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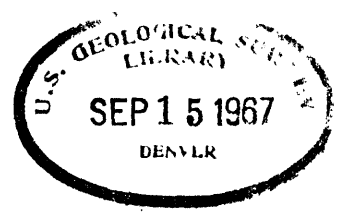
FLOODS IN NORTH AND SOUTH DAKOTA FREQUENCY AND MAGNITUDE

By
John A. McCabe and Orlo A. Crosby

Prepared in cooperation with the
NORTH DAKOTA STATE HIGHWAY DEPARTMENT AND
THE SOUTH DAKOTA DEPARTMENT OF HIGHWAYS



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PREFACE

This report was prepared by the U. S. Geological Survey in cooperation with the North Dakota State Highway Department and the South Dakota Department of Highways. The work was performed under the supervision of H. M. Erskine, District Engineer, Surface Water Branch, Water Resources Division, U. S. Geological Survey. The authors were assisted by R. E. West. Advice and review were furnished by the Floods Section, Surface Water Branch, Washington, D. C.

The streamflow records used in this report were collected and compiled by the U. S. Geological Survey cooperating with the following agencies: the North Dakota State Engineer and State Water Conservation Commission; the South Dakota State Engineer, State Geologist, State Fish and Game Commission, and State Water Resources Commission; the Corps of Engineers, Department of the Army; the Department of State; the Bureau of Reclamation and the Fish and Wildlife Service, Department of the Interior; the Soil Conservation Service, Department of Agriculture; and others.

CONTENTS

1/ Station number, plate 1

CONTENTS

CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS

TABLE

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ABSTRACT

The magnitude of a flood of a selected frequency for any point in the two states may be determined by methods outlined in this report, with two limitations. These methods are not applicable for regulated streams or for small drainage areas (in general, less than 100 square miles). The determination of the magnitude of a flood of a selected frequency in the two-state area is accomplished by the use of composite frequency curves for 2 flood regions and curves showing variation of mean annual flood with drainage area for 9 hydrologic areas and 10 main-stem streams.

These curves are based on all flood data collected in North and South Dakota with some use made of records from adjoining states. These data are tabulated in the report.

Also included in the report is a tabulation of maximum flood experiences at gaging stations and outstanding floods at many miscellaneous sites.

INTRODUCTION

When loss of life is not a factor, it is generally not economically sound to design structures in or across streams for the maximum flood that may occur. Economic considerations will dictate the choice of a design frequency. An evaluation of these economic factors is beyond the scope of this report. With the procedures outlined in this report it will be possible to determine, at any point on most streams, the magnitude of a flood for the frequency selected. These procedures are not applicable to regulated streams or small (less than 100 square miles) drainage areas. The results obtained in this study have been based on all flood experiences in the Dakotas. The methods used are those developed by the Geological Survey.

Description of the Area

Physiography

The Dakotas are located in two provinces of the Interior Plains. Fenneman (1930, 1938) defines the boundary between these provinces; the Great Plains lie to the west and the Central Lowland to the east. The boundary between the glaciated and unglaciated portions of the Missouri Plateau and the outline of the Black Hills, taken from Fenneman, are shown on figure 1. The outline of the Turtle Mountains and glacial Lake Agassiz in North Dakota was taken from a report by Simpson (1929). The outlines of glacial Lakes Souris, Sargent and Dakota were supplied by the Bismarck office of the Bureau of Reclamation. The remaining detail in South Dakota was obtained from a report by Flint (1955).

West of the Missouri River, the drainage pattern is well defined but east of the Missouri River, owing to glacial activity, the drainage pattern is relatively new and poorly defined. Much of the Area in the Central Lowland and in the glaciated portion of the Missouri Plateau does not contribute runoff to the major streams. There are many closed basins varying in size from a few acres up to 3,940 square miles in the closed Devils Lake Basin. The surface runoff of these areas drains into potholes and lakes where it is lost through evaporation, transpiration and infiltration.

The Dakotas vary in altitude from 750 feet above mean sea level in northeastern North Dakota to 7,240 feet on Harney Peak in the Black Hills of South Dakota. With the exception of the Black Hills, all of the Dakotas is under 4,000 feet altitude.

Climate

Climate is one of the more important factors that influence flood frequencies and magnitudes. The climate in the Dakotas is of the Continental type with extremes of heat and cold and rapid fluctuations of temperatures. The average annual precipitation is 17 inches in North Dakota and 19 inches in South Dakota. This will vary from less than 15 inches in western North Dakota and northwestern South Dakota to 22 inches in eastern North Dakota, and 25 inches in southeastern South Dakota and in parts of the Black Hills.

About 75 percent of the precipitation will occur during the months from April to August. Most of the precipitation in the months from May to August is from thunderstorms.

The average annual temperature is 40° in North Dakota and 45° in South Dakota. This will vary from a mean January temperature of 7° in North Dakota and 17° in South Dakota to a mean July temperature of 70° in North Dakota and 73° in South Dakota.

The relatively low winter temperatures can result in an accumulation of snow cover from storms in November or December through March.

Causes of Floods

Annual floods in the Dakotas are of two distinct types that are primarily influenced by different weather conditions. The magnitude of the spring flood peak is the resultant of several factors: snow cover, antecedent

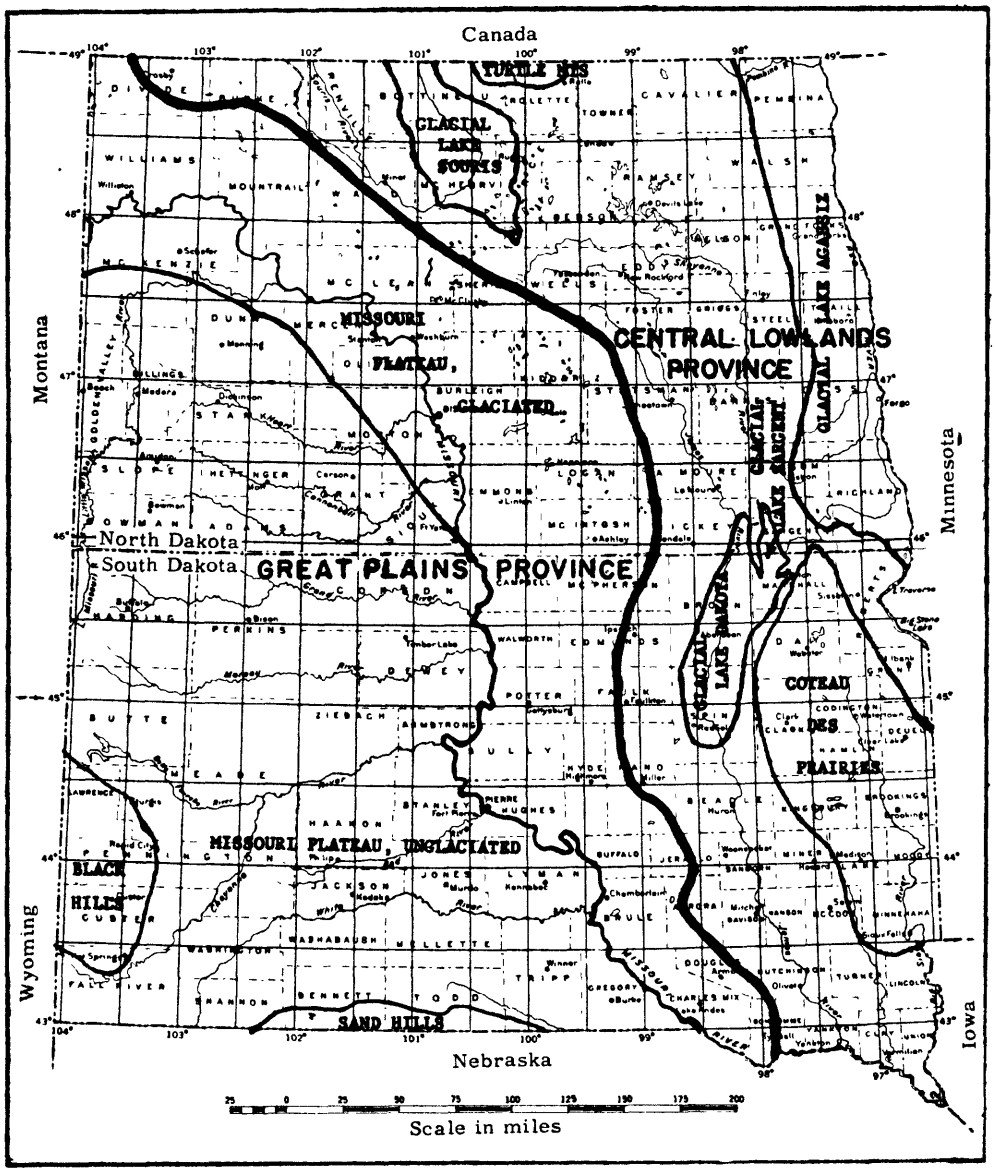

Figure 1. --Map of North and South Dakota showing variations in physiography.

soil moisture conditions, precipitation during the breakup, previous winter temperatures, temperatures during the breakup, penetration of frost, ice jams, and time of occurrence of the breakup. The greatest breakup floods are caused by high antecedent soil moisture, heavy snow cover, frozen ground surface, precipitation during the breakup, and a seasonally late breakup. When the breakup is early in the spring, the timing of the changes in temperature may be such that the melting of the snow pack is spread over a week or two, thus reducing the magnitude of the peak. During a late breakup the temperatures will generally rise and remain above the freezing point, so that the melting of the snow cover will occur in a few days time.

