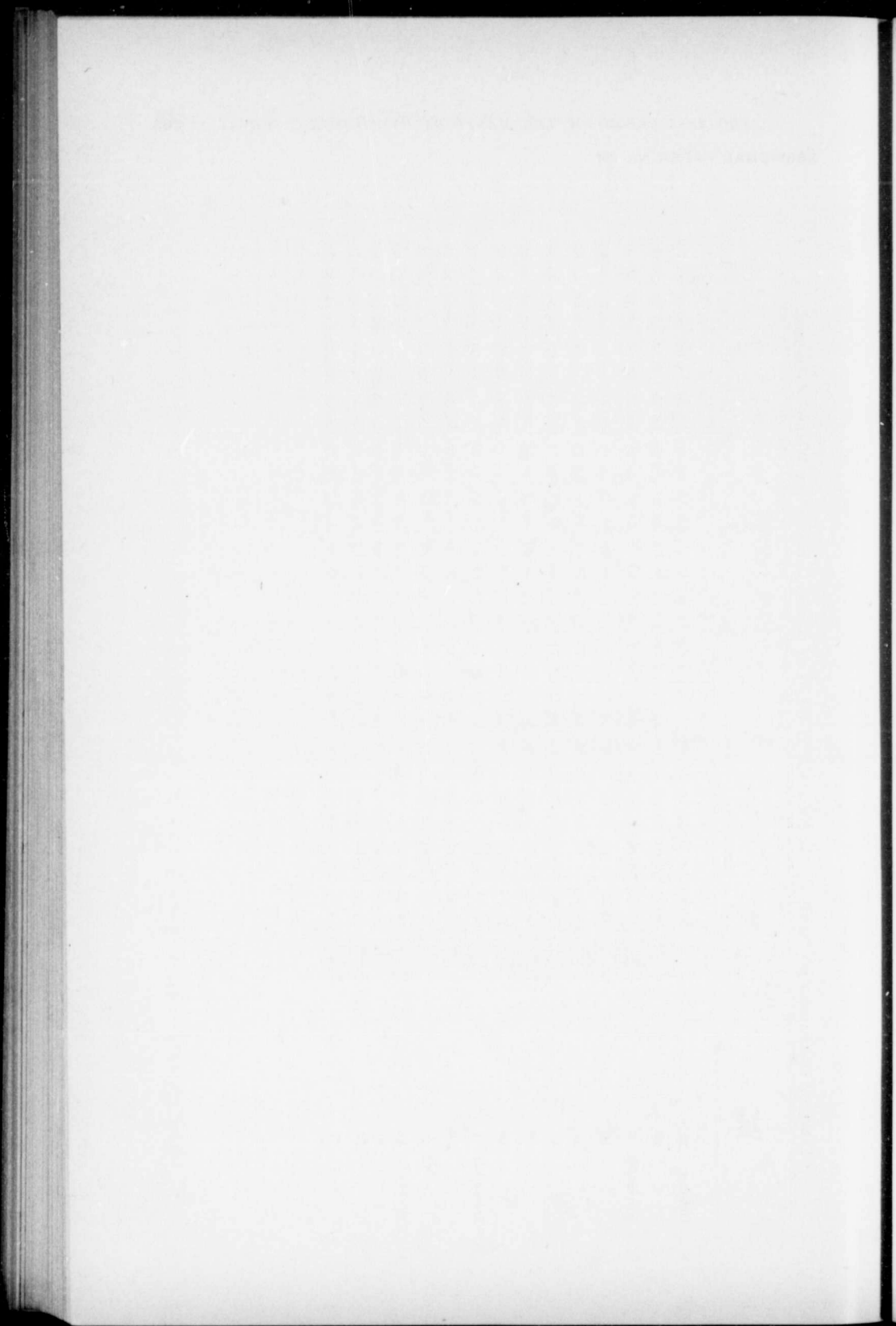
THE CALENDAR YEAR, 1915

PART IV.

METEOROLOGICAL DATA

SESSIONAL PAPER No. 25f

METEOROLOGICAL DATA

REPORT ON METEOROLOGICAL STATION, WINNIPEG BEACH.

May 1915	Time	Evaporation	Time	Evaporation	Rain
1					
2					
3					
4					
5			[1]9.00p.m.		
6			5.25 "	0·055	
7	7.50 a.m.	0·015	4.55 "	0·025	
8	9.35 "	0·050	5·15 "	0·030	
9	10.30 "	0·050	6.25 "	0·100	
10	8.20 "	0·070	4.35 "	0·070	
11	8.35 "	0·045	4.23 "	0·075	
12	8.25 "	0·060	6·30 "	0·055	0·12
13	8.55 "	0·045	5.05 "	0·075	
14	8.35 "	0·065	4.25 "	0·065	
15	8.30 "	0·155	4.40 "	0·100	
16	10.25 "	0·165	4.35 "	0·100	
17	8.40 "	0·075	5.05 "	0·070	Snow
18	8.43 "	0·025	4.30 "	0·045	
19	8.50 "	0·185	4.35 "	0·130	
20	7.50 "	0·100	4·35 "	0·105	
21	8·10 "	0·105	4.35 "	0·060	
22	9·00 "	0·175	3.52 "	0·070	
23	9.30 "	0·280			

[1] Tank Set.

REPORT ON METEOROLOGICAL STATION, WINNIPEG BEACH.

