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Floods of 1952

Upper Mississippi—Missouri—Red River of the North

Prepared by

HYDROLOGIC SERVICES DIVISION

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PREFACE

The purpose of this report is to compile and record the basic hydrometeorological data for the great upper Mississippi-Missouri-Red River of the North floods of April 1952. This type of information is essential in the planning of land and water management programs, including the safeguarding of life and property. The report has been prepared by the United States Weather Bureau, under the general direction of F. W. Reichelderfer, Chief of Bureau, and William E. Hiatt, Chief, Hydrologic Services Division; coordination and final assembly of report was under the direction of Bennett Swenson, Chief of the River Services Section.

The collection and coordination of field data were under the direct supervision of Verne Alexander, North Central Area Hydrologic Engineer, Kansas City, Mo. Assistance with field work, and the collection and tabulation of the basic information relating to precipitation and river stages was furnished by the staffs of river district offices and Weather Records Processing Center. The officials in charge of offices participating in the collection and preparation of the information were F. J. Bavendick, Bismarck, N. Dak.; L. W. Dick, Moline, Ill.; M. R. Hovde, Minneapolis, Minn.; H. L. Jacobson, R. E. Johnson, and G. E. Stegall, Kansas City, Mo.; C. F. Jesperson, Burlington, Iowa; I. P. Rennels, Sioux City, Iowa; A. D. Sanial, La Crosse, Wis.; R. W. Schultz, Fargo, N. Dak.; E. F. Stapowich, Omaha, Nebr.; and H. F. Wahlgren and Phillip Light, St. Louis, Mo.

Many other members of the staff of the Weather Bureau, including technical and clerical staffs of the Hydrologic Services Division, made valuable contributions to this work.

The Corps of Engineers, Department of the Army, and the Geological Survey, Department of the Interior, have materially aided through the contribution or verification of basic information. The Corps of Engineers assisted with the collection of snow, water equivalent, and river stage data and furnished damage statistics. The Geological Survey furnished river stage data for some points and assisted with the correlation of peak values at other points. The hundreds of cooperating weather and river observers performed an invaluable service in making available the precipitation and river stage information used in this report.

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Alkali Creek 3 miles west of Malta, Mont., April 1, 1953. This is the embryo flood, typical of the upper Plains area where the flood originated. Note well-ripened snowcover and ice jam forming. (*Official photo U. S. Corps of Engineers.*)

FLOODS OF 1952
UPPER MISSISSIPPI—MISSOURI—RED RIVER OF THE NORTH

INTRODUCTION

The floods of April 1952 on the upper Mississippi, Missouri, and Red River of the North were unprecedented in areal coverage. The rivers involved drain an area of three quarters of a million square miles. Nearly 3,000,000 acres of land were inundated. The reaches of the flood extended along 3,000 miles of the main stem channels and along 2,000 miles of the tributary channels. Figure 1 shows the general area of the flooding and expresses, to some degree, the severity of flooding.

All previous records of stage were exceeded from St. Paul to Winona, Minn. on the Mississippi, and from Mobridge, S. Dak., to Rulo, Nebr., except at Yankton, S. Dak., on the Missouri. A comparison with the historic flood of 1881 shows that the upper Mississippi, at four key points, averaged 1.3 feet higher than in 1881 while the middle Missouri averaged 1 foot higher.

The prime characteristic of the 1952 flood was that it came from snowmelt. In the Missouri River it was due almost entirely to the rapid melting of an abnormal snow cover in the Dakotas and eastern Montana. Snowmelt was also the major contributing factor in the Mississippi and Red River floods; however, groundwater and lake levels in this area were already very high due to excessive precipitation during the two previous years.

TABLE 1.—*Grand divisions of the Mississippi Basin*

	Area in square miles	Ratio to whole basin
Upper Mississippi Basin	188, 000	0. 151
Missouri Basin	529, 400	.426
Ohio Basin	204, 000	.164
Arkansas and White Basins	188, 100	.151
Red Basin (of the South)	92, 200	.074
Lower Mississippi Basin	42, 000	.034
Total	1, 243, 700	1. 000

In total property damages the 1952 flood ranks sixth among the major flood disasters of the Nation, with a monetary loss of nearly $200 million. Eleven lives were lost as a direct result of the flood, a very low comparative figure in the statistics of major floods. This minimization of losses can be attributed to the characteristics of the flood type, the accurate long-range forecasts, and the well-coordinated protective measures by municipal, State, and Federal agencies.

BASIC DATA PRESENTED

The basic hydrometeorological data presented in the following pages of this report have been compiled with the objective of making available information essential in the planning of land and water management programs. They are confined to the area in which the flood originated and where damages were experienced. In general, they complement streamflow data reported by the United States Geological Survey for the same flood.

General location map, inside back cover, shows the precipitation and river stage stations for which data have been presented or considered in this report.

Table 2 lists the 10 major floods of record at 15 key river stations in the upper Mississippi, Missouri, and Red River of the North basins. It serves as a ready index and reference to past floods and their magnitudes.

Table 3 summarizes precipitation in the area by months for the period November 1951–March 1952 by State divisions and gives the monthly and seasonal departure from normal. Similar data for April 1952 have been included as an indication of precipitation events during the period of flooding.

Table 4 contains monthly precipitation data for the period November 1951–March 1952 for individual points and is a detailed supplement to

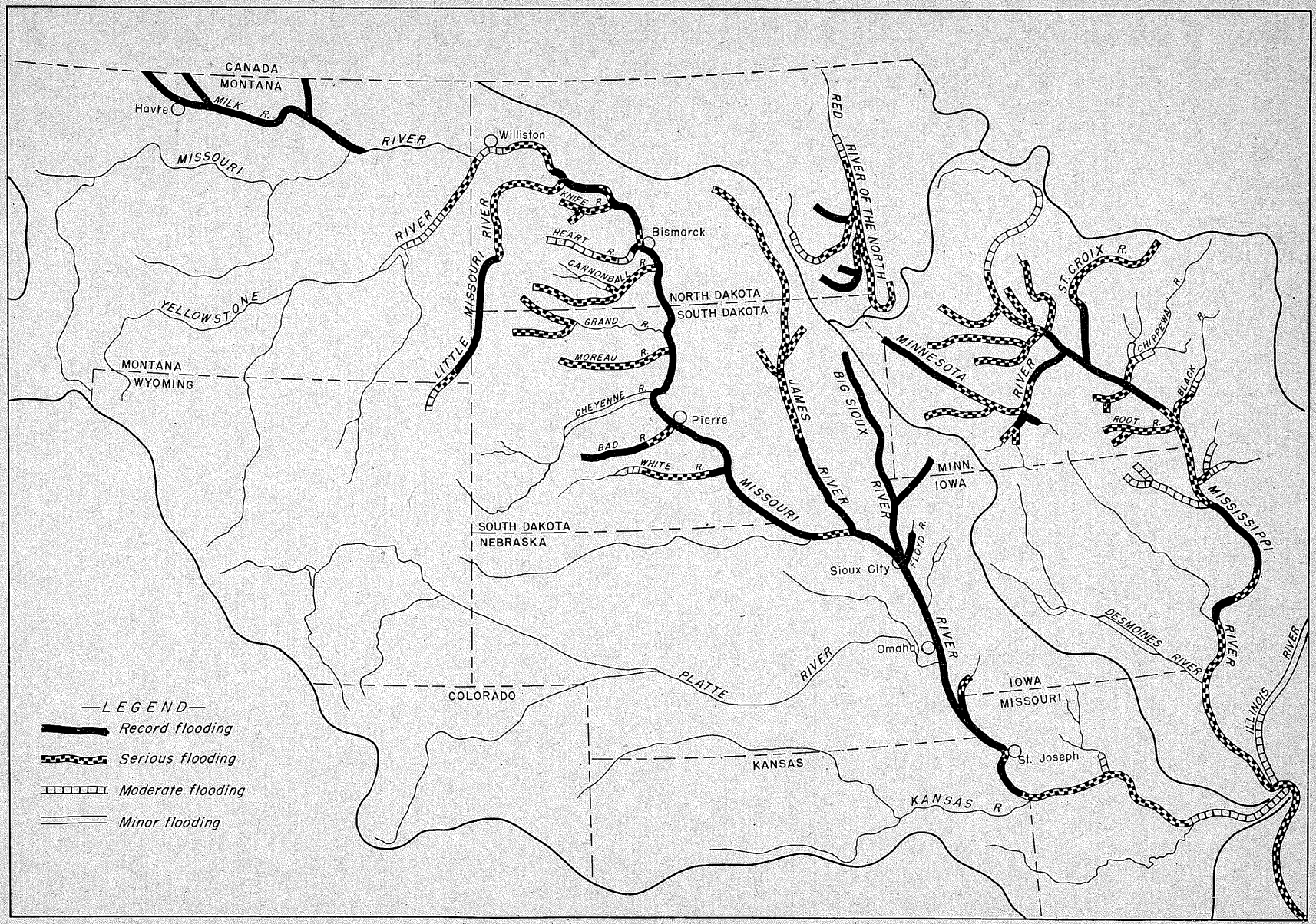

FIGURE 1.—Map showing flood conditions April–May 1952.

the State division summary. Daily totals and hourly values, as indicated by symbol, for these stations are not included in this report but are available in regular monthly issues, or supplements, of Monthly Climatological Data.

Figure 3 presents the total winter precipitation in the form of isohyets.

Water equivalent of snow has also been shown in map form (fig. 4). In general, the observations were made on or about March 20, 1952. Observations significantly prior to this date were adjusted on the basis of daily precipitation between the date of observation and March 20. Water equivalent data were colleced at Weather Bureau and Civil Aeronautics Administration stations semiweekly. In addition, field surveys were made by the Corps of Engineers, Northern States Power Co., Wisconsin Valley Improvement Co., and other power company cooperatives. The results of the field surveys are tabulated in table 5.

Tables 6 and 7 present daily meteorological data related to the melting of the heavy snow cover.

Figures 6 and 7 present in graphical form depth of snow on ground and concurrent meteorological data during the period of maximum snowmelt. The data for 1952 are compared with similar data for the same period of 1951. Figure 8 presents frequency curves of maximum snow depth during March for period of record.

Figure 9 gives a comparison of daily maximum and minimum air temperatures for March and April 1951 and 1952. Figure 10 shows in map form accumulated degree days for the snowmelt periods in 1951 and 1952.

Comparisons of the resultant runoff from snowmelt during the 1951 and 1952 seasons are shown in figure 11.

Table 8 includes dates of freezeup and breakup of the main rivers for the period of record at selected points. These data are not only of value to navigation interests but the date of breakup serves to signalize the time of the annual spring rise of the rivers.

Table 9 contains miscellaneous data such as mean sea level elevation of river gages, flood stage, drainage area, river miles from the mouth, highest stages of record, period of record, and the operating agencies for river stations used in this report. Like table 2 it is a ready reference to river stations in the three river basins covered by this report.

Table 10 contains daily river stages for the months of March and April, or April and May, 1952 for approximately 180 points in the basins. Footnotes contain supplemental stage data necessary for definition of stage graphs. Unless otherwise noted, the observations were made at approximately 7 a. m., local time, daily. Figures 12–16 present the same data for selected stations in graphical form.

The flood damage statistics, table 11, were assembled and coordinated by the Corps of Engineers and Weather Bureau. The files of these agencies contain details from which this summary was compiled. Weather Bureau files also contain information on the monetary value of savings effected by flood warnings issued.

Table 12 contains, for comparative purposes, flood loss data for past great floods.

BASIN DESCRIPTIONS

The Mississippi River drains an area of 1,243,700 square miles, or 41 percent of the area of the United States. It is divided into six major divisions, the relative sizes of which are shown in table 1. The two major divisions involved in the April 1952 flood are the Missouri and upper Mississippi Basins which drain 717,400 square miles, or 57.7 percent of the whole basin.

The other important basin with major flooding in April 1952 was the Red River of the North. It should not be confused with the Red Basin of table 1, which is in Texas and Louisiana. The Red River of the North Basin adjoins the Mississippi system on the north but is not part of the system—instead, it drains northward. At the international boundary its drainage area is 40,200 square miles (36,200, excluding the closed Devils Lake Basin), about 1 percent of the area of the United States.

MISSOURI BASIN

The Missouri River has its source in southwestern Montana at the confluence of the Jefferson, Madison, and Gallatin Rivers. From its source to its confluence with the Mississippi it flows 2,465 miles, the longest river on the continent. Its drainage area is more than twice the area of any of the major subdivisions of the Mississippi system, and almost half the entire Mississippi system drainage. The Missouri's

northern limit extends almost to the Saskatchewan River. A swiftly flowing stream in its upper course, it passes through the "Gate of the Rocky Mountains," a gorge about 6 miles long with perpendicular walls about 1,200 feet in height. At Great Falls, Mont., in a series of falls, it descends 350 feet in 16 miles. In the lower part of its course, the river moves more slowly across the vast plains. Chief tributaries are the Osage and Kansas in Missouri and Kansas; the Platte and Niobrara in Nebraska; a large number of short streams such as the Nishnabotna and Little Sioux in Iowa; the Big Sioux, White, James, and Cheyenne in South Dakota; the Little Missouri in North Dakota; and the Yellowstone and Milk in Montana. Of these, all but the James, Big Sioux, Milk, and the streams in Iowa, flow in from the west or south (right bank of the Missouri facing downstream).

The broad range in latitude and elevation over the basin is associated with a wide variation in climatic conditions—from arid to humid. The arid zone, in general, lies west of the 105th meridian with annual rainfall as low as 10 inches, while the humid zone lies east of the 98th meridian with annual rainfall as high as 40 inches in the lower reaches. For the entire basin the average annual runoff is about 2.1 inches (for the period 1893–1949, reference Missouri Basin Interagency Committee Report on Adequacy of Flows in the Missouri River). For the same period, it is 2 inches at Williston, N. Dak. and 1.5 inches at Sioux City, Iowa. For the reach between these two points, from which came the principal contribution to the April 1952 flood, the annual average runoff is 0.9 inch.

Most years the Missouri is subject to two periods of generally high water—the "March rise" and the "June rise." The March rise follows a rapid melting of snow in the Plains and the accompanying breakup of ice in the main stem and tributaries. The June rise is produced by a combination of runoff from melting snow in the mountains and seasonally heavy rains in the middle and lower parts of the basin. However, both drought and flood are common; in recent years the drought of the thirties and the Kansas River flood of July 1951 are noteworthy extremes. Large multiple-purpose dams—for flood protection, power, navigation, and irrigation—are under construction in the Dakotas, at Garrison, Oahe, and Fort Randall; and at the time of this flood Fort Peck Reservoir, in Montana, was in operation.

UPPER MISSISSIPPI BASIN

This division of the Mississippi system includes all sections, exclusive of the Missouri, above the mouth of the Ohio. Total drainage area is about the same as that of the Arkansas and White division and about 16,000 square miles smaller than that of the Ohio. The main river rises in the Lake Hernando de Soto Basin draining into Lake Itasca in northern Minnesota, only about 12 miles from the source of the Red River of the North. For the first 60 miles its course is northward, with the result that the river's winding path remains within the State of Minnesota for more than a quarter of the length of 1,470 miles to its confluence with the Ohio. In elevation the river descends from 1,535 feet above sea level at Mississippi Springs (above Itasca) to 275 feet at the Ohio. Chief tributaries are the Minnesota in Minnesota; the St. Croix, Chippewa, and Wisconsin in Wisconsin; the Rock and Illinois in Illinois; and the Iowa and Des Moines in Iowa.

The climate in the upper Mississippi Basin is midcontinental, with a wide seasonal variation in temperature and precipitation, more pronounced in the northern headwater regions than in the southern portion of the basin. Average annual precipitation ranges from about 25 inches in the north to 45 inches in the south, more than half occurring in the growing season. Rainfall and runoff are relatively stable and adequate. By way of comparison with the Missouri, the average annual runoff at Keokuk, Iowa, is slightly over 7 inches whereas the Missouri's at Sioux City, Iowa, is 1.5 inches.

High flow commonly occurs in the period April to July, generally from melt of the heavy winter snow pack in the headwaters region combined with the spring rains. The lake regions of Wisconsin and Minnesota provide natural storage; and flows have been further stabilized by developed storage of about 3,000,000 acre-feet. Navigation structures permit dependable water transportation as far upstream as St. Paul, Minn.

RED RIVER OF THE NORTH BASIN

Separate from either Missouri or Mississippi drainage, the Red River of the North rises in the lake region of west-central Minnesota, not far from the headwaters of the Mississippi. It is formed by the confluence of the Otter Tail and Bois de Sioux Rivers, and then flows northward to Canada, forming the boundary between Minnesota and North Dakota. It is the largest northward-

flowing river in the United States. At the Canadian border it includes in its drainage area about 2,000 square miles in Canada.

The main river valley is very flat, varying in width from about 15 miles at the southern end to about 150 miles at the northern end. In the United States the river slope is gentle, averaging about half a foot per mile. On east and west the central plain is flanked by rougher uplands 300 to 700 feet higher. The Red's most important tributaries are the Sheyenne and Pembina—both from the west, the latter flowing from Canada—and the Red Lake River in Minnesota.

The climate of the basin is typically continental, with a wide annual range in temperature and a concentration of precipitation in the summer months. Both mean temperature and precipitation decrease uniformly northward, with average precipitation about 20 inches for the basin as a whole. Over half of the annual precipitation occurs in the months from May to August, and about 15 percent in the winter as snow. Runoff averages from about 1 inch in eastern North Dakota to about 3 inches in western Minnesota.

The basin-wide floods of the Red River of the North are usually associated with the spring snowmelt, with occasional extremely high stages due to ice jams. April is the predominant flood month, with the five highest floods of record at Moorhead, Minn., having occurred during that month. The fact that the melting of winter snow starts in the upper reaches of this northward-flowing river tends to concentrate spring runoffs in the Fargo-Moorhead-Grand Forks area.

PREVIOUS FLOODS OF THE AREA

GENERAL

Official records for the North Central States are sufficiently comprehensive to define all major floods for the past 70 or 80 years. These records are antedated by approximately 50 years of documentary information in the form of diaries, journals, river navigation logs, and military reports. A review of these records fails to establish definite recurrence intervals or trends. Nevertheless, there are significant characteristics common to segments of the area. Practically all serious floods in this area north of the 44th parallel occur in April. South of this line the predominance, although not so well defined, is in June.

Severe floods have been experienced in localized areas almost every year. Table 2 shows the 10 greatest floods of record at 15 key points in the area. Out of the 150 floods reported in table 2 only one occurred in the 1930–39 decade—the disastrous flood commonly known as the Republican River Flood of 1935. In contrast to this dry decade is the abundance of flooding during the period 1940–52 (see fig. 2) particularly in the Missouri and Red River of the North Basins. The records at St. Louis during that period largely reflect Missouri flooding. Another significant feature is the relative infrequency of flooding in the Mississippi River above Davenport, Iowa.

Table 12 reflects economic, social, and technical developments in the Nation. The dollar value of the Nation's wealth has increased along with the population. At the same time, improvements in communication facilities, hydrologic techniques, and flood-fighting methods have increased the savings in lives and movable property. During the flood of 1903, 100 lives were lost while, despite the increase in population, only 28 lives were lost in a much more severe flood in the same area in 1951. The flood of 1913 in the Ohio Valley caused $147 million damage and 467 lives were lost as compared to $200 million damage and only 11 lives lost in the 1952 flood covered by this report.

UPPER MISSISSIPPI BASIN

Official river stage records cover a period of approximately 90 years. There is a complete record for the Mississippi in the Davenport-Rock Island area starting about 1860. The record at St. Paul, Minn., starts in 1873. There are fragmentary, but fairly authentic, prior records that include a major flood early in June 1851. Three notable floods occurred in the 1880 decade—in 1880, 1881, and 1888. In general, these remained dominant for nearly 70 years, or until 1951. While the 1951 flood could not be considered as exceeding those of the 1880 decade, it suggested the potential occurrence of even greater floods. This potential became a reality in 1952.

MISSOURI BASIN

Historic main-stem floods include those of 1844, 1881, 1903, 1915, 1943, and 1951. Of these, the flood of 1881 established records for the middle Missouri Basin. In most respects it was very similar to the 1952 flood covered in this report.

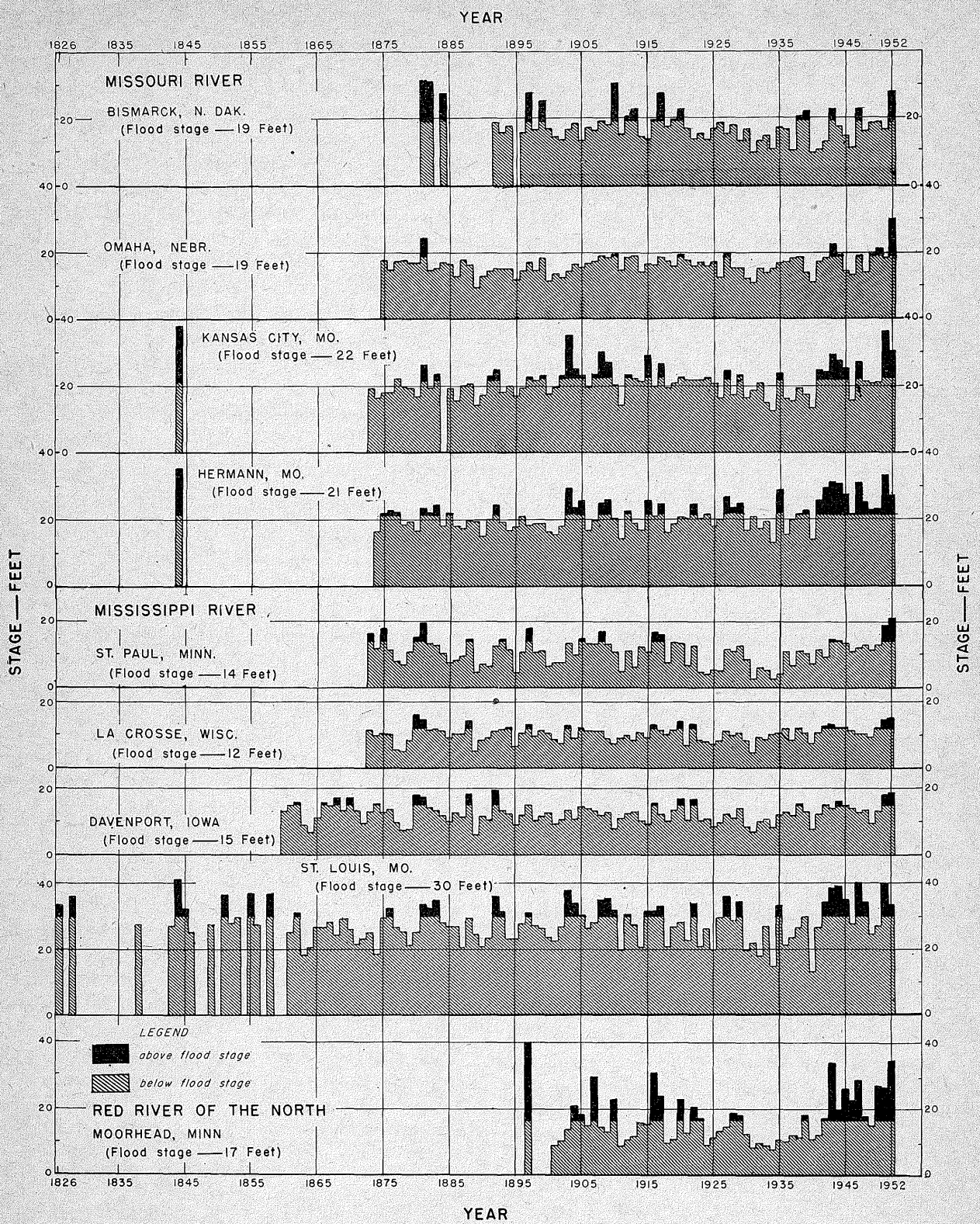

FIGURE 2.—Highest annual river stages, selected stations for period of record.

TABLE 2.—*Major floods in order of magnitude*

MISSISSIPPI RIVER

St. Paul, Minn.

Zero of gage.—683.68 feet (1929 adj.).
Drainage area.—36,780 square miles.
Flood stage.—14 feet.
Period of record.—1866–1952.

	Crest stage:	*Date*
1	22.1	Apr. 16, 1952.
2	19.7	Apr. 29, 1881.
3	18.8	Apr. 16, 1951.
4	18.6 [2]	July 23, 1867.
5	18.0 [2]	Apr. 16, 1875.
6	18.0	Apr. 6, 1897.
7	16.8	June 29, 1908.
8	16.6	Apr. 6 and 9, 1916.
9	16.4	Apr. 21, 1873.
10	16.1	Sept. 24–27, 1869.

MISSISSIPPI RIVER

Hannibal, Mo.

Zero of gage.—449.07 feet (1929 adj.).
Drainage area.—137,200 square miles.
Flood stage.—16 feet.
Period of record.—1878–1952.

	Crest stage:	*Date*
1	24.1	June 9, 1947.
2	22.6	May 13, 1951.
3	22.5	May 28, 1944.
4	22.5	June 8, 1903.
5	22.1	Apr. 27, 1929.
6	21.8	May 17, 1888.
7	21.7	Apr. 25, 1952.
8	21.6	Mar. 24, 1948.
9	21.6 [1]	June 1851.
10	20.8 [5]	Apr. 29, 1897.

MISSOURI RIVER

Bismarck, N. Dak.

Zero of gage.—1,618.38 feet (1929 adj.).
Drainage area.—186,360 square miles.
Flood stage.—19 feet.
Period of record.—1881–1952.

	Crest stage:	*Date*
1	31.6 [1 6]	Mar. 30, 1881.
2	31.1	Mar. 21, 1887.
3	30.4	Mar. 14, 1910.
4	27.9	Apr. 6, 1952.
5	27.7	Apr. 8, 1897.
6	27.6	Apr. 8, 1917.
7	27.4	Mar. 25, 1884.
8	25.2	Apr. 14, 1899.
9	22.8	Mar. 29, 1947.
10	22.7	Apr. 1, 1943.

MISSOURI RIVER

St. Joseph, Mo.

Zero of gage.—788.19 feet (1929 adj.).
Drainage area.—424,340 square miles.
Flood stage.—17 feet.
Period of record.—1873–1952.

	Crest stage:	*Date*
1	27.2	Apr. 29, 1881.
2	26.8	Apr. 22–23, 1952.
3	24.5	June 1844.
4	22.8	June 26, 1883.
5	21.8	July 2–3, 1878.
6	21.4	Mar. 7, 1949.
7	21.1	June 14–15, 1877.
8	20.5	June 2, 1903.
9	20.4	June 16, 1947.
10	20.4	June 14–15, 1908.

RED RIVER OF NORTH

Wahpeton, N. Dak.

Zero of gage.—942.97 feet (1929 adj.).
Drainage area.—4,010 square miles.
Flood stage.—10 feet.
Period of record.—1901–52.

	Crest stage:	*Date*
1	17.0 [1]	April 1897.
2	15.0	Apr. 12, 1952.
3	14.8 [1]	Spring, 1916.
4	14.8	Apr. 2, 1943.
5	14.0	Apr. 7, 1951.
6	12.1	June 6, 1944.
7	11.9	Apr. 12, 1947.
8	11.6	Apr. 2, 1950.
9	11.5	May 10, 1950.
10	11.4	Mar. 17, 1945.

[1] From high water mark.
[2] Incomplete record, may have been higher.
[3] Also fragmentary records 1828–60.
[4] Flood of April 1785 may have reached 42.
[5] 20.8 July 3, 1892.

MISSISSIPPI RIVER

La Crosse, Wis.

Zero of gage.—625.83 feet (1929 adj.).
Drainage area.—62,840 square miles.
Flood stage.—12 feet.
Period of record.—1873–1952.

	Crest stage:	*Date*
	16.5 [1]	June 19, 1880.
	15.3	Apr. 20, 1952.
	14.9	Apr. 19, 1951.
	14.5	May 8–9, 1888.
	14.4	Oct. 17, 1881.
	14.2	Apr. 2, 1920.
	13.7	Apr. 17, 1922.
	13.7	Apr. 10, 1897.
	13.6	Apr. 28–29, 1916.
	13.6	Apr. 18–20, 1888.

MISSISSIPPI RIVER

St. Louis, Mo.

Zero of gage.—379.94 feet (1929 adj.).
Drainage area.—701,013 square miles.
Flood stage.—30 feet.
Period of record.—1861–1952.[3]

	Crest stage:	*Date*
	41.4 [1 4]	June 27, 1844.
	40.3	July 22, 1951.
	40.3	July 2, 1947.
	39.1	Apr. 30, 1944.
	38.9	May 24, 1943.
	38.0	June 10, 1903.
	37.2 [1]	June 15, 1858.
	37.1 [1]	——— 1855.
	36.6	June 10, 1851.
	36.4 [1]	——— 1828.

MISSOURI RIVER

Sioux City, Iowa

Zero of gage.—1,076.96 feet (1929 adj.).
Drainage area.—314,617 square miles.
Flood stage.—16 feet.
Period of record.—1878–1952.

	Crest stage:	*Date*
	24.3	Apr. 14, 1952.
	22.5	Apr. 25, 1881.
	18.7	Apr. 10, 1943.
	18.4	Apr. 25, 1950.
	18.4	Apr. 23, 1899.
	18.0	July 7–8, 1905.
	17.4	Mar. 26, 1887.
	16.8	Mar. 23, 1923.
	16.6	May 13, 1927.
	16.6 [7]	Mar. 20, 1910.

MISSOURI RIVER

Kansas City, Mo.

Zero of gage.—715.79 feet (1929 adj.).
Drainage area.—489,162 square miles.
Flood stage.—22 feet.
Period of record.—1873–1952.

	Crest stage:	*Date*
	38.0 [2]	June 16, 1844.
	36.2	July 14, 1951.
	35.0	June 2, 1903.
	30.6	Apr. 24, 1952.
	30.3	June 15, 1908.
	29.1	June 19, 1943.
	29.0	July 21, 1915.
	27.8	Apr. 30, 1881.
	27.6	Apr. 24, 1944.
	27.0 [8]	June 25, 1947.

RED RIVER OF NORTH

Moorhead, Minn.

Zero of gage.—861.33 feet (1929 adj.).
Drainage area.—6,800 square miles.
Flood stage.—17 feet.
Period of record.—1901–52.

	Crest stage:	*Date*
	40.1 [1]	Apr. 7, 1897.
	37.8 [1]	Apr. 11, 1882.
	34.6	Apr. 16, 1952.
	34.3	Apr. 7, 1943.
	31.2	Apr. 6, 1916.
	29.8	Mar. 30–31, 1907.
	28.9	Apr. 15, 1947.
	28.6	July 12, 1916.
	27.2	Apr. 8, 1950.
	26.8	Apr. 12, 1951.

[6] Flood of Mar. 21, 1887 approximately 1 foot higher in town a mile below gage.
[7] 16.6 Mar. 21, 1888.
[8] 27.0 June 21, 1915, and July 13, 1909.

MISSISSIPPI RIVER

Davenport, Iowa

Zero of gage.—542.00 feet (1929 adj.).
Drainage area.—88,449 square miles.
Flood stage.—15 feet.
Period of record.—1860–1952.

	Crest stage:	*Date*
	20.9	Mar. 10, 1868.
	19.4	June 27, 1892.
	18.6	Apr. 28, 1952.
	18.6	May 15–16, 1888.
	18.4	June 26, 1880.
	18.3	Apr. 28–29, 1951.
	17.7	Oct. 25–27, 1881.
	17.1	Apr. 23, 1922.
	17.1	Apr. 9, 1920.
	17.0	Apr. 24–26, 1870.

MISSISSIPPI RIVER

Cape Girardeau, Mo.

Zero of gage.—304.77 feet (1929 adj.).
Drainage area.—716,000 square miles.
Flood stage.—32 feet.
Period of record.—1896–1952.

	Crest stage:	*Date*
	42.5 [1]	July 4, 1844.
	42.4	May 27, 1943.
	41.9	July 5–6, 1947.
	41.8	July 24, 1951.
	40.8	May 6, 1944.
	40.0	Apr. 20, 1927.
	38.7	Apr. 3, 1945.
	38.3	May 2, 1952.
	38.0	Apr. 21–22, 1922.
	37.8	Mar. 28–29, 1948.

MISSOURI RIVER

Omaha, Nebr.

Zero of gage.—958.23 feet (1929 adj.).
Drainage area.—322,820 square miles.
Flood stage.—19 feet.
Period of record.—1872–1952.

	Crest stage:	*Date*
	30.2	Apr. 18, 1952.
	24.6	Apr. 25, 1881.
	22.8	Apr. 9, 1881.
	22.4	Apr. 13, 1943.
	21.2	Apr. 27, 1950.
	20.6	April 1867.
	20.0	Apr. 13, 1949.
	19.9	May 15, 1927.
	19.6	June 25–26, 1908.
	19.5	May 18, 1920.

MISSOURI RIVER

Hermann, Mo.

Zero of gage.—481.34 feet (1929 adj.).
Drainage area.—528,200 square miles.
Flood stage.—21 feet.
Period of record.—1873–1952.

	Crest stage:	*Date*
	35.5 [2]	June 1844.
	33.0	July 19, 1951.
	31.2	June 29, 1947.
	31.1	May 21, 1943.
	30.8	Apr. 28, 1944.
	29.6	June 28, 1942.
	29.5	June 7, 1903.
	28.7	June 7, 1935.
	28.0	June 24, 1943.
	27.7	Apr. 20, 1945.

RED RIVER OF NORTH

Grand Forks, N. Dak.

Zero of gage.—778.42 feet (1929 adj.).
Drainage area.—26,100 square miles.[9]
Flood stage.—30 feet.
Period of record.—1882–1952.

	Crest stage:	*Date*
	50.2 [10]	Apr. 10, 1897.
	49.5	Apr. 21, 1882.
	45.6	May 12, 1950.
	45.5	Apr. 24, 1893.
	41.7	Apr. 16, 1948.
	41.0	Apr. 17, 1916.
	41.0	Mar. 29, 1920.
	40.7	Apr. 22, 1947.
	40.6	Apr. 27, 1904.
	40.6	Apr. 28, 1883.

[9] Excludes 3,940 square miles in Devils Lake drainage.
[10] Legendary flood of 1852 probably was higher by 0.3 foot or more.

It occurred in April and was the result of snowmelt in the high Plains area. Like that of 1952 it was accompanied by ice jams in the upper reaches; however, there is evidence that these ice jams were more severe in 1881. This is indicated by the high stage at Yankton, S. Dak., which is recorded as being 15 feet higher than in 1952. The record stage of 27.2 feet at St. Joseph, Mo., established by this flood remains unbroken. The flood of April 1943 likewise was a snowmelt flood. At Sioux City and Omaha it ranked third and fourth, respectively, in order of magnitude. In the middle and lower reaches, however, it was overshadowed by a flood caused by heavy rains during May and June of the same year.

At Bismarck ice jams severe enough to cause flooding have an average recurrence interval of 3 years. In fact, only twice in 70 years has there been sufficient water in the Missouri to cause flooding at Bismarck except from ice jams. The highest stage of record in parts of Bismarck was reached in March 1887; however, due to local conditions associated with the jam it was 0.5 foot lower than 1881 at the official gage. The only serious upstream main-stem flood of recent years was in 1943. Local flooding in tributaries has been experienced at frequent intervals. On the Milk River serious flooding occurred in three consecutive years, 1906, 1907, and 1908. In general, 1908 appears to have been a serious flood year for most small streams in the North Central States although floods of 1912 were probably worse in some tributary basins such as the Milk and Cannonball. The recent tributary floods of April 1950 were the worst of record in most streams from Bismarck, N. Dak., to Sioux City, Iowa. Nearly $10 million damage was experienced from this flood on the Little Missouri, Knife, Heart, Cannonball, Grand, Moreau, and James Rivers. A comprehensive report is contained in Geological Survey *Water-Supply Paper* 1137–A. Floods in the lower Missouri Basin predominantly occur in May and June. The details are not given here but much information is available in the listed references.

RED RIVER OF THE NORTH

Official river stage records at Grand Forks, N. Dak., date from 1882 and from 1901 at Fargo-Moorhead. There is also a wealth of documentary information in the form of newspapers and jouraals left by early travelers and settlers. These documents establish the fact that the flood of 1826 was the greatest of record. Francis Heron, clerk of the Hudson's Bay Co. (Hudson's Bay Co., 1950, p. 42) recorded a day-by-day account of this flood in the vicinity of Winnipeg. It appears the Red River was above bankfull from May 4 to July 5, 1826. It is quite probable the stage at Grand Forks was approximately 53.5 feet, present gage and datum. The second greatest flood of legendary record is that of 1852. It may have exceeded 51 feet at Grand Forks. Similar conditions existed in 1861. The flood of 1897 is defined by reliable records. Stages of 17.0, 40.1, and 50.2 feet at Wahpeton, Moorhead, and Grand Forks, respectively, establish the all-time official record. The recent flood of 1950 was several feet below these stages but the property damage was excessive, approximating $33 million. Seasonal occurrence of floods in the Red River of the North is significant. Eight of the 10 highest floods of record at Moorhead and Grand Forks were in April and one was at the end of March.

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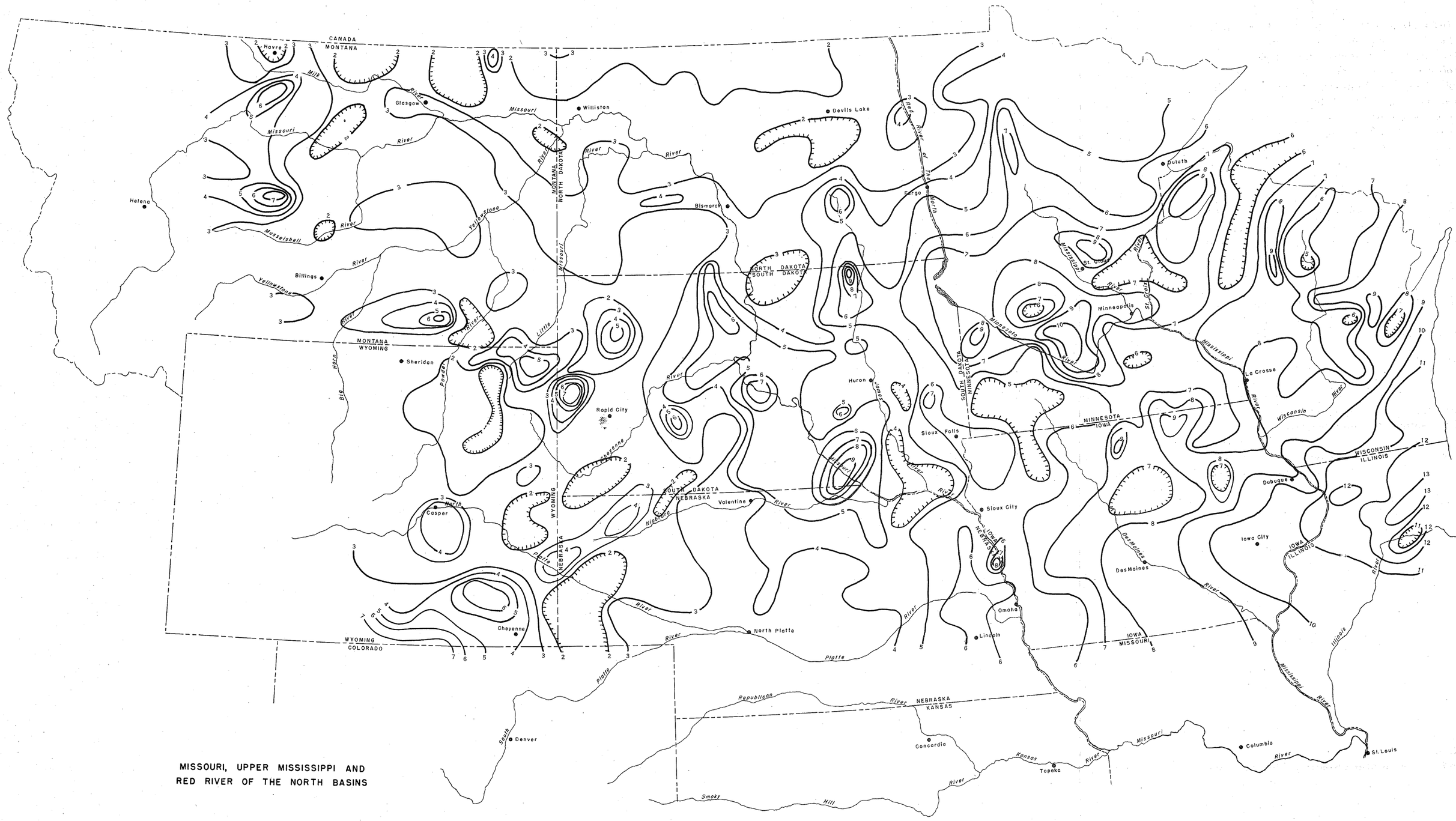

MISSOURI, UPPER MISSISSIPPI AND RED RIVER OF THE NORTH BASINS

FIGURE 3.—Total precipitation for period November 1951 to March 1952.

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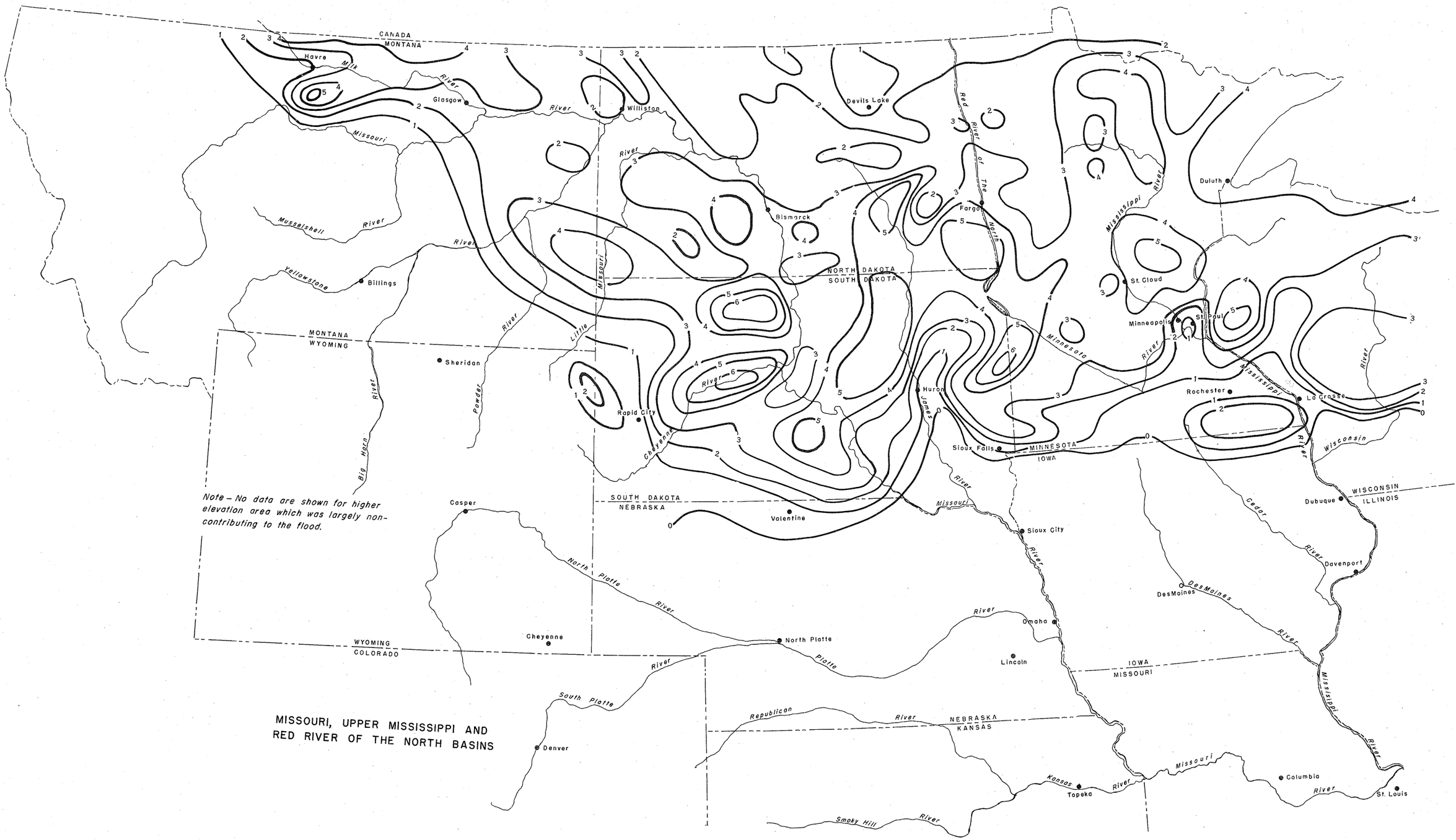

MISSOURI, UPPER MISSISSIPPI AND RED RIVER OF THE NORTH BASINS

FIGURE 4.—Water equivalent of snow on ground as of March 20, 1952.

302318 O - 54 (Face p. 8) No. 2

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CAUSES AND DEVELOPMENT OF 1952 FLOODS

The weather during the summer and autumn months of 1951 had been cooler and wetter than usual over the northern Great Plains area. The winter of 1951–52 produced an abnormally heavy accumulation of snow over portions of eastern Montana, the Dakotas, Minnesota, and Wisconsin. In general, except for a warm period in February with some melting, the snow cover remained intact with little or no melting from mid-February until late in March.

Briefly the weather by months was as follows:

November 1951.—Month was cold with scanty precipitation. Temperatures averaged from 2° below normal in eastern Montana to more than 8° below in portions of upper Mississippi Basin. Precipitation was 25 percent of normal in central South Dakota and upper Yellowstone Basin. Only area above normal was in vicinity of Minneapolis, where 150 percent of normal precipitation was recorded.

December 1951.—Temperatures were well below normal—2° below in Wisconsin to more than 10° below in eastern Montana. Precipitation was heaviest over upper Red River of North with 300 percent of normal at Fargo and generally above normal elsewhere.

January 1952.—Temperatures averaged from 2° to more than 4° below normal over the area. Precipitation ranged from 25 percent of normal over portions of Yellowstone Basin to 200 percent in central North Dakota.

February 1952.—Departure of mean temperature from normal averaged 8° above normal over the area. On February 12, departures ranged from slightly above normal in northern Minnesota and Wisconsin, to more than 12° below normal in eastern Montana. Percent of normal precipitation ranged from 25 in northern Minnesota and Wisconsin to 300 in vicinity of Glasgow, Mont.

March 1952.—Temperatures averaged 2° to more than 6° below normal. Precipitation was heaviest over upper Mississippi Basin (200 percent of normal); elsewhere, near or slightly below normal.

April 1952.—The month was in general warm and dry over the northern plains. A large area in the Dakotas received no precipitation during the month and in general precipitation averaged below 25 percent of normal over the entire area.

UPPER MISSISSIPPI BASIN

The record flood of April 1952 in the upper Mississippi drainage was produced by rapid melting of a heavy snow pack covering a deep layer of frozen ground. The preceding fall and winter were abnormally wet and cold in southern and central Minnesota, and total November-March precipitation in the drainage area above St. Paul, where the major spring runoff originated, averaged about 150 percent of normal. Corresponding amounts for the area between St. Paul and dam 10 averaged only slightly above normal. A large percentage of the precipitation occurred as late-season snowfall and, consequently, most of the winter's accumulation of snow remained on the ground at the close of March.

On March 20, 1952, the snow cover in the upper Mississippi drainage extended through Minnesota and central and northern Wisconsin, as shown in figure 4. The snow pack was especially heavy in the upper Minnesota, Rum, and St. Croix River Basins, where amounts in excess of 5 inches of water equivalent were recorded. A storm on March 22 and 23 deposited 1 to 2 inches additional water equivalent of snow over the Crow River Basin, and raised the snow pack there to major proportions. It is difficult to make accurate comparisons of snow cover with other seasons because of the relatively short period of detailed snow surveys that form the principal basis for water equivalent estimates in the area concerned. However, a frequency analysis of long-term snow-depth records, as shown in figure 8, indicates that the March 1952 snow cover was above normal, but of lesser magnitude generally than in March 1951. The 1951-52 comparison is supported by examination of partial-area snow surveys made in March 1951.

Ground conditions underneath the snow were more favorable for runoff in 1952 than in the 1951 season. Heavy autumn rains preceded the for-

mation of the snow cover, and the moisture was fixed in the soil by an early severe freeze in November 1951. That month was the coldest November in Minnesota since 1911, and many of the lakes and streams were frozen early in the month. An unusual local flood occurred at Minneapolis in late November due to heavy formation of frazil ice that blocked the main channel below St. Anthony Falls. The abnormally early winter, plus continued severe cold thereafter, produced a deep layer of frost that remained in the ground during March 1952. Frost depths reported by the Corps of Engineers at the time of the March 1952 snow survey varied generally between 24 and 42 inches, with extremes of 18 and 80 inches, indicating considerably greater frost penetration prior to melting in 1952 than in 1951. Other effects of above-normal autumn precipitation were record-high winter flows in many streams and unusually high ground-water levels during the winter season at key observation wells maintained by the United States Geological Survey. In spite of the high flow, the ice cover was very thick and solid throughout the winter in the northern streams. Some early thawing occurred in February but failed to break the ice, although the increased flow that resulted from these minor warm spells produced rises in stage underneath the ice cover.

The breakup of ice and snow accumulation occurred as a result of warming from the end of March through the middle of April, and was not accompanied by any significant amounts of rain. In most of the streams the ice breakup occurred well in advance of peak snowmelt runoff, and there were no damaging ice jams except at a few points in tributaries of the Wisconsin River. There were two main surges of warming: from March 29 through April 1, and April 6 through 9. The early warm spell produced temperatures in the fifties along the southern zone of the snow blanket. This snow cover was depleted rapidly and sharp rises were produced through April 3 in the Blue Earth tributary of the Minnesota River, the lower Chippewa River, the Black River, and in adjacent small tributaries of the Mississippi River. In the latter group, the Cannon and Root Rivers in southeastern Minnesota experienced maximum discharges of record on April 1 and 2. The rises in all these tributary streams, although confined to a small portion of the upper Mississippi system, combined to produce an early crest near flood stage on the main stem at La Crosse, Wis., and immediate points downstream, from April 4 to 6.

The second warm spell, from April 6 to 9, was unusually abrupt and intense, and thawing occurred this time over the entire remaining snow-covered area. Temperatures rose into the sixties, and melting was very rapid along a broad west-east belt through central Minnesota, resulting in record flows through April 13 in the Rum River, Crow River, and numerous tributaries of the upper Minnesota River. Farther north, in the extreme headwaters of the Mississippi, the snow cover and resultant runoff were moderate, and the flow at Fort Ripley, Minn., was below average for the spring season. However, the increase of tributary flow below that point was so great as to produce the maximum stage of record in the Mississippi River at Minneapolis on April 14. The lower Minnesota River was receding slowly from the early rise when the extreme flows occurred in the upper section of the stream. These flows were transmitted rapidly down the main Minnesota River, and produced a flood crest at Mankato, Minn., on April 14, slightly under the record stage of 1951. The peak flow of the lower Minnesota River synchronized closely with the major peak from the upper Mississippi branch, and resulted in a crest of the Mississippi River at St. Paul of 22.02 feet on April 16, about 8 feet above flood level, and the highest stage since records began in 1867.

Provisional discharge data furnished by the United States Geological Survey Office at St. Paul indicate that the volume of runoff in the 1952 snowmelt rise varied between 4 and 5 inches for subbasins in the region of extreme flow. Corresponding average depths of water equivalent of antecedent snow are estimated as 5 to 6 inches for the same areas. For the entire Mississippi drainage area above St. Paul the figures are roughly 3½ inches for runoff and 4½ inches for water equivalent of snow cover. All of the above evidence indicates that approximately 1 inch of moisture was abstracted from the 1952 snow cover to satisfy basin losses, a value substantially less than for the similar rise in 1951. Presumably, the smaller loss and consequent higher percentage of surface runoff in 1952 resulted mainly from the imperviousness of the soil caused by the prevalent ground frost and higher antecedent soil moisture in that season. A secondary factor may be a greater rate of melting associated with the more rapid

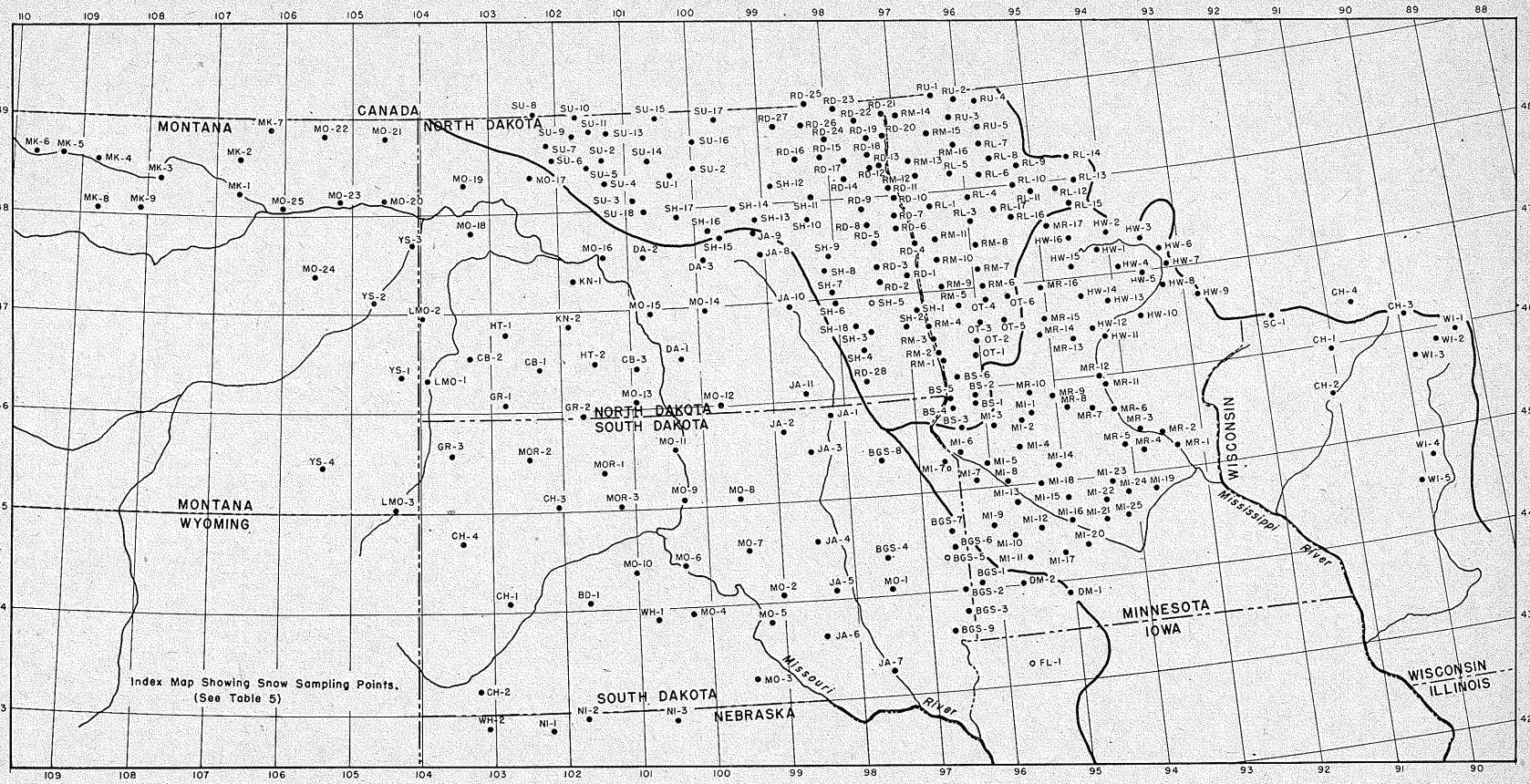


FIGURE 5.—Index map for supplemental precipitation data shown in table 5.

TABLE 3.—*Summary of November 1951 to April 1952 precipitation and departures from normal by State divisions in Illinois, Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wisconsin, and Wyoming*

[Observed and departure from normal, in inches, shown in monthly columns]

ILLINOIS

State division	November		December		January		February		March		Accumulated, November–March		April	
	Observed	Departure	Observed	Departure	Observed	Departure	Observed	Departure	Observed	Departure	Observed	Departure	Observed	Departure
Northern	2.99	+0.77	2.20	+0.53	1.68	−0.07	0.57	−0.92	3.86	+1.28	11.30	+1.59	2.58	−0.18
Central	2.68	+.08	1.88	−.21	1.52	−.69	1.78	−.09	3.71	+.54	11.57	−0.37	4.13	+.50
Average	2.84	+.43	2.04	+.16	1.60	−.38	1.18	−.51	3.79	+.91	11.44	+.62	3.49	+.16

IOWA

Northwest	0.42	−0.90	0.90	+0.13	1.47	+0.79	0.73	−0.11	2.14	+0.83	5.66	+0.74	1.04	−1.43
North central	.82	−.93	1.02	0	2.10	+1.11	.43	−.57	2.68	+1.09	7.05	+.70	1.35	−1.07
Northeast	1.66	−.25	1.12	−.12	1.74	+.62	.41	−.69	3.24	+1.39	8.17	+.95	1.38	−1.11
West central	.46	−1.01	.83	−.06	1.23	+.40	.88	−.11	3.24	+1.90	6.64	+1.12	2.31	−.03
Central	1.31	−.44	.93	−.17	1.34	+.27	.53	−.54	3.94	+2.10	8.05	+1.22	1.47	−1.22
East central	2.35	+.40	1.49	+.13	1.61	+.33	.74	−.51	4.00	+1.93	10.19	+2.28	1.79	−.97
Average	1.17	−.52	1.05	−.02	1.58	+.59	.62	−.42	3.21	+1.54	7.63	+1.17	1.56	−.97

MINNESOTA

Northern	1.08	−0.06	1.63	+0.87	0.78	+0.06	0.14	−0.55	0.96	−0.11	4.59	+0.21	0.82	−1.02
Southwest	1.03	−.01	1.68	+1.03	1.33	+.64	1.29	+.55	1.57	+.35	6.90	+2.56	.76	−1.49
Southeast	1.60	+.22	1.31	+.43	1.38	+.54	.87	+.01	2.34	+.96	7.50	+2.16	1.11	−1.11
Average	1.21	+.03	1.55	+.79	1.09	+.35	.64	+.11	1.50	+.30	5.99	+1.58	.89	−1.16

MONTANA

North central	0.25	−0.22	0.94	+0.47	0.48	−0.01	0.55	+0.10	0.39	−0.25	2.61	+0.09	0.18	−0.79
Central	.37	−.24	1.22	+.69	.52	−.01	.72	+.23	.70	−.04	3.53	+.63	.34	−.68
South central	.33	−.47	1.09	+.32	.55	−.04	.86	+.34	.70	−.23	3.53	−.08	.70	−.76
Northeastern	.24	−.19	.61	+.22	.37	−.04	.88	+.54	.48	−.13	2.58	+.40	.16	−.81
Southeastern	.42	−.16	1.00	+.47	.65	−.08	.65	+.23	.66	−.08	3.38	+.38	.09	−1.17
Average	.32	−.26	.97	+.43	.51	−.04	.73	+.29	.59	−.15	3.12	+.28	.29	−.84

NEBRASKA

Eastern	0.57	−0.56	0.68	−0.12	0.56	−0.13	1.04	+0.16	2.60	+1.28	5.45	+0.63	3.35	+0.73
Central	.29	−.38	.77	+.14	.49	−.01	.94	+.31	.98	−.09	3.47	−.03	2.13	−.28
Western	.15	−.39	.67	+.10	.26	−.20	.72	+.17	1.02	+.02	2.82	−.30	1.34	−.71
Average	.34	−.45	.71	+.04	.44	−.11	.90	+.21	1.57	+.43	3.96	+.12	2.31	−.06

NORTH DAKOTA

Eastern	0.35	−0.37	0.97	+0.43	0.92	+0.40	0.63	+0.08	0.47	−0.35	3.34	+0.19	0.31	−1.40
Middle	.23	−.36	.66	+.21	.73	+.29	.45	+.01	.38	−.40	2.45	−.25	.04	−1.29
Western	.27	−.25	.56	+.11	.44	−.03	.68	+.25	.58	−.17	2.53	−.09	.05	−1.16
Average	.28	−.33	.73	+.25	.70	+.22	.59	+.12	.48	−.30	2.78	−.04	.13	−1.29

SOUTH DAKOTA

Eastern	0.31	−0.49	1.45	+0.90	1.16	+0.60	0.96	+0.33	1.03	−0.13	4.91	+1.21	0.83	−1.53
Middle	.16	−.39	1.72	+1.30	.85	+.39	1.21	+.72	.86	−.13	4.80	+1.89	.14	−1.76
Western	.27	−.34	.96	+.42	.22	−.40	.80	+.25	.78	−.39	3.03	−.46	.18	−1.75
Average	.25	−.41	1.37	+.86	.75	+.20	.99	+.44	.89	−.22	4.25	+.87	.39	−1.68

WISCONSIN

Northwest	1.69	−0.01	1.23	+0.18	1.26	+0.22	0.51	−0.48	2.02	+0.65	6.71	+0.56	1.61	−0.61
North central	1.68	+.23	1.14	−.03	1.59	+.40	.52	−.60	1.84	+.36	6.77	+.36	1.64	−.68
Northeast	2.18	+.25	1.05	−.30	1.93	+.51	.56	−.81	2.21	+.63	7.93	+.28	1.04	−1.41
West central	1.73	+.11	1.11	−.15	1.75	+.64	.92	−.18	2.15	+.49	7.66	+.91	1.74	−.84
Central	1.73	−.16	.89	−.28	1.84	+.65	.75	−.41	2.03	+.41	7.24	+.21	1.30	−1.34
East central	1.80	−.34	1.67	+.20	2.09	+.60	.66	−.78	2.62	+.81	8.84	+.49	1.72	−.72
Southwest	2.09	+.10	1.01	−.23	1.85	+.69	.63	−.52	2.45	+.78	8.03	+.82	1.50	−1.14
South central	2.29	+.18	1.58	+.20	2.27	+.87	.65	−.69	3.15	+1.33	9.94	+1.89	1.89	−.76
Southeast	2.99	+.96	2.03	+.53	2.13	+.50	.72	−.83	3.62	+1.35	11.49	+2.51	2.53	−.13
Average	1.91	+.02	1.23	−.02	1.77	+.53	.64	−.56	2.29	+.67	7.84	+.64	1.61	−.86

WYOMING

Platte	0.42	−0.16	0.76	+0.14	0.29	−0.32	0.79	+0.12	1.27	+0.26	3.53	+0.04	0.70	−1.08
Missouri	.30	−.29	.73	+.21	.17	−.40	.43	−.04	.98	+.03	2.61	−.49	.23	−1.60
Yellowstone	.28	−.45	.63	+.03	.34	−.28	.67	+.15	.70	−.22	2.62	−.77	1.14	−.39
Average	.33	−.30	.71	+.13	.27	−.33	.63	+.08	.98	+.02	2.92	−.41	.69	−1.02

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*

COLORADO

Station	1951		1952			Total Nov. 1951–Mar. 1952	Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.			Nov.	Dec.	Jan.	Feb.	Mar.	
Akron CAA AP	0.24	0.67	0.20	1.17	2.55	4.83	Le Roy 6WSW	.44	1.04	.59	1.09	1.71	4.87
Allenspark	.95	3.64	.08	.46	3.17	8.30	Longmont 2SSE	.39	.95	T	T	1.96	3.30
Boulder	1.51	1.54	.01	.48	2.26	5.80	Otis 11NE	.30	.39	.17	.56	.79	2.21
Estes Park	.16	2.63	.11	.06	1.07	4.03	Ovid	.04	.54	.31	.93	.64	2.46
Fleming	.28	.65	.28	1.26	1.35	3.82	Paoli	[1].23	.60	.38	.56	[1].60	2.37
Fort Collins	.66	.94	.07	.08	1.57	3.32	Red Feather Lakes 1SE	.72	2.32	T	.36	1.75	5.15
Fort Lupton	.17	.84	.00	[1].15	.87	2.03	Sedgwick	.10	.86	.42	1.39	1.01	3.78
Fort Morgan 1N	.15	.23	.16	.30	.62	1.46	Spicer 2NE	1.20	3.74	1.30	.70	[1]1.60	8.54
Grand Lake 1N	1.37	4.94	1.49	1.01	2.38	11.19	Steamboat Springs	1.43	7.26	3.53	2.40	3.32	17.94
Glendevey Lodge	.93	3.81	.91	.82	1.44	7.91	Sterling	.31	.30	.36	.58	.44	1.99
Greeley	.24	.77	.05	.14	.88	2.08	Walden	.36	2.40	.59	.57	.88	4.80
Grover 10W	.50	.50	.00	.37	1.80	3.17	Waterdale	.46	1.18	.03	.05	1.96	3.68
Holyoke	.06	.12	.27	.37	.51	1.33	Windsor	.32	.94	T	.11	1.26	2.63
Julesburg	.10	.88	.45	1.20	1.15	3.78	Wray	.51	.50	.70	1.25	.20	3.16
Kauffman 4SSE	[1].30	.39	.00	.17	.63	1.49	Yampa	.99	3.49	1.53	.94	2.10	9.05
Kremmling	.15	2.81	1.50	(2)	1.82	6.28	Yuma	.33	.47	.21	.87	1.48	3.36

ILLINOIS

Aledo	2.30	1.40	.83	.55	4.68	9.76	La Salle 1S	[1]1.94	1.37	1.34	.27	3.59	8.51
Annawan	2.39	[1]1.70	1.70	.59	3.88	10.26	Lockport lock and dam R	2.67	2.48	1.92	.42	3.55	11.04
Antioch	3.71	2.37	2.08	.75	3.77	12.68	Marengo	3.54	2.95	1.53	.24	4.39	12.65
Arlington Heights 4SSE	3.08	3.00	1.66	.39	3.59	11.72	Marseilles Lock	2.06	2.59	.00	.58	3.25	8.48
Aurora College	2.59	2.97	1.85	.28	3.89	11.58	McHenry R	3.66	2.43	1.84	.69	3.34	11.96
Belvidere sewage plant R	2.84	1.63	------	.29	3.51	------	McHenry 2S	3.83	3.08	1.84	.54	3.30	12.59
Bradford CAA	3.06	1.62	1.71	1.07	3.99	11.45	Moline WB AP R	1.68	1.28	1.57	.78	3.88	9.19
Channahon Dresden	3.04	2.92	1.99	.65	4.24	12.84	Morris	2.54	1.65	1.48	.55	3.21	9.43
Chicago University R	3.38	2.52	1.85	.41	3.22	11.38	Morris 3NE	[1]2.60	.73	1.26	.33	2.86	7.78
Chicago WB AP R	3.74	2.76	2.18	.44	3.64	12.76	Morrison	2.11	2.22	1.77	.62	3.62	10.34
Chicago WB City R	3.54	3.14	2.14	.50	3.72	13.04	Mount Carroll	4.24	2.25	2.35	.49	4.30	13.63
Cicero	3.64	3.74	2.14	.43	4.07	14.02	Newark 7E	2.45	[1]2.60	1.66	.28	3.66	10.65
Crete R	3.30	------	------	.58	3.44	------	New Boston Dam 17	1.40	1.54	1.80	.83	4.67	10.24
Dixon R	2.96	2.52	2.19	.34	4.33	12.34	New Boston	2.13	2.01	1.31	.51	4.11	10.07
Dwight State Refuge R	3.22	1.90	1.24	.64	3.30	10.30	Oregon R	------	------	1.64	.24	3.18	------
Elgin	4.10	2.93	1.91	.30	4.00	13.24	Oregon water works	2.90	2.25	1.83	.18	4.04	11.20
Freeport	2.15	2.11	2.14	.40	3.94	10.74	Ottawa	2.12	2.16	1.57	.60	3.53	9.98
Freeport sewage plant R	------	1.84	2.45	.37	4.08	------	Paw Paw	3.86	2.68	1.82	.34	4.45	13.15
Do	4.53	1.54	2.42	.30	3.74	12.53	Peotone	4.40	2.57	1.12	.81	4.06	12.96
Fulton Dam 13 R	3.90	1.31	1.94	.15	2.13	9.43	Princeton 1S R	2.85	2.12	1.52	1.05	4.08	11.62
Do	3.87	1.99	1.97	.49	4.02	12.34	Prophetstown R	1.96	1.23	1.54	.47	3.40	8.60
Galena	[1]4.00	4.23	1.23	.36	2.93	12.75	Rockford	2.89	2.50	1.75	.09	4.64	11.87
Galva	2.87	1.53	1.34	.63	4.04	10.41	Rockford CAA AP	4.14	1.80	1.24	.26	3.66	11.10
Geneseo	2.49	1.69	1.92	1.06	4.30	11.46	Rock Island Dam 15	1.54	1.43	1.78	.86	3.43	9.04
Illinois City Dam 16	3.87	1.28	1.56	.91	4.23	11.85	Stockton	2.43	1.94	2.38	.39	4.26	11.40
Joliet Brandon Rd	2.91	2.93	2.34	.49	3.31	11.98	Streator	3.24	2.33	1.68	1.29	3.65	12.19
Joliet WB AP	3.53	2.40	2.13	.58	5.26	13.90	Sycamore	3.17	2.81	1.87	.43	4.34	12.62
Kankakee	2.15	[1]1.50	.83	.52	2.22	7.22	Tiskilwa	[1]3.03	2.18	1.88	.85	4.47	12.41
Kankakee 4W	3.31	1.41	1.06	.94	2.35	9.07	Toulon	2.30	1.39	1.59	1.00	3.81	10.09
Kankakee sewage plant R	------	1.30	1.26	.59	3.14	------	Utica Starved Rock Dam	2.40	2.34	1.25	.39	3.89	10.27
Keithsburg	1.50	1.19	1.06	.82	4.28	8.85	Walnut	1.81	2.40	2.01	.39	4.00	10.61
Kewanee R	2.95	------	1.59	------	3.82	------	Waterman R	------	1.35	1.56	------	3.47	------
Do	[1]2.20	1.50	1.85	1.20	3.42	10.17	Waukegan	4.30	2.40	1.54	.70	3.79	12.73
Lanark R	3.87	1.60	1.97	.35	3.94	11.73	Wenona R	2.44	1.49	1.25	1.38	3.31	9.87
La Salle	3.13	2.25	1.85	.78	4.20	12.21	Wheaton College	[1]3.15	3.62	1.60	.14	2.75	11.26

IOWA

Akron	0.39	1.09	1.04	0.86	1.88	5.26	Clarence	1.92	[1]2.00	------	.99	4.81	------
Albia	1.29	[1]1.24	.73	1.11	3.68	8.05	Clarion	.69	1.00	2.05	.78	2.35	6.87
Algona	.33	.78	1.98	.39	1.98	5.46	Clinton No. 1	3.40	1.88	1.90	.66	4.48	12.32
Allison	1.28	1.95	1.59	.50	2.73	8.05	Clinton No. 2	3.22	1.87	2.05	.57	4.65	12.36
Alta	.24	.68	1.40	1.08	2.40	5.80	Columbus Junction	2.86	[1]1.40	1.46	.71	4.11	10.54
Ames 3SW R	1.20	.53	1.70	.43	4.42	8.28	Coon Rapids R	.70	.63	1.23	.82	3.12	6.50
Ames 3SW	1.22	.71	1.54	.43	4.49	8.39	Corning 1W	1.01	.17	.30	.26	2.62	4.36
Anamosa 1NW	2.21	1.32	1.64	.26	3.88	9.31	Council Bluffs 5NE	.46	.92	.59	.56	2.95	5.48
Ankenny 2SW R	1.27	.39	.86	.44	3.46	6.42	Council Bluffs 6NE R	.49	1.34	.59	.83	3.00	6.25
Ankenny 2SW	1.15	[1].80	.92	.44	3.35	6.66	Cresco	1.72	1.05	1.67	.36	3.10	7.90
Atlantic 1E R	1.12	.53	.63	.67	2.46	5.41	Creston 2SW	1.82	.33	.50	.43	2.43	5.51
Atlantic 1NE	1.06	.46	.55	.51	2.60	5.18	Cumberland 5NW	.86	1.00	.60	.67	3.17	6.30
Audubon 2S	.28	1.00	.91	.63	4.93	7.75	Dakota City R	.43	.83	1.73	.31	2.81	6.11
Bancroft	.54	1.25	1.81	.42	3.05	7.07	Do	.47	.84	1.64	.29	2.92	6.16
Belle Plaine	2.06	1.56	1.16	.56	4.67	10.01	Davenport WB City	1.99	1.98	1.97	1.14	4.73	11.81
Bellevue lock and dam 12 R	2.61	1.45	------	.31	3.20	------	Decorah	1.29	.78	2.02	.53	2.31	6.93
Do	2.59	1.70	1.95	.36	3.66	10.26	Delaware 2W	1.89	1.84	1.72	.42	4.15	10.02
Boone	.94	.80	1.80	.54	4.45	8.53	Denison 1S	.26	.35	.86	.59	1.89	3.95
Boyer 5SE R	.30	------	1.18	1.20	2.40	------	Des Moines WB AP R	1.81	.93	1.03	.77	4.03	8.57
Britt	.86	1.10	3.53	.60	3.28	9.37	Des Moines WB City R	1.80	1.01	.97	.94	4.32	9.04
Carroll	.54	.77	1.54	1.36	3.97	8.18	Dexter R	1.02	.81	.75	1.12	4.27	7.97
Carson R	.79	.70	.51	.52	2.21	4.73	Dubuque lock and dam 11	2.18	1.49	1.63	.36	3.23	8.89
Cascade R	2.29	1.74	1.89	.30	4.10	10.32	Dubuque WB AP R	2.57	2.03	2.02	.37	3.72	10.71
Cascade	2.24	1.78	1.87	.29	4.47	10.65	Dubuque City R	2.02	1.38	1.29	------	------	------
Castana 4E	.31	.46	1.10	.87	2.97	5.71	Dumont 4NW	.66	.88	1.29	.37	2.21	5.41
Cedar Falls	[1].56	1.58	1.50	.44	2.70	6.78	Dunbar 2NE	2.12	1.04	1.34	.41	4.16	9.07
Cedar Rapids No. 1	1.97	1.74	1.70	.75	4.59	10.75	Eddyville	.96	1.32	.70	.85	3.52	7.35
Cedar Rapids No. 2	1.95	1.59	1.62	.88	4.61	10.65	Eldora	1.49	.69	1.66	.29	3.34	7.47
Chariton 3E	1.29	.60	.60	.69	2.85	6.03	Elkader	1.84	1.11	1.81	.49	3.15	8.40
Charles City R	1.23	1.09	2.37	.41	3.13	8.23	Emerson 2N R	.72	.55	.26	------	------	------
Cherokee R	.53	.82	1.76	.70	2.31	6.12	Emerson 5NE	1.19	.44	.39	.60	2.97	5.59
Do	.48	.79	1.73	.59	2.22	5.81	Emmetsburg	.75	.37	2.19	.67	2.91	6.89