One of the characteristics of breakup floods is the formation of ice jams. The forming and breaking of ice jams with the resultant storage and release of water can result in peak discharges that have no relation to the amount of snow cover, precipitation, or any of the other factors that influence the magnitude of a peak.

The other type of flood peak is caused by rainfall in the late spring, summer, or fall. In summer thunderclouds may produce heavy rainfall in a short time over small areas.

In eastern and central North Dakota and eastern South Dakota the annual maximum flood nearly always occurs during the spring breakup. In western North Dakota the annual maximum flood is associated with the spring breakup about two-thirds of the time. In southwestern South Dakota the annual maximum flood occurs during the spring breakup about half the time except throughout the Black Hills where the annual maximum flood is usually caused by heavy rainfall during the summer months.

More than 90 percent of the stations used in this analysis have a drainage area in excess of 200 square miles. On smaller drainage areas the thundercloud type of storm may produce proportionally more annual floods than our present data indicate.

Drainage Areas

East of the Missouri River, owing to poorly defined drainage patterns, there are large areas that do not contribute directly to surface runoff. Precipitation that falls on these areas is collected in lakes and potholes where it is intercepted through evaporation, transpiration, or infiltration. Therefore, contributing drainage area rather than total drainage area has been used in this analysis. The noncontributing area is relatively large at some stations, being as great as two-thirds of the total area. The division between contributing and noncontributing area is frequently difficult to define. Until good topographic maps are available for the Dakotas, a usable figure can be obtained from the best available maps.

DETERMINATION OF DISCHARGE FOR A SELECTED FLOOD FREQUENCY

Tributary Sites (except for regulation)

At gaged or ungaged sites on the tributaries of the Missouri River and the Red River of the North, the following procedure will enable the reader to determine the magnitude of the flood for the selected frequency. This procedure is not applicable for the main stems of the Red River of the North, Missouri, Pembina, Little Missouri, Cheyenne, Belle Fourche, White, James, Big Sioux and Souris downstream from Lake Darling, N. Dak. Furthermore it is not applicable for reaches of certain other streams, as explained on page 5.

1. Determine the contributing drainage area of the stream above the site.

2. Determine the number of the hydrologic area in which the site is located from figure 2.

3. With the contributing drainage area as determined in step 1 and the number of the hydrologic area in step 2, select the mean annual flood from figure 3.

4. Determine the flood-frequency region in which the site is located from figure 4.

5. Determine the ratio of the flood for the selected frequency to the mean annual flood from figure 5 or 6.

6. Multiply the mean annual flood obtained in step 3 by the ratio obtained in step 5. This is the discharge of the flood for the selected frequency.

7. If a flood-frequency curve is required for the site, steps 5 and 6 can be repeated for selected frequencies and the curve developed. Caution should be exercised in extending this curve beyond its limit of definition.

Main Stems (except Souris and Missouri)

Certain larger streams in the two States have characteristics differing from the smaller ones because they cross boundary lines of hydrologic areas and flood-frequency regions. The timing of flood peaks entering the main stem from large tributaries compared to the timing of the flood peak traveling down the main stem is also a factor. For this reason separate curves of mean annual flood plotted against drainage area are required.

These streams are the Red River of the North, Pembina, Little Missouri, Cheyenne, Belle Fourche, White, James, and Big Sioux. The discharge for a selected frequency can be obtained by the same method as outlined for the tributary sites except that the mean annual flood is selected from figures 7 or 8. The discharge for a selected frequency for the James River for sites located in region B (fig. 4) can be obtained by weighting region A and B factors according to drainage area involved using the mean annual flood selected from figure 7.

Souris River

A series of pools and dams was constructed by the U. S. Fish and Wildlife Service on the Souris and Des Lacs Rivers in the period 1935-37. Since that time the Souris River downstream from Lake Darling has been regulated. When a stream is so regulated, the natural flood-frequency and magnitude characteristics are modified. The records for this stream were analyzed separately and separate frequency and magnitude curves were determined for the base period 1937-55. The discharge for a selected frequency on the Souris River below Lake Darling can be selected in the following manner:

1. Determine the distance downstream from the Canadian-United States boundary and select the mean annual flood from figure 9.

2. Using the frequency selected on the basis of economic considerations determine the ratio of the flood for the selected frequency to the mean annual flood from figure 10.

3. Multiply the result obtained in step 1 by the result in step 2 to obtain the discharge. A flood-frequency curve for the site can be computed by repeating steps 2 and 3 for selected frequencies.

These curves represent average operating procedures at the U. S. Fish and Wildlife Service structures and they should not be used in a probability sense without a study of the operating procedures.

Missouri River

Major regulation began on the Missouri River with the completion of Fort Peck Dam and Reservoir in 1937. No other large structures were built until the closure of Fort Randall Dam in 1952, of Garrison Dam in 1954, and of Gavins Point Dam in 1955. Flood-frequency and magnitude characteristics were materially changed after the closure of Fort Peck Dam and again when Fort Randall, Garrison, and Gavins Point structures were

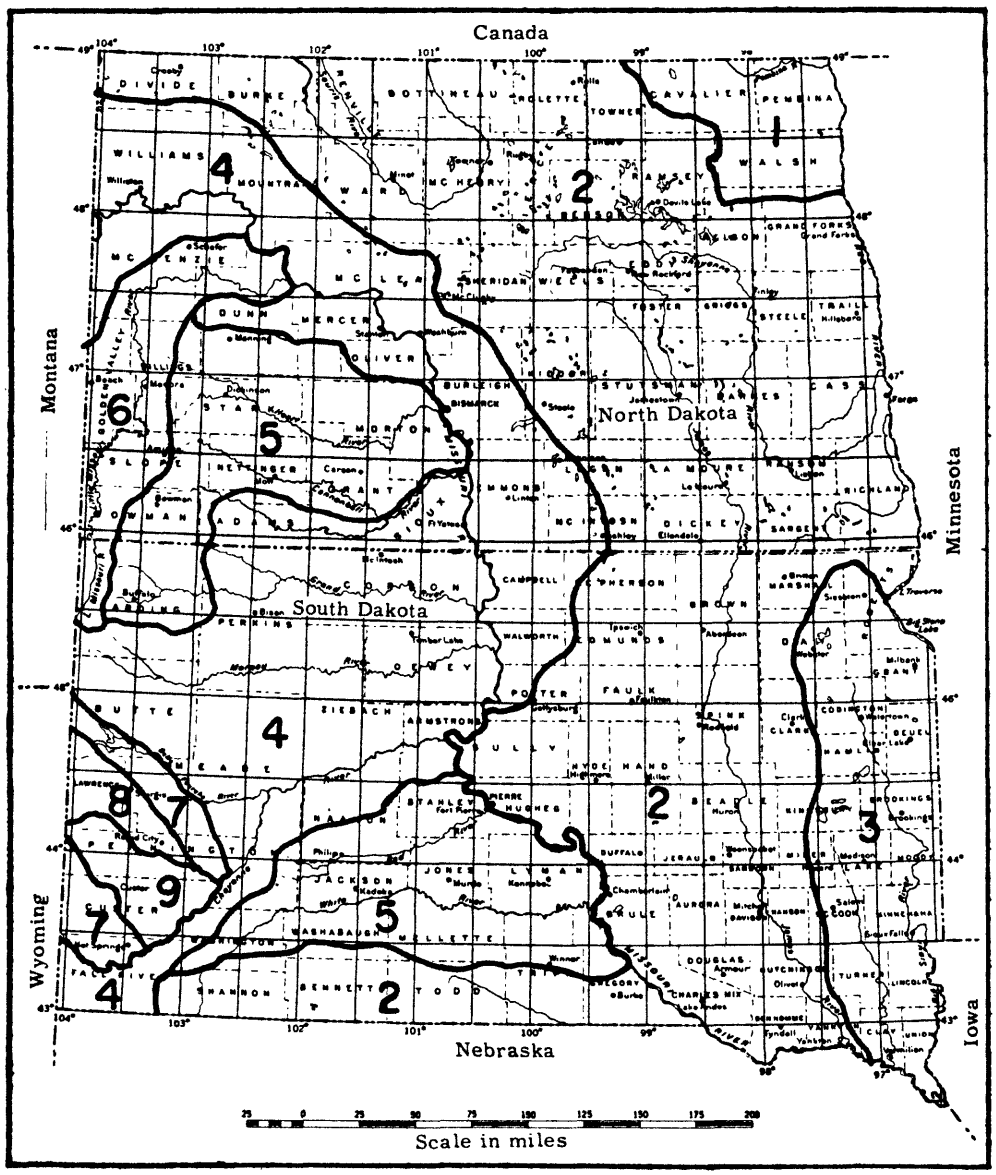

Figure 2.--Map of North and South Dakota showing hydrologic areas used to develop a relation between mean annual flood and contributing drainage area.