June 1915	Time	Evaporation	Time	Evaporation	Rain
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12	9.30 a.m.	0·100	7.15 p.m.	0·100	
13	9.30 "	0·090	6.30 "	Rain Gauge broken	0·147[1]
14	9.30 "	Rain Gauge broken	6.30 "	0·200	0·158[1]
15	9.30 "	0·060	6.30 "	0·100	
16	9.30 "	0·100	6.30 "	0·100	0·220
17	9·30 "	0·020	6.30 "	0·060	0·190
18	9.30 "	0·120	6.30 "	0·050	
19	9.30 "	0·060	6.30 "	0·080	
20	9·30 "	0·120	6.30 "	0·020	0·070
21	9·30 "	0·020	6.30 "	0·110	0·030
22	9·30 "	0·110	6.30 "	0·090	
23	9.30 "	0·100	6.30 "	0·060	0·150
24	9.30 "	0·090	6.30 "	0·060	0·170
25	9.30 "	0·090	6.30 "	0·040	0·290
26	9.30 "	0·090	6.30 "		
27	9.30 "	0.060		0·120	
28	9.30 "	0·200	6.30 "	0·080	0·100
29	9.30 "	0·020	6.30 "	0·160	
30	9.30 "	0·120	6.30 "	0·080	0·200

[1] Computed.

REPORT ON METEOROLOGICAL STATION, WINNIPEG BEACH.

July 1915	Time	Evaporation	Time	Evaporation	Rain
1	9.30 a.m.	0·040	6.30 p.m.	0.160	**0·050**
2	9.30 "	0·030	....	....	**0·030**
3	....	....	....	....	**¹0·120**
4	....	....	....	....	....
5	....	....	....	....	....
6	....	....	....	....	....
7	....	....	....	....	....
8	....	....	....	....	....
9	....	....	....	....	....
10	....	....	....	....	....
11	....	....	....	....	0·065
12	....	....	....	....	....
13	....	....	....	....	....
14	....	....	....	....	....
15	....	....	....	....	....
16	....	....	....	....	....
17	....	....	....	....	....
18	....	....	....	....	....
19	....	....	....	....	....
20	....	....	....	....	....
21	....	....	....	....	....
22	....	....	....	....	....
23	....	....	....	....	....
24	....	....	....	....	....
25	....	....	....	....	....
26	....	....	....	....	....
27	....	....	....	....	....
28	9.30 a.m.	....	6.30 p.m.	0·080	....
29	9.30 "	0·100	6.30 "	0·070	....
30	9.30 "	0·060	6.30 "	0·080	....
31	9.30 "	0·010	6.30 "	0·020	....

¹ Pin of Evaporation tank broken.

REPORT ON METEOROLOGICAL STATION, WINNIPEG BEACH.

August 1915	Time	Evaporation	Time	Evaporation	Rain
1	9.30 a.m.	0·040	6.30 p.m.	0·060	·11
2	9.30 "	0·200	6.30 "	0·400	....
3	9.30 "	0·080	6.30 "	0·200	....
4	9.30 "	0·070	6.30 "	0·200	....
5	9.30 "	0·100	6.30 "	0·080	....
6	9.30 "	0·160	6.30 "	0·100	....
7	9.30 "	0·080	6.30 "	0·080	....
8	9.30 "	0·060	6.30 "	0·100	....
9	9.30 "	0·060	6.30 "	0·040	....
10	9.30 "	0·060	6.30 "	0·140	....
11	9.30 "	0·080	6.30 "	0·180	....
12	9.30 "	0·100	6.30 "	0·080	....
13	9.30 "	0·060	6.30 "	0·150	....
14	9.30 "	0·050	6.30 "	0·100	....
15	9.30 "	0·090	6.30 "	0·160	....
16	9.30 "	0·090	6.30 "	0·150	....
17	9.30 "	0·100	6.30 "	0·100	....
18	9.30 "	0·080	6.30 "	0·150	....
19	9.30 "	0·060	6.30 "	0·120	....
20	9.30 "	0·100	6.30 "	0·090	·22
21	9.30 "	0·060	6.30 "	0·090	....
22	9.30 "	0·060	6.30 "	0·080	....
23	9.30 "	0·120	6.30 "	0·150	....
24	9.30 "	0·100	6.30 "	0·150	....
25	9.30 "	0·100	6.30 "	0·160	....
26	9.30 "	0·080	6.30 "	0·120	....
27	9.30 "	0·040	6.30 "	0·180	....
28	9.30 "	0·080	6.30 "	0·090	·40
29	9.30 "	0·100	6.30 "	0·060	....
30	9.30 "	0·040	6.30 "	0·060	....
31	9.30 "	0·040	6.30 "	0·090	....

SESSIONAL PAPER No. 25f

REPORT ON METEOROLOGICAL STATION, WINNIPEG BEACH.

Sept. 1915	Time	Evaporation	Time	Evaporation	Rain
1	9.30 a.m.	0·100	6.30 p.m.	0·080	....
2	9.30 "	0·040	6.30 "	0·060	·17
3	9.30 "	0·030	6.30 "	0·040	....
4	9.30 "	0·040	6.30 "	0·100	....
5	9.30 "	0·050	6.30 "	0·120	....
6	9.30 "	0·020	6.30 "	0·100	·35
7	9.30 "	....	....	....	a.m. ·33
					p.m. 1.50
8	9.30 "	....	6.30 "	0·020	1·40
9	9.30 "	0·040	6.30 "	0·100	....
10	9.30 "	0·080	6.30 "	0·090	·25
11	9.30 "	0·060	6.30 "	0·100	·40

INDEX.

SESSIONAL PAPER No. 25f