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

IOWA—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Estherville	.85	.79	2.04	.45	2.07	6.20
Exira 5E R	.97	.61	.60	.51	4.37	7.06
Fairfield	3.19	1.10	1.20	.96	3.33	9.78
Fayette	1.35	1.13	1.91	.49	3.28	8.16
Forest City	1.17	1.90	2.75	.35	3.27	8.44
Fort Dodge	.56	.99	2.00	.73	3.02	7.30
Glenwood	1.09	1.01	.52	.63	4.68	7.93
Greenfield R	1.08	.94	.62	.70	4.10	7.44
Do	1.22	.66	.55	.53	3.88	6.84
Grinnell R	2.34	------	1.19	.51	4.03	------
Do	2.40	1.03	1.10	.42	4.12	9.07
Grundy Center 4NE	1.24	.84	1.40	.35	3.05	6.88
Guthrie Center	.96	1.25	.75	.84	5.50	9.30
Guttenberg lock and dam 1	[1] 1.87	.99	1.34	.43	3.37	8.00
Hampton 3NE	.82	.77	1.64	.27	2.67	6.17
Harlan	.39	1.02	.85	.75	4.78	7.79
Hawarden	.40	1.11	.83	.81	2.03	5.18
Hawarden 6NNE R	.39	1.38	------	.97	2.24	------
Hinton 5WNW R	.36	.86	1.45	1.32	1.59	5.58
Holstein	.35	.70	1.27	.87	2.04	5.23
Hornick R	.52	.85	1.43	.71	1.95	5.46
Ida Grove R	.42	.52	1.63	1.06	2.40	6.03
Do	.45	.70	1.73	1.10	2.42	6.40
Independence 2W	1.45	.19	1.52	.34	3.17	6.67
Indianola	2.19	1.18	.90	.80	4.17	9.24
Inwood 2W	.39	1.26	.98	.86	1.63	5.12
Iowa City 1S	2.49	.78	1.52	.70	3.54	9.03
Iowa City AP CAA	2.65	1.13	1.59	1.42	4.02	10.81
Iowa City Ralston Creek 1 R	2.27	.73	------	.35	3.18	------
Iowa City Ralston Creek 2 R	2.13	.50	1.31	.56	3.17	7.67
Iowa City Ralston Creek 3 R	1.52	.44	.96	.32	------	------
Iowa City Ralston Creek 4 R	2.26	.66	1.33	.42	3.38	8.05
Iowa City Ralston Creek 5 R	2.52	1.14	1.38	1.03	3.68	9.75
Iowa Falls 1N	1.11	.89	1.53	.45	3.10	7.08
Irwin R	.40	------	.91	.60	2.15	------
Jefferson 1S	.51	.98	1.69	.84	3.57	7.59
Jewell 2S	.79	.65	1.18	.15	3.41	6.18
Kanawha	.78	.35	1.56	.33	1.75	4.77
Knoxville 2W R	1.92	.85	.98	1.03	3.61	8.39
Do	1.96	.85	1.06	.93	3.55	8.35
Lake City	.50	.51	1.42	.70	1.78	4.91
Lake Park	.45	.92	1.62	.44	1.96	5.39
Lake View	.40	.67	1.55	.98	2.94	6.54
Lansing	1.74	[1] 1.04	2.26	1.05	4.48	10.57
Larrabee R	.59	.71	1.66	.71	1.95	5.62
Le Claire	2.48	1.29	1.36	.64	4.15	9.92
Le Claire lock and dam 14	1.80	1.23	1.28	.46	3.31	8.08
Le Mars	.37	.89	1.76	.73	2.25	6.00
Little Rock R	.13	.44	------	.68	1.52	------
Logan	.36	.80	.93	1.12	3.35	6.56
Lorimor	2.39	[1] 1.00	1.16	.95	3.86	9.36
Malvern 5W	1.17	.72	.47	.63	3.59	6.58
Mapleton 5NW	.39	.42	1.42	.57	2.08	4.88
Maquoketa 6NE	2.50	1.54	1.93	.88	3.84	10.69
Marion 4NE R	1.74	------	------	.29	2.23	------
Marshalltown R	1.50	1.06	1.27	.38	3.86	8.07
Do	1.48	.98	1.28	.40	3.76	7.90
Mason City 3N	.70	.58	1.60	.33	1.96	5.17
Mason City AP CAA R	.40	.57	1.67	.31	2.29	5.24
McGregor R	1.69	1.09	1.79	.58	2.72	7.87
Merrill 5W	.35	.80	1.55	1.19	1.47	5.36
Milford 4NW	.36	.52	1.04	.44	1.53	3.89
Mineola 3WSW R	.82	.91	.76	.96	3.34	6.79
Missouri Valley R	.34	1.32	.95	1.14	4.60	8.35
Do	.30	1.19	.93	1.06	4.55	8.03
Moneta R	.35	1.09	1.50	------	------	------
Monmouth 4SW	[1] 2.23	[1] 1.70	1.89	.45	.00	6.27
Montezuma	2.88	1.24	1.19	.88	4.62	10.81
Morse R	2.43	1.16	1.59	.69	3.51	9.38
Morse 1NE R	2.32	.63	1.68	------	3.04	------
Morse 4SSW R	2.24	.88	1.17	.78	------	------
Moville R	.31	1.53	1.12	.98	2.50	6.44
Muscatine No. 1 R	3.32	1.29	1.73	1.10	4.38	11.82
Do	3.43	1.40	1.82	1.15	4.46	12.26
Muscatine No. 2	3.19	1.55	2.10	1.05	4.54	12.43
New Hampton	[1] 1.49	.98	1.47	.24	2.33	6.51
Newton	1.83	.95	1.12	.60	3.98	8.48
Northwood	1.04	.96	2.17	.38	1.99	6.54
Oakland 2E	1.02	.81	.64	.56	2.57	5.60
Oasis R	2.18	.82	------	.49	3.35	------
Oelwein 2SE	.87	.43	1.76	.27	2.34	5.67
Onawa	.69	.95	1.27	1.01	2.20	6.12
Osage	1.10	1.30	2.52	.90	3.24	9.06
Osceola	2.26	1.04	.86	.82	3.51	8.49
Oskaloosa	2.42	1.11	1.10	.94	3.95	9.52
Ottumwa CAA AP 5N R	1.64	1.22	.58	.62	------	------
Ottumwa AP CAA	1.59	.94	.67	.59	3.25	7.04
Ottumwa	1.41	1.24	1.13	.69	3.55	8.02
Pella	2.42	1.36	1.10	1.04	4.61	10.53
Perry 2SE	1.01	.91	1.00	.72	3.82	7.46
Pisgah	.37	.58	1.00	.57	3.13	5.65
Primghar	.51	1.13	1.23	.92	2.59	6.38
Red Oak	1.06	.74	.42	.79	3.48	6.49
Remsen R	.30	.79	1.58	.54	2.38	5.59
Rock Rapids	.31	1.74	.99	1.47	1.56	6.07
Rockwell City R	.60	.92	1.82	.79	2.92	7.05
Do	.56	.90	2.00	.80	2.98	7.24
Sac City	.34	.66	1.85	.86	2.42	6.13
St. Ansgar 2S R	1.04	.78	1.76	.39	2.03	6.00
St. Charles R	1.80	1.03	.80	1.08	4.01	8.72
Sanborn	.46	[1] 1.19	1.61	.66	1.71	5.63
Sheffield R	.50	.49	1.80	.27	1.97	5.03
Sheldon	.33	1.21	1.23	.71	2.58	6.06
Shell Rock R	1.40	.79	1.62	.37	3.06	7.24
Sibley	.31	1.16	1.68	1.15	1.97	6.27
Sigourney	2.28	[1] 1.20	1.24	1.01	3.37	9.10
Sioux City WB AP R	.41	.91	1.25	.69	2.16	5.42
Sioux City 4N	.41	.00	1.60	.45	1.37	3.83
Sioux Rapids	.30	.33	1.03	.56	2.70	4.92
Soldier R	.53	.69	1.12	.88	------	------
Spencer 1N	.33	.71	1.66	.43	1.55	4.68
Spillville R	1.27	.72	1.74	.29	1.97	5.99
Storm Lake 2E	.22	.43	1.50	1.00	2.14	5.29
Strawberry Point R	2.21	1.22	1.76	.46	3.53	9.18
Tipton	[1] 2.38	2.16	1.31	.60	4.48	10.93
Titonka 6NE	.32	.79	1.43	.17	2.23	4.94
Toledo	2.33	1.26	1.25	.42	4.21	9.47
Tracy	1.30	.50	.79	.80	2.97	6.36
Traer R	------	1.48	1.22	.35	3.81	------
Tripoli	1.36	1.38	1.86	.48	3.91	8.99
Van Meter	1.13	[1] 1.00	.92	.71	4.20	7.96
Vinton	1.50	1.50	1.24	.44	3.52	8.20
Wallin 2WNW R	.71	.48	.48	.71	3.07	5.45
Wapello	1.61	1.37	1.59	1.15	4.10	9.82
Washington R	3.62	1.47	1.50	.77	4.04	11.40
Do	3.75	1.52	1.54	.62	3.94	11.37
Waterloo AP 5NW	1.02	1.35	1.97	.52	3.01	7.87
Waukee	1.12	.70	.99	.38	4.13	7.32
Waukon	[1] 1.31	.34	1.92	.37	2.12	6.06
Webster City R	.65	.86	1.26	.18	2.80	5.75
Do	.68	.94	1.54	.25	2.90	6.31
Wheatland R	3.54	.81	1.81	.38	3.79	10.33
Williamsburg	2.05	.91	1.19	.71	3.31	8.17
Winterset	1.66	1.03	.72	1.07	3.73	8.21
Woodbine 5SE R	------	1.48	1.22	.35	3.81	------
Woodward 7N	1.03	.77	1.15	.47	4.24	7.66

MINNESOTA

Aitkin ranger station	1.24	1.18	1.36	0.46	1.37	5.61
Albert Lea 3E R	------	.69	1.29	.15	2.19	------
Albert Lea	1.53	1.27	.84	.04	1.70	5.38
Alexandria CAA AP R	1.53	------	1.18	.76	1.29	------
Alexandria CAA	1.67	2.01	1.27	1.21	1.41	7.57
Amboy R	------	.96	1.20	.68	2.49	------
Argyle	.42	.38	1.02	.09	.51	2.42
Artichoke Lake	[1] 1.00	1.66	1.15	1.04	1.07	5.92
Austin 4S	1.47	1.13	2.58	.61	2.73	8.52
Baudette	.82	1.68	.20	.09	.59	3.38
Beardsley	1.40	[1] 1.70	1.20	1.12	2.14	7.56
Beaver 1N	1.99	.00	1.49	.71	2.40	6.59
Bemidji AP	1.23	3.16	.22	.04	.42	5.07
Big Falls ranger station R	.74	1.52	.53	.15	1.00	3.94
Big Fork R	.65	1.95	1.06	.09	1.37	5.12
Bird Island	.98	2.21	1.26	2.17	3.44	10.06
Blackduck ranger station	1.07	1.54	.30	.07	.67	3.65
Blanchard power station	.66	1.31	1.72	.71	2.95	7.35
Blue Earth	.65	.76	1.34	.38	1.83	4.96
Brainerd	.94	1.85	2.22	.69	2.20	7.90
Brainerd Ranger Station	1.03	1.23	1.42	.54	1.35	5.57
Brimson	[1] 1.30	1.24	.66	.08	2.19	5.47
Buffalo sewage plant R	1.63	1.25	1.08	1.20	1.50	6.66
Caledonia	2.22	.84	2.61	1.27	3.63	10.57
Cambridge Epilep C R	1.46	1.47	.84	.50	2.08	6.35
Cambridge Epilep C	1.43	1.48	.94	.72	2.15	6.72
Campbell	[1] 1.00	1.48	1.73	2.19	.40	6.80
Canby R	.57	1.78	1.69	1.72	2.60	8.36
Canby	.56	1.85	1.68	1.87	2.60	8.56
Caribou 2S	[1] .60	.34	.16	.21	.51	1.82
Cass Lake Forest Experiment Station	1.43	2.56	.79	.04	1.03	5.85
Chaska 1NE	1.22	1.05	.81	.97	3.17	7.22
Clementson 4NE R	1.04	2.07	.22	.28	.97	4.58
Cloquet Forest Experiment Station	1.33	1.78	1.47	.49	1.48	6.55
Cokato	1.33	[1] 2.00	2.07	1.62	2.51	9.53
Coleraine	.89	1.59	1.15	.00	1.21	4.84
Collegeville, St. John University	1.18	1.23	1.56	2.11	2.54	8.62

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

MINNESOTA—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Comfrey	.78	1.18	.96	.72	1.77	5.41
Correll R		1.45	.96	.70	.81	
Crane Lake Ranger Station R	1.03	1.04	.44	.28	1.31	4.10
Crookston NW School	.60	1.12	.66	.19	.34	2.91
Dawson	2.02	[1] 1.60	1.48	2.04	2.22	9.36
Detroit Lakes 1NNE	1.23	1.81	1.10	.30	.46	4.90
Dodge Center R			1.02	.47	1.89	
Duluth WB AP R	1.37	1.71	.88	.25	2.06	6.27
Duluth	1.17	1.66	1.33	.34	2.04	6.54
Elbow Lake	1.31	2.17	.88	1.00	1.07	6.43
Elk River	.95	1.11	1.18	.62	1.16	5.02
Fairmont 1S	.47	.91	1.36	.63	2.11	5.48
Faribault	1.67	.97	.98	.48	1.71	5.81
Farmington 3NW	2.51	1.04	.68	1.05	2.51	7.79
Fergus Falls	1.07	1.80	1.19	.90	.84	5.80
Fosston power plant R	1.10		.27	.10	.52	
Fosston power plant	1.09	1.53	.30	.04	.53	3.49
Frazee water works R	1.52	3.16	1.09	.30	.57	6.64
Glenwood	2.39	1.68	2.42	1.06	1.32	8.87
Gonvick	1.32	1.92	.22	.14	.43	4.03
Granite Falls powerplant R	.76	1.68	1.35	2.32	2.53	8.64
Grand Meadow	[1] 1.30	.72	1.79	.66	2.45	6.92
Grand Rapids NC School	.83	1.72	.87	.05	1.30	4.77
Gull Lake Dam R	1.23	1.68			2.24	
Gull Lake Dam	1.17	1.54	1.65	.82	2.05	7.23
Gunflint Lake R	1.18	.91	1.17	.39	(2)	
Hallock	.58	.18	.33	.09	.26	1.44
Harmony	[1] 1.50	1.20	2.18	.71	2.50	8.09
Hastings Dam 2	1.45	.76	.83	.46	1.37	4.87
Hawley 4 SE R	.92	1.28	.78	.51		
Hibbing P. Sub Station	.80	1.47	.56	.09	1.78	4.70
Highlanding	1.52	1.77	.37	.21	.31	4.18
Hinckley	1.44	1.58	1.31	.50	2.00	6.83
Hinckley water works R	1.68	1.63	1.67	.59	2.27	7.84
Hokah	1.90	[1] .70	.00		2.73	
Holyoke R	1.23	1.41	.98	.37	(2)	
Hutchinson R	.89	1.00	.79	.63	1.12	4.43
Indus	.90	2.33	.43	.20	1.18	5.04
International Falls WB AP R	1.10	1.15	.58	.27	.87	3.97
Island Lake Reservoir	.89	1.29	.83	.32	1.81	5.14
Itaska State Park	1.92	3.68	1.07	.18	.90	7.75
Jordan 1S	1.29	1.27	1.35	1.09	2.62	7.62
Kettle Falls	1.00	[1] 1.20	.68	.08	1.13	4.09
Lac Qui Parle	.63	2.17	1.35	1.46	1.34	6.95
La Crescent Dam 7	1.77	.71	2.36	.98	2.04	7.86
Lake City	2.10	.00	1.76	.56	1.55	5.97
Lakefield 1S R			.86	.68	1.70	
Le Center	1.79	.99	1.06	.87	2.08	6.79
Leech Lake Dam	1.10	1.84	.91	.01	1.02	4.88
Leonard 8NE	[1] 1.50	3.01	.64	.12	1.18	6.45
Le Sueur R	.79	1.00	.91	.68	1.78	5.16
Litchfield	[1] 1.30	2.19	1.44	1.07	1.36	7.36
Little Falls WW R	1.24	1.22	1.13	.57		
Long Prairie	1.49	1.54	1.36	.84	1.43	6.66
Luverne R	.31	1.93	1.06	1.08	1.11	5.49
Madison	1.15	1.51	1.25	1.58	1.39	6.88
Mahoning Mine	.92	1.26	.53	.03	1.08	3.82
Mankato	2.61	1.18	1.43	.87	2.14	8.23
Maple Plain	1.31	1.76	1.16	1.38	2.98	8.59
Marshall	.40	1.44	1.19	2.47	2.10	7.60
Meadowlands R	.91	1.11	.60	.00	1.62	4.25
Milaca	1.35	2.17	1.71	1.64	3.07	9.94
Milan	1.00	2.40	1.12	2.06	1.24	7.82
Minneapolis WB AP R	2.12	1.21	1.05	1.20	3.09	8.67
Minnesota City Dam	1.44	.87	1.30	.21	2.31	6.13
Montevideo	.78	2.37	1.83	2.27	1.37	8.62
Montgomery	[1] 1.80	1.66	1.38	.71	1.80	7.35
Moorhead State Teachers College			.73	.05	.39	
Moose Lake 1SE	1.18	1.20	1.02	.43	1.59	5.42
Mora	1.64	1.55	1.36	.48	2.10	7.13
Morris WC School	[1] 2.00	1.90	.82	1.16	.99	6.87
New London	1.36	1.84	1.56	2.06	1.91	8.73
New Ulm	2.17	2.14	1.99	.86	2.70	9.86
Northfield Carleton College R	1.96	1.27	1.33	.96	3.27	8.79
Oklee	[1] 1.20	1.53	.31	.19	.37	3.60
Onamia Ranger Station R	1.01	1.22	1.07	.38	2.68	6.36

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Orr Ranger Station R	.85	1.23	.68	.16	1.60	4.52
Do	1.06	[1] 1.20	.82	.17	1.05	4.30
Ortonville sewage plant	1.00	1.98	1.22	1.16	.73	6.09
Ottertail	.48	2.66	.99	.63	.47	5.23
Park Rapids	1.58	2.61	1.31	.20	.98	6.68
Pelican Rapids	1.05	2.03			.96	
Pine River Dam	1.76	[1] 1.50	1.39	.33	1.81	6.79
Pipestone	.20	1.58	1.23	1.21	.64	4.86
Pokegama Dam R	1.15	1.60	1.25	.08	1.66	5.74
Do	.92	1.24	.90	.05	1.23	4.34
Reads	1.79	[1] .80	1.55	.56	1.76	6.46
Red Lake Falls	.56	1.08	.25	.14	.13	2.16
Red Lake Indian Agency R		2.52	.42	.14	.60	
Do	.98	2.38	.87	.15	.67	5.05
Red Wing	1.85	1.04	1.73	.81	1.84	7.27
Red Wing Dam 3 R	1.91	1.03	1.24	.65	1.87	6.70
Do	1.90	1.10	1.22	.65	1.71	6.58
Redwood Falls CAA	1.15	1.01	.97	.59	1.86	5.58
Riverton	.99	1.26	1.68	.55	1.85	6.33
Rochester WB AP R	1.80	.80	1.63	.61	2.07	6.91
Roseau power plant	.65	.44	.26	.12	.51	1.98
Rosemount Agricultural Experiment Station	2.17	.58	.78	.57	2.23	6.33
Rushford sewage plant R	1.36	.70	1.73	.61	3.30	7.70
St. Cloud WB AP R	1.54	1.65	1.33	.70	1.97	7.19
St. James sewage plant	1.02	[1] 1.00	1.36	.25	1.50	5.13
St. Paul WB AP R	2.47	1.36	1.08	1.20	2.66	8.77
St. Peter 2SW	1.92	2.16	1.72	.93	2.43	9.16
Sandy Lake Dam Libby R	1.17	1.37	.99	.14	1.93	5.16
Do	1.17	1.43	1.15	.13	1.48	5.36
Sherburn 3NE R	.46	1.09	1.43	.57	1.95	5.50
Springfield R	.66		1.30	.82	2.03	
Do	.68	[1] 1.20	1.47	.76	1.91	6.02
Spring Grove 1NW R	2.08		2.10	.57		
Do	1.65	.53	1.46	.48	2.16	6.28
Spring Valley R	1.54	.76	1.85	.69	2.75	7.59
Stillwater	2.17	1.44	1.05	1.34	2.64	8.64
Theilman	1.85	.88	1.30	.47	1.79	6.29
Thief Lake Refuge R	.85	.83	.26	.10	.86	2.90
Thief River Falls	1.31	1.72	.87	.09	.85	4.84
Thorhult 3E	1.09	1.93	.38	.13	.72	4.25
Tofte Ranger Station R	2.05	1.82	.88	.15	2.64	7.54
Tower Ranger Station	.88	1.23	.71	.11	1.24	4.17
Tracy power plant R	.59		1.20	1.28	1.78	
Tracy power plant	.43	.92	1.14	1.28	2.01	5.78
Trail 13NNE	1.02	1.56	.27	.15	.41	3.41
Twin Valley 3SW R	1.40	2.55	.48	.14	.56	5.13
Two Harbors	1.29	1.40	.79	.34	1.29	5.11
Tyler	[1] .40	1.26	1.45	.72	1.19	5.02
Vesta	.58	1.48	1.12	.86	2.06	6.10
Virginia OIMC laboratory R	1.08	1.25	.64	.18	(2)	
Virginia OIMC laboratory	1.10	1.32	.88	.14	1.01	4.45
Wadena	1.52	2.72	1.31	.40	.67	6.62
Wales 2E R		1.21	.80	.21	1.39	
Walker Ah Gwah Ching	1.55	2.00	1.06	.03	1.06	5.70
Walker Ranger Station R	1.20	1.84	.88	.09	.93	4.94
Warroad R	.82	.91	.24	.16	.69	2.82
Warroad	.88	.84	.20	.11	.47	2.50
Waseca University Experimental Farm	1.88	.97	.91	.47	3.10	7.33
Wayland 9NW	1.05	2.06	.23	.21	.73	4.28
Wells 1 NW	1.38	.80	1.05	.22	2.75	6.20
White Face Reservoir	[1] 1.50	.94	.21	.07	1.74	4.46
White Rock Dam R	.49	1.35	1.12	.56	.53	4.05
Willmar AP R		1.44	.63	2.34		
Willmar State Hospital	1.14	1.36	.82	1.10	1.07	5.49
Windom	.50	1.33	.70	.44	1.41	4.38
Winnebago	1.06	.91	1.64	.43	1.51	5.55
Winnibigoshish Dam	.92	2.12	.86	.08	1.01	4.99
Winona	1.72	1.11	2.51	1.30	2.65	9.29
Winona 3SW R	1.52	.98	2.00	1.03	3.57	9.10
Winona Dam 5 A	1.37	.64	1.53	.55	2.89	6.98
Winton power plant R	.64	.77	.47	.20	(2)	
Worthington R	.25	1.00	1.08	.68	1.52	4.53
Worthington	.23	.96	1.16	.72	1.28	4.35
Zumbro Falls 1SE R	1.61	.71	1.49	.43	1.81	6.05
Zumbrota	1.99	.62	1.37	.33	2.19	6.50

MONTANA

Adel	0.56	1.20	[1] 0.38	0.46	0.74	3.34
Albion	.29	1.10	.18	.48	.33	2.38
Alzada R	.42	.76	.07	.61	.64	2.50
Ashland Ranger Station R	.32	.55	.04	.43	.57	1.91
Baker	.35	.83	.11	.61	.85	2.75
Ballantine	.23	1.03	.20	.71	.17	2.34
Barber	.11	.83	.79	.52	.17	2.42
Belltower	.02	.74	.42	.45	.89	2.52
Biddle	.35	[1] .60	.22	.30	.37	1.84
Big Sandy	[1] .30	2.55	.96	.46	.50	4.77
Billings water plant	.15	.55	.19	.48	.45	1.82
Billings WB AP R	.16	1.04	.36	.93	.41	2.90
Birney 11E	.80	1.87	.21	1.04	2.23	6.15
Bloomfield 5E R		.56	.18	.43	.14	
Bowdoin 7NNE	.24	.23	.42	.70	.60	2.19
Boyes	.48	.93	.10	.38	.64	2.53
Brady Aznoe	.06	[1] .87	.24	.71	.11	1.99
Bredette R		.40	.11	.63	.63	
Do	.18	.54	.21	.52	.87	2.32
Bridger R	.32	.66	.07	.68	.99	2.72

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

MONTANA—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Bridger R	.32	.57	.07	.63	.94	2.53
Broadus power plant R	.49	.61	.12	.58	.64	2.44
Do	.64	.79	.14	.63	.70	2.90
Broadview	.10	1.06	.24	.64	.20	2.24
Browning R	.36	.94	------	.57	.41	------
Busby	.20	.52	.05	.38	.38	1.53
Campbell farm 4	.25	.87	[1].27	.97	.15	2.51
Canyon Ferry 2NNW	.48	.98	.25	.52	1.18	3.41
Cascade 5S	.54	1.23	.11	1.10	.68	3.66
Chinook 15N	.17	[1].38	.97	1.04	[1].80	3.36
Choteau R	.18	.41	.14	.62	.31	1.66
Circle 7N	.22	[1].80	.30	.63	.15	2.10
Cleveland	.34	1.26	.74	.89	.35	3.58
Cohagen R	.43	------	1.17	.47	.47	------
Colstrip	.36	.93	.24	.36	.38	2.27
Conrad	.14	1.05	.19	.48	.34	2.20
Content R	.41	.35	.39	.55	.37	2.07
Corwin Springs R	.43	1.04	.64	.59	2.70	5.40
Crow Agency	.37	1.17	.21	.70	.30	2.75
Culbertson	[1].10	[1].40	.49	.78	.29	2.06
Cut Bank CAA AP R	.04	------	.30	(2)	.66	------
Decker R	.30	.69	.08	.49	.60	2.16
Del Bonita 2SW R	.21	1.20	.42	.39	.53	2.75
Delphia R	.17	.93	.45	.90	.10	2.55
Denton	.56	1.81	.51	1.02	.39	4.29
Dovetail 1N R	.46	1.47	.82	.32	.15	3.22
Dunkirk 16NE	.07	.86	.44	.34	.32	2.03
Dupuyer R	.32	------	.28	.78	.63	------
Dupuyer 5SE R	.24	.88	.24	.51	.55	2.42
Dutton 6ESE R	.36	1.41	.44	.74	.30	3.25
East Helena	.40	.79	.14	.33	1.25	2.91
Edgar 10SE	.44	.84	.09	.95	.80	3.12
Ekalaka R	.61	------	.17	.79	.99	------
Do	.47	1.02	.18	.67	.68	3.02
Fairfield	.15	.24	.18	.47	.29	1.33
Fairview	[1].20	[1].30	.53	.55	.49	2.07
Flatwillow 4ENE	.28	1.09	.52	.38	.07	2.34
Forks 5NE	.20	.21	.28	.66	.28	1.63
Forsyth 2E	.26	.88	.20	.38	.22	1.94
Fort Assinniboine	.14	.73	.55	.63	.15	2.20
Fort Benton	.62	1.79	[1].67	1.07	.64	4.79
Fort Logan 1W	.27	1.04	.37	.45	.68	2.81
Fort Peck R	.43	------	.36	1.32	.31	------
Do	.27	.55	.26	1.06	.27	2.41
Four Buttes R	.13	.43	.16	.49	.22	1.43
Frazer	.38	.55	.58	1.45	.76	3.72
Galata 16SSW	.34	1.37	.69	.33	.42	3.15
Garland	.54	1.25	.15	.53	.35	2.82
Geraldine	.46	3.12	.45	.90	.37	5.30
Gibson 3SE	.15	[1].70	.45	.55	.28	2.13
Glasgow 15NW	.29	.50	.44	.70	.36	2.29
Glasgow WB City	.48	.79	.50	1.45	.49	3.71
Glendive R	.45	------	.35	1.44	.75	------
Do	.38	.60	.25	1.23	.66	3.12
Goldbutte 7NW	.01	1.01	.27	.18	.33	1.80
Grass Range	.08	1.14	.27	.76	.10	2.35
Great Falls WB AP R	.41	1.71	.34	1.63	.76	4.85
Harb	1.88	.32	.25	.30	.45	3.20
Hardin	.27	.87	.38	.58	.11	2.21
Harlowton	.12	1.16	.71	.45	.29	2.73
Havre WB City R	.25	1.02	.60	.81	.47	3.15
Havre 16N	.14	.27	.62	.33	.30	1.66
Havre 22NW R	.11	.49	.53	.44	.38	1.95
Haxby 18SW	.43	.72	.58	.27	.44	2.44
Hays R	.41	.80	.57	.92	.54	3.24
Hays	.89	.89	.63	.73	.50	3.64
Highwood 7NE	.31	1.36	.22	.51	.32	2.72
Hilger R	.34	1.74	.47	.95	.59	4.09
Hinsdale	.53	.65	.61	1.39	.61	3.79
Hinsdale 23N	.39	.33	.26	.50	.31	1.79
Hogeland 7WSW	.17	.57	.54	.61	.68	2.57
Huntley Experiment Station	[1].20	[1]1.00	[1].20	.58	.08	2.06
Iliad R	.24	------	.22	.52	.45	------
Ingomar 6SE	.44	.80	.82	[1].70	.25	3.01
Ingomar 23NE	.28	.65	.15	.49	.20	1.77
Ismay R	.56	1.06	.24	.51	.56	2.93
Joliet	.44	.90	.22	.91	.70	3.17
Joplin 6N R	.03	1.73	1.20	.46	.32	3.74
Joplin 6N	.03	1.69	1.18	.48	.35	3.73
Jordan	.40	.70	.61	.28	.40	2.39
Judith Gap	[1].40	2.35	.89	1.00	1.05	5.69
Kings Hill R	------	4.58	2.03	1.94	2.11	------
Do	1.98	4.62	1.76	1.77	1.16	11.29
Knobs	.30	.50	.13	.37	.46	1.76
Kremlin	.04	.70	.51	.65	.34	2.24
Lakeview R	.97	2.90	4.84	1.17	1.94	11.82
Lame Deer	.41	1.40	.19	.82	.80	3.62
Laurel	.37	.91	.31	.85	.50	2.94
Lavina R	------	------	.58	.45	.18	------
Lewistown CAA AP	.67	1.50	.39	.86	.52	3.94
Lewistown CAA AP R	------	1.35	.50	.83	.55	------
Lewistown 10S	1.09	2.67	.60	2.08	.99	7.43
Lindsay	1.04	.72	.27	.92	.51	3.46
Livingston CAA AP R	------	.67	1.29	.50	.42	------
Lloyd R	1.09	[1]1.20	[1].70	1.88	.76	5.63
Lodge Grass R	.52	1.75	.10	1.46	.76	4.59
Loma	.26	[1]1.69	.58	.44	.30	3.27
Loring 10N	.41	.14	.32	.80	.35	2.02
Loweth	.38	1.11	.64	.30	.53	2.96
Lustre 4NW R	.09	.33	.22	.41	.16	1.21
Do	.03	.32	.21	.35	.13	1.04
MacKenzie	[1].11	.77	.16	[1].70	.34	2.08
Malta	.47	.46	.41	.69	.53	2.56
Martinsdale R	.08	1.04	------	.42	.28	------
Do	.07	.76	.65	.32	.14	1.94
McLeod 12SSW R	.42	1.38	1.32	1.11	.71	4.94
Medicine Lake 3SE	.07	.27	.22	.48	.33	1.37
Melstone	.19	1.36	.85	.91	.20	3.51
Melville	.25	.40	.60	.18	.38	1.81
Miles City R	------	1.13	.34	.66	.82	------
Do	.46	1.15	.35	.68	.83	3.47
Miles City CAA AP	.32	1.14	.42	.92	.59	3.39
Millegan R	.47	.93	.28	.62	.75	3.05
Molt 7SW R	------	------	.42	.50	.45	------
Moorhead 1S	.23	.45	.06	.39	.72	1.85
Do R	.36	.42	.07	.44	.76	2.05
Mystic Lake R	.74	1.73	1.20	1.36	1.45	6.48
Nohly 3WNW	.16	.37	.22	.92	.58	2.25
Opheim	.18	.57	.26	.43	.35	1.79
Opheim 12SSE	.13	.35	.12	.36	.52	1.48
Phillips 3SW	T	.34	.38	.32	[1].50	1.54
Plentywood	.07	.40	.18	[1].60	.27	1.52
Plevna	.51	1.17	.15	.72	.54	3.09
Poplar	.29	[1].54	.48	[1]1.60	.53	3.44
Powderville	.78	1.28	.20	.74	.94	3.94
Pryor	.23	.55	[1].40	.44	[1].59	2.21
Pryor 27SE Hillsboro R	.37	.58	.26	.44	.73	2.38
Raymond Border Station	T	.22	.17	.37	.16	.92
Redstone	.13	.33	.11	.74	.35	1.66
Reed Point R	.43	------	.62	.65	.80	------
Richey	.24	1.05	.48	.84	.35	2.96
Ridge R	.97	1.59	.25	.50	1.20	4.51
Ringling	.37	1.13	.34	.12	.48	2.44
Rock Springs	.03	1.35	[1].34	[1].84	[1]1.45	4.01
Rocky Boy	.65	2.60	.71	1.38	[1]1.45	6.79
Roundup	.17	.69	.45	.32	.03	1.66
Roy 8NE	.05	.97	.40	.35	.08	1.85
Russell R	.11	------	.26	.41	.38	------
Savage	.20	.31	.44	1.05	.45	2.45
Scobey	.21	1.60	.53	1.38	.73	4.45
Shelby R	.18	------	------	.11	.28	------
Do	.07	[1]1.39	[1].55	.15	.30	2.46
Sidney	.12	.28	.09	.45	.20	1.14
Simpson 4NNW	.17	.62	.63	.25	.43	2.10
Sonnette 4N	.25	.59	T	.50	.45	1.79
Stanford 2NE R	.47	1.33	.36	.85	.24	3.25
Do	.42	1.29	.39	.82	.25	3.17
Sunburst 8E	T	1.28	.45	.39	.49	2.61
Sun River 5SW	.41	.97	.23	.83	.55	2.99
Sweetgrass R	------	1.00	.14	.20	.33	------
Do	[1]0.	.96	.14	.20	.33	1.63
Teigen 13NNE	.33	[1].99	.52	.41	.18	2.43
Telegraph Creek	.44	.72	.38	.36	.51	2.41
Terry	.31	.52	.36	.59	.34	2.12
Terry 25NW Olanda R	.83	1.23	.25	.27	.66	3.24
Thoeny	.42	.37	.44	.84	.64	2.71
Tiber Lake	.42	[1].77	.33	.34	[1].44	2.30
Toston 2SW	.18	.58	.22	.29	.67	1.94
Townsend	.17	.61	.25	.52	1.72	3.27
Turner	.13	.42	.39	.42	.39	1.75
Ulm 8SE Truly	.39	1.54	.12	1.27	.87	4.19
Utica R	.39	.99	[1].50	.61	.58	3.07
Vanada 5ESE R	.32	1.21	.29	.25	.39	2.46
Vida	.40	.81	.37	1.22	.72	3.52
Volborg	.38	.49	T	.78	.52	2.17
Westby R	.14	.43	.25	.62	.52	1.96
Westby	.24	.65	.55	1.00	.55	2.99
White Sulphur Springs	1.80	2.87	1.39	.85	1.09	8.00
White Sulphur Springs 10N	.80	1.74	.64	.48	1.08	4.74
White Water	.05	[1].20	.20	.72	.47	1.64
Wibaux 2E	.36	.60	[1].30	1.20	.40	2.86
Wilsall R	.45	.67	.83	.24	.45	2.64
Wilsall	.31	.57	.75	.23	.45	2.31
Winnett 5NE	.30	1.41	.90	.51	.22	3.34
Winnett 11ESE R	.22	------	.80	.46	.18	------
Wolf Point 4ESE	.34	.52	.35	1.75	.69	3.65
Wolf Point R	.24	.49	------	1.24	.67	------
Wyola	.15	.82	.10	.96	.48	2.51
Yellowstone NE Ent R	3.88	------	3.56	3.10	------	------
Yellowtail Dam	[1].25	[1].90	.29	1.77	.30	3.51

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

NEBRASKA

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Agate	0.05	0.93	0.05	0.53	1.38	2.94
Agnew	.65	[1]1.00	------	.96	2.27	------
Ainsworth	.46	1.46	.82	.98	.67	4.39
Albion 7WNW R	------	------	.60	.94	1.14	------
Alliance	.02	.27	.05	.41	1.62	2.37
Amelia R	.43	1.34	.93	.82	.95	4.47
Anselmo R	------	.73	.86	.70	.80	------
Do	------	.68	.95	.81	1.01	------
Antioch R	.12	.48	.11	.83	1.42	2.96
Arcadia	.37	.58	.53	.72	.92	3.12
Arnold	.28	.42	.71	.95	.80	3.16
Arthur	[1].10	.47	.34	.69	.28	1.88
Ashland 4N	.28	.95	.48	.83	2.83	5.37
Ashton R	.34	.74	.35	1.06	.78	3.27
Atkinson	.47	1.93	.67	.57	.63	4.27
Bartlett 7NNE	.37	[1]1.20	.91	.84	.63	3.95
Basset R	.49	1.81	.96	.99	.82	5.07
Beemer	.62	.69	1.32	1.07	2.22	5.92
Bennington 3E R	.31	1.06	.75	1.09	3.05	6.26
Big Springs R	.14	------	------	.68	.86	------
Do	.10	------	------	.98	.80	------
Blair	.46	1.04	.72	1.23	2.85	6.30
Bloomfield	[1].47	1.76	.90	.40	------	------
Box Butte Exp Farm	.02	.23	.10	.20	.93	1.48
Brewster	.14	.61	.92	.63	.80	3.10
Bridgeport R	.07	.40	.12	.45	.84	1.88
Do	.10	.50	.12	.40	.72	1.84
Broken Bow No. 2 R	.28	.43	.70	.75	.72	2.88
Broken Bow 2W	.28	.33	.71	.62	.89	2.83
Burwell R	.31	1.04	.69	.68	.82	3.54
Do	.26	.75	.55	.54	.73	2.83
Butte	[1].76	2.50	1.40	1.20	1.15	7.01
Central City	.64	.68	.58	.89	1.12	3.91
Chadron AP 4W R	.03	.48	.00	.38	.43	1.32
Do	.03	.52	------	.47	.51	------
Chambers	.33	1.11	.79	.91	1.16	4.30
Clarkson	.56	.78	.52	.95	2.28	5.09
Coleridge R	.57	.70	1.28	.58	------	------
Columbus	.69	[1]1.00	.69	1.08	1.40	4.86
Comstock	.34	.75	.58	.58	.67	2.92
Creighton	.49	.84	.60	.70	1.01	3.64
Creston R	------	.89	.62	1.08	1.69	------
Dalton	.19	1.15	.09	1.44	1.25	4.12
David City R	.85	1.21	.51	1.14	2.79	6.50
Do	.89	1.23	.51	1.34	3.19	7.16
Dodge	.84	[1].80	.62	------	2.05	------
Elgin 9WSW Arden	.47	1.26	.53	1.08	.91	4.25
Elkhorn	.36	.86	.61	1.08	2.79	5.70
Ellsworth	.22	.23	.40	1.04	.72	2.61
Emerson	.50	.81	1.39	1.16	2.29	6.15
Emerson 4SE R	.73	.98	2.17	1.59	1.91	7.38
Ericson 4WNW	.51	1.00	.52	.87	.38	3.28
Ewing	.48	[1]1.59	1.00	1.22	1.14	5.43
Ewing 12S	.54	[1]1.50	1.10	.88	.91	4.93
Fort Robinson	.14	.88	------	.78	.92	------
Fremont	.17	[1]1.00	.85	1.28	3.41	6.71
Fullerton	.42	.97	.40	.98	1.21	3.98
Genoa R	.49	1.04	.46	1.01	.92	3.92
Do	.45	.92	.38	1.05	1.41	4.21
Gordon 1E	[1].10	.66	.03	.20	.81	1.80
Gordon 27SE	[1].30	.81	.13	------	------	------
Gretna 3NE R	.41	.70	.64	1.02	2.21	4.98
Halsey 3W	.61	[1].92	.81	1.12	.95	4.41
Harrisburg 15 NW	.13	.61	.18	.68	1.19	2.79
Harrison	.32	1.75	------	1.02	1.16	------
Harrison 9W R	.00	.39	.05	.14	.30	.88
Harrison 1NE	.10	.65	------	.75	1.10	------
Harrison 17N	[1].10	.82	------	.48	1.66	------
Hartington	.53	.62	1.00	.93	1.92	5.00
Hay Springs	.08	1.50	.10	1.01	1.60	4.29
Hay Springs 12S	------	.20	------	1.10	.65	------
Henry 6N	[1].20	[1].90	.70	1.11	1.36	4.27
Herman 1SSE	.38	.57	.75	1.03	1.98	4.71
Hershey	.13	.51	.48	.76	.76	2.64
Homer	.40	.56	1.03	.69	1.96	4.64
Hyannis	.04	.91	.10	.66	1.01	2.72
Kimball	.19	1.18	------	.79	1.14	------
Kingsley Dam R	.05	1.10	.45	1.10	1.74	4.44
Kingsley Dam	.05	1.05	.50	.96	1.21	3.77
Koshopah 1ENE	.40	1.57	1.32	.99	.75	5.03
Laurel	.66	.60	1.10	.91	1.76	5.03
Lodgepole	.05	.93	.10	.98	1.34	3.40
Loup City	.27	.75	.29	.87	.76	2.94
Loup City 7NNE	.65	.89	------	------	------	------
Lyman	.16	.40	.53	1.54	1.21	3.84
Lynch	.31	1.62	.47	.89	.88	4.17
Do R	.40	1.64	.50	.97	.92	4.43
Lyons	.59	.59	1.06	.97	1.81	5.02
Madison	.36	.88	.87	1.03	1.97	5.11
Malmo 1E R	.51	.61	.63	1.08	1.39	4.22
Mason City	.75	.56	.57	1.14	1.53	4.55
Merriman	.30	[1].80	.06	.65	1.52	3.33
Minature 8N	.02	.17	.25	.15	.52	1.11
Mitchell 5E	.04	.25	.28	.36	.58	1.51
Mullen	.21	1.04	.58	1.09	.95	3.87
Neligh	------	.77	.50	1.03	1.46	------
Nenzel 19S	.13	1.31	------	------	1.44	------
Newcastle	.51	.88	1.15	.88	2.02	5.44
Newport	.61	1.83	.88	.95	.74	5.01
Norfolk	.49	.70	.74	1.00	2.02	4.95
Norfolk WB AP R	.37	.57	.86	.77	1.63	4.20
North Platte WB AP R	.32	.62	.74	.80	.98	3.46
Oakdale	.44	.79	.81	1.11	1.16	4.31
Oconto	.32	[1].50	.70	1.00	.75	3.27
Oconto 6SW	.93	.40	.71	.97	------	------
Ogallala	.06	1.11	.46	1.14	.99	3.76
Omaha West	.48	1.18	.50	.69	2.99	5.84
Omaha WB AP R	.51	.97	.73	.68	2.35	5.24
Ord	.48	1.19	.53	.95	1.13	4.28
Osceola 9W	.61	.95	.39	1.10	2.01	5.06
Oshkosh	.21	.88	.14	1.00	.87	3.10
Osmond	.58	1.29	1.03	1.11	1.87	5.88
Paxton	------	[1].80	.43	------	------	------
Pender R	.57	------	------	1.07	1.40	------
Pilger	.43	.77	1.24	1.06	1.52	5.02
Plattsmouth	.02	[1]1.00	.75	.80	------	------
Potter 1W	.16	.38	.03	.75	.45	1.77
Purdum	.33	1.01	.79	.78	.48	3.39
Rackett R	.05	------	.18	.77	1.91	------
Randolph	.28	.68	1.16	.56	1.29	3.97
Ravenna	.11	.40	.13	------	------	------
Rosalie 1NE R	.56	.50	1.21	.88	2.12	5.27
Rushville	.07	1.06	.02	.57	1.16	2.88
St. Paul	.22	.71	.28	1.18	.98	3.37
Schuyler	.89	1.07	.59	1.12	2.31	5.98
Scottsbluff WB AP R	.06	.45	.23	.49	1.09	2.32
Scribner R	.68	1.01	.74	1.19	2.60	6.22
Sidney CAA AP R	.10	.78	.11	.79	.92	2.70
Do	.06	.90	.06	.86	.94	2.82
Spalding R	.36	.96	.59	.49	1.15	3.55
Spencer	.43	2.09	.47	.87	.95	4.81
Spiker R	.35	.88	.85	1.20	2.63	5.91
Spiker 4NW	.44	[1].60	.86	.85	2.11	4.86
Springview	.33	2.32	1.30	.83	.85	5.63
Stanton	.42	.78	1.01	.72	2.05	4.98
Stapleton 5SSE	.32	.98	.98	1.37	.89	4.54
Tarnov R	.47	.45	------	.99	1.14	------
Taylor	.22	.69	.92	.44	.59	2.86
Tekamah	.44	2.14	1.39	1.08	3.04	8.09
Thedford R	.47	1.44	.90	------	------	------
Thurston	.47	.75	1.18	.86	1.83	5.09
Tryon	.32	.69	.93	.48	.89	3.31
Ulysses	.71	.43	.52	1.22	1.77	4.65
Valentine Lakes Game	.32	1.08	.85	.77	1.02	4.04
Valentine WB City R	.21	1.37	.46	.75	.92	3.71
Valparaiso	.60	.82	.86	1.07	3.09	6.44
Wahoo	.36	1.26	.69	1.38	2.46	6.15
Wakefield	.47	.67	1.15	1.04	1.66	4.99
Walthill	.50	.46	1.30	.76	1.75	4.77
Wayne 4N R	.52	.43	1.07	.91	1.99	4.92
Wayne	.48	.79	1.00	1.05	1.55	4.87
Westpoint	.95	.78	.95	1.13	2.50	6.31
Whitman R	.18	1.21	.37	1.07	1.07	3.90
Winnebago	.44	.46	1.36	.80	1.49	4.55
Winside	.69	.95	1.13	1.07	2.10	5.94

NORTH DAKOTA

Adams 7S	0.46	0.41	0.74	0.02	0.62	2.25
Alexander	.35	.73	.36	.72	.43	2.59
Almont 7SW	.16	.76	.31	.59	.58	2.40
Ambrose	.17	.37	.64	.28	.26	1.72
Amenia	.14	1.13	.38	.21	.17	2.03
Amidon R	.25	------	.33	.70	1.21	------
Do	.26	1.08	.27	.82	1.21	3.64
Antler R	[1].25	.32	.84	.03	.15	1.59
Arvilla State Park	.22	.53	.51	.21	.38	1.85
Ashley R	------	.75	------	.78	.31	------
Do	.03	.73	.84	.78	.31	2.69
Balfour R	.25	------	.69	.21	.38	------
Bantry	.38	[1].40	1.05	------	.05	------
Beach R	.54	.92	.48	.93	.34	3.21
Do	.34	.89	.41	1.08	.41	3.13
Belcourt Indian Reservation R	.35	------	------	.11	.47	------
Do	.32	.24	.42	.03	.26	1.27

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

NORTH DAKOTA—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Belfield	.43	[1].50	.46	.92	.91	3.22
Berthold	.25	.58	.52	.18	.15	1.68
Beulah R	.16	.93	.36	.74	.54	2.73
Do	.13	.76	.34	.67	.48	2.38
Bisbee	.18	.29	.47	----	.23	1.17
Bismarck WB City	.19	.75	1.48	.90	.42	3.74
Bismarck WB AP R	.20	.91	1.24	1.03	.49	3.87
Bottineau	.12	.16	.40	.04	.13	0.85
Bowbells	.19	.20	1.02	.27	.26	1.94
Bowbells 5E	.19	.10	.66	.36	.31	1.62
Bowman Courthouse R	.51	1.22	.36	1.47	----	----
Do	.26	.84	.13	.88	1.13	3.24
Bowman 11SE	.21	.79	.49	.78	1.13	3.40
Breien R	.07	[1]1.00	.64	.68	.47	2.90
Buchanan R	.04	1.19	.49	.41	.39	2.52
Burt 16N	.07	.44	.25	.88	.82	2.46
Butte	.34	.65	.63	.15	.44	2.21
Cando	.31	----	.43	.11	.43	----
Carrington	.55	1.07	2.34	.93	.48	5.37
Carson R	[1].20	.77	.22	.57	.38	2.14
Carson No. 2	.19	1.23	.40	.64	.61	3.07
Cavalier	.80	[1].50	----	----	----	----
Center	.32	1.22	.32	.96	.50	3.32
Colgate	.13	[1]1.00	.37	.34	.32	2.16
Columbus	.37	.26	.78	.13	.20	1.74
Cooperstown	.44	.82	.45	.32	.50	2.53
Courtenay	.16	.80	1.04	.54	.44	2.98
Crosby R	.20	.18	.44	.20	----	----
Do	.20	.16	.51	.15	.16	1.18
Dawson R	.10	----	.49	.35	----	----
Devils Lake WB City R	.31	.25	.76	.16	.70	2.18
Dickinson CAA AP R	.08	.47	.60	.89	----	----
Dickinson CAA	.21	.51	.43	.86	1.18	3.19
Dickinson Experiment Station	.21	.54	.48	.67	.73	2.63
Donnybrook	.14	[1].40	.97	.15	.20	1.86
Drake	.32	[1].60	.76	.19	.34	2.21
Dunn Center	.16	.66	.37	.77	.63	2.59
Eckman	.23	.39	.68	.06	.10	1.46
Edgeley Experiment Farm	.10	.85	.96	1.68	.68	4.27
Edmore 1W	.22	.15	.68	.04	.14	1.23
Elbowoods	.27	[1].60	.33	.23	.23	1.66
Elgin 5S	----	.76	.53	.97	.51	----
Ellendale	.04	1.55	1.04	1.77	.52	4.92
Epping	.13	[1].40	.36	.74	.63	2.26
Esmond R	.20	----	----	.26	.59	----
Fargo WB AP R	.70	2.19	1.07	.30	.68	4.94
Fessenden	.33	[1].40	1.19	.57	.91	3.40
Flasher	.05	.69	.60	.50	.33	2.17
Flaxton	.25	.23	.93	.20	.15	1.76
Forman	.20	1.25	1.35	1.17	.00	3.97
Fort Yates	----	.90	.31	1.28	.26	----
Foxholm 7N	.65	[1].50	1.10	.12	.11	2.48
Fryburg R	.33	[1].60	.24	.27	.38	1.82
Fullerton	.04	1.85	1.48	1.84	.62	5.83
Gackle	.10	1.23	.60	1.93	.47	4.33
Glen Ullin R	.10	.83	.25	.67	.62	2.47
Glen Ullin 13N	[1].20	.65	----	----	----	----
Golden Valley 1S	.04	[1].40	----	----	----	----
Golva 1SE R	----	.58	.30	.67	.31	----
Grace City R	.32	.59	----	.20	.49	----
Grafton State Sch	.77	.53	1.27	----	.46	----
Grand Forks CAA AP R	.83	----	----	.50	.27	----
Grand Forks CAA	.79	1.56	.96	.58	.31	4.20
Grand Forks University	.91	1.16	.79	.54	.28	3.68
Grand Rapids 1N	.08	1.34	1.11	1.13	1.00	4.66
Grano R	.35	.90	.87	.13	.26	2.51
Granville	.21	.21	.62	.06	.34	1.44
Grassy Butte R	.96	1.38	.32	.61	.66	3.93
Grassy Butte 1N	1.34	1.25	.32	.71	----	----
Grenora	[1].20	.35	.31	1.21	.50	2.57
Haley	.20	[1].80	----	----	----	----
Halliday R	.31	----	.33	.93	.58	----
Do	.26	[1].50	.37	1.01	.63	2.77
Hankinson Railroad Station	.39	1.97	1.99	1.69	1.08	7.12
Hannaford R	.18	.49	----	----	.47	----
Hannah	.42	.27	.34	.09	.24	1.36
Hansboro	.21	[1].20	.39	.03	.21	1.04
Harvey 3NE	.12	.29	.31	.23	.48	1.43
Haynes 6NE	.19	----	.45	.56	.34	----
Hazelton Railroad Station R	.32	.76	.67	1.10	.21	3.06
Hettinger	.25	.69	.17	.86	.82	2.79
Hettinger 17N	.15	[1].50	----	.85	----	1.54
Hillsboro	.32	1.29	1.01	.21	.30	3.13
Hurdsfield R	.20	.75	.57	.37	.22	2.11
Jamestown CAA AP R	.50	2.50	----	1.62	----	----
Jamestown CAA	.27	1.63	1.66	1.16	1.18	5.90
Jamestown State Hospital	.08	.87	.58	.77	.72	3.02
Kenmare R	.15	.31	----	.17	.23	----
Kensal Wildlife Refuge	.14	.66	.44	.41	.33	1.98
Killdeer 8NW	.58	.79	.50	1.13	.75	3.75
Kramer 5SE	.33	.28	.58	.00	.07	1.26
Kulm	.19	[1].80	1.34	1.26	.48	4.07
Langdon Experiment Farm	.72	.42	.83	.12	.34	2.43
Lansford	.32	.49	1.18	.10	.25	2.34
Leeds	.28	.52	.92	.12	.87	2.71
Lefor 10E	[1].30	.58	.14	.28	1.07	2.37
Linton	.04	1.50	.83	1.42	.21	4.00
Lisbon	.10	[1]1.80	.96	.68	.44	3.98
Litchville	.45	1.31	1.04	1.13	.43	4.36
Lostwood 12N	.19	[1].25	----	----	----	----
Maddock Agricultural School	.29	.47	.74	.31	.69	2.50
Mandan Experimental Station	.13	.72	.95	1.10	.40	3.30
Mandan Fort Lincoln Park	[1].15	.95	.43	.85	.26	2.64
Marmarth	.57	1.07	.33	1.00	.71	3.68
Marmarth MDU Co R	.36	1.08	.27	.97	.77	3.45
Martin	.47	.36	.60	.29	.71	2.43
Max	.51	[1].70	.61	.12	.16	2.10
Mayville	.37	1.14	1.06	.46	.21	3.24
McClusky	.17	.91	.71	.51	.69	2.99
McHenry 5N	.18	.29	.57	.28	.32	1.64
McVille	.27	.37	.73	.22	.33	1.92
Medina 1W	----	[1]1.50	.95	.68	.55	----
Medora 4NNE	.24	.51	.23	.47	.70	2.15
Melville R	.07	.43	.44	.28	.18	1.40
Minot CAA AP R	.20	.59	1.23	.14	.15	2.31
Minot CAA	.25	.58	1.41	.20	.24	2.68
Minot Experiment Farm	.20	.36	.77	.23	.13	1.69
Moffit 4SE	[1].28	.84	1.13	.45	.15	2.85
Mohall	.32	.41	.74	.13	.11	1.71
Montpelier	.30	1.60	1.58	1.72	1.13	6.33
Mott	.19	----	.25	.62	.38	----
Do	.18	1.05	.30	.61	.48	2.62
Munich 4SW	.34	.27	.70	.08	.23	1.62
Napoleon 1SE R	.07	.81	.40	----	----	----
Do	.05	.85	.62	.79	.86	3.17
New England	.14	.78	.13	1.07	.92	3.04
New Rockford 7WNW	.22	.26	.58	.30	.45	1.81
New Salem 1S	.17	.97	.61	.95	.89	3.59
Noonan	.11	.29	.81	.30	.31	1.82
Northgate R	.25	.23	.70	.12	.13	1.43
Oakes R	----	----	.91	1.03	.51	----
Do	.12	1.30	.96	1.08	.62	4.08
Park River	.21	.20	.46	----	.20	----
Parshall	.43	.38	.55	.37	.14	1.87
Pembina 2N R	----	----	.50	.02	.36	----
Do	.32	.12	.44	.01	.22	1.11
Petersburg	.40	.46	.89	.08	.40	2.23
Pettibone R	.08	.51	.74	.34	.56	2.23
Do	.09	.54	.77	.45	.52	2.37
Pingree	.04	.60	.74	1.15	.94	3.47
Portal	.29	.26	.69	.22	.19	1.65
Powers Lake 1N	.15	.27	.52	.26	.19	1.39
Pretty Rock	.25	.84	.37	.34	.91	2.71
Raub R	.26	.53	.52	.47	.13	1.91
Reeder	.27	[1].80	.14	1.05	----	----
Reeder 14N	.05	.49	.25	1.35	1.03	3.17
Richardton Abbey R	.43	1.07	.53	1.48	1.07	4.58
Do	.38	.78	.53	1.41	1.08	4.18
Riverdale R	.28	.55	.58	----	.42	----
Do	.21	.57	.68	.50	.42	2.38
Rolette R	----	.23	.56	.05	.46	----
Rolla	.47	[1].30	.92	.07	.36	2.12
Rugby	.27	.43	.59	.18	.53	2.00
Ryder	.15	[1].70	.35	.21	.22	1.63
San Haven	.27	.22	.83	.04	.31	1.67
Scranton	.41	.81	.18	1.17	.98	3.55
Selfridge 11W	.00	1.85	.54	1.49	1.61	5.49
Sentinel Butte 2S	.57	.91	.26	.81	.30	2.85
Sharon	.43	1.05	1.03	.38	.26	3.15
Sherwood 3N	.47	.18	.62	----	----	----
Sheyenne	----	----	----	----	.42	----
Shields	.02	.85	.26	.81	.57	2.51
Stanley R	.21	.36	.42	.46	.51	1.96
Do	.18	.42	.54	.43	.43	2.00
Steele	.13	1.47	.68	.72	.32	3.32
Sykeston	[1].30	.31	----	.34	.17	----
Tagus	.22	.44	.36	.20	.15	1.37
Tioga	.27	[1].40	.67	.68	.31	2.33
Towner	.31	.67	.87	.11	.43	2.39
Trotters 3S R	.18	.48	.19	.40	.30	1.55
Trotters 6WNW	.32	.53	.30	.82	.81	2.78
Turtle Lake	.24	----	.82	.74	.61	----
Tuttle	.18	[1].60	1.08	.55	.36	2.77
Upham 3N	.32	.36	.62	.09	.05	1.44
Valley City	.29	1.24	.58	.43	.33	2.87
Velva	.27	.60	1.01	.26	.24	2.38
Wahpeton powerplant R	.43	----	----	.84	.51	----
Wahpeton State School	.73	1.37	1.68	1.20	.62	5.60
Walhalla	.16	.28	.74	----	.10	----
Washburn	.39	.65	.45	.65	.48	2.62
Washburn waterworks R	.14	.73	.52	.57	.67	2.63
Watauga 8N S Dak	.10	.50	.14	.65	.37	1.76

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

NORTH DAKOTA—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952	Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.			Nov.	Dec.	Jan.	Feb.	Mar.	
Watford City	.35	.47	.47	.85	.52	2.66	Willow City	.34	.30	.38	.08	.21	1.31
Watford City 11E R	.64	.83	.48	.34	.39	2.68	Wilton Railroad station	.12	.67	.56	.94	.24	2.53
Westhope	.23	.24	.94	------	.11	------	Wishek	------	.74	.85	.96	.34	------
Wildrose	.24	.41	.58	.38	.33	1.94	Woodworth 5E	.06	[1].50	.60	.60	.69	2.45
Williston WB City R	.21	.55	.57	.81	.42	2.56	Zahl	.18	.23	.37	.39	.24	1.41

SOUTH DAKOTA

Aberdeen CAA AP R	0.08	1.48	0.67	2.02	1.09	5.34	Hot Springs	.17	.23	.03	.66	.94	2.03
Aberdeen CAA AP 2E	.17	1.59	1.65	2.06	1.15	6.62	Hot Springs 7W	.23	.52	------	------	------	------
Academy	.74	1.91	1.22	1.09	1.15	6.11	Hot Springs 9SW	.09	.41	------	.67	.89	------
Alcester R	------	------	.35	.88	1.18	------	Howard R	.34	------	1.09	.30	.83	------
Alexandria	.29	1.16	1.12	.40	.95	3.92	Do	[1].62	1.04	1.17	.25	.84	3.92
Andover 7N	.23	2.13	1.56	1.03	.59	5.54	Huron WB AP 2NW R	.14	1.44	1.12	.79	.70	4.19
Angostura Dam R	.16	.46	.03	.76	.80	2.21	Interior R	------	1.15	.60	1.24	1.34	------
Do	.21	.46	.03	.71	.84	2.25	Ipswich	T	1.83	1.18	1.35	.52	4.88
Antelope Range Station	.03	.63	.06	.19	[1].85	1.76	Iroquois	.21	1.41	1.46	.45	.78	4.31
Ardmore 7NW R	.00	------	.08	.55	.55	------	Isabel R	.12	.89	------	.86	.28	------
Arlington	.34	1.41	1.29	1.24	1.17	5.45	Isabel 15N R	.11	.73	------	.89	------	------
Armour	.49	2.19	2.23	1.00	1.81	7.72	Kennebec	.13	------	.96	.52	.50	------
Ashton	------	1.11	1.15	.94	.55	------	La CreekWildlife R	.14	------	.00	.60	1.00	------
Belle Fourche 2NE R	.18	.34	.07	.36	.41	1.36	La Delle 7NE	------	.98	1.38	.37	.51	------
Do	.17	.26	.06	.33	.42	1.24	Lead	1.23	3.38	.26	.85	1.72	7.44
Belle Fourche 25NNE	.10	[1]1.50	.30	.20	1.11	3.21	Lemmon R	.17	.81	.30	.98	.33	2.59
Bison	------	.92	.11	1.12	.41	------	Do	[1].20	.87	.36	.93	.35	2.71
Bixby Dam R	.15	.47	.06	.62	.37	1.67	Leola	T	1.49	1.06	1.46	.64	4.65
Do	.20	.46	.11	.63	.47	1.87	Longvalley	.15	1.49	.20	.76	.84	3.44
Blunt	.20	[1]2.25	.74	1.49	1.04	5.72	Madison	.41	2.09	1.13	1.82	2.20	7.65
Bonilla 4SSW	------	1.74	.96	.69	.81	------	Manderson	.05	.78	------	.64	1.11	------
Bowdle	.02	1.41	.33	.79	.51	3.06	Marion	.86	[1]1.34	.53	1.13	1.62	5.48
Bridgewater	.46	[1]1.80	.86	.82	1.34	5.28	Martin	.17	.55	.02	.30	.42	1.46
Britton	.07	.81	.82	1.16	.46	3.32	McIntosh R	.00	------	.34	.93	------	------
Brookings R	.32	1.32	1.21	.52	.83	4.20	Do	T	[1].73	1.01	.82	1.22	3.78
Buffalo R	.18	.78	.14	.78	.50	2.38	Meadow R	.18	------	.07	.89	.71	------
Buffalo Gap	------	.45	.10	.77	.80	------	Mellette	------	1.25	1.07	1.76	.91	------
Buskala Ranch	1.14	2.75	.17	.65	1.38	6.09	Menno R	.46	1.28	.27	------	1.32	------
Canistota 2N	.39	1.68	.83	.84	1.78	5.52	Do	.31	1.30	.37	.62	1.50	4.10
Canton	.55	2.06	.66	1.21	1.93	6.41	Midland	.09	1.11	.27	.92	.71	3.10
Carpenter R	.00	.85	.51	.20	.50	2.06	Milbank	.38	1.94	1.65	1.23	1.11	6.31
Carthage	.36	1.01	.92	.18	.35	2.82	Milesville 5NE R	.12	1.33	.85	1.73	.56	4.59
Castle Rock R	.16	.16	.18	------	1.04	------	Do	.18	1.61	.63	2.08	.78	5.28
Castlewood	.33	.91	1.12	.49	.37	3.22	Miller	.01	2.17	1.18	.67	.55	4.58
Cedarbutte	.11	[1].71	.34	.89	.39	2.44	Miller 16N	.00	1.72	1.10	.62	1.61	5.05
Centerville	.50	.95	.41	.68	1.48	4.02	Mission 14SSE	.11	[1]2.25	.32	1.05	1.90	5.63
Chamberlain	.72	2.14	.85	.65	.56	4.92	Mitchell 2SE	.34	1.25	1.69	.46	.66	4.40
Cheyenne Agency R	.10	2.40	1.03	1.33	.36	5.22	Mobridge	.02	1.09	.64	.96	.32	3.03
Do	.13	2.29	1.14	1.24	.40	5.20	Moenville	.10	2.31	.82	1.21	1.46	5.90
Clark	T	1.06	1.26	.79	.47	3.58	Moon R	1.17	1.13	.17	.41	[1]1.07	3.95
Clear Lake	.49	[1]2.00	1.77	1.49	1.59	7.34	Mud Butte R	.05	------	.25	.65	1.00	------
Columbia 8N R	.04	------	1.10	1.23	.72	------	Murdo R	.14	.67	.31	1.16	.55	2.83
Do	[1].10	[1]3.00	1.05	.81	.45	5.41	Murdo 1W	.08	.69	.43	1.01	.52	2.73
Cottonwood 2E	.09	1.83	1.30	1.44	1.80	6.46	Oelrichs	.05	.36	------	.33	.62	------
Cresbard 7NW	T	[1]1.80	.50	1.23	1.60	5.13	Oelrichs 8W	.03	.41	------	.29	.36	------
Deadwood	1.64	3.00	.31	.98	1.97	7.90	Oglala R	------	------	.04	.68	.87	------
Deerfield Dam	.26	.48	.02	.56	.86	2.18	Onaka R	.03	1.35	.60	.69	.57	3.24
De Smet	.33	1.34	1.49	.41	1.04	4.61	Do	------	1.42	.77	.89	.51	------
Dewey	.09	[1].70	.03	.29	.96	2.07	Onida	.15	2.29	.60	1.20	1.20	5.44
Dewey 9NE R	.23	.56	.00	.32	1.33	2.44	Orman Dam	.19	.37	.24	.62	.47	1.89
Dewey 15NNE	.31	[1].60	.01	.35	1.18	2.45	Pactola Ranger Station R	.18	.56	.13	.46	.73	2.06
Dixon R	.22	1.55	------	.85	.72	------	Parkston 5E	.21	1.33	.73	.55	.68	3.50
Dumont	1.76	3.36	.21	.68	1.62	7.63	Parmelee R	.12	------	.25	.67	.81	------
Dupree R	.11	1.53	------	.81	.27	------	Philip AP CAA 4E	.15	1.71	.73	.69	.75	4.03
Do	.13	1.23	.17	.99	.29	2.81	Pickstown R	.56	1.65	.75	.70	1.64	5.30
Dupree 16S	.06	1.45	.21	.99	1.16	3.87	Do	.39	[1]2.50	.97	.75	1.36	5.97
Eagle Butte	[1].20	[1]1.67	.20	2.25	.60	4.92	Pierre AP CAA 4E	.05	2.91	.97	2.66	1.08	7.67
Edgemont R	.03	.50	.00	.50	1.12	2.15	Pine Ridge	.16	.71	.17	.83	1.70	3.57
Edgemont 1N	.07	.34	------	.38	1.08	------	Plainview R	.20	1.44	[1].24	1.20	.50	3.58
Ellingson 1NE	.00	.45	.11	.49	.39	1.44	Platte 2S	[1].60	1.51	.91	------	------	------
Elm Springs 1S	.05	.85	.24	.95	.65	2.74	Pollock	T	[1]1.00	.48	1.25	.16	2.89
Eureka R	.09	.80	.39	.88	.44	2.60	Provo	.20	.25	------	.33	.79	------
Do	.09	.79	.41	.87	.46	2.62	Pukwana 3W	.35	[1]2.00	1.29	.51	.33	4.48
Fairfax	.90	3.28	1.57	1.93	1.90	9.58	Ralph	.15	.71	.12	.90	1.13	3.01
Faith R	.20	------	.30	1.40	.28	------	Rapid City WB AP 8ESE R	.21	.53	.01	.65	.81	2.21
Do	[1].41	[1]1.18	.28	1.71	.34	3.92	Rapid City	.41	.49	.08	.81	.71	2.50
Farmingdale 2N	.04	.23	------	.39	.37	------	Raymond	.18	1.23	------	------	------	------
Faulkton	T	.88	.73	.65	.77	3.03	Redfield	------	1.73	1.38	1.22	.93	------
Flandreau 4SW	.28	1.79	1.24	1.01	1.37	5.69	Redfield 6E R	.02	1.70	.82	.43	.45	3.42
Forestburg 3NE	.29	1.75	1.72	1.09	.86	5.71	Redig 9NE	.14	.42	.17	.50	.66	1.89
Fort Meade	.26	[1]1.05	.24	.34	.37	2.26	Redowl	.19	1.41	------	------	------	------
Frederick	.02	4.81	2.19	2.14	1.19	10.35	Ree Heights 6NW	------	[1]2.00	1.11	.54	.58	------
Gannvalley	.15	.61	1.09	.15	.31	2.31	Rochford Ranger Station R	.36	.76	.07	.35	.79	2.33
Garretson R	.33	1.77	1.05	1.06	1.31	5.52	Rockham	.10	[1]1.70	------	.65	------	------
Glad Valley	.12	1.29	.27	1.27	.49	3.44	Roscoe	------	1.44	.54	.68	.65	------
Glenham	[1].03	.91	.60	.54	.27	2.35	Roslyn R	.21	1.05	.84	1.26	1.00	4.36
Gregory	.51	------	1.15	1.02	1.38	------	Rumford	.05	.70	------	.77	1.17	------
Hayes 5ESE	------	------	.78	2.35	.99	------	Salem	.39	1.79	1.31	.87	1.19	5.55
Highmore 1W	.03	1.53	------	1.15	1.10	------	Scenic	------	.56	------	.77	.77	------
Hilland 4NW	.04	1.35	.33	1.49	1.11	4.32	Shadehill Dam	------	[1].70	------	.88	------	------
Hopewell 1SE R	.11	.77	.37	1.54	1.00	3.79	Sioux Falls WB AP R	.26	1.59	.94	2.09	1.70	6.58
Do	.10	.87	.39	1.85	1.00	4.21	Sisseton 3ESE	.31	[1]1.90	2.01	1.35	.85	6.42

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

SOUTH DAKOTA—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Smithwick 6SW	.12	.43	.03	.45	.93	1.96
Spearfish AP R	.51	2.91	.51	.74	1.62	6.29
Spearfish 1W	1.09	[1] 3.30	.50	.52	1.58	6.99
Stickney R	.52	1.87	1.18	.72	.77	5.06
Strool 2N R	.15	1.50	------	------	.73	------
Sulphur 2W	.06	[1] 1.20	.03	.20	.18	1.67
Thunder Hawk	.06	.42	.06	.59	.14	1.27
Timber Lake	.61	2.81	1.38	1.46	.46	6.72
Tulare	------	[1] 1.70	1.31	.74	.86	------
Tyndall	[1] .67	1.27	.47	.80	1.13	4.34
Union Center	.32	1.18	.28	.61	.38	2.77
Vale	.11	.49	.17	.47	.65	1.89
Van Metre	.15	1.78	------	.97	------	------
Vermillion R	------	.76	.78	.88	1.34	------
Do	.57	.96	.43	.69	.96	3.61
Victor 5NE	.82	1.98	1.63	1.58	1.19	7.20
Vivian	.24	1.89	.80	1.47	1.50	5.90
Wasta	.05	.54	.04	1.05	.66	2.34
Watertown CAA AP R	.08	.70	.66	.90	.72	3.06
Watertown CAA AP	.08	.80	.77	.91	.73	3.29
Wentworth	.39	1.46	1.17	1.38	1.42	5.82
Wessington Springs	.07	1.22	.80	.57	.59	3.25
Wessington Springs 9S	.33	1.89	1.72	.90	1.74	6.58
Whitehorse R	.09	------	------	.46	.30	------
White Lake	.46	1.99	1.51	1.02	.89	5.87
Wilmot	.28	2.27	2.10	2.04	.90	7.59
Wind Cave R	.11	.40	.11	.36	.95	1.93
Winner	.24	1.86	.95	.82	1.62	5.49
Wolsey	.03	1.69	1.47	.76	.79	4.74
Wood	.11	[1] 1.90	.48	1.60	1.80	5.89
Yankton 3NNW	.37	.69	.34	.96	.94	3.30
Zeona	.33	1.65	.60	1.53	1.10	5.25