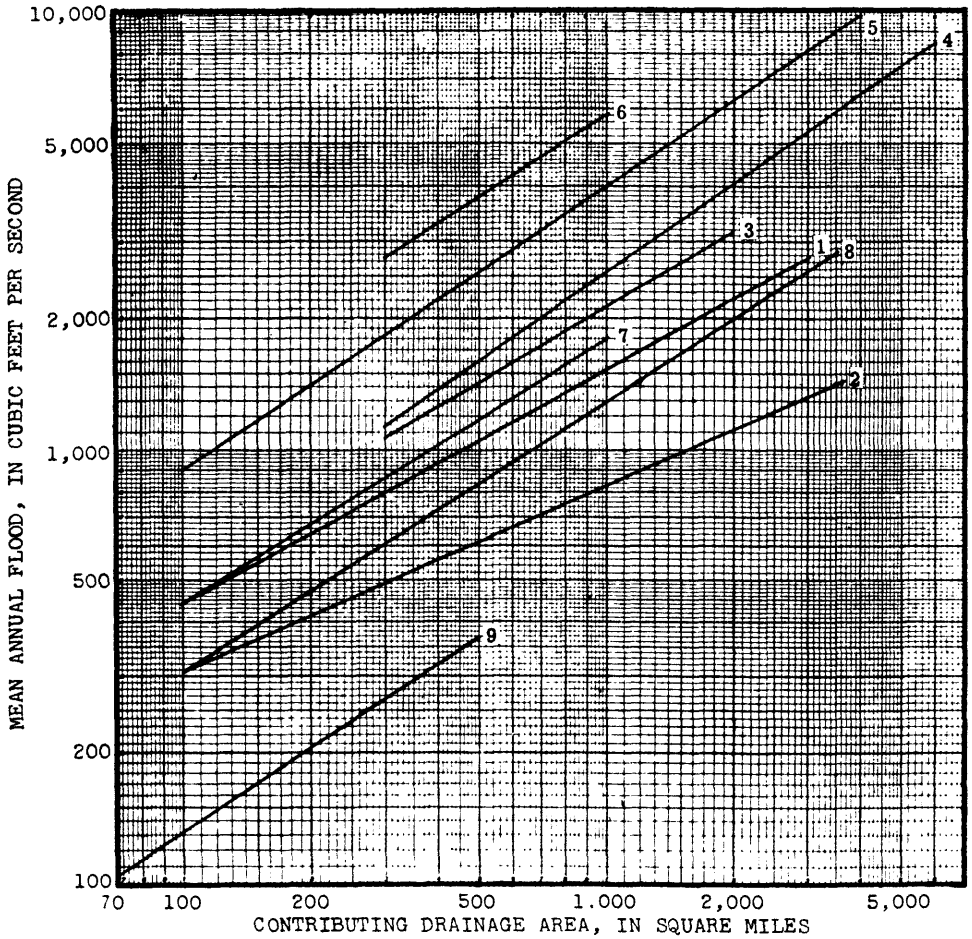

Figure 3. --Variation of mean annual flood with contributing drainage area in hydrologic areas 1-9.

built. With these changes in regulation it would not be feasible to plan future events on the basis of past records. If the past history of the flood events of this stream is desired, figures 11 and 12 give the variation of the mean annual flood and the frequency of annual floods for the period 1938-52.

Regulated Streams

With the exception of the Souris River where there has been sufficient record to define the modifications due to regulation, the frequency methods outlined herein are not applicable where flood peaks have been changed by the construction and operation of diversion and storage projects. At the time of writing this report these methods are not applicable for the following reaches:

Sheyenne River from Baldhill Dam to the mouth.
South Branch Park River from Homme Dam to the mouth.
Des Lacs River.
Missouri River downstream from Garrison Dam.
Heart River from Dickinson Dam to mouth of the Green River and from Heart Butte Dam to the mouth.
Grand River from Shadehill Dam to the mouth.
Cheyenne River from Angostura Dam to mouth of Belle Fourche River.
Castle Creek from Deerfield Reservoir to the mouth.
Rapid Creek from mouth of Castle Creek to the mouth.
Belle Fourche River above Redwater Creek.
James River from Jamestown Dam to LaMoure, N. Dak.

FLOOD-FREQUENCY ANALYSIS

Flood Frequency at a Gaging Station

Types of Series

There are two types of flood series, the annual-flood and the partial-duration. The annual-flood series is an array of the maximum discharge for each year of record in order of magnitude. A fault of the annual-flood series is that it omits the secondary floods, which in high years might be higher than the annual floods in most years. That fault is overcome in the partial-

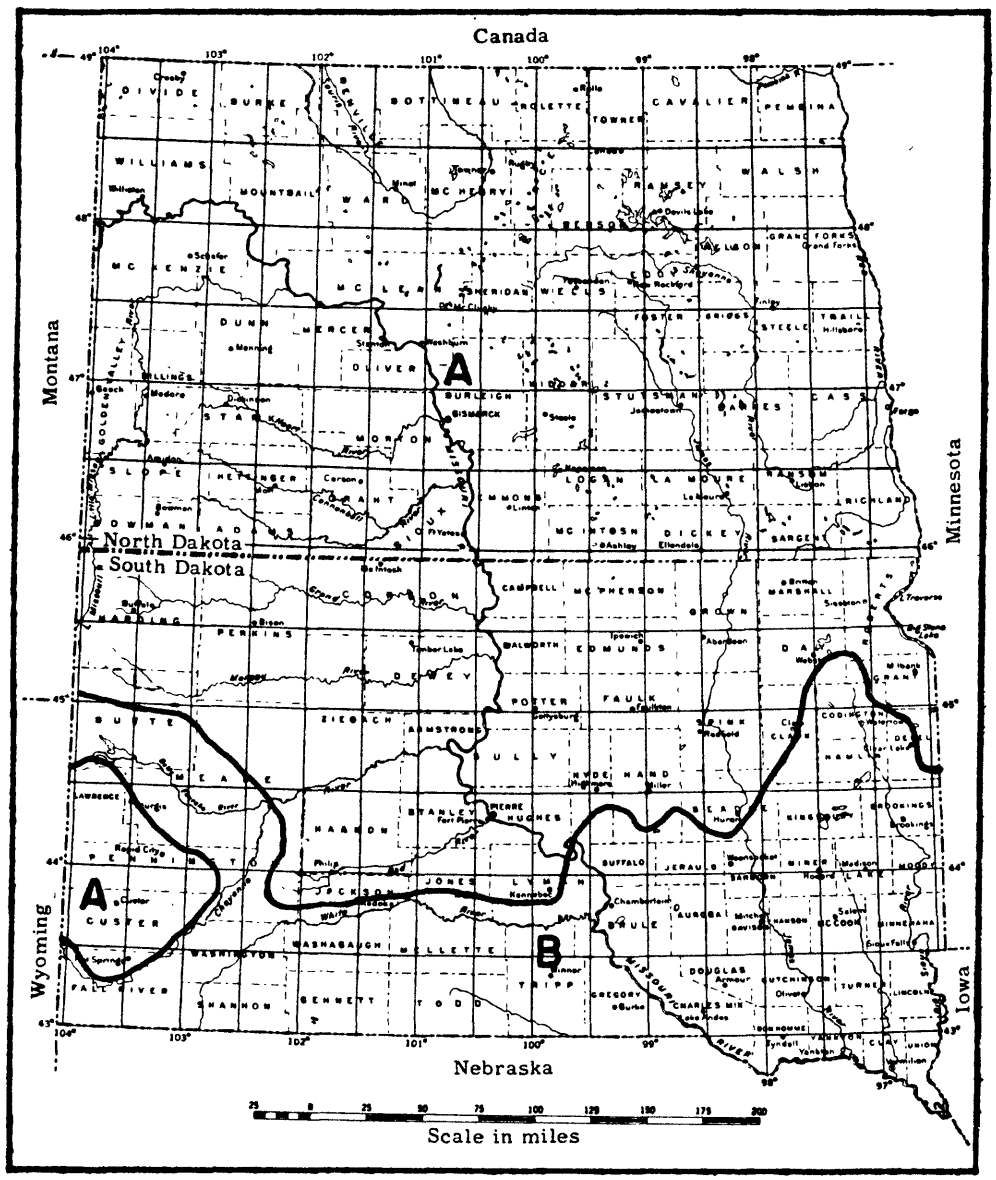

Figure 4.--Map of North and South Dakota showing regions having similar flood-frequency characteristics.