WISCONSIN

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Alma Dam 4 R	------	1.07	1.62	0.79	2.83	------
Do	1.92	.73	1.59	.74	2.23	7.21
Amery Black Brook	1.89	1.28	.96	.54	2.18	6.85
Antigo	1.92	.90	1.67	.36	1.64	6.49
Appleton powerplant	1.56	1.29	2.53	.98	2.17	8.53
Arlington	1.76	[1] .90	1.85	.68	2.55	7.74
Ashland Experimental Farm R	1.84	1.30	1.20	.13	1.76	6.23
Do	1.79	1.35	1.31	.39	1.22	6.06
Babcock R	------	1.17	2.21	1.05	2.10	------
Baraboo	2.26	1.10	1.65	.83	2.57	8.41
Bayfield	1.83	[1] 1.52	1.56	.47	1.62	7.00
Beloit College	3.87	1.60	2.06	.31	3.36	11.20
Berlin powerplant R	1.47	1.28	2.10	.82	2.43	8.10
Big St. Germain	1.84	1.02	1.49	.45	1.97	6.77
Black River Falls sewage R	1.45	1.14	1.89	.62	2.67	7.77
Blair	1.44	.89	1.71	.88	2.09	7.01
Bloomer	1.69	1.09	1.18	.91	1.08	5.95
Breakwater	1.72	1.07	1.34	.47	2.12	6.72
Brillion	1.52	[1] 1.30	2.30	.68	2.40	8.20
Broadhead	2.62	1.51	2.85	.43	4.21	11.62
Brule Ranger Station	1.78	1.35	1.89	1.50	2.70	9.22
Brule Island	1.49	1.08	2.21	.82	2.13	7.73
Buckataphon	1.45	.89	1.12	.70	2.19	6.35
Burlington Sewage	2.26	[1] 2.00	1.89	.60	3.31	10.06
Burnett	1.21	[1] 1.60	------	------	------	------
Cashton	2.08	[1] .90	2.40	1.45	2.37	9.20
Cedar Falls Hydro	2.60	1.64	1.19	.73	2.01	8.17
Cherokee	1.62	1.23	1.67	------	------	------
Chilton	1.63	1.73	2.28	.82	2.62	9.08
Chilton sewage plant R	------	1.72	2.22	.86	2.79	------
Chippewa Falls power-plant R	1.87	1.54	1.75	1.06	2.48	8.70
Clintonville Sewage Plant R	2.33	1.14	2.37	.82	2.50	9.16
Coddington 1E	1.33	.54	1.64	.83	1.82	6.16
Coddington Experimental Farm R	1.46	.68	1.48	.59	1.51	5.72
Coon Valley Experimental Farm R	1.27	.81	1.82	.68	2.43	7.01
Couderay 3N R	1.56	.91	1.31	.32	2.40	6.50
Do	1.85	1.32	1.29	.35	2.28	7.09
Crivitz High Falls R	1.87	1.03	2.15	.53	2.51	8.09
Do	1.92	1.07	2.21	.55	2.44	8.19
Cuba City R	2.17	.49	1.48	.08	------	------
Cumberland	2.51	1.33	1.49	.63	2.46	8.42
Curtiss	1.47	1.44	1.95	.60	2.14	7.60
Dalton	1.31	.77	1.33	.39	1.81	5.61
Danbury	2.69	1.97	1.32	.50	2.25	8.73
Darlington	[1] 2.50	1.61	2.03	.40	3.75	10.29
Dodge	1.71	.72	1.67	.88	2.88	7.86
Dodgeville	2.13	[1] 1.50	1.98	.33	1.79	7.73
Drummond Ranger Station R	------	1.44	1.51	.28	2.42	------
Durand	1.96	1.10	------	------	2.12	------
Eagle 5N R	3.47	1.81	2.09	.67	3.31	11.35
Eau Claire	1.83	1.31	1.55	.92	2.15	7.76
Eau Claire CAA AP	1.85	1.10	1.62	.69	1.12	6.38
Eau Pleine	[1] 2.22	.97	1.63	.73	2.03	7.58
El Dorado 1SE	1.33	[1] 1.70	1.94	.58	2.07	7.62
Fairchild Ranger	1.49	1.23	1.82	.84	2.69	8.07
Fennimore 1NE R	2.34	.71	1.03	.24	2.25	6.57
Flambeau Reservoir	1.65	1.34	1.89	.58	3.48	8.94
Fort Atkinson 2SSE	2.58	1.84	2.26	.62	3.50	10.80
Frederic R	1.73	1.60	1.41	.84	3.02	8.60
Friendship Ranger Station R	------	1.30	2.54	1.09	2.58	------
Galesville 3ESE	1.56	.40	1.52	.47	2.09	6.04
Gays Mills 1W	2.08	.63	------	------	------	------
Genoa Dam 8 R	------	.88	2.44	.61	2.23	------
Do	[1] 1.87	.65	2.22	.55	1.95	7.24
Germantown 2W	3.01	[1] 1.80	1.88	0.58	2.02	9.29
Goodrich	1.66	.69	1.31	.47	1.69	5.82
Gordon	.90	[1] 1.70	.79	------	------	------
Grand River Lock	1.88	.84	1.94	.41	1.79	6.86
Grantsburg AP CAA 2N	1.32	1.23	.69	.32	2.32	5.88
Green Bay WB AP R	1.66	1.09	2.06	.70	1.98	7.49
Hancock Experimental Farm	1.86	.73	1.85	.42	2.10	6.96
Hatfield Dam	1.56	.92	1.84	.74	2.04	7.10
Hayward Ranger Station	1.41	1.25	1.81	.40	2.47	7.34
Hillsboro	2.07	.95	1.68	1.15	1.72	7.57
Hillsboro sewage plant R	1.84	.71	1.98	.63	1.97	7.13
Holcombe	1.32	1.06	1.29	.47	1.44	5.58
Janesville power station R	2.47	1.20	2.01	.49	2.68	8.85
Do	2.83	1.37	2.23	.37	2.84	9.64
Jump River	[1] 1.70	1.40	1.22	.61	1.91	6.84
Kenosha	4.03	[1] 2.10	1.65	.71	3.37	11.86
Kewaunee	1.82	2.36	1.52	.59	2.23	8.52
Knowlton R	2.34	1.36	1.79	.83	2.42	8.74
Knowlton 1W	2.29	.97	1.85	.82	2.36	8.29
La Crosse Experimental Farm R	1.71	.77	1.68	.61	2.24	7.01
La Crosse WB AP R	1.57	.80	2.22	.95	2.21	7.75
La Crosse WB City R	1.66	.92	2.09	1.05	2.53	8.25
Lac Vieux Desert	1.55	1.27	1.63	.66	2.39	7.50
Ladysmith	1.16	.95	1.22	.47	1.87	5.67
Ladysmith Ranger Station R	------	------	1.02	.20	1.54	------
La Farge R	------	------	2.11	1.12	2.62	------
Do	1.70	[1] 1.00	------	------	2.64	------
Lake Geneva	3.55	1.88	2.22	.54	3.93	12.12
Lake Mills	2.08	1.59	2.34	.53	3.26	9.80
Lancaster R	------	1.25	1.84	.41	3.68	------
Do	2.74	1.31	1.89	.45	3.36	9.75
Land O'Lakes	[1] 1.60	.79	1.03	.36	2.35	6.13
Lone Rock CAA AP R	2.22	.81	1.91	.50	2.69	8.13
Lone Rock CAA	2.38	.90	1.73	.61	2.61	8.23
Long Lake Dam	1.62	1.12	1.55	.43	1.69	6.41
Lynxville Dam 9 R	------	.66	1.99	.22	2.23	------
Do	1.33	.66	1.80	.23	2.16	6.18
Madeline Island	1.44	1.19	1.91	.62	1.87	7.03
Madison WB AP R	2.17	1.47	2.21	.60	2.92	9.37
Madison WB City R	2.05	1.79	2.24	.84	3.09	10.01
Manitowoc	2.40	1.49	------	------	------	------
Marinette	3.13	1.15	1.87	.39	2.47	9.01
Marshfield Experimental Farm R	------	.68	1.47	.53	1.91	------
Do	1.93	.63	1.72	.79	1.88	6.95
Mather 3NW	1.94	1.60	2.15	1.10	2.12	8.91
Mauston	1.87	.75	2.03	.80	1.98	7.43
Medford R	------	1.17	1.90	.36	1.45	------
Do	1.83	2.13	2.48	.70	2.22	9.36
Mellen Dam 2NE	1.79	1.16	1.38	.36	1.27	5.96
Menasha Lock	1.18	[1] 1.30	1.97	.49	1.75	6.69
Menomonie	[1] 1.90	1.45	1.22	.89	2.35	7.81
Menomonie sewage plant R	1.88	1.59	1.49	1.18	2.48	8.62
Mercer Ranger Station R	1.79	1.21	1.34	.49	2.66	7.49
Merrill R	1.81	1.13	1.66	.61	1.80	7.01
Do	1.67	.46	1.33	.33	.96	4.75
Milwaukee Mount Mary College	2.64	1.83	2.25	.70	3.97	11.39
Milwaukee North Side	2.62	1.80	2.38	.81	4.29	11.90
Milwaukee WB AP R	1.99	2.26	2.08	.82	3.67	10.82
Milwaukee WB City R	2.69	2.31	2.40	.82	3.80	12.02
Minocqua Dam	1.82	1.27	1.21	.63	1.71	6.64
Minong Ranger Station R	1.42	------	1.65	.50	[2]	------
Mondovi	1.89	1.18	1.73	.82	2.16	7.78
Monroe 1W	2.25	1.47	2.07	.33	3.86	9.98
Mount Horeb 1WSW	2.12	1.60	1.95	.83	3.63	10.13
Muscoda	1.90	.67	1.49	.41	2.13	6.60
Neillsville	1.56	1.51	1.69	.89	1.69	7.34
New London	1.91	1.41	2.30	.81	2.62	9.05

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

WISCONSIN—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
North Pelican	1.67	1.03	1.84	.42	1.17	6.13
Oconomowoc	1.82	1.19	1.92	.30	2.93	8.16
Oshkosh Buckstaff	1.43	1.21	1.95	.49	1.90	6.98
Owen County Asylum	1.42	.93	1.80	.86	2.15	7.16
Park Falls R	1.64	1.32	1.70	.32	2.57	7.55
Do	1.59	.76	1.81	.20	2.30	6.66
Peshtigo power plant R	1.99	.88	1.49	.39	2.14	6.89
Phelps Deerskin Dam R	1.31	.75	.95	------	1.40	------
Do	1.21	.97	1.44	.26	1.22	5.10
Pine River 3NE	1.93	1.07	2.22	.90	2.46	8.58
Pittsville	1.88	1.00	1.81	.74	2.04	7.47
Platteville	2.55	1.25	1.84	.35	3.86	9.85
Plymouth	2.14	2.12	2.48	.70	3.22	10.66
Portage	[1] 1.80	1.60	1.70	.92	2.65	8.67
Portage Lock R	1.59	------	1.79	.97	2.50	------
Port Washington	2.61	2.23	3.00	.45	3.49	11.78
Port Wing	1.55	1.29	1.50	.41	2.00	6.75
Prairie Du Chien	1.82	1.00	1.98	.57	2.49	7.86
Prairie Du Sac 2N	1.79	.91	1.82	.66	1.73	6.91
Prentice 6W	1.99	[1] 1.20	1.76	.53	3.27	8.75
Prentice Ranger Station R	1.77	1.04	1.35	.48	------	------
Racine	3.15	2.67	1.68	.69	3.20	11.39
Rainbow Reservoir R	1.69	.61	.99	.14	1.35	4.78
Do	1.78	.83	1.10	.13	1.15	4.99
Reedsburg	1.93	.84	------	------	------	------
Rest Lake	1.63	1.35	1.72	.44	2.41	7.55
Rhinelander	1.28	1.11	1.64	.49	1.58	6.10
Rib Falls	2.15	.83	1.49	.50	1.39	6.36
Rice Lake Power Plant R	1.91	------	1.29	.64	2.23	------
Rice Reservoir R	1.64	1.17	1.44	.34	1.52	6.11
Do	1.73	1.14	1.46	.35	1.28	5.96
Richland Center	2.13	1.06	1.82	.81	2.69	8.51
Ripon 5E	1.84	1.61	2.51	1.34	3.40	10.70
River Falls	2.31	1.49	1.06	.84	2.26	7.96
Rosholt Collins Park	1.87	1.07	1.87	.83	2.31	7.95
St. Croix Falls	1.69	1.54	1.01	.73	1.58	6.55
Shawano	2.43	[1] 1.30	2.09	.76	1.94	8.52
Sheboygan	2.89	2.04	2.33	.75	3.27	11.28
Solon Springs	2.37	1.79	2.05	.28	3.13	9.62
South Pelican	1.66	.95	1.98	.49	1.29	6.37
Sparta Power Plant	1.34	.81	1.68	.85	1.34	6.02
Spooner Experimental Farm R	1.17	1.08	.68	.14	1.82	4.89
Spring Valley	2.27	1.20	1.05	.84	1.88	7.24
Steuben 1NW R	1.89	1.08	2.01	.63	2.93	8.54
Do	1.86	1.10	2.01	.61	2.84	8.42
Stevens Point AP	1.56	1.31	------	------	------	------
Stoughton	2.04	1.29	2.12	.54	2.96	8.95
Stratford	2.48	[1] .70	1.72	.53	1.93	7.36
Strum 5S R	1.91	1.57	1.91	1.08	2.08	8.55
Sturgeon Bay Experiment Station R	2.03	1.59	1.89	.50	3.17	9.18
Sturgeon Bay Experiment Station	2.08	[1] 1.50	1.95	.27	2.99	8.79
Sugar Camp	1.55	.93	1.35	.23	1.46	5.52
Summit Lake Ranger Station	2.29	1.24	------	.53	1.55	------
Superior Bong AP	1.04	[1] 1.70	.73	.18	1.60	5.25
Three Lakes Ranger Station R	1.43	.94	1.38	.40	1.40	5.55
Tomah Ranger Station R	1.99	.92	2.17	------	------	------
Tomahawk Spirit Reservation	1.57	.91	1.53	.54	1.44	5.99
Trempealeau Dam 6 R	1.16	1.04	1.95	1.21	------	------
Do	1.66	.84	2.07	1.07	3.22	8.86
Two Rivers	2.35	2.17	2.57	.94	3.33	11.36
Union Grove	3.17	1.90	1.67	.66	3.15	10.55
Viroqua	2.20	.95	2.34	1.32	2.07	8.88
Washington Island R	------	1.35	2.07	.48	2.60	------
Do	1.66	1.18	2.00	.28	2.50	7.62
Watertown	2.10	1.98	2.70	.80	3.87	11.45
Waukesha	3.92	2.39	2.17	.93	4.22	13.63
Waupaca	1.63	.41	1.45	.62	1.52	5.63
Wausau R	2.18	.88	1.57	------	------	------
Wausau CAA AP	2.28	1.24	1.66	.66	1.95	7.79
Wausau Old Post Office	2.43	1.29	1.93	.81	1.72	8.18
West Allis	2.87	2.21	------	------	------	------
West Salem	1.31	.87	1.42	.83	2.02	6.45
Whitewater	3.04	1.91	1.78	.60	3.36	10.69
Williams Bay Yerkes Observatory	3.91	2.15	2.14	.77	4.61	13.58
Willard R	1.14	.75	------	.45	1.76	------
Willow Reservoir	1.36	1.32	1.03	.52	1.42	5.65
Winter 6NNW	1.69	.59	1.50	.34	1.64	5.76
Wisconsin Dells	2.16	1.36	2.29	1.11	2.99	9.91
Wisconsin Rapids	1.66	.93	1.88	1.16	1.92	7.55
Wisconsin Rapids Grand Avenue Bridge	[1] 1.70	.51	1.48	.74	1.61	6.04

WYOMING

Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.	
Albin	[1] 0.40	1.55	.25	1.50	[1] .75	4.45
Alva 5SE	.85	2.27	.34	.63	1.47	5.56
Archer	1.17	.43	.04	.43	1.97	4.04
Arvada 3N	.18	.45	.05	.50	.61	1.79
Barnum 1N R	.21	.33	.02	.91	.63	2.10
Bill	[1] .10	[1] 1.30	.11	.60	[1] 1.18	3.29
Bill 12W	T	.39	T	.24	.15	.78
Bill 15SW R	.09	.81	.05	.57	.66	2.18
Bright 7NE	0	.27	T	.42	.77	1.46
Buffalo 5W	.26	.24	.03	.65	.90	2.08
Buffalo 11NW	.43	1.06	.10	.89	.76	3.24
Buffalo 21S	.63	.07	.07	.39	.68	1.84
Carpenter 3E	.51	.51	T	.28	.67	1.96
Casper	.38	.74	.06	2.01	1.53	4.72
Casper WB AP R	.20	.42	T	.75	1.56	2.93
Centennial	.90	2.87	1.18	.75	1.90	7.60
Cheyenne Horticultural Station	.46	.26	T	.24	.38	1.34
Cheyenne WB AP	.79	.93	T	.80	1.84	4.36
Chugwater	.59	1.08	.28	1.36	1.88	5.19
Clareton R	.05	.12	.04	.13	.29	.63
Clareton 16SW	T	.25	T	.06	.30	.61
Clearmont 1SW	.17	.62	.12	.60	[1] .92	2.43
Colony 1SE	.42	.84	.20	.59	.91	2.96
Devils Tower	.70	[1] 1.34	.30	.40	1.67	4.41
Double Four Ranch	.23	.54	.21	.65	.95	2.58
Douglas	.08	.42	.23	1.24	1.38	3.35
Douglas 17NE	.03	.24	.01	.42	.52	1.22
Douglas CAA AP R	.05	------	.22	.67	.70	------
Douglas CAA AP	.05	.21	.18	.74	1.02	2.20
Dull Center R	.00	.37	.03	.23	.58	1.21
Do	T	.38	.00	.18	.51	1.07
Echeta	.29	.41	.09	.42	.59	1.80
Elk Mountain	.55	.47	.53	.80	1.62	3.97
Encampment 10ESE	.94	2.09	1.00	.67	1.51	6.21
Four Corners 5S	.93	1.54	.19	.42	1.58	4.66
Four Corners 6WSW	1.21	.90	.38	[1] .70	1.13	4.32
Foxpark	.44	2.51	.57	.70	2.89	7.11
Gillette	.50	.40	[1] 1.40	[1] .50	.85	2.65
Gillette 9SW R	.20	------	.32	.39	------	------
Gillette 18SW	.23	.57	[1] .18	.35	.67	2.00
Glenrock 1W	T	.61	[1] .90	1.50	1.27	4.28
Glenrock 14SSE	.57	.77	.03	1.21	1.91	4.49
Glenrock 16N	.01	.24	.02	[1] .70	.34	1.31
Hampshire 3SW	.00	.17	.00	[1] .20	1.13	1.50
Hat Creek	.00	.29	.02	.64	.60	1.55
Hat Creek 14N	.00	.41	.03	1.03	.97	2.44
Hecla	.82	1.10	T	.56	1.69	4.17
Jay Em	.05	.72	.12	.36	.42	1.67
Jelm R	.25	1.93	.46	.64	1.70	4.98
Jireh	.11	.53	.09	.45	.62	1.80
Kaycee	.10	.17	.05	.31	.50	1.13
Kaycee 17WNW	.16	.40	.15	.98	.93	2.62
Kaycee 26SSW	.04	.21	.02	1.00	.66	1.93
Keyhole Dam R	.33	.67	.11	.18	.72	2.01
Do	.39	.61	.11	.19	.94	2.24
Kirtley	.13	1.10	.02	.91	1.09	3.25
La Grange	.12	.38	.18	.57	.53	1.78
Lance Creek R	.01	.41	.08	.53	.57	1.60
Lance Creek 10N	T	.14	T	.11	.24	.49
Lance Creek 14NW	[1] T	.34	T	.27	.41	1.02
Lance Creek 18N	.04	.80	.08	1.49	1.07	3.48
Laramie	.68	1.09	.24	1.01	1.15	4.17
Laramie 2WSW R	.41	.47	.16	.32	.57	1.93
Laramie CAA AP	.36	.53	.22	.46	.82	2.39
Lawver	T	[1] .17	T	.06	.22	.45
Lawver 8SW	.01	.11	.06	.17	.37	.72
Leath Ranch	.18	.21	.07	.22	.55	1.23
Leo 6SW	.58	.75	.09	1.11	[1] .96	3.49
Little Medicine 4NNW R	.33	.94	.14	------	.96	------
Lookout 14NE	1.12	.77	.76	1.12	2.38	6.15
Lower Crazy Woman Cr	.32	.45	.05	.36	.73	1.91
Lusk	.15	.74	.01	.51	.86	2.27
Marshall 9SW	.34	.73	.41	.60	2.49	4.57
Mayoworth R	.16	.26	.08	.51	.69	1.70
McFadden	.80	.17	.39	.89	1.10	3.35
Medicine Bow R	.54	.22	.44	.64	.74	2.58
Do	.56	.20	.42	.63	.76	2.57
Metz Ranch	.11	.19	.12	.31	.73	1.46
Midwest	.16	.78	.03	.66	.70	2.33
Midwest 6N R	.14	.50	.03	.48	.52	1.67
Moorcroft CAA	.30	.55	.45	.19	.87	2.36
Morrisey	.04	.34	.02	.44	1.38	2.22
Mule Creek R	.00	.27	.07	.53	1.61	2.48
Do	.00	[1] .30	.07	.53	1.61	2.51
Newcastle R	------	.77	.05	.17	1.21	------

See footnotes at end of table.

TABLE 4.—*Total and monthly precipitation November 1951 to March 1952, by stations*—Continued

WYOMING—Continued

Station	1951		1952			Total Nov. 1951–Mar. 1952	Station	1951		1952			Total Nov. 1951–Mar. 1952
	Nov.	Dec.	Jan.	Feb.	Mar.			Nov.	Dec.	Jan.	Feb.	Mar.	
Newcastle	.36	.71	.05	.21	1.27	2.60	Rozet	[1].40	.30	.05	.17	.03	.95
Newcastle 14W	T	.35	T	.11	.39	.85	Saratoga	.49	.46	.69	.78	.83	3.25
Newcastle 15SSE	.15	[1].31	T	.10	.64	1.20	Seminoe Dam R	.62	------	.18	([2])	2.04	------
Nine Mile Creek	.35	.15	.30	.77	.88	2.45	Do	.58	.72	.12	.88	.59	2.89
Osage R	.31	1.00	.08	.18	1.03	2.60	Shawnee 14N R	.05	.37	.00	.84	.89	2.15
Osage 10NNE	.86	.89	.23	.19	1.00	3.17	Sheridan Fld. Sta. 8NE	.13	.57	[1].13	1.17	.63	2.63
Pathfinder Dam R	.06	.37	.00	.65	.46	1.54	Sheridan WB AP R	.15	.68	.15	1.39	.85	3.22
Do	.07	.37	T	.85	.47	1.76	Spencer 10NE	T	.57	.15	[1].50	1.63	2.85
Phillips R	.23	.44	.12	.42	1.12	2.33	Story R	.32	[1]1.00	.17	1.04	.99	3.52
Phillips	.38	.61	.13	.50	1.31	2.93	Sundance	.38	.66	.36	.22	.93	2.55
Pine Bluffs	.33	.42	T	.40	.51	1.66	Taylor Ranch	.08	.13	[1].10	1.45	.46	2.22
Pine Bluffs 5W R	.24	.46	.00	.18	.48	1.36	Teckla R	.10	.48	.15	[1].20	[1].50	1.43
Pine Tree 9NE	.08	.22	.02	.18	.41	.91	Tennyson	.78	.54	.03	.53	.85	2.73
Pine Tree 9NNE R	.04	.22	.02	.18	.41	.87	Torrington 1S R	------	.77	.27	.75	1.41	------
Pole Mountain	[1].97	.89	T	.37	.97	3.20	Upton	.56	1.14	.68	.35	1.75	4.48
Raven R	.16	.40	.04	.25	1.08	1.93	Upton 12S	.15	.57	.07	.34	[1].56	1.69
Recluse R	.32	.58	.10	.47	.96	2.43	Upton 13SW	.06	.81	.02	.71	.59	2.19
Recluse 3NNE	.48	.65	.16	.69	1.13	3.11	Verse 8NW	T	.72	.07	.19	.75	1.73
Redbird	T	.28	T	.60	.66	1.54	Weston 3N	[1].30	.10	.01	.06	.02	.49
Rochelle 3E	.02	.39	.04	.16	.56	1.17	Wheatland 1N R	.10	.58	.20	.71	.70	2.29
Ross	.16	.58	.07	[1].60	.50	1.91	Yoder	.15	.55	.40	.66	1.16	2.92

[1] Estimated.
[2] Amount included in following month.
Figures and letters following the station name, such as 12SSW, indicate distance in miles and direction from the post office.

T Trace, an amount too small to measure.
— No record.
R Automatic recording gage, hourly values available in regular Weather Bureau publication.

TABLE 5.—*Supplemental precipitation data—snow depth and water equivalent, March 1952*

MISSOURI RIVER BASIN

Location	Date[1]	Amounts in inches		Snow and soil conditions
		Snow depth	Water equivalent	
MO—Missouri Local				
1. Howard, S. Dak	18	0.0	0.00	Melt in progress; small patches of ice.
2. Gann Valley, S. Dak	20	8.0	3.77	Frozen 12"+, top 3" wet and flinty; 1.60" ice on ground; 80 percent cover; granular with hard crust; slight melt under ice.
3. Gregory, S. Dak	17	8.7	3.90	Frost 6"–18"; 1.25" ice on ground; 90 percent cover; granular.
4. Vivian, S. Dak	18	12.1	5.50	Frost 3"; 1" ice on ground; 100 percent cover; heavy drifting.
5. Chamberlain, S. Dak	18	4.0	3.00	Frozen with standing water; 2" ice; 40 percent cover; wet and granular.
6. Pierre, S. Dak	19	6.3	2.70	Frost 18"; 1.50" ice on ground; 100 percent cover; granular, hard surface crust.
7. Highmore, S. Dak	19	15.6	5.60	Frost 12", 0.50" ice on ground; 100 percent cover; granular except top 3" (hard crust).
8. Seneca, S. Dak	19	15.2	4.00	Frost 3", 0.50" ice on ground; 100 percent cover; granular, wet, light crust.
9. Whitlocks Crossing, S. Dak	19	7.4	3.25	Frost 3", 1.25" ice on ground; 95 percent cover; granular, wet, water between snow and ice.
10. Hayes, S. Dak	19	10.4	3.20	Frost 10"; 100 percent cover; granular, wet, heavy drifting.
11. Mobridge, S. Dak	21	10.0	3.28	Wet, frozen, 0.20" ice on ground; 100 percent cover.
12. Zeeland, N. Dak	21	9.0	2.60	Wet, frozen ground; 100 percent cover.
13. Selfridge, N. Dak	20	10.0	3.35	Frozen, 0.50" ice on ground; 100 percent cover.
14. Steele, N. Dak	20	10.0	2.77	Moderate frost; 100 percent cover.
15. Bismarck, N. Dak	21	14.0	3.17	Wet, frozen ground; 100 percent cover.
16. Riverdale, N. Dak	20	8.0	1.98	Moderate frost; 100 percent cover.
17. Stanley, N. Dak	20	6.0	1.41	Heavy frost; 100 percent cover.
18. Wafford City, N. Dak	20	10.0	2.73	Moderate frost; 100 percent cover.
19. Epping, N. Dak	20	12.0	3.26	Light frost; 100 percent cover.
20. Culbertson, Mont	19	11.1	2.25	Frozen, wet ground; 100 percent cover.
21. Plentywood, Mont	19	13.1	2.83	Frozen, 12"; 100 percent cover.
22. Scoby, Mont	19	9.8	2.05	Frozen, trace of ice; 100 percent cover.
23. Popular, Mont	18	13.2	2.78	Frozen 8"; 100 percent cover; granular.
24. Circle, Mont	18	10.8	2.20	Frozen 5", 0.25" ice on ground; 100 percent cover; snow granular.
25. Frazer, Mont	18	11.2	2.70	Frozen 12", 0.50" ice on ground; 100 percent cover; snow granular.
MK—Milk Basin				
1. Glasgow, Mont	18	10.0	2.60	Frozen 12", 0.50" ice on ground; 100 percent cover; snow and ice granular.
2. Glasgow, Mont. (25 miles north)	20	11.5	3.22	Frozen 12"; 100 percent cover; severe drifting.
3. Malta, Mont	18	10.4	2.90	Frozen 12"; 0.75"; 100 percent cover; snow granular, ice solid.
4. Harlem, Mont	18	8.9	2.99	Frozen 12", 1.25"; 100 percent cover; snow granular, ice solid.
5. Chinook, Mont	18	6.2	2.86	Frozen 12", 1.50" ice on ground; 100 percent cover; snow granular, ice solid.
6. Havre, Mont	18	5.4	1.76	Frozen 12", 0.50" ice on ground; 95 percent cover; snow granular, ice solid.
7. Turner, Mont	19	13.3	3.12	Frozen 12", 0.75" ice on ground; 100 percent cover; ice solid.
8. Hays, Mont	19	3.6	.98	Frozen 12", 0.50" ice on ground; 95 percent cover; ice solid.
9. Phillips, Mont	19	4.8	.99	Frozen 12", 0.50" ice on ground; 98 percent cover; snow and ice granular.

[1] All dates in March 1952.

TABLE 5.—*Supplemental precipitation data—snow depth and water equivalent, March 1952*—Continued

MISSOURI RIVER BASIN—Continued

Location	Date[1]	Amounts in inches		Snow and soil conditions
		Snow depth	Water equivalent	
YS—Yellowstone Basin				
1. Baker, Mont	20	11.0	4.13	Frozen; 1″ ice on ground; 100 percent cover; ice semiporous.
2. Glendive, Mont	20	10.2	2.20	Frozen 12″; 95 percent cover; snow granular and crusted.
3. Sidney, Mont	19	10.6	2.44	Frozen 12″; trace of ice on ground; 100 percent cover.
4. Broadus, Mont	20			30 percent cover, no sample taken.
LMO—Little Missouri Basin				
1. Marmarth, N. Dak	20	12.0	4.16	Frozen; 1″ ice on ground; 100 percent cover; ice hard.
2. Beach, N. Dak	20	10.0	2.49	Frozen; 0.30″ ice on ground; 100 percent cover; ice hard.
3. Alzada, Mont				10 percent cover, no sample taken.
KN—Knife Basin				
1. Beulah, N. Dak	20	8.0	2.20	Frozen; 0.10″ hard ice on ground; 100 percent cover.
2. Glen Ullin, N. Dak	20	14.0	4.14	Frozen; 0.40″ hard ice on ground; 100 percent cover.
HT—Heart Basin				
1. Dickinson, N. Dak	20	8.0	2.62	Frozen; 0.50″ hard ice on ground; 95 percent cover.
2. Carson, N. Dak	20	14.0	4.12	Frozen; 0.30″ ice on ground; 90 percent cover; standing water.
CB—Cannonball Basin				
1. Mott, N. Dak	20	6.0	1.72	Frozen; 0.20″ ice on ground.
2. Amidan, N. Dak	20	12.0	2.99	Frozen; trace ice on ground; 100 percent cover.
3. Breien, N. Dak	20	11.0	3.45	Frozen; 0.50″ ice on ground; 100 percent cover; standing water.
GR—Grand Basin				
1. Bucyrus, N. Dak	20	14.0	3.70	Frozen; 100 percent cover.
2. Morristown, S. Dak	20	7.0	2.27	Frozen; 0.25″ hard ice on ground; 100 percent cover.
3. Buffalo, S. Dak	21	9.0	2.66	Frozen; wet; 0.50″ hard ice on ground; 100 percent cover.
MOR—Moreau Basin				
1. Isabel, S. Dak	21	20.0	6.12	Frozen, wet; 100 percent cover.
2. Bison, S. Dak	21	12.0	3.26	Frozen; moderately wet; 100 percent cover.
3. Eagle Butte, S. Dak	21	7.0	2.94	Frozen; wet; 1″ hard ice on ground; 100 percent cover.
CH—Cheyenne Basin				
1. New Underwood, S. Dak	19	5.7	3.70	Frost 6″; 2″ ice on ground; 75 percent cover; granular; thin cover of water on surfaces with no snow.
2. Oelrichs, S. Dak	20	0.0	0.00	No frost; saturated.
3. Faith, S. Dak	21	9.0	3.66	Frozen; wet; 0.80″ hard ice on ground; 100 percent cover.
4. Newell, S. Dak	20			40 percent cover, no sample taken.
BD—Bad Basin				
1. Philip, S. Dak	19	8.0	2.85	Frost 12″; 0.50″ ice on ground; 60 percent cover; granular; hard surface crust.
WH—White Basin				
1. Murdo, S. Dak	18	11.2	4.25	Frost 1″–6″; 1.50″ ice on ground; 100 percent cover; bottom 3″ granular; heavy crust; top 3″–4″ new snow.
2. Chadron, Nebr	20		(2)	No frost; saturated; 5–10 percent cover.
NI—Niobrara Basin				
1. Gordon, Nebr	20		(2)	Frost 7″–10″; saturated; 5–10 percent cover.
2. Merriman, Nebr	20		(2)	Frost 4″; wet; 5–10 percent cover.
3. Valentine, Nebr			(2)	No frost; top 6″; 2″ frost layer under, soil saturated; 5 percent cover.
JA—James Basin				
1. Hecla, S. Dak	19	15.7	4.86	Frost 12″+; top 1″ flinty, remainder hard, dry; 0.06″ ice on ground; 100 percent cover.
2. Leola, S. Dak	19	17.7	5.20	Frost 8″, very dry except top 2″; 100 percent cover; top 12″ fine and packed. ice layer beneath 0.50″–1″ thick.
3. Aberdeen, S. Dak	19	16.1	5.04	Frost 12″+; top 3″ hard, flinty; 0.28″ ice on ground; 100 percent cover; top 6″ fine and packed; loose, thick crust 6″ down; granular.
4. Bonilla, S. Dak	19	8.1	4.37	Frozen 12″+; top 4″ hard, flinty; 1.80″ ice on ground; 100 percent cover; soft, wet and coarse, considerable melt water in ice layer.
5. Woonsocket, S. Dak	20	3.3	2.54	Frozen 12″; top 2″ hard, flinty; 1.90″ ice on ground; 60 percent cover; coarse, icy.
6. Stickney, S. Dak	20	2.8	1.81	Frozen 10″; top 2″ hard and flinty; 1.10″ ice on ground; 50 percent cover; ponded water in fields, no runoff evident.
7. Menno, S. Dak	20	0.0	0.00	Top 6″ thawed, moist 6″–12″; runoff evident in fields; small streams bankfull; Vermillion River slightly overbank on Highway 18.
8. Carrington, N. Dak	21	8.0	1.88	Moderately wet; frozen; 0.30″ ice on ground; 95 percent cover; ice porous.
9. New Rockford, N. Dak	20	5.0	2.32	Moderate frost; 1″ ice on ground; 95 percent cover; ice porous.
10. Jamestown, N. Dak	20	10.0	4.43	Moderate frost; 1″ hard ice on ground; 98 percent cover.
11. Ellendale, N. Dak	20	7.0	2.93	High frost; 0.20″ ice on ground; 98 percent cover; ice hard.

[1] All dates in March 1952.
[2] No sample.

TABLE 5.—*Supplemental precipitation data—snow depth and water equivalent, March 1952*—Continued

MISSOURI RIVER BASIN—Continued

Location	Date[1]	Amounts in inches		Snow and soil conditions
		Snow depth	Water equivalent	
BGS—Big Sioux Basin				
1. Pipestone, Minn	17	5.7	2.55	Moist; frozen 11″; top 2″ saturated; 0.65″ ice on ground; 90 percent cover; 3 layers of snow; crusts between consist of 0.25″–1″ thick ice layer, melt in progress; no runoff.
2. Split Rock Creek, Minn. (North course 2½ miles west of South Dakota–Minnesota border on Highway 34).	17	3.4	2.68	Frozen 12″+; saturated; 1.35″ ice on ground; 90 percent cover; snow ripened; melt in progress, no runoff.
3. Split Rock Creek, Minn. (middle course, Sherman, S. Dak., 2W).	17	4.6	3.66	Frozen 12″+; wet; 2.15″ ice on ground; 80 percent cover; ice saturated; melt in progress, no runoff; Big Sioux frozen tight east of Egan.
4. De Smet, S. Dak	18	6.9	3.43	Frozen 14″+; 1″ ice on ground; 95 percent cover; coarse, wet, little melt; streams frozen, some ponded water.
5. Brookings, S. Dak	18	7.5	3.42	Frost 12–13″; wet; 0.90″ ice on ground; 95 percent cover; coarse; granular; icy; some water in ice.
6. Six Mile Creek, S. Dak. (middle course, White, S. Dak. 3NNE).	18	10.9	3.35	Frost 10″+; top 1″ thawed, next 2″ frozen; 0.05″ ice on ground; 100 percent cover; coarse, granular; icy; moderate crust, no melt.
7. Toronto, S. Dak	18	19.7	6.67	Frost 12″+; top 2″ flinty; 100 percent cover; fine, packed, dense.
8. Webster, S. Dak	18	9.9	3.51	Frost 14″+; top 2″ flinty; 95 percent cover; badly drifted; fine, dense, crusted.
9. Sioux Falls, S. Dak	20	2.3	1.45	Top 2″ thawed; saturated; 2″–10″ frozen; 35 percent cover, snow degenerated to rotten ice; Big Sioux River at Sioux Falls almost bankful, ice not out, over ice in places.
FL—Floyd Basin				
1. Sanborn, Iowa	17	1.0	1.03	Frost 12″+; saturated; 1.10″ ice on ground; 30 percent cover, melt in progress, water in and under ice and snow.
DA—Dead Area River				
1. Hazelton, N. Dak	21	19.0	4.75	Frozen, moderately wet; 100 percent cover.
2. Mercer, N. Dak	21	10.0	2.33	Do.
3. Hurdsfield, N. Dak	21	4.0	2.00	1.50″ ice on ground; 95 percent cover, 1″ ice porous, 0.5″ hard.

RED RIVER OF THE NORTH BASIN

RD—Red Local (North Dakota side)				
1. Gardner, N. Dak	17	11.3	2.90	90 percent cover; crystallized.
2. Erie, N. Dak	17	10.0	2.60	75 percent cover; crystallized.
3. Galesburg, N. Dak	17	8.3	2.30	50 percent cover; crystallized; drifted.
4. Hillsboro, N. Dak	17	10.0	3.20	75 percent cover; crystallized; drifted.
5. Portland, N. Dak	17	9.3	2.30	50 percent cover; crystallized; drifted.
6. Buxton, N. Dak	17	8.2	2.30	60 percent cover; drifted; wet.
7. Thompson, N. Dak	17	9.9	3.60	Drifted; slushy near ground.
8. Northwood, N. Dak	16			15 percent cover; scattered drifts; snow in ditches.
9. Larimore, N. Dak	16			Do.
10. Grand Forks, N. Dak	16			25 percent; scattered drifts, 6″ to 20″ deep.
11. Manvel, N. Dak	16			Do.
12. Minto, N. Dak	15			30 percent cover; snow in ditches and timber; drifts about 12″ deep.
13. Warsaw, (nr), N. Dak	15			Do.
14. Fordville, N. Dak	16			Do.
15. Adams, N. Dak	16	6.8	1.30	50 percent cover; layers of ice.
16. Edmore, N. Dak	16			30 percent cover; snow in low places; ditches and timber.
17. Park River, N. Dak	15			10–20 percent cover; ice and water in ditches.
18. Grafton, N. Dak	15			Do.
19. Junction U. S. 81 and 29, North Dakota	15			Do.
20. Pittsburg, N. Dak	15			Do.
21. Joliette, N. Dak	15			Scattered snow and ice in fields.
22. Cavalier, N. Dak	15			10–20 percent cover; ice and water in ditches.
23. Walhalla, N. Dak	15	11.5	1.90	60 percent cover; loose heavy snow in timber; some drifts.
24. Milton, N. Dak	15			20 percent cover; loosely packed patches of ice in fields and ditches.
25. Maida, N. Dak	15	9.8	2.10	35 percent cover; light snow, some layers.
26. Langdon, N. Dak	15			30 percent cover; drifted snow, small patches of ice.
27. Clyde, N. Dak	15	6.8	1.30	55 percent cover; honeycombed; light, glazed surface.
28. Forman, N. Dak	20	18.0	4.88	Moderate frost, 100 percent cover.
RM—Red Local (Minnesota side)				
1. Breckenridge, Minn	17	14.0	4.90	100 percent cover; heavy crystallized; drifted.
2. McCavleyville, Minn	18	13.3	3.70	100 percent cover; crust, layers; drifting.
3. Wolverton, Minn	18	13.0	4.00	100 percent cover; drifted; crystallized.
4. Rustad, Minn	18	10.5	2.40	Do.
5. Hawley, Minn	13	11.0	2.08	Hard crust over loose granular snow.
6. Callaway, Minn	16	10.4	2.42	Honeycombed; some water and ice under snow.
7. Waubun, Minn	16	9.4	2.78	Do.
8. Bejou, Minn	16	8.8	2.48	Light crust; granular snow.
9. Felton, Minn	13	8.6	3.08	Granular snow, loose; 1″ to 2″ water under snow.
10. Ada, Minn	13	9.0	3.55	Granular snow; 1″ to 2″ water under snow; 90 percent cover.
11. Beltrami, Minn	13	7.1	[3] 2.70	Water under snow; granular snow.
12. Warren, Minn	14	7.5	2.03	Granular snow; light crust.
13. Argyle, Minn	14	8.0	2.70	Hard crust; granular snow.
14. Hallock, Minn	13	6.5	1.58	Hard crust; granular snow; 75 percent cover.
15. Karlstad, Minn	14	7.5	1.65	Light crust; granular snow.
16. Middle River, Minn	14	9.2	1.68	Light granular snow.

[1] All dates in March 1952.
[3] Adj. 2.30.

TABLE 5.—*Supplemental precipitation data—snow depth and water equivalent, March 1952*—Continued

RED RIVER OF THE NORTH BASIN—Continued

Location	Date[1]	Amounts in inches		Snow and soil conditions
		Snow depth	Water equivalent	
SU—Souris Basin				
1. Towner, N. Dak	14	8.0	2.10	90 percent cover; snow well packed; drifted; some new snow.
2. Rugby, N. Dak	15	6.3	1.10	80 percent cover; layers of ice, packed, some drifting.
3. Velva, N. Dak	13	9.0	2.00	75 percent cover; snow drifted, layers of ice, hard packed; 1″ new snow.
4. Minot, N. Dak	13	8.3	1.30	85 percent cover; heavy drifting, hard packed, layers of ice; 2″ new snow.
	20	12.0	2.66	Moderate frost, 0.50″ hard ice on ground; 90 percent cover.
5. Foxholm, N. Dak	13			50 percent cover; snow cover very light.
6. Coulee, N. Dak	13	6.3	1.90	75 percent cover; some crusted layers; some new snow; ice on ground.
7. Kenmare, N. Dak	14	7.0	1.50	85 percent cover; crusted, well packed; some new snow.
8. Northgate, N. Dak	14	8.5	2.00	80 percent cover; drifted, well packed; some new snow.
9. Mouse River Bridge, N. Dak	14	6.3	1.80	80 percent cover; heavy crust; some new snow; ice on ground.
10. Sherwood, N. Dak	14	7.5	1.60	80 percent cover; some crusted; some new snow; drifted.
11. Mohall, N. Dak	14	7.0	1.90	80 percent cover; crystallized; some new snow; ice on ground.
12. Glenburn (nr), N. Dak	13	6.0	1.60	60 percent cover; new snow,crusted layers, some drifting.
13. Junction State Highway 5 and U. S. 83, N. Dak.	14	7.8	1.10	70 percent cover; new snow, crusted layers, packed.
14. Bantry, N. Dak	14	8.8	1.80	85 percent cover; hard packed; some loose snow.
15. Bottineau, N. Dak	14			20 percent cover; scattered drifts, fields bare.
16. Fonda, N. Dak	15	5.0	1.40	60 percent cover; honeycombed; glazed.
17. Rolla, N. Dak	15	10.0	1.70	80 percent cover; packed, layers of ice, honeycombed.
18. Bergen, N. Dak	20	9.0	2.40	98 percent cover; light frost.
SH—Sheyenne Basin				
1. West Fargo, N. Dak	17	9.3	3.70	90 percent cover; drifted; crystallized.
2. Kindred, N. Dak	11	12.8	3.90	Hard packed; glazed; frost line 5″ 1 location, 30″ at another.
3. Enderlin, N. Dak	11	10.3	3.90	Hard packed; heavily drifted.
4. Lisbon, N. Dak	12	13.2	4.30	80 percent cover; crusted; packed; drifted; ice base.
5. Buffalo, N. Dak	12	8.0	2.25	70 percent cover; crusted; packed; drifted.
6. Valley City, N. Dak	12	6.5	2.10	50 percent cover; crystallized; drifted; ice base.
7. Baldhill Dam, N. Dak	12	10.7	2.75	95 percent cover; packed; drifts; crystallized.
8. Walum, N. Dak	12	8.0	2.10	80 percent cover; crystallized; packed; glazed.
9. Cooperstown, N. Dak	12	5.5	2.40	60 percent cover; honeycombed; crystallized; loose.
Cooperstown, N. Dak	21	3.0	1.61	Frozen, moderately wet, 0.60″ hard ice on ground; 90 percent cover.
10. Pekin, N. Dak	16	5.8	1.70	30 percent cover; loose snow; ice base.
11. Lakota, N. Dak	16	6.5	1.80	50 percent cover; glazed; crystallized; ice base.
12. Devils Lake, N. Dak	16			40 percent cover; light cover of snow; drifting.
13. Sheyenne, N. Dak	12	7.5	1.40	70 percent cover; packed; crystallized.
14. Maddock, N. Dak	13	7.3	1.50	50 percent cover; drifted; packed; crystallized.
15. Fessenden, N. Dak	13	10.8	2.70	80 percent cover; packed; drifted; crystallized.
16. Harvey, N. Dak	13	8.5	1.80	90 percent cover; packed; drifted; crystallized.
	20	6.0	2.58	Light frost, 1″ soft ice on ground; 99 percent cover.
17. Drake, N. Dak	13	7.5	1.90	75 percent cover; drifted; crusted layers ice.
18. Nome, N. Dak	20	5.0	1.50	95 percent cover.
RU—Roseau Basin				
1. Caribou, Minn	14	7.4	1.45	Hard crust; granular snow.
2. Duxby, Minn	15	7.2	1.70	Do.
3. Greenbush, Minn	14	8.1	1.62	Light granular snow.
4. Roseau, Minn	15	8.2	1.75	Hard crust; granular snow.
5. 18 mi. S Roseau, Minn	15	8.5	1.70	Medium crust; then light granular snow.
RL—Red Lake Basin				
1. Crookston, Minn	13	3.6	1.55	½″ to 1″ water under snow; 50 percent bare.
3. Erskine, Minn	16	11.1	2.40	Hard crust; light granular snow.
4. Plummer, Minn	15	16.4	2.42	Light granular snow.
5. Thief River Falls, Minn	15	9.6	2.15	Light crust; granular snow.
6. Goodridge, Minn	15	7.8	1.68	Light crust; light granular snow.
7. Gatzke, Minn	15	7.5	1.68	Hard crust; then light granular snow.
8. Grygla, Minn	15	8.0	2.00	Hard crust; granular snow; thin layer ice under snow.
9. Junction State Highway 1 and 89, Minn	15	15.2	2.50	Light crust; light granular snow.
10. Red Lake Dam, Minn	11	14.0	3.69	Crystallized; open field observation.
11. Red Lake, Minn	11	11.5	3.31	Do.
12. Quiring, Minn	11	15.0	3.18	Do.
13. Kelliher, Minn	11	11.0	2.93	Do.
14. Waskish, Minn	11	18.2	4.20	Loose
15. Blackduck, Minn	11	9.5	2.54	Crystallized open field observation.
16. Clearbrook, Minn	15	11.4	2.48	Hard crust; granular snow.
17. Trail, Minn	15	9.9	2.72	Hard crust; granular light snow.
OT—Otter Tail Basin				
1. Fergus Falls, Minn	13	10.5	2.88	Granular snow; hard crust 6″ below surface.
2. Erhard, Minn	13	12.0	2.90	2″ new snow, then hard crust; granular snow.
3. Dunvilla, Minn	13	17.2	2.58	Loose snow granular; taken in timber.
4. Detroit Lakes, Minn	11	7.7	2.80	Drifted glazed crystalline.
5. Luce, Minn	11	11.5	2.10	Loose, glazed crystalline; frost 24″.
6. Toad Lake, Minn	16	13.2	2.42	Loose granular fluffy snow.
BS—Bois de Sioux Basin				
1. Herman, Minn	18	12.5	3.40	100 percent cover; layers of crust crystallized.
2. Norcross, Minn. (8N)	18	12.5	3.30	100 percent cover; layers of crystallized snow.
3. Graceville, Minn	12	13.2	4.15	Hard icy crust about 8″ above ground.
4. Wheaton, Minn	12	13.8	3.62	Granular snow; hard crust.
5. Wheaton, Minn. (6N)	12	13.9	4.55	Do.
6. Campbell, Minn	18	11.5	4.20	100 percent cover; crusted layers of crystal.

[1] All dates in March 1952.

TABLE 5.—*Supplemental precipitation data—snow depth and water equivalent, March 1952*—Continued

UPPER MISSISSIPPI RIVER BASIN

Location	Date[1]	Amounts in inches		Snow and soil conditions
		Snow depth	Water equivalent	
HW—Headwater Reservoir Area				
1. Federal Dam, Minn.	12	16.0	3.05	Crust on top, remainder crystallized; open field observation.
2. Winnibigoshis Dam, Minn.	12	18.5	3.94	Crystallized; wooded area.
3. Pokegama Dam, Minn.	12	15.8	3.82	Crust on top, remainder crystallized; wooded area.
4. Remer, Minn.	12	15.0	3.43	Crystallized; open field observation.
5. Hill City, Minn.	13	15.2	4.07	Do.
6. Calumet, Minn.	12	16.2	3.81	Crystallized; brushy area.
7. Jacobson, Minn.	13	13.7	3.05	Crystallized; open field observation.
8. Sandy Lake Dam, Minn.	13	12.5	3.44	New snow on top, bottom crystallized.
9. Cromwell, Minn.	13	13.7	3.05	New snow on top, bottom crystallized; open field observation.
10. Aitken, Minn.	13	15.0	3.30	Loose snow on top, bottom crystallized; open field observation.
11. Brainerd, Minn.	14	17.5	4.07	New snow on top, bottom crystallized; open field observation.
12. Gull Lake Dam, Minn.	14	18.2	3.18	Do.
13. Pine River Dam, Minn.	14	17.7	2.42	Crust on top, bottom crystallized; open field observation.
14. Backus, Minn.	14	13.5	2.94	Crystallized; open field observation.
15. Walker, Minn.	14	15.2	3.82	Do.
16. Cass Lake, Minn.	14	13.2	2.42	Crust on top, bottom crystallized; open field observation.
MR—Mississippi Local				
1. Anoka, Minn.	10	12.0	3.30	Crusted and crystalline.
2. Elk River, Minn. (4W)	10	13.2	2.60	Crusted and crystalline; frost 20″.
3. Becker, Minn.	10	14.0	4.00	Crusted.
4. Buffalo, Minn.	19	13.8	3.40	
5. Annandale, Minn.	19	14.5	3.80	
6. St. Cloud, Minn.	10	13.7	4.40	Do.
7. Avon, Minn.	18	11.0	2.30	100 percent cover; loose wet snow.
8. Melrose, Minn.	18	10.5	3.30	100 percent cover; loose wet snow, some drifts.
9. West Union, Minn.	18	10.0	2.90	100 percent cover; drifted; loose wet snow.
10. Alexandria, Minn.	18	13.5	3.90	Do.
11. Royalton, Minn.	10	13.5	4.70	Crusted layers.
12. Little Falls, Minn.	10	11.5	3.00	Heavy top crust with crusted layers.
13. Motley, Minn.	11	16.0	3.00	Loose with light crust.
14. Wadena, Minn.	11	12.0	2.80	Moderately crusted.
15. Sebeka, Minn.	16	13.8	3.55	Hard crust; light granular snow.
16. Park Rapids, Minn.	16	13.0	3.00	Light granular snow.
17. Bemidji, Minn.	11	13.5	3.56	Crystallized; open field observation.
MI—Minnesota Basin				
1. Glenwood, Minn.	18	12.0	3.20	90 percent covered; drifted; crystallized.
2. Starbuck, Minn.	18	9.8	3.60	70 percent cover; drifted; crystallized.
3. Morris, Minn.	18	14.0	4.10	80 percent cover.
4. Benson, Minn.	12	10.0	3.25	1″ ice layer 6″ below surface.
5. Appleton, Minn.	12	13.9	4.05	1″ ice layer 8″ below surface.
6. Ortonville, Minn.	12	12.9	4.28	2″ ice layer 7″ above ground.
7. Junction Highways 212 and 75, Minn.	11	9.5	2.88	½″ layer of ice 4″ above ground; thin layer of ice on ground.
7a. Milbank, S. Dak.	18	13.3	4.28	Frost 11″, top 2″ flinty, 0.62″ hard ice on ground. 100 percen cover, no melt.
8. Watson, Minn.	11	12.5	3.12	1″ ice layer 6″ below surface; granular snow; no bare spots.
9. Taunton, Minn.	11	9.6	2.92	Heavy granular snow; thin layer ice under snow.
10. Marshall, Minn.	11	9.8	2.88	Thin layer ½″ of ice under granular soft snow.
11. Tracy, Minn.	11	9.9	3.20	
12. Vesta, Minn.	11	8.6	2.58	½″ to ¾″ ice at bottom of granular snow; 2 percent bare ground.
13. Granite Falls, Minn.	12	7.6	3.00	Granular snow; hard crust.
14. Willmar, Minn.	12	9.4	3.08	Granular hard crust.
15. Olivia, Minn.	12	7.6	2.52	½″ to ¼″ layer of ice on bottom.
16. Morton, Minn.	11	6.1	1.92	10 percent cover; granular, hard crust.
17. Sanborn, Minn.	17	5.0	1.80	Slushy snow about ½″ under snow.
18. Clara City, Minn.	11	8.0	2.12	Granular snow; light crust; some bare spots.
19. Cologne, Minn.	10	8.4	2.63	Granular snow; slush on bottom.
20. Sleepy Eye, Minn.				Frost depth 36″ to 42″.
21. Gibbon, Minn.	11	6.9	2.75	½″ layer ice at bottom granular snow; bare spots in cover.
22. Stewart, Minn.	11	6.6	2.08	
23. Hutchinson, Minn.	11	9.8	3.02	Granular ice, ½″ layer 3″ down.
24. Glencoe, Minn.	10	8.5	2.62	Granular snow.
25. Gaylord, Minn.	11	8.0	2.62	Thin layer ice underneath granular snow.
SC—St. Croix Basin				
1. Solon Springs, Wis.	15	12.0	2.80	
CH—Chippewa Basin				
1. Winter, Wis.	15	13.5	2.47	Wet.
2. Ladysmith, Wis.	15	11.5	2.75	
3. Rest Lake, Wis.	15	15.5	3.75	
4. Mellen, Wis.	15	14.8	3.20	
WI—Wisconsin Basin				
1. Burnt Rollways, Wis. Sec. 22, T. 40N, R. 11E. Vilas County.	15	16.2	2.77	Granular snow with heavy crust.
2. Rainbow Snow C, Wis. Sec. 18, T. 39N, R. 8 E. Oneida County.	14	16.7	2.96	
3. Cedar Falls Snow Wis. Sec. 23, T. 38 N, R. 5 E. Oneida County.	14	16.1	2.85	
4. Eau Pleine, Wis. Sec. 13, T. 26 N, R. 5 E Marathon County.	14	13.3	2.59	
5. Arpen, Wis. Sec. 3, T. 23 N, R. 3 E. Wood County.	14	15.9	2.66	
DM—Des Moines Basin				
1. Windom, Minn.	17	1.6	.88	Frozen 12″+, wet, 0.75″ ice on ground; 70 percent cover; melt in progress, no runoff; large stream adjacent to course frozen.
2. Slayton, Minn.	17	1.8	1.35	Frozen 12″+, saturated; 75 percent cover; melt in progress; snow ripened to layer of rotten ice in many places.

[1] All dates in March 1952.

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine	Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine
				Maximum	Minimum	Maximum	Minimum							Maximum	Minimum	Maximum	Minimum		
BILLINGS, MONT.																			
Mar. 16				47	23	31	21	5.0	34	Apr. 1				49	28	17	−3	12.4	92
Mar. 17				48	31	30	18	6.2	81	Apr. 2	T			57	30	33	9	5.1	74
Mar. 18				55	28	31	13	8.3	37	Apr. 3				48	36	33	8	20.0	73
Mar. 19	T			40	30	29	6	9.5	29	Apr. 4				63	30	28	15	12.5	86
Mar. 20	0.06	T		35	22	26	3	11.6	36	Apr. 5				73	32	28	14	12.4	100
Mar. 21	.01	T		29	19	24	7	5.6	20	Apr. 6				75	40	26	16	11.4	88
Mar. 22	T			33	17	12	−1	7.9	79	Apr. 7	.21			66	27	36	22	17.1	42
Mar. 23	.02	T		44	20	28	9	21.1	8	Apr. 8	.06			35	25	27	15	7.0	53
Mar. 24	.14	T		40	30	36	21	8.0	13	Apr. 9				44	22	24	17	7.8	66
Mar. 25	.05	T		38	28	32	26	9.0	19	Apr. 10				55	26	28	17	5.3	79
Mar. 26	.02			47	31	33	26	9.2	41	Apr. 11				62	30	29	8	10.1	100
Mar. 27				57	33	30	25	14.4	81	Apr. 12	.01			56	40	37	24	6.3	31
Mar. 28				61	41	27	18	15.0	52	Apr. 13				63	32	34	18	9.5	100
Mar. 29	T			53	36	35	23	9.8	32	Apr. 14				72	38	36	17	7.3	94
Mar. 30				52	32	32	16	9.3	47	Apr. 15	T			65	47	39	31	16.3	32
Mar. 31				50	30	25	11	13.6	55										
GREAT FALLS, MONT.																			
Mar. 16		2	.60	48	15	32	14	11.2	87	Apr. 1				48	25	19	12	15.2	83
Mar. 17		2	.50	48	22	34	19	11.5	82	Apr. 2				53	35	31	19	14.3	56
Mar. 18	0.12	1	.40	46	28	31	23	14.6	31	Apr. 3				48	31	28	3	19.5	48
Mar. 19	T	1	.40	37	19	26	13	10.1	83	Apr. 4				64	37	30	22	16.3	83
Mar. 20	T	1		26	19	17	14	5.8	12	Apr. 5				70	42	29	18	16.5	84
Mar. 21	T	1		29	16	20	10	5.8	51	Apr. 6				73	48	32	22	21.3	86
Mar. 22		1		38	15	20	13	8.0	71	Apr. 7	.03			55	25	36	24	15.8	0
Mar. 23	T	T		44	32	31	21	22.2	5	Apr. 8	T			40	18	26	15	8.0	43
Mar. 24	.04			40	29	31	25	10.7	37	Apr. 9	T			43	25	25	16	5.5	53
Mar. 25	.09			37	25	35	24	9.2	3	Apr. 10				58	25	26	11	7.5	100
Mar. 26	T			51	32	33	28	14.3	75	Apr. 11				58	32	30	12	12.2	76
Mar. 27				59	36	28	23	19.8	81	Apr. 12	T			55	34	35	27	5.1	49
Mar. 28				61	40	29	21	23.6	51	Apr. 13				66	39	31	15	14.0	90
Mar. 29				45	34	21	15	24.0	14	Apr. 14				70	42	34	19	17.8	72
Mar. 30	T			47	31	31	17	19.9	5	Apr. 15	T			52	44	40	31	17.0	0
Mar. 31				44	27	20	9	22.0	57										
GLASGOW, MONT.																			
Mar. 16		5	0.83	29	9	25	9			Apr. 1		2		43	23	30	17		
Mar. 17		5	.80	32	6	20	4			Apr. 2		1		42	20	31	17		
Mar. 18		5	.93	33	8	25	6			Apr. 3	.12	1		41	29	32	24		
Mar. 19	0.02	4	.91	35	7	26	7			Apr. 4		T		51	23	34	21		
Mar. 20	T	4	.89	28	8	21	3			Apr. 5		T		55	27	41	24		
Mar. 21	T	4	.90	23	4	15	0			Apr. 6				70	36	48	33		
Mar. 22	.01	4	.93	20	−3	9	−7			Apr. 7	.18	T		49	29	39	26		
Mar. 23	.30	7	.87	31	−4	27	−8			Apr. 8	T	T		39	23	28	17		
Mar. 24	T	7	1.29	40	23	32	19			Apr. 9				42	22	25	16		
Mar. 25		6	1.30	38	13	27	10			Apr. 10				53	26	30	18		
Mar. 26	T	6	1.12	28	0	19	−1			Apr. 11				62	31	38	28		
Mar. 27		6	1.08	47	10	29	9			Apr. 12				54	35	39	28		
Mar. 28		5	1.04	44	24	34	21			Apr. 13				62	31	40	30		
Mar. 29		4	.99	50	27	34	24			Apr. 14				71	39	34	25		
Mar. 30		3	.73	46	23	33	21			Apr. 15				73	39	44	30		
Mar. 31		2	.70	48	27	34	24												
HAVRE, Mont.																			
Mar. 16	T	3	0.79	28	0	19	0	3.7	73	Apr. 1				48	29	23	19	10.3	100
Mar. 17	T	3	.62	33	−1	23	−1	6.7	79	Apr. 2	.02			51	29	35	28	7.8	60
Mar. 18		2	.63	38	11	31	13	4.6	62	Apr. 3				45	30	33	24	10.3	46
Mar. 19	T	2	.48	30	13	19	17	8.3	82	Apr. 4				61	29	38	29	5.5	80
Mar. 20	T	2	.42	25	9	17	14	10.7	84	Apr. 5				64	30	45	32	5.5	77
Mar. 21	T	1		23	5	14	2	8.8	100	Apr. 6				78	32	37	28	10.4	91
Mar. 22	T	1		27	−7	16	−8	5.8	100	Apr. 7	T			58	28	33	24	10.3	5
Mar. 23	T	1		41	5	32	28	11.1	22	Apr. 8				39	20	23	15	6.7	75
Mar. 24	T	1		40	23	32	26	8.5	41	Apr. 9				45	25	24	19	6.1	76
Mar. 25		T		42	28	31	28	6.5	70	Apr. 10				55	26	27	22	5.2	99
Mar. 26		T		48	26	34	28	7.3	70	Apr. 11				59	28	28	23	6.6	72
Mar. 27		T		58	30	37	32	8.7	99	Apr. 12				59	38	36	29	5.0	76
Mar. 28	T	T		62	31	35	30	9.6	71	Apr. 13				68	34	35	26	7.2	100
Mar. 29		T		47	31	26	24	9.6	84	Apr. 14				74	46	31	29	8.1	100
Mar. 30	0.06			50	29	32	25	10.9	79	Apr. 15				64	44	44	40	11.5	61
Mar. 31	T			46	31	34	25	12.5	65										

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine	Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine
				Maximum	Minimum	Maximum	Minimum							Maximum	Minimum	Maximum	Minimum		
HELENA, MONT.																			
Mar. 16		T		42	20	30	17	2.6	99	Apr. 1				46	22	26	10	5.2	95
Mar. 17		T		43	23	32	19	4.3	88	Apr. 2	T			51	26	37	22	2.8	46
Mar. 18	T	T		47	28	30	19	6.7	27	Apr. 3	.04			47	31	33	16	14.2	78
Mar. 19	T	T		35	16	23	14	5.5	59	Apr. 4				64	33	33	26	4.7	95
Mar. 20	0.03	T		30	22	24	15	8.3	60	Apr. 5				68	26	33	22	4.5	100
Mar. 21	T	T		29	18	18	10	6.1	78	Apr. 6				73	29	38	24	6.0	90
Mar. 22		T		36	11	22	5	4.3	73	Apr. 7	.19			53	27	40	22	9.3	0
Mar. 23	T	T		44	32	27	17	15.2	37	Apr. 8	T			44	22	25	16	7.0	81
Mar. 24	.26	T		43	29	33	24	5.2	24	Apr. 9	T			46	25	28	21	5.7	75
Mar. 25	.56	1	0.25	36	21	33	19	2.9	0	Apr. 10				58	24	30	14	4.3	85
Mar. 26	.24	T	.49	48	32	35	27	4.1	70	Apr. 11				58	24	30	13	6.8	79
Mar. 27		T		54	28	37	26	4.1	92	Apr. 12	T			56	33	33	26	4.8	70
Mar. 28	T			61	31	32	26	8.9	72	Apr. 13				66	25	34	22	5.5	93
Mar. 29				46	30	25	19	10.3	64	Apr. 14				67	36	36	25	7.6	64
Mar. 30	T			43	26	30	19	8.3	22	Apr. 15	.06			48	42	42	30	9.3	7
Mar. 31				43	27	25	7	11.8	72										
CHEYENNE, WYO.																			
Mar. 16	0.03			54	21	33	17	5.2	79	Apr. 1		T		47	26	19	11	16.2	100
Mar. 17	.17	T		35	25	31	19	20.5	0	Apr. 2	T			54	27	32	13	5.3	80
Mar. 18		T		47	25	20	14	18.6	95	Apr. 3	.09			47	23	31	15	19.7	64
Mar. 19				38	21	23	6	21.8	87	Apr. 4				50	19	27	12	13.2	100
Mar. 20	.63	1		30	15	21	5	12.8	6	Apr. 5				60	30	30	18	8.5	100
Mar. 21	.45	6	0.83	15	8	11	3	24.8	46	Apr. 6				69	29	27	16	10.7	100
Mar. 22	T	7	1.05	18	3	7	−4	19.2	89	Apr. 7				69	41	30	24	9.2	93
Mar. 23		7	1.00	28	6	15	−5	21.3	80	Apr. 8	.06	T		57	20	34	18	21.8	1
Mar. 24	T	4	.95	38	21	23	12	13.6	64	Apr. 9	.03			36	15	20	8	11.5	91
Mar. 25	.29	3	.15	38	15	24	12	8.8	79	Apr. 10				48	19	26	13	12.6	51
Mar. 26	T	4	.48	37	10	26	6	5.1	95	Apr. 11	.02			43	27	35	19	9.8	0
Mar. 27		1	.42	45	18	27	13	8.8	100	Apr. 12	T			48	29	32	18	21.0	77
Mar. 28		T		55	29	26	12	7.2	100	Apr. 13	T			49	28	27	18	11.9	74
Mar. 29		T		56	36	24	10	8.5	46	Apr. 14				58	24	29	21	14.5	93
Mar. 30	T	T		54	32	30	20	10.4	61	Apr. 15	T			47	29	33	24	9.6	39
Mar. 31		T		45	27	21	13	17.9	90										
CASPER, WYO.																			
Mar. 16		T		52	31	32	22	12.7		Apr. 1				47	26	28	3	7.3	
Mar. 17	0.47	3		38	21	31	19	6.5		Apr. 2	.03			52	27	35	15	10.8	
Mar. 18		1	0.40	41	18	27	16	19.1		Apr. 3				50	25	34	15	9.6	
Mar. 19	T	T		38	20	28	10	17.1		Apr. 4				56	25	23	12	10.9	
Mar. 20	T	T		27	17	19	10	10.4		Apr. 5				62	33	30	19	12.8	
Mar. 21	T	T		22	14	13	7	13.9		Apr. 6				69	41	30	16	17.0	
Mar. 22	.05	T		21	−2	11	−4	5.0		Apr. 7	T			70	39	40	26	17.2	
Mar. 23	T	T		31	10	22	0	16.8		Apr. 8	.07	T		39	23	33	16	13.1	
Mar. 24	.03	T		37	21	26	17	7.8		Apr. 9				47	19	20	13	6.0	
Mar. 25	.04	T		38	20	29	19	6.0		Apr. 10	T			57	23	29	16	6.5	
Mar. 26	T	T		36	20	26	18	7.0		Apr. 11	T			56	35	37	18	8.3	
Mar. 27		T		48	26	27	19	13.7		Apr. 12				51	31	28	16	13.1	
Mar. 28				51	33	24	19	18.3		Apr. 13				57	28	28	19	6.1	
Mar. 29				54	36	30	21	18.3		Apr. 14				68	27	32	21	8.3	
Mar. 30	T			50	30	32	15	15.9		Apr. 15	T			51	35	35	25	12.0	
Mar. 31	T			46	26	26	3	11.0											
LANDER, WYO.																			
Mar. 16		3	0.36	47	19	35	13	5.3	57	Apr. 1		T	.40	46	19	20	9	5.5	89
Mar. 17	0.55	5	.56	41	22	33	16	6.4	67	Apr. 2		T		50	23	28	12	6.3	53
Mar. 18	T	4	.91	45	16	27	11	12.7	82	Apr. 3		T		53	26	28	18	8.7	74
Mar. 19	T	4	.87	33	19	23	9	15.5	86	Apr. 4				56	25	29	14	6.6	100
Mar. 20	.37	5	.84	25	15	20	4	7.9	0	Apr. 5				63	31	35	20	6.3	100
Mar. 21	.10	14	1.02	31	6	18	−2	6.1	21	Apr. 6				69	32	31	18	6.7	83
Mar. 22	T	13	1.02	29	4	15	−5	7.0	72	Apr. 7	T			67	44	34	8	15.2	73
Mar. 23		12	1.00	40	4	21	−6	6.9	67	Apr. 8	.17	T		45	24	26	6	7.0	27
Mar. 24	.05	10	1.00	42	18	27	9	6.6	47	Apr. 9	T			48	25	26	17	6.1	90
Mar. 25	.01	7	1.02	44	13	28	8	4.3	61	Apr. 10				55	27	29	19	5.3	60
Mar. 26	.01	6	1.04	42	26	29	16	4.9	49	Apr. 11	T			57	36	29	18	6.2	38
Mar. 27		5	1.01	50	20	25	11	5.0	92	Apr. 12	T			52	36	34	23	7.4	45
Mar. 28		4	.82	55	25	29	16	7.0	74	Apr. 13				54	32	31	19	6.7	93
Mar. 29		4	.78	55	30	28	17	7.9	79	Apr. 14	T			63	31	35	22	7.9	77
Mar. 30	.01	2	.74	49	29	32	15	8.3	90	Apr. 15	.37			53	35	37	30	9.8	25
Mar. 31		1	.60	47	22	22	11	8.5	81										

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.) Maximum	Temperature (° F.) Minimum	Dew point (° F.) Maximum	Dew point (° F.) Minimum	Wind speed, m.p.h.	Percent of possible sunshine
SHERIDAN, WYO.									
Mar. 16		4	0.38	41	14	30	12	5.8	70
Mar. 17	0.03	3	.36	47	26	33	20	12.5	76
Mar. 18		2	.26	48	19	31	16	5.8	64
Mar. 19	.02	2	.21	38	20	29	16	9.6	10
Mar. 20	.11	3	.19	31	19	25	14	11.1	63
Mar. 21	T	3	.27	30	13	17	9	15.5	71
Mar. 22	.02	3	.27	26	8	16	5	15.0	82
Mar. 23	.20	3	.29	40	5	32	−3	14.3	62
Mar. 24	.03	3	.44	37	28	29	23	12.4	75
Mar. 25	.02	3	.37	37	27	29	23	8.3	74
Mar. 26	.06	3	.39	43	24	29	19	7.4	82
Mar. 27		2	.33	52	28	32	19	11.3	100
Mar. 28		1	.19	57	26	37	19	4.9	93
Mar. 29		T	.14	58	34	36	27	10.7	84
Mar. 30	.04	T	.08	45	29	34	24	7.4	53
Mar. 31	.03			53	26	32	16	12.3	80
Apr. 1	.01			46	24	29	16	9.8	99
Apr. 2				53	27	31	17	5.4	86
Apr. 3	.01			47	30	32	18	10.3	63
Apr. 4				59	26	33	17	6.8	87
Apr. 5				69	30	38	18	3.3	100
Apr. 6				74	28	35	22	2.9	100
Apr. 7	.05			77	30	37	23	14.1	68
Apr. 8	.25	2	.21	33	24	29	17	12.1	78
Apr. 9				48	19	27	15	4.3	100
Apr. 10				59	23	29	20	2.9	94
Apr. 11				63	29	31	19	3.5	97
Apr. 12				55	36	31	24	11.5	99
Apr. 13				60	28	31	23	5.6	100
Apr. 14				70	34	33	19	17.0	95
Apr. 15	.28			61	46	45	29	13.2	60
DEVILS LAKE, N. DAK.									
Mar. 16	T	1		31	13	18	10	9.6	81
Mar. 17	0.50	5		32	22	30	24	10.0	0
Mar. 18	T	5	0.75	30	23	21	19	7.3	0
Mar. 19		4		30	23	22	21	6.7	14
Mar. 20	.02	4		28	15	22	20	10.0	0
Mar. 21	.01	5		20	2	12	0	8.6	56
Mar. 22	.01	5		20	3	11	1	14.1	33
Mar. 23		4		27	1	10	−3	11.4	100
Mar. 24		3		32	2	17	−1	5.5	85
Mar. 25	T	2		29	11	25	9	4.9	17
Mar. 26	.02	3		29	19	22	20	7.0	0
Mar. 27	.02	2		36	12	26	11	5.4	22
Mar. 28		1		35	28	30	28	8.2	19
Mar. 29		1		40	27	32	26	8.1	19
Mar. 30		T		45	32	39	32	4.6	42
Mar. 31		T		54	29	34	29	5.7	87
Apr. 1	T	T		40	31	32	31	13.8	12
Apr. 2		T		40	29	28	23	14.5	74
Apr. 3	T	T		34	24	24	21	10.5	31
Apr. 4	T			34	24	25	20	7.3	14
Apr. 5				44	28	26	22	5.3	66
Apr. 6				46	24	33	21	10.2	89
Apr. 7				60	31	43	31	12.0	93
Apr. 8	.02			43	23	31	21	15.0	38
Apr. 9				35	18	14	5	9.8	100
Apr. 10				42	16	19	10	7.8	96
Apr. 11				50	27	30	24	13.8	81
Apr. 12				49	29	33	29	6.8	100
Apr. 13				58	28	30	25	6.3	86
Apr. 14				65	29	28	25	6.2	100
Apr. 15				67	34	28	24	8.4	99
BISMARCK, N. DAK.									
Mar. 16	0.03	11	2.08	31	10	28	10	15.5	21
Mar. 17	.01	9	2.08	37	23	34	19	12.1	0
Mar. 18	T	8	2.06	28	20	21	16	6.1	39
Mar. 19	.01	8	2.03	31	21	22	19	4.9	7
Mar. 20	.12	10	2.13	29	18	24	18	10.8	32
Mar. 21	T	10	2.12	25	9	18	7	11.5	46
Mar. 22	T	10	2.10	15	1	11	−3	17.0	30
Mar. 23		9	2.10	22	−2	10	−6	8.8	87
Mar. 24	.01	9	2.08	25	−8	16	−12	2.2	52
Mar. 25	.02	8	2.09	33	12	25	10	7.8	50
Mar. 26	T	8	2.08	27	8	22	5	10.9	26
Mar. 27		7	2.08	38	7	31	4	4.8	58
Mar. 28		6	2.05	35	16	32	14	8.1	24
Mar. 29		5	2.02	38	26	33	26	7.0	37
Mar. 30	T	4	1.95	37	28	33	27	2.6	0
Mar. 31		3	1.55	46	20	37	20	5.6	64
Apr. 1		3	1.30	39	27	31	22	16.0	1
Apr. 2		3	1.25	42	25	28	19	13.0	100
Apr. 3		2	[1] 1.00	42	21	29	19	8.4	41
Apr. 4		1	[1] .92	44	25	30	24	5.5	71
Apr. 5		T	[1] .70	40	23	30	22	7.5	74
Apr. 6		T	[1] .28	46	29	37	26	12.9	48
Apr. 7		T		61	32	46	32	9.6	75
Apr. 8	T	T		44	26	42	17	22.2	24
Apr. 9		T		38	22	19	13	10.2	100
Apr. 10		T		44	20	25	16	13.0	100
Apr. 11		T		52	31	34	24	15.4	100
Apr. 12		T		53	30	37	30	7.1	82
Apr. 13		T		56	29	34	28	4.0	76
Apr. 14		T		63	25	35	23	6.8	100
Apr. 15		T		68	32	35	27	11.0	100
DICKINSON, N. DAK.									
Mar. 16	0.02	15	3.37	32	10				
Mar. 17	.13	15	3.52	33	8				
Mar. 18		15	3.75	30	3				
Mar. 19	.30	15	3.75	27	11				
Mar. 20	.03	18	4.32	23	12				
Mar. 21	.02	18	4.32	18	−2				
Mar. 22	.01	18	4.33	10	−6				
Mar. 23	T	18	4.33	24	−10				
Mar. 24	.04	18		25	12				
Mar. 25	T	17	4.38	33	12				
Mar. 26	T	17	4.38	23	8				
Mar. 27		17	4.38	37	20				
Mar. 28		14	4.33	37	19				
Mar. 29		9	3.47	43	29				
Mar. 30		5	1.95	45	26				
Mar. 31	T	4	1.84	42	23				
Apr. 1		3	1.58	36	22				
Apr. 2		3		43	18				
Apr. 3		2		42	21				
Apr. 4		2	1.02	47	22				
Aprl 5		1		47	25				
Apr. 6		1		55	30				
Apr. 7		T		73	33				
Apr. 8	T	T		37	22				
Apr. 9				38	16				
Apr. 10				47	22				
Apr. 11				58	29				
Apr. 12	T			56	28				
Apr. 13				59	33				
Apr. 14				64	28				
Apr. 15				70	34				

[1] Estimated from drifts.