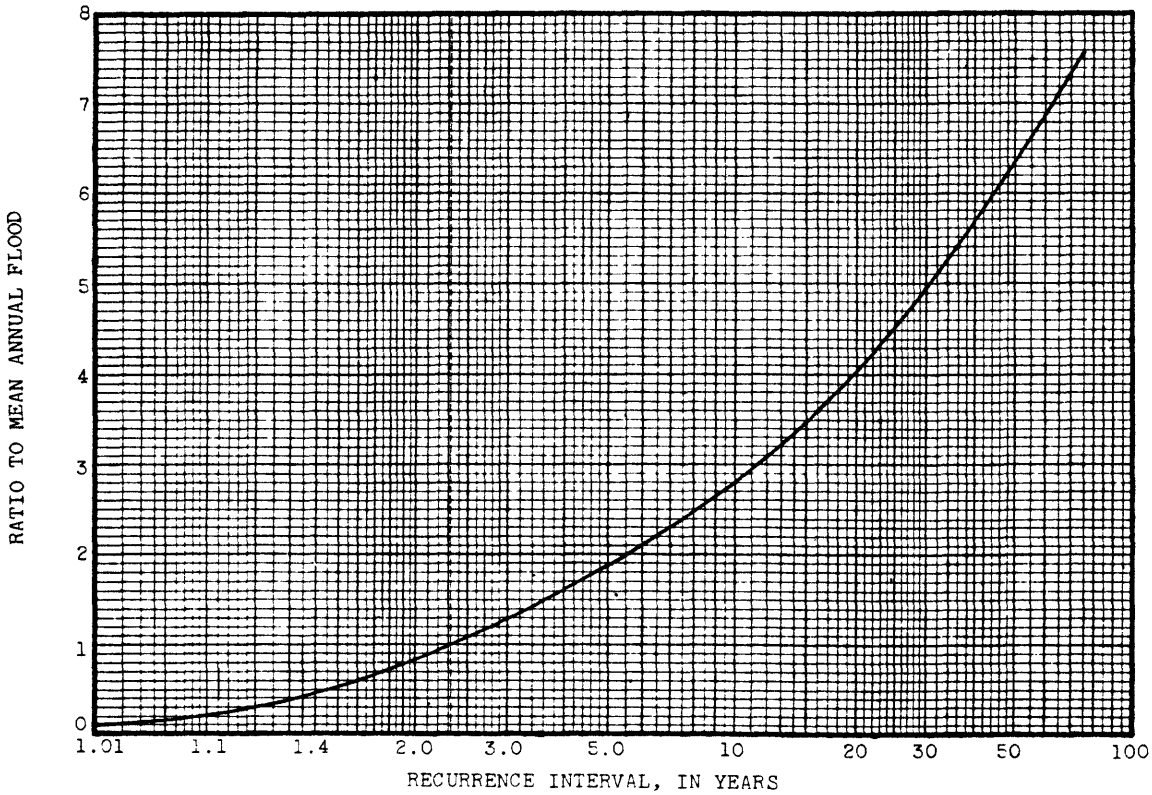

Figure 5.--Composite frequency of annual floods, region A, 1882-1955.

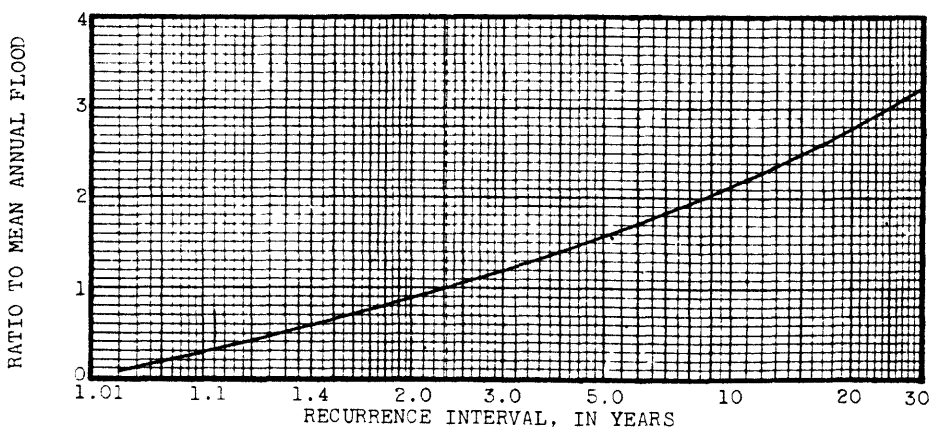

Figure 6.--Composite frequency of annual floods, region B, 1929-55.

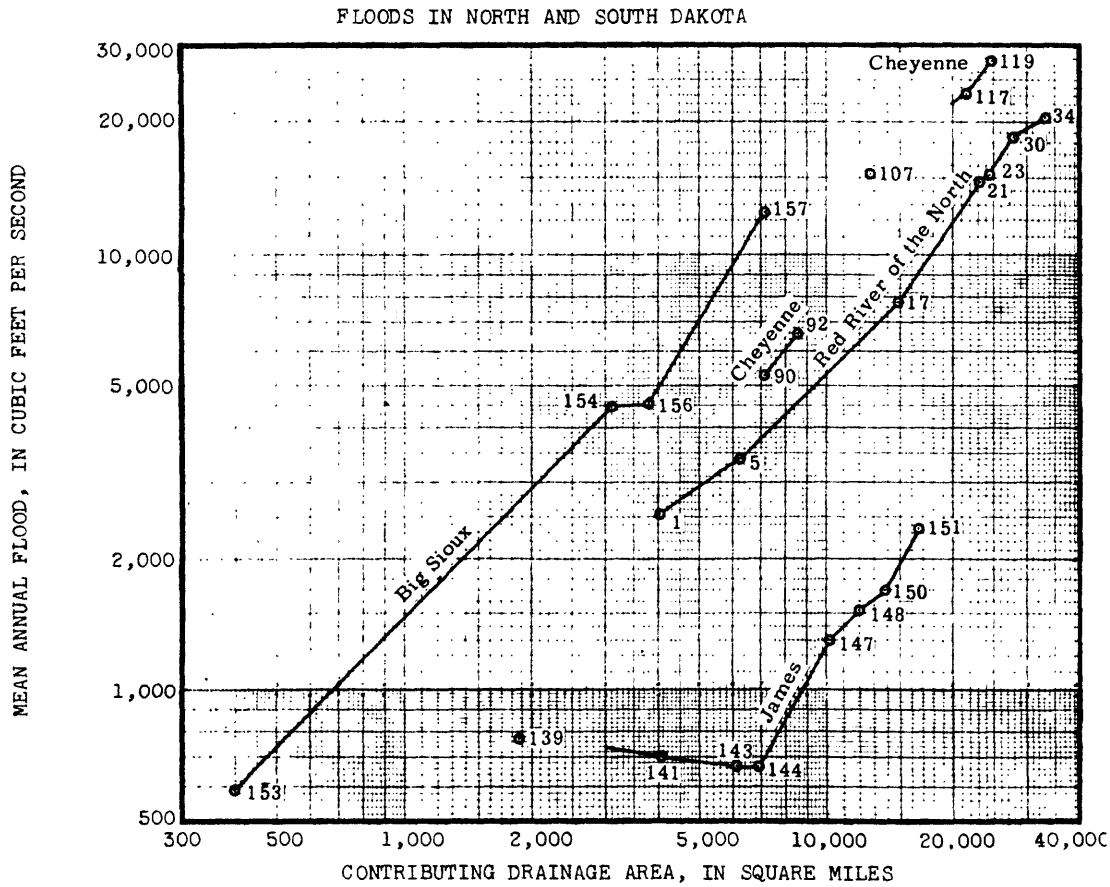

Figure 7. --Variation of mean annual flood with contributing drainage area on the main stems of Big Sioux, James and Cheyenne Rivers, and Red River of the North.

Note. --Numbered points refer to gaging stations on plate 1 and in table 1.

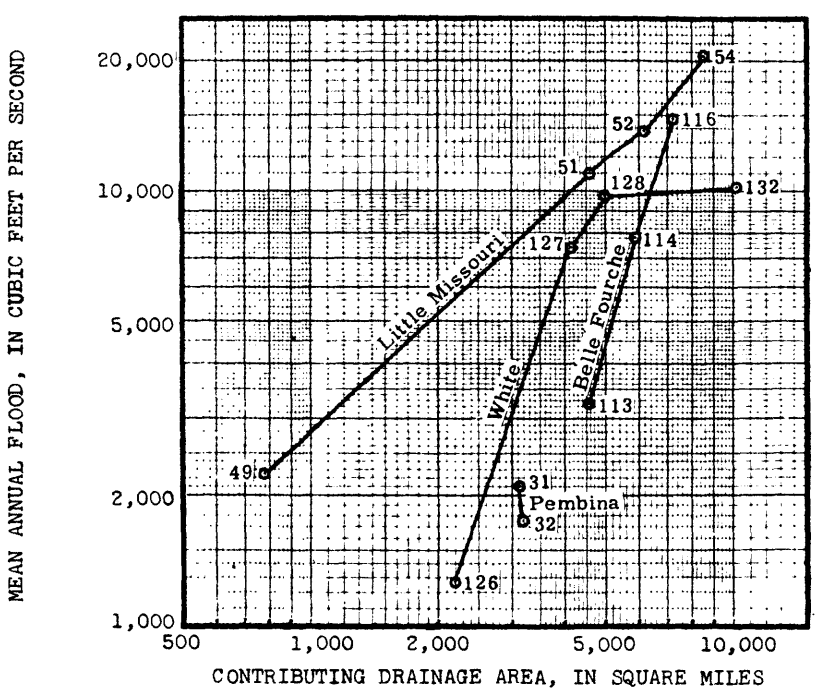

Figure 8. --Variation of mean annual flood with drainage area on the main stems of Little Missouri, White, Belle Fourche, and Pembina Rivers.

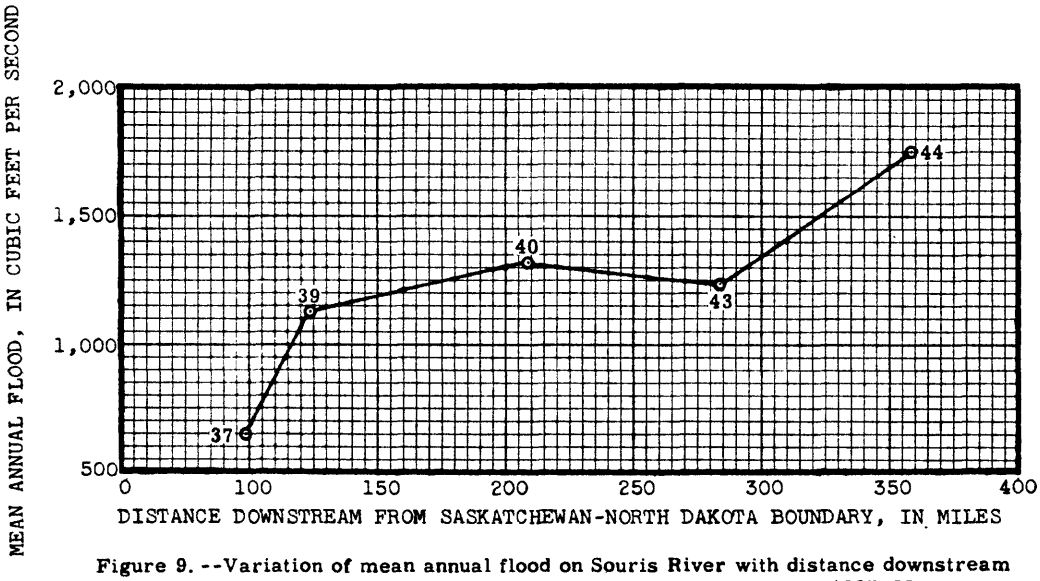

Figure 9.--Variation of mean annual flood on Souris River with distance downstream from Saskatchewan-North Dakota boundary, base period 1937-55.

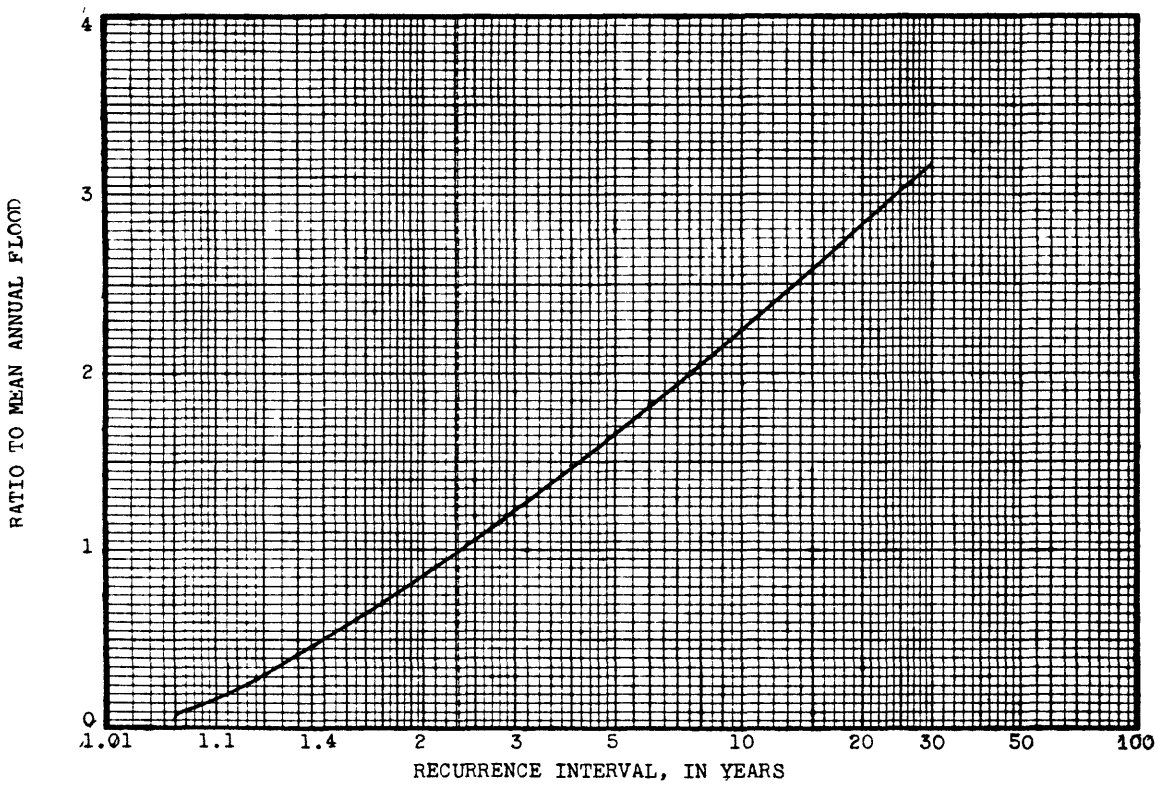

Figure 10.--Composite frequency of annual floods, Souris River below Lake Darling, N. Dak., 1937-55.

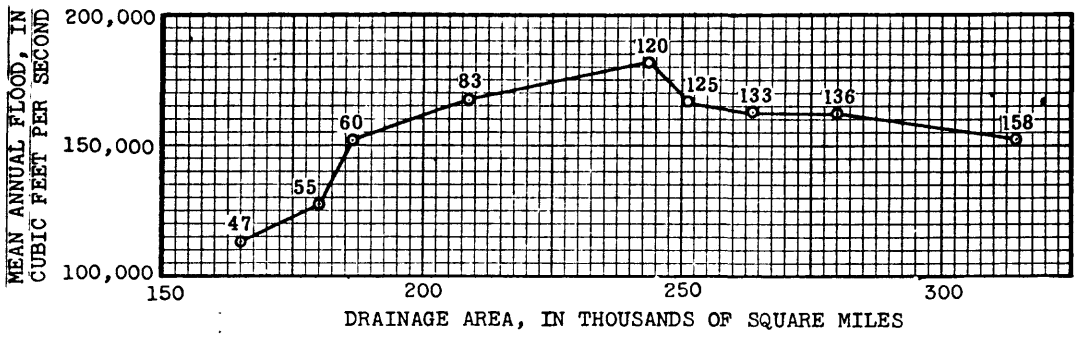

Figure 11.--Variation of mean annual flood with drainage area on Missouri River, base period 1938-52.

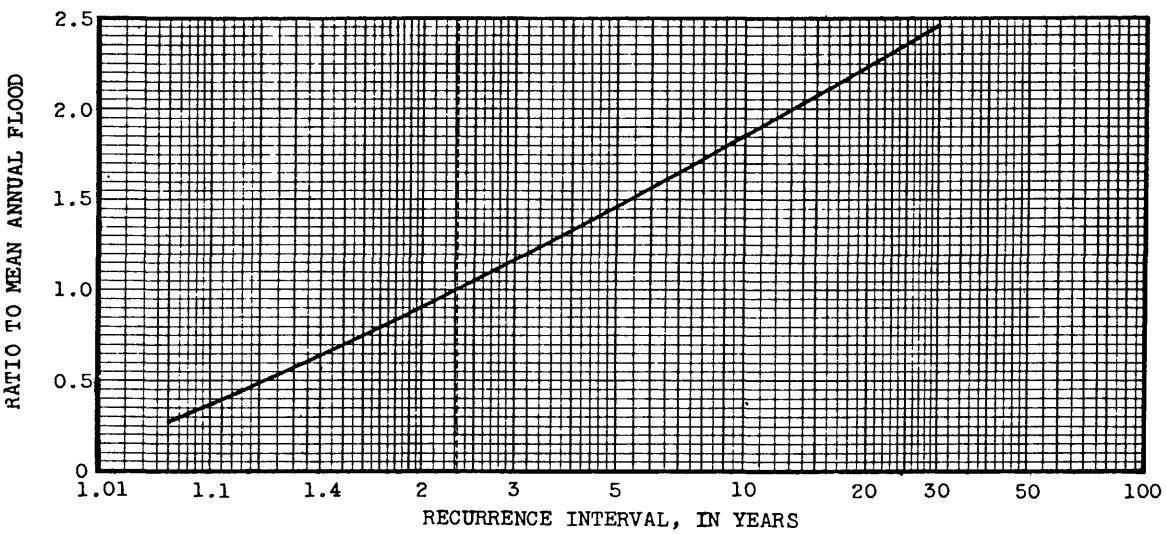

Figure 12.--Composite frequency of annual floods, Missouri River main stem, 1938-52.

duration series, which is an array of all floods above a base irrespective of the number of floods in any one year. A fault of the partial-duration series is that floods in any one year may not all be independent events; that is, one flood may set the stage for a higher or lower flood. For the purpose of overcoming that fault, the following rules were observed in listing the partial-duration series in this report:

1. Only the highest of two or more peaks were listed if they occurred within 48 hours of each other unless there was conclusive evidence that they were independent events.