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine	Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine
				Maximum	Minimum	Maximum	Minimum							Maximum	Minimum	Maximum	Minimum		
FARGO, N. DAK.																			
Mar. 16		5	1.90	30	4	23	0	6.9	81	Apr. 1	T	2	1.70	41	31	34	28	18.5	17
Mar. 17	0.27	6	1.90	35	24	30	16	16.3	1	Apr. 2	T	1	1.70	37	31	30	25	23.4	30
Mar. 18	T	6	2.08	33	30	30	28	15.4	33	Apr. 3	T	1		32	28	26	23	14.0	0
Mar. 19	T	6	2.08	32	28	29	25	14.8	0	Apr. 4	T	1		32	29	26	24	10.2	5
Mar. 20	.10	7	2.08	31	21	29	19	14.2	12	Apr. 5		1		38	29	29	23	9.7	19
Mar. 21	T	7	2.18	24	17	18	11	15.9	30	Apr. 6		T		40	29	33	27	10.9	100
Mar. 22	.07	7	2.20	24	14	17	10	24.6	6	Apr. 7		T		51	33	42	30	24.0	92
Mar. 23	.01	8	2.25	23	11	17	4	19.0	59	Apr. 8	.18	1		47	30	37	26	19.1	0
Mar. 24		8	2.20	31	3	18	0	6.9	100	Apr. 9		T		33	24	26	11	18.3	95
Mar. 25		8	2.20	32	9	22	6	7.7	72	Apr. 10				35	21	22	11	7.5	91
Mar. 26	.08	7	2.20	33	21	29	18	6.5	13	Apr. 11				43	30	32	23	23.9	68
Mar. 27	.05	7	2.28	31	16	24	14	10.1	41	Apr. 12				46	33	35	31	9.4	9
Mar. 28		4	2.31	35	24	28	21	8.8	77	Apr. 13				55	31	39	29	12.8	100
Mar. 29		2	2.00	40	26	33	23	15.4	24	Apr. 14				59	29	33	24	5.5	99
Mar. 30		2	1.70	39	31	35	31	4.3	0	Apr. 15				62	30	39	29	9.0	100
Mar. 31		2	1.70	44	29	39	28	7.3	54										
JAMESTOWN, N. DAK.																			
Mar. 16	T	6		26	0					Apr. 1		T		37	32				
Mar. 17	0.44	9		31	21					Apr. 2		T		41	30				
Mar. 18	T	10	2.70	31	25					Apr. 3	T	T		41	25				
Mar. 19	T	9		36	23					Apr. 4	T	T		35	27				
Mar. 20	.06	8		29	22					Apr. 5		T		36	27				
Mar. 21	.01	8	2.68	24	13					Apr. 6		T		43	26				
Mar. 22	.40	9		20	6					Apr. 7		T		57	32				
Mar. 23	T	11		23	2					Apr. 8	.02	T		44	27				
Mar. 24		10		33	0					Apr. 9				38	20				
Mar. 25	T	9	2.90	29	11					Apr. 10				39	19				
Mar. 26	T	8		31	21					Apr. 11				48	29				
Mar. 27	T	7		37	14					Apr. 12				42	32				
Mar. 28		5	3.02	33	26					Apr. 13				56	25				
Mar. 29		4		35	26					Apr. 14				62	27				
Mar. 30		2		38	31					Apr. 15				64	29				
Mar. 31		1		44	26														
GRAND FORKS, N. DAK.																			
Mar. 16		3		34	15					Apr. 1	.01	T		43	32				
Mar. 17	0.15	3		31	25					Apr. 2		T		38	30				
Mar. 18		5	1.65	33	27					Apr. 3	T	T		32	27				
Mar. 19		4		31	27					Apr. 4		T		33	24				
Mar. 20	.01	4		30	19					Apr. 5		T		42	28				
Mar. 21	T	4	1.53	24	12					Apr. 6		T		44	28				
Mar. 22	.02	4		22	9					Apr. 7				55	33				
Mar. 23		4		25	9					Apr. 8	.02			42	30				
Mar. 24		4		33	8					Apr. 9				33	21				
Mar. 25		3	1.46	38	23					Apr. 10				40	17				
Mar. 26	.01	2		35	22					Apr. 11				45	28				
Mar. 27	T	2		33	19					Apr. 12				45	30				
Mar. 28		2	1.32	35	27					Apr. 13				58	28				
Mar. 29		1		46	27					Apr. 14				64	28				
Mar. 30		1		49	32					Apr. 15				65	34				
Mar. 31		T		53	29														
MINOT, N. DAK.																			
Mar. 16	T	2		27	10					Apr. 1		T		39	31				
Mar. 17	.01	2		32	23					Apr. 2		T		46	27				
Mar. 18		2	.68	28	19					Apr. 3		T		45	24				
Mar. 19		2		28	21					Apr. 4		T		47	23				
Mar. 20	.10	2		27	20					Apr. 5		T		44	23				
Mar. 21	.01	3	.70	20	4					Apr. 6		T		50	27				
Mar. 22	.01	3		18	−4					Apr. 7				68	36				
Mar. 23		3		21	−2					Apr. 8	T	T		39	22				
Mar. 24		3		30	6					Apr. 9				36	17				
Mar. 25	.02	2	.73	32	13					Apr. 10				45	15				
Mar. 26	T	2		26	15					Apr. 11				55	23				
Mar. 27		2		38	17					Apr. 12				59	34				
Mar. 28		1		40	24					Apr. 13				60	33				
Mar. 29		1		47	28					Apr. 14				65	38				
Mar. 30		T		48	30					Apr. 15				70	36				
Mar. 31		T		48	28														

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine
				Maximum	Minimum	Maximum	Minimum		
WILLISTON, N. DAK.									
Mar. 16	T	13	1.79	29	19	26	12	11.3	48
Mar. 17	T	12	1.79	29	13	28	10	5.9	65
Mar. 18	T	12	1.7	32	10	21	8	5.5	64
Mar. 19	0.03	12	1.74	32	21	26	16	5.2	60
Mar. 20	.01	12	1.66	27	17	23	15	10.5	43
Mar. 21	.01	11	1.67	19	5	15	1	7.8	70
Mar. 22	T	11	1.66	12	−3	2	−6	5.1	98
Mar. 23	T	11	1.61	20	−11	11	−16	4.7	66
Mar. 24	.02	11	1.61	25	15	17	10	5.1	65
Mar. 25	T	10	1.61	32	15	23	11	6.8	86
Mar. 26	T	9	1.61	22	13	17	9	6.7	75
Mar. 27		7	1.61	41	22	30	17	5.3	90
Mar. 28		7	1.59	48	24	33	22	5.3	87
Mar. 29		3	1.10	44	33	32	24	3.7	76
Mar. 30		1	.30	48	32	34	26	4.2	86
Mar. 31		T	.12	44	29	34	26	7.5	97
Apr. 1		T		40	26	31	17	12.3	75
Apr. 2		T		45	22	24	8	3.6	100
Apr. 3		T		44	27	28	20	4.4	70
Apr. 4		T		50	25	34	22	3.0	100
Apr. 5				53	27	37	25	5.5	87
Apr. 6				71	37	44	31	7.3	97
Apr. 7	.07			68	30	47	30	8.7	79
Apr. 8	.09	T	.13	34	23	29	18	10.8	68
Apr. 9				34	18	17	7	4.5	100
Apr. 10				47	22	28	16	8.3	100
Apr. 11				62	27	31	23	4.9	99
Apr. 12	T			56	35	40	32	7.9	56
Apr. 13				60	36	36	30	6.1	97
Apr. 14				69	38	34	23	8.2	100
Apr. 15				74	43	36	27	6.0	98
HURON, S. DAK.									
Mar. 16		5	1.28	35	4	32	1	10.3	74
Mar. 17	T	2	1.18	39	33	32	28	15.0	18
Mar. 18	T	2	.85	33	27	32	24	15.8	0
Mar. 19	T	1	.66	36	24	26	21	8.6	58
Mar. 20	0.01	1		31	24	27	21	12.9	57
Mar. 21	T	1		28	18	23	14	12.3	47
Mar. 22	.17	3	.38	18	12	15	9	22.6	21
Mar. 23	T	4	.57	20	5	12	0	20.5	88
Mar. 24		3	.49	25	−2	18	−7	5.8	89
Mar. 25	.01	3	.44	27	9	22	6	4.5	41
Mar. 26	.01	2	.45	33	15	27	13	8.5	69
Mar. 27	T	1	.40	38	19	32	15	9.2	58
Mar. 28		1		41	19	35	18	6.8	38
Mar. 29		T		49	32	40	30	15.0	78
Mar. 30	T	T		35	31	32	30	5.0	1
Mar. 31	T	T		38	32	34	31	9.2	21
Apr. 1		T		41	32	35	27	17.8	70
Apr. 2		T		41	28	32	22	18.3	100
Apr. 3		T		42	24	31	21	9.5	92
Apr. 4	T	T		36	31	31	26	8.5	3
Apr. 5	T	T		35	30	29	23	7.8	0
Apr. 6		T		53	30	36	23	15.2	77
Apr. 7		T		72	38	48	31	20.5	94
Apr. 8	.02	T		55	33	45	30	20.0	1
Apr. 9		T		36	23	27	17	14.2	75
Apr. 10		T		43	19	24	12	9.6	100
Apr. 11	T	T		48	32	33	23	22.3	56
Apr. 12	T	T		42	34	34	30	9.3	0
Apr. 13				54	31	35	29	13.0	96
Apr. 14				62	27	32	15	7.0	100
Apr. 15				64	30	32	25	13.3	100
ABERDEEN, S. DAK.									
Mar. 16	T	17		30	−1				
Mar. 17	0.17	18		36	30				
Mar. 18		18	6.00	31	24				
Mar. 19		18		32	21				
Mar. 20	.07	19		29	20				
Mar. 21	T	18	5.80	27	15				
Mar. 22	.31	21		19	10				
Mar. 23	.04	22		19	3				
Mar. 24		22		26	−3				
Mar. 25	T	22	7.39	31	4				
Mar. 26	T	22		32	18				
Mar. 27	T	21		34	18				
Mar. 28		20	5.73	34	20				
Mar. 29		18		44	23				
Mar. 30	T	17		34	30				
Mar. 31		15		40	31				
Apr. 1		15	6.20	37	29				
Apr. 2		15		37	27				
Apr. 3	T	12		39	21				
Apr. 4	T	7	2.60	34	29				
Apr. 5		7		33	25				
Apr. 6		6		49	25				
Apr. 7		4		64	36				
Apr. 8	.33	T		51	32				
Apr. 9		T		34	24				
Apr. 10		T		40	22				
Apr. 11		T		46	31				
Apr. 12		T		42	33				
Apr. 13		T		53	30				
Apr. 14		T		60	30				
Apr. 15		T		64	30				
MOBRIDGE, S. DAK.									
Mar. 16	0.03	6		33	15				
Mar. 17	.01	5		35	29				
Mar. 18	T	4	2.15	30	22				
Mar. 19	T	4		29	20				
Mar. 20	.15	5		31	23				
Mar. 21	T	4	1.95	25	11				
Mar. 22	T	4		12	7				
Mar. 23	T	4		22	1				
Mar. 24	T	4		25	−3				
Mar. 25	T	4	1.85	36	19				
Mar. 26		3		30	18				
Mar. 27		3		41	15				
Mar. 28		3	1.75	37	20				
Mar. 29		2		36	30				
Mar. 30	T	2		37	30				
Mar. 31		2		50	27				
Apr. 1		2	.85	40	28				
Apr. 2		2		42	25				
Apr. 3		1		43	23				
Apr. 4		1	.45	43	25				
Apr. 5		1		48	24				
Apr. 6		1		51	28				
Apr. 7		1		66	30				
Apr. 8	T	T		53	28				
Apr. 9				39	22				
Apr. 10				46	20				
Apr. 11				53	32				
Apr. 12				50	30				
Apr. 13				56	31				
Apr. 14				63	26				
Apr. 15				68	35				

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine	Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine
				Maximum	Minimum	Maximum	Minimum							Maximum	Minimum	Maximum	Minimum		
PHILIP, S. DAK.																			
Mar. 16	T	8		36	19					Apr. 1		T		44	26				
Mar. 17		6		36	24					Apr. 2		T		48	23				
Mar. 18		5	1.48	32	15					Apr. 3		T		48	25				
Mar. 19	0.06	5		30	12					Apr. 4				49	23				
Mar. 20	.01	8		31	22					Apr. 5				53	22				
Mar. 21	.01	8	1.87	26	11					Apr. 6				69	25				
Mar. 22	.01	8		15	5					Apr. 7				84	28				
Mar. 23	T	7		25	−1					Apr. 8				48	28				
Mar. 24	.05	7		33	15					Apr. 9				44	23				
Mar. 25	T	6	2.01	36	20					Apr. 10				58	23				
Mar. 26		5		28	11					Apr. 11				58	32				
Mar. 27		4		47	13					Apr. 12				51	25				
Mar. 28		2	1.24	43	21					Apr. 13				56	28				
Mar. 29		1		48	27					Apr. 14				65	22				
Mar. 30	T	T		41	29					Apr. 15		T		72	36				
Mar. 31	T	T		47	27														
RAPID CITY, S. DAK.																			
Mar. 16		T	0.17	45	20	30	17	14.0	65	Apr. 1	.03			45	27	31	18	14.7	75
Mar. 17	T	T		39	27	33	20	18.1	0	Apr. 2				51	22	23	12	7.0	98
Mar. 18		T		44	23	26	16	7.3	82	Apr. 3	.04			43	30	32	9	8.0	0
Mar. 19	0.04	T		43	23	31	18	11.7	7	Apr. 4	T			54	27	38	24	15.3	100
Mar. 20		T		33	19	24	12	18.7	66	Apr. 5				58	31	38	23	8.4	100
Mar. 21	T	T		25	13	14	6	25.0	0	Apr. 6				72	32	42	25	7.9	100
Mar. 22	T	T		19	10	11	3	27.0	36	Apr. 7				81	40	38	24	12.0	80
Mar. 23	.12			37	3	30	−3	6.2	68	Apr. 8	.10			41	24	34	14	26.5	4
Mar. 24	.07	T	.17	37	25	27	17	18.5	72	Apr. 9				42	20	18	8	9.0	95
Mar. 25	.14	1	.16	35	23	27	13	14.0	69	Apr. 10				58	19	24	9	17.3	90
Mar. 26		T	.14	29	20	22	10	10.0	100	Apr. 11				56	33	27	20	12.3	90
Mar. 27				51	21	35	15	8.4	24	Apr. 12	T			56	30	34	22	13.6	63
Mar. 28				61	27	39	23	6.3	97	Apr. 13	T			54	33	35	24	11.3	44
Mar. 29				55	34	34	26	11.2	54	Apr. 14				66	27	30	14	12.7	100
Mar. 30				48	31	34	27	10.2	45	Apr. 15	T			68	36	44	20	13.8	54
Mar. 31	.02			51	29	33	24	11.3	36										
PIERRE, S. DAK.																			
Mar. 16	0.01	20		34	15					Apr. 1		8	3.56	40	26				
Mar. 17	.02	15		41	32					Apr. 2		8		40	22				
Mar. 18	T	15	7.67	32	21					Apr. 3		7		43	21				
Mar. 19	T	14		34	19					Apr. 4		6	2.64	43	23				
Mar. 20	.03	14		33	22					Apr. 5		5		43	21				
Mar. 21	T	13	6.93	27	14					Apr. 6		4		58	24				
Mar. 22	.02	13		15	8					Apr. 7		2		71	34				
Mar. 23	T	13		22	2					Apr. 8	T	1		55	31				
Mar. 24	T	13		31	0					Apr. 9		T		39	23				
Mar. 25	T	13	4.34	5	17					Apr. 10		T		48	21				
Mar. 26		13		32	17					Apr. 11		T		56	33				
Mar. 27		12		42	11					Apr. 12		T		47	32				
Mar. 28		10	4.51	39	15					Apr. 13		T		53	34				
Mar. 29		10		40	30					Apr. 14				61	28				
Mar. 30	T	9		36	30					Apr. 15				70	33				
Mar. 31	T	8		44	29														
SIOUX FALLS, S. DAK.																			
Mar. 16		4	1.98	36	5	25	4	7.4		Apr. 1		T		46	31	36	27	18.5	
Mar. 17	T	3	1.80	41	29	38	24	15.8		Apr. 2		T		45	29	33	25	19.7	
Mar. 18	0.01	3	1.45	40	30	39	29	16.0		Apr. 3				45	27	29	22	10.1	
Mar. 19	T	1	1.36	37	29	29	23	10.4		Apr. 4	T			37	28	29	22	12.7	
Mar. 20	T	1		34	27	29	22	14.3		Apr. 5	T			35	30	27	22	10.7	
Mar. 21	.03	1	.47	28	20	23	17	19.5		Apr. 6				51	29	34	21	7.7	
Mar. 22	.56	8	.65	21	15	19	12	28.7		Apr. 7				67	37	42	29	17.0	
Mar. 23	.04	8	1.15	22	9	11	1	20.1		Apr. 8	T			62	35	44	26	18.7	
Mar. 24		6	1.15	31	2	20	−4	5.4		Apr. 9				36	27	28	15	17.0	
Mar. 25	T	5	1.20	34	9	25	6	3.3		Apr. 10				43	23	24	3	8.3	
Mar. 26	T	5	1.20	34	19	28	17	9.1		Apr. 11	.02			39	30	33	21	16.5	
Mar. 27		3	1.30	37	20	26	17	7.8		Apr. 12	.26			40	33			9.6	
Mar. 28		2	1.13	48	21	36	19	5.1		Apr. 13	T			52	35	35	29	12.9	
Mar. 29		1	.81	57	31	44	30	12.8		Apr. 14				57	34	35	16	6.8	
Mar. 30		T	.23	59	30	51	31	6.5		Apr. 15				61	34	31	15	7.7	
Mar. 31	.26	T		40	31	36	31	11.4											

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.) Maximum	Temperature (° F.) Minimum	Dew point (° F.) Maximum	Dew point (° F.) Minimum	Wind speed, m.p.h.	Percent of possible sunshine
ALEXANDRIA, MINN.									
Mar. 16		14	3.92	32	−3				
Mar. 17	0.07	13	3.64	32	14				
Mar. 18	.12	12	3.54	34	32				
Mar. 19	.02	11	3.35	34	29				
Mar. 20	T	11	3.35	31	24				
Mar. 21		11	3.30	31	20				
Mar. 22	.56	11	3.19	25	14				
Mar. 23	.10	16	3.86	20	10				
Mar. 24		16	3.91	25	0				
Mar. 25		15	3.91	34	−2				
Mar. 26	T	14	3.78	32	−3				
Mar. 27	T	14	3.78	31	14				
Mar. 28		13	3.78	33	21				
Mar. 29		13	3.50	38	21				
Mar. 30	T	12	3.12	40	30				
Mar. 31	T	11	2.86	37	31				
Apr. 1	T	10	2.60	35	29				
Apr. 2	T	10	2.60	34	27				
Apr. 3	T	10	2.60	32	25				
Apr. 4		10	2.60	37	24				
Apr. 5	T	9	2.34	36	28				
Apr. 6		8	2.08	43	19				
Apr. 7		7	2.09	42	28				
Apr. 8	.25	2	.31	47	29				
Apr. 9		1	.32	29	21				
Apr. 10		1		33	14				
Apr. 11		T		36	26				
Apr. 12		T		42	28				
Apr. 13		T		52	29				
Apr. 14		T		55	27				
Apr. 15		T		61	29				
MINNEAPOLIS, MINN.									
Mar. 16		2	1.21	35	15	18	6	6.0	100
Mar. 17	0.07	2	1.23	36	22	33	14	13.4	7
Mar. 18	.29	3	1.16	37	33	35	32	12.9	0
Mar. 19	.11	2	1.35	38	33	33	30	10.4	13
Mar. 20	.01	2	1.14	34	30	31	23	9.7	3
Mar. 21	T	2	1.17	37	29	30	24	11.7	35
Mar. 22	1.40	14	1.17	30	22	23	20	22.8	0
Mar. 23	.04	16	2.55	23	15	20	10	15.6	62
Mar. 24	T	15	2.54	25	8	14	4	7.8	97
Mar. 25		13	2.53	30	4	17	1	6.3	100
Mar. 26		12	2.46	31	8	20	7	6.6	100
Mar. 27	.01	11	2.36	34	14	25	13	5.6	59
Mar. 28		8	2.22	42	23	27	18	6.8	83
Mar. 29		3	1.95	47	25	34	18	16.7	91
Mar. 30	.02	1	.35	50	40	45	35	6.7	2
Mar. 31	.49	T	.25	40	35	40	34	8.9	0
Apr. 1	T	T		40	35	35	31	16.8	78
Apr. 2	T	T		37	33	31	22	22.0	1
Apr. 3	T	T		34	29	26	23	12.5	26
Apr. 4	T	T		42	30	30	25	10.6	48
Apr. 5	T	T		39	32	31	24	12.8	31
Apr. 6		T		45	28	29	24	8.9	100
Apr. 7				57	29	36	25	14.2	99
Apr. 8	.21			67	36	47	31	17.0	60
Apr. 9	.09	T		36	27	35	16	19.1	7
Apr. 10				38	23	21	15	9.1	100
Apr. 11				41	25	30	18	14.1	27
Apr. 12	T			44	32	30	24	13.9	6
Apr. 13	.01			51	34	33	14	21.6	51
Apr. 14				56	34	26	11	11.0	99
Apr. 15				68	31	33	15	4.1	100
BEMIDJI, MINN.									
Mar. 16		6		36	−6				
Mar. 17	0.10	5		31	20				
Mar. 18	.02	7	1.73	35	27				
Mar. 19	.10	7		35	30				
Mar. 20	.04	8		36	25				
Mar. 21	T	8		28	20				
Mar. 22	.01	8		24	14				
Mar. 23	.06	10		21	4				
Mar. 24		11		30	−10				
Mar. 25		10	1.46	39	−11				
Mar. 26	T	9		35	1				
Mar. 27	.01	9		37	9				
Mar. 28		8		37	−3				
Mar. 29		7		43	18				
Mar. 30		6		46	30				
Mar. 31		5		42	26				
Apr. 1		4	2.14	42	30				
Apr. 2	.20	4		33	25				
Apr. 3	.02	7		34	20				
Apr. 4	T	6		34	23				
Apr. 5		6		37	23				
Apr. 6		5		47	12				
Apr. 7		4		50	20				
Apr. 8	.41	2	.51	46	26				
Apr. 9		6		30	10				
Apr. 10		5		38	0				
Apr. 11		2		42	14				
Apr. 12		1		49	29				
Apr. 13		1		52	27				
Apr. 14		1		55	21				
Apr. 15		T	.06	65	22				
REDWOOD FALLS, MINN.									
Mar. 16		7		32	2				
Mar. 17	0.02	6		37	22				
Mar. 18	.07	4	1.72	37	32				
Mar. 19	T	2		35	29				
Mar. 20	.02	2		31	28				
Mar. 21	T	2	.87	30	22				
Mar. 22	.77	3		28	16				
Mar. 23	.35	13		18	4				
Mar. 24		14		22	3				
Mar. 25		13	4.17	31	−3				
Mar. 26		11		35	−3				
Mar. 27	T	9		32	18				
Mar. 28		8	2.70	38	17				
Mar. 29		6		44	25				
Mar. 30	T	1		40	30				
Mar. 31	.23	1		36	31				
Apr. 1		1		38	31				
Apr. 2	T	T		37	32				
Apr. 3		T		38	28				
Apr. 4		T		38	28				
Apr. 5	T	T		37	28				
Apr. 6		T		45	28				
Apr. 7		T		59	32				
Apr. 8	.03			61	32				
Apr. 9	T			34	26				
Apr. 10				39	22				
Apr. 11				40	28				
Apr. 12	.02	T		42	32				
Apr. 13				52	33				
Apr. 14				54	30				
Apr. 15				64	31				

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine	Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.)		Dew point (° F.)		Wind speed, m.p.h.	Percent of possible sunshine
				Maximum	Minimum	Maximum	Minimum							Maximum	Minimum	Maximum	Minimum		
ROCHESTER, MINN.																			
Mar. 16		1		35	15	18	7	7.8		Apr. 1	T	T		45	34	36	29	17.5	
Mar. 17	0.05	T		39	18	31	13	13.3		Apr. 2		T		37	32	30	23	20.6	
Mar. 18	.54	1		38	32	34	32	11.3		Apr. 3	T	T		37	29	26	22	14.3	
Mar. 19	.03	T	0.38	36	31	33	28	12.0		Apr. 4	T			41	30	29	21	10.6	
Mar. 20	T	T		37	28	31	23	9.5		Apr. 5	T			40	32	30	24	13.8	
Mar. 21	T	T		37	29	29	24	10.8		Apr. 6				49	27	31	22	11.3	
Mar. 22	.72	8	.10	33	21	30	19	18.6		Apr. 7				57	23	27	22	11.8	
Mar. 23	.07	11	.79	22	8	19	6	15.5		Apr. 8	.01			67	41	41	27	20.4	
Mar. 24	T	10	.79	24	3	16	2	7.0		Apr. 9	.90	4		43	24	42	17	16.8	
Mar. 25		8	.79	31	0	20	−3	4.0		Apr. 10		2	.74	36	16	22	12	9.0	
Mar. 26		7	.66	34	4	20	1	4.5		Apr. 11		1	.62	39	13	29	11	10.5	
Mar. 27	T	7	.60	34	8	25	5	6.3		Apr. 12	.10	1		37	31	34	26	12.5	
Mar. 28		3	.56	39	17	26	14	5.0		Apr. 13	.85	6	.38	37	31	33	24	19.3	
Mar. 29		1	.24	45	25	34	21	14.0		Apr. 14		1	.73	51	28	30	19	10.8	
Mar. 30	.06	T		52	40	47	35	11.4		Apr. 15		T		58	23	32	15	4.9	
Mar. 31	.34	T		43	35	43	34	8.9											
ST. PAUL, MINN.																			
Mar. 16		1		35	15	18	5	6.6		Apr. 1	T			45	37	36	31	14.0	
Mar. 17	0.03	T		36	21	33	16	10.0		Apr. 2	.01			38	33	32	22	20.3	
Mar. 18	.46	T		37	34	35	33	9.1		Apr. 3	T			35	30	28	22	11.5	
Mar. 19	.08	T		40	33	34	31	8.8		Apr. 4	T			44	30	30	25	9.5	
Mar. 20	.03	T		35	31	32	24	9.0		Apr. 5	T			42	32	31	23	10.2	
Mar. 21		T		38	30	30	22	11.3		Apr. 6				49	28	29	23	8.0	
Mar. 22	1.08	11		30	22	23	20	15.6		Apr. 7				57	28	33	22	9.1	
Mar. 23	.03	12	1.67	23	16	21	9	13.8		Apr. 8	.21			68	37	46	27	16.3	
Mar. 24	T	6	1.65	27	12	14	8	6.2		Apr. 9	.21	T		38	27	36	16	18.1	
Mar. 25		6	1.01	33	7	16	4	2.7		Apr. 10				40	23	23	13	8.7	
Mar. 26		2	.98	34	11	22	9	5.8		Apr. 11				42	27	31	18	10.4	
Mar. 27	.01	2	.95	35	15	28	13	5.5		Apr. 12	T			44	33	30	23	9.0	
Mar. 28		1	.93	43	20	26	19	4.0		Apr. 13	T			51	35	32	13	19.0	
Mar. 29		T		47	26	34	17	14.0		Apr. 14				56	33	32	16	11.0	
Mar. 30	.03			50	40	46	35	3.8		Apr. 15				68	30	36	26	2.7	
Mar. 31	.42			42	36	41	36	6.8											
ST. CLOUD, MINN.																			
Mar. 16		14	4.13	35	4	18	−2	3.2		Apr. 1	T	2	1.68	41	31	34	29	14.7	
Mar. 17	0.02	13	3.23	33	14	32	8	10.3		Apr. 2	T	2	.99	36	30	29	23	17.8	
Mar. 18	.13	11	4.13	35	32	34	32	6.9		Apr. 3		2	.70	33	27	26	22	9.5	
Mar. 19	.36	13	3.85	39	30	34	29	7.2		Apr. 4		1	.63	40	28	30	24	7.4	
Mar. 20	T	11	3.63	37	29	32	25	7.4		Apr. 5	T	T	.57	37	27	29	23	7.5	
Mar. 21		11	3.52	33	25	27	23	9.8		Apr. 6		T		45	23	29	21	3.8	
Mar. 22	.40	14	3.42	30	16	24	12	15.2		Apr. 7		T		50	25	36	24	10.3	
Mar. 23	.14	16	3.72	23	14	13	2	12.5		Apr. 8	.28			59	32	45	31	12.9	
Mar. 24		15	3.78	30	0	16	−4	4.4		Apr. 9	.01			32	24	32	14	14.8	
Mar. 25		14	3.91	34	−2	17	−6	2.5		Apr. 10				36	19	20	12	4.9	
Mar. 26		13	3.70	35	−1	23	−3	3.1		Apr. 11				40	24	32	20	9.5	
Mar. 27	.04	12	3.66	37	14	24	15	4.2		Apr. 12	T			44	32	31	26	6.8	
Mar. 28	T	11	3.45	36	16	26	15	4.7		Apr. 13				55	31	29	19	10.4	
Mar. 29		9	2.98	42	17	34	13	11.2		Apr. 14				56	28	30	18	5.5	
Mar. 30	T	6	2.50	40	31	36	32	3.6		Apr. 15				65	25	33	18	2.3	
Mar. 31	.26	3	2.24	39	33	36	33	6.0											
SCOTTS BLUFF, NEBR.																			
Mar. 16				41	29	33	27	12.6		Apr. 1				47	26	27	18	9.5	
Mar. 17	0.50	4		37	25	34	21	13.0		Apr. 2	.01			62	22	38	13	4.6	
Mar. 18		1	0.40	46	13	30	11	8.8		Apr. 3	.36			53	31	40	24	12.1	
Mar. 19				47	23	28	7	14.5		Apr. 4				58	27	30	18	12.0	
Mar. 20	T			36	20	21	12	11.6		Apr. 5				69	30	32	20	6.9	
Mar. 21	.02	T		24	16	16	8	15.8		Apr. 6				75	31	31	16	8.2	
Mar. 22	T	T		25	11	7	2	17.6		Apr. 7				82	39	33	24	7.5	
Mar. 23	T	T		38	10	26	3	16.3		Apr. 8	.09	T		56	27	36	17	13.1	
Mar. 24	T			43	27	29	17	13.2		Apr. 9				42	21	25	8	7.9	
Mar. 25	T			40	25	31	19	7.2		Apr. 10				52	24	21	12	16.1	
Mar. 26	T			43	24	27	16	7.5		Apr. 11				46	28	28	17	7.1	
Mar. 27				54	21	30	18	9.5		Apr. 12				58	29	35	18	12.1	
Mar. 28				65	26	26	19	7.5		Apr. 13	T			54	28	30	21	9.3	
Mar. 29				66	32	31	19	8.0		Apr. 14				65	26	29	18	14.4	
Mar. 30				66	32	36	24	9.7		Apr. 15	.07			55	35	41	24	10.3	
Mar. 31	T			55	33	27	12	14.1											

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.) Maximum	Temperature (° F.) Minimum	Dew point (° F.) Maximum	Dew point (° F.) Minimum	Wind speed, m. p. h.	Percent of possible sunshine
VALENTINE, NEBR.									
Mar. 16	T	5		38	21	33	20	12.0	17
Mar. 17	0.04	3		42	28	33	29	11.0	37
Mar. 18	T	3		33	19	24	19	8.4	59
Mar. 19	T	1		53	18	35	18	4.8	69
Mar. 20	T	1		32	21	27	17	12.9	23
Mar. 21	.02	1		22	14	16	12	15.4	0
Mar. 22	T	2		14	7	9	6	19.8	48
Mar. 23	T	1		30	5	19	−1	9.5	89
Mar. 24	T	1		32	20	27	15	6.3	33
Mar. 25	T	1		37	21	29	21	8.7	57
Mar. 26		1		36	18	29	15	7.7	100
Mar. 27		1		52	17	30	16	7.8	72
Mar. 28		T		65	25	31	24	5.6	100
Mar. 29				64	35	40	25	8.0	93
Mar. 30	.02			57	33	37	35	6.1	75
Mar. 31	.05			45	28	34	29	7.8	24
Apr. 1	T			46	26	31	15	11.5	86
Apr. 2				54	22	20	16	6.5	89
Apr. 3	T			42	27	27	19	4.4	5
Apr. 4				48	27	24	13	8.8	98
Apr. 5				51	27	29	25	6.0	91
Apr. 6				72	26	36	25	12.1	100
Apr. 7				84	42	40	29	15.4	91
Apr. 8	T			60	31	35	19	16.7	0
Apr. 9				38	23	17	8	11.1	69
Apr. 10				50	16	21	12	12.5	89
Apr. 11				49	31	32	21	14.5	54
Apr. 12	.09			40	31	35	32	7.0	0
Apr. 13				50	32	31	27	7.8	66
Apr. 14				59	23	28	21	6.4	100
Apr. 15	T			66	34	41	28	10.0	81
SIOUX CITY, IOWA									
Mar. 16				44	21	32	18	6.3	100
Mar. 17				54	32	43	28	12.2	6
Mar. 18	0.39			44	32	42	31	10.0	0
Mar. 19				52	31	36	27	6.6	73
Mar. 20				42	31	32	24	11.0	68
Mar. 21	.29	1		31	24	29	22	13.5	0
Mar. 22	.67	8	0.43	25	17	24	15	21.8	0
Mar. 23	.06	10	1.03	24	7	14	0	13.1	84
Mar. 24		9	.99	30	−4	19	−9	3.3	86
Mar. 25	T	8	.96	34	6	30	2	4.1	54
Mar. 26	T	7	.93	38	18	28	17	4.9	72
Mar. 27		6	.89	42	17	31	17	5.5	73
Mar. 28		4	.81	49	24	37	22	4.2	100
Mar. 29		T	.53	67	30	49	29	10.9	100
Mar. 30				65	43	53	44	8.0	57
Mar. 31	T			43	34	43	33	8.7	6
Apr. 1				53	32	36	28	13.4	73
Apr. 2				52	30	31	20	12.8	100
Apr. 3	T			49	29	31	26	6.3	48
Apr. 4	T			37	28	30	25	11.3	0
Apr. 5	T			37	32	30	25	8.9	0
Apr. 6				55	32	34	24	6.8	69
Apr. 7				71	34	44	31	14.2	75
Apr. 8	.02			70	35	49	32	13.6	68
Apr. 9	.22	T		35	26	33	19	17.2	19
Apr. 10				42	23	26	18	8.0	100
Apr. 11	.17			40	30	34	25	12.7	3
Apr. 12	.22			38	32	36	33	7.8	0
Apr. 13	T			53	32	41	30	17.3	55
Apr. 14				60	32	44	31	7.2	100
Apr. 15				62	28	42	27	5.4	100
DUBUQUE, IOWA									
Mar. 16		T		38	22	22	14	7.6	
Mar. 17	T			46	23	30	20	15.8	
Mar. 18	0.56			40	36	40	36	13.6	
Mar. 19	.05			41	30	36	31	14.6	
Mar. 20				53	26	42	25	9.4	
Mar. 21	.06			41	28	32	22	10.3	
Mar. 22	.47	5	0.09	33	27	32	24	14.8	
Mar. 23	.05	5	.46	27	17	17	12	25.0	
Mar. 24	T	5	.58	26	5	17	1	10.7	
Mar. 25		3	.58	30	12	17	8	5.3	
Mar. 26		3	.58	34	15	23	10	9.6	
Mar. 27		1	.52	37	17	27	15	8.0	
Mar. 28		T	.25	46	26	28	23	3.9	
Mar. 29		T		53	25	36	24	14.6	
Mar. 30	T			63	39	53	38	19.6	
Mar. 31	.25			58	38	54	48	12.6	
Apr. 1				56	35	39	34	21.1	
Apr. 2	T			46	33	30	23	23.6	
Apr. 3				50	30	33	23	13.8	
Apr. 4				39	27	27	21	11.0	
Apr. 5	T			46	31	27	20	14.4	
Apr. 6				53	33	30	7	13.5	
Apr. 7				57	25	23	6	7.0	
Apr. 8				66	34	35	22	26.2	
Apr. 9	0.02			58	29	49	30	15.8	
Apr. 10	T			42	25	22	14	10.4	
Apr. 11				43	23	27	17	13.0	
Apr. 12	.22			35	32	34	31	13.5	
Apr. 13	.52			34	31	33	31	13.1	
Apr. 14	.05			49	32	33	26	13.6	
Apr. 15				57	30	26	16	9.4	
GRANTSBURG, WIS.									
Mar. 16		17		38	5				
Mar. 17	0.31	16		35	8				
Mar. 18	.21	19	4.04	36	33				
Mar. 19	.09	17		36	32				
Mar. 20	T	16		35	27				
Mar. 21	T	15	4.42	36	26				
Mar. 22	.55	16		26	20				
Mar. 23	.02	23		23	10				
Mar. 24	T	23		31	9				
Mar. 25		23	4.13	36	−10				
Mar. 26		23		36	−1				
Mar. 27	T	23		35	7				
Mar. 28		23	4.70	38	0				
Mar. 29		22		42	5				
Mar. 30	T	16		46	36				
Mar. 31	.59	11		45	33				
Apr. 1	0.26	9	4.83	43	33				
Apr. 2	T	7		36	30				
Apr. 3	T	6		36	26				
Apr. 4	T	5	1.95	42	28				
Apr. 5	.01	5		39	29				
Apr. 6		4		45	20				
Apr. 7		2		50	16				
Apr. 8	.08	1	.28	61	35				
Apr. 9	.07	T		35	24				
Apr. 10		T		38	18				
Apr. 11	T	T		38	15				
Apr. 12		T		48	29				
Apr. 13		T		50	33				
Apr. 14		T		56	27				
Apr. 15				67	19				

TABLE 6.—*Daily meteorological data, Mar. 16–Apr. 15, 1952*—Continued

Date	Precipitation 24-hour amounts (inches)	Snow or ice on ground at 6 p. m. C. S. T. (inches)	Water equivalent of snow or ice on ground at 6 a. m. C. S. T.	Temperature (° F.) Maximum	Temperature (° F.) Minimum	Dew point (° F.) Maximum	Dew point (° F.) Minimum	Wind speed, m.p.h.	Percent of possible sunshine
LA CROSSE, WIS.									
Mar. 16		1		37	18	20	10	5.7	
Mar. 17	0.05	T		42	20	35	16	7.9	
Mar. 18	.38	T		39	32	36	32	7.3	
Mar. 19	.05	T		39	32	33	29	8.8	
Mar. 20		T		40	28	34	25	8.2	
Mar. 21	T	T		40	31	29	24	9.9	
Mar. 22	.35	4	.01	36	25	29	21	14.0	
Mar. 23	.03	5	.58	25	12	23	8	15.7	
Mar. 24	T	4	.58	27	11	17	6	7.5	
Mar. 25		3	.58	35	8	16	6	4.2	
Mar. 26		2	.50	36	14	20	10	5.0	
Mar. 27	T	1	.43	36	15	25	15	5.3	
Mar. 28		1	.35	43	29	28	19	3.0	
Mar. 29		T	.19	50	27	33	22	13.7	
Mar. 30	.29			62	41	52	31	13.6	
Mar. 31	.55			59	37	51	35	11.2	
Apr. 1				50	37	38	30	20.6	
Apr. 2	T	T		40	34	32	23	23.5	
Apr. 3	T			38	31	27	22	15.3	
Apr. 4				42	31	28	21	11.9	
Apr. 5	T			44	32	31	21	18.2	
Apr. 6				50	30	28	14	15.5	
Apr. 7				60	24	28	13	9.4	
Apr. 8				68	41	37	19	16.8	
Apr. 9	.56	2		58	26	45	20	19.8	
Apr. 10		T	.40	35	23	21	12	14.8	
Apr. 11	T	T		41	21	29	16	12.1	
Apr. 12	.07	T		38	32	35	22	14.8	
Apr. 13	.89	5	.30	36	31	34	31	19.8	
Apr. 14	T	T	.75	51	34	31	22	17.8	
Apr. 15				61	31	33	15	9.8	
MADISON, WIS.									
Mar. 16		1		37	19	19	6	11.2	100
Mar. 17		T		42	17	30	12	8.3	71
Mar. 18	0.59	T		38	35	37	29	17.9	0
Mar. 19	.06	T		41	34	36	30	13.4	0
Mar. 20				50	28	39	26	7.5	86
Mar. 21	.01			43	30	31	26	15.8	66
Mar. 22	.44	1		35	29	32	23	25.1	0
Mar. 23	.02	1	0.35	29	18	25	11	30.0	61
Mar. 24	T	1	.35	28	15	16	9	13.6	48
Mar. 25				32	14	18	9	4.3	100
Mar. 26				38	20	21	14	7.2	96
Mar. 27				41	20	26	14	10.3	87
Mar. 28	T			45	29	27	23	3.7	72
Mar. 29				49	27	32	22	12.1	100
Mar. 30	T			58	35	51	25	16.0	19
Mar. 31	.02			54	42	51	44	10.8	0
Apr. 1	T			58	36	40	28	23.0	89
Apr. 2	T			42	33	30	23	24.0	1
Apr. 3	T			44	29	28	24	14.5	21
Apr. 4				39	28	27	21	12.0	13
Apr. 5	T			45	32	30	24	21.4	12
Apr. 6				51	30	26	14	19.0	94
Apr. 7				56	23	28	13	5.3	100
Apr. 8				61	28	37	22	15.9	99
Apr. 9	.20			66	30	46	28	17.8	20
Apr. 10	T			42	28	27	18	17.3	68
Apr. 11				38	23	26	17	11.8	32
Apr. 12	.21			35	32	33	26	20.5	0
Apr. 13	.77			36	32	34	31	25.2	0
Apr. 14	T			51	33	32	26	20.5	51
Apr. 15				57	30	33	20	11.7	100

TABLE 7.—*Daily radiation data, Mar. 16–Apr. 15, 1952*

Date	Lander, Wyo. Total radiation on horizontal surface (langleys)	Rapid City, S. Dak. Total radiation on horizontal surface (langleys)	Madison, Wis. Total radiation on horizontal surface (langleys)
Mar. 16	445	295	519
Mar. 17	460	209	410
Mar. 18	586	444	40
Mar. 19	611	254	137
Mar. 20	193	422	423
Mar. 21	447	259	380
Mar. 22	596	448	41
Mar. 23	477	444	447
Mar. 24	484	474	415
Mar. 25	539	515	518
Mar. 26	489	521	495
Mar. 27	650	420	555
Mar. 28	581	496	515
Mar. 29	610	430	545
Mar. 30	627	392	176
Mar. 31	547	299	101
Apr. 1	680	473	529
Apr. 2	462	526	194
Apr. 3	637	189	297
Apr. 4	699	504	189
Apr. 5		540	252
Apr. 6	708	541	617
Apr. 7	557	411	607
Apr. 8	363	176	524
Apr. 9	708	580	225
Apr. 10	605	529	449
Apr. 11	426	446	265
Apr. 12	488	444	55
Apr. 13	657	474	41
Apr. 14	622	576	346
Apr. 15	404	371	652

TABLE 8.—*Dates of annual freezeup and breakup of rivers*

MISSOURI RIVER

Year	Bismarck, N. Dak.			Year	Bismarck, N. Dak.			Year	Bismarck, N. Dak.		
	Breakup	Freezeup	Ice thickness		Breakup	Freezeup	Ice thickness		Breakup	Freezeup	Ice thickness
1881	Mar. 29	Nov. 17		1906	Apr. 2	Nov. 19	35.0	1931	Mar. 24	Nov. 23	22.0
1882	Apr. 5	Nov. 10		1907	Mar. 24	Dec. 2	35.0	1932	Apr. 1	Nov. 11	22.0
1883	Apr. 10	Nov. 15		1908	Apr. 6	Dec. 1	26.0	1933	Mar. 23	Dec. 8	30.5
1884	Mar. 25	Dec. 14		1909	Apr. 3	Nov. 15	32.0	1934	Mar. 20	Dec. 3	25.0
1885	Apr. 4	Dec. 5		1910	Mar. 13	Nov. 19	28.0	1935	Apr. 11	Nov. 2	34.0
1886	Apr. 8	Nov. 16						1936	Mar. 18	Dec. 5	36.0
1887	Mar. 16	Nov. 22		1911	Mar. 23	Nov. 10	36.0	1937	Apr. 7	Nov. 20	33.0
1888	Apr. 9	Nov. 15		1912	Apr. 3	Dec. 5	38.0	1938	Mar. 16	Nov. 23	29.0
1889	Mar. 24	do		1913	Apr. 5	Dec. 22	30.0	1939	Mar. 25	Dec. 27	31.0
1890	Apr. 4	Dec. 3		1914	Apr. 6	Nov. 16	35.0	1940	Apr. 9	Nov. 12	20.0
				1915	do	Nov. 30	34.0				
1891	Apr. 3	Nov. 15		1916	Mar. 26	Nov. 14	37.0	1941	Apr. 2	Nov. 23	24.0
1892	do	Nov. 21		1917	Apr. 6	Dec. 7	35.0	1942	Mar. 20	Dec. 1	25.0
1893	do	Nov. 22		1918	Mar. 22	Dec. 22	28.0	1943	Mar. 29	Dec. 15	28.0
1894	Mar. 16	Nov. 18		1919	Apr. 5	Oct. 27	23.0	1944	Apr. 5	Nov. 29	28.0
1895	Mar. 27	Dec. 1		1920	Mar. 26	Nov. 11[1]	29.0	1945	Mar. 23	Dec. 10	34.0
1896	Mar. 29	Nov. 9						1946	Mar. 27	Nov. 21	33.5
1897	Apr. 5	Nov. 20		1921	Mar. 31	Nov. 19	24.0	1947	Mar. 28	Nov. 22	29.0
1898	Apr. 10	do		1922	Apr. 2	Dec. 9	31.0	1948	Apr. 9	Dec. 6	33.5
1899	Apr. 12	Dec. 11		1923	Apr. 9	Dec. 19	28.0	1949	Apr. 2	Dec. 9	35.0
1900	Apr. 2	Nov. 16		1924	Apr. 4	Nov. 28	20.0	1950	Apr. 15	Nov. 25	30.0
				1925	Mar. 28	Dec. 21	30.0				
1901	Mar. 31	Dec. 13		1926	Mar. 21	Nov. 19	23.0	1951	Apr. 4	Dec. 14	34.0
1902	Apr. 4	Nov. 17		1927	Mar. 27	Nov. 15	28.0	1952	Apr. 5		31.0
1903	Apr. 5	Nov. 16	32.0	1928	Mar. 23	Dec. 2	25.0				
1904	Apr. 6	Nov. 29		1929	Mar. 19	Nov. 21	34.0				
1905	Mar. 22	do		1930	Apr. 2	do	30.0				

Year	Pierre, S. Dak.		Year	Pierre, S. Dak.		Year	Pierre, S. Dak.		Year	Pierre, S. Dak.	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1845		[2]	1872	Mar. 14	[2]	1900	Mar. 12	Nov. 20.	1927	Mar. 13	Nov. 20.
1846	Apr. 20	[2]	1873	Mar. 11	[2]				1928	Mar. 12	Dec. 5.
1847	Apr. 10	[2]	1874	Apr. 14	[2]	1901	Mar. 17	Dec. 17.	1929	Mar. 15	Nov. 23.
1848	Apr. 9	[2]	1875	Mar. 25	[2]	1902	Mar. 12	Dec. 4.	1930	Feb. 24	Dec. 15.
1849	Apr. 1	[2]	1876	Mar. 31	[2]	1903	Mar. 30	Nov. 18.			
1850	Apr. 3	[2]	1877	Mar. 16	[2]	1904	Mar. 21	Dec. 13.	1931	Feb. 16	Nov. 29.
			1878	Mar. 23	[2]	1905	Mar. 8	Nov. 30.	1932	Mar. 27	Nov. 15.[4]
1851	Mar. 24	[2]	1879	Mar. 31	[2]	1906	Mar. 28	Dec. 14.	1933	Mar. 16	Dec. 12.
1852	Mar. 22	[2]	1880	Apr. 7	[2]	1907	Mar. 8	Dec. 22.	1934	Feb. 12	Dec. 23.
1853	Mar. 26	[2]				1908	Mar. 17	Dec. 27.	1935	Mar. 9	Nov. 16.
1854	Apr. 5	[2]	1881	Mar. 27	[2]	1909	Mar. 6	Nov. 19.	1936	Mar. 18	Dec. 5.
1855	Mar. 30	[2]	1882	Mar. 4	[2]	1910	Mar. 11	[2]	1937	Mar. 18	Do.
1856	Apr. 6	[2]	1883	Mar. 17	[2]				1938	Mar. 17	Dec. 19.
1857	Mar. 26	[2]	1884	Mar. 28	[2]	1911	Mar. 14	Nov. 13.	1939	Mar. 24	Dec. 26.
1858	Apr. 12	[2]	1885	Mar. 18	[2]	1912	Mar. 28	[3]	1940	Mar. 31	Nov. 13.
1859	Apr. 18	[2]	1886	Mar. 16	[2]	1913	[3]	[2]			
1860	Mar. 24	[2]	1887	Mar. 12	[2]	1914	Mar. 15	[2]	1941	Mar. 26	Dec. 28.
			1888	Mar. 30	[2]	1915	Apr. 10	[2]	1942	Mar. 13	Dec. 2.
1861	Apr. 5	[2]	1889	Mar. 18	[2]	1916	Mar. 4	[2]	1943	Mar. 28	Dec. 15.
1862	Mar. 27	[2]	1890	Mar. 20	[2]	1917	[2]	[2]	1944	Apr. 3	Dec. 1.
1863	Mar. 23	[2]				1918	Mar. 20	[2]	1945	Mar. 15	Nov. 22.
1864	Apr. 15	[2]	1891	Mar. 31	[2]	1919	Mar. 25	[2]	1946	Mar. 13	Do.
1865	Apr. 13	[2]	1892	Mar. 5	[2]	1920	Mar. 22	[2]	1947	Mar. 28	Nov. 20.
1866	Apr. 7	[2]	1893	Mar. 12	[2]				1948	Mar. 24	Dec. 6.
1867	Apr. 4	[2]	1894	Mar. 17	Nov. 17.	1921	Mar. 26	Nov. 21.	1949	Mar. 23	Dec. 11.
1868	Mar. 25	[2]	1895	Mar. 19	Nov. 22.	1922	Mar. 17	Dec. 6.	1950	Apr. 2	Nov. 23.[5]
1869	Mar. 29	[2]	1896	Mar. 27	Nov. 18.	1923	Mar. 6	Dec. 30.			
1870	Apr. 8	[2]	1897	Mar. 29	Nov. 27.	1924	Mar. 15	Dec. 16.	1951	Mar. 29	Dec. 1.
			1898	Mar. 6	Nov. 21.	1925	Mar. 16	Dec. 25.	1952	Apr. 4	
1871	Apr. 2	[2]	1899	Apr. 11	Dec. 18.	1926	Mar. 6	Nov. 19.			

See footnotes at end of table.

TABLE 8.—*Dates of annual freezeup and breakup of rivers*—Continued

MISSOURI RIVER—Continued

Year	Yankton, S. Dak.		Year	Yankton, S. Dak.		Year	Yankton, S. Dak.		Year	Yankton, S. Dak.	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1871	Feb. 27	(2)	1892	Mar. 18	(2)	1913	Mar. 12	Jan. 2, 1914.	1934	Mar. 2	Dec. 11.
1872	Mar. 19	(2)	1893	Mar. 29	(2)	1914	do	Nov. 19 [6].	1935	Mar. 9	Dec. 21.
1873	Mar. 14	(2)	1894	Mar. 20	(2)	1915	Apr. 4	Dec. 15.	1936	Mar. 15	Dec. 7.
1874	Mar. 20	(2)	1895	Mar. 16	(2)	1916	Feb. 17	Dec. 13.	1937	Mar. 10	Dec. 31.
1875	Mar. 18	(2)	1896	Mar. 18	(2)	1917	Mar. 25	Dec. 8.	1938	do	Dec. 27.
1876	Apr. 14	(2)	1897	Mar. 20	(2)	1918	Mar. 8	Dec. 25.[7]	1939	Mar. 21	Dec. 29.
1877	Feb. 21	(2)	1898	Mar. 7	(2)	1919	Mar. 16	Nov. 12.	1940	Mar. 28	Nov. 13.
1878	Feb. 19	(2)	1899	Apr. 5	(2)	1920	Mar. 14	Dec. 22.			
1879	Mar. 7	(2)	1900	Mar. 11	(2)				1941	Mar. 21	Jan. 1, 1942.
1880	Feb. 23	(2)				1921	Feb. 25	Dec. 21.	1942	Mar. 8	Dec. 2.
			1901	Mar. 6	(2)	1922	Mar. 15	Dec. 6.[8]	1943	Mar. 23	Dec. 23.
1881	Mar. 27	(2)	1902	Mar. 15	(2)	1923	Mar. 20	Dec. 31.	1944	Mar. 21	Dec. 10.
1882	Mar. 16	(2)	1903	Mar. 12	(2)	1924	Mar. 5	(2)	1945	Mar. 12	Nov. 23.[5]
1883	Mar. 5	(2)	1904	Mar. 19	(2)	1925	Mar. 4	Dec. 20.	1946	Mar. 2	Dec. 14.
1884	Mar. 20	(2)	1905	Mar. 1	(2)	1926	Feb. 25	Dec. 12.	1947	Mar. 23	Dec. 5.
1885	Mar. 13	(2)	1906	Feb. 22	Dec. 17.	1927	Mar. 5	Dec. 7.	1948	Mar. 19	Dec. 10.
1886	Mar. 7	(2)	1907	Feb. 17	Jan. 16, 1908.	1928	Mar. 7	Jan. 1, 1929.	1949	Mar. 21	Dec. 14.
1887	Mar. 9	(2)	1908	Mar. 11	Dec. 7.	1929	Mar. 13	Dec. 3.	1950	Mar. 26	Nov. 27.
1888	Mar. 19	(2)	1909	Mar. 6	Dec. 4.	1930	Feb. 21	Do.			
1889	Mar. 4	(2)	1910	do	Dec. 11.				1951	Mar. 28	Dec. 1.
1890	Mar. 20	(2)				1931	Jan. 30	Jan. 3, 1932.	1952	do	
			1911	Mar. 8	Nov. 27.	1932	Mar. 13	Nov. 17.			
1891	Mar. 15	(2)	1912	Mar. 30	Jan. 5, 1913.	1933	Feb. 28	Dec. 25.			

Year	Omaha, Nebr.		Year	Omaha, Nebr.		Year	Omaha, Nebr.		Year	Omaha, Nebr.	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1874		Oct. 23.	1894	Mar. 4	(2)	1914	Mar. 13	Dec. 12.	1934	Feb. 23	Jan. 22, 1935.
1875	Mar. 29	Nov. 24.	1895	Mar. 3	Jan. 4, 1896.	1915	Feb. 21	Dec. 30.	1935	Mar. 1	Dec. 23.
1876	Mar. 31	Nov. 24.	1896	Feb. 26	Jan. 23, 1897.	1916	Feb. 23	Dec. 13.	1936	Mar. 5	Jan. 6, 1937.
1877	Mar. 15	Jan. 5, 1878.	1897	Mar. 16	Nov. 28.	1917	Mar. 10	Dec. 10.	1937	Mar. 8	Dec. 10.
1878	Feb. 15	Dec. 18.	1898	Feb. 27	Nov. 23.	1918	Mar. 4	Dec. 25.	1938	Mar. 3	Feb. 9, 1939.
1879	Mar. 8	Dec. 10.	1899	Mar. 25	Dec. 31.	1919	Mar. 8	Dec. 1.	1939	Mar. 13	Dec. 28.
1880	Feb. 16	Dec. 28.	1900	Mar. 11	Feb. 24, 1901.	1920	Mar. 12	Dec. 23.	1940	Mar. 17	(1)
1881	Mar. 26	Jan. 3, 1882.	1901	Mar. 1	Dec. 13.	1921	Jan. 12	Dec. 21.	1941	(3)	Jan. 2, 1942.
1882	Feb. 27	Dec. 6.	1902	Mar. 7	Dec. 4.	1922	Mar. 12	Dec. 13.	1942	Mar. 9	Dec. 4.
1883	Mar. 9	Dec. 30.	1903	Mar. 9	Dec. 25.	1923	Mar. 22	Dec. 31.	1943	Feb. 22	Dec. 16 [3].
1884	Mar. 19	Dec. 17.	1904	Mar. 15	Dec. 13.	1924	Mar. 21	Dec. 8.	1944	Feb. 23	Mar. 1, 1945.
1885	Mar. 10	Dec. 10.	1905	Mar. 1	Dec. 3.	1925	Feb. 25	Dec. 21.	1945	Mar. 13	Dec. 16.
1886	Mar. 17	Nov. 30.	1906	Mar. 25	Dec. 19.	1926	Feb. 9	Dec. 14.	1946	Feb. 6	(3)
1887	Mar. 12	Dec. 28.	1907	Feb. 18	Feb. 2, 1908.	1927	Mar. 11	Dec. 4.	1947	(3)	Jan. 27, 1948.
1888	Mar. 16	Jan. 18, 1889.	1908	Feb. 13	Dec. 1.	1928	Feb. 7	Dec. 24.	1948	Feb. 28	(3)
1889	Mar. 4	(2)	1909	Feb. 27	Dec. 10.	1929	Mar. 12	Dec. 19.	1949	(3)	(3)
1890	(2)	(2)	1910	Mar. 4	Jan. 3, 1911.	1930	Feb. 17	Jan. 14, 1931.	1950	(3)	(3)
1891	(2)	(2)	1911	Mar. 1	Dec. 28.	1931	Jan. 28	Jan. 9, 1932.	1951	(3)	(3)
1892	(2)	(2)	1912	Mar. 18	Dec. 12.	1932	Mar. 18	Dec. 9.	1952	(3)	(3)
1893	(2)	(2)	1913	Feb. 16	Dec. 28.	1933	Jan. 31	Dec. 27.			

Year	Sioux City, Iowa		Year	Sioux City, Iowa		Year	Sioux City, Iowa		Year	Sioux City, Iowa	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1889		Jan. 1, 1890.	1905	Feb. 27	Jan. 4, 1906.	1921	Feb. 25	Nov. 23.	1938	Mar. 3	Feb. 8, 1939.
1890	(2)	Jan. 4, 1891.	1906	Mar. 2	Feb. 4, 1907.	1922	Mar. 13	Dec. 10.	1939	Mar. 23	(3)
			1907	Feb. 17	Jan. 27, 1908.	1923	Mar. 20	Dec. 31.	1940	(3)	Jan. 28, 1941.
1891	Mar. 31	Nov. 25.	1908	Mar. 3	Dec. 4.	1924	Mar. 7	Dec. 1.			
1892	Mar. 5	Dec. 19.	1909	Mar. 5	Dec. 6.	1925	Mar. 5	Dec. 21.	1941	Mar. 10	Jan. 2, 1942.
1893	Mar. 12	Dec. 1.	1910	do	Dec. 10.	1926	Feb. 27	Dec. 16.	1942	do	Dec. 4.
1894	Mar. 4	Dec. 28.				1927	Mar. 8	Dec. 7.	1943	Mar. 22	Dec. 24.
1895	Mar. 20	Dec. 1.	1911	Mar. 6	Dec. 28.	1928	Feb. 5	Dec. 21.	1944	Feb. 22	Dec. 19.
1896	Feb. 26	Nov. 12.	1912	Apr. 1	Feb. 4, 1913.	1929	Mar. 14	Dec. 2.	1945	Mar. 11	Nov. 24.
1897	Mar. 20	Nov. 27.	1913	Mar. 11	Dec. 29.	1930	Feb. 21	(3)	1946	Feb. 25	Dec. 19.[4]
1898	Mar. 7	Nov. 22.	1914	Mar. 13	Dec. 15.				1947	Mar. 15 [5]	Dec. 10.
1899	Apr. 4	Dec. 20.	1915	Mar. 9	Dec. 19.	1931	(3)	(3)	1948	Mar. 4	Dec. 11.
1900	Mar. 12	Nov. 20.	1916	Feb. 21	Dec. 12.	1932	(3)	Dec. 12.	1949	Mar. 14	Dec. 14.
			1917	Mar. 24	Dec. 7.	1933	Mar. 1	Dec. 26.	1950	Mar. 25	Nov. 24.
1901	do	Dec. 17.	1918	Mar. 9	Jan. 6, 1919.	1934	Mar. 2	Dec. 4.			
1902	Mar. 8	Dec. 4.	1919	Mar. 13	Nov. 12.	1935	do	Dec. 20.	1951	Mar. 27	Dec. 17.
1903	Mar. 12	Dec. 1.	1920	Mar. 14	Dec. 20.	1936	Mar. 6	Dec. 7.	1952	do	
1904	Mar. 20	Dec. 15.				1937	Mar. 18	Dec. 6.			

See footnotes at end of table.

TABLE 8.—*Dates of annual freezeup and breakup of rivers*—Continued

MISSISSIPPI RIVER

Year	St. Paul, Minn.		Year	St. Paul, Minn.		Year	St. Paul, Minn.		Year	St. Paul, Minn.	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1866		Nov. 29.	1888	Apr. 7	Dec. 12.	1910	Mar. 8	Nov. 29.	1931	Feb. 2	Jan. 30, 1932.
1867	Apr. 7	Dec. 2.	1889	Mar. 19	Nov. 25.				1932	Mar. 15	Dec. 7.
1868	Mar. 20	Dec. 10.	1890	Mar. 25	Dec. 3.	1911	Mar. 4	Nov. 12.	1933	Feb. 21	Dec. 6.
1869	Mar. 27	Dec. 6.				1912	Mar. 23	Jan. 1, 1913.	1934	Mar. 28	Dec. 7.
1870	(2)	(2)	1891	Mar. 29	Nov. 29.	1913	Mar. 11	Dec. 21.	1935	Feb. 28	Nov. 22.
			1892	Mar. 7	Nov. 27.	1914	Mar. 10	Dec. 14.	1936	Feb. 29	Jan. 5, 1937.
1871	(2)	(2)	1893	Apr. 1	Nov. 12.	1915	Mar. 23	Dec. 27.	1937	Mar. 26	Nov. 22.
1872	Apr. 14	Dec. 8.	1894	Mar. 8	Nov. 30.	1916	Mar. 19	Dec. 14.	1938	Mar. 9	Do.
1873	Mar. 23	Dec. 4.	1895	Mar. 22	Nov. 28.	1917	Mar. 23	Dec. 5.	1939	Mar. 21	Dec. 14.
1874	Apr. 10	Nov. 29.	1896	Mar. 10	Do.	1918	Mar. 4	Jan. 3, 1919.	1940	Mar. 15	Nov. 13.
1875	Apr. 9	Nov. 19.	1897	Mar. 20	Do.	1919	Mar. 11	Dec. 1.			
1876	do	Nov. 29.	1898	Mar. 8	Nov. 23.	1920	Mar. 15	Dec. 18.	1941	Mar. 28	Dec. 8.
1877	Mar. 31	Jan. 4, 1878.	1899	Apr. 8	Dec. 13.				1942	Mar. 10	Nov. 29.
1878	Mar. 1	Dec. 14.	1900	Apr. 1	Dec. 25.	1921	Mar. 10	Dec. 21.	1943	Mar. 16	Dec. 12.
1879	Mar. 9	Dec. 8.				1922	Mar. 5	Dec. 12.	1944	Mar. 21	Dec. 1.
1880	Mar. 28	Nov. 17.	1901	Mar. 25	Dec. 4.	1923	Mar. 22	Dec. 30.	1945	Mar. 15	Dec. 8.
			1902	Mar. 10	Do.	1924	Mar. 1	Dec. 17.	1946	Mar. 14	Dec. 19.
1881	Apr. 7	Dec. 9.	1903	Mar. 14	Dec. 10.	1925	Mar. 20	Dec. 24.	1947	Mar. 8	Nov. 24.
1882	Mar. 27	Dec. 8.	1904	Mar. 29	Dec. 13.	1926	Mar. 19	Dec. 6.	1948	Mar. 13	Dec. 8.
1883	Apr. 7	Dec. 14.	1905	Mar. 7	Nov. 30.	1927	Mar. 8	Dec. 8.	1949	Mar. 2	Do.
1884	Mar. 24	Nov. 24.	1906	Apr. 1	Dec. 7.	1928	Mar. 16	Dec. 22.	1950	Mar. 15	Dec. 3.
1885	Apr. 4	Dec. 6.	1907	Mar. 23	Dec. 11.	1929	Mar. 22	Nov. 29.			
1886	Mar. 25	Nov. 24.	1908	Mar. 16	Dec. 2.	1930	Mar. 18	Nov. 28.	1951	Apr. 5	Dec. 13.
1887	Mar. 22	Nov. 28.	1909	do	Dec. 6.				1952	Feb. 26	

Year	La Crosse, Wis.		Year	La Crosse, Wis.		Year	La Crosse, Wis.		Year	La Crosse, Wis.	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1874		Nov. 29.	1894	Mar. 25	Dec. 28.	1914	Mar. 16	Dec. 15.	1934	Mar. 13	Dec. 11.
1875	Apr. 3	Nov. 22.	1895	Mar. 24	Dec. 3.	1915	Mar. 24	Dec. 21.	1934	Mar. 15	Dec. 20.
1876	Apr. 7	Nov. 30.	1896	Mar. 23	Nov. 27.	1916	Mar. 26	Dec. 16.	1936	Mar. 22	Dec. 7.
1877	Mar. 27	Dec. 2.	1897	Mar. 18	Dec. 1.	1917	Mar. 28	Dec. 8.	1937	do	Nov. 21.
1878	Feb. 24	Dec. 16.	1898	Mar. 15	Nov. 26.	1918	Mar. 20	Jan. 1, 1919.	1938	Mar. 1	Nov. 27.
1879	Mar. 26	Dec. 12.	1899	Apr. 12	Dec. 19.	1919	Mar. 17	Dec. 2.	1939	Mar. 21	Dec. 31.
1880	Mar. 6	Nov. 19.	1900	Apr. 5	Dec. 14.	1920	Mar. 22	Dec. 21.	1940	Mar. 18	Dec. 3.
1881	Apr. 6	Dec. 31.	1901	Mar. 31	Dec. 14.	1921	Mar. 2	Dec. 23.	1941	Mar. 26	Dec. 14.
1882	Mar. 3	Dec. 2.	1902	Mar. 9	Dec. 11.	1922	Mar. 16	Dec. 12.	1942	Mar. 6	Dec. 2.
1883	Apr. 5	Dec. 18.	1903	Mar. 12	Dec. 5.	1923	Apr. 7	Jan. 1, 1924.	1943	Mar. 26	Dec. 13.
1884	Mar. 26	Nov. 27.	1904	Apr. 1	Dec. 15.	1924	Mar. 23	Dec. 14.	1944	Jan. 28	Dec. 18.
1885	Mar. 31	Dec. 7.	1905	Mar. 23	Dec. 26.	1925	Mar. 20	Dec. 7.	1945	Mar. 14	Dec. 11.
1886	Mar. 28	Nov. 29.	1906	Apr. 2	Dec. 17.	1926	Apr. 1	Dec. 5.	1946	Mar. 2	Dec. 13.
1887	Mar. 19	Nov. 28.	1907	Mar. 23	Jan. 1, 1908.	1927	Mar. 7	Dec. 6.	1947	Mar. 7	Nov. 28.
1888	Apr. 7	Dec. 31.	1908	Mar. 12	Dec. 8.	1928	Mar. 23	Dec. 20.	1948	Mar. 20	Dec. 10.
1889	Mar. 15	Nov. 26.	1909	Mar. 31	Dec. 9.	1929	Mar. 19	Nov. 30.	1949	Mar. 5	Dec. 14.
1890	do	Dec. 4.	1910	Mar. 18	Dec. 11.	1930	Feb. 23	Nov. 28.	1950	Mar. 24	Nov. 24.
1891	Mar. 31	Nov. 27.	1911	Mar. 8	Dec. 28.	1931	Feb. 3	Jan. 19, 1932.	1951	Mar. 13	Dec. 15.
1892	Mar. 25	Dec. 10.	1912	Mar. 30	Dec. 12.	1932	Mar. 29	Dec. 9.	1952	Mar. 13	
1893	Apr. 2	Dec. 1.	1913	Mar. 18	Jan. 10, 1914.	1933	Mar. 7	Dec. 14.			