2. Only the higher of two adjacent peaks was listed if the discharge of the trough between the two was within 25 percent of the discharge of the lower peak.

3. Only one peak was listed for periods of diurnal peaks caused by snow melt for each distinct period of melting.

Langbein (1949) has shown by statistical principles that there is a relationship between the two types of series and that equivalent results will be obtained by use of either series if the length of the record is 10 years or longer. The following table by Langbein illustrates this relationship.

Recurrence intervals in years	
Annual-flood series	Partial-duration series
1.16	0.5
1.58	1.0
2.00	1.45
2.54	2.0
5.52	5.0
10.5	10
20.5	20
50.5	50
100.5	100

In the tables accompanying this report both series are listed for many stations. Generally the partial-duration series has been listed for periods of use of a recording gage. The frequency relations shown in this report are based completely on the annual-flood series. If the reader prefers the partial-duration series, he can use the above table to convert the results from the annual-flood series to the partial-duration series.

Plotting Positions

In order to fit a time scale to the array of annual floods a plotting position must be selected. Although there are several different ways to make this fit, probably the most common method and the one used in this report is $T = (n+1)/m$, shere T is the recurrence interval in years, n is the number of years of record and m is the order number of the flood with the highest flood of record being order number 1. These points are plotted on a special form (Powell, 1943) with discharge on a linear scale as the ordinate and recurrence interval on a scale graduated to the theory of extreme values (Gumbel, 1945) as the abscissa.

Historical Data

Historical floods can be used frequently to extend the frequency curve of a station to cover a longer period. This information may be obtained from newspaper files, old records of stage, local historical society records, and individuals who remember the event. It is of particular value if the order of magnitude of this historical flood can be established for the period up to and including the base period.

Fitting Frequency Curves

After the time scale is selected (see plotting position), it is necessary to fit a curve to the plotted points. Various frequency functions have been proposed whereby a curve can be fitted to these plotted points. Since the underlying law is not known, these functions serve no purpose as the results can not be extrapolated beyond the limits of the data. Only visually-fitted smooth curves were used in this report.

It is known that the maximum flood or floods of record may have a recurrence interval considerably larger than the actual period of record. Therefore, in drawing frequency curves more weight is given to the lower floods than to the higher floods.

Regional Frequency Analysis

Frequency curves obtained for individual stations have a limited use. Generally the period of record is so short that the sampling errors are quite large. A flood-frequency curve based on a number of stations is a firmer one than a curve based on only one station. In order to combine the records for a number of stations two conditions have to be met. The first condition is that the same (base) period of record be used for all of the stations, and the second is that the stations have similar flood-frequency characteristics.

Base Period

The first condition was met by adjusting all records to a base period covering the water years 1929-55. For region A, adjustment was made to a longer base period (1882 to 1955) on the basis of records for 13 long-term stations. One of these stations, the Red River of the North at Grand Forks, N. Dak., has a complete record of maximum discharges for the longer base period (74 years). The other 12 stations had periods of records ranging from 11 to 54 years with historical data available for the higher floods prior to the period of record at each station.

The available gaging-station records for each station do not completely cover the 27-year base period 1929-55 (fig. 13). In order to combine the individual stations, the same period of record must be used for each station. The actual record at each station was extended to the 27-year base period by computing a discharge for each year where there was no record. These computed discharges, which were based on correlation with long-term stations, were used only to assign more nearly correct order numbers to the years for which there were records available.

Homogeneity Test

The second condition that must be satisfied before records may be combined is that the individual stations have similar flood-frequency characteristics. The test set up to compare these characteristics involves determining whether differences in slopes of individual frequency curves are greater than might occur by chance in random sampling. The test has been set up on a 95 percent confidence level of one station in 20 plotting outside the upper or lower limits. The slope of each individual frequency curve is determined from the ratio of the 10-year flood to the mean annual flood. The 10-year flood is used because it is impossible to define a flood with larger recurrence interval at a number of the stations due to the short period of available record. All of the stations in the Dakotas and several stations in Minnesota, Montana, and Wyoming that satisfied the following criteria were used:

1. Station had five or more years of unregulated record of maximum discharges during the base period.

2. Drainage area at station differed from upstream or downstream station by more than 25 percent.

Records from a total of 112 stations were available for this test. The test indicated that the Dakotas are divided into two regions with similar flood-frequency characteristics in each region. These regions are outlined on figure 4. The stations in North Dakota, the northern half of South Dakota and in the Black Hills of South Dakota grouped together in one region (A), and the stations in the remainder of South Dakota grouped into another region (B). It is believed to be a coincidence that the Black Hills area has the same flood-frequency characteristics as the remainder of region A. A different set of causative factors in each area happened to give similar results.

The composite frequency curve for region A was defined by records of 87 stations for the period 1929-55 and extended on the basis of 13 long-term records for the period 1882-1955. The composite frequency curve for region B was defined by records of 25 stations for the period 1929-55.

Index no.	Gaging Station	Drainage area (square miles)		Mean annual flood (cfs)	Annual peak record, water years
		Contributing	Total		1900 1910 1920 1930 1940 1950 1955
	Red River of the North basin				
1	Red River of the North at Wahpeton, N. Dak.	4,010	4,010	2,520	
2	Wild Rice River near Mantador, N. Dak.	1,010	1,540	240	
3	Antelope Creek at Dwight, N. Dak.	224	267	360	
4	Wild Rice River near Abercrombie, N. Dak.	1,530	2,170	900	
5	Red River of the North at Fargo, N. Dak.	6,130	6,800	3,400	a
6	Sheyenne River near Harvey, N. Dak.	171	535	220	
7	Sheyenne River at Sheyenne, N. Dak.	560	1,790	820	
8	Sheyenne River near Warwick, N. Dak.	660	2,070	-----	
9	Sheyenne River near Cooperstown, N. Dak.	1,260	6,750	900	
10	Sheyenne River below Baldhill Dam, N. Dak.	1,900	7,880	-----	
11	Sheyenne River at Valley City, N. Dak.	2,070	8,180	1,150	
12	Sheyenne River near Kindred, N. Dak.	2,970	9,150	-----	
13	Sheyenne River at West Fargo, N. Dak.	3,070	9,250	1,350	
14	Maple River at Mapleton, N. Dak.	1,350	1,480	570	
15	Rush River at Amenia, N. Dak.	107	107	245	
16	Buffalo River near Dilworth, Minn.	1,040	1,040	1,220	
17	Red River of the North at Halstad, Minn.	14,900	21,800	7,800	
18	Goose River near Portland, N. Dak.	397	531	570	
19	Goose River at Hillsboro, N. Dak.	1,090	1,220	950	
20	Sand Hill River at Climax, Minn.	405	405	600	
21	Red River of the North at Grand Forks, N. Dak.	23,100	30,100	14,800	b
22	Turtle River at Manvel, N. Dak.	525	602	700	
23	Red River of the North at Oslo, Minn.	24,100	31,200	15,200	
24	Forest River near Fordville, N. Dak.	396	531	1,050	
25	Forest River near Minto, N. Dak.	442	578	650	
26	Forest River at Minto, N. Dak.	583	719	1,200	
27	South Branch Park River near Park River, N. Dak.	214	214	710	
28	South Branch Park River below Homme Dam, N. Dak.	229	229	-----	
29	Park River at Grafton, N. Dak.	716	716	1,200	
30	Red River of the North at Drayton, N. Dak.	27,600	34,800	18,700	
31	Pembina River near Walhalla, N. Dak.	3,110	3,110	2,100	
32	Pembina River at Neche, N. Dak.	3,190	3,190	1,750	
33	Tongue River at Akra, N. Dak.	148	148	500	
34	Red River of the North at Emerson, Mantioba	33,000	40,200	20,300	
35	Long Creek near Crosby, N. Dak.	600	1,800	600	
36	Souris River near Sherwood, N. Dak.	3,380	9,330	1,480	
37	Souris River near Foxholm, N. Dak.	3,660	9,860	-----	
38	Des Lacs River at Foxholm, N. Dak.	743	947	-----	
39	Souris River above Minot, N. Dak.	4,570	11,000	-----	
40	Souris River near Verendrye, N. Dak.	5,200	11,800	-----	
41	Wintering River near Karlsruhe, N. Dak.	250	740	160	

a 1881-82, 1896-97

b 1881-1955

Figure 13. --Period of record of annual peaks at gaging stations.

Index no.	Gaging Station	Drainage area (square miles)		Mean annual flood (cfs)	Annual peak record, water years
		Contributing	Total		1900 1910 1920 1930 1940 1950 1955
	Red River of the North basin--Continued				
42	Souris River near Towner, N. Dak.	-----	13,100	-----	
43	Souris River near Bantry, N. Dak.	-----	13,400	-----	
44	Souris River near Westhope, N. Dak.	-----	17,600	-----	
	Minnesota River basin				
45	Little Minnesota River near Peever, S. Dak.	447	447	980	
46	Whetstone River near Big Stone City, S. Dak.	389	389	1,320	
	Missouri River main stem				
47	Missouri River near Williston, N. Dak.	164,500	164,500	-----	
	Little Muddy Creek basin				
48	Little Muddy Creek near Williston, N. Dak.	820	920	1,300	
	Little Missouri River basin				
49	Little Missouri River near Alzada, Mont.	780	780	2,250	
50	Little Beaver Creek near Marmarth, N. Dak.	615	615	4,300	
51	Little Missouri River at Marmarth, N. Dak.	4,570	4,570	11,000	
52	Little Missouri River at Medora, N. Dak.	6,190	6,190	13,800	
53	Beaver Creek at Wibaux, Mont.	351	351	1,480	
54	Little Missouri River near Watford City, N. Dak.	8,490	8,490	20,400	
	Missouri River main stem				
55	Missouri River near Elbowoods, N. Dak.	179,800	179,800	-----	
56	Missouri River below Garrison Dam, N. Dak.	181,400	181,400	-----	
	Knife River basin				
57	Knife River near Golden Valley, N. Dak.	1,230	1,230	3,500	
58	Spring Creek at Zap, N. Dak.	545	545	1,790	
59	Knife River at Hazen, N. Dak.	2,350	2,350	5,100	
	Missouri River main stem				
60	Missouri River at Bismarck, N. Dak.	186,400	186,400	-----	
	Heart River basin				
61	Heart River near South Heart, N. Dak.	315	315	1,920	
62	Heart River at Lehigh, N. Dak.	443	443	2,220	
63	Green River near Gladstone, N. Dak.	356	356	2,050	
64	Heart River near Richardton, N. Dak.	1,240	1,240	5,200	
65	Heart River below Heart Butte Dam near Glen Ullin, N. Dak.	1,710	1,710	7,200	
66	Antelope Creek near Carson, N. Dak.	221	221	1,500	
67	Muddy Creek near Almont, N. Dak.	456	456	1,380	

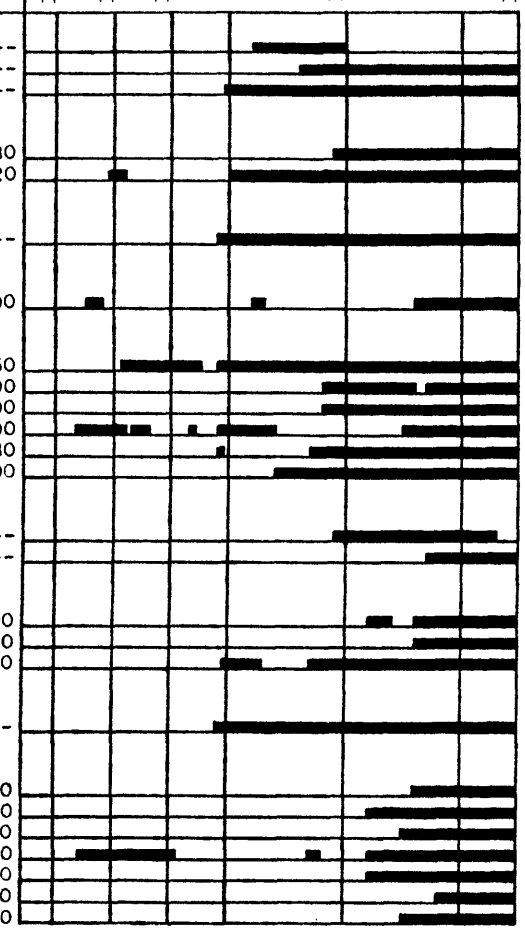

Figure 13.--Period of record of annual peaks at gaging stations--Continued.

Index no.	Gaging Station	Drainage area (square miles)		Mean annual flood (cfs)	Annual peak record, water years
		Contributing	Total		1900 1910 1920 1930 1940 1950 1955
	Heart River basin--Continued				
68	Heart River near Lark, N. Dak.	2,750	2,750	-----	
69	Sweetbriar Creek near Judson, N. Dak.	157	157	-----	
70	Heart River near Mandan, N. Dak.	3,310	3,310	10,300	
	Apple Creek basin				
71	Apple Creek near Menoken, N. Dak.	1,180	1,680	750	
	Cannonball River basin				
72	Cannonball River at Regent, N. Dak.	580	580	2,150	
73	Cannonball River below Bentley, N. Dak.	1,140	1,140	3,500	
74	Cedar Creek near Haynes, N. Dak.	553	553	1,750	
75	Cedar Creek near Pretty Rock, N. Dak.	1,340	1,340	2,400	
76	Cannonball River at Breien, N. Dak.	4,100	4,100	6,900	
	Beaver Creek basin				
77	Beaver Creek at Linton, N. Dak.	617	717	1,740	
	Grand River basin				
78	North Fork Grand River at Haley, N. Dak.	509	509	2,200	
79	North Fork Grand River near White Butte, S. Dak.	1,140	1,190	2,800	
80	South Fork Grand River near Cash, S. Dak.	1,350	1,350	2,700	
81	Grand River at Shadehill, S. Dak.	3,120	3,120	6,200	
82	Grand River near Wakpala, S. Dak.	5,510	5,510	8,000	
	Missouri River main stem				
83	Missouri River near Mobridge, S. Dak.	208,700	208,700	-----	
	Moreau River basin				
84	Moreau River at Bixby, S. Dak.	1,570	1,570	3,000	
85	Moreau River near Faith, S. Dak.	2,660	2,660	5,100	
86	Moreau River near Eagle Butte, S. Dak.	4,320	4,320	6,600	
87	Moreau River at Promise, S. Dak.	5,220	5,220	7,700	
	Cheyenne River basin				
88	Beaver Creek near New Castle, Wyo.	1,320	1,320	1,130	
89	Beaver Creek near Burdock, S. Dak.	1,540	1,540	-----	
90	Cheyenne River at Edgemont, S. Dak.	7,143	7,143	5,350	
91	Hat Creek near Edgemont, S. Dak.	1,044	1,044	3,230	
92	Cheyenne River near Hot Springs, S Dak.	8,710	8,710	6,600	
93	Cheyenne River below Angostura Dam, S. Dak.	9,100	9,100	-----	
94	Fall River at Hot Springs, S. Dak.	137	137	540	

Figure 13.--Period of record of annual peaks at gaging stations--Continued.

Index no.	Gaging Station	Drainage area (square miles)		Mean annual flood (cfs)	Annual peak record, water years
		Contributing	Total		1900 1910 1920 1930 1940 1950 1955
	Cheyenne River basin--Continued				
95	Beaver Creek near Buffalo Gap, S. Dak.	130	130	170	
96	Battle Creek at Hermosa, S. Dak.	178	178	-----	
97	Spring Creek near Hermosa, S. Dak.	199	199	170	
98	Castle Creek above Deerfield Reservoir near Hill City, S. Dak.	83	83	120	
99	Castle Creek below Deerfield Dam, D. Dak.	96	96	-----	
100	Rapid Creek below Pactola Dam, S. Dak.	320	320	245	
101	Rapid Creek above Canyon Lake near Rapid City, S. Dak.	371	371	-----	
102	Rapid Creek at Rapid City, S. Dak.	410	410	740	
103	Rapid Creek below Hawthorn ditch at Rapid City, S. Dak.	427	427	-----	
104	Rapid Creek below Little Giant ditch near Rapid City, S. Dak.	447	447	-----	
105	Rapid Creek at Caputa, S. Dak.	509	509	-----	
106	Rapid Creek near Farmingdale, S. Dak.	602	602	1,180	
107	Cheyenne River near Wasta, S. Dak.	12,800	12,800	15,500	
108	Elk Creek near Elm Springs, S. Dak.	540	540	1,590	
109	Belle Fourche River at Wyoming-South Dakota Line.	3,280	3,280	2,250	
110	Spearfish Creek at Spearfish, S. Dak.	168	168	450	
111	Redwater Creek above Belle Fourche, S. Dak.	920	920	1,210	
112	Belle Fourche River near Belle Fourche, S. Dak.	4,310	4,310	-----	
113	Belle Fourche River near Fruitdale, S. Dak.	4,540	4,540	3,230	
114	Belle Fourche River near Sturgis, S. Dak.	5,870	5,870	7,800	
115	Bear Butte Creek near Sturgis, S. Dak.	192	192	645	
116	Belle Fourche River near Elm Springs, S. Dak.	7,210	7,210	14,700	
117	Cheyenne River near Plainview, S. Dak.	21,600	21,600	23,300	
118	Cherry Creek near Plainview, S. Dak.	1,140	1,190	2,850	
119	Cheyenne River near Eagle Butte, S. Dak.	24,500	24,500	28,000	
	Missouri River main stem				
120	Missouri River at Pierre, S. Dak.	243,500	243,500	-----	
	Bad River basin				
121	North Fork Bad River at Philip, S. Dak.	164	164	1,280	
122	Bad River near Midland, S. Dak.	1,500	1,500	2,250	
123	Bad River near Fort Pierre, S. Dak.	3,107	3,107	6,600	
	Medicine Creek basin (upper)				
124	Medicine Creek near Blunt, S. Dak.	445	445	620	
	Missouri River main stem				
125	Missouri River at Chamberlain, S. Dak.	250,800	250,800	-----	

Figure 13.--Period of record of annual peaks at gaging stations--Continued.