Year	Dubuque, Iowa		Year	Dubuque, Iowa		Year	Dubuque, Iowa		Year	Dubuque, Iowa	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1874		Nov. 21.	1894	Mar. 11	Dec. 6.	1914	Mar. 18	Nov. 20.	1934	Mar. 14	Dec. 7.
1875	Apr. 7	Nov. 18.	1895	Mar. 23	Dec. 3.	1915	Mar. 21	Dec. 20.	1935	Mar. 15	Dec. 1.
1876	Mar. 14	Nov. 26.	1896	Mar. 21	Nov. 13.	1916	Mar. 23	Nov. 16.	1936	Mar. 18	Dec. 2.
1877	Mar. 28	Dec. 10.	1897	Mar. 28	Nov. 26.	1917	Mar. 31	Dec. 5.	1937	Mar. 27	Nov. 21.
1878	Feb. 20	Dec. 18.	1898	Mar. 17	Dec. 1.	1918	Mar. 19	Jan. 2, 1919.	1938	Mar. 8	Dec. 26.
1879	Mar. 22	Nov. 23.	1899	Apr. 1	Dec. 16.	1919	Mar. 15	Nov. 30.	1939	Mar. 23	Dec. 24.
1880	Mar. 16	Nov. 16.	1900	Mar. 25	Dec. 29.	1920	do	Dec. 18.	1940	Mar. 30	Nov. 30.
1881	Apr. 12	Nov. 21.	1901	Mar. 18	Dec. 15.	1921	Feb. 17	Dec. 22.	1941	Mar. 29	Dec. 11.
1882	Feb. 26	Dec. 1.	1902	Mar. 12	Dec. 25.	1922	Mar. 6	Dec. 5.	1942	Mar. 7	Dec. 2.
1883	Apr. 1	Nov. 15.	1903	Mar. 9	Dec. 16.	1923	Apr. 3	Dec. 31.	1943	Mar. 13	Dec. 15.
1884	Mar. 25	Nov. 24.	1904	Mar. 24	Jan. 15, 1905.	1924	Mar. 28	Nov. 27.	1944	Mar. 12	Dec. 19.
1885	Apr. 4	Dec. 6.	1905	Mar. 23	Dec. 17.	1925	Mar. 25	Nov. 28.	1945	Mar. 1	Dec. 12.
1886	Mar. 26	Nov. 24.	1906	Apr. 2	Dec. 8.	1926	Mar. 24	Nov. 21.	1946	Feb. 18	Dec. 18.
1887	Mar. 16	Nov. 22.	1907	Mar. 28	Dec. 5.	1927	Mar. 8	Dec. 1.	1947	Mar. 23	Jan. 14, 1948
1888	Apr. 4	Dec. 14.	1908	Mar. 6	Nov. 17.	1928	Mar. 20	Dec. 4.	1948	Mar. 15	Dec. 11.
1899	Mar. 19	Nov. 28.	1909	Mar. 21	Dec. 17.	1929	do	Nov. 22.	1949	Mar. 6	Dec. 8.
1890	Mar. 24	Dec. 4.	1910	Mar. 18	Nov. 20.	1930	Mar. 6	Dec. 2.	1950	Mar. 5	Nov. 30.
1891	Mar. 30	Nov. 18.	1911	Mar. 6	Nov. 14.	1931	Feb. 18	Jan. 7, 1932.	1951	Mar. 23	Dec. 16.
1892	Mar. 21	Nov. 22.	1912	Apr. 4	Dec. 9.	1932	Mar. 18	Nov. 21.	1952	Mar. 8	
1893	Mar. 23	Nov. 23.	1913	Mar. 17	Dec. 20.	1933	Mar. 12	Nov. 16.			

See footnotes at end of table.

TABLE 8.—*Dates of annual freezeup and breakup of rivers*—Continued

MISSISSIPPI RIVER—Continued

Year	Davenport, Iowa		Year	Davenport, Iowa		Year	Davenport, Iowa		Year	Davenport, Iowa	
	Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup		Breakup	Freezeup
1841		Dec. 27.	1870	Mar. 24	Dec. 21.	1898	Mar. 10	Dec. 8.	1926	Feb. 16	Dec. 16.
1842	Mar. 1	Nov. 7.				1899	Mar. 13	Dec. 27.	1927	Feb. 6	Dec. 17.
1843	Apr. 10	Jan. 27, 1844.	1871	Feb. 25	Dec. 5.	1900	Mar. 22	Jan. 30, 1901.	1928	Feb. 8	Jan. 7, 1929.
1844	Feb. 27	Feb. 4, 1845.	1872	Mar. 28	Nov. 29.				1929	Mar. 13	Dec. 4.
1845	Feb. 19	Nov. 30.	1873	Mar. 14	Dec. 22.	1901	Mar. 16	Dec. 15.	1930	Feb. 21	Jan. 14, 1931.
1846	Jan. 24	Jan. 8, 1847.	1874	Mar. 10	Jan. 4, 1875.	1902	Mar. 5	Jan. 8, 1903.			
1847	Mar. 15	Jan. 18, 1848.	1875	Mar. 30	Dec. 19.	1903	Mar. 7	Dec. 16.	1931	Feb. 18	[3]
1848	Feb. 17	Nov. 17.	1876	Feb. 10	Dec. 8.	1904	Mar. 22	Jan. 7, 1905.	1932	[3]	Dec. 12.
1849	Mar. 17	Dec. 1.	1877	Feb. 21	[3]	1905	Mar. 18	[3]	1933	Feb. 25	Dec. 27.
1850	Mar. 1	Dec. 2.	1878	[3]	Dec. 19.	1906	[3]	[3]	1934	Mar. 13	Dec. 8.
			1879	Mar. 9	Do.	1907	[3]	Jan. 30, 1908.	1935	Mar. 11	Nov. 30.
1851	Feb. 26	Dec. 16.	1880	Jan. 7	Nov. 25.	1908	Feb. 13	Jan. 11, 1909.	1936	Mar. 14	Dec. 6.
1852	Mar. 4	Dec. 17.				1909	Feb. 20	Dec. 20.	1937	Mar. 6	Dec. 1.
1853	do	Dec. 23.	1881	Apr. 1	[3]	1910	Mar. 12	Dec. 12.	1938	Feb. 18	Nov. 27.
1854	Mar. 2	Jan. 21, 1855.	1882	[3]	Dec. 11.				1939	Mar. 14	Dec. 22.
1855	Mar. 8	Dec. 24.	1883	Mar. 17	Dec. 19.	1911	Feb. 15	Jan. 4, 1912.	1940	Mar. 28	Dec. 1.
1856	Mar. 29	Dec. 6.	1884	Mar. 23	Dec. 18.	1912	Mar. 28	Feb. 1, 1913.			
1857	Feb. 27	[3]	1885	Mar. 30	Dec. 8.	1913	Mar. 11	Feb. 10, 1914.	1941	Mar. 22	Dec. 30.
1858	[3]	Jan. 22, 1859.	1886	Mar. 18	Dec. 2.	1914	Mar. 15	Dec. 16.	1942	Mar. 15	[2]
1859	Feb. 21	Dec. 20.	1887	Mar. 9	Dec. 21.	1915	Feb. 15	Dec. 29.	1943	Mar. 16	Dec. 14.
1860	Mar. 3	Dec. 22.	1888	Mar. 19	Jan. 10, 1889.	1916	Mar. 12	Dec. 17.	1944	Feb. 28	Dec. 13.
			1889	Mar. 12	Jan. 16, 1890.	1917	Mar. 13	Dec. 9.	1945	Mar. 5	Dec. 10.
1861	Mar. 2	Dec. 28.	1890	Mar. 14	Feb. 4, 1891.	1918	Mar. 2	Jan. 2, 1919.	1946	Mar. 1	Dec. 18.
1862	Mar. 28	[3]				1919	Jan. 21	Dec. 10.	1947	Mar. 20	Nov. 29.
1863	[3]	Dec. 18.	1891	Mar. 10	Nov. 29.	1920	Mar. 13	Dec. 27.	1948	Mar. 16	Dec. 10.
1864	Mar. 2	Dec. 7.	1892	Feb. 14	Dec. 22.				1949	Mar. 7	Do.
1865	Mar. 6	Dec. 12.	1893	Mar. 13	Dec. 2.	1921	Jan. 21	Jan. 1, 1922.	1950	Mar. 6	Nov. 24.
1866	do [3]	Dec. 27.	1894	Mar. 4	Dec. 28.	1922	Feb. 24	Dec. 15.			
1867	Apr. 5	Dec. 8.	1895	Mar. 1	Dec. 7.	1923	Mar. 3	Jan. 3, 1924.	1951	Mar. 23	Dec. 14.
1868	Mar. 12	Dec. 9.	1896	Feb. 25	Jan. 27, 1897.	1924	Mar. 4	Dec. 20.	1952	Mar. 7	
1869	Feb. 13	Jan. 18, 1870.	1897	Mar. 11	Dec. 21.	1925	Feb. 25	Dec. 24.			

Note: These records represent in some cases the actual freezing and breaking of the ice in the rivers, and in other cases, the actual date of the first and last boat that traversed the stream. However, the two are closely related and no distinction is made in the summary.

[1] River opened again Nov. 28 and closed Dec. 16.
[2] No record.
[3] Channel open throughout the winter.
[4] River opened again Dec. 2 and closed Dec. 8.
[5] Estimated date.
[6] River opened again Nov. 20 and closed Dec. 14.
[7] River opened again Jan. 25 and closed Feb. 27.
[8] River opened again Mar. 9 and closed Mar. 18.
[9] River opened again Jan. 25 and closed again Feb. 12.
[10] Only partly frozen during winter 1946–1947; frozen in some places, but shore ice and open water in other places.

TABLE 9.—*River gages—miscellaneous information*

Stream and location	Gage zero 1929 adj.	Flood stage (feet)	Drainage area (sq. mi.)	Miles from mouth	Highest stages				Record since—	Operated by—
					Prior to 1952		March–May 1952			
					Feet	Year	Feet	Date		
Mississippi River:										
Aitkin, Minn	1,185.41	12	6,140	2,020	19.49	1950	14.73	Apr. 13	1902	C, G
Fort Ripley, Minn	[1] 1,134.71	10	11,010	1,946	13.3	1950	12.2	Apr. 14–15	1904	W, C
Minneapolis, Minn	794.30	16	19,500	1,822	19.2	1945	19.5	Apr. 14	1938	W
St. Paul, Minn	683.68	14	36,780	1,803	19.7	1881	22.02	Apr. 16	1866 [2]	G, C, W
Hastings, Minn	670.17	15	36,990	1,779	18.98	1870	20.93	do	1879	W, C
Red Wing, Minn	664.65	14	46,680	1,755	16.3	1951	16.85	Apr. 18	1893	W, C
Reads Landing, Minn	663.34	12	56,600	1,727	15.0	1880, 1951	15.0	Apr. 18–19	1894	W, C
Winona, Minn	639.64	13	59,245	1,690	17.36	1951	17.93	Apr. 20	1878	G, C, W
La Crosse, Wis	625.83	12	62,840	1,662	16.5	1880	15.32	do	1873	G, C, W
Lansing, Iowa	611.79	18	66,280	1,627	19.9	1880	18.14	Apr. 23	1912	W, C
Prairie du Chien, Wis	604.91	18	67,400	1,599	21.5	1880	21.0	Apr. 23–24	1878	W
Dubuque, Iowa	584.94	17	81,600	1,544	22.66	1951	22.70	Apr. 25	1869	W, C
Clinton, Iowa	[1] 566.29	16	85,600	1,482	20.9	1880	20.92	Apr. 28	1893	W, C
Le Claire, Iowa	562.66	12	88,400	1,461	14.5	1880	13.76	do	1873	W, C
Davenport, Iowa	542.00	15	88,449	1,447	20.9	1868	18.63	do	1860	W, C
Muscatine, Iowa	530.97	16	99,400	1,419	21.0	1951	21.05	do	1878	W, C
Keithsburg, Ill	522.72	12	113,000	1,392	17.1	1951	16.86	do	1893	W, C
Burlington, Iowa	511.00	15	114,000	1,367	18.94	1851	17.85	do	1878	W, C
Keokuk, Iowa	477.41	16	119,000	1,328	21.0	1851	18.95	Apr. 24	1868	G, C, W
Gregory Landing, Mo	[1] 472.71	15	133,900	1,317	21.1	1944	19.32	do	1930	W, C
Quincy, Ill	458.22	17	135,000	1,291	23.9	1947	21.9	Apr. 25	1878	W, C
Hannibal, Mo	449.07	16	137,200	1,274	24.1	1947	21.67	do	1878	W, C
Louisiana, Mo	437.52	15	140,570	1,246	22.61	1947	19.94	Apr. 26	1873 [2]	W, C
Grafton, Ill	403.79	18	171,300	1,182	32.1	1844	24.6	Apr. 30–May 1	1879	W, C
St. Louis, Mo	379.94	30	701,013	1,144	41.4	1844	33.83	May 1	1861	G, C, W
Chester, Ill	341.05	27	712,565	1,074	39.8	1844	34.40	May 2	1891	G, C, W
Cape Girardeau, Mo	304.77	32	716,000	1,016	42.5	1844	38.3	do	1896	W, C
Minnesota River:										
Montevideo, Minn	[1] 910.87	14	6,300	271	17.45	1919	20.02	Apr. 10	1909	G, C
New Ulm, Minn	[1] 700.00						107.75	Apr. 13		
Mankato, Minn	747.92	19	14,900	106	29.9	1881	24.82	Apr. 14	1903	G, C, W
Carver, Minn	[1] 690.00	18	16,200	36	28.0	1951	28.31	Apr. 15	1934	G
Redwood River: Redwood Falls, Minn			697	9	17.0	1917	11.84	Apr. 5	1909 [2]	G
Cottonwood River: New Ulm, Minn	[1] 799.09		1,280	2	16.94	1947	14.30	do	1909 [2]	G
Le Sueur River: Rapidan, Minn			1,100	2	13.7	1943	[3] 16.0	Apr. 2	1939 [2]	G

See footnotes at end of table.

TABLE 9.—*River gages—miscellaneous information*—Continued

Stream and location	Gage zero 1929 adj.	Flood stage (feet)	Drainage area (sq. mi.)	Miles from mouth	Highest stages				Record since—	Operated by—
					Prior to 1952		March–May 1952			
					Feet	Year	Feet	Date		
St. Croix River:										
Grantsburg 10N, Wis	[1] 848.98		2,820	103	15.06	1950	11.74	Apr. 10	1923	G
Stillwater, Minn	[1] 600.00	87	7,150	23	89.5	1850	89.71	Apr. 16	1878 [2]	C, W
Chippewa River: Durand, Wis	[1] 695.20	11	9,010	17	18.4	1884	11.94	Apr. 10	1905	G, C, W
Zumbro River: Theilman, Minn	[1] 727.00	12	1,320	24	16.49	1951	14.49	Apr. 1	1936	G, C, W
Black River:										
Neillsville, Wis	962.77	18	756	80	23.8	1938	16.5	Apr. 2	1905 [2]	G, W
Galesville, Wis	[1] 658.43	12	2,120	9	14.31	1938	14.01	Apr. 3	1931	G. C, W
Root River: Houston, Minn	[1] 660.00	15	1,560	16	18.05	1938	17.57	Apr. 1	1936	C, G
Upper Iowa River: Decorah, Iowa	829.80		560		15.19	1941	[3] 8.5	do	1913 [2]	G
Wisconsin River:										
Rothschild, Wis	1,135.86		4,000	274	14.04	1945	14.80	Apr. 2	1944	G
Portage, Wis	775.09	17	7,979	116	20.5	1938	15.50	Apr. 11–14	1909	W, C
Muscoda, Wis	667.05	9	10,300	44	11.48	1938	6.77	Apr. 15	1913	G, C, W
Kickapoo River: Steuben, Wis	[1] 657.82	8	690	14	13.66	1951	9.75	Apr. 3	1933	G, W
Turkey River: Garber, Iowa	[1] 635.34	11	1,556	17	28.06	1922	15.88	Apr. 1	1913 [2]	G, C
Maquoketa River: Maquoketa, Iowa	[1] 636.52	14	1,550	28	24.7	1944	[3] 6.3	do	1913	G, C
Wapsipinicon River: Dewitt, Iowa	[1] 599.73	10	2,300	18	12.07	1944	[3] 9.3	Apr. 9–10	1934	G, C
Rock River:										
Rockton, Ill	707.94		6,290		14.6	1937	11.82	Mar. 22	1903 [2]	G, C
Joslin, Ill	564.06	10	9,520	27	16.23	1948	11.73	Apr. 16	1939	C
Moline, Ill	[1] 551.34	13	10,771	7	16.4	1892	11.5	Apr. 1	1929	W
Pecatonica River: Freeport, Ill	743.18	14	1,330		17.0	1929	8.5	Apr. 15	1914	G, C
Cedar River:										
Waterloo, Iowa	824.09	15	5,190	155	20.0	1929	[3] 13.5	Apr. 3	1941	G, W
Cedar Rapids, Iowa	700.33	13	6,640	81	20.1	1929	10.43	Apr. 5	1890 [2]	G, W
Iowa River:										
Iowa City, Iowa	627.27	16	3,230	67	21.0	1918	[3] 6.7	Apr. 9	1893 [2]	G
Wapello, Iowa	[1] 548.98	10	12,510	16	16.85	1947	[3] 10.3	do	1915	G, C, W
Skunk River: Augusta, Iowa	[1] 521.69	15	4,285	12	23.0	1944	13.39	Apr. 23	1915	G, C, W
Des Moines River:										
Boone, Iowa	[1] 871.52	12	5,490	258	19.85	1947	[3] 10.8	Apr. 1–3	1905 [2]	G, W
Des Moines, Iowa	773.84	23	6,180	202	27.3	1903	[3] 20.2	Apr. 4	1893 [2]	G, W
Tracy, Iowa	[1] 671.78	14	12,400	130	26.5	1947	15.25	do	1920 [2]	G, C, W
Eddyville, Iowa	645.09	15	13,000	111	28.1	1947	17.3	Apr. 5	1936 [2]	W
Ottumwa, Iowa	622.77	9	13,200	93	23.0	1903	10.28	do	1913 [2]	G, W
Keosauqua, Iowa	557.30	20	13,900	51	27.85	1903	[3] 9.6	do	1903 [2]	G, C, W
Raccoon River: Van Meter, Iowa	841.15	13	3,410	30	21.6	1947	14.81	Apr. 1	1915	G, C, W
Illinois River:										
Morris, Ill	478.50	13	7,380	263	26.85	1866	13.7	Apr. 14	1916	G, C, W
La Salle, Ill	430.00	20	11,835	225	31.0	1943	22.62	do	1908	W, C
Peoria, Ill	428.39	18	13,520	162	28.6	1943	18.4	Apr. 18	1867 [2]	W, C
Havana, Ill	424.28	14	17,560	120	27.3	1943	16.61	Apr. 24	1896	G, C, W
Beardstown, Ill	419.89	14	23,445	89	29.7	1943	18.6	Apr. 27–28	1878	G, C, W
Bourbeuse River: Union, Mo	488.58	15	798	13	28.5	1915	13.2	Apr. 6	1916	G, W
Meramec River:										
Sullivan, Mo	570.75	11	1,475	108	33.0	1915	[3] 12.7	Apr. 13	1921 [2]	W, G
Valley Park, Mo	392.92	14	3,807	22	37.85	1915	17.3	Apr. 14	1916	W
Kaskaskia River: New Athens, Ill	359.50	20	5,220	41	39.35	1943	24.25	Apr. 16	1935	G
Big Muddy River: Murphysboro, Ill	335.50		2,170	37	36.01	1949	24.10	Apr. 17	1916 [2]	G
Missouri River:										
Zortman 22SW, Mont			40,630	2,069	30.16	1947	[3] 12.4	Mar. 28	1934	G
Fort Peck (below), Mont	2,020.00	20	57,800	1,861	[4] 12.3	1936	[3] 10.5	Apr. 19	1934	G
					9.72	1943				
Wolf Point, Mont	1,958.57		83,175	1,802	[4] 17.45	1930	[3] 13.3	Apr. 7	1930	G
					14.82	1932				
Culbertson, Mont	1,883.40		92,500	1,715	15.12	1943			1941	G
Williston 7W, N. Dak	1,830.20	20	164,500	1,650	19.78	1943	17.76	Apr. 1	1905 [2]	G, W
					[4] 26.0	1920				
Elbowoods, N. Dak	1,720.55	17	179,800	1,504	23.2	1947	25.20	Apr. 5	1935	G, W
Garrison Dam, N. Dak	0.00	1,690	180,940	1,454	1,704.0	1947	1,701.9	do	1943 [2]	C
Washburn, N. Dak	1,649.98	22	183,860	1,419	23.9	1927	31.50	Apr. 6	1918	W
Bismarck, N. Dak	1,618.38	19	186,360	1,378	31.6	1881	27.9	do	1881	G, W
Mobridge, S. Dak	1,527.19	16	208,710	1,251	19.6	1943	25.07	Apr. 9	1928	G, W
Pierre, S. Dak	1,414.41	15	243,529	1,118	[5] 19.65	1943	25.35	Apr. 10	1891	G, W
Chamberlain, S. Dak	1,320.22	18	250,750	1,013	19.5	1943	25.55	Apr. 11	1905	G, W
Geddes, S. Dak	1,250.53	12	263,450	938	17.7	1927	22.55	Apr. 12	1931	W
Fort Randall, S. Dak	0.00	1,250	263,480	921	1,252.6	1943	1,258.9	do		C
Yankton, S. Dak	1,159.68	12	279,540	840	30.5	1881	15.50	Apr. 13–14	1873 [2]	G, W
Sioux City, Iowa	1,076.96	16	314,617	760	22.5	1881	24.28	Apr. 14	1878	G, C, W
Decatur, Nebr	1,031.10	12	316,140	717	20.5	1943	23.31	Apr. 15–16	1935	C
Blair, Nebr	987.31	19	321,400	670	21.83	1950	23.50	Apr. 17	1882 [2]	C, W
Omaha, Nebr	958.23	19	322,820	632	24.65	1881	30.20	Apr. 18	1872	G, C, W
Plattsmouth, Nebr	0.00	952.5	323,540	608	957.9	1881	961.43	do	1874 [2]	C, W
Nebraska City, Nebr	903.94	18	414,420	579	25.8	1949	27.66	do	1878 [2]	G, W
Brownsville, Nebr	870.90	15		552	21.5	1951	29.8	Apr. 17		C
Rulo, Nebr	837.23	17	418,900	514	21.6	1950	25.6	Apr. 22	1886 [2]	C, G
St. Joseph, Mo	788.19	17	424,340	460	27.2	1881	26.82	Apr. 22–23	1873	G, C, W
Atchison, Kans	762.27	22	424,670	435	26.6	1949	32.5	Apr. 23	1879	C
Leavenworth, Kans	742.35	19	425,010	408	23.1	1881, 1943	27.6	do	1873 [2]	C
Kansas City, Mo	715.79	22	489,162	378	38.0	1844	30.63	Apr. 24	1873	G, W
Napoleon, Mo	680.24	17		332	26.85	1951	24.6	do	1928	C
Lexington, Mo	663.46	22		321	33.9	1844	30.1	Apr. 26	1873 [2]	C
Waverly, Mo	645.49	18	491,230	297	28.2	1951	28.10	Apr. 24	1878 [2]	G, C, W
Miami, Mo	621.35	18		265	29.0	1951	26.5	Apr. 26	1942	C
Glasgow, Mo	586.11	25	502,900	227	36.7	1951	32.06	Apr. 27	1878 [2]	C
Booneville, Mo	565.02	21	505,710	197	32.82	1951	27.70	do	1873	G, C, W
Jefferson City, Mo	519.71	23	507,525	143	34.2	1951	26.10	do	1878	W, C
Gasconade, Mo	486.06	22	524,150	104	35.4	1951	29.2	do	1894 [2]	C
Hermann, Mo	481.34	21	528,200	97	35.5	1844	27.10	Apr. 28	1873	G, C, W
Washington, Mo	457.24	20		67	31.0	1951	24.4	Apr. 28–29	1943	C
St. Charles, Mo	413.59	25	529,190	28	40.11	1844	31.80	Apr. 29	1868 [2]	G, C, W
Milk River: Nashua, Mont	2,027.71	24	23,300	24	30.8	1939	31.38	Apr. 18	1939	G

See footnotes at end of table.

TABLE 9.—*River gages—miscellaneous information*—Continued

Stream and location	Gage zero 1929 adj.	Flood stage (feet)	Drainage area (sq. mi.)	Miles from mouth	Highest stages				Record since—	Operated by—
					Prior to 1952		March–May 1952			
					Feet	Year	Feet	Date		
Yellowstone River:										
Billings, Mont.	3,083.33	11	11,870	346	12.5	1944	[3] 6.2	Apr. 30	1904 [2]	G, W
Miles City, Mont.	2,337.88	13	42,995	182	19.3	1944	[3] 11.0	Mar. 29	1922 [2]	W
Sidney, Mont.	1,895.43	17	69,450	30	21.85	1947	19.0	Mar. 31	1934	G
Little Missouri:										
Marmarth, N. Dak.		18	4,724	305	21.7	1947	23.4	do	1938	G
Medora, N. Dak.		15	6,323	188	20.5	1947	18.35	Apr. 1	1903 [2]	G, W
Watford City 17S, N. Dak.	1,929.03	20	8,490	81	24.0	1947	15.53	Apr. 10	1934	G
Knife River:										
Golden Valley, N. Dak.	1,846.75	20	1,233	67	26.7	1943	25.63	Apr. 7	1903 [2]	G
Hazen, N. Dak.	1,712.24	22	2,352	13	26.3	1943	25.83	do	1928 [2]	G
Heart River:										
Glen Ullin 14S, N. Dak.	1,998.87	10	1,760	103	14.0	1947	6.99	Apr. 9	1943	G
Mandan 3W, N. Dak.	1,638.70	17	3,362	14	24.7	1943	25.75	Apr. 4	1924 [2]	G
Cedar Creek: Pretty Rock 10S, N. Dak.	2,155.18	16	1,260	67	26.5	1950	20.91	do	1943	G
Cannonball River:										
New Leipzig, N. Dak.	2,222.91	20	1,260	168	34.0	1950	20.10	Apr. 8	1943	G
Breien, N. Dak.	1,676.54	8	4,066	30	22.30	1950	15.42	Apr. 7	1934	G
Grand River:										
Shadehill, S. Dak.			3,120	198	21.0	1950	10.45	Apr. 9	1943	G
Wakpala 5W, S. Dak.		17	5,510	21	22.75	1950	14.0	Apr. 1	1911 [2]	G
Moreau River:										
Eagle Butte 13N, S. Dak.			4,320	108	23.0	1944	21.70	Apr. 4	1943	G
Promise, S. Dak.		17	5,223	34	24.4	1947	24.16	Apr. 5	1928	G
Cheyenne River:										
Wasta, S. Dak.	2,263.40	12	12,800	145	11.28	1932	8.54	May 22	1914 [2]	G
Eagle Butte 21S, S. Dak.		16	24,499	37	15.0	1933	11.36	Apr. 3	1928	G
Belle Fourche River: Elm Springs, S. Dak.			7,210	16	21.8	1927	[3] 8.8	Apr. 1	1928 [2]	G
Bad River:										
Midland, S. Dak.			1,650	88	10.5	1948 1950	14.00	Apr. 2	1946	G
Fort Pierre, S. Dak.	1,427.83	16	3,107	5	30.89	1927	27.24	Apr. 1	1928 [2]	G
White River:										
Kadoka, S. Dak.		16	5,000	228	18.0	1905 1927	11.35	Mar. 29	1942	G
Oacoma, S. Dak.		15	10,200	2	17.6	1950	15.40	Mar. 30	1928	G
Niobrara River: Spencer 5SE, Nebr.	1,478.65		10,850	39	[6]	1943	[3] 21.6	Apr. 1	1908 [2]	G
James River:										
Huron, S. Dak.	1,223.44	11	15,800	223	16.5	1922	15.25	Apr. 15	1902 [2]	G, W
Scotland 5NE, S. Dak.		13	21,550	33	15.9	1950	16.23	Apr. 23	1928	G
Vermillion River: Wakonda 7SE, S. Dak.			1,715	27	16.63	1947	16.37	Mar. 31	1945	G
Big Sioux River:										
Sioux Falls, S. Dak.		10	6,200	90	14.3	1951	14.5	Apr. 7	1943	G
Akron, Iowa.	1,118.90	61	9,500	54	19.66	1951	19.75	Apr. 1	1927	G, W
Floyd River: James, Iowa.	1,102.59	16	918	10	20.0	1951	20.32	Mar. 31	1934	G, W
Little Sioux River: Turin 4S, Iowa.	1,020.00		4,460	17	26.0	1949	[3] 18.8	Apr. 1	1939	G
Soldier River: Pisgah, Iowa.	1,036.34		417	13	28.2	1950	[3] 8.0	May 23	1940	G
Boyer River: Logan, Iowa (RR).	1,009.38	19	810	31	20.7	1949	[3] 5.6	do	1918 [2]	G
Platte River: Ashland 3NE, Nebr.	1,052.51	7	88,262	29	9.6	1912	[3] 4.1	May 24	1928	G, W
Nishnabotna River: Hamburg 2NE, Iowa.	894.17	18	2,800	11	26.03	1947	18.2	Mar. 13	1922 [2]	G
Little Nemaha River: Auburn, Nebr.			885		27.60	1950	[3] 10.8	Apr. 22	1949	G
Nemaha River: Falls City, Nebr.	861.24	20	1,320	26	28.8	1949	[3] 12.8	do	1944	G
Tarkio River: Fairfax, Mo.	867.66	17	508	13	22.33	1929	[3] 10.5	May 22	1922	G, W
Nodaway River: Burlington Junction, Mo.	896.17	18	1,240	72	19.69	1949	[3] 8.0	May 23	1922	G, W
Platte River: Agency, Mo.	807.38	20	1,760	67	30.46	1947	16.4	May 24	1924 [2]	G
Kansas River:										
Topeka, Kans.	854.08	21	56,710	82	42.2	1844	17.21	Apr. 23	1904	G, W
Lecompton, Kans.	821.60	17	58,420	63	30.23	1951	15.18	do	1882 [2]	G, W
Bonner Springs, Kans.	747.01	21	59,890	20	38.6	1951	14.5	Apr. 24	1917	G, W
Grand River:										
Chillicothe, Mo.	658.70	24	4,900	60	33.8	1947	20.7	do	1915	W
Sumner, Mo.	630.87	26	6,880	39	39.5	1947	28.20	do	1924	G, W
Brunswick, Mo.	615.52	12	7,883	5	26.1	1951	22.90	Apr. 27	1910	W
Chariton River: Keytesville 4NE, Mo.	616.37	20	1,950	39	25.3	1947	18.8	Apr. 25	1929	G, W
Lamine River: Clifton City, Mo.	621.91	19	598	39	35.3	1905	16.8	Apr. 5	1922	G, W
Osage River: St. Thomas, Mo.	528.06	23	14,750	43	43.8	1943	[3] 12.5	Apr. 24	1931	G, W
Gasconade River:										
Jerome, Mo.	657.64	15	2,840	107	29.0	1897	[3] 12.8	Apr. 14	1885 [2]	G, W
Rich Fountain, Mo.	553.70	20	3,180	53	29.1	1945	13.8	Apr. 15	1921	G
Otter Tail River: Fergus Falls 5SW, Minn.	[1] 1,069.95		1,810	45	4.81	1947	[3] 3.8	Apr. 8	1900 [2]	G, C
Red River of the North:										
Wahpeton, N. Dak.	942.97	10	4,010	549	17.0	1897	14.99	Apr. 12	1917	G, W
Moorhead, Minn.	861.33	17	6,800	452	40.1	1897	34.65	Apr. 16	1901	G, W
Halstead, Minn.	826.65		[8] 17,860	375	40.0	1897	29.78	Apr. 18	1936 [2]	G
Grand Forks, N. Dak.	778.42	30	[8] 26,100	296	50.2	1897	33.60	Apr. 21	1882	G
Oslo, Minn.	777.65	28	[8] 27,300	272	32.5	1897	25.47	Apr. 23	1936 [2]	G
Drayton, N. Dak.	756.59	32	[8] 30,900	209	41.58	1950	28.83	Apr. 26	1936 [2]	G
Emerson, Manitoba.	0.00	778	40,200	155	790.89	1950	773.0	Apr. 14	1912	[7]
Bois de Sioux River: White Rock, S. Dak.	[1] 959.89	21	1,160	34	9.3	1944	10.3	Apr. 13	1941	G, C
Wild Rice River: Abercrombie, N. Dak.	907.94		2,170	42	21.02	1943	20.62	Apr. 12	1932	G
Sheyenne River:										
Valley City, N. Dak.		13	[8] 4,260	253	20.0	1882	6.02	Mar. 31	1919 [2]	G
West Fargo, N. Dak.	877.19	16.5	[8] 5,330	25	21.8	1882 1897	[3] 20.5	Apr. 9–10	1902 [2]	G
Maple River: Mapleton, N. Dak.	886.67		1,480	11	18.04	1947	18.91	Apr. 6	1944	G
Buffalo River: Dilworth, Minn.			1,040	20	22.60	1943	[3] 21.1	Apr. 10	1931	G
Goose River: Hillsboro, N. Dak.		12	1,200	28	18.0	1882	3.33	Apr. 4	1931	G
Red Lake River: Crookston, Minn.	832.72	20	5,280	52	25.70	1950	12.65	Apr. 11	1901	G

[1] 1912 adjustment.
[2] Record not continuous.
[3] Highest reported.
[4] Site and datum then in use.
[5] 21.0 in 1881, relation to present datum unknown.
[6] Maximum discharge 21,500 c. f. s.
[7] Canada.
[8] Excludes 3,940 square miles Devils Lake drainage.

C—Corps of Engineers.
G—U. S. Geological Survey.
W—U. S. Weather Bureau.
(RR)–C&NW RR datum.

TABLE 10.—*Daily river stages, March–May 1952*

(C) Record furnished by Corps of Engineers
(WG) Record collected in cooperation with U. S. Geological Survey
(G) Record furnished by U. S. Geological Survey.
(I) International Gaging Station

Date	MISSISSIPPI RIVER Aitkin, Minn. (C)		MISSISSIPPI RIVER Fort Ripley, Minn.		MISSISSIPPI RIVER Minneapolis, Minn.		MISSISSIPPI RIVER St. Paul, Minn. (WG)		MISSISSIPPI RIVER Hastings, Minn.	
	April	May	April	May	April	May	April	May	April	May
1	8.0	13.5	----------	9.4	6.9	11.8	4.6	14.2	6.8	14.8
2	8.2	13.0	----------	9.3	7.3	11.4	5.8	13.7	8.0	14.5
3	8.5	12.3	----------	9.2	7.5	11.6	6.3	13.2	8.8	13.9
4	9.0	11.6	----------	9.1	7.7	11.2	7.2	12.7	9.5	13.7
5	9.6	11.0	----------	8.0	8.2	10.5	8.4	12.2	10.2	13.3
6	10.0	10.3	----------	7.5	9.3	10.5	10.0	11.7	11.5	12.9
7	10.7	9.9	7.5	7.4	9.0	9.8	11.3	11.0	12.5	12.6
8	11.8	9.5	9.1	7.2	10.5	9.5	13.3	10.5	13.4	12.2
9	13.0	9.1	9.9	7.1	13.3	9.3	15.3	10.0	14.8	11.8
10	13.7	8.8	10.8	6.0	14.5	8.5	16.9	9.7	16.4	11.6
11	14.2	8.8	11.4	6.3	17.6	8.6	18.4	9.2	17.7	10.9
12	14.5	8.8	11.7	6.8	18.2	7.6	19.8	8.5	18.8	10.3
13	[1] 14.7	8.2	11.9	6.5	19.3	7.8	21.0	8.2	19.7	10.2
14	14.6	7.4	12.2	6.5	[2] 19.4	7.9	21.6	8.0	20.3	9.8
15	14 6	6.6	12.2	6.4	19.2	7.9	22.0	7.8	20.8	9.8
16	14.6	6.2	12.1	6.3	18.5	7.8	[3] 22.0	7.5	[4] 20.9	9.5
17	14.5	5.9	11.7	5.8	17.9	7.2	22.0	7.1	20.9	9.3
18	14.4	5.8	11.4	5.4	17.3	7.1	21.7	6.6	20.7	8.8
19	14.4	5.8	11.1	5.3	16.6	6.8	21.2	6.3	20.4	8.4
20	14.3	5.6	10.9	5.1	16.1	7.1	20.6	6.1	19.9	8.3
21	14.3	5.5	10.7	5.1	15.5	6.6	19.9	5.7	19.5	7.9
22	14.4	4.8	10.6	5.1	15.2	6.8	19.0	5.4	18.9	7.7
23	14.5	4.4	10.4	5.0	14.6	6.4	18.3	5.0	18.4	7.4
24	14.5	3.8	10.3	4.9	14.5	6.5	17.8	4.8	17.9	7.1
25	14.4	3.3	10.3	4.7	14.3	6.0	17.2	4.6	17.5	6.3
26	14.4	3.3	10.2	4.6	13.9	5.7	16.6	4.5	17.0	6.0
27	14.2	3.1	10.0	4.5	13.9	6.1	16.2	4.5	16.6	5.9
28	14.2	3.0	9.8	4.5	12.9	6.1	15.6	4.4	16.2	6.1
29	14.0	2.7	9.6	4.6	12.2	5.9	15.2	4.2	15.7	6.0
30	13.8	2.7	9.4	4.6	12.0	5.9	14.6	4.4	15.3	5.9
31	----------	2.6	----------	4.5	----------	6.9	----------	4.6	----------	5.9

[1] Crest, 14.73, 5 p. m. [2] Crest, 19.5, 8 a. m. [3] Crest, 22.02, 7–11 a. m. [4] Crest, 20.93, 7 p. m.

	MISSISSIPPI RIVER Red Wing, Minn.		MISSISSIPPI RIVER Reads Landing, Minn.		MISSISSIPPI RIVER Winona, Minn. (WG)		MISSISSIPPI RIVER La Crosse, Wis. (WG)		MISSISSIPPI RIVER Lansing, Iowa	
	April	May	April	May	April	May	April	May	Aprll	May
1	5.4	12.3	4.4	11.0	7.6	13.9	8.9	12.8	9.3	15.5
2	6.6	11.9	6.0	10.5	8.4	13.3	10.6	12.4	10.4	14.9
3	7.9	11.5	7.0	10.2	9.5	12.9	10.7	12.0	11.1	14.3
4	8.6	11.2	8.0	10.0	10.1	12.2	11.9	11.7	11.6	13.8
5	9.3	10.7	8.5	9.6	10.3	11.8	11.7	11.4	12.2	13.2
6	9.7	10.3	9.0	9.4	10.6	11.3	11.3	11.0	12.6	12.7
7	10.3	10.0	9.4	9.0	10.8	10.8	11.2	10.7	12.5	12.3
8	10.9	9.8	9.7	8.8	11.0	10.4	11.1	10.4	12.4	11.9
9	11.8	9.5	10.4	8.5	11.5	10.0	11.2	10.1	12.3	11.5
10	12.9	9.2	11.2	8.2	12.4	9.8	11.5	9.7	12.2	11.2
11	14.0	8.9	12.2	8.0	13.3	9.5	12.0	9.6	12.4	10.7
12	15.0	8.6	13.2	7.8	14.5	9.2	12.6	9.3	12.8	10.5
13	15.8	8.3	14.0	7.5	15.6	8.8	13.4	9.0	13.5	10.2
14	16.3	8.1	14.4	7.3	15.9	8.5	13.9	8.7	14.3	10.0
15	16.6	7.9	14.6	7.2	16.9	8.3	14.2	8.7	15.0	9.7
16	16.7	7.7	14.8	7.1	17.2	8.2	14.6	8.5	15.7	9.6
17	16.8	7.6	14.9	6.9	17.5	7.9	14.8	8.4	16.4	9.4
18	[1] 16.8	7.3	[2] 15.0	6.7	17.7	7.8	15.0	8.1	17.0	9.2
19	16.8	7.1	[2] 15.0	6.5	17.8	7.6	15.3	8.0	17.4	9.1
20	16.7	6.8	14.9	6.5	[3] 17.9	7.5	[4] 15.3	7.7	17.8	9.0
21	16.4	6.6	14.8	6.1	17.9	7.2	15.3	7.6	18.0	9.0
22	16.1	6.3	14.6	5.8	17.8	7.0	15.3	7.4	18.1	8.9
23	15.8	6.1	14.2	5.5	17.6	6.8	15.1	7.1	[5] 18.1	8.9
24	15.3	5.8	13.8	5.3	17.2	6.7	14.9	7.1	18.0	8.7
25	15.0	5.5	13.6	5.2	16.8	6.3	14.6	7.0	17.9	8.5
26	14.7	5.0	13.2	5.0	16.5	6.1	14.4	6.5	17.7	8.4
27	14.2	4.8	12.8	4.7	16.1	5.8	14.2	6.1	17.4	8.3
28	13.8	4.5	12.2	4.6	15.5	5.8	13.9	5.8	17.0	8.0
29	13.4	4.5	11.8	4.5	15.0	5.9	13.5	5.8	16.5	7.9
30	12.9	4.5	11.4	4.4	14.4	5.4	13.2	6.0	16.0	8.0
31	----------	4.4	----------	4.4	----------	5.6	----------	5.8	----------	8.2

[1] Crest, 16.85, 7 a. m. [2] Crest. [3] Crest, 17.93, 4 p. m. [4] Crest, 15.32, 9a–2p. [5] Crest, 18.14, 7 a. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	MISSISSIPPI RIVER Prairie du Chien, Wis.		MISSISSIPPI RIVER Dubuque, Iowa (C)		MISSISSIPPI RIVER Clinton, Iowa		MISSISSIPPI RIVER Le Claire, Iowa (C)		MISSISSIPPI RIVER Davenport, Iowa (C)	
	April	May	April	May	April	May	April	May	April	May
1	9.9	18.2	11.5	20.9	10.8	20.2	9.5	13.3	9.3	18.3
2	11.2	17.6	11.8	20.3	11.2	19.9	9.5	13.1	9.8	17.9
3	12.3	17.0	12.5	19.7	11.4	19.4	9.5	12.7	10.0	17.6
4	13.3	16.5	13.6	19.0	12.2	18.9	9.8	12.4	10.4	17.1
5	14.0	15.8	14.4	18.4	12.7	18.4	9.9	12.1	10.9	16.5
6	14.7	15.2	15.1	17.7	13.4	17.8	10.2	11.9	11.4	16.0
7	14.9	14.6	15.8	17.0	13.9	17.2	10.3	11.7	11.9	15.4
8	14.9	14.1	16.1	16.5	14.4	16.7	10.4	11.4	12.6	14.8
9	14.8	13.7	16.2	15.6	14.7	16.0	10.6	11.2	12.8	14.1
10	14.8	13.3	16.2	15.1	15.0	15.5	10.8	11.0	13.1	13.5
11	14.8	12.7	16.1	14.6	15.2	14.9	10.6	10.7	13.3	12.9
12	15.1	12.5	16.2	14.2	15.1	14.4	10.7	10.6	13.3	12.4
13	15.8	12.1	16.5	13.5	15.2	13.7	10.8	10.3	13.4	11.7
14	16.6	11.7	17.1	13.1	15.3	13.1	10.8	10.2	13.4	11.0
15	17.5	11.4	17.8	12.7	15.6	12.9	10.9	10.0	13.6	10.6
16	18.3	11.2	18.7	12.2	16.0	12.3	11.1	9.9	14.0	10.1
17	19.0	11.0	19.6	12.1	16.6	12.0	11.3	9.7	14.5	9.7
18	19.6	10.7	20.3	11.8	17.3	11.6	11.6	9.6	15.1	9.3
19	20.0	10.4	21.0	11.6	18.0	11.3	11.5	9.6	15.8	9.0
20	20.3	10.2	21.5	11.3	18.6	11.1	11.9	9.6	16.3	8.9
21	20.6	10.0	21.9	11.2	19.2	10.8	12.3	9.6	16.8	8.5
22	20.8	9.7	22.2	10.9	19.7	10.6	12.8	9.5	17.3	8.3
23	[1] 21.0	9.6	22.4	11.1	20.2	10.7	13.1	9.6	17.7	8.3
24	[1] 21.0	9.6	22.6	10.9	20.4	10.8	13.4	9.5	18.0	8.7
25	20.9	9.5	[2] 22.7	11.1	20.7	10.7	13.6	9.5	18.3	8.7
26	20.7	9.2	22.7	10.6	20.8	10.6	13.7	9.5	18.5	8.5
27	20.3	8.9	22.5	10.2	20.9	10.2	13.7	9.4	18.6	8.4
28	19.9	8.6	22.3	9.9	[3] 20.9	9.8	[4] 13.8	9.3	[5] 18.6	7.9
29	19.4	8.2	21.9	9.3	20.8	9.5	13.7	9.2	18.6	7.6
30	18.8	8.0	21.4	9.0	20.6	8.4	13.5	9.1	18.4	6.7
31	----------	8.0	----------	9.0	----------	8.4	----------	9.1	----------	6.3

[1] Crest, Apr. 23–24.
[2] Crest, 22.70, 7:30 a. m.
[3] Crest, 20.92 noon.
[4] Crest, 13.76.
[5] Crest, 18.63, 4–9 p. m.

Date	MISSISSIPPI RIVER Muscatine, Iowa		MISSISSIPPI RIVER Keithsburg, Ill.		MISSISSIPPI RIVER Burlington, Iowa		MISSISSIPPI RIVER Keokuk, Iowa (WG)		MISSISSIPPI RIVER Gregory Landing, Mo.	
	April	May	April	May	April	May	April	May	April	May
1	11.0	20.7	9.7	16.6	11.5	17.7	9.6	18.3	9.8	18.5
2	11.6	20.3	10.1	16.4	11.9	17.6	10.5	18.0	10.6	18.3
3	11.9	19.9	10.3	16.1	12.1	17.4	10.9	17.8	11.2	18.1
4	12.2	19 5	10.5	15.8	12.3	17.2	11.4	17.4	11.8	17.8
5	12.8	19.0	10.9	15.4	12.4	16.9	11.6	17.0	12.2	17.3
6	13.2	18.4	11.2	15.0	12.9	16.5	12.1	16.5	12.5	16.9
7	13.8	17.8	11.5	14.6	13.1	16.2	12.7	16.0	12.9	16.4
8	14.5	17.2	12.2	14.2	13.5	15.8	13.1	15.7	13.2	16.0
9	14.9	16.5	12.8	13.7	14.0	15.4	13.5	15.2	13.6	15.6
10	15.3	15.8	13.0	13.2	14.4	15.0	13.9	14.5	14.0	15.1
11	15.6	15.1	13.1	12.7	14.5	14.6	14.2	14.0	14.3	14.5
12	15.6	14.6	13.0	12.3	14.5	14.1	14.3	13.6	14.5	14.2
13	15.6	14.0	12.9	11.9	14.5	13.8	14.5	12.9	14.6	13.4
14	15.6	13.2	12.9	11.4	14.5	13.4	14.3	12.2	14.6	12.8
15	15.8	12.6	12.9	10.9	14.4	12.9	14.2	11.5	14.6	12.2
16	16.0	12.3	13.0	10.6	14.5	12.5	14.4	10.7	14.6	11.5
17	16.5	11.7	13.3	10.3	14.7	12.3	14.6	10.9	14.8	11.4
18	17.2	11.0	13.7	9.9	14.9	12.0	14.7	10.4	15.0	11.3
19	18.0	10.6	14.2	9.5	15.3	11.5	15.3	9.7	15.3	10.6
20	18.6	10.5	14.6	9.2	15.8	11.1	15.7	8.9	15.8	9.9
21	19.1	10.1	15.1	9.0	16.1	10.9	16.1	8.3	16.3	9.1
22	19.6	9.8	15.5	8.8	16.5	10.7	16.6	8.3	16.8	8.9
23	20.2	9.7	16.0	8.6	17.0	10.5	17.8	7.8	[5] 17.7	8.5
24	20.5	10.2	16.4	8.9	17.5	10.5	[4] 18.8	7.3	[6] 19.0	8.1
25	20.7	10.2	16.6	9.3	17.7	11.0	18.9	8.8	19.3	9.2
26	20.8	10.2	16.7	9.4	17.7	11.2	18.8	9.3	19.1	10.1
27	20.9	9.9	16.8	9.2	17.8	11.0	18.6	9.1	19.0	9.9
28	[1] 21.0	9.4	[2] 16.8	8.8	[3] 17.8	10.8	18.5	8.7	18.8	9.4
29	21.0	9.0	16.8	8.4	17.8	10.3	18.5	7.9	18.8	8.8
30	20.9	8.4	16.7	8.2	17.8	10.1	18.5	6.8	18.7	7.7
31	----------	7.6	----------	7.3	----------	9.5	----------	5.9	----------	6.9

[1] Crest, 21.05, 7:30 a. m.
[2] Crest, 16.86, 1 p. m.
Crest, 17.85.
Crest, 18.95, 8 p. m.
[5] 18.4, 1 p. m.
[6] Crest, 19.32, 7 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	MISSISSIPPI RIVER Quincy, Ill.		MISSISSIPPI RIVER Hannibal, Mo.		MISSISSIPPI RIVER Louisiana, Mo. (C)		MISSISSIPPI RIVER Grafton, Ill.		MISSISSIPPI RIVER St. Louis, Mo. (WG)	
	April	May	April	May	April	May	April	May	April	May
1	11.9	20.7	13.0	20.6	11.8	18.9	15.7	24.6	18.7	[1] 33.7
2	12.0	20.5	13.2	20.5	12.0	18.8	15.7	24.4	18.3	33.6
3	12.7	20.3	13.6	20.3	12.3	18.7	15.6	24.2	18.5	33.2
4	13.3	20.0	13.8	20.0	12.8	18.5	15.8	23.8	20.4	32.5
5	14.0	19.6	14.6	19.7	13.4	18.2	16.4	23.2	23.9	31.5
6	14.2	19.2	14.6	19.3	13.8	17.9	16.7	22.6	25.3	30.3
7	14.5	18.7	15.0	19.0	13.8	17.6	17.1	21.9	25.5	29.0
8	15.0	18.3	15.3	18.5	14.0	17.2	17.0	21.3	25.1	28.0
9	15.3	17.8	15.6	18.2	14.2	16.9	16.9	20.8	24.5	27.1
10	15.8	17.6	16.0	18.0	14.5	16.7	17.0	20.2	24.4	26.2
11	16.2	17.0	16.3	17.4	14.9	16.4	17.1	19.8	24.5	25.5
12	16.4	16.3	16.6	16.8	15.3	15.9	17.4	19.3	25.1	25.0
13	16.6	15.8	17.0	16.2	15.9	15.3	18.4	18.8	26.6	24.2
14	16.8	14.9	17.1	15.6	16.2	14.7	19.2	18.1	27.8	23.4
15	16.6	14.1	17.0	14.9	16.0	14.0	19.6	17.3	28.1	22.6
16	16.6	13.4	17.0	14.2	15.9	13.4	19.8	16.5	28.2	21.5
17	16.7	13.1	16.9	13.9	15.7	12.8	19.8	16.0	28.5	20.5
18	16.9	13.6	17.1	14.2	15.7	13.1	19.7	15.5	28.5	19.8
19	17.1	12.8	17.2	13.8	15.8	13.0	19.7	15.7	28.6	19.6
20	17.5	11.8	17.5	13.2	16.0	12.4	19.7	15.7	28.6	19.5
21	18.0	11.7	17.9	12.5	16.3	11.6	19.8	15.2	28.5	19.4
22	18.5	11.8	18.4	12.3	16.7	11.5	20.0	15.0	28.7	18.6
23	19.0	11.6	18.9	12.1	17.1	11.6	20.4	15.0	29.1	17.6
24	[2] 21.1	11.5	20.5	12.0	18.2	11.6	21.0	14.9	29.7	17.0
25	[3] 21.9	11.8	[4] 21.6	12.1	19.5	11.8	21.7	14.9	30.6	16.4
26	21.7	12.2	21.6	12.9	[5] 19.9	12.4	22.7	15.1	31.5	17.0
27	21.3	12.1	21.3	13.0	19.8	12.5	23.5	15.5	32.4	19.5
28	21.1	11.7	21.1	12.7	19.4	12.3	24.1	15.5	33.1	20.2
29	21.0	11.6	20.9	12.3	19.2	11.9	24.4	15.3	33.5	19.8
30	20.8	11.5	20.8	11.8	19.0	11.5	24.6	15.0	33.7	18.6
31		11.3		11.6		11.5		14.9		16.7

[1] Crest, 33.83, 2 a. m.
[2] 21.7, 7 p. m.
[3] Crest.
[4] Crest, 21.67, 2:30 p. m.
[5] Crest, 19.94, 7 a. m.–7 p. m.

Date	MISSISSIPPI RIVER Chester, Ill. (WG)		MISSISSIPPI RIVER Cape Girardeau, Mo.		MINNESOTA RIVER Montevideo, Minn. (G)		MINNESOTA RIVER New Ulm, Minn. (C)		MINNESOTA RIVER Mankato, Minn. (WG)	
	April	May	April	May	March*	April*	April [3]	May [3]	March	April
1	20.3	34.4	27.7	38.1	5.2	6.1	97.4	101.3	5.2	18.7
2	20.0	[1] 34.4	27.2	[2] 38.3		7.1	97.8	100.9	5.6	20.2
3	19.8	34.4	26.7	38.3		8.7	98.7	100.6	5.9	20.7
4	20.3	34.0	26.7	38.2		10.6	99.6	100.5	5.9	20.8
5	23.9	33.3	28.9	37.9	5.2	11.5	100.8	100.4	5.6	20.5
6	25.7	32.3	30.8	37.3	5.2	12.2	101.9	100.2	5.3	20.4
7	26.6	31.1	31.9	36.5	5.2	13.8	103.2	100.0	5.3	20.8
8	26.9	29.7	32.3	35.3	5.2	16.5	104.4	99.8	4.9	21.4
9	26.3	28.5	32.1	34.1	5.2	18.5	105.7	99.6	4.7	22.3
10	25.8	27.3	31.4	32.9	5.5	[4] 19.8	106.0	99.5	4.5	23.3
11	25.7	26.2	31.0	31.6	6.0	19.9	106.1	99.3	4.6	23.6
12	25.8	25.4	30.8	30.5	6.5	19.7	107.0	98.9	5.3	23.6
13	27.4	24.8	32.0	29.7	6.8	19.5	[5] 107.8	98.6	5.4	24.3
14	28.4	24.0	33.1	29.1	7.3	19.1	107.6	98.3	5.6	[6] 24.6
15	29.0	23.3	33.7	28.2	7.5	18.7	106.7	98.1	5.8	24.3
16	29.5	22.4	34.1	27.6	7.5	18.4	106.2	97.9	5.9	23.6
17	29.6	21.2	34.3	26.8	7.5	18.1	105.6	97.6	6.1	22.9
18	29.6	20.2	34.4	25.7	7.4	17.8	105.1	97.3	6.4	22.2
19	29.6	19.6	34.4	25.1	7.3	17.5	104.6	97.1	6.8	21.6
20	29.5	19.5	34.3	24.8	7.2	17.3	104.1	96.9	9.2	20.9
21	29.4	19.4	34.1	24.6	6.9	17.2	103.7	96.8	10.4	20.5
22	29.4	19.1	34.1	24.5	6.4	17.1	103.5	96.7	11.2	20.2
23	29.6	18.2	34.1	24.0	5.9	16.9	103.3	96.5	10.9	19.9
24	29.9	17.4	34.4	23.2	6.5	16.7	103.2	96.3	10.2	19.6
25	30.4	17.0	34.8	22.7	6.7	16.6	102.9	96.0	9.1	19.3
26	31.0	16.5	35.2	22.2		16.5	102.5	95.7	8.4	18.8
27	31.9	17.7	35.8	22.5	6.5	16.3	102.2	95.3	8.1	18.5
28	32.7	19.4	36.5	24.0	6.3	16.2	102.0	95.1	8.1	18.1
29	33.5	19.5	37.2	24.8	6.0	16.1	101.8	94.8	8.1	17.8
30	34.0	19.1	37.8	24.7	5.7	16.0	101.6	94.4	11.0	17.2
31		17.6		23.8	5.7			94.1	15.7	

*Mean daily stage.
[1] Crest, 34.40, 6 a. m.
[2] Crest, 38.3, 10 p. m.
[3] Readings at 1 p. m.
[4] Crest, 20.02, 11:59 p. m.
[5] Highest stage reported, 107.75.
[6] Crest, 24.82 high watermark.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	MINNESOTA RIVER Carver, Minn. (G)		REDWOOD RIVER Redwood Falls, Minn. (G)		COTTONWOOD RIVER New Ulm, Minn. (G)		LE SUEUR RIVER Rapidan, Minn. (G)		ST. CROIX RIVER Grantsburg (10N), Wis. (G)	
	March	April	March*	April*	March*	April*	March*	April*	April	May
1	7.6	17.2	1.8	3.4	2.6	11.6	5.7	14.6	7.7	7.0
2	7.5	18.5	1.8	3.6	2.4	12.2	5.8	16.0	8.2	6.5
3	7.8	20.9	1.8	4.0	2.4	12.9	5.9	14.4	8.6	6.2
4	8.0	23.2	1.8	----	2.5	13.2	5.7	12.4	8.8	6.0
5	7.7	24.4	1.8	(1)	2.4	[2] 14.1	5.6	10.7	9.3	5.9
6	7.4	24.8	1.8	10.2	2.3	13.8	5.5	9.8	9.7	5.8
7	7.3	24.9	1.8	9.2	2.3	12.7	5.3	9.1	9.9	5.6
8	7.3	25.1	1.8	8.8	2.3	11.8	5.2	8.7	9.3	5.6
9	7.0	25.4	1.9	8.5	2.3	11.6	5.2	8.4	10.4	5.5
10	6.8	25.8	1.9	7.7	2.3	11.6	5.2	8.2	[3] 11.5	5.5
11	6.7	26.4	1.9	7.2	2.4	11.2	5.8	8.0	11.6	5.4
12	7.0	27.1	1.9	6.5	2.4	10.5	6.5	7.8	11.2	5.5
13	7.7	27.5	1.9	6.3	2.4	10.0	6.4	7.6	10.9	5.4
14	8.3	27.9	1.9	5.9	2.4	9.4	6.4	7.4	10.7	5.4
15	8.6	[4] 28.2	1.8	5.4	2.5	8.8	6.4	7.2	10.6	5.4
16	8.9	28.3	1.8	5.1	2.6	8.3	6.4	7.0	10.6	5.3
17	9.2	28.1	1.8	4.9	2.6	7.8	6.6	6.8	10.5	5.2
18	9.6	27.7	1.9	4.7	2.9	7.5	7.4	6.6	10.4	5.3
19	10.5	27.0	2.5	4.6	----	7.1	8.3	6.5	10.2	5.2
20	11.9	26.4	3.2	4.5	----	6.8	8.1	6.3	9.9	5.2
21	13.2	25.8	2.7	4.4	----	6.6	8.2	6.3	9.7	5.1
22	14.2	25.3	2.3	4.3	----	6.6	8.0	6.6	9.7	5.1
23	14.1	24.8	2.3	4.2	5.4	6.6	7.0	6.7	10.0	5.0
24	13.8	24.4	2.2	4.1	----	6.6	6.2	6.5	10.1	5.1
25	14.6	24.1	2.1	4.1	3.9	6.4	5.9	6.3	9.8	5.1
26	14.9	23.7	2.0	4.1	3.7	6.1	6.2	6.1	9.3	5.0
27	14.6	23.4	2.0	4.0	3.6	5.8	5.9	5.8	8.8	5.0
28	14.1	23.1	2.0	3.8	3.6	5.6	6.1	5.6	8.2	4.9
29	13.8	22.8	2.5	3.7	4.0	5.3	6.4	5.4	7.7	4.9
30	13.9	22.5	3.2	3.6	6.1	5.0	10.0	5.1	7.3	5.0
31	15.8	----	3.3	----	9.2	----	12.5	----	----	5.1

*Mean daily stage.
[1] Crest, 11.84.
[2] Crest, 14.30.
[3] Crest, 11.74, 10 p. m.
[4] Crest, 28.31, 1–7 a. m.

Date	ST. CROIX RIVER Stillwater, Minn. (C)		CHIPPEWA RIVER Durand, Wis. (WG)		ZUMBRO RIVER Theilman, Minn. (C)		BLACK RIVER Galesville, Wis. (G)		BLACK RIVER Neillsville, Wis. (WG)	
	April	May	April	May	April	May	April	May	April	May
1	77.1	84.0	5.0	5.0	(1) [2] 14.1	(1) 3.9	6.7	3.4	12.0	3.8
2	78.7	83.7	8.5	4.9	13.5	3.9	9.7	3.3	[3] 15.2	3.7
3	79.2	----	10.2	3.9	11.5	3.9	[4] 14.0	3.0	11.7	3.5
4	79.5	82.9	10.7	4.4	9.0	3.1	13.0	2.9	10.1	3.4
5	80.3	82.5	9.5	2.8	9.4	2.9	11.8	2.7	9.5	3.3
6	81.5	82.2	8.4	3.6	9.1	2.8	10.4	2.4	9.6	3.2
7	82.2	81.9	9.0	3.7	9.8	3.2	9.7	2.6	9.9	3.2
8	83.5	81.6	9.8	3.6	10.0	3.6	9.4	2.5	9.5	3.2
9	85.1	81.4	10.1	3.7	9.6	3.7	9.3	2.6	9.5	3.2
10	86.3	81.0	[5] 11.3	3.7	8.8	3.8	9.0	2.6	10.1	3.3
11	87.4	80.5	11.9	3.5	6.8	3.8	8.9	2.7	8.8	3.5
12	88.3	80.1	10.7	3.5	6.3	3.6	9.0	2.4	7.9	3.5
13	88.9	79.9	10.3	4.1	5.9	3.6	8.3	2.3	7.3	3.7
14	89.3	79.8	9.2	4.5	5.6	3.1	7.6	2.5	6.7	3.7
15	89.6	79.6	7.7	4.2	5.9	2.2	7.3	2.6	8.0	4.1
16	[6] 89.7	79.3	8.0	4.8	6.9	2.5	7.2	2.7	9.8	3.8
17	89.7	79.1	8.6	4.1	6.7	2.3	8.3	2.8	9.1	3.6
18	89.6	78.7	8.9	4.4	6.1	1.9	9.7	3.0	8.4	3.5
19	89.3	78.5	9.3	3.9	5.8	2.5	9.3	2.7	7.7	3.4
20	89.0	78.3	9.7	3.6	5.6	1.8	8.1	2.6	7.2	3.3
21	88.6	78.0	9.4	3.5	5.4	3.3	7.2	2.6	6.7	3.2
22	88.0	77.9	9.3	3.3	5.3	3.4	6.3	2.5	6.4	3.1
23	87.6	77.6	9.1	3.0	5.4	2.4	5.9	2.4	6.7	3.1
24	87.2	77.3	9.9	2.7	5.2	3.5	5.6	2.5	6.2	3.1
25	86.7	76.9	9.6	3.2	4.9	3.4	5.5	2.5	5.5	3.1
26	86.4	76.4	8.2	2.6	4.6	2.7	4.9	2.4	5.0	3.1
27	86.0	76.4	7.1	3.4	4.4	2.2	4.4	1.9	4.6	3.1
28	85.5	76.4	6.8	3.6	4.3	3.4	4.1	2.4	4.3	3.3
29	85.0	76.4	6.1	3.5	4.1	2.9	3.8	2.4	4.1	3.3
30	84.5	76.4	5.2	3.5	3.9	3.0	3.8	2.3	4.0	3.6
31	----	76.3	----	3.5	----	2.9	----	2.3	----	4.2

[1] Average for day.
[2] Crest, 14.49, 6–7 p. m.
[3] Crest, 16.50, 12:30 a. m.
[4] Crest, 14.01, 7 a. m.
[5] Crest, 11.94, 4 p. m.
[6] Crest, 89.71, 6 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	ROOT RIVER Houston, Minn. (G)		UPPER IOWA RIVER Decorah, Iowa (G)		WISCONSIN RIVER Rothschild, Wis. (G)		WISCONSIN RIVER Portage, Wis.		WISCONSIN RIVER Muscoda, Wis. (G)	
	April*	May*	April*	May*	April*	May*	April	May	April	May
1	[1] 17.2	7.0	8.5	1.7	10.7	3.7	11.4	11.4	4.2	2.9
2	15.7	6.9	5.1	1.6	[2] 13.7	4.0	12.0	11.4	4.2	3.0
3	12.0	6.9	3.9	1.7	10.1	4.2	12.4	11.4	4.1	3.3
4	10.1	6.8	3.3	1.6	8.4	4.1	12.7	11.0	4.6	3.2
5	9.6	6.8	3.0	1.6	7.7	3.9	12.9	10.8	4.7	2.7
6	9.2	6.8	2.7	1.5	7.9	3.7	13.0	10.8	5.1	2.8
7	8.9	6.7	2.6	1.6	8.4	3.5	13.2	10.8	4.8	2.2
8	8.8	6.9	2.4	1.8	9.0	3.5	14.8	10.9	5.0	2.7
9	8.8	6.9	2.5	1.9	10.5	4.2	15.2	10.6	5.3	2.6
10	8.8	7.0	2.4	1.9	10.4	3.9	15.0	10.6	5.8	2.2
11	8.4	7.0	2.4	1.8	9.0	3.9	15.5	10.6	6.3	2.3
12	8.1	6.9	2.4	1.7	7.9	4.6	15.1	10.0	6.4	2.5
13	8.1	6.8	2.4	1.6	7.4	4.7	15.5	10.5	6.6	2.2
14	8.1	6.8	2.4	1.6	6.0	4.9	15.5	10.5	6.8	2.2
15	8.0	6.8	2.7	1.5	7.1	4.4	14.9	10.8	[3] 6.8	2.4
16	8.9	6.7	3.6	1.5	8.2	4.6	12.7	10.8	6.8	2.3
17	9.8	6.7	3.7	1.5	9.2	4.6	12.6	10.8	6.4	2.5
18	9.0	6.6	3.1	1.4	9.8	4.3	14.2	10.8	4.8	2.3
19	8.6	6.5	2.8	1.4	[4] 9.9	4.1	14.5	10.8	5.0	2.3
20	8.3	6.6	2.6	1.4	9.6	4.1	14.8	10.8	5.5	2.2
21	8.1	6.6	2.5	1.4	8.5	3.7	14.7	10.8	5.8	1.7
22	7.9	6.6	2.4	1.4	7.8	3.5	15.0	10.7	6.1	2.0
23	7.7	6.6	2.3	1.9	7.5	3.3	14.2	10.6	6.0	2.3
24	7.7	6.6	2.3	1.8	6.6	3.4	13.2	10.6	6.2	2.5
25	7.5	6.6	2.1	1.6	6.0	3.8	13.0	10.8	5.6	2.5
26	7.4	6.5	2.0	1.5	5.5	3.8	12.8	10.5	4.8	2.6
27	7.3	6.5	1.9	1.5	5.3	3.8	12.0	10.3	4.7	2.3
28	7.2	6.5	1.9	1.5	4.6	3.6	11.8	10.4	4.1	1.8
29	7.1	6.5	1.8	1.4	4.2	3.7	11.2	10.5	3.6	2.2
30	7.0	6.5	1.7	1.4	3.7	3.8	11.0	10.2	3.4	1.8
31		6.5		1.6		5.5		10.0		2.0

*Mean daily stage.
[1] Crest, 17.57, 7 a. m.
[2] Crest, 14.80, 8:30 a. m.
[3] 6.77 highest observed.
[4] Crest, 10.20, 11 p. m.

Date	KICKAPOO RIVER Steuben, Wis. (G)		TURKEY RIVER Garber, Iowa (G)		MAQUOKETA RIVER Maquoketa, Iowa (WG)		WAPSIPINICON RIVER De Witt, Iowa (G)		ROCK RIVER Rockton, Ill. (G)	
	April*	May*	April*	May*	April*	May*	April*	May*	April*	May*
1	8.6	4.1	[1] 15.7	6.3	6.3	2.8	7.9	5.5	9.5	6.3
2	9.4	4.0	13.5	6.3	6.1	2.7	8.0	5.4	9.4	6.2
3	[2] 9.6	4.0	10.7	6.3	5.2	2.6	8.1	5.3	9.3	5.9
4	9.0	3.9	9.5	6.3	5.6	2.5	8.3	5.2	9.2	5.7
5	8.8	3.9	8.8	6.2	4.3	2.5	8.5	5.0	9.1	5.5
6	8.2	3.8	8.3	6.1	3.9	2.3	8.7	5.0	9.0	5.5
7	6.6	3.9	7.9	6.1	3.6	2.5	8.9	4.9	8.7	5.3
8	6.0	4.1	7.7	6.9	3.3	2.6	9.2	5.0	8.6	5.4
9	5.7	4.4	7.5	8.0	3.4	2.6	9.3	4.9	8.4	5.3
10	5.7	4.3	7.7	7.5	3.3	2.7	9.3	5.0	8.3	5.2
11	5.6	4.1	7.8	7.1	3.2	2.8	8.3	5.1	8.2	5.0
12	5.4	4.0	7.7	6.8	3.0	2.7	7.3	5.3	8.1	4.8
13	5.5	4.0	7.9	6.6	3.3	2.5	7.0	5.6	8.5	4.7
14	5.8	3.9	8.6	6.4	3.5	2.5	7.0	5.8	[3] 9.1	4.6
15	6.4	4.0	9.9	6.3	4.0	2.6	7.1	5.9	9.1	4.5
16	6.8	4.1	10.1	6.2	4.2	2.4	7.1	5.9	9.0	4.5
17	[4] 6.8	4.0	10.0	6.1	4.0	2.2	7.3	5.7	8.9	4.4
18	6.2	3.8	9.3	6.0	3.9	2.3	7.5	5.4	8.7	4.5
19	5.7	3.7	8.6	6.0	3.8	2.2	7.6	5.2	8.4	4.4
20	5.4	3.7	8.1	5.9	3.6	2.0	7.5	5.0	8.2	4.2
21	5.2	3.7	7.8	5.9	3.4	2.2	7.3	4.9	8.0	4.3
22	5.0	3.8	7.6	6.3	3.5	2.5	7.3	5.0	7.8	4.2
23	4.9	4.4	7.4	8.7	3.5	3.2	7.3	8.0	7.7	4.7
24	4.8	5.0	7.3	8.9	3.4	3.7	7.1	7.1	7.6	5.2
25	4.6	5.0	7.1	8.6	3.2	5.0	6.8	6.5	7.4	5.1
26	4.5	4.3	6.9	7.7	3.2	3.4	6.5	6.8	7.1	5.1
27	4.4	4.1	6.8	7.1	3.0	3.5	6.2	6.8	6.9	4.9
28	4.3	4.0	6.6	7.0	2.9	3.0	6.0	7.0	6.8	4.7
29	4.3	4.0	6.5	6.9	2.6	2.7	5.8	6.8	6.6	4.6
30	4.2	4.0	6.4	6.7	2.8	2.5	5.6	6.4	6.5	4.4
31		4.5		7.0		2.6		6.2		4.4

*Mean daily stage.
[1] Crest, 15.88, 9 p. m.
[2] Crest, 9.75, 7 a. m.
Crest, 9.13, 1 p. m.
[4] Crest. 6.96, 1 a. m

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	ROCK RIVER Joslin, Ill. (G)		ROCK RIVER Moline, Ill.		PECATONICA RIVER Freeport, Ill. (G)		CEDAR RIVER Waterloo, Iowa (WG)		CEDAR RIVER Cedar Rapids, Iowa (WG)	
	April*	May*	April	May	April	May	April	May	April	May
1	11.7	8.6	11.5	9.7	8.3	4.8	11.0	6.2	5.8	4.5
2	11.5	8.5	11.4	9.5	8.4	4.7	13.3	6.2	6.4	4.5
3	11.4	8.3	11.2	9.4	8.2	4.6	13.5	6.0	7.3	4.4
4	11.3	8.1	11.0	9.3	7.7	4.5	12.0	6.0	9.1	4.2
5	11.2	7.9	10.9	9.2	7.2	4.4	11.1	6.1	[1] 10.4	4.2
6	11.0	7.7	10.8	9.1	6.7	4.3	8.7	5.4	9.9	4.2
7	11.0	7.4	10.4	9.0	6.4	4.2	8.2	5.9	8.5	4.1
8	10.8	7.4	10.6	9.0	6.1	4.4	7.8	6.0	7.2	4.2
9	10.6	7.3	10.5	8.9	5.9	4.6	7.5	6.4	6.3	4.2
10	10.5	7.2	10.5	9.0	5.8	4.7	7.5	6.6	5.9	4.5
11	10.4	7.2	10.4	9.0	5.8	4.6	7.4	6.6	5.7	4.6
12	10.3	7.1	10.4	8.9	5.7	4.5	7.4	6.6	5.6	4.6
13	10.3	6.6	10.4	8.7	6.1	4.4	7.4	6.4	5.6	4.7
14	10.6	6.8	10.5	8.7	7.9	4.3	7.5	6.3	5.7	4.6
15	11.3	6.5	10.7	8.9	[2] 8.5	4.2	7.7	6.2	5.9	4.5
16	[3] 11.7	6.5	11.0	8.9	8.4	4.1	8.2	6.1	5.9	4.4
17	11.7	6.4	[4] 11.3	8.9	8.1	4.1	8.2	6.1	5.9	4.3
18	11.4	6.2	[4] 11.3	8.8	7.4	4.0	8.2	6.0	6.1	4.2
19	11.2	6.2	11.1	8.8	6.8	3.9	7.8	5.9	6.2	4.2
20	11.0	6.2	11.0	8.8	6.5	3.9	7.4	5.8	6.1	4.1
21	10.8	6.1	10.9	8.7	6.2	3.9	7.2	5.8	5.8	4.1
22	10.5	6.1	10.6	8.6	6.1	3.9	7.0	5.9	5.6	4.1
23	10.3	6.1	10.5	8.6	6.1	5.0	7.0	6.3	5.3	4.8
24	10.1	6.5	10.4	8.6	5.9	5.6	6.9	6.6	5.3	4.9
25	9.8	6.9	10.3	9.6	5.7	5.5	6.8	6.4	5.1	4.9
26	9.7	7.2	10.2	9.2	5.5	5.7	6.7	6.2	5.0	4.8
27	9.5	7.1	10.1	9.2	5.3	5.0	6.6	6.1	5.0	4.6
28	9.2	7.0	10.0	9.4	5.2	4.4	6.4	6.1	4.8	4.5
29	9.0	6.7	9.9	9.4	5.0	4.2	6.3	6.1	4.7	4.4
30	8.9	6.6	9.8	9.3	4.9	4.1	6.2	6.0	4.6	4.3
31		6.2		9.2		3.9		6.0		4.3

*Mean daily stage. [1] Crest, 10.43, 11 a. m. [2] Highest stage observed. [3] Crest, 11.73, 9 a. m. [4] Crest.

Date	IOWA RIVER Wapello, Iowa (WG)		IOWA RIVER Iowa City, Iowa (G)		SKUNK RIVER Augusta, Iowa (WG)		DES MOINES RIVER Boone, Iowa		DES MOINES RIVER Des Moines, Iowa (WG)	
	April	May	April*	May*	April	May	April	May	April	May
1	6.3	4.3	5.6	3.3	6.7	6.0	10.8	2.3	18.8	15.1
2	6.4	4.1	5.8	3.2	6.7	5.8	10.8	2.0	19.8	15.0
3	6.7	3.9	5.9	3.1	6.7	5.5	10.8	1.9	20.1	14.9
4	7.0	3.8	6.0	2.9	6.8	5.3	9.8	1.8	20.2	14.8
5	7.4	3.7	6.1	2.8	6.7	5.1	8.8	1.7	20.0	14.7
6	8.1	3.5	6.3	2.8	6.5	4.8	8.3	1.6	19.4	14.6
7	9.1	3.4	6.5	2.9	5.8	4.6	7.5	1.5	18.9	14.5
8	10.2	3.5	6.6	3.0	5.3	4.5	6.8	1.5	18.4	14.4
9	[1] 10.3	3.6	6.7	2.9	5.1	4.6	6.3	1.6	18.0	14.4
10	9.4	3.6	5.8	2.9	4.9	4.4	6.3	1.8	17.6	14.6
11	7.8	3.8	4.8	2.9	4.8	5.4	6.5	1.8	17.5	14.7
12	6.5	3.9	4.4	2.9	4.7	5.0	6.8	1.9	17.6	14.7
13	6.1	3.9	4.5	2.8	4.8	4.4	7.1	1.8	17.7	14.7
14	6.1	3.9	4.8	2.8	5.2	4.0	7.2	1.6	18.0	14.7
15	6.3	3.8	4.9	2.7	5.6	3.8	7.5	1.6	18.1	14.5
16	6.3	3.7	4.9	2.6	5.7	3.7	7.4	1.5	18.3	14.5
17	6.4	3.7	4.9	2.6	5.5	6.1	6.8	1.4	18.3	14.4
18	6.3	3.5	5.0	2.6	5.4	6.4	6.2	1.3	18.1	14.4
19	6.4	3.4	4.9	2.5	5.4	5.5	5.8	1.3	17.6	14.2
20	6.5	3.2	4.8	2.4	5.2	4.3	5.4	1.3	17.6	14.1
21	6.5	3.1	4.6	2.3	5.3	4.0	4.9	1.2	17.0	14.0
22	6.3	3.0	4.9	2.5	5.3	3.8	4.6	1.2	16.7	14.0
23	6.5	2.9	4.8	6.0	[2] 8.6	3.7	4.4	1.2	16.5	14.8
24	6.3	6.1	4.7	6.1	12.5	3.8	4.3	1.3	16.4	14.5
25	6.0	6.4	4.6	5.9	9.4	5.5	4.0	1.3	16.3	14.4
26	5.7	6.0	4.4	5.9	7.8	6.8	3.7	1.3	16.1	14.4
27	5.4	5.4	4.2	5.6	7.0	7.0	3.4	1.3	16.0	14.2
28	5.1	5.0	4.0	4.6	6.7	7.2	3.1	1.3	15.7	14.2
29	4.9	4.5	3.7	4.0	6.4	5.5	2.6	1.3	15.5	14.1
30	4.6	4.1	3.5	3.8	6.2	4.6	2.5	1.2	15.3	14.1
31		3.9		3.5		5.0		1.2		14.0

*Mean daily stage. [1] Highest stage reported. [2] Crest, 13.39, 1 p. m

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	DES MOINES RIVER Tracy, Iowa (WG)		DES MOINES RIVER Eddyville, Iowa		DES MOINES RIVER Ottumwa, Iowa (WG)		DES MOINES RIVER Keosauqua, Iowa (WG)		RACCOON RIVER Van Meter, Iowa (WG)	
	April	May	April	May	April	May	April	May	April	May
1	12.7	8.5	14.1	10.0	7.5	4.6	6.2	4.3	[1] 13.5	5.3
2	13.9	7.9	15.5	9.7	8.6	4.3	7.5	4.0	11.6	5.1
3	15.0	7.6	16.5	9.4	9.5	4.1	8.5	3.8	11.5	5.0
4	[2] 15.3	7.4	17.2	9.0	10.1	3.9	9.2	3.6	10.9	4.9
5	15.2	7.2	[3] 17.3	8.8	[4] 10.3	3.7	[5] 9.6	3.5	9.0	4.7
6	14.9	7.0	17.1	8.6	10.2	3.8	9.6	3.3	7.8	4.6
7	13.6	6.8	16.2	8.4	9.7	3.4	9.4	3.1	7.3	4.5
8	12.5	6.6	15.7	8.0	8.4	3.3	8.2	3.1	6.9	4.4
9	11.8	6.5	13.7	8.5	7.7	3.2	7.3	3.0	6.5	4.5
10	11.3	7.6	13.6	10.0	7.2	4.3	6.8	4.4	6.6	5.2
11	10.9	7.8	12.9	9.8	6.8	4.5	6.3	4.7	6.6	5.0
12	10.8	7.3	12.7	9.0	6.6	4.0	6.1	4.0	6.8	4.9
13	11.0	7.2	13.0	8.8	6.6	3.8	6.0	3.6	7.2	4.9
14	11.7	7.0	13.6	8.6	7.3	3.7	6.5	3.4	8.0	4.7
15	12.2	6.8	14.2	8.5	7.8	3.5	7.2	3.2	8.1	4.6
16	12.2	6.7	14.2	8.4	7.8	3.4	7.3	3.2	7.9	4.9
17	12.1	7.2	14.0	9.6	7.7	4.1	7.2	4.4	7.4	5.6
18	11.9	8.2	13.9	10.3	7.6	4.7	7.0	4.5	7.0	4.9
19	11.5	7.5	13.5	9.5	7.3	4.3	6.9	4.5	6.7	4.6
20	11.0	6.7	13.1	8.6	6.9	3.6	6.6	3.8	6.5	4.5
21	10.5	6.5	13.0	8.1	6.5	3.3	6.2	3.1	6.2	4.4
22	10.4	6.3	12.2	7.8	6.3	3.1	5.8	2.9	6.4	4.4
23	10.6	8.2	12.9	8.5	7.1	3.4	[7] 8.0	2.8	6.7	8.6
24	11.3	[6] 13.1	13.6	14.9	7.3	8.0	7.5	5.0	6.9	6.4
25	10.8	9.8	12.7	12.5	6.9	7.3	7.0	7.7	6.9	6.1
26	10.2	8.9	12.2	10.8	6.4	5.3	6.2	5.5	6.6	5.9
27	9.8	7.9	11.8	9.8	6.0	4.7	5.7	4.6	6.3	5.7
28	9.3	7.4	11.3	9.0	5.6	4.0	5.3	4.0	6.0	5.7
29	8.9	7.2	11.0	8.7	5.3	3.7	4.9	3.5	5.7	5.3
30	8.6	6.9	10.3	8.4	4.9	3.5	4.6	3.3	5.5	5.1
31		6.6		8.2		3.3		3.1		5.1

[1] Crest, 14.81, 1 a. m.
[2] Crest, 15.25, 8 a. m.
[3] Crest.
[4] Crest, 10.28, 2 a. m.
[5] Highest stage reported.
[6] Crest, 13.07, 7:15 a. m.
[7] Crest, 8.20, 7 p. m.

Date	ILLINOIS RIVER Morris, Ill.		ILLINOIS RIVER La Salle, Ill.		ILLINOIS RIVER Peoria, Ill.		ILLINOIS RIVER Havana, Ill.		ILLINOIS RIVER Beardstown, Ill.	
	April	May	April	May	April	May	April	May	April	May
1	6.7	7.3	18.0	17.5	16.8	16.6	15.6	16.0	16.5	18.1
2	7.0	7.2	17.7	17.2	16.5	16.3	15.4	15.7	16.3	17.9
3	6.7	6.9	17.5	16.5	16.2	16.0	15.2	15.5	16.1	17.6
4	6.9	6.5	17.2	16.2	16.1	15.5	15.1	15.2	15.9	17.2
5	7.1	6.5	16.7	15.7	15.9	15.1	15.0	14.9	15.7	16.8
6	6.9	6.5	16.7	15.2	15.5	14.9	14.8	14.6	15.5	16.5
7	7.3	6.0	16.6	14.9	15.2	14.4	14.6	14.4	15.4	16.1
8	7.1	6.2	16.9	14.5	15.0	14.2	14.4	14.1	15.2	15.7
9	7.0	6.1	16.8	14.2	14.7	13.8	14.2	13.9	15.0	15.3
10	8.1	6.8	16.3	14.0	14.9	13.4	14.2	13.6	14.8	15.0
11	7.3	6.5	16.4	13.9	14.6	13.1	14.1	13.3	14.6	14.6
12	7.1	6.4	16.9	13.9	14.5	12.9	14.0	13.1	14.5	14.2
13	[1] 11.8	6.3	20.5	13.7	14.8	12.6	14.2	12.8	14.7	13.8
14	[2] 13.7	6.1	[3] 22.5	13.6	15.8	12.2	14.6	12.5	15.2	13.3
15	12.9	6.1	22.1	13.3	16.9	12.1	15.0	12.1	15.6	12.8
16	12.0	6.2	21.4	13.0	[4] 17.8	11.9	15.6	11.9	16.1	12.3
17	10.9	6.2	20.8	13.0	[5] 18.2	12.1	15.9	11.9	16.5	12.1
18	9.4	7.0	20.5	13.1	18.4	11.8	16.2	12.2	17.0	12.2
19	8.9	7.0	20.2	13.9	18.3	11.8	16.3	12.2	17.4	12.3
20	8.3	7.2	19.6	14.6	18.1	11.7	16.3	12.0	17.6	12.3
21	7.4	7.2	19.1	14.5	18.0	11.7	16.3	11.8	17.7	12.2
22	7.8	7.0	19.0	14.3	17.6	11.8	16.2	11.7	17.7	12.0
23	8.0	7.1	18.3	14.7	17.6	11.9	16.3	11.6	17.8	11.4
24	9.6	7.3	19.0	13.9	17.4	11.8	[6] 16.6	11.6	18.2	11.9
25	9.5	7.0	19.5	13.9	17.2	11.8	16.6	11.7	18.4	11.7
26	9.8	7.2	19.5	14.2	17.2	11.8	16.4	11.7	18.5	11.7
27	9.2	7.7	19.3	14.4	17.3	11.6	16.4	11.7	[7] 18.5	11.6
28	8.5	7.7	19.0	14.9	17.2	11.7	16.3	11.6	18.6	11.7
29	7.9	7.8	18.5	14.9	17.1	11.8	16.3	11.5	18.5	11.6
30	7.3	7.8	18.0	15.1	16.9	11.7	16.1	11.4	18.3	11.5
31		7.6		14.6		11.8		11.3		11.3

[1] 12.6, 11:30 a. m.
[2] 13.6 noon.
[3] Crest, 22.62, 9:30 a. m.
[4] 17.9 noon.
[5] 18.3 noon.
[6] Crest, 16.61, 5:45 p. m.
[7] Crest, 18.6, 27–28, 5 p. m.–5 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	BOURBEUSE RIVER Union, Mo. (WG)		MERAMEC RIVER Sullivan, Mo. (WG)		MERAMEC RIVER Valley Park, Mo.		KASKASKIA RIVER New Athens, Ill. (G)		BIG MUDDY RIVER Murphysboro, Ill.(G)	
	April	May	April	May	April	May	April*	May*	April*	May*
1	2.2	1.9	3.5	3.4	1.4	11.4	21.5	20.9	22.0	20.5
2	2.1	1.8	3.4	3.3	1.2	11.2	21.2	20.9	20.2	[1] 20.6
3	2.0	1.8	3.3	3.2	1.1	10.5	20.9	20.7	18.1	20.6
4	3.3	1.7	4.1	3.1	1.3	10.0	21.3	20.3	16.8	20.5
5	8.5	1.7	11.5	3.1	10.5	9.2	22.6	19.7	18.0	20.1
6	[2] 12.3	1.7	9.6	3.0	14.9	8.3	23.2	18.8	18.7	19.5
7	7.2	1.6	6.4	3.0	16.5	6.8	23.3	17.6	19.6	18.6
8	4.3	1.6	5.5	3.0	12.2	4.8	23.3	16.4	20.7	17.5
9	3.6	1.6	5.0	3.0	6.8	4.5	23.1	15.1	21.4	16.4
10	3.4	1.6	4.7	2.9	5.9	4.2	22.9	14.1	21.4	15.3
11	4.0	1.6	4.7	2.8	5.5	3.7	22.7	13.2	20.6	14.1
12	5.9	1.6	6.4	2.8	6.5	2.8	22.6	12.5	19.9	13.0
13	7.1	1.5	[4] 12.7	2.8	13.4	2.3	23.2	12.0	21.3	12.2
14	[3] 10.3	1.5	12.2	2.7	[5] 15.8	1.5	23.7	11.4	22.2	11.5
15	5.8	1.5	7.1	2.7	17.0	1.2	24.2	10.7	22.9	10.7
16	4.4	1.4	5.9	2.6	13.2	0.6	[6] 24.2	9.9	23.5	9.9
17	3.7	1.4	5.3	2.6	9.3	0.0	24.0	9.0	[7] 24.0	8.9
18	3.2	1.4	4.9	2.6	8.4	−0.5	23.8	8.4	24.0	8.0
19	3.0	1.3	4.6	2.6	7.8	−0.7	23.8	8.0	23.3	7.6
20	2.8	1.3	4.4	2.6	7.6	−0.8	23.7	7.7	22.6	7.2
21	2.6	1.3	4.2	2.6	7.2	−0.8	23.5	7.6	21.8	7.1
22	2.5	1.3	4.1	2.6	7.4	−0.8	23.2	7.5	21.0	7.0
23	2.4	1.3	4.0	2.5	7.4	−0.8	22.8	7.5	20.3	6.4
24	2.3	1.3	3.9	2.5	8.0	−0.8	22.4	7.4	19.7	5.7
25	2.3	1.3	4.0	2.7	8.5	−0.8	22.1	7.6	19.4	5.3
26	2.2	1.3	3.9	2.7	9.2	−0.8	21.8	8.1	19.0	4.8
27	2.1	1.3	3.7	2.6	10.0	−0.8	21.7	7.8	18.8	5.3
28	2.1	1.3	3.6	2.6	10.5	−0.7	21.4	8.1	19.1	6.7
29	2.0	1.3	3.5	2.5	11.2	−0.7	21.0	8.3	19.7	7.1
30	1.9	1.3	3.4	2.4	11.4	−0.5	20.8	8.2	20.2	6.8
31		1.2		2.4		−0.5		7.9		5.8

*Mean daily stage.
[1] Crest, 20.66, 11:59 p. m.
[2] Crest, 13.20, 8 p. m.
[3] Crest, 10.31, 6 a. m.
[4] Highest stage reported.
[5] Crest, 17.3, 11 p. m.
[6] Crest, 24.25, 4 a. m.
[7] Crest, 24.10, 11:59 p. m.

Date	MISSOURI RIVER Zortman (22SW), Mont. (G)		MISSOURI RIVER Fort Peck (below) Mont. (G)		MISSOURI RIVER Wolf Point, Mont. (G)		MISSOURI RIVER Williston (7W), N. Dak. (WG)		MISSOURI RIVER Elbowoods, N. Dak. (WG)	
	March*	April*	March*	April*	March*	April*	March	April	March*	April*
1	9.2		2.4	2.8	6.3	9.0	6.5	[1 2 3] 17.4	8.0	13.3
2	8.9		2.6	3.0	6.0	9.5	6.5	13.8	8.0	14.8
3	8.8		2.6	3.0	5.9	10.0	6.6	13.1	8.1	16.5
4	8.4		3.2	3.4	6.0	9.6	6.6	[4 5] 12.2	8.1	19.5
5	8.7		2.9	3.6	5.8	10.4	6.5	11.8	8.3	[6] 22.3
6	8.6		2.6	3.9	6.2	12.3	6.3	9.3	8.2	17.5
7	8.6	8.1	2.5	5.6	6.2	13.3	6.1	8.4	8.2	15.1
8	8.6	7.8	2.5	7.1	6.2	10.3	6.0	11.4	8.2	12.3
9	8.6	7.4	2.3	8.3	6.2	8.8	6.0	10.5	8.1	12.8
10	8.5	7.4	2.7	8.2	6.0	8.5	6.1	10.0	7.9	12.6
11	8.4	7.5	1.9	7.7	6.1	8.2	6.1	9.1	7.9	12.1
12	8.6	7.3	1.6	7.3	5.5	8.0	6.1	8.5	7.9	10.3
13	8.4	7.1	1.7	7.1	5.2	7.8	6.2	7.7	7.8	9.2
14	8.4	6.9	1.6	7.0	5.3	7.8	6.2	7.5	7.9	8.8
15	8.2	6.8	1.6	7.3	5.2	7.9	6.1	7.5	7.9	8.6
16	8.2	6.7	1.5	7.6	5.1	8.1	6.0	7.3	7.9	8.5
17	8.2	6.7	1.6	8.5	5.1	8.4	6.0	7.5	7.9	8.6
18	8.3	6.7	1.6	10.2	5.1	9.0	5.9	7.7	8.0	8.7
19	8.8	6.8	1.5	10.5	5.2	9.8	5.8	7.6	7.9	8.9
20	9.1	6.9	1.5	9.5	5.1	9.7	5.9	7.9	7.9	9.0
21	9.0	7.0	1.5	9.6	5.1	9.0	5.7	8.2	7.8	9.3
22	9.1	7.3	1.7	8.0	5.1	8.6	5.9	7.8	7.7	9.5
23	9.0	7.6	2.0	7.4	5.1	8.3	6.5	7.2	7.8	9.3
24	9.1	7.6	1.7	7.0	5.5	8.0	6.7	7.1	7.8	8.7
25	9.0	7.7	1.8	6.8	5.6	8.1	6.8	6.9	7.9	8.4
26	9.5	7.7	2.2	6.8	5.5	8.3	6.9	6.7	7.9	8.3
27	10.8	7.7	2.5	6.5	5.8	8.5	6.8	6.6	8.0	8.1
28	12.4	7.7	2.8	6.2	6.2	8.4	6.8	6.6	8.1	8.0
29		7.7	2.6	6.1	6.9	8.5	6.7	6.6	8.4	7.9
30		7.7	2.5	5.9	7.3	8.4	7.5	6.6	10.2	7.9
31			2.1		8.2		9.3		11.4	

*Mean daily stage.
[1] Crest, 17.76, 8:20 a. m., ice moving.
[2] 15.8, 2 p. m.
[3] 16.9, 4:30 p. m., jam downstream.
[4] 10.8, 4:30 p. m.
[5] 14.4, 9 p. m., release from upstream jam on 3d.
[6] Crest, 25.20, 2 a. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	MISSOURI RIVER Garrison Dam, N. Dak. (C)		MISSOURI RIVER Washburn, N. Dak.		MISSOURI RIVER Bismarck, N. Dak. (WG)		MISSOURI RIVER Mobridge, S. Dak. (WG)		MISSOURI RIVER Pierre, S. Dak. (WG)	
	March	April	March	April	March	April	March	April	March	April
1	84.4	86.1	[1] 7.7	[1] 8.3	8.4	8.9	7.5	8.8	8.1	13.2
2	84.4	89.5	[1] 7.7	[1] 10.7	8.3	10.1	7.3	10.7	8.5	15.6
3	84.4	90.7	[1] 7.7	[1] 13.2	8.3	12.6	7.2	12.6	7.7	16.9
4	84.4	92.6	----------	[1] 14.9	8.4	14.8	6.9	14.5	7.7	13.8
5	84.5	[2 3 4 5 6] 94.7	----------	[7] 16.6	8.4	17.1	6.9	16.2	7.3	13.7
6	84.4	99.7	[1] 7.9	[8] 29.0	8.5	[9 10] 19.0	7.0	16.8	7.2	17.5
7	84.5	96.2	[1] 7.9	([11])	8.5	[12] 25.4	7.0	17.8	7.2	16.6
8	84.4	91.6	[1] 7.8	----------	8.5	22.8	7.1	21.8	7.2	[13] 19.0
9	84.3	90.4	[1] 7.8	----------	8.5	19.3	7.2	[14] 25.1	7.2	[15] 21.8
10	84.3	90.6	[1] 7.6	----------	8.4	17.7	7.3	23.0	7.2	[16] 25.0
11	84.3	90.1	[1] 7.5	----------	8.3	17.1	7.3	18.9	7.1	24.8
12	84.2	88.6	[1] 7.5	----------	8.2	16.1	7.4	16.8	7.2	22.2
13	84.1	87.1	[1] 7.4	----------	8.2	13.7	7.4	13.2	7.2	18.9
14	84.2	86.2	[1] 7.4	----------	8.1	12.6	7.3	11.1	7.3	16.1
15	84.2	85.8	[1] 7.4	----------	8.2	11.9	7.2	9.9	7.3	12.9
16	84.3	85.7	[1] 7.4	----------	8.2	11.6	7.1	9.2	7.3	11.3
17	84.2	85.5	[1] 7.5	----------	8.2	11.3	7.1	8.9	7.4	10.4
18	84.1	85.5	[1] 7.4	----------	8.2	11.1	7.0	8.7	7.7	9.8
19	84.0	85.8	[1] 7.3	----------	8.2	10.7	7.0	8.6	7.7	9.4
20	84.1	----------	[1] 7.3	----------	8.1	10.6	6.9	8.7	7.7	9.1
21	84.0	85.9	[1] 7.2	----------	8.0	10.5	7.1	8.6	7.6	9.0
22	84.0	86.5	[1] 7.2	----------	8.0	10.4	7.0	8.6	7.6	9.2
23	84.0	86.2	[1] 7.3	----------	7.9	10.7	7.0	8.8	7.3	9.0
24	84.0	85.6	[1] 7.1	----------	7.9	10.3	7.0	9.0	7.6	9.1
25	84.0	85.0	[1] 7.1	----------	7.9	9.4	6.9	8.8	7.3	9.4
26	84.1	84.9	[1] 7.1	----------	7.9	8.7	6.9	8.1	7.2	9.3
27	84.2	----------	[1] 7.3	----------	7.9	8.6	6.8	7.6	7.2	8.6
28	84.3	84.6	[1] 7.4	----------	8.0	8.5	6.8	7.5	7.3	8.1
29	84.6	84.5	[1] 7.6	----------	8.2	8.3	6.8	7.4	7.4	7.8
30	85.0	84.5	[1] 7.7	----------	8.3	8.1	6.9	7.3	7.9	7.7
31	84.8	----------	[1] 7.9	----------	8.5	----------	7.2	----------	9.6	----------

[1] Top of ice.
[2] 101.5, 9:45 a. m.
[3] 100.7, 11:10 a. m.
[4] 101.6 noon, ice out.
[5] 99.4, 4 p. m., open.
[6] 100.1, 10 p. m., open crest.
[7] 20.8, 10 p. m.
[8] Crest, 31.0, 3:15 a. m. from high water mark.
[9] Crest, 27.9, 6 p. m.
[10] 25.1, 11 p. m.
[11] No subsequent record.
[12] 25.7, 3 a. m.
[13] 20.2, 9 p. m.
[14] Crest, 25.07, 5 a. m.
[15] 24.2, 9 p. m.
[16] Crest, 25.35, 5–7 p. m.

Date	MISSOURI RIVER Chamberlain, S. Dak. (WG)		MISSOURI RIVER Geddes, S. Dak.		MISSOURI RIVER Fort Randall Dam, S. Dak. (C)*		MISSOURI RIVER Yankton, S. Dak. (WG)		MISSOURI RIVER Sioux City, Iowa (WG)	
	March	April	March	April	March	April	March	April	March	April
1	[1] 7.6	7.5	7.4	7.1	----------	[2] 42.6	[1] 5.9	7.0	[1] 3.7	10.0
2	[1] 7.4	7.8	7.4	6.7	----------	[2] 42.5	[1] 5.8	6.4	[1] 3.9	9.9
3	[1] 7.2	11.0	7.3	10.3	----------	[3] 46.3	[1] 5.8	6.3	[1] 3.8	9.1
4	[1] 6.9	12.0	7.1	10.3	----------	[3] 47.0	[1] 5.7	8.8	[1] 3.5	13.3
5	[1] 6.6	14.4	6.9	10.7	----------	[3] 47.4	[1] 5.7	9.9	[1] 3.4	13.7
6	[1] 6.4	14.9	6.4	12.9	----------	[3] 49.2	[1] 5.7	10.2	[1] 3.4	14.7
7	[1] 6.3	17.5	6.2	15.2	----------	[3] 50.9	[1] 5.4	10.4	[1] 3.5	16.1
8	[1] 6.2	18.0	6.1	15.9	----------	[3] 51.7	[1] 5.0	11.2	[1] 3.4	17.1
9	[1] 6.2	19.7	6.1	16.8	----------	[3] 53.0	[1] 4.8	11.5	[1] 3.0	17.8
10	[1] 6.2	22.8	6.1	18.4	----------	[3] 54.7	[1] 4.7	12.1	[1] 3.0	18.8
11	[1] 6.3	[4] 25.2	6.2	20.8	----------	[3] 57.2	[1] 4.8	13.1	[1] 3.4	19.5
12	[1] 6.3	25.3	6.2	[5] 22.5	----------	[3 6] 58.8	[1] 4.9	14.2	[1] 3.4	21.0
13	[1] 6.4	23.3	6.2	22.0	----------	[3] 58.2	[1] 4.7	[7] 15.2	[1] 4.3	23.2
14	[1] 6.5	20.2	6.3	20.0	----------	[3] 56.8	[1] 4.9	[7] 15.3	[1] 3.7	[8] 24.3
15	[1] 6.5	16.7	6.3	17.2	----------	[3] 54.3	[1] 4.8	14.6	3.3	24.1
16	[1] 6.5	13.4	6.3	13.4	----------	[3] 50.7	[1] 4.8	13.3	3.3	22.7
17	[1] 6.4	11.9	6.4	11.3	----------	[3] 48.4	[1] 4.8	11.2	3.6	19.6
18	[1] 6.4	11.1	6.7	10.3	----------	[3] 47.5	5.1	9.6	4.1	14.3
19	[1] 6.4	10.6	6.9	9.6	----------	[3] 46.5	5.7	8.7	4.7	12.3
20	[1] 6.3	10.1	7.0	9.4	----------	[3] 46.2	5.8	8.2	4.8	11.2
21	[1] 6.3	9.9	7.1	9.1	----------	[3] 45.9	6.1	7.8	4.7	10.0
22	[1] 6.3	9.6	6.8	9.2	----------	[3] 45.5	5.9	7.6	4.2	9.4
23	[1] 6.3	9.6	6.5	9.0	----------	[3] 45.2	5.0	7.4	3.7	9.0
24	[1] 6.2	9.4	6.2	8.9	----------	[3] 45.1	5.4	7.2	3.0	8.4
25	[1] 6.3	9.5	6.3	8.8	[2] 40.9	[3] 44.9	5.5	6.9	2.9	8.0
26	[1] 6.3	9.8	6.5	9.0	[2] 41.0	[3] 45.3	5.3	6.8	3.2	7.7
27	[1] 6.3	9.4	6.6	8.9	[2] 41.2	[3] 45.4	5.4	6.9	3.2	7.7
28	[1] 6.5	8.6	6.7	8.6	[2] 41.5	[2] 44.7	5.6	6.9	3.3	7.8
29	[1] 7.0	8.1	8.9	8.1	[2] 42.0	[2] 44.0	6.1	6.6	3.8	7.9
30	7.4	7.7	7.4	7.7	[2] 44.3	[2] 43.3	5.3	5.8	8.7	6.7
31	7.8	----------	7.3	----------	[2] 42.4	----------	7.5	----------	10.0	----------

*All readings above 1,200 m. s. l.
[1] Top of ice.
[2] 5,500 feet d. s. from centerline.
[3] At centerline of dam.
[4] Crest, 25.55, 6 p. m.
[5] Crest, 22.55 noon.
[6] Crest, 58.9, 3 p. m.
[7] Crest, 15.50, 6 p. m.–6 a. m., Apr. 13–14.
[8] Crest, 24.28, 7–10 a. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	MISSOURI RIVER Decatur, Nebr. (C)		MISSOURI RIVER Blair, Nebr.		MISSOURI RIVER Omaha, Nebr. (WG)		MISSOURI RIVER Plattsmouth, Nebr. (C) *		MISSOURI RIVER Nebraska City, Nebr. (WG)	
	April	May	April	May	April	May	April	May	April	May
1	13.8	11.4	16.3	16.3	15.1	14.2	52.4	50.1	15.5	16.7
2	13.2	10.8	16.4	15.7	15.8	13.3	52.6	49.9	16.0	16.0
3	12.6	10.2	16.5	15.2	15.6	12.7	52.7	49.4	16.2	15.4
4	14.2	9.8	16.1	14.9	14.7	12.3	52.1	49.1	15.4	15.0
5	16.0	9.6	18.2	14.4	16.2	11.9	52.4	48.7	15.9	14.5
6	16.6		19.5	13.9	17.1	11.4	53.9	48.3	16.7	14.1
7	17.8		20.5	13.6	18.2	10.9	54.6	48.1	17.5	13.7
8	18.7		21.1	13.6	19.4	10.8	55.1	48.1	17.8	13.3
9	19.8		21.0	13.2	20.5	10.6	56.0	48.1	18.8	13.2
10	20.2		21.3	13.0	20.5	10.4	56.1	48.0	19.5	13.1
11	20.9		21.7	13.0	21.5	10.3	56.6	47.7	20.3	12.9
12	21.5		21.9	13.4	22.6	10.5	57.6	48.1	20.5	13.0
13	22.1		22.2	13.7	24.6	11.4	58.3	48.3	21.3	13.5
14	23.1		22.6	13.3	25.6	10.7	59.4	48.9	21.8	13.5
15	[1] 23.3		22.8	12.8	27.0	10.5	60.1	47.7	[2] 22.9	13.0
16	23.3		23.1	12.7	28.3	10.4	60.4	47.5	[3] 25.1	12.6
17	22.6		[4] 23.5	12.7	29.4	10.5	60.4		[5] 26.6	12.9
18	20.8		23.4	13.0	[6] 30.2	10.7	[7] 61.4	47.5	[8] 27.6	13.0
19	18.4		22.6	12.6	29.5	10.6	60.9	47.6	[9] 24.6	13.0
20	16.0		21.5	12.0	27.3	10.0	59.8	47.7	24.0	12.7
21	14.8		20.6	11.5	24.3	9.4	58.1	47.7	23.4	12.0
22	14.0		20.1	11.3	21.7	9.3	56.5	47.6	22.5	11.9
23	13.6		19.6	11.6	20.5	9.4	55.0	48.0	21.5	12.1
24	13.1		19.1	11.8	19.5	10.6	54.0	48.7	20.7	14.1
25	12.6		18.7	11.1	18.5	9.1	53.2	47.0	20.0	13.1
26	12.5		18.2	10.2	17.5	8.7	52.6	47.3	19.4	11.9
27	12.5		17.7	10.6	16.6	8.4	52.1	47.1	18.6	11.4
28	12.4		17.6	11.4	16.0	9.2	51.1	47.1	18.2	11.6
29	12.4		17.4	11.3	15.7	9.5		47.5	17.8	12.2
30	11.8		16.9	11.1	15.2	9.2		47.6	17.4	12.1
31				10.7		9.0		47.1		12.0

*All readings above 900.00 m. s. l.
[1] Crest, 23.31, 15–16, 6 a. m.–2 a. m.
[2] 24.4, 7 p. m.
[3] 25 7 noon
[4] Crest, 23.50, 4 a. m.
[5] 27.1, 7 p. m.
[6] Crest, 30.20, 4 a. m.
[7] Crest, 61.43, 7 a. m.
[8] Crest, 27.66, 6 a. m.
[9] 24.4 noon.

Date	MISSOURI RIVER Brownsville, Nebr. (C)		MISSOURI RIVER Rulo, Nebr. (C)		MISSOURI RIVER St. Joseph, Mo. (WG)		MISSOURI RIVER Atchison, Kans. (C)		MISSOURI RIVER Leavenworth, Kans. (C)	
	April	May	April*	May*	April	May	April	May	April	May
1	17.1	19.4	17.4	19.9	15.4	19.0	20.0	22.9	15.9	21.2
2	17.8	18.8	17.8	19.3	15.7	18.4	20.0	22.1	16.2	20.4
3	18.0		18.0	18.5	16.0	17.6	20.3	21.3	16.3	19.6
4	17.5		18.0	17.7	16.0	16.9	20.5	20.6	16.4	18.6
5	17.5	17.2	17.9	17.1	15.8	16.1	19.9	19.6	16.2	17.8
6	18.4	16.6	18.6	16.5	16.2	15.5	20.4	19.1	16.3	17.2
7	18.7	16.1	18.9	15.9	16.7	15.0	20.7	18.5	16.6	16.7
8	19.6	15.4	19.4	15.5	17.0	14.5	21.0	18.3	16.8	16.2
9	20.4	15.0	20.0	15.4	17.3	14.3	21.4	17.9	17.2	15.8
10	21.0	15.2	20.8	15.1	17.8	14.1	21.9	17.8	17.7	15.6
11			21.3	14.8	18.3	13.7	22.7	17.5	18.4	15.3
12	22.2	15.1	21.8	14.8	18.7	13.5	23.4	17.3	18.8	15.0
13	23.2	15.5	22.3	15.2	19.4	13.4	23.9	17.2	19.4	15.0
14	24.1	15.7	22.5	15.4	19.8	13.8	24.4	17.7	19.9	15.4
15	24.9	15.1	22.9	15.0	20.3	13.9	24.8	17.8	20.4	15.6
16	27.5	14.7	23.5	14.8	20.8	12.9	25.3	17.3	20.8	15.2
17	[1] 29.7	15.0	24.3	15.1	21.9	12.9	26.1	17.4	21.5	15.1
18	25.9		24.2	15.3	24.2	13.3	27.6	17.7	22.4	15.6
19	24.4	15.1	24.4	15.2	24.7	13.1	28.9	17.6	24.6	15.6
20	25.2	14.9	24.7	15.0	25.0	13.0	29.5	17.4	25.3	15.4
21	24.7	14.1	25.4	14.4	25.4	12.7	30.2	16.9	25.9	15.1
22	24.0	13.9	[2] 25.3	15.4	[3] 26.4	12.4	31.6	16.6	26.7	14.7
23	23.3	14.7	24.6	16.0	26.8	14.6	[4] 32.5	18.7	[5] 27.5	17.1
24	22.6	16.0	23.8	16.1	25.8	14.1	31.8	18.9	27.4	17.1
25	22.1	15.7	23.1	15.8	24.4	14.1	29.6	18.7	26.4	16.9
26	21.4	13.8	22.4	14.5	23.1	13.4	27.0	17.9	25.0	16.4
27	21.0	13.2	21.8	13.9	21.7	12.5	25.9	16.9	23.9	15.2
28	20.4	13.1	21.3	13.7	20.8	12.0	25.1	16.2	23.2	14.7
29	20.1	13.8	20.8	14.3	20.0	12.2	24.4	16.0	22.4	14.2
30	19.8	14.0	20.3	14.4	19.3	12.6	23.6	16.4	21.8	14.6
31		13.7		14.3		12.5		16.6		14.6

*Mean daily stage.
[1] Crest, 29.8, 9 a. m.
[2] Crest, 25.60, 2–3 a. m.
[3] Crest, 26.82, 7 p. m.–4 a. m.
[4] Crest, 32.5, 7 a. m.–noon.
[5] Crest, 27.6 noon–9 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	MISSOURI RIVER Kansas City, Mo. (WG)		MISSOURI RIVER Napoleon, Mo. (C)		MISSOURI RIVER Lexington, Mo. (C)		MISSOURI RIVER Waverly, Mo. (WG)		MISSOURI RIVER Miami, Mo. (C)	
	April	May	April	May	April	May	April	May	April	May
1	15.1	19.0	10.4	17.6	17.1	25.0	15.0	23.0	12.4	22.6
2	16.1	18.1	12.9	16.7	19.8	24.2	18.8	22.2	16.7	21.8
3	15.9	17.4	13.2	16.0	19.6	23.5	18.7	21.3	17.5	20.6
4	16.1	16.4	13.7	15.1	19.7	22.6	18.9	20.3	17.6	19.4
5	16.3	15.6	14.2	14.3	20.0	21.7	19.1	19.3	18.0	18.1
6	15.8	14.8	13.8	13.5	19.7	20.8	18.5	18.4	17.5	17.1
7	15.9	14.4	13.8	12.9	19.9	20.2	18.7	17.7	17.4	16.2
8	16.1	13.8	13.8	12.4	20.1	19.8	18.9	17.2	17.6	15.7
9	16.5	13.6	14.2	12.0	20.2	19.2	18.9	16.9	17.6	15.3
10	17.1	13.5	14.8	11.9	20.4	18.9	19.3	16.5	17.5	15.2
11	17.8	13.2	15.9	11.8	21.3	18.8	19.9	16.6	17.8	15.1
12	18.2	12.7	16.0	11.2	21.3	18.3	20.2	16.0	18.5	14.3
13	18.2	12.6	16.1	11.0	21.5	17.9	20.9	15.7	18.9	14.1
14	19.3	12.6	16.9	10.9	22.0	17.8	21.7	15.5	19.9	13.8
15	20.1	13.0	17.4	11.2	22.6	18.2	22.3	15.8	20.6	14.0
16	20.6	12.8	17.7	11.2	23.0	18.2	22.5	15.9	21.0	14.4
17	20.5	12.7	17.9	10.7	23.0	17.9	22.8	15.3	21.2	14.0
18	21.0	12.8	18.0	10.9	23.4	18.0	22.9	15.5	21.3	14.0
19	22.0	13.2	18.8	11.4	24.1	18.6	23.2	15.9	21.7	14.5
20	23.0	13.0	19.5	11.4	24.9	18.4	23.6	16.0	22.4	14.5
21	24.7	12.7	20.6	11.5	25.8	18.0	24.4	15.6	23.0	14.2
22	26.6	12.2	21.9	10.5	27.1	17.6	25.9	15.1	24.0	13.6
23	29.0	13.5	23.0	10.9	27.4	17.8	26.1	15.2	24.8	13.3
24	[1] 30.6	15.0	[2] 24.5	13.0	29.0	20.0	[3] 27.8	17.1	25.9	14.8
25	29.2	15.8	23.5	12.8	28.8	20.0	27.9	17.6	26.4	16.2
26	26.8	15.4	22.7	13.6	[4] 30.1	20.6	27.6	17.8	[5] 26.2	15.9
27	24.4	13.8	21.5	12.5	29.1	19.5	27.8	17.3	26.3	15.8
28	22.6	12.6	20.2	11.1	27.8	18.2	25.7	15.9	25.8	14.2
29	21.1	12.0	19.0	10.3	26.7	17.2	24.8	15.1	24.9	13.3
30	20.1	12.0	18.4	10.1	25.7	17.0	23.9	14.8	23.6	12.9
31		12.4		10.5		17.3		15.0		13.1

[1] Crest, 30.63, 8–10 a. m.
[2] Crest, 24.6, 6–8 p. m.
[3] Crest, 28.1, 4–11 p. m.
[4] Crest, 30.1, 5–8 a. m.
[5] Highest stage reported, 26.5, 4 p. m.

Date	MISSOURI RIVER Glasgow, Mo. (C)		MISSOURI RIVER Boonville, Mo. (WG)		MISSOURI RIVER Jefferson City, Mo.		MISSOURI RIVER Gasconade, Mo. (C)		MISSOURI RIVER Hermann, Mo. (WG)	
	April	May	April	May	April	May	April	May	April	May
1	16.2	29.6	12.6	25.6	13.1	24.8	14.5	28.0	13.7	26.0
2	20.0	28.5	15.3	24.2	14.2	23.7	14.9	27.0	14.7	24.9
3	21.4	27.4	17.2	23.0	17.7	22.5	17.8	25.3	16.7	23.8
4	21.6	26.0	17.6	22.0	18.0	21.1	18.7	23.4	18.0	22.3
5	22.4	24.4	18.4	20.2	19.5	19.7	21.5	21.2	20.7	20.6
6	22.4	23.1	19.0	19.0	19.4	18.4	21.7	19.2	20.9	19.0
7	21.9	22.0	18.6	18.0	18.8	17.5	21.2	18.1	20.4	18.1
8	21.9	21.4	18.6	17.2	18.5	16.8	20.9	17.3	19.9	17.4
9	21.9	20.9	18.7	16.7	18.4	16.4	20.5	16.5	19.7	16.7
10	21.8	21.0	18.7	16.6	18.5	16.3	20.5	16.1	19.8	16.3
11	22.3	21.0	19.4	16.6	18.7	16.2	20.8	15.9	20.1	16.1
12	22.6	20.5	20.1	16.2	19.3	16.0	21.4	15.6	[1] 20.3	15.7
13	23.3	19.8	20.6	15.6	20.1	15.4	23.4	15.0	22.5	15.2
14	23.9	19.4	21.6	15.3	20.2	15.0	23.2	14.6	22.1	14.9
15	24.6	19.4	22.2	15.2	20.5	14.7	23.6	14.1	22.4	14.4
16	25.0	19.5	22.4	15.3	20.9	14.8	24.2	14.0	23.1	14.2
17	25.1	19.3	22.3	15.3	21.1	14.9	24.2	14.2	23.2	14.3
18	25.3	19.4	22.5	15.2	21.1	14.6	24.0	14.1	23.0	14.2
19	25.6	20.5	22.5	16.3	21.0	15.6	23.8	14.1	22.7	14.1
20	26.2	20.5	22.8	16.4	20.9	16.3	23.8	15.0	22.7	15.0
21	26.9	19.9	23.4	15.9	21.3	15.8	24.2	15.1	22.9	15.1
22	27.9	19.2	24.1	16.1	21.8	15.2	24.4	14.5	23.0	14.6
23	29.0	18.6	25.1	14.9	22.9	14.9	25.5	14.1	23.7	14.1
24	29.8	19.4	25.8	15.2	24.0	14.6	26.7	13.6	24.7	13.7
25	31.7	22.4	27.0	18.0	25.0	17.1	27.6	14.7	25.4	14.4
26	31.9	21.7	27.6	17.9	25.7	18.4	28.3	17.1	25.9	16.7
27	[2] 32.0	21.7	[3] 27.7	17.7	[4] 26.1	17.9	[5] 29.1	16.7	26.5	16.5
28	32.0	20.0	27.5	16.7	26.1	17.2	29.2	16.5	[6] 27.1	16.3
29	31.8	19.0	27.2	15.3	25.9	15.9	28.9	15.4	26.7	15.4
30	30.9	17.9	26.7	14.5	25.6	14.6	28.5		26.4	14.1
31		17.8		14.0		13.9		13.1		13.3

[1] 21.5, 3 p. m.
[2] Crest, 32.06, 10 a. m.–2 p. m.
[3] Crest, 27.70, 6–7 a. m.
[4] Crest, 26.10, 6 a. m.–2 p. m.
[5] Crest, 29.2 noon.
[6] Crest, 27.10, 6–11 a. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	MISSOURI RIVER Washington, Mo. (C)		MISSOURI RIVER St. Charles, Mo.		MILK RIVER Nashua, Mont. (G)		YELLOWSTONE RIVER Billings, Mont. (WG)		YELLOWSTONE RIVER Miles City, Mont. (Municipal water plant)	
	April	May	April	May	March*	April*	March	April	March	April
1	11.6	23.6	17.8	31.1	5.2	11.8	1.5	2.2	5.7	6.5
2	11.9	22.8	18.5	30.8	4.9	13.5	1.5	2.1	5.7	6.1
3	14.2	21.6	19.2	29.6	4.7	15.2	1.5	2.2	5.6	5.8
4	15.9	20.1	21.9	27.9	4.5	18.3	1.4	2.3	5.4	5.6
5	17.7	18.4	[1] 24.3	25.9	4.4	21.8	1.5	2.3	5.4	5.5
6	18.0	16.7	[2] 25.3	23.7	4.3	25.7	1.7	2.6	5.4	5.3
7	17.6	15.9	25.0	22.4	4.4	27.9	1.6	3.2	5.4	5.2
8	17.2	15.1	24.4	21.6	4.4	30.5	1.5	3.4	5.4	5.3
9	16.9	14.5	24.1	20.8	4.4	30.7	1.6	3.4	5.4	5.4
10	16.9	14.1	24.0	19.9	4.4	30.4	1.7	2.9	5.5	5.4
11	17.1	13.8	24.3	19.4	4.4	30.1	1.8	2.6	5.6	4.9
12	18.0	13.5	24.2	19.1	4.4	29.8	1.7	2.5	5.9	4.5
13	19.3	13.3	26.3	18.9	4.4	29.7	1.7	2.7	5.9	4.5
14	19.2	12.9	[3] 26.6	18.6	4.4	29.7	1.6	2.7	5.9	4.5
15	19.4	12.5	26.7	18.1	4.4	29.9	1.7	2.8	5.9	4.4
16	19.9	12.3	27.3	17.8	4.3	30.3	1.6	2.9	5.8	4.4
17	20.0	12.4	27.5	17.5	4.2	30.8	1.7	3.2	5.8	4.5
18	19.8	12.4	27.4	17.6	4.1	[4] 31.3	1.9	3.1	5.8	4.5
19	19.6	12.2	27.2	17.7	4.1	31.1	2.1	3.2	6.0	4.5
20	19.5	13.0	27.0	18.0	4.0	30.7	2.0	3.2	6.4	5.2
21	19.7	13.2	27.1	18.8	4.0	30.2	1.9	3.5	6.5	4.8
22	20.0	12.7	27.3	18.7	3.9	29.8	1.9	3.7	6.7	5.6
23	20.8	12.3	27.7	18.1	3.9	29.4	1.8	3.4	6.4	5.4
24	21.5	11.9	28.5	17.5	3.9	29.1	1.6	3.2	6.3	5.1
25	22.3	12.4	29.2	17.4	3.8	28.9	1.8	3.2	6.0	5.1
26	23.1	14.4	29.9	18.8	3.8	28.9	1.9	3.5	6.5	4.8
27	23.8	14.4	30.7	20.4	3.8	28.5	1.9	4.2	6.5	4.8
28	[5] 24.2	14.3	31.6	20.2	3.8	27.8	2.0	4.8	[6] 7.0	5.4
29	24.0	13.5	[7] 31.8	19.9	3.8	26.9	2.1	5.4	[6] 11.0	5.4
30	23.8	12.4	31.5	18.5	6.0	25.7	2.5	6.2	7.4	6.4
31		12.3		17.4	10.0		2.4		6.8	

*Mean daily stage
[1] 24.6 noon.
[2] 25.3 noon.
[3] 26.7 noon.
[4] Crest, 31.38.
[5] 24.4 Md[3]t. 28–29.
[6] Ice gorge below gage.
[7] Crest.

Date	YELLOWSTONE RIVER Sidney, Mont.		LITTLE MISSOURI RIVER Marmarth, N. Dak. (G)		LITTLE MISSOURI RIVER Medora, N. Dak. (G)		LITTLE MISSOURI RIVER Watford City 17S, N. Dak. (G)		KNIFE RIVER Golden Valley 10S, N. Dak. (G)	
	March	April	March*	April*	March*	April*	March*	April*	March*	April*
1	5.2	16.2	6.7	15.8	3.9	[1] 12.3	3.7	10.5	3.5	15.8
2	5.1	14.1	6.5	16.3	3.8	15.1	3.7	11.5	3.5	20.5
3	5.2	11.0	6.5	14.7	3.8	15.1	3.7	13.7	3.3	23.5
4	5.3	9.1	6.6	12.8	3.7	13.2	3.7	13.8	3.2	24.6
5	5.2	8.4	6.6	13.9	3.7	12.9	3.7	13.0	3.1	24.6
6	5.2	8.3		16.2	5.3	14.6	3.7	12.5	3.1	25.0
7	5.2	8.0	6.4	16.9	5.3	16.4	3.6	13.0	3.0	[2] 25.5
8	5.1	7.1	6.3	14.0	4.5	16.8	3.6	14.0	3.0	24.9
9	5.1	6.2	6.3	9.9	4.7	13.0	3.6	15.1	3.0	21.0
10	5.1	5.4	6.2	8.0	4.8	9.1	3.6	[3] 13.9	3.0	16.2
11	5.2	4.5	6.2	6.8	4.8	7.6	3.6	9.6	3.0	11.4
12	5.4	3.8	6.2	6.0	4.9	6.6	3.6	8.2	2.9	8.3
13	5.2	3.2	6.2	5.5	5.1	5.9	3.6	7.2	2.9	7.4
14	5.4	2.7	6.2	5.1	5.1	5.3	3.6	6.6	2.8	7.1
15	5.4	2.5	6.2	4.7	5.0	4.9	3.6	6.1	2.8	6.9
16	5.4	2.3	6.1	4.4	5.0	4.7	3.6	5.7	2.8	6.6
17	5.4	2.3	6.1	4.2	4.9	4.3	3.6	5.3	2.8	6.2
18	5.4	2.2	6.1	3.9	4.8	4.0	3.6	5.0	2.8	5.8
19	5.4	2.2	6.1	3.8	4.9	3.6	3.6	4.7	2.8	5.5
20	5.4	2.6	6.1	3.6	4.8	3.1	3.6	4.4	2.8	5.2
21	5.5	3.2	6.1	3.5	4.8	2.9	3.6	4.2	2.8	4.9
22	5.6	2.9	6.1	3.3	4.8	2.7	3.6	4.0	2.8	4.7
23	5.6	2.8	6.1	3.3	4.8	2.6	3.7	3.9	2.7	4.5
24	6.1	3.1	6.1	3.2	4.8	2.5	5.0	3.8	2.8	4.3
25	6.2	3.2	6.1	3.1	4.8	2.4	4.8	3.6	2.8	4.2
26	6.2	2.9	6.2	3.0	4.7	2.3	4.5	3.4	2.8	4.1
27	6.1	2.6	6.2	3.0	4.6	2.2	4.3	3.4	2.8	4.0
28	6.1	2.5	6.3	2.9	5.1	2.2	4.5	3.3	2.9	3.8
29	6.8	2.6	7.1	2.8	6.3	2.1	6.0	3.2	3.0	3.8
30	9.4	3.3	9.2	2.8	7.6	2.1	9.5	3.1	3.4	3.7
31	[4] 18.1		[5] 14.5		8.1		10.6		5.9	

*Mean daily stage. [1] Crest, 18.35, 7 p. m. [2] Crest, 25.63 noon. [3] Crest, 15.53, 1 a. m. [4] Crest, 19.0 early morning. [5] Crest, 23.4, 4 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	KNIFE RIVER Hazen, N. Dak. (G)		HEART RIVER Glen Ullin (14S), N. Dak. (G)		HEART RIVER Mandan, N. Dak. (G)		CEDAR RIVER Pretty Rock (10S), N. Dak. (G)		CANNONBALL RIVER New Leipzig, N. Dak. (G)	
	March*	April*	March*	April*	March*	April*	March*	April*	March*	April*
1	4.2	14.1	1.7	1.6		12.5	3.0	15.9	5.4	15.5
2	4.1	21.4	1.7	4.6		16.6	3.0	18.1	5.4	16.8
3	4.2	24.3	1.7	6.2		23.1	3.0	18.4	5.4	18.5
4	4.2	24.6	1.7	6.4		[1] 23.5	3.0	[2] 17.7	5.3	19.5
5	4.2	24.9	1.7	6.6		17.4	3.0	16.5	5.3	19.3
6	4.2	25.1	1.7	6.8	4.5	17.3	3.0	17.2	5.3	19.9
7	4.1	[3] 25.6	1.7	6.9		17.6	3.0	17.8	5.2	20.0
8	4.0	25.6	1.7	6.9	3.5	17.0	3.0	18.1	5.2	[5] 19.5
9	4.0	25.0	1.7	[4] 7.0		14.7	3.0	19.0	5.2	16.3
10	4.0	23.6	1.7	7.0		12.6	3.0	18.0	5.3	13.2
11	4.0	17.8	1.7	6.9		11.5	3.0	16.0	5.2	10.5
12	4.0	13.3	1.7	6.8		11.2	3.0	12.7	5.2	8.5
13	4.0	11.2	1.7	6.8		11.0	3.0	7.5	5.2	7.7
14	4.0	10.1	1.7	6.7		10.8	3.0	6.0	5.2	7.3
15	4.0	9.5	1.7	6.6		10.7	3.0	5.3	5.2	7.0
16	4.0	9.0	1.7	6.5		10.6	3.0	4.8	5.2	6.8
17	4.0	8.5	1.7	6.5	3.9	10.5	3.0	5.1	5.2	6.8
18	4.0	8.1	1.7	6.4		10.3	3.0	4.9	5.3	6.8
19	3.9	7.7	1.7	6.3		10.1	3.0	4.6	5.3	6.6
20	3.9	7.3	1.7	6.2		9.9	3.0	4.4	5.3	6.4
21	4.0	7.1	1.7	6.1		9.7	3.0	4.3	5.3	6.3
22	3.9	6.7	1.7	5.7		9.6	3.0	4.2	5.3	6.1
23	4.0	6.5	1.7	4.8	4.7	9.3	3.0	4.1	5.3	6.1
24	4.0	6.3	1.7	4.1		8.5	3.0	4.0	5.2	6.0
25	3.9	6.1	1.7	3.6		7.9	3.0	3.9	5.3	5.9
26	3.9	5.9	1.7	3.2		7.4	3.0	3.8	5.3	5.9
27	3.9	5.8	1.7	3.0		7.0	3.0	3.8	5.4	5.8
28	3.9	5.7	1.9	2.7	4.7	6.6	3.0	3.7	5.6	5.8
29	3.9	5.6	2.0	2.6	4.8	6.4	3.5	3.7	6.5	5.7
30	4.7	5.4	1.8	2.4	5.0	6.1	5.5	3.6	9.0	5.7
31	8.0		1.5		7.3		10.4		13.3	

*Mean daily stage. [1] Crest, 25.75, 2:45 p. m. [2] Crest, 20.91, 8:30 a. m. [3] Crest, 25.83, 10 p. m. [4] Crest, 6.99, 6 a. m. [5] Crest, 20.10, 6 a. m.

Date	CANNONBALL RIVER Breien, N. Dak. (G)		GRAND RIVER Shadehill, S. Dak. (G)		GRAND RIVER Wakpala, S. Dak. (G)		MOREAU RIVER Eagle Butte (13N), S. Dak. (G)		MOREAU RIVER Promise, S. Dak. (G)	
	March*	April*	March*	April*	March*	April*	March*	April*	March*	April*
1		12.6	3.4	4.1	5.7	[1] 12.3	5.3	17.7	5.6	13.1
2		14.1	3.4	3.8		12.5		17.9	5.5	20.5
3		14.7	3.3	3.6	5.7	12.3		20.5	5.8	22.2
4		14.7	3.4	4.0	5.7	12.1		[2] 21.5	5.8	23.1
5		14.8	3.4	7.8	5.6	11.8		20.2	5.7	[3] 23.7
6		15.1	3.3	9.5	5.6	12.0		19.5	5.6	23.3
7		[4] 15.1	3.3	10.0	5.6	12.4		20.5	5.5	23.2
8		14.9	3.3	10.3	5.6	12.4	5.2	20.8	5.5	23.7
9		13.9	3.3	[5] 10.4		11.7		16.8	5.4	23.1
10		13.0	3.4	10.4	5.6	10.7		11.8	5.4	20.7
11		12.3	3.4	10.4		10.2		9.0	5.4	14.1
12		11.1	3.4	10.3	5.6	10.0		7.9	5.3	11.6
13		9.2	3.4	10.3		9.9			5.2	
14	1.8	7.0	3.4	10.2	5.3	9.8			5.3	9.5
15	1.8	5.7	3.4	10.2	5.3	9.8			5.3	8.9
16			3.4	10.2		9.8			5.6	8.5
17			3.4	10.1	5.0	9.8	5.1		5.7	7.9
18			3.4	10.0	5.0	9.8			5.6	7.4
19		4.2	3.4	10.0	5.0	9.8		5.0	5.6	7.0
20			3.4	9.9	5.0	9.7			5.6	6.5
21			3.3	9.9	5.1	9.7		4.8	5.5	6.0
22			3.3	9.8	5.1	9.5			5.6	5.6
23		3.4	3.3	9.7		9.4			5.6	5.1
24	1.7	3.2	3.3	9.7	5.6	9.4	5.1		5.5	4.9
25		3.1	3.3	9.6	5.6	9.2			5.4	4.7
26		2.9	3.3	9.5	5.6	9.2		3.5	5.4	4.4
27	1.7	2.8	3.3	9.5	6.2	9.2		3.5	5.5	4.3
28		2.7	3.5	9.4	6.3	9.1	5.7		5.6	4.1
29	1.8		4.3	9.3	6.3	9.1			5.8	3.9
30			4.3	9.2	6.3	9.2		3.1	6.9	3.7
31			4.3		7.7				10.1	

*Mean daily stage. [1] Crest, 14.0, 1 a. m. [2] Crest, 21.70, 6 a. m. [3] Crest, 24.16, 2 a. m. [4] Crest, 15.42, 7 p. m. [5] Crest, 10.45, 2 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	CHEYENNE RIVER Wasta, S. Dak. (G)		CHEYENNE RIVER Eagle Butte (21S) S. Dak. (G)		BELLE FOURCHE RIVER Elm Springs, S. Dak. (G)		BAD RIVER Midland, S. Dak. (G)		BAD RIVER Fort Pierre, S. Dak. (G)	
	March*	April*	March*	April*	March*	April*	March*	April*	March*	April*
1	4.0	3.0		10.0		8.8	3.2	13.2		[3] 25.2
2				10.7		6.4	3.1	[1] 13.7		24.0
3	4.0	2.7	4.9	[2] 11.0		5.0	3.0	12.9		25.5
4		2.4		10.3		3.7	3.0	11.4		25.2
5	4.0	2.5	4.9	9.8	5.9		3.0	11.7		25.1
6	4.0	2.5		9.9			3.0	10.8		25.6
7	4.0	2.5	4.7	9.2	5.9	3.2	2.9	11.6		26.7
8	4.0	2.5		8.6			2.9	10.0		25.3
9		2.4		7.5		2.3	2.8	8.2		20.5
10	4.7	2.4		6.7	5.9		2.8	6.3		16.2
11	4.7	2.3		6.2		1.5	2.8	5.9		15.0
12	4.3	2.3	4.8	6.0		1.4	2.8	5.5		13.3
13	4.3	2.3	4.9	5.7				5.0		11.5
14	4.3	2.3		5.5		1.2		4.8		10.9
15		2.3		5.4		1.0	2.8	4.6		10.6
16		2.3	5.2	5.3		1.0	2.8	4.6		10.5
17	4.2	2.3				.9	3.8	4.4		9.7
18	4.3	2.3		5.1		.8	3.9	4.1		8.8
19		2.3	5.0			.7	3.8	3.8		8.1
20	4.5	2.3				.7	3.7	3.7		7.8
21	5.2	2.2		4.7		.6	3.6	3.6		7.3
22	4.7	2.2				.6	3.6	3.3		6.6
23	4.8	2.2	5.9	4.5		.6	3.6	3.2		6.0
24	4.8	2.2				.6	3.6	3.0		
25		2.2	6.0	4.3		.5	4.1	2.7		
26	4.7	2.2			6.2	.5	4.0	2.6		
27		2.2				.4	3.6	2.6		
28	5.7	2.2	5.8	4.2	6.5	.4	3.6	2.6	6.8	
29	5.9	2.1			7.3	.4	6.4	2.6	11.2	
30	5.2	2.1		4.1		.4	11.0	2.5	19.4	
31	3.8		10.5		8.7		13.6		22.9	

*Mean daily stage.

[1] Crest, 14.00, 4 a. m.

[2] Crest, 11.36, 3:30 a. m.

[3] Crest, 27.24, 11:30 a. m.

Date	WHITE RIVER Kadoka, S. Dak. (G)		WHITE RIVER Oacoma, S. Dak. (G)		NIOBRARA RIVER Spencer, Nebr. (G)		JAMES RIVER Huron, S. Dak. (WG)		JAMES RIVER Scotland, S. Dak. (G)	
	March*	April*	March*	April*	March*	April*	March	April	March*	April*
1	5.0	6.1	6.5	10.6	1.4	2.6		10.5	4.4	12.2
2	5.0	5.5	6.4	9.0	1.3	2.0		10.6	4.2	12.3
3	5.1	5.3	6.2	7.9	1.2			10.3	4.0	12.4
4	5.2	5.0	6.3	6.8	1.1			10.4	3.8	12.6
5	5.1	4.7	6.3	6.2	1.0			11.1	3.7	13.0
6	4.9	4.6	6.3	5.8	1.0			11.4	3.5	13.6
7	4.8	4.5	5.9	6.0	1.0			11.7	3.4	14.3
8	4.8	4.4	5.7	5.9	1.1			11.9	3.4	14.8
9	4.9	4.1	6.1	5.4	1.2			12.4	3.4	15.2
10	5.5	3.9	6.5	4.8	1.5			13.2	3.3	15.3
11	6.6	3.9	6.5	4.4	1.5			13.9	3.4	15.3
12		3.8	6.5	4.1	1.4	.9		14.5	3.4	15.2
13	7.8	3.7	6.5	4.0	1.3	1.0		14.9	3.5	15.0
14	7.1	3.7	6.6	3.8	1.2	.9		15.1	3.6	14.9
15	6.6	3.6	6.8	3.6	1.2	.8		[1] 15.2	3.6	14.8
16	6.2	3.6	7.1	3.6	1.1	.8		15.1	3.7	14.8
17	6.2	3.7	7.9	3.6	1.2	.8		15.0	4.2	14.9
18	6.5	3.8	8.8	3.5	1.6	.9		14.9	5.8	15.2
19	7.0	3.8	8.9	3.5	1.5	.8		14.6	6.7	15.6
20	7.5	3.7	8.6	3.3	1.7	.8		14.3	7.6	16.0
21	7.9	3.6	8.5	3.2	1.7	.9		14.0	8.4	15.9
22	7.6	3.6	9.1	3.1	1.4	.9		13.9	8.8	16.2
23	7.3	3.5	10.4	3.0	1.0	.8		13.9	8.3	[2] 16.2
24	6.5	3.5	13.0	2.8	.9	.6		14.2	7.7	16.1
25	6.1	3.5	13.5	2.7	1.1	.6		14.4	7.9	15.9
26	6.0	3.5	12.9	2.6	1.3	.5		14.6	7.8	15.7
27	6.8	3.5	13.4	2.5	1.5	.5		14.7	7.6	15.4
28	8.0	3.4	9.2	2.4	1.6	.5		[3] 14.7	7.9	15.1
29	[4] 9.4	3.4	10.2	2.4	2.3	.5	5.7	14.7	9.8	14.9
30	8.7	3.4	[5] 13.9	2.3	2.3	.6	9.1	14.6	11.6	14.7
31	7.1		13.9		2.4		10.0		12.1	

*Mean daily stage.

[1] Crest, 15.25, 1 a. m.–7 p. m.

[2] Crest, 16.23, 4–8 a. m.

[3] Crest, 14.80, 4–8 p. m.

[4] Crest, 11.35, 2:30 p. m.

[5] Crest, 15.40, 8 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	VERMILLION RIVER, Wakonda (7SE), S. Dak. (G)		BIG SIOUX RIVER, Sioux Falls, S. Dak. (G)		BIG SIOUX RIVER, Akron, Iowa (WG)		FLOYD RIVER, James, Iowa (WG)		LITTLE SIOUX RIVER, Turin, Iowa (WG)	
	March*	April*	March*	April*	March	April	March*	April*	April*	May*
1	6.6	15.8		10.5		[1] 19.7	10.8	18.5	18.8	
2	6.6	15.3		11.3	5.3	19.5	10.6	16.4	17.7	
3	6.3	15.5		10.9		18.6	10.2	14.6	16.6	
4	6.4	15.5		10.4		17.9	9.1	13.6	17.3	
5	6.3	15.2		10.4		17.6	9.2	12.9	17.3	
6	6.2	14.8		12.2		17.3	9.4	12.2	17.3	
7	6.0	14.6		[2] 14.2		17.1	9.2	11.9	17.1	
8	6.0	14.4		13.8		16.7	9.1	11.8	16.6	
9	5.9	14.0		13.0	4.6	17.0	9.2	11.9	16.1	
10	5.9	13.4		12.3		[3] 17.6	9.8	11.9	15.8	12.6
11	5.6	12.7		12.4		17.6	12.7	11.6		
12	6.6	12.1		12.6		17.4	14.4	11.6		
13	6.5	11.7		12.1		17.0	17.2	11.7		
14	6.7	11.1		11.4		16.9	14.8	11.8		
15	6.7	10.4		10.8		16.8	13.2	11.7		
16	7.1	9.8		10.2	7.2	16.7	13.8	11.3		
17	8.4	9.3		9.6		16.3	14.4	11.1	15.5	12.6
18	10.5	9.0				15.9	15.4	11.0		
19	12.1	8.8			13.3	15.5	17.3	11.0		
20	13.3	8.5			13.9	14.9	18.4	11.0		
21	14.5	8.5			14.7	14.5	17.2	10.9		
22	15.0	9.4			[4] 16.1	14.1	13.2	11.2		
23	13.8	9.9			14.3	13.9	9.6	11.7		
24	11.5	9.9			12.1	14.1	9.3	11.2		
25	10.2	9.2			12.0	14.4	9.8	10.6		
26	9.5	8.6				14.2	9.7	10.3		
27	9.1	8.1				13.5	9.9	10.2		
28	9.3	7.8	3.5			13.2	10.7	9.9		
29	11.5	7.5	7.9		[5] 8.3	12.8	12.8	9.7		
30	15.4	7.2	12.0		15.7	12.4	17.9	9.6		
31	[6] 16.1				[7] 17.8		[8] 20.0			

*Mean daily stage.
[1] Crest, 19.75, 5–6 p. m.
[2] Crest, 14.5.
[3] Crest, 17.71, 3–10 p. m.
[4] Crest, 16.10, 7 p. m.
[5] 10.5, 2 p. m.
[6] Crest, 16.37, 10:30 p. m.
[7] 18.7, 5 p. m.
[8] Crest, 20.32, 3–4 a. m.

Date	SOLDIER RIVER, Pisgah, S. Dak. (WG)		BOYER RIVER, Logan, Iowa (WG)		PLATTE RIVER, Ashland, Nebr. (WG)		NISHNABOTNA RIVER, Hamburg, Nebr. (G)		LITTLE NEMAHA RIVER, Auburn, Nebr. (G)	
	April*	May*	April*	May*	April	May	April*	May*	April*	May*
1	6.8	6.5	5.3	4.0	4.0	2.6	14.3	9.7	6.3	6.2
2	6.7	6.5	4.9	3.9	3.7	2.5	11.8	9.8	6.1	6.2
3	6.6	6.5	4.6	4.2	3.4	2.5	10.6	9.5	6.0	6.1
4	6.5	6.5	4.5	3.9	3.1	2.6	10.1	9.3	6.1	6.0
5	6.4	6.4	4.3	3.7	2.9	2.5	9.7	9.1	5.9	5.9
6	6.4	6.3	4.2	3.8	2.6	2.4	9.6	8.9	6.0	5.7
7	6.5	6.6	4.1	3.9	2.8	2.4	9.5	8.8	5.8	5.8
8	6.4	6.8	4.1	4.1	2.6	2.3	9.5	8.7	5.8	5.8
9	6.9	6.6	4.0	4.6	2.9	2.6	10.0	8.8	7.7	5.8
10	6.5	6.5	4.6	4.4	2.7	2.5	10.7	9.1	8.7	5.8
11	6.8	6.4	4.8	4.0	2.7	2.6	11.0	9.9	7.6	5.7
12	6.8	6.4	4.8	3.9	2.6	2.6	11.6	8.9	7.5	5.6
13	6.7	6.4	4.8	3.7	2.7	2.4	12.6	8.6	9.9	5.6
14	6.7	6.4	4.7	3.8	2.6	2.3	13.3	8.5	7.9	5.6
15	6.6	6.4	4.8	4.5	2.6	2.3	13.9	8.4	6.9	5.6
16	6.5	6.7	4.6	4.3	2.8	2.3	16.1	8.8	6.8	6.2
17	6.6	6.6	4.5	4.2	2.8	2.3	17.2	10.4	7.1	7.3
18	6.6	6.4	4.4	3.9	2.7	2.5	16.3	10.5	7.3	6.2
19	6.6	6.4	4.3	3.8	2.6	2.6	14.7	9.2	7.5	5.8
20	6.5	6.4	4.2	3.8	2.6	2.5	17.6	8.8	6.8	5.8
21	6.7	6.8	4.2	3.8	2.9	2.5	17.0	8.7	8.1	5.8
22	6.8	7.2	4.4	4.5	3.0	2.5	15.8	9.7	10.8	8.3
23	6.9	8.0	4.9	5.6	3.5	3.7	14.5	13.5	8.2	8.7
24	6.6	6.9	4.6	4.9	3.4	4.1	13.4	12.3	7.3	6.5
25	6.6	6.6	4.3	4.6	3.2	3.7	12.4	10.1	6.9	6.1
26	6.6	6.6	4.3	4.2	3.2	3.5	11.6	9.3	6.7	5.9
27	6.5	7.0	4.1	4.5	3.1	3.3	11.0	9.2	6.6	5.8
28	6.5	6.5	4.1	4.5	3.0	3.3	10.5	9.1	6.4	5.8
29	6.5	6.5	4.0	4.5	2.8	3.3	10.1	9.0	6.3	5.8
30	6.5	6.5	4.0	4.4	2.7	3.4	9.9	8.5	6.2	5.7
31		6.5		4.0		3.3		8.3		5.6

*Mean daily stage.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	TARKIO RIVER Fairfax, Mo. (WG)		NEMAHA RIVER Falls City, Nebr. (WG)		NODAWAY RIVER Burlington Jct., Ia. (WG)		PLATTE RIVER Agency, Mo. (WG)		KANSAS RIVER Topeka, Kans. (WG)	
	April	May	April*	May*	April*	May*	April*	May*	April	May
1	6.7	6.9	5.6	6.0	3.5	3.4	6.0	5.7	8.5	8.7
2	6.7	6.9	5.6	5.9	3.3	----	5.8	5.5	8.2	8.4
3	6.6	6.7	5.2	5.9	3.0	3.1	5.6	5.4	8.1	8.3
4	6.7	6.7	5.7	5.6	3.0	3.1	6.4	5.3	8.2	8.4
5	6.7	6.7	5.9	5.5	2.8	2.9	7.0	5.2	7.9	7.9
6	6.6	6.6	5.4	5.4	2.6	2.8	6.1	5.2	7.4	7.7
7	6.5	6.6	5.3	5.3	2.7	2.7	5.8	4.9	7.0	7.5
8	6.5	5.6	5.3	5.2	2.6	2.7	5.6	5.5	6.8	7.6
9	6.5	6.5	5.7	5.2	3.1	2.6	5.4	6.3	6.7	7.9
10	7.2	6.5	8.4	5.2	3.6	2.8	5.7	6.1	8.8	7.8
11	6.7	6.5	7.8	5.2	3.6	3.2	6.2	5.2	7.3	7.8
12	6.9	6.5	8.8	5.2	3.6	2.9	6.5	5.2	9.4	7.4
13	7.2	6.5	10.7	4.9	4.5	2.6	7.4	5.0	10.8	7.2
14	8.2	6.5	9.5	4.9	4.6	2.5	8.9	4.7	12.8	7.0
15	7.3	6.4	8.0	5.0	4.1	2.5	8.3	4.7	14.4	6.9
16	7.0	7.1	6.5	5.2	3.6	2.8	7.3	4.8	12.3	6.5
17	6.9	7.8	6.4	6.5	3.5	4.0	6.6	8.0	10.8	6.5
18	7.2	7.1	8.4	6.2	3.7	3.9	6.1	10.0	9.7	6.6
19	7.1	6.6	8.8	5.5	3.9	3.2	6.1	7.8	9.5	7.0
20	6.9	6.5	7.8	5.2	3.7	2.8	6.4	6.2	11.3	7.1
21	7.1	6.6	8.5	6.2	4.5	2.7	6.5	5.7	11.1	6.9
22	9.5	10.5	12.8	16.4	7.4	5.2	8.5	6.8	12.4	6.6
23	9.4	10.4	11.7	14.6	7.6	8.0	14.9	11.6	[1] 15.7	6.4
24	8.1	7.8	9.0	11.0	6.2	6.3	[2] 15.3	[3] 16.2	15.2	10.0
25	7.7	7.0	7.7	7.3	5.3	5.6	10.5	14.6	12.6	10.5
26	7.4	6.7	7.1	6.6	4.6	4.3	8.1	8.6	11.4	9.6
27	7.2	6.6	6.8	6.3	4.2	3.6	7.3	6.7	10.7	8.4
28	7.1	6.6	6.4	6.0	3.9	3.4	6.7	6.2	10.0	8.4
29	7.0	6.6	6.4	5.8	3.7	3.2	6.3	5.7	9.6	8.0
30	6.9	6.6	6.2	5.6	3.5	3.1	6.0	5.4	9.1	7.1
31	----	----	----	5.5	----	3.0	----	5.2	----	6.7

*Mean daily stage.

[1] Crest, 17.21, 6 p. m.

[2] Crest, 15.70, 2 a. m.

[3] Crest, 16.40, 3 p. m.

Date	KANSAS RIVER Lecompton, Kans. (WG)		KANSAS RIVER Bonner Springs, Kans. (WG)		GRAND RIVER Chillicothe, Mo.		GRAND RIVER Sumner, Mo. (WG)		GRAND RIVER Brunswick, Mo.	
	April	May	April	May	April	May	April	May	April	May
1	7.1	7.4	5.9	6.2	9.0	8.3	12.0	11.2	7.9	18.2
2	6.9	7.1	5.6	6.0	8.8	8.0	11.6	10.7	12.1	17.2
3	6.7	6.7	5.4	5.7	8.5	7.8	11.2	10.4	13.4	16.3
4	7.2	7.0	6.1	5.6	9.2	7.6	11.3	10.0	13.0	15.1
5	7.1	6.6	6.7	5.4	11.9	7.4	17.2	9.7	13.7	13.8
6	6.4	6.4	5.6	5.1	10.3	7.3	16.2	9.6	13.5	12.4
7	6.1	6.3	5.0	5.0	9.3	7.1	13.2	9.4	13.0	11.5
8	5.7	6.3	4.7	4.9	8.7	7.6	12.0	9.5	13.2	10.9
9	5.6	6.6	4.4	5.1	8.4	8.0	11.4	10.8	13.1	10.5
10	8.2	6.6	6.1	6.1	8.3	10.9	11.5	15.8	13.3	10.2
11	6.1	6.3	6.6	5.3	8.6	9.2	11.6	14.1	13.9	10.3
12	7.4	6.1	5.3	4.9	8.6	8.3	11.8	11.5	14.6	9.7
13	9.3	5.9	7.1	4.6	10.1	8.7	13.0	10.8	14.9	9.1
14	10.8	5.8	9.2	4.5	14.9	8.2	20.1	9.9	15.9	8.8
15	12.1	5.6	10.5	4.3	14.1	7.0	22.6	9.5	16.7	8.7
16	10.6	5.3	10.3	4.1	11.4	6.8	17.9	9.1	16.6	8.8
17	9.9	5.3	8.8	4.0	10.2	10.8	14.5	13.3	16.5	8.6
18	8.4	5.7	7.7	4.3	9.3	17.5	12.9	23.0	16.5	9.4
19	9.0	5.9	6.9	4.2	8.9	13.5	12.0	21.7	16.5	10.6
20	9.0	5.8	7.1	4.1	8.8	10.4	12.8	15.6	17.0	9.8
21	9.6	5.6	8.3	4.1	8.7	9.0	11.5	12.5	17.6	9.0
22	11.0	5.4	9.5	4.1	8.9	8.3	11.8	11.1	18.6	8.6
23	[1] 13.1	5.3	11.9	4.0	[2] 17.9	8.9	[3] 24.8	10.8	20.0	7.9
24	13.7	6.3	[4] 14.5	4.1	[5] 20.5	16.6	[6] 28.0	20.3	21.2	9.2
25	10.0	9.1	11.1	7.3	14.8	13.7	26.6	18.5	[7] 22.7	11.5
26	9.7	9.0	9.3	7.3	11.8	13.1	20.4	17.5	[8] 22.8	10.7
27	9.0	7.1	8.4	7.1	10.4	9.8	15.8	13.5	[9] 22.9	10.5
28	8.5	6.3	7.8	5.4	9.6	8.6	13.7	11.1	22.2	9.2
29	8.1	6.6	7.3	5.4	8.9	8.0	12.5	10.2	21.1	7.9
30	7.7	5.9	6.1	4.9	8.6	7.6	11.8	9.7	19.5	7.5
31	----	5.5	----	4.3	----	7.5	----	9.3	----	7.7

[1] Crest, 15.18, 11:59 p. m.
[2] 19.52, 6 p. m.
[3] 26.90, 7 p. m.
[4] Highest observed.
[5] Crest, 20.70 early morning
[6] Crest, 28.20, 2 p. m.
[7] 22.8, 7 p. m.
[8] 22.8, 7 p. m.
[9] Crest, 22.90, 7 a. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	CHARITON RIVER Keytesville, Mo. (G)		LAMINE RIVER Clifton City, Mo. (WG)		OSAGE RIVER St. Thomas, Mo. (WG)		GASCONADE RIVER Jerome, Mo. (WG)		GASCONADE RIVER Rich Fountain, Mo. (G)	
	April*	May*	April*	May*	April	May	April	May	April*	May*
1	8.4	10.0	3.2	3.1	10.8	9.4	4.0	3.5	4.5	4.0
2	8.0	9.1	3.1	3.0	10.0	8.9	3.8	3.5	4.4	3.9
3	7.6	8.4	3.2	3.0	8.3	8.3	3.7	3.4	4.3	3.8
4	8.5	7.9	5.9	2.8	8.3	7.0	4.5	3.3	6.2	3.7
5	8.9	7.4	[1] 13.7	2.7	12.1	2.8	7.7	3.3	8.4	3.6
6	8.0	7.1	5.4	2.7	11.3	7.5	9.3	3.2	9.8	3.5
7	7.9	6.9	4.7	2.6	11.2	7.7	9.9	3.2	10.6	3.5
8	7.5	6.7	4.0	2.5	11.1	7.1	7.1	3.2	8.9	3.5
9	7.0	7.7	3.9	2.7	11.0	6.1	6.2	3.2	7.2	3.4
10	7.0	10.6	5.6	2.7	11.8	6.0	6.3	3.1	7.3	3.4
11	7.5	8.9	6.2	2.7	9.4	2.5	7.1	3.1	7.5	3.3
12	8.1	7.9	5.9	2.7	12.2	2.0	8.1	3.1	9.4	3.2
13	8.9	7.5	[2] 12.8	2.5	12.3	5.0	10.7	3.1	10.8	3.2
14	9.5	7.5	9.7	2.4	8.3	3.9	12.8	3.0	12.9	3.1
15	11.0	7.1	6.0	2.4	10.9	3.2	11.3	2.9	[3] 13.3	3.1
16	10.6	6.9	4.9	2.3	11.1	4.3	8.3	2.8	10.7	3.0
17	9.7	7.5	4.3	2.4	11.2	4.5	7.0	2.8	8.1	3.0
18	9.1	10.1	4.0	2.5	11.2	2.2	6.1	2.8	7.1	3.0
19	8.3	10.6	3.7	2.5	10.4	2.0	5.6	2.8	6.5	3.0
20	8.4	9.7	3.6	2.5	9.8	4.1	5.2	2.8	6.0	3.0
21	9.0	9.9	3.5	2.4	10.4	3.2	4.9	2.7	5.7	2.9
22	10.9	9.1	3.5	2.4	10.7	3.3	4.6	2.7	5.3	2.9
23	16.4	8.1	8.9	2.3	12.1	2.5	4.4	2.7	5.2	2.9
24	18.6	7.6	7.3	3.6	12.5	3.0	4.3	2.7	4.9	2.8
25	[4] 18.7	11.0	5.9	3.4	11.3	2.1	4.1	2.7	4.8	2.8
26	17.3	8.8	4.5	2.6	11.2	2.0	4.0	2.8	4.6	2.8
27	14.5	9.9	3.9	2.4	10.3	3.9	3.9	2.7	4.5	2.9
28	13.1	9.2	3.5	2.4	8.0	4.3	3.8	2.7	4.4	2.9
29	12.3	7.9	3.4	2.3	7.3	3.3	3.7	2.7	4.2	2.9
30	11.2	7.0	3.3	2.2	9.2	2.1	3.6	2.6	4.1	2.8
31		6.6		2.2		1.9		2.6		2.8

*Mean daily stage. [1] Crest, 16.8, 9 a. m. [2] Crest, 15.0, night 13–14. [3] Crest 13.8, 1 a. m. [4] Crest, 18.8, 8–10 a. m.

Date	OTTER TAIL RIVER Fergus Falls, Minn. (G)		RED RIVER (NORTH) Wahpeton, N. Dak.		RED RIVER (NORTH) Moorhead, Minn.		RED RIVER (NORTH) Halstead, Minn. (G)		RED RIVER (NORTH) Grand Forks, N. Dak. (G)	
	April*	May*	March	April	April	May	April*	May*	April	May
1	2.9	3.5	5.3	5.5	[1] 10.7	16.5	8.0	11.7	10.8	21.8
2	3.0	3.5	5.3	5.6	[1] 10.9	16.3	9.5	11.4	12.5	19.1
3	3.0	3.4	5.3	5.7	[1] 11.0	16.0	11.2	11.2	14.1	17.1
4	3.0	3.4	5.3	5.7	[1] 11.1	15.7	11.9	11.0	14.9	16.0
5	2.9	3.4	5.3	5.8	[1] 11.2	15.5	12.4	10.6	16.0	15.4
6	3.0	3.4	5.4	6.0	[1] 11.5	15.2	13.4	10.3	16.9	14.9
7	3.3	3.4	5.3	6.6	[1] 12.7	15.2	16.4	10.1	17.6	14.4
8	3.8	3.5	5.3	10.3	[1] 17.3	14.8	20.4	9.8	18.9	13.9
9	3.7	3.5	5.2	13.1	20.9	14.6	24.1	9.6	20.5	13.4
10	3.8	3.5	5.2	13.8	23.4	14.5	25.7	9.4	23.2	13.0
11	3.8	3.5	5.0	14.5	25.9	14.3	25.9	9.2	27.0	12.6
12	3.7	3.5	5.2	[2] 15.0	29.4	14.2	26.7	9.2	29.3	12.3
13	3.6	3.5	5.2	14.9	31.6	14.2	27.6	9.0	30.6	12.3
14	3.7	3.5	5.2	14.7	33.3	14.1	28.2	8.8	31.3	12.3
15	3.8	3.5	5.1	14.4	34.3	14.1	28.8	8.7	32.0	12.2
16	3.7	3.6	5.2	14.1	[3] 34.6	14.0	29.2	8.6	32.5	12.1
17	3.6	3.6	5.2	13.4	34.6	14.0	29.5	8.6	32.8	12.1
18	3.5	3.6	5.3	12.8	34.2	13.9	[4] 29.7	8.4	33.2	12.1
19	3.5	3.6	5.3	11.8	33.5	13.9	29.8	8.1	33.4	12.0
20	3.4	3.6	5.4	10.3	32.7	13.8	29.6	7.9	33.5	12.0
21	3.5	3.6	5.4	8.1	31.6	13.8	29.2	7.8	[5] 33.6	12.0
22	3.4	3.6	5.4	7.1	30.3	13.8	28.5	7.8	33.6	11.8
23	3.4	3.6	5.3	6.7	28.8	13.7	27.5	7.7	33.4	11.6
24	3.4	3.6	5.2	6.3	26.9	13.7	26.2	7.7	33.2	11.4
25	3.4	3.5	5.3	6.0	24.5	13.6	24.7	7.7	32.8	11.3
26	3.4	3.5	5.4	6.1	21.8	13.5	23.0	7.7	32.0	11.3
27	3.4	3.6	5.3	7.2	19.1	13.6	20.7	7.6	31.0	11.2
28	3.3	3.5	5.3	7.4	17.0	13.5	17.8	7.6	29.7	11.1
29	3.3	3.5	5.4	7.4	16.5	13.5	15.0	7.5	27.6	11.0
30	3.3	3.5	5.4	7.4	16.6	13.4	12.7	7.5	24.9	10.9
31		3.5	5.5			13.4		7.5		10.8

*Mean daily stage. [1] Frozen, but open at gage. [2] Crest, 14.99, 9 a. m. [3] Crest, 34.65 noon. [4] Crest, 29.78, 6:30 p. m. [5] Crest, 33.60, 4–12 p. m.

TABLE 10.—*Daily river stages, March–May 1952*—Continued

Date	RED RIVER (NORTH) Oslo, Minn. (G)		RED RIVER (NORTH) Drayton, N. Dak. (G)		RED RIVER (NORTH) Emerson, Manitoba (I)		BOIS DE SIOUX RIVER White Rock, S. Dak. (G)		WILD RICE RIVER Abercrombie, N. Dak. (G)	
	April*	May*	April*	May*	April*	May*	April*	May*	April*	May*
1	7.7	17.2	9.1	26.2	52.8	70.8	7.0	9.1	1.3	6.6
2	9.2	14.7	10.2	24.2	53.5	70.0	7.1	9.2	1.3	5.7
3	10.9	12.4	11.5	22.2	54.4	68.6	7.2	9.2	1.3	5.0
4	12.2	11.0	13.1	19.7	56.4	66.7	7.2	9.2	1.3	4.3
5	13.9	10.0	14.6	17.2	57.9	64.5	7.2	9.2	1.4	3.8
6	14.2	9.3	16.2	15.1	58.5	62.2	7.3	9.1	1.8	3.4
7	14.9	8.8	17.2	13.7	60.5	60.6	7.4	9.1	4.8	3.2
8	15.4	8.3	18.7	12.6	61.7	58.6	8.9	9.1	14.5	3.1
9	16.0	7.9	20.6	11.8	62.8	57.5	9.1	9.2	18.1	3.0
10	17.1	7.4	22.1	11.1	64.1	56.7	9.1	9.2	19.8	2.9
11	19.3	7.1	23.8	10.7	65.7	56.0	9.3	9.2	20.4	2.9
12	21.1	6.8	25.6	10.3	67.6	55.6	9.7	9.1	[1] 20.6	2.8
13	22.2	6.7	26.5	9.9	69.7	55.1	[2] 10.1	9.1	20.4	2.8
14	23.0	6.7	26.6	9.7	[3] 73.0	54.8	10.0	9.1	19.9	2.8
15	23.7	6.7	27.0	9.7	71.7	54.5	9.7	9.1	19.5	2.7
16	24.1	6.6	27.3	9.6	71.3	54.4	9.3	9.1	19.0	2.6
17	24.5	6.6	27.5	9.5	71.1	54.3	8.8	9.0	18.0	2.6
18	24.8	6.6	27.7	9.3	71.1	54.2	8.0	9.0	16.8	2.5
19	25.1	6.6	28.0	9.4	71.1	54.2	6.2	9.0	15.7	2.5
20	25.3	6.6	28.2	9.3	71.2	54.1	4.2	9.0	14.4	2.4
21	25.4	6.5	28.4	9.3	71.3	54.1	4.1	8.9	13.1	2.4
22	25.4	6.5	28.5	9.3	71.5	54.0	4.0	8.9	12.0	2.3
23	[4] 25.5	6.3	28.7	9.2	71.6	54.0	3.9	8.8	11.2	2.3
24	25.4	6.0	28.8	9.1	71.7	53.9	3.8	8.8	10.5	2.3
25	25.1	5.9	28.8	9.1	71.8	53.8	5.4	8.8	10.1	2.3
26	24.7	5.9	[5] 28.8	8.9	71.9	53.6	8.3	8.8	9.5	2.2
27	24.0	5.9	28.7	8.7	71.9	53.5	8.4	9.0	9.1	2.2
28	23.1	5.8	28.5	8.5	71.8	53.4	8.6	9.0	8.7	2.2
29	21.8	5.7	28.1	8.5	71.6	53.3	8.8	8.9	8.2	2.2
30	19.8	5.6	27.3	8.4	71.4	53.2	8.9	8.9	7.5	2.1
31		5.4		8.3		53.1		9.0		2.1

*Mean daily stage. [1] Crest, 20.62, 8:30 a. m. [2] Crest, 10.3, hour unknown. [3] Crest, 73.00, throughout day. [4] Crest, 25.47. [5] Crest, 28.83, 9 a. m.

Date	SHEYENNE RIVER Valley City, N. Dak. (G)		SHEYENNE RIVER West Fargo, N. Dak. (G)		MAPLE RIVER Mapleton, N. Dak. (G)		BUFFALO RIVER Dilworth, Minn. (G)		RED LAKE RIVER Crookston, Minn. (G)	
	April*	May*	April*	May*	April*	May*	April*	May*	April*	May*
1	4.6	3.0	4.2	5.9	6.4	7.3	7.2	6.8	6.8	7.5
2	3.7	3.0	4.1	5.7	7.4	7.3	8.6	6.4	7.2	7.3
3	3.3	3.0	4.1	5.6	8.0	7.2	9.7	6.1	7.1	7.3
4	3.2	3.0	4.1	5.5	11.6	7.2	10.0	5.8	6.8	7.2
5	3.0	2.9	4.9	5.3	16.9	7.2	10.2	5.6	6.9	7.0
6	3.1	2.8	12.1	5.2	[1] 18.8	7.1	11.3	5.3	7.1	6.8
7	3.1	2.9	17.9	5.1	18.4	7.1	14.0	5.1	7.5	6.4
8	3.2	2.9	20.0	5.0	17.9	7.1	16.2	4.9	8.7	6.3
9	3.0	3.0	20.5	5.0	17.0	7.0	20.1	4.7	9.6	6.1
10	2.9	2.9	20.5	5.0	16.2	7.0	21.1	4.5	10.0	5.9
11	2.9	2.9	20.4	5.1	15.7		20.2	4.4	[2] 10.3	6.0
12	2.9	2.9	20.3	5.1	15.0	7.0	19.2	4.2	10.4	6.2
13	2.8	2.9	19.9	5.0	13.5	7.0	18.2	4.1	9.7	6.3
14	2.8	3.0	19.2	5.0	11.4	7.0	17.4	4.0	9.7	6.3
15	2.8	2.9	18.3	4.9	9.9	7.0	16.5	3.9	9.8	6.4
16	2.8	2.9	17.0	4.8	9.0	7.0	15.7	3.8	9.9	6.7
17	2.8	2.9	14.3	4.7	8.4	7.0	15.0	3.6	9.8	6.6
18	2.8	2.9	11.3	4.7	8.1	7.0	14.4	3.5	9.3	6.7
19	2.7	2.9	9.8	4.7	8.1		13.7	3.5	8.9	6.6
20	3.0		9.1	4.7	8.0	6.9	12.9	3.4	8.5	6.6
21	2.8	3.0	8.6	4.7	7.9	6.9	12.1	3.4	8.4	6.7
22	2.8	3.0	8.0	4.7	8.0	6.9	11.4	3.3	8.5	6.4
23	2.7	3.0	7.7	4.7	7.8	6.9	10.7	3.3	8.6	6.4
24	2.7	3.0	7.2	4.6	7.7	6.9	10.1	3.2	8.3	6.2
25	2.7	3.0	7.0	4.6	7.6		9.5	3.1	8.0	6.4
26	2.7	3.0	6.8	4.6	7.5	6.9	9.0	3.0	8.0	6.3
27	2.6	3.0	6.6	4.5		6.9	8.5	3.1	8.1	6.3
28	2.7	3.0	6.4	4.5	7.4	6.9	8.0	3.3	7.8	6.2
29	2.8	2.9	6.2	4.6	7.4	6.9	7.6	3.4	7.9	6.3
30	2.9	3.0	6.0	4.6	7.3	6.9	7.2	3.6	7.6	6.1
31		3.0		4.5		6.9		3.5		6.1

*Mean daily stage. [1] Crest, 18.91, 3 a. m. [2] Crest, 12.65, 8 p. m.

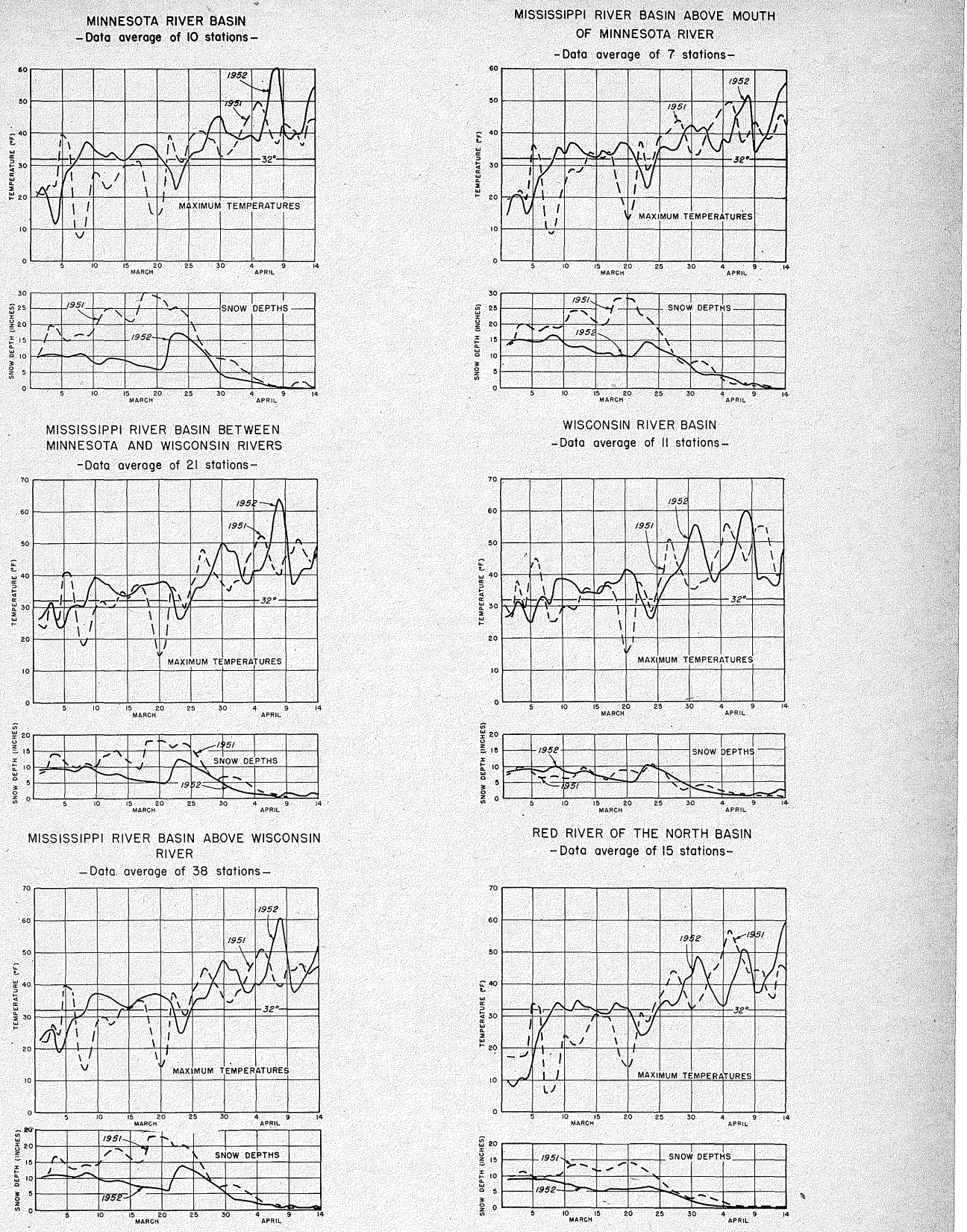


FIGURE 6–A.—Comparison of 1951 and 1952 maximum temperatures and depths of snow on ground, upper Mississippi and Red River of the North Basins.

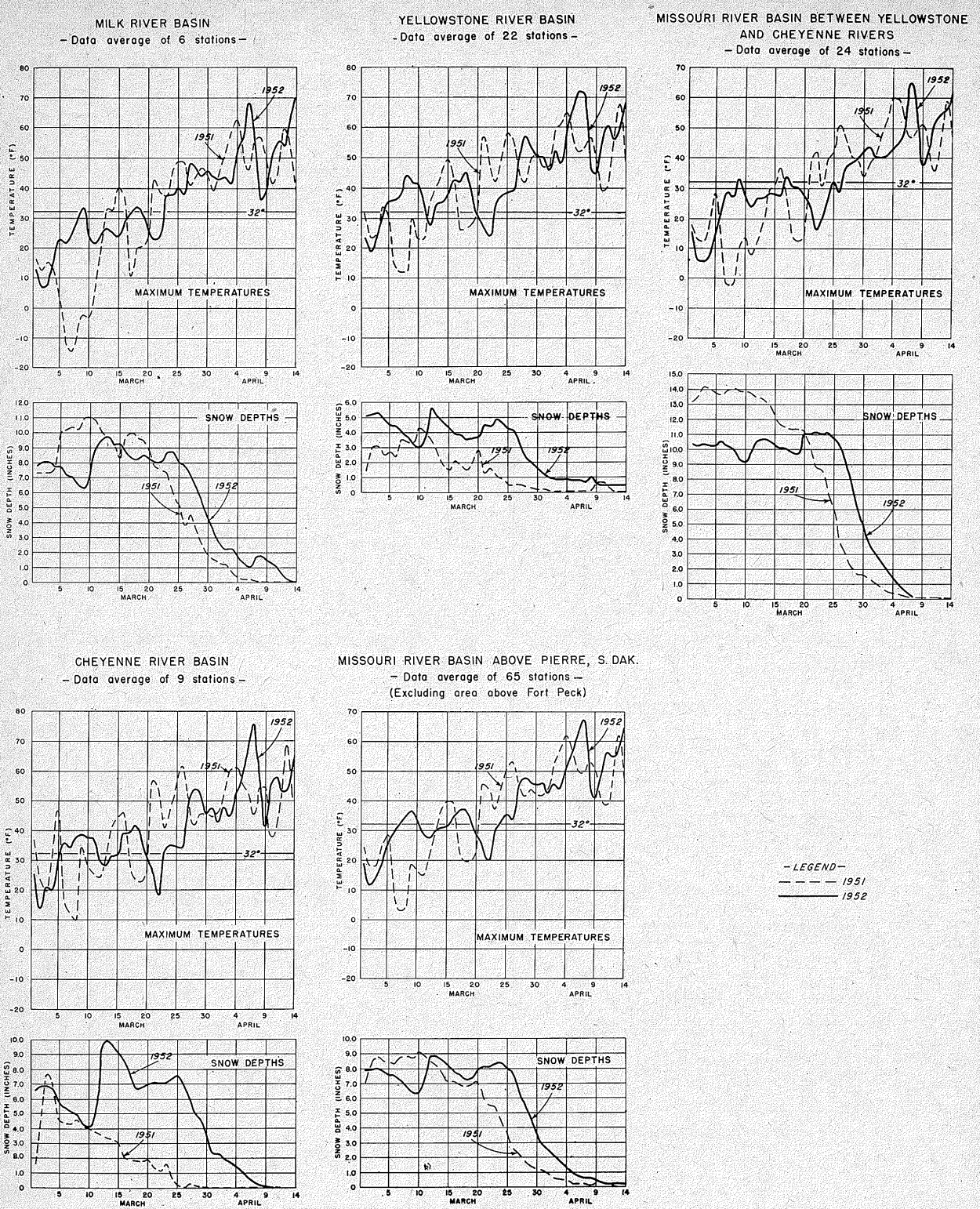


FIGURE 6–B.—Comparison of 1951 and 1952 maximum temperatures and depths of snow on ground, Missouri River Basin

rise of temperature in 1952 that probably reduced infiltration losses.

In the immediate large tributary below St. Paul, the St. Croix River, heavy runoff was restricted to the lower portion of the basin where the snow accumulations were high. The corresponding runoff from the large upstream area was only moderate and slow to respond because of numerous lakes, so that the net contribution from the St. Croix River was not extreme. However, backwater from the Mississippi River produced record stages in the lower St. Croix from Stillwater to the mouth. Farther downstream, the snow in the lower sections of the Chippewa and Wisconsin tributaries had been depleted in the first melt period, and the remaining snow cover was not unusually large. As a result, runoff from the upper portions of these streams was moderate for the season, and a considerable proportion of the runoff volume was withheld by storage reservoirs. Consequently, the contributions of these streams during the passage of the main river flood crest were minor, and below corresponding flows during the 1951 flood passage. The smaller tributaries of the Mississippi River below St. Paul had crested early in the month and were down to near base-flow levels at the time of the main flood passage. Fortunately, no heavy general rains occurred during the 2-week period following the St. Paul crest. As a result, the flood was of record-breaking magnitude down to Winona, Minn., near the mouth of the Black River, but diminished in relative severity as it proceeded downstream. However, the flood crest equalled or exceeded that of 1951 down to Muscatine, Iowa, and was above bankfull for a considerable distance below that point.

The river crested at Muscatine, and points immediately above the mouth of the Skunk River, on April 28. Fairly heavy rains along the Mississippi Valley from the Skunk to the Illinois River April 22–23 produced sharp rises in the intermediate small tributaries, and resulted in a preliminary crest on the main stem from Keokuk, Iowa, to Louisiana, Mo., April 24–26, that slightly exceeded the upriver crest. The next large tributary, the Missouri River, experienced an upriver type of flood (described herein), very similar in characteristics to the upper Mississippi flood. Its crest reached the Missouri-Mississippi junction about the same time as the upper Mississippi crest. However, both crests were subjected to so much reduction by valley storage, that the combined flow produced only moderate flooding in the Mississippi River below the mouth of the Missouri. Crests in the St. Louis-Cairo reach occurring from May 1 to 5, were below damage levels at most points, and well under record heights throughout the reach.

MISSOURI BASIN

The magnitude of any potential snowmelt flood in the Missouri River is determined by several contributing factors: the accumulation and distribution of the snow cover; antecedent soil conditions affecting the opportunity for infiltration; meteorological conditions attending the breakup; river ice and the occurrence of serious ice jams in the river channels.

The accumulation of an extensive snowfield during the winter of 1951–52 had become abnormally heavy over eastern Montana and southern North Dakota extending to the White River in South Dakota and across northeastern South Dakota into Minnesota. The snow cover remained intact with little or no melting until late in March. Measurements of the water stored in this pack were made at frequent intervals at United States Weather Bureau and Civil Aeronautics Administration weather stations and by snow survey crews of the United States Corps of Engineers. Water equivalent varied from 2.5 to 5.0 inches with a few reports exceeding 6.0 inches. Figure 4 shows the lines of equal water equivalent of snow on the ground on March 20. Frequent snows occurred from March 1 through March 25. High winds during March formed unusually deep snow drifts. Many of the smaller ditches and gullies were filled with hard-packed snow.

The summer and autumn months of 1951 had been cooler and wetter than usual over the northern Great Plains area. Streamflow preceding the freezeup was above normal. Observations of the depth of frost penetration in the ground and the presence or absence of an ice layer on top of the ground were made by the Corps of Engineers snow survey crews during February and March. These observations indicated losses of snow water by infiltration during the early phases of the breakup would be less than normal.

River ice had little opportunity to deteriorate and soften until the arrival of warm weather during the last week of March. Near the close of March, ice cover in the main stem of the Missouri River was reported by the United States Geological Survey to be 24 inches in thickness at

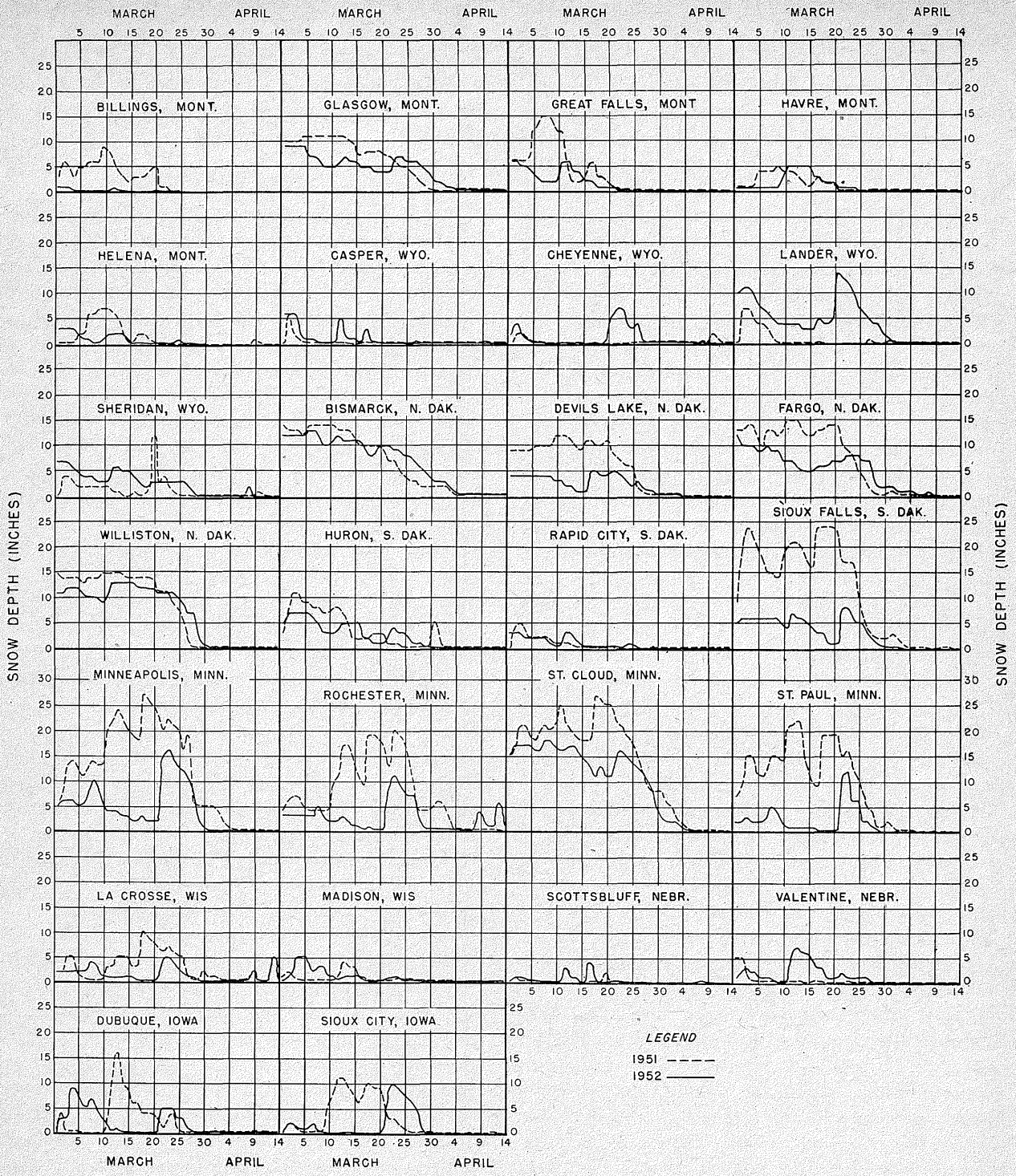


FIGURE 7.—Comparison of depth of snow on ground, March 1–April 14, 1951 and 1952.

Pierre, S. Dak., 25 inches at Mobridge, S. Dak., 28 inches at Bismarck, N. Dak., 31 inches at Elbowoods, N. Dak., and 32 inches at Williston, N. Dak. The ice breakup was slow during the next four weeks, reaching Yankton by March 18.

March temperatures were unseasonably low in all upper Plains States with Montana having an average 6.4° below normal, North Dakota 6.6° below, and South Dakota 8.0° below. The first melt-producing temperatures were reached on March 24 in the Milk River drainage and the adjacent Missouri River drainage above Fort Peck Reservoir. This rapid thaw progressed down the Missouri Valley as a narrow wedge, crossing the lower Yellowstone, Little Missouri, and upper reaches of the Heart, Cannonball, Grand, and Moreau Basins on March 27. Rapidly rising temperatures were also moving upstream from the south, effecting a great pincer movement of spring temperatures on the cooler Elbowoods-Bismarck-Jamestown area of North Dakota. (See fig. 10 A and B.)

Floodwaters of the early breakup in the upper reaches of the main stem of the Missouri were held in check by Fort Peck Dam. Fort Peck Reservoir inflow reached a provisional mean daily high flow of 86,380 cubic-feet per second on March 31, while outflows were held to near 5,000 cubic-feet per second. This interception of the upstream runoff reduced the peak stages downstream. Floodwaters from the Milk River were slow in moving downstream and did not contribute to the Missouri River crest. Tributary flows of the Heart River were controlled by the Dickinson Dam and the Heart Butte Dam. Shadehill Dam on the Grand River in South Dakota kept the flows of that stream, below the reservoir, within its natural banks.

The sharp rise in temperature depleted the snow cover, poured snowmelt water into the lower Yellowstone and produced rapidly rising stages which broke the river ice. Huge ice jams were formed—sending the stages higher. The Yellowstone River ice broke at Sidney, Mont., early on March 31, reached a near maximum stage, and forced a heavy load of ice against the unbroken ice of the Missouri. Great ice jams were formed before the solid ice gave way. The Missouri River reached a crest at Williston on April 1 with a peak flow just under the record 1930 ice breakup. The "snowplow" effect of the swelling flood, moving with increased force against the stubborn resistance of the unbroken ice, was halted temporarily by the formation of enormous gorges. After breaking, these gorges re-formed again downstream. On April 5, the crest at Elbowoods exceeded the previous record stage by 2 feet. The flooding Little Missouri, dammed at its mouth by the frozen Missouri, was then adding to the main-stem flood as the crest reached Elbowoods. Each recurring ice jam retarded the flood and increased the peak flow as the jam was broken. The flooding Knife River increased the flood peak as impounded water was released when the main-stem ice sheet broke. The peak flow resulting from the ice-jam crest at Bismarck on April 6 has been estimated by the United States Geological Survey as 500,000 cubic feet per second.

To the south, the Big Sioux River, flooding in the lower reaches, recorded a near maximum stage on April 1. In the upper reaches above Sioux Falls, S. Dak., the heavy runoff was impounded behind ice jams, reaching stages 1 to 2 feet higher than the 1951 spring flood. At Sioux Falls, the Big Sioux crested 0.2 foot above the 1951 flood on April 6. The Floyd River had already reached the highest stage of record at James, Iowa, on March 31. Tributaries of the Little Sioux were overflowing from rapidly melting snow on this date, but did not contribute to the main stem crests which occurred two weeks later.

The Heart, Cannonball, Grand, and Moreau Rivers reaching flood stage during the first few days of April deposited their winter accumulation of ice in the lower reaches, pushed the tributary ice onto the Missouri River ice, and created a giant ice plug which temporarily stalled the progress of the main-stem breakup and resulted in excessive localized flooding near the confluences of all tributaries.

The breakup, moving upstream in South Dakota from the south, reached Geddes on March 30, Chamberlain on April 1, Pierre on April 4, and Mobridge on April 5. The last 50 miles of ice cover, in the reach between Bismarck and Mobridge, moved out on April 8. Thus it may be seen that all factors worked in conjunction to concentrate the runoff. The crest moved downstream without further jamming. High tributary inflow prevented sharp reductions in the peak as it moved through South Dakota.

The temperature rise over the James River valley was more favorable for an orderly breakup. Melting progressed from the lower portion of the valley rather steadily upstream. Three distinct rises were recorded on the James River, each one

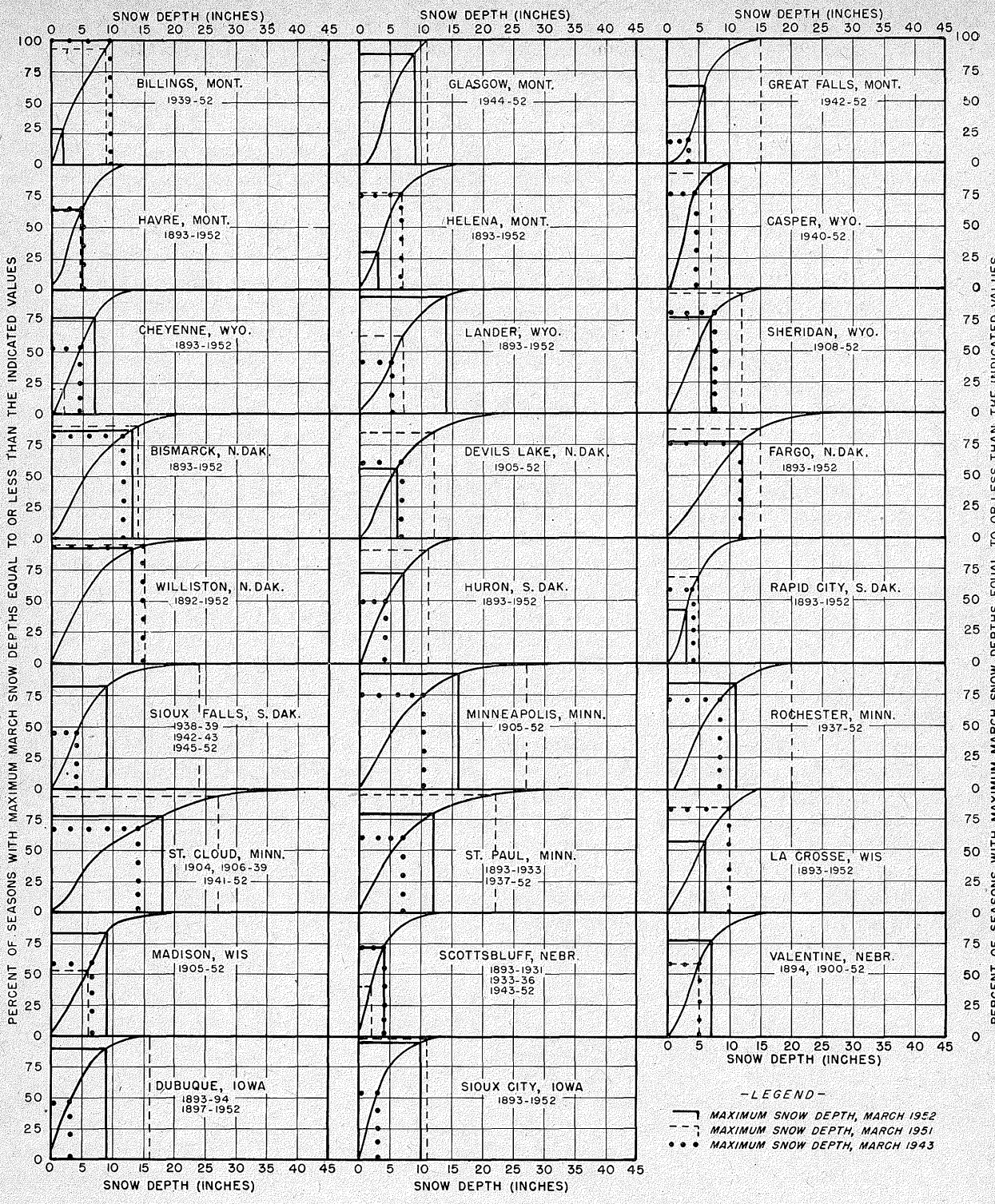


FIGURE 8.—Frequency curves of maximum March snow depths for selected Weather Bureau stations.

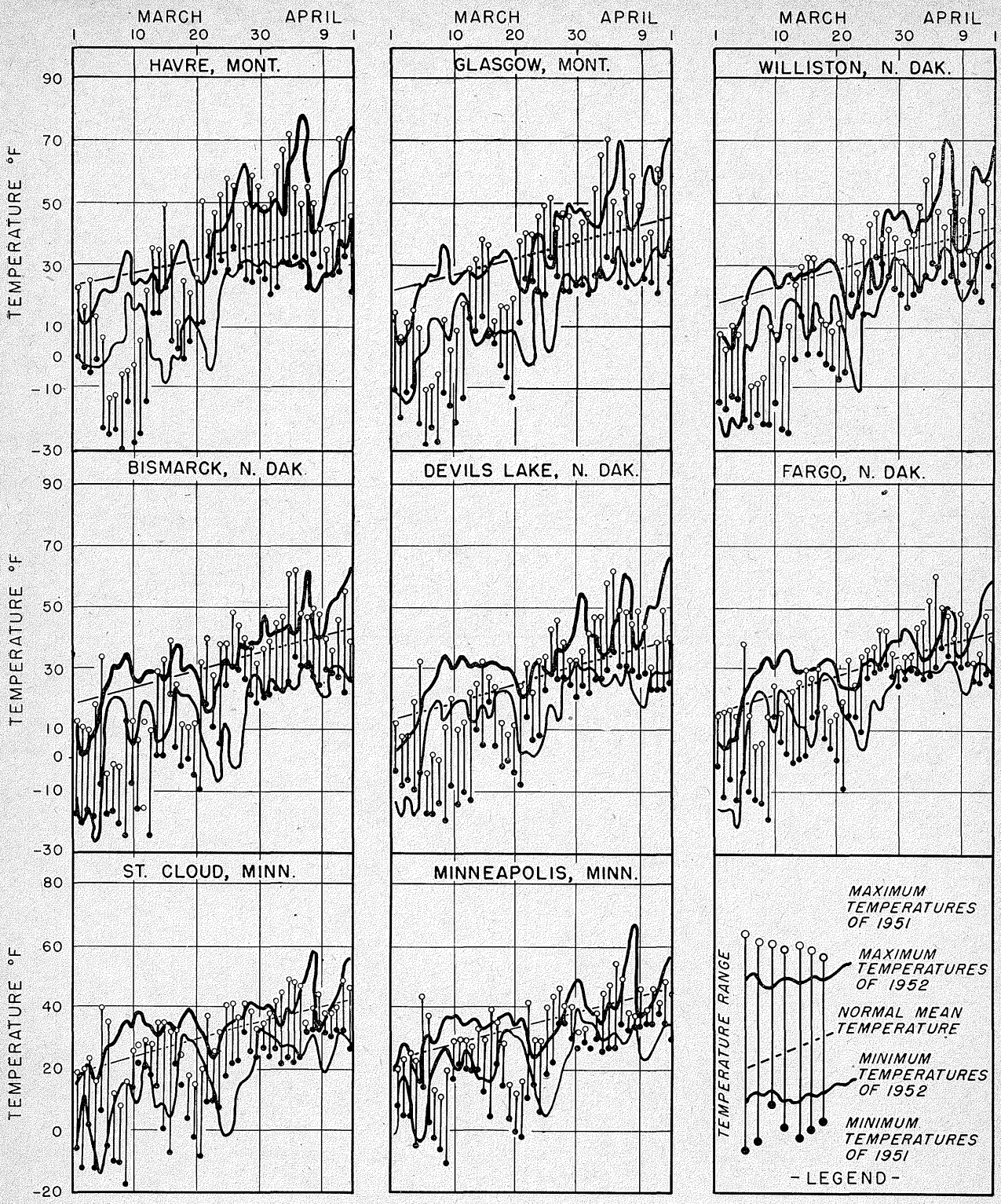


FIGURE 9.—Comparison of daily maximum and minimum air temperatures, March 1–April 14, 1951 and 1952.

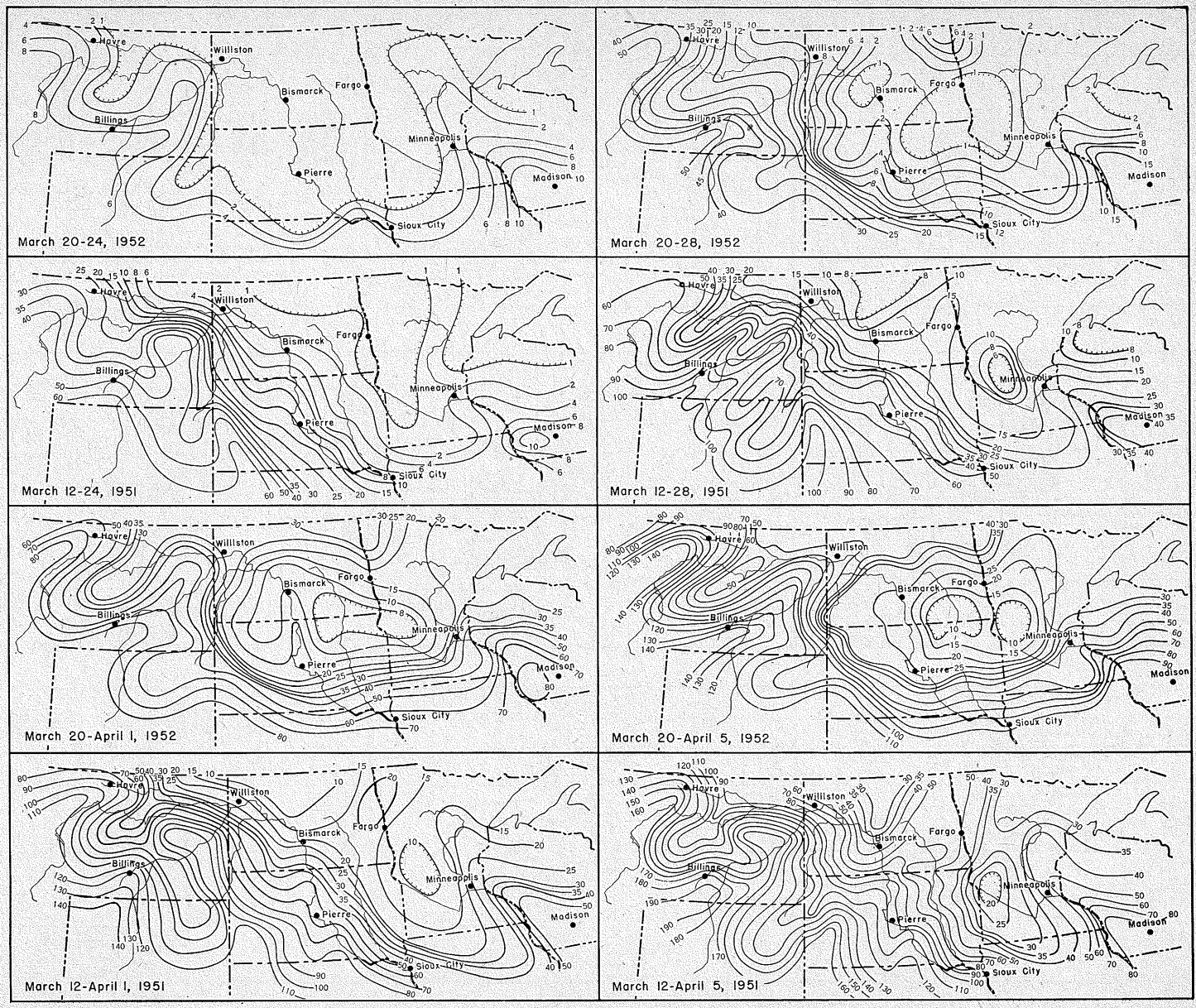


FIGURE 10.—Accumulated degree days, March and April 1951 and 1952.

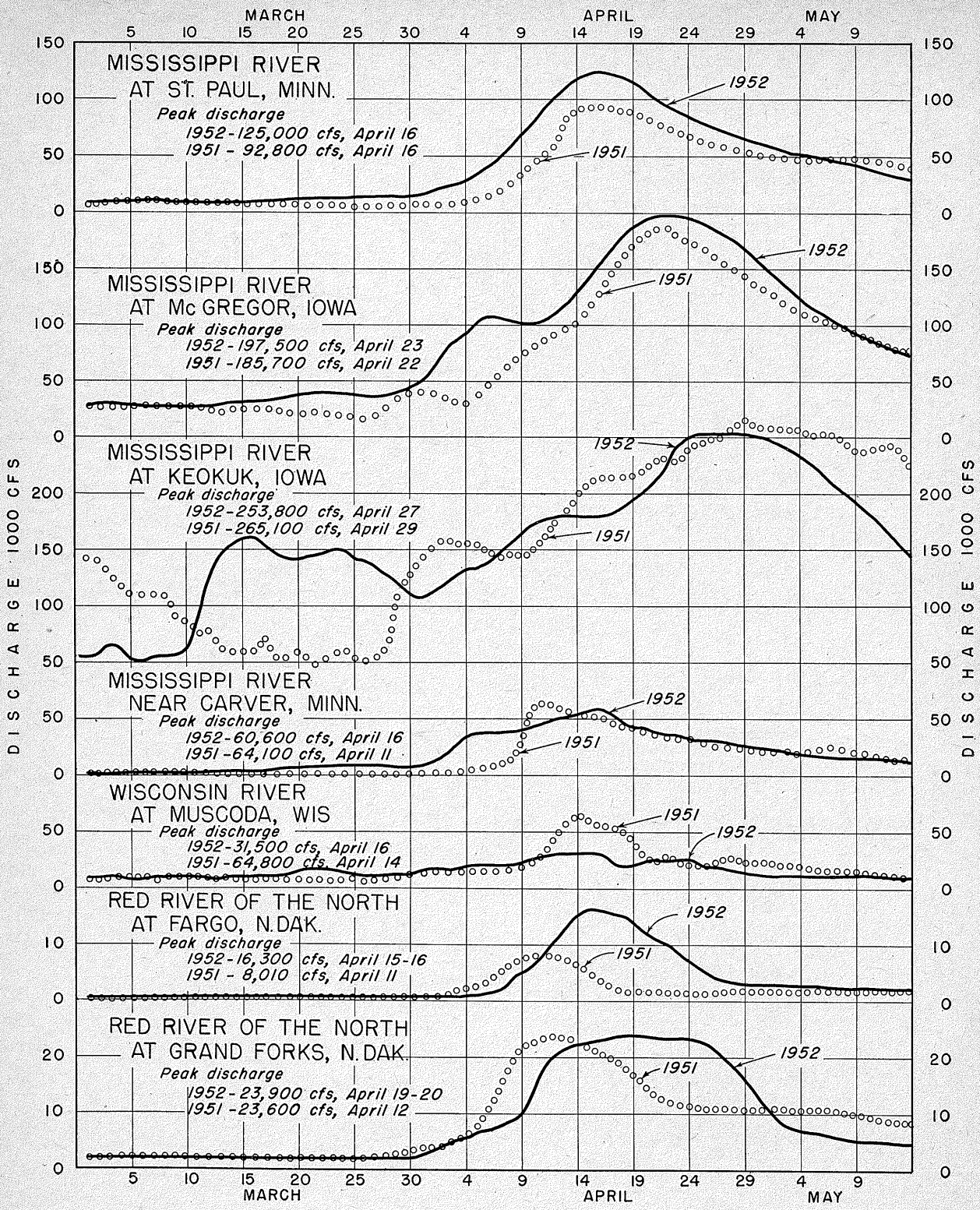


FIGURE 11–A.—Mean daily discharge hydrographs, March 1–May 14, 1951 and 1952, Upper Mississippi and Red River of the North Basins.

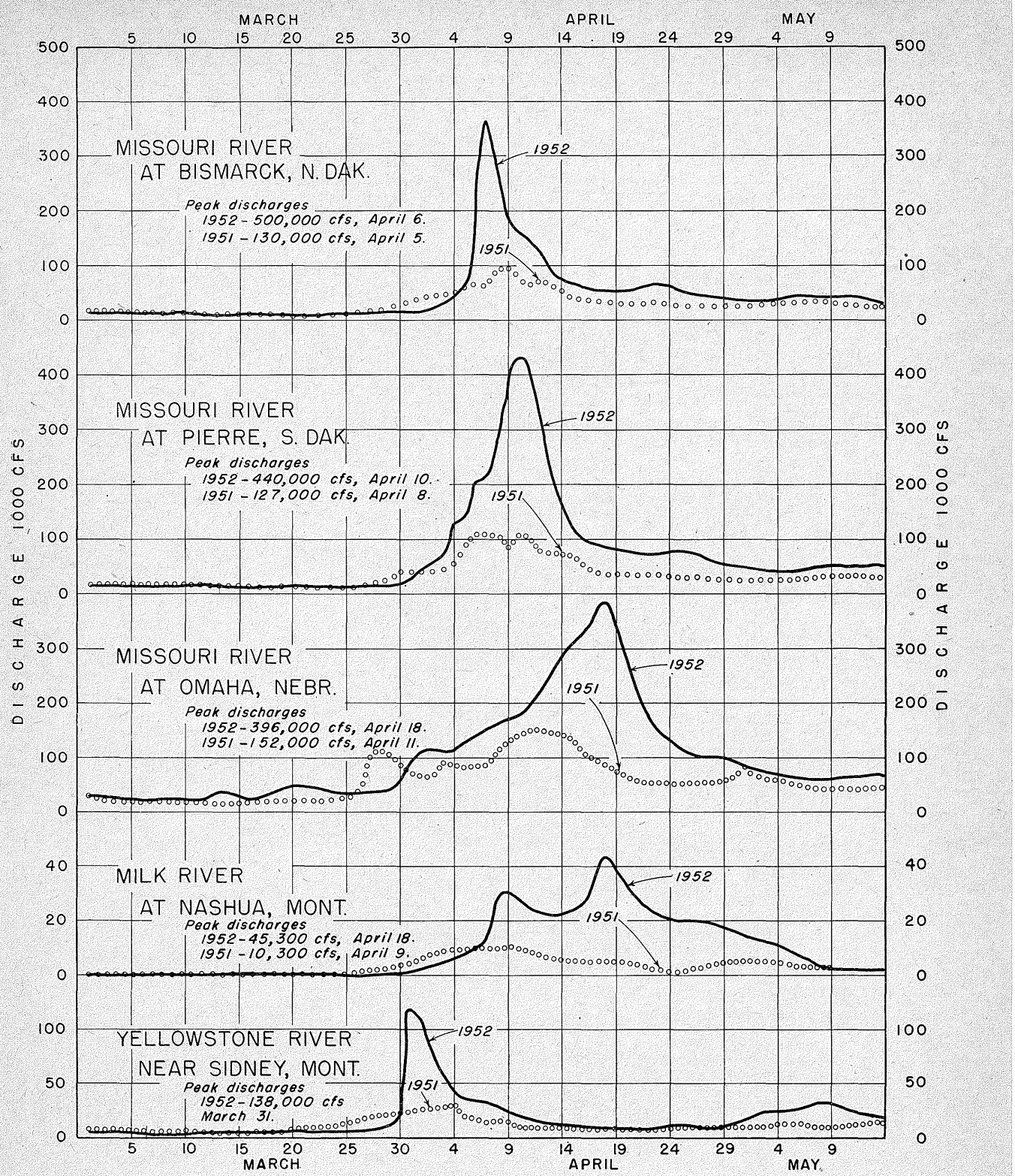


FIGURE 11–B.—Mean daily discharge hydrographs, March 1–May 14, 1951 and 1952, Missouri River Basin.

coming from farther upstream. A general thaw along the entire length of the stream could have caused even greater flooding then actually occurred. The Scotland, S. Dak., gaging station reached flood stage on April 5, cresting 3.2 feet above bankfull on April 23. Flood waters did not recede to within the stream banks until mid-May.

An understanding of the April 1952 flood in the upper portion of the Missouri River basin depends largely upon a knowledge of the snowmelt and the factors which caused it, and how 1952 differed in these respects from other years. The large sampling errors, the limited number of stations making daily measurements, and the absence of records prior to 1952 limit the usefulness of the 1952 data on water equivalent of snow on the ground. The greater number of stations which measure the depth of snow on the ground and the many years of record afford a better opportunity for an understanding of the flood through use of snow-depth data.

An examination of snow-depth data of past years indicated that the snowpack of 1951 was comparable with the one of 1952 although little flooding resulted from snowmelt in the main stem of the Missouri River in 1951. This fact, it seemed, made the spring of 1951 a good choice for comparison with 1952.

The values of the maximum March snow depths measured in 1951, 1952, and 1943—another year of large snow pack and also a flood year—are indicated on frequency curves constructed for First-Order Weather Bureau stations and shown in figure 8. Daily measurements of

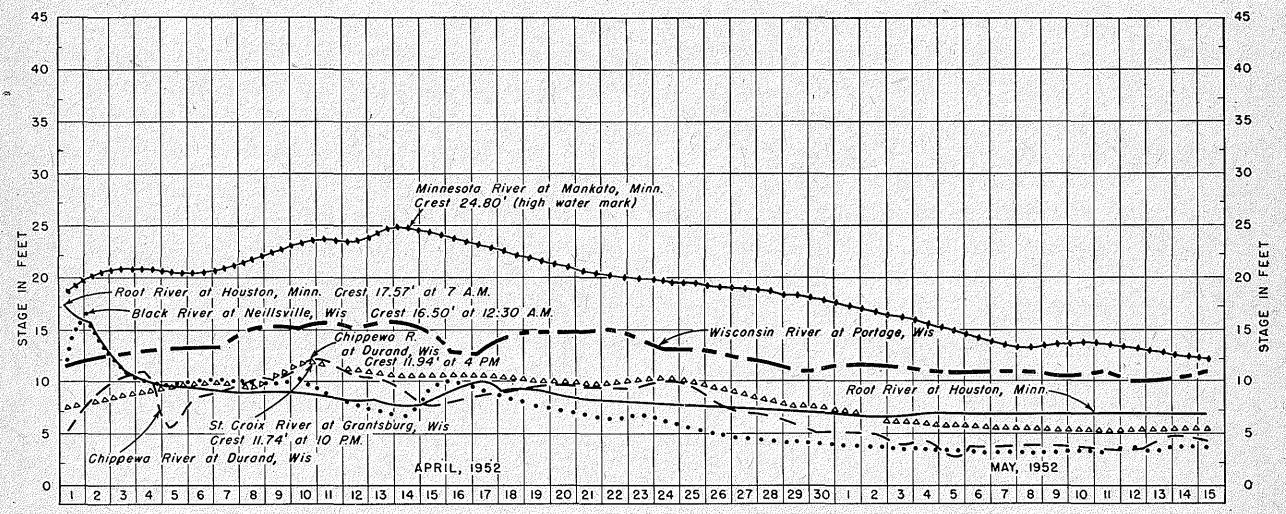


FIGURE 12.—River stage graphs, Mississippi River tributaries.

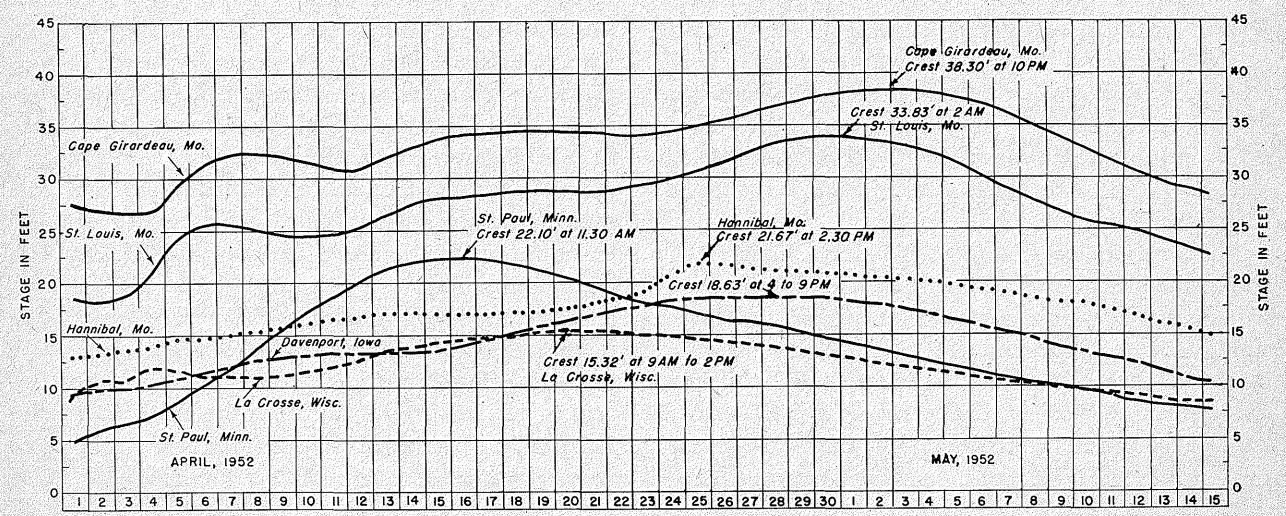


FIGURE 13.—River stage graphs, Mississippi River.

snow depths during March and early April of 1951 and 1952 are compared in figure 7. Similar comparisons made for daily maximum and minimum temperatures are shown in figure 9.

In order to minimize the effects of sampling errors in measurements of snow depths and to facilitate a comparison of the snow pack of 1951 with 1952 over the upper Missouri Basin it was desirable to average daily snow-depth measurements of a large number of stations in the area. All stations in the Missouri River Basin above Pierre, S. Dak., with complete records of daily snow-depth measurements listed in Climatological Data for March 1 to April 14, 1951 and 1952, were used. The comparison of the two seasons for the upper Missouri Basin and its subdivisions is presented in figure 6-A. It can be seen that the upper Missouri River Basin had comparable snow packs during early March of 1951 and 1952. The gradual decrease of snow during March 1951 and the little change in depth during most of March 1952 resulted in 1952 depths greatly exceeding those of 1951 during late March. Since temperature is the major factor affecting snowmelt it was desirable to make a comparison of temperatures for the two seasons, using the same stations which were used for the comparisons of the snow packs. The daily maximum-temperature curves are also presented in figure 6-A. It appears that the low temperatures which preserved the snow pack during most of March 1952 were an important factor in causing the floods of the Missouri River.

An analysis of the records of the snowmelt floods of 1951 and 1952 was made to determine the losses in potential runoff in selected local areas. Average water equivalent of the snow cover on March 20 for both years was compared with surface runoff. Subsurface runoff was not included in the study. The time base of the runoff hydrographs was chosen as 20–25 days for 1952 and 30–35 days in 1951 with routing time taken into consideration.

The average water equivalent of the snow cover in the lower Yellowstone in 1952 was slightly over 2 inches, four times greater than in 1951. Losses amounted to approximately 65 percent in both years. In the Williston-Bismarck reach of the Missouri River Basin, an area of 21,900 square miles, the water equivalents of the snow cover on March 20, 1951 and 1952 were comparable. The 1951 average amounted to 2.55 inches and the 1952 was 2.35 inches. Losses in the surface runoff period were determined to be 1.90 inches in 1951 and 1.05 inches in 1952. However, the heaviest zone of potential runoff in 1951 was concentrated in the Garrison-Bismarck portion of the reach and the lower Knife River Basin. The 1952 distribution was concentrated in the headwaters of the Knife River and along the middle reaches of the Little Missouri River. The potential runoff in the 22,300-square-mile Bismarck-Mobridge reach averaged approximately 75 percent greater on March 20 in 1952 than in 1951. Yet the losses in potential runoff were nearly equal. Field observations indicated that frozen ground and the ice layer beneath the snow covered a more extensive area in 1952 than was observed in 1951. Temperature rises were more rapid during the 1952 breakup and this rapid rate of melt lessened the opportunity for infiltration during the 1952 thaw.

Field reports from the Big Sioux River Basin indicated the ground was frozen and ice covered. Average winter precipitation over this basin in 1952 was 10 percent less than in 1951, yet flood waters of the Big Sioux, aggravated by the occurrence of serious ice jams, reached a crest approximately 1 to 2 feet above the 1951 flood in the vicinity of Flandreau, S. Dak. Rapid temperature rises were also responsible for the greater rate of melt in this basin.

The most northerly reach of the main stem of the Missouri River lies between Fort Peck, Mont., and Bismarck, N. Dak. The Yellowstone and Little Missouri tributaries flow northward to enter this reach near Williston and Elbowoods, N. Dak., respectively. Normally, warming temperatures approach the Fort Peck-Bismarck reach from the west, south, or southwest. The Yellowstone and Little Missouri usually break up before the Missouri River in this area. As snowmelt water flows over the solid river ice, the ice breaks and tends to jam and form a partial dam or ice gorge. The runoff is temporarily stored behind these ice dams until sufficient energy is produced to rupture the ice gorge. As the jam breaks and releases the water held in storage, a surge travels downstream and may or may not jam again. Successive jamming tends to delay the flood wave and concentrate the flood volume. Such ice action may increase the magnitude of the downstream crests. During the spring of 1952 runoff from the lower Yellowstone was nearly three and one-half times greater than in the spring of 1951, while 1952 runoff in the Little Missouri was approximately 5

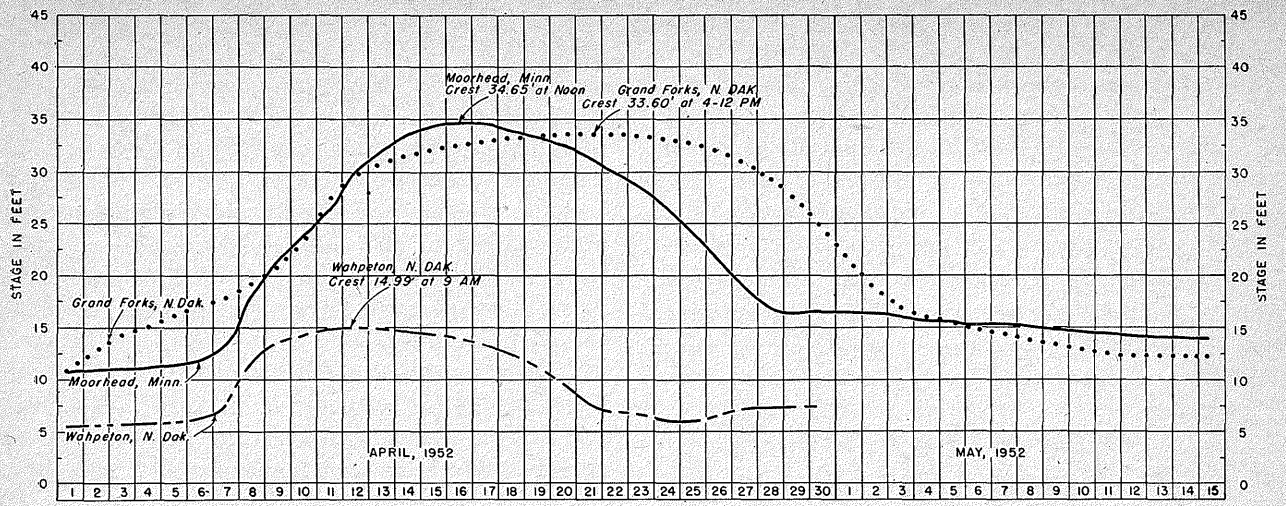


FIGURE 14.—River stage graphs, Red River of the North.

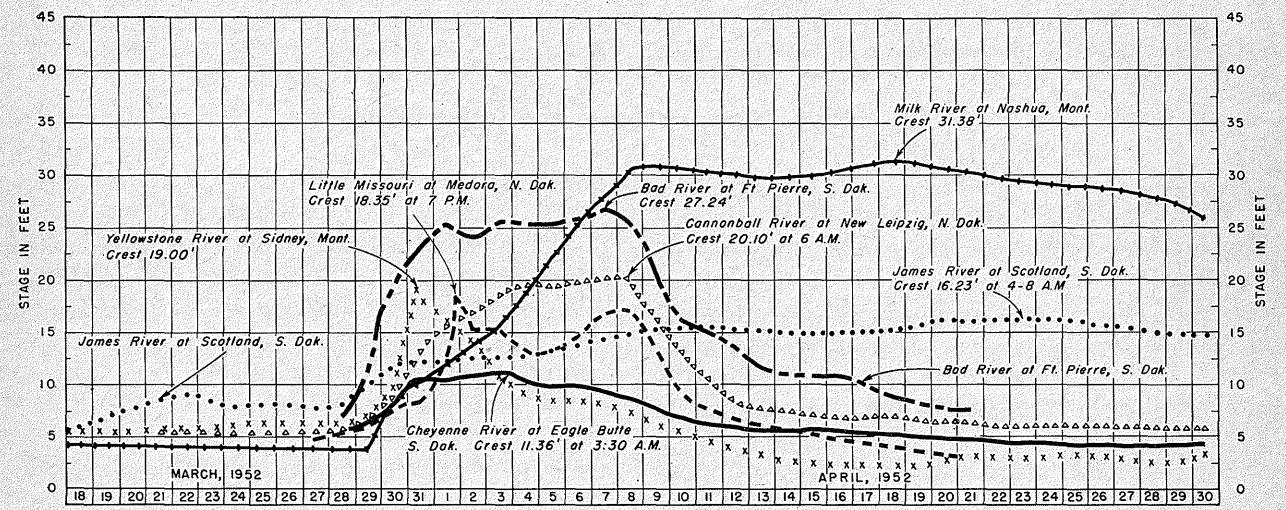


FIGURE 15.—River stage graphs, Missouri River tributaries.

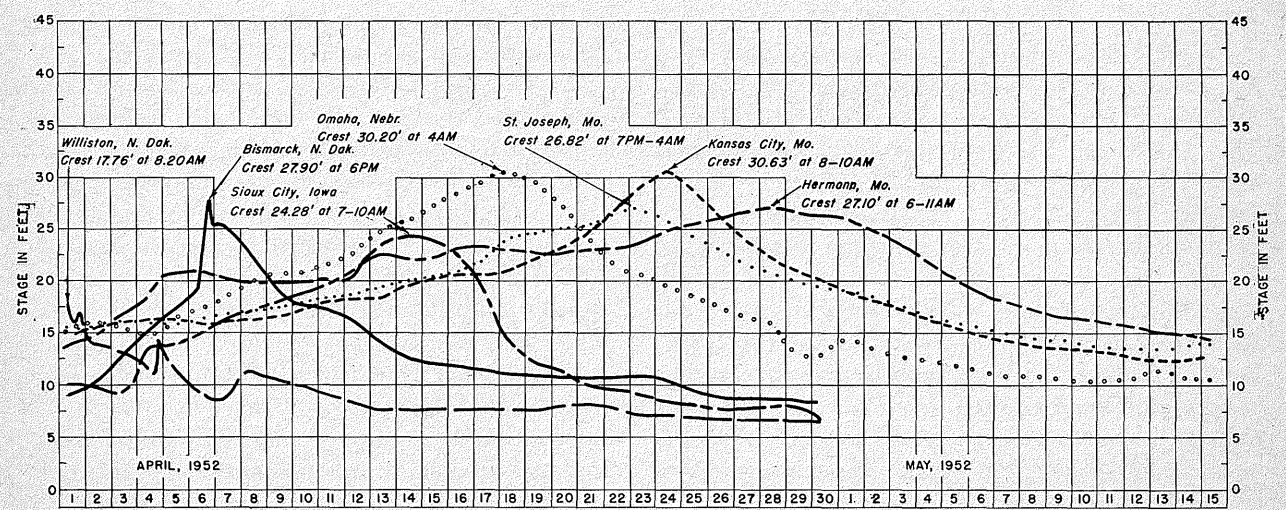


FIGURE 16.—River stage graphs, Missouri River.

times greater than in 1951. Successive jamming increased the magnitude of the flood crest as it moved downstream to Bismarck in 1952. Heavy tributary flow below Bismarck prevented significant reductions in crest as the 1952 flood moved downstream. Only one occurrence of main-stem flooding, due to snowmelt runoff and ice jamming, was reported during the 1951 April rise. Stages at Garrison, N. Dak., were reported as 4 feet above bankfull as a result of ice jam activity. Below-bankfull stages were recorded on the main stem below Garrison in April 1951.

RED RIVER OF THE NORTH

The severe flooding in the headwaters of the Red River of the North was due to the heavy snow accumulation during the winter in the area south of Fargo, N. Dak. Other contributing factors were the unusually cold weather in December, which resulted in a rather deep frost penetration in the spring, and the late runoff accompanying a sudden change to warm temperatures. A snow survey during March showed 4 to 5 inches of moisture available for runoff over Richland and Sargent Counties in extreme southeastern North Dakota, and 3 to 4 inches over Grant and Wilkin Counties, immediately to the east in Minnesota. A slow thaw during the last half of March and early April filled drainage ditches but general flow into the Red River was held up by ice in the ditches. Maximum temperatures rose into the forties and fifties during the second week in April. The fields and ditches then drained into the Red River rapidly. Over the northern part of the valley, snow had been extremely light with snow depths of less than 2 inches. The resulting flood crest, unusually severe in the upper reaches, flattened out considerably by the time it reached Grand Forks.

GENERAL DESCRIPTION OF 1952 FLOODS

LOCATION

Main-stem flooding on the Mississippi extended from the headwaters to the confluence with the Ohio River. It was most severe in the reach from St. Paul, Minn., to Davenport, Iowa. Flooding on the Missouri River reached from the Montana-North Dakota State line to the mouth, with the most serious conditions existing from Bismarck, N. Dak., to Kansas City, Mo. Serious flooding in the Red River of the North was confined to the area above Fargo, N. Dak. Figure 1 outlines the general area and severity of flooding.

EXTENT OF FLOODING

Record-breaking stages were experienced at a majority of points along the main stem of the Mississippi from Minneapolis, Minn., to Muscatine, Iowa. At St. Paul the crest was 2.3 feet higher than the previous record of 1881. Downstream from that point the crest diminished to heights like those of the previous year but, in general, slightly higher.

All previous records were exceeded on the Missouri from Mobridge, S. Dak., to Leavenworth, Kans., except at St. Joseph, Mo. At St. Joseph, because the flood created new channels, the crest was 0.4 foot below the record of 1881. At Washburn, N. Dak., ice jams and fluctuating flows brought the stage about 7 feet higher than the previous record. Sensational events occurred all along a 1,100-mile reach of the river from Elbowoods, N. Dak., to the Kansas City area.

The volume of storage behind ice jams is illustrated by conditions at Bismarck, N. Dak. At 10 a. m., April 6, the flow was 75,000 cubic feet per second. It increased to a peak of 500,000 cubic feet per second by 6 p. m. of that day. This increase of 425,000 cubic feet per second within 8 hours is probably the greatest increase in flow ever observed in streams in the United States in a similar period of time. The United States Geological Survey reports that this instantaneous flow of 500,000 cubic feet per second was about 65 percent greater than the summation of maximum flows from upstream tributaries.

At Omaha, Nebr., flood protection structures constricted the flow in "hourglass" fashion. Because of reliable warnings of the expected magnitude of the flood given 10 days in advance, extensive preparations were made to strengthen the levee system. These proved effective and flood waters did not reach the industrial districts of Omaha and Council Bluffs, Iowa. The crest of 30.20 feet was 5.5 feet higher than the previous record stage of 24.65 feet in 1881 and within inches of the top of the emergency levee extensions. Industrial and residential damage amounting to millions of dollars was prevented by the coordinated flood fight by Federal, State, and municipal organizations.

At St. Joseph, Mo., over 1,000 miles below the point of origin of the flood, new channels were cut at a giant S-curve. (See photograph p. 88.) A permanent new channel was cut between the municipal airport and the city and Rosecrans Field was flooded to a depth of from 4 to 10 feet.

In the Milk River Basin, a tributary in Montana, peak flows exceeded those previously recorded at Havre and all downstream points. In some instances 1952 peak flows in tributaries were exceeded by rain floods of June 1906 and June 1908. The peak flow of Frenchman Creek at the international boundary, however, was estimated at 420 percent of the previous maximum obtained over a continuous 35-year record. (See photographs pp. 83–84.) Flood waters of the Milk River Basin did not contribute materially to the crest of the Missouri main-stem flood since the peak flow at Nashua, Mont., was observed April 18, or 12 days after the crest passed Bismarck.

Severe flooding in the Red River of the North was confined to the upper reaches, a contrast to the devastating flood of 1950 which was most severe in the lower reaches. The crest of 15.0 feet at Wahpeton, N. Dak., on April 12, 1952, was the second greatest of record, being 2 feet below that of 1897. In the Moorhead-Fargo area it was the third greatest of record but 5.5 feet below that of 1897. The extent of flooding in the Red Basin should not be minimized; however, it was overshadowed by the magnitude of the Missouri and Mississippi River flood. (See photographs p. 93.)

The following tabulation, based on data furnished by the United States Geological Survey, compares April and May of 1952 with average values for the same months. It shows that runoff of the Mississippi was 158 percent of average, Missouri 296 percent, and the Red 455 percent.

Average Daily Discharge (cfs)

Stream	1952		Period of record		Period
	April	May	April	May	
Mississippi (Keokuk)	189,000	148,000	110,470	101,866	1878–1951
Missouri (Omaha)	188,800	61,000	49,600	34,800	1929–1951
Red (Fargo)	7,256	2,149	1,260	808	1902–1951

MISSISSIPPI BASIN

As will be seen in figure 10 warming up began first in the upper Missouri Basin before moving into the upper Mississippi. This tended to synchronize the Mississippi and Missouri River flood crests so that they arrived at St. Louis at approximately the same time.

The two main surges of warming, from March 29 to April 1, and April 6–9 characterized the flooding. The first period of warming produced sharp rises through April 3 in the lower Minnesota River and Mississippi River tributaries in southeastern Minnesota, and adjacent portions of Wisconsin. Two streams, the Cannon and Root Rivers, experienced maximum discharges of record on April 1 and 2. The rises in these tributaries combined to produce an early crest near flood stage in the Mississippi at La Crosse, Wis., and immediately below.

The second warm spell, April 6–9, produced moderate runoff from the extreme headwaters of the Mississippi at and above Fort Ripley, Minn. Below that point, record flows occurred in the Rum and Crow Rivers producing the maximum stage of record, 19.5 feet, at Minneapolis on April 14. Record flows occurred in numerous tributaries of the upper Minnesota and record flooding occurred at Montevideo, Minn. The crest of the flood reached Mankato, Minn., on April 14 at 24.82 feet, 1.4 feet below the flood crest which occurred just 1 year and 5 days earlier. Damages at a number of towns along the Minnesota River were reduced by preventative measures such as sand bagging and dike construction. This was especially true at Mankato which suffered severely in the 1951 flood.

The peak flow of the lower Minnesota River synchronized closely with the major peak from the upper Mississippi, resulting in a crest of 22.02 feet at St. Paul, Minn., on April 16, the highest stage since records began in 1867. Extensive damages occurred in St. Paul and South St. Paul. St. Paul Municipal Airport was closed from April 11 to 27. Depth of water was 2 to 3 feet over the airport. Residences in low-lying areas were inundated and a number of industrial plants along the river were affected. (See photographs p. 89.)

Below St. Paul, peak stages in the main river exceeded those of April 1951, while the absolute highest stage of record occurred at Hastings, Red Wing, and Winona, Minn., and was equalled at Reads Landing, Minn. The crest flattened out somewhat below Winona but was in excess of the maximum flood of 1951. The highest stage of record at La Crosse is 16.5 feet June 19, 1880, an excessive rainfall-thunderstorm type of flood. The 1952 flood reached a peak stage of 15.32 feet April 20. The crest reached Prairie du Chien, Wis., April 23–24, at a stage of 21.0 feet compared

to 20.8 in 1951 and 21.5 in June 1880. (See photographs pp. 90–91.)

In the reach of the river from St. Paul to Prairie du Chien, tributary contribution was relatively minor owing to the absence of significant precipitation during the 2-week period following the flood crest at St. Paul. Also, with the exception of the St. Croix River, the remaining larger tributaries such as the Chippewa and Wisconsin, because of lighter snow cover and regulatory effects, did not contribute excessively to the main river flood. Another favorable circumstance was that the Black River with record flow, and other small tributaries, had crested nearly 2 weeks prior to the main river crest at St. Paul.

Warnings of the impending flood were given 10 days to 2 weeks prior to the occurrence of the crests, giving time to survey low places in the cities and prepare for dike construction and sandbagging operations. These preventive measures were particularly effective in the La Crosse and Winona areas where damage was reduced to about half of that from the 1951 flood with stages 0.4 to 0.6 foot higher in 1952.

As at St. Paul, industrial plants along the river suffered the greater damage. Underground seepage was a problem at La Crosse and Winona and also to some extent in Prairie du Chien. Many highways were closed along the river from Red Wing to Prairie du Chien. Nearly 1,000 families were made homeless in Winona, La Crosse, and Prairie du Chien, and several hundred more in smaller towns. Evacuation was greatest in the summer cottages on low ground where many families stay the year around.

In the reach from the mouth of the Wisconsin River to Muscatine, Iowa, tributaries entering the Mississippi from east-central Iowa, extreme southern Wisconsin, and northwestern Illinois were quite low as the upstream flood approached. A number of them were so low that some of the main-stream flood water entered storage en route lowering the crest heights slightly. In this area, the only material contribution came from the Rock River, which had a higher discharge than in April 1951.

Cities and towns along this stretch of the river were affected in varying degree and included Dubuque and Clinton, Iowa, Fulton, Ill., the quad cities of Davenport and Bettendorf, Iowa, and Moline and Rock Island, Ill., and downstream from there, Muscatine, Iowa. On April 13 a warning was released that stages were likely to exceed the 1951 flood. This warning, together with the experience gained in the 1951 flood, encouraged extensive protective measures.

At the time of the crest at Dubuque, on April 24, several residential and industrial blocks were inundated. By some emergency dike building, individual protective measures and removal of equipment and materials a good deal of property loss was prevented. (See photographs pp. 91–92.)

Flood waters entered Clinton, Iowa, on April 17 and a state of emergency was declared for Clinton and also for Fulton, Ill., across the river, on April 19. The crest reached Clinton on April 28. United States Highway 30 crossing the Mississippi was closed for a few days.

The great industrial area of the quad cities was the site of a long battle against the river beginning early on April 14, following the first prediction of record-breaking stages, and continuing until after the crest passed there on April 28.

At Muscatine, Iowa, flooding was largely confined to a narrow strip along the waterfront. The city built up 12 miles of protective levee. Across the river in the Drury drainage district, instead of raising levees with added earth and sandbags, a board wall weighted down by sandbags was built on top of the existing levee.

From about Clinton, to Burlington, Iowa, a distance of approximately 120 miles, the river crested on the same day, April 28. Fairly heavy rains occurred along the Mississippi from the Skunk to the Illinois River on April 22–23. These rains produced sharp rises in the intermediate small tributaries and resulted in a preliminary crest on the main stem from Keokuk, Iowa,. to Louisiana, Mo., on April 24–26, that slightly exceeded the upriver crest. The main surge, when it arrived from upstream, merely prolonged the high water a few days. Damage was held to a minimum as levees held in all sections though there was some seepage. At Keithsburg, Ill., where no levees protected the city, about 25 blocks were inundated.

The crest from the Missouri River flood reached the junction with the Mississippi at about the same time as the arrival of the upper Mississippi crest. Both crests had by then been subjected to so much reduction by valley storage that the combined flow produced only moderate flooding in the Mississippi below the mouth of the Missouri. The river crested at St. Louis, Mo., on May 1 at a stage of 33.83 feet, compared to 41.4 in 1844 and 40.3 in July 1951.

On April 14 a stage of 38.5 feet was forecast to occur at Cape Girardeau, Mo., on May 4. Prior to the arrival of the main crest, two secondary crests occurred during April. These rises were caused by several periods of rainfall during April in the lower Missouri and middle Mississippi Valleys. Flood stage was exceeded slightly in some reaches between St. Louis and the mouth of the Ohio River in the April rises. The main Mississippi River crest reached Cape Girardeau, Mo., at a stage of 38.3 feet on May 2.

Cape Girardeau was the only urban area in the reach entered by flood waters. Most of the town is on a high hill but 18 first-class business houses on lower ground were affected, some flooded but others protected by emergency sandbag barriers. In the same area, 13 homes were flooded.

Downstream at Cairo, Ill., and New Madrid, Mo. (below the Ohio River), the flooding was minor. At Cape Girardeau, however, it was a major flood, having been exceeded only six times since 1844; it is noteworthy that five of these major floods have occurred since 1943, the flood crests being:

1943, May 27	42. 37
1944, May 6	40. 80
1947, July 5–6	41. 88
1951, July 24	41. 80
1952, May 2	38. 3

MISSOURI RIVER BASIN

On February 29 the Weather Bureau issued its first general news release regarding the possibility of serious flooding along the Missouri River. The following is quoted from part of this release:

> Heavy snowfall during the winter months over the Dakotas has reached such proportions as to justify concern over the possibility of serious flooding this spring along the Missouri River, and tributary streams in the two-State area. Total precipitation for the 3-month period ending March 1 has averaged 155 percent of normal for the plains area above Sioux City, Iowa. The maximum observed for the period reached 460 percent of normal at Pierre, S. Dak.

On March 13 a second general news release was made indicating that the snow mantle remained intact with little or no change in the water equivalent of the snow pack since February 29. The possibility of serious flooding remained, with the magnitude of any potential snowmelt flood dependent upon the ensuing meteorological conditions attending the spring breakup and the occurrence of serious ice jams.

During the last days of March warm weather moved across the northern Rockies, crossing Wyoming, southern Montana and into the western edges of the Dakotas. Temperatures rose into the sixties and seventies over the Yellowstone River Basin in Montana. Ice began to break in the lower Yellowstone River and stages rose. The ice broke at Sidney, Mont., early on March 31, reached a near-maximum stage, and the flood waters and ice piled into the Missouri River in the vicinity of Williston, N. Dak. At Williston, the ice in the Missouri rose, buckled, and broke into huge blocks. Numerous ice jams began to form on April 1 and 2.

During the first few days of April, mild temperatures prevailed as far eastward as the western Dakotas. The western tributaries, namely, the Little Missouri, Knife, Heart, Cannonball, Grand, Moreau, and Cheyenne, all began to rise. Most of these streams reached bankfull or more before they began to shed their ice. When the breakup came on these tributaries, they were at a high stage and in a few days they were flooding heavily in their lower portions and dumping large quantities of ice and water into the icebound Missouri. Farther south, the Bad, White, and Niobrara broke up during the last few days of March. Fort Pierre, S. Dak., underwent a long period of flooding. First there was flooding from ice jams near the mouth of the Bad River, and then came the flood on the Missouri.

The flood along the Little Missouri River in North Dakota affected 75 families. Ten homes suffered major damage and 50 homes minor damage. Very little damage occurred on the Heart River because of the protective dikes at Mandan, N. Dak., but Highway 10 between Bismarck and Mandan and some farmlands were inundated. On the Knife River, about 4 houses had major damage and 15 minor damage. Some damage also occurred on the Cannonball River and Beaver Creek. The flooding along Beaver Creek was heavy, with major damage to 5 farm buildings, complete destruction to 10, and minor damage to others.

The ice breakup reached the mouth of the Little Missouri River at Elbowoods, N. Dak., on April 4. For several hours the Little Missouri released a tremendous volume of ice and water. This caused an immediate increase of stage and an acceleration of ice breakup on the Missouri River. The breakup was a spectacular sight. Chunks of ice as large as city blocks breaking loose, floating, grinding against each other, gorging, breaking again, moving down like an avalanche, ripping up the solid ice downstream. This process repeated

itself perhaps hundreds of times, until it came to the end of the solid ice just north of Mobridge, S. Dak.

Flooding was severe along the Missouri River. At Williston, N. Dak., the Missouri crested on April 1 with a peak flow just short of the record 1930 ice breakup. At Elbowoods, the Missouri exceeded the highest stage of record by 2 feet on the 5th. The crest at Washburn during the morning of the 6th was the highest ever known (31.0 feet).

At Bismarck, N. Dak., the crest of 27.9 feet (500,000 cubic feet per second) on the 6th was the highest stage since 1917. During the morning of April 6, there were two ice jams in critical locations near Bismarck, one about a mile upstream from the Northern Pacific Railroad bridge, the other stretched from about 5 miles downstream from Bismarck to Fort Yates, N. Dak. The upstream jam broke up shortly after noon, releasing an extraordinary amount of water. From 11 a. m., the river rose from a stage of 18.8 feet to a peak stage of 27.9 feet at 6 p. m. The instantaneous peak discharge reached 500,000 cubic feet per second. The downstream ice jam held and caused higher stages than would have prevailed with open water conditions. (See photograph p. 85.)

In the meantime, the ice breakup had been progressing upstream from the south, releasing the impounded flow of the Bad, Cheyenne, Moreau, and Grand Rivers in South Dakota. The last 50 miles of ice cover in the reach below Bismarck moved out on April 8. High tributary inflow prevented sharp reductions of the peak as it moved downstream. The Missouri River crested on the morning of the 9th at Mobridge, S. Dak., 9.1 feet above flood stage (16 feet). Mobridge was the first gaging station to reach its crest as a free-flowing river.

The flood of 1952 was the worst disaster ever to strike Pierre and Fort Pierre, S. Dak. During the first week of April, Fort Pierre had been partly flooded because of ice jamming near the mouth of the Bad River. This had hardly subsided when the second week of April brought the devastating flood on the Missouri. Fort Pierre was 85 percent inundated; except for the few left behind to save the power and water plants, the town was completely evacuated. At the height of the flood, the power and water plants were lost and for a time the town was deserted. Across the river at Pierre, the capital of South Dakota, 100 blocks, most of the business section, were flooded. On April 10 the Missouri reached a crest of 25.35 feet at Pierre, 10.35 feet above flood stage. (See photograph p. 85.)

Along the Missouri the flood progressed downstream from Pierre. Stages rose very high where contained in narrow valleys. In other places, the crest dropped down as the river flooded widely across the valley. On April 11, the Missouri crest reached Chamberlain, S. Dak., reaching an all-time high of 25.55 feet; and a portion of the railroad bridge was swept away. (See photograph, p. 86.) The next day, a 22.55 foot crest passed Wheeler Bridge, near Geddes, S. Dak., and valley flooding was becoming very widespread from Geddes and Niobrara, Nebr., to Sioux City, Iowa.

South Sioux City, Nebr., a town of 6,200 population, had had minor flooding in previous years, when the Missouri stage rose above 18 feet at Sioux City. A levee had been constructed from the town to 3 miles west, that was designed to hold the Missouri River up to a crest of 19.5 to 20 feet. On April 11, the Missouri rose over the levees, and in 36 hours, 75 percent of south Sioux City was inundated. On the day of the crest, only a small ridge at the south side of the town stood above the water. (See photograph p. 86.)

North Sioux City, S. Dak. (formerly called Stevens), is a village of 700 people on the right bank of the Big Sioux River, about three-fourths mile upstream from the confluence of the Big Sioux with the Missouri River. Except for only a few houses, north Sioux City was completely inundated, mostly from backwater from the Missouri. In this same area, but in Iowa and on the left bank of the Big Sioux, Riverside, a suburb of Sioux City, never before had experienced more than fringe flooding. This time, it was 60 to 70 percent inundated.

In Sioux City, Iowa, 352 city blocks were flooded within the bounds of the city. Some of these were in parks or vacant lots, but about 250 were in residential or business areas. At the height of the flood, 15,000 people were evacuated from their homes in Sioux City and the bordering towns. On Monday morning, April 14, the crest of 24.28 feet set a new high record, and the April flood of 1881 was pushed into second place.

South Dakota farmers suffered heavy losses from Yankton to Sioux City. Flooding ranged from 7 to 10 miles wide between Yankton and Vermilion, S. Dak., and 3 to 5 miles wide from Vermilion to Sioux City. An estimated 200,000 acres were inundated in this section of the river

valley. South of Gayville, entire farms were cut away, and farm buildings went down the river.

From Bismarck to Sioux City, approximately 500,000 acres were inundated, and between 30,000 and 40,000 people were homeless during the flood. All east-west highways and railroads were flooded as the high water progressed downstream.

The Missouri River crest reached Omaha, Nebr., on the 18th at a stage of 30.20 feet, 11.2 feet above flood stage or 5.55 feet above the previous maximum stage of record (24.65 feet in 1881). It traveled approximately 3.6 miles per hour during that 1-week period between Pierre and Omaha (599 miles).

The levee and flood walls protecting Omaha and Council Bluffs, Iowa, form a very narrow channel at that point on the Missouri which varies in width from 1,100 feet, 500 feet below the gage, to 2,000 feet, 2 miles above the gage. Four miles above the gage the flood walls were 1 mile apart. At the Bellevue, Nebr., gage, 13 miles downstream, the flood waters spread to a width of 3.5 miles and there the stage exceeded the historic flood of 1881 by 0.1 foot. Thirty-nine miles above the Omaha gage the flood water formed a huge lake 10 miles in width.

A very determined and successful fight, which paid dividends, was made to raise and strengthen the protective dike system in the Omaha-Council Bluffs area. The amount of raise varied from 3 to 4 feet. If the levee system had not been strengthened, and had broken, one-half of Council Bluffs would have flooded as well as most of east Omaha and an important segment of Omaha's industrial area. (See photographs pp. 87–88.)

An important event took place during the evening of April 18 when a big break occurred in an Omaha sewer tunnel behind the levee. The tremendous pressure on this "blowout" was controlled by placement of steel beams, stone, and sandbags over the outlet on the river side of the levee. One thousand acres were flooded behind the levee before the flow of water could be stopped. This type of sewer failure (blowout) caused flooding of the Kansas City, Kans., Fairfax industrial district in the July 1951 flood.

The last remaining levee (unit L575) between Omaha and Rulo, Nebr., was overtopped on the 18th. The crest at Nebraska City, Nebr., was 27.66 feet, 1.9 feet above the previous maximum stage of record (1949). To lessen the destruction in Hamburg, Mo., the lower end of L575 was dynamited. The maximum discharge passed the Nebraska City gaging station on a falling stage as flood waters raced through the levee breaks, inundating the entire valley.

The rate of travel of the crest between Omaha and Kansas City, Mo., decreased to 1.8 miles per hour and reached Kansas City on the 24th. The crest of 30.63 feet was 8.6 feet above flood stage but 7.4 feet below the previous record stage of 38 feet in 1844. It was 5.6 feet below the severe flood of 1951. Minor difficulty was experienced controlling sandboils behind levees. "Flashboard" levee extensions were placed along the upstream levees as a precautionary measure in the event heavy rains occurred.

Below Kansas City the flood waters were approaching maximum stages just high enough to overtop the upper tiebacks of the few remaining large levee units, but without sufficient energy to "breakout" at the lower end. Great quantities of water were impounded as the crest moved downstream. The last natural breakthrough of these entrapped flood waters occurred just above Lexington, Mo., releasing the contents of the 10,000 acre Sunshine Levee unit, giving a second crest of 30.1 feet on the 26th.

The crest at Waverly, Mo., approached within 0.1 foot of the previous record stage of 1951 (28.2 feet). Below that point the crest was from 5 to 10 feet lower than in the floods of 1951 and 1844.

Milk River.—The Milk and its tributaries in Montana flooded generally from Fresno Reservoir to its confluence with the Missouri below Fort Peck Dam during the period beginning March 31 at Havre and ending April 26 at Nashua. All cities and towns along the river were subjected to damage, but hardest hit were Havre and Chinook. Flooding covered an unusually long period—2 to 4 weeks over most valley bottom land, damaging alfalfa severely and delaying spring work well over a month. Total damage from flooding the entire valley was estimated at about $3,000,000. At least 70 road bridges were washed out or damaged. Irrigation systems were badly washed and generally disrupted. Main highways were closed for several days. There were no fatalities.

James River.—Weather over the James Valley was more favorable for an orderly runoff than over comparable streams in western South Dakota. For the most part, melting progressed from the lower portion of the valley, rather steadily upstream. A rapid thawout above Redfield could have caused even greater flooding than occurred.

Three distinct rises showed up on the James River, each one coming from farther upstream.

The first rise developed from Forestburg and Mitchell to the mouth, during a period of rising temperatures in the last week of March. This caused light to moderate flooding over lowlands in Hutchinson and Yankton Counties, but no important damage.

The second rise developed from a rapid increase in melting from Huron to Aberdeen. Heavy melting over the Turtle Creek watershed (and other creeks immediately to the north) caused the stage at Huron to rise to 15.25 feet on April 15, to a higher stage than Huron later received out of a rise coming down the main stem of the James from above Ashton. This second rise caused considerable lowland flooding as it passed downstream during the next 2 weeks, particularly in the Scotland and Menno areas.

The third rise came mostly from Aberdeen to the headwaters, near Fessenden, N. Dak. This rise caused widespread lowland flooding from below Jamestown down across South Dakota, although because of the larger channel in the lower reaches of the stream, flooding was somewhat less from Huron to Yankton than during the second rise.

The James River floods of 1952 exceeded the floods of 1950 across the State of South Dakota. However, the 1950 floods caused much greater damage in North Dakota, and especially the heavy flooding at Jamestown, N. Dak. Total damages in 1952 were less, since most of the flooding was over farmland.

Big Sioux River.—For the second successive year, the Big Sioux River flooded heavily throughout its length from just below Watertown, S. Dak., down to Sioux City. The April flood of 1952 reached even higher stages than in April 1951.

The winter's snow cover was heavy over the Big Sioux valley, and a cold March preserved most of the snow cover until a quick warmup began on the 28th of March. On March 29 and 30, temperatures rose into the fifties at Sioux Falls, and into the sixties at Sioux City. A rapid rise developed on the main stem of the Big Sioux from Flandreau, S. Dak., downstream; also on the tributaries along this segment of the river. While the Big Sioux remained within the levees at Sioux Falls, during this rise, the combined flow from the main stem of the Big Sioux and Skunk Creek and the Rock River caused severe flooding on the lower Big Sioux from Hawarden, Iowa, downstream. The Big Sioux crested at Akron, Iowa, at 19.75 feet during the afternoon of April 1, surpassing April 1951's crest of 19.66, and becoming the highest stage at Akron since the record flood of 1881. At this high stage, flood waters ranged from one-half mile to 1 mile wide over much of the distance from Hawarden to Sioux City. When the crest reached Sioux City 2 days later, 18 cabins and houses of various kinds were flooded on the west bank of the river in North Sioux City, S. Dak. (formerly called Stevens). Much greater flooding occurred in this town, 1 to 2 weeks later, from backwater from the flood on the Missouri River.

During the first 4 days of April, while the first major rise on the Big Sioux was passing into the Missouri River, a second rise was developing in the upper half of the Big Sioux valley. This rise was also due to melting snow on frozen soil; rain was not a factor in the flood. The rise began at Trent, S. Dak., on April 4, and reached Sioux Falls April 5 and 6. The levees broke at the Sioux Falls Municipal Airport early April 6, and severe flooding occurred at the Airport and housing units nearby. Upstream from Sioux Falls, serious flooding occurred at Renner, Dell Rapids, Trent, Egan, and Flandreau. Flooding was more extensive than in 1951 and more farms and farm homes were affected. This second rise reached 1 to 2 feet higher, from Trent to Sioux Falls, than the highest water in 1951. While a record of stages is not available, it is generally believed that this was the highest flood on the Big Sioux River at Sioux Falls in the last 50 to 70 years. As these flood waters moved downstream from Sioux Falls into a larger river channel, the flooding became much less. Akron, Iowa, experienced its second crest, 17.71 feet, on April 10—2 feet lower than the previous one of April 1.

FLOOD DAMAGE

On the basis of monetary loss the flood of April 1952 ranks sixth in national flood disasters. The total damage has been estimated as approximately $200 million. A summary showing losses by areas and types is given in table 11. (Table 12 contains comparative data for other major floods.) A breakdown by basins indicates approximately $179 million in the Missouri Basin, $19 million in the upper Mississippi, and $2 million in the Red River of the North.

The 10 States of Montana, North Dakota, South Dakota, Nebraska, Kansas, Iowa, Missouri, Minnesota, Wisconsin, and Illinois were affected. The greatest loss in a single State was about $54 million in Missouri. Other States with heavy losses were: Iowa, approximately $45 million; Nebraska, $31 million; South Dakota, $25 million; and Kansas, $17 million. Five major midwest cities, Minneapolis, St. Paul, Omaha, Kansas City, and St. Louis, were in the path of the flood. Many other important cities such as Bismarck, and Fargo, N. Dak.; Sioux City, Council Bluffs, Dubuque, and Davenport, Iowa; La Crosse, Wis.; Kansas City, Kans., and St. Joseph, Mo., suffered serious damage. As examples, loss in the Fairfax industrial district of Kansas City, Kans., including loss of income and wages, was about $9 million. Other representative losses are: Sioux City, $3¼ million; St. Joseph, $2 million; Dubuque, $1¾ million; Fargo-Moorhead $1 million; and La Crosse slightly over one-half million. A total of approximately 200 municipalities experienced damage.

Rural damage, including farm buildings, livestock, stored grains, and prospective crops, amounted to $118 million, or 60 percent of the total loss. Over 3 million acres were inundated. The loss to growing crops was relatively small due to the season. Accurate flood warnings were issued several days in advance and this permitted removal of all livestock and a major portion of stored grain. The heaviest losses were from levee, fence, and building destruction.

Indirect losses amounted to nearly 15 percent of the total. This included the cost of emergency flood-protection structures and evacuations as well as loss of wages and income due to suspension of business. Damage to utilities, communications, and transportation systems was unusually great. The Chicago & Northwestern Railway System, alone, spent $385,000 for flood fighting, evacuation, and restoration. In addition to this it was estimated the loss of revenue amounted to $465,000. Mr. Robert B. Brooks, consulting engineer for the Missouri Valley Development Association, stated that loss to transportation networks amounted to $4 million. Approximately $4½ million were expended in emergency protective measures in the Omaha-Council Bluffs area alone.

Table 11 shows eleven lives lost as a result of the flood. This is the least loss of life ever recorded for a flood of this magnitude. It should be noted that all of these were rather indirectly associated with the flood. As an example, the six lives reported lost in the Bad River Basin were due to an automobile accident in which the vehicle rolled into the flooded stream. Another loss of life is attributed to inability to reach medical facilities due to high water.

When comparing the flood of April 1952 with past flood disasters consideration should be given to changing economic and social conditions. This involves many complicated factors, some of which are compensating. The population and wealth of the basins are the greatest of record. This, alone, would tend to materially increase the monetary losses These factors are offset, to a great extent, by the facilities for safeguarding the welfare of valley occupants. Conservative estimates indicate the flood warning service of the United States Weather Bureau permitted a saving of $102 million. The Corps of Engineers have estimated that construction work in the form of protective structures prevented damages of over $238 million. Emergency measures in the Omaha-Council Bluffs area prevented failure of the levee system and resulted in a saving of approximately $62 million at that point alone.

In summary, it may be said that a loss of $200 million was experienced. Welfare facilities together with the coordinated efforts of Federal State, municipal, and charitable agencies, effected a saving of more than $400 million. This was accomplished at a cost of about $13½ million, the amount spent by the Federal Government, local interests, and the Red Cross.

TABLE 11.—*Summary of flood damage, March–May 1952*

Stream basins	Acres inundated	Estimated damage in dollars				Lives lost
		Rural	Urban	Indirect	Total	
Mississippi River Basin:						
Main stem, above mouth Minnesota	26,000	$572,000	$2,677,000	$905,000	$4,154,000	1
Main stem, mouth Minnesota to Guttenberg	14,500	612,000	673,000	449,700	1,734,700	
Main stem, Guttenberg to dam 22	109,000	2,452,970	1,051,145	4,968,205	8,472,320	
Main stem, Dam 22 to Cairo	25,950	246,500	0	0	246,500	
Minnesota River	181,400	2,200,000	797,000	195,000	3,192,000	1
St. Croix River		0	143,000	35,000	178,000	
Zumbro River		5,000	5,000	0	10,000	
Root River		320,000	206,000	0	526,000	
Total Mississippi River Basin	356,850	6,408,470	5,552,145	6,552,905	18,513,520	2
Missouri River Basin:						
Main stem, above Yellowstone	3,800	9,010	0	2,300	11,310	
Main stem, Yellowstone to South Dakota line	238,045	720,340	769,040	447,220	1,936,600	1
Main stem, South Dakota line to Rulo, Nebr	781,500	50,839,600	28,342,900	17,351,600	96,534,100	
Main stem, Rulo, Nebr. to Kansas City	327,160	25,636,100	13,787,800	2,927,800	42,351,700	
Main stem, Kansas City to mouth	699,100	19,324,000	1,665,300	522,200	21,511,500	
Tributaries above Fort Peck	103,530	319,000	11,360	13,430	343,790	
Milk River	126,060	3,930,650	569,150	1,524,370	6,024,170	1
Yellowstone River	6,000	42,780	200	11,900	54,880	
Little Missouri River	32,925	123,550	9,850	3,450	136,850	
Knife River	18,000	94,580	3,650	4,040	102,270	
Heart River	4,310	121,560	250	28,000	149,810	
Cannonball River	8,320	144,430	1,200	3,885	149,515	
Minor Tributaries	7,550	118,945	0	0	118,945	
Oak Creek	1,600	1,070	1,550	1,140	3,760	
Grand River	8,800	59,370	22,100	9,870	91,340	
Moreau River	22,000	68,530	0	13,180	81,710	
Cheyenne River	0	3,900	0	0	3,900	
Bad River	12,080	710,200	500	0	710,700	6
White River	1,560	241,000	0	300	241,300	
James River	73,860	4,020,040	0	6,500	4,026,540	
Vermillion River	2,180	69,800	0	700	70,500	
Big Sioux River	98,520	3,647,100	823,900	62,800	4,533,800	1
Floyd River	8,570	264,800	30,400	11,400	306,600	
Total Missouri River Basin	2,585,350	110,510,355	46,039,150	22,946,085	179,495,590	9
Red River of the North Basin	289,000	1,401,000	891,100	57,500	2,349,600	0
Grand total	3,231,200	118,319,825	52,482,395	29,556,490	200,358,710	11

TABLE 12.—*Comparative damage, major floods in the United States*

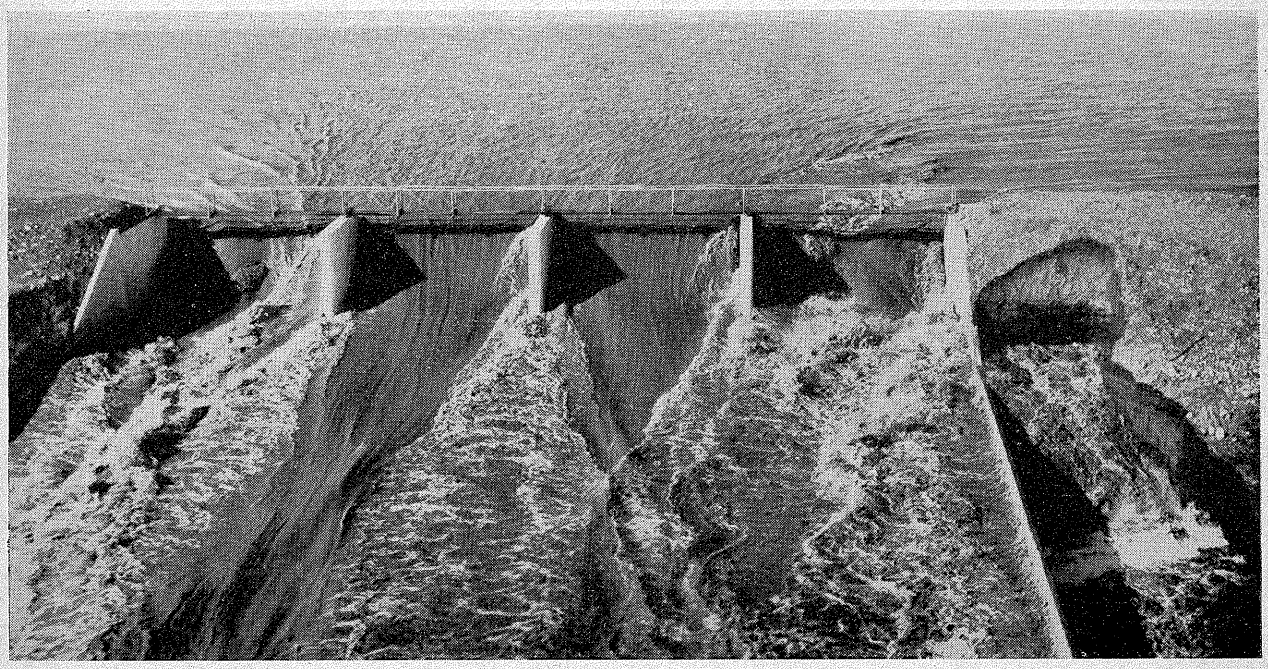
Date	Basins	Total damage	Lives lost
May–June 1903	Kansas, lower Missouri, and upper Mississippi	40,000,000	100
March 1913	Ohio and tributaries	147,000,000	467
Spring of 1927	Mississippi Valley	284,118,000	313
May–June 1935	Republican, Kansas, and lower Missouri	28,000,000	110
March–April 1936	Rivers in eastern United States	270,000,000	107
January–February 1937	Ohio and lower Mississippi	418,000,000	137
April–June 1943	Maumee, Wabash, upper Mississippi, Missouri, White, and Arkansas	172,500,000	60
April–June 1944	Upper Mississippi, Missouri, Arkansas, Red, lower Mississippi, and east Texas streams	82,000,000	17
May–July 1947	Lower Missouri and middle Mississippi	235,000,000	29
May–June 1948	Columbia	112,000,000	37
June–July 1951	Missouri, Mississippi, and Arkansas	935,000,000	28
April–May 1952	Upper Mississippi, Missouri, and Red River of the North	200,359,000	11

FLOOD SCENES

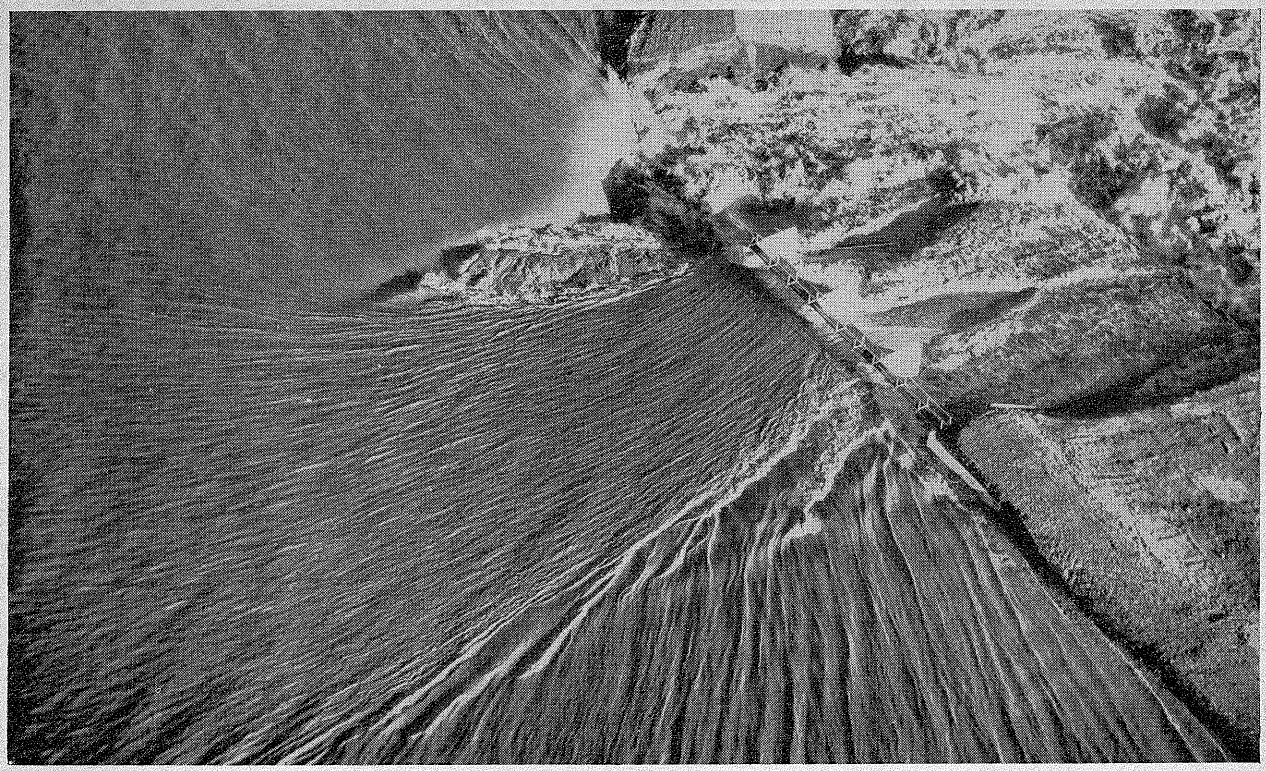
To show this flood more vividly and to document its physical extent and force in the most devastated areas, the following photographs of flood scenes are included in this report. For those who experienced the disaster of flooding these photographs will serve only as grim reminders. They are included primarily for those who did not experience this flood but who will have to make the plans and take the preventive measures required by future floods. Since record floods like this one occur about once in 100 years, the voices of experience may well be stilled long before a new threat approaches the cities of these river valleys. It is therefore essential that the written record of past floods contain all possible information for the use of those who must cope with the next record flood.

Another purpose of the photographs is to provide the present civic, State, and Federal officials with pictorial evidence on which to base long-range plans for river works which may prevent destruction similar to that pictured here. Future developers of residential, industrial, and civic areas in a city along a river must always take the river and its flood potential into consideration in their plans, and photographs of areas flooded in the past are often more helpful than statistics.

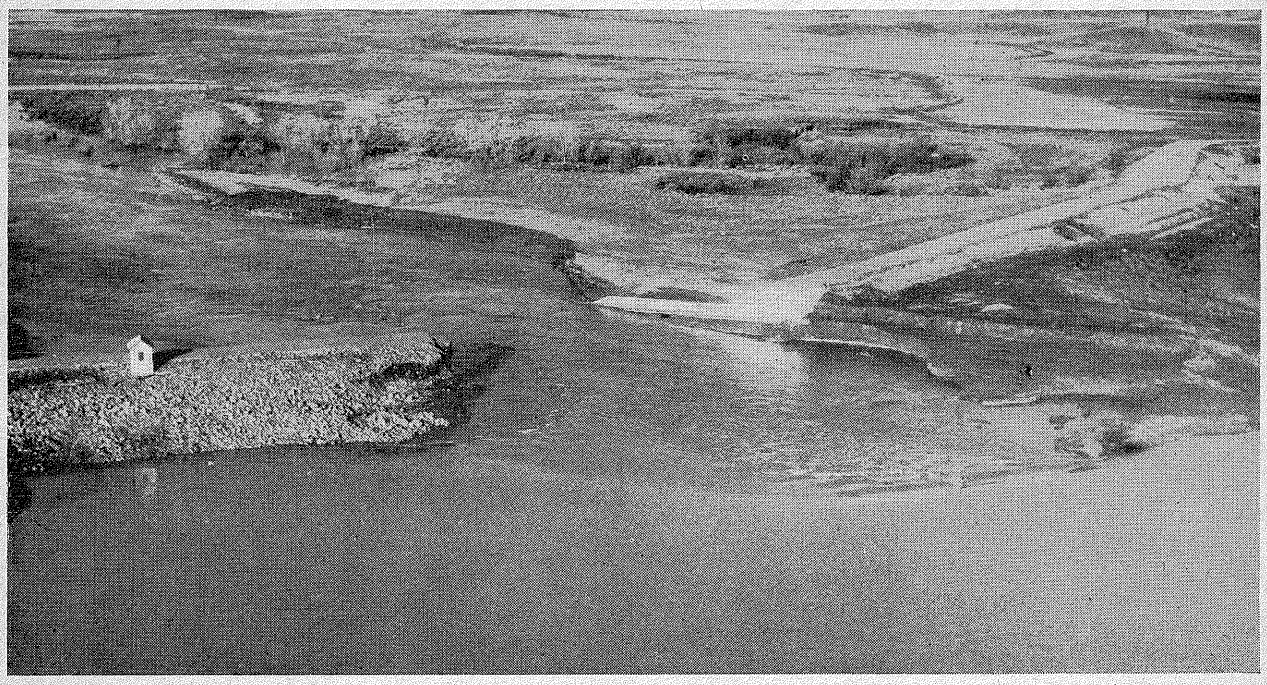
A. Frenchman Dam, Valleytown, Mont. View at 2 p. m., April 15, 1952. Dikes overflowing in foreground. (*Official photo U. S. Corps of Engineers.*)



B. Frenchman Dam, Valleytown, Mont. View at 5 p. m. April 15, 1952 just prior to failure. Note flow through left (looking downstream) abutment. (*Official photo U. S. Corps of Engineers.*)



A. Frenchman Dam, Valleytown, Mont. View at 5:45 p. m., April 15, 1952, after failure of left abutment. (*Official photo U. S. Corps of Engineers.*)



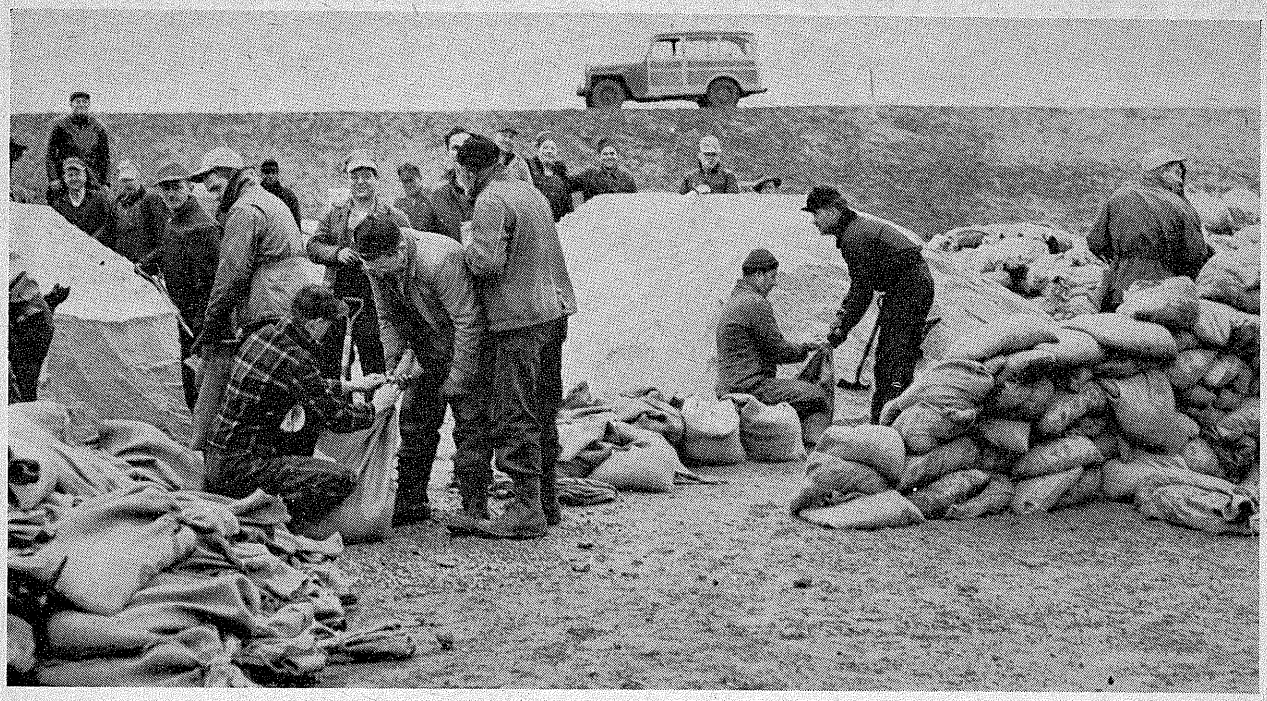
B. Frenchman Dam, Valleytown, Mont. View at 6:45 a. m., April 16, 1952. Structure has been destroyed. (*Official photo U. S. Corps of Engineers.*)

A. Missouri River, Bismarck, N. Dak., April 6, 1952, about 6 p. m., at crest stage 27.9 feet. View looking east shows Park Hill addition in foreground and lighting towers of flooded ball park in center. (*Courtesy Bismarck Tribune.*)

B. Pierre, S. Dak., looking across town toward Capitol Building. One hundred blocks inundated. Photo taken Thursday noon, April 10, 1952, shortly before the river reached its crest of 25.35 feet.

A. Missouri River at Chamberlain, S. Dak. Note railroad cars on bridge in foreground, placed there to keep rest of span from moving out. April 1952.

B. Missouri River at Sioux City, Iowa, 1½ days prior to crest, looking downstream, with Sioux City on left bank and South Sioux City, Nebr., on right bank.

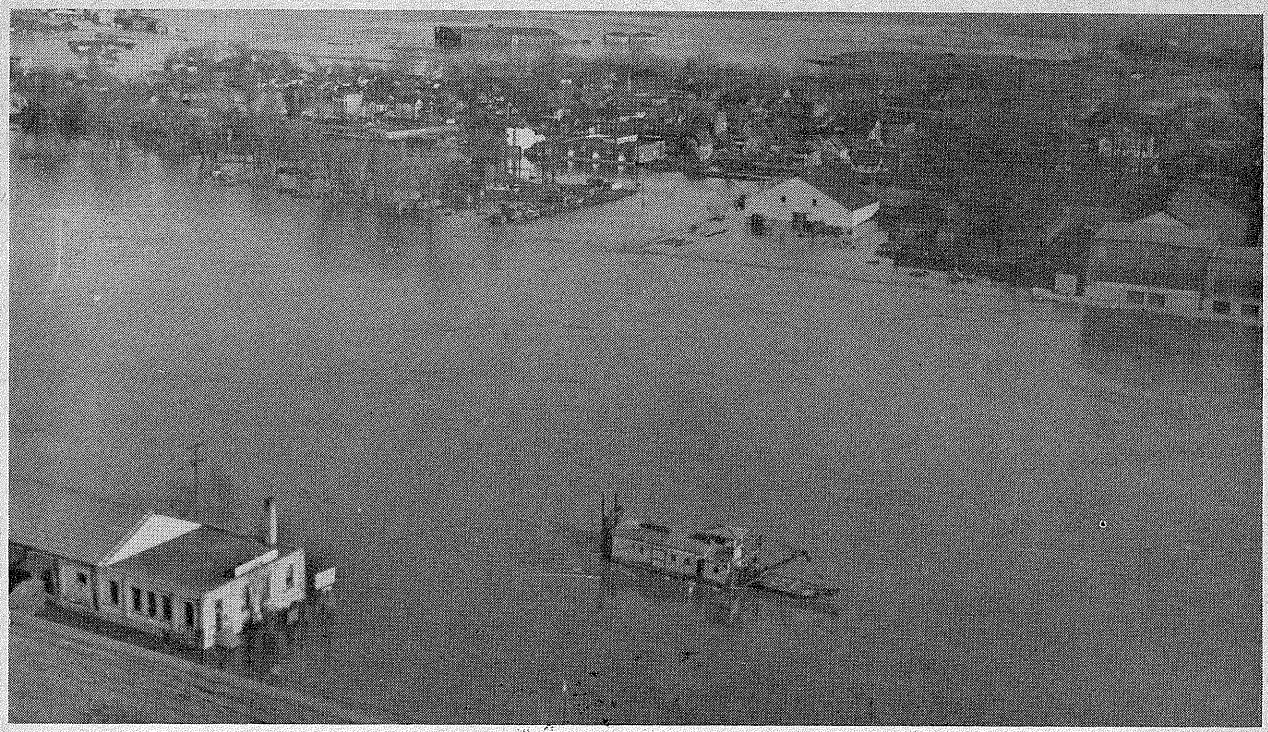


A. Flood fight behind the levee, 60th and Walker Streets, North Omaha, Nebr. Workers at this and other sites filled sandbags at the rate of 15,000 an hour. About 5½ million bags were used. (*Courtesy Omaha World Herald.*)

B. Flashboards going up at waterworks north of Council Bluffs, Iowa, days in advance of the crest. These were reinforced by sandbags, front and back. About 800,000 board feet of lumber were used. (*Courtesy Omaha World Hearld.*)

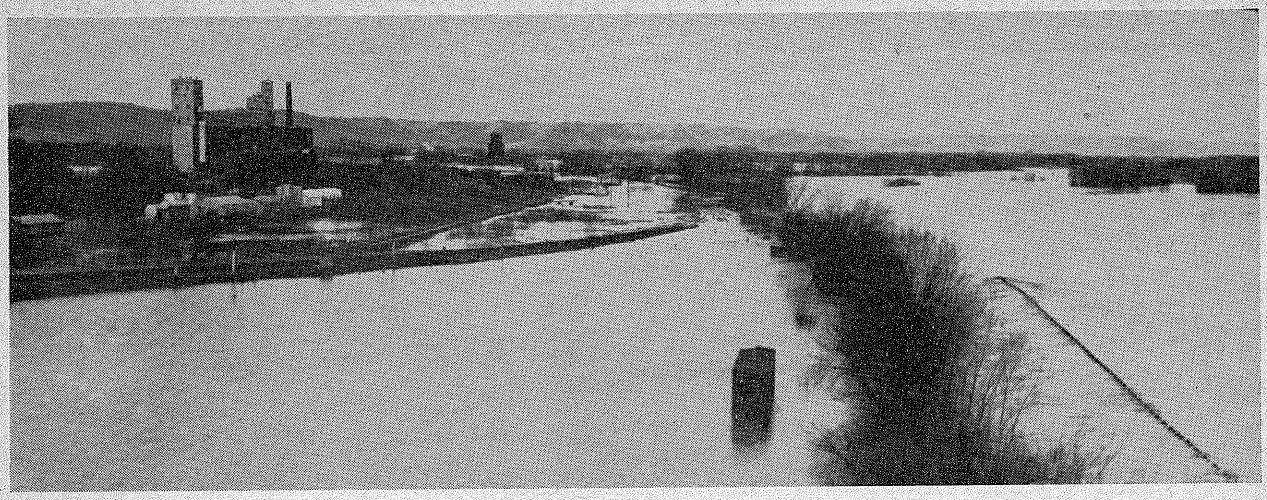
A. An endless procession of trucks hauled 21,000 cubic yards of dirt to raise this ¾ mile stretch of levee south of Council Bluffs, Iowa. A total of 225,000 cubic yards of earth was moved in the Omaha area. (*Courtesy Omaha World Herald.*)

B. Missouri River near St. Joseph, Mo., April 29, 1952, stage 20 feet (crest was 26.82 feet, April 22). View looking southwest shows cutoff after recession from crest. Main channel in immediate foreground and also in background. A similar cutoff, not shown, just north of this point separated St. Joseph Municipal Airport (Rosecrans Field) from the city. (*Official photo U. S. Corps of Engineers.*)

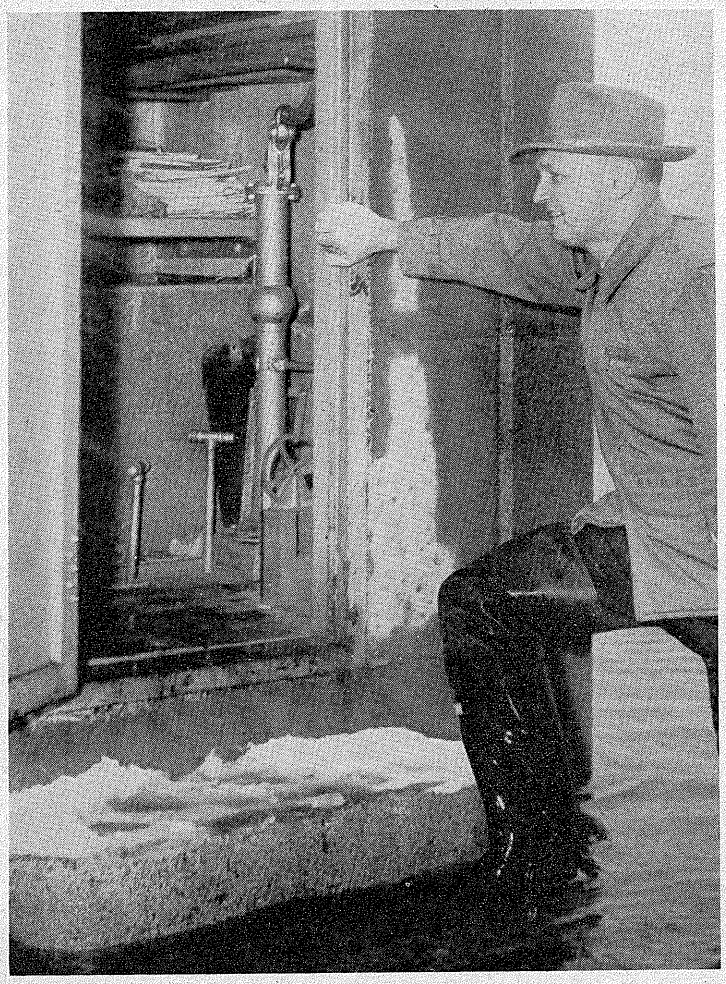


A. Mississippi River at St. Paul, Minn., stage 22.1 feet, April 16, 1952. Flooded industrial area in foreground, residential area in center, and municipal airport in background. (*Official photo U. S. Corps of Engineers.*)

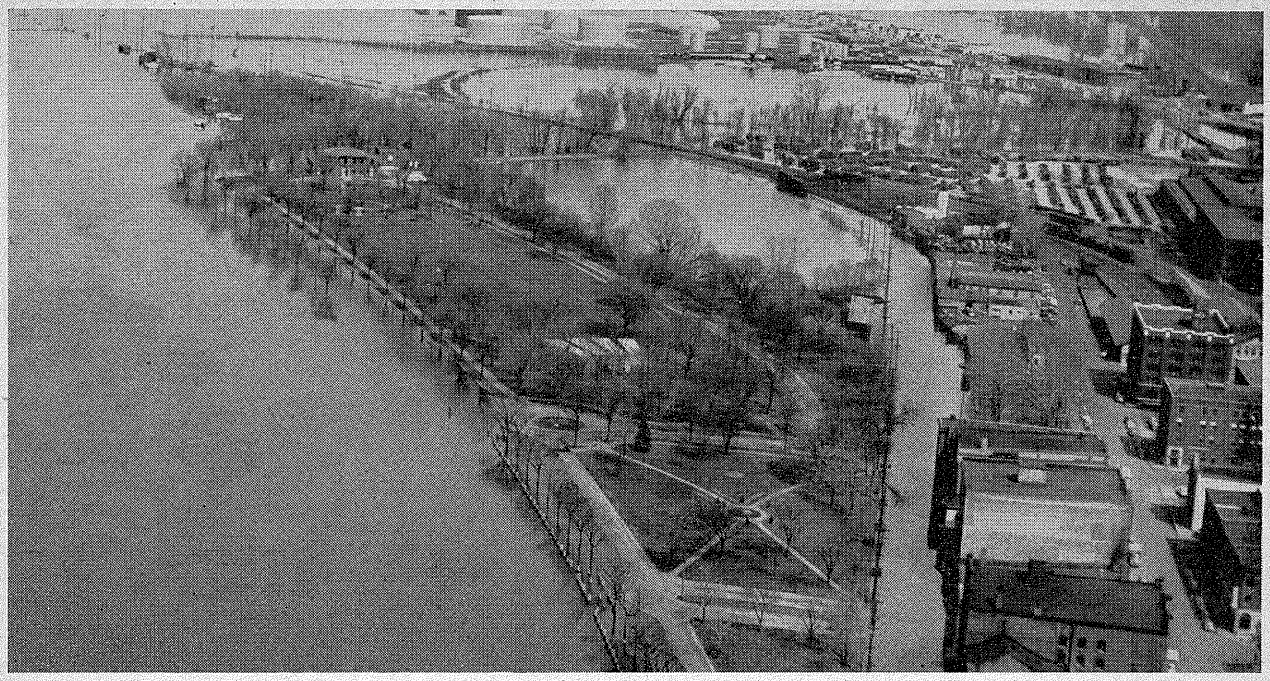
B. Mississippi River at South St. Paul, Minn., stage 22.1 feet, April 16, 1952. Emergency levees protecting meatpacking companies. (*Official photo U. S. Corps of Engineers.*)



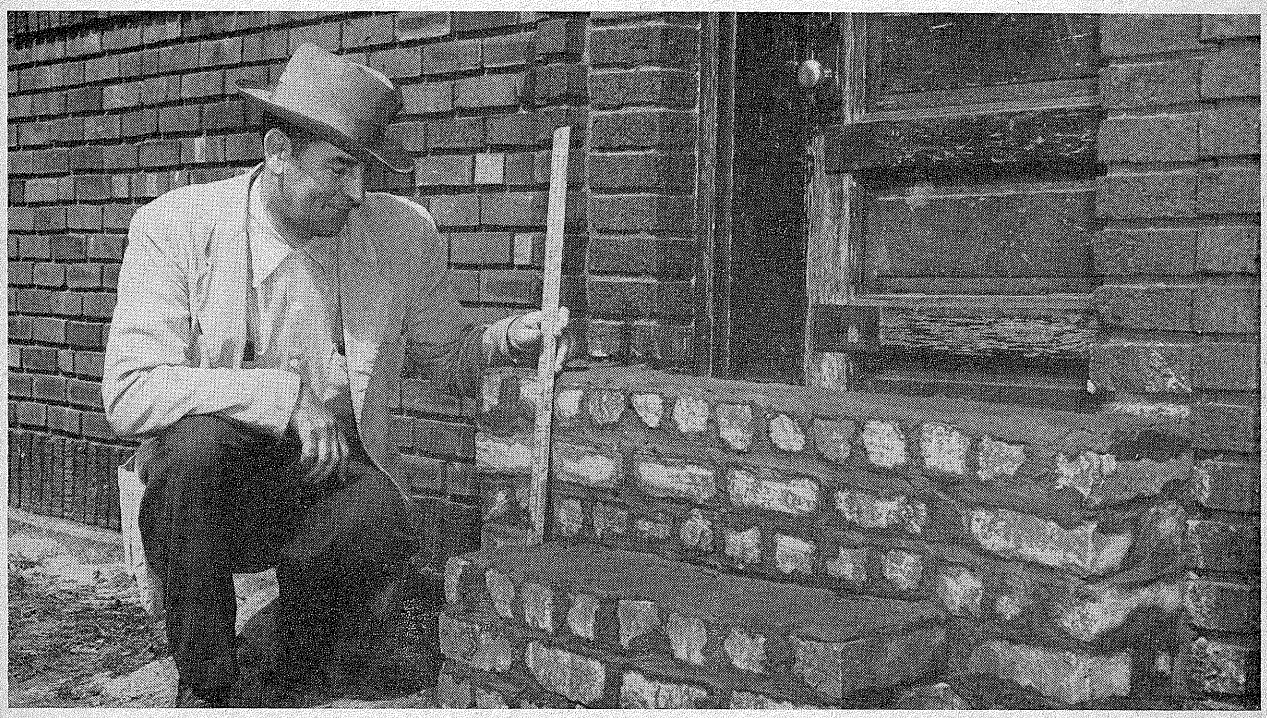
A. Mississippi River at Winona, Minn., stage 17.8 feet, April 22, 1952. View looking upstream from highway bridge. (*Official photo, U. S. Corps of Engineers.*)



B. Cooperative weather and river observer at Winona, Minn., wading through a rising Mississippi to read the river gage. (*Republican-Herald photo by Merritt Kelley.*)

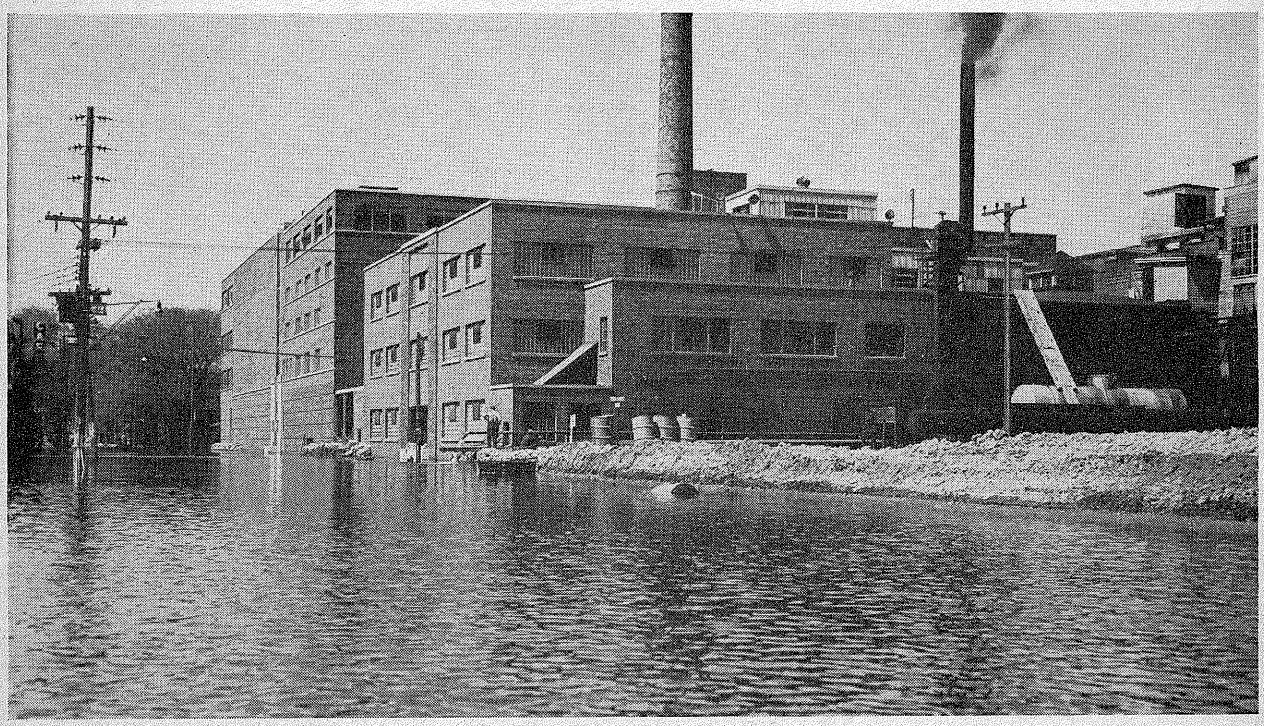


A. Mississippi River at La Crosse, Wis. Riverside Park and part of wholesale business district. (*La Crosse Tribune photo.*)



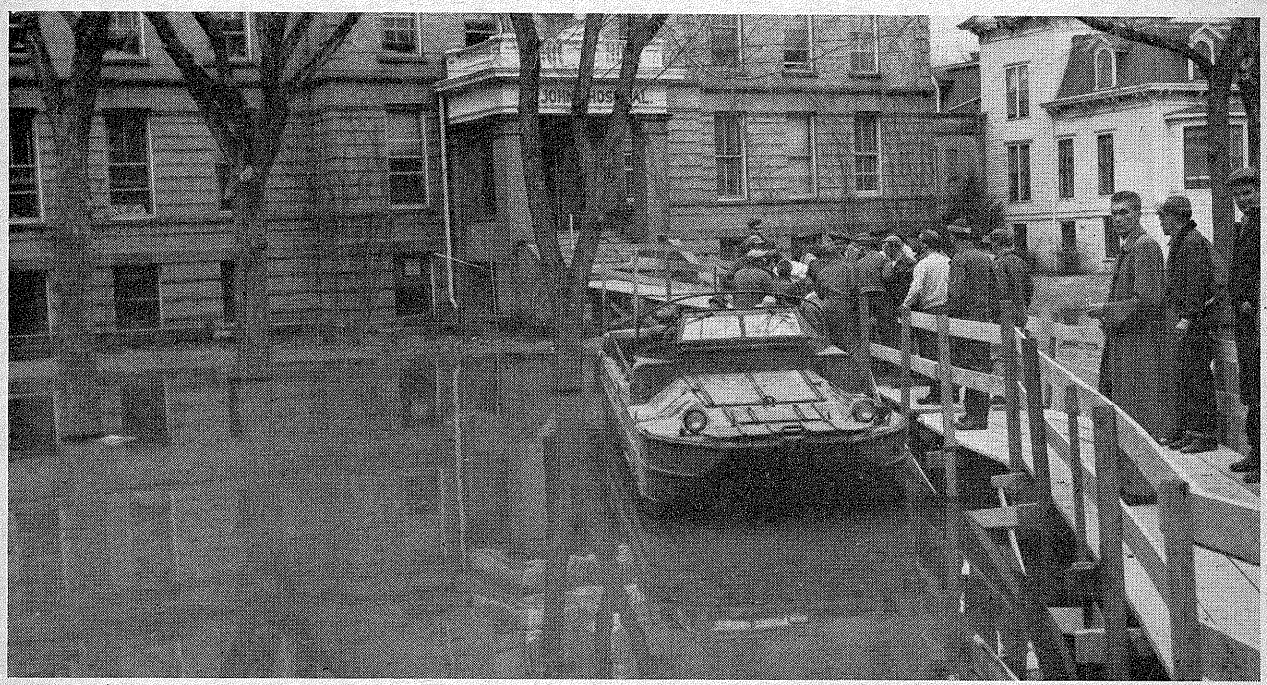
B. Dubuque, Iowa, April 17, 1952. City garage was ready for the crest 8 days before it arrived. Present stage was 19.6 feet and crest was 22.7 feet on April 25. Note stone masonry protection. (*Courtesy Mel Schieltz, Telegraph Herald.*)

A. Dubuque, Iowa, April 17, 1952. Construction of dike around Dubuque Packing Co. 8 days before crest. (*Courtesy Mel Schieltz, Telegraph Herald.*)



B. Dubuque, Iowa, April 27, 1952. View of same plant 10 days later, stage 22.5 feet, and shortly after the crest. (*Courtesy Mel Schieltz, Telegraph Herald.*)

A. Red River of the North, Fargo, N. Dak., April 14, 1952, stage 33.5 feet. Flood warnings enabled construction of dike which successfully protected Veterans Hospital buildings. (*Courtesy Fargo Forum.*)



B. Evacuation of patients from St. Johns Hospital to Veterans Hospital, Fargo, N. Dak., April 12, 1952. Present stage of Red River of the North, 30.13 feet. Crest was 34.65 feet at noon, April 16, 1952 (*Courtesy Fargo Forum.*)

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