Index no.	Gaging Station	Drainage area (square miles)		Mean annual flood (cfs)	Annual peak record, water years
		Contributing	Total		1900 1910 1920 1930 1940 1950 1955
	White River basin				
126	White River near Oglala, S. Dak.	2,200	2,200	1,280	
127	White River near Interior, S. Dak.	4,120	4,120	7,400	
128	White River near Kadoka, S. Dak.	5,000	5,000	9,700	
129	South Fork White River near Rosebud, S. Dak.	1,020	1,020	920	
130	South Fork White River below White River, S. Dak.	1,570	1,570	-----	
131	White River at Westover, S. Dak.	7,850	7,850	-----	
132	White River near Oacoma, S. Dak.	10,200	10,200	10,200	
133	Missouri River below Fort Randall Dam, S. Dak.	263,500	263,500	-----	
	Niobrara River basin				
134	Keyapaha River near Hidden Timber, S. Dak.	320	320	-----	
135	Keyapaha River at Wewela, S. Dak.	1,070	1,070	750	
	Missouri River main stem				
136	Missouri River at Yankton, S. Dak.	279,500	279,500	-----	
	James River basin				
137	James River at New Rockford, N. Dak.	406	596	-----	
138	Pipestem Creek near Buchanan, N. Dak.	475	925	470	
139	James River at Jamestown, N. Dak.	1,090	2,840	770	
140	James River at LaMoure, N. Dak.	2,940	5,740	-----	
141	James River at Columbia, S. Dak.	4,050	7,050	720	
142	Elm River at Westport, S. Dak.	1,170	1,680	1,100	
143	James River near Stratford, S. Dak.	6,070	9,990	660	
144	James River at Ashton, S. Dak.	6,810	11,000	660	
145	West Branch Snake Creek near Athol, S. Dak.	1,090	1,430	300	
146	Turtle Creek at Redfield, S. Dak.	1,540	1,540	-----	
147	James River near Redfield, S. Dak.	10,200	14,800	1 310	
148	James River at Huron, S. Dak.	12,010	16,800	1,510	
149	Sand Creek near Alpena, S. Dak.	240	240	495	
150	James River near Forestburg, S. Dak.	13,810	18,600	1,700	
151	James River near Scotland, S. Dak.	16,760	21,550	2,400	
	Vermillion River basin				
152	Vermillion River near Wakonda, S. Dak.	1,680	1,680	2,020	
	Big Sioux River basin				
153	Big Sioux River at Watertown, S. Dak.	400	1,800	600	
154	Big Sioux River near Dell Rapids, S. Dak.	3,090	5,060	3,950	
155	Skunk Creek near Sioux Falls, S. Dak.	-----	520	1,760	
156	Big Sioux River at Sioux Falls, S. Dak.	3,780	5,750	5.300	
157	Big Sioux River at Akron, Iowa	7,060	9,030	12,700	
	Missouri River main stem				
158	Missouri River at Sioux City, Iowa	314,600	314,600	-----	

Figure 13.--Period of record of annual peaks at gaging stations--Continued.

Combining Records

It is not possible to combine records for a station with a drainage area of 100 square miles with records for a station of 1,000 square miles or to combine records for two stations with different runoff characteristics without the use of a dimensionless factor. The dimensionless factor used in this analysis was the ratio of each flood to the mean annual flood for the station. For any one station, the mean annual flood is defined as the intersection of a visually-fitted frequency curve with the 2.33-year recurrence interval ordinate.

The maximum discharge for each year of record at a gaging station was divided by the mean annual flood for that station. These ratios were then listed by order number for each station in the region and the median ratio of all the stations for each order number was selected. These median ratios were used to define the composite flood-frequency curve for each of the two regions (figs. 5 and 6). Separate frequency curves have been developed in a like manner for the Souris River downstream from Lake Darling and the Missouri River (figs. 10 and 12).

HYDROLOGIC AREAS

The magnitude of a flood of any given frequency at a particular site on a stream may be influenced by many physiographic and meteorologic factors. Some of the physiographic factors are drainage-area size and shape, slope of the stream, stream pattern, natural or artificial storage in lakes, ponds or reservoirs, slope of the land, stream density, elevation of basin, geology, soil type, cultivation and others. The meteorologic factors are the amount, type and distribution of precipitation, temperature, and others. An attempt to correlate the mean annual flood with some of these factors was unsuccessful, owing to a lack of good topographic maps covering both States and to the complexity of the relationships between the factors.

Dividing the two States into hydrologic areas and developing a relation between the mean annual flood and the size of the contributing drainage basins proved to be the most satisfactory grouping of the data. Owing to the sparseness of stream-gaging stations, some of the boundaries between the hydrologic areas could not be delineated on basis of that relation, but were based on topographic features. Generally, the boundaries follow drainage divides or major streams. The two States were divided into nine hydrologic areas (fig. 2) and the variation of mean annual flood with drainage area for each area is shown (fig. 3).

For a variety of reasons, known and unknown, some plotted points scatter considerably from the curve for the area in which the station is located. The subdivision was made and the curves were drawn so that rather than averaging all the data in a particular area, the curves would give results on the high side and the points that plotted wide of the curve would all be low. This tends to interpret the uncertainties on the side of safety.

Area 1

Area 1 is located in northeastern North Dakota and includes the Pembina, Park and Forest River basins. The mean annual flood for this area is higher than the mean annual flood in adjacent area 2, possibly because of the influence of the Manitoba escarpment which is more pronounced in the northern part of the state, and to the longer period of snow cover with the resultant deeper cover. The variation of the mean annual flood with drainage area curve was defined by 7 stations.

Area 2

Area 2 is a large area in eastern North and South Dakota and southern South Dakota. The variation of mean annual flood with drainage area curve is defined by 26 stations. In some future report with additional years of record and additional stations, this area may be further subdivided; however, the existing data does not warrant additional subdivision at this time. This area, in addition to areas 1 and 3, lies entirely in the glaciated section of the Dakotas with the exception of that portion of area 2 west of the Missouri River in southern South Dakota. The northern boundary of the strip in South Dakota west of the Missouri River crosses a number of the tributaries of the White River from the south. The writer believes that the short tributaries of the White River from the south have higher mean annual floods similar to area 5 than do the longer tributaries such as the South Fork of White River. In a later report with additional stations and years of record, it is expected that this boundary can be better defined.

Area 3

Area 3 in eastern South Dakota includes the Minnesota, Vermillion and Big Sioux River basins. Most of the Coteau Des Praires lies within this region. The variation of mean annual flood with drainage area curve is poorly defined by only five stations. However, the mean annual flood for this area is definitely higher than for the adjacent area 2.

Area 4

Area 4 is in places a transition between area 2 to the east with a low mean annual flood and areas 5 and 6 to the west with a higher mean annual flood. It includes both glaciated and unglaciated terrain. The variation of mean annual flood with drainage area curve is defined by records for 21 stations.

Area 5

Area 5 includes the Knife River basin above the confluence with Spring Creek, the Heart River basin, the Cannonball River basin above the confluence with Cedar Creek and the area on the north side of the Cannonball River below the confluence with Cedar Creek, the western end of the Grand River basin, a small portion of the Moreau River basin and the Bad River basin. The variation of mean annual flood with drainage area curve is defined by records of 15 stations.

Area 6

Area 6 in western North Dakota and northwestern South Dakota includes that portion of the Little Missouri River basin drained by the short tributaries on either side of the river. The variation of mean annual flood with drainage area curve is defined by only one station, Little Beaver Creek near Marmarth, N. Dak., and by the slope of the curves for the adjacent areas. The mean annual flood of this area is higher than anywhere else in the Dakotas.

Area 7

Area 7 is in the northern and southern Black Hills. The variation of mean annual flood with drainage area is defined by only four stations. This area is a transition area between area 4, to the north, east and south of the Black Hills with a relatively high mean annual flood and areas 8 and 9 in the central hills with a relatively low mean annual flood. The boundary between areas 4 and 7 crosses Boxelder Creek and the boundary between areas 7 and 8 crosses several creeks between Belle Fourche and Rapid City, S. Dak. There are insufficient data to define the exact location of the boundaries.

Area 8

The variation of the mean annual flood with drainage area curve for area 8 is defined by only 4 stations.

Area 9

The variation of mean annual flood with drainage area curve for area 9 is defined by only 4 stations. The mean annual flood for area 9 is lower than anywhere else in the Dakotas. The mean annual flood for all of these areas in the Black Hills (areas 7, 8, and 9) is lower than the adjacent areas to the north, east and south.

MAXIMUM FLOODS

Over a period of years, outstanding floods have been measured on all of the major streams and many smaller tributaries in the two states. This information has been published in water-supply papers of the Geological Survey, and is frequently presented by graphs with discharge plotted against drainage area, discharge per square mile against drainage area, or discharge against miles from a selected origin. The curves in figure 3 show that the mean annual flood for a given drainage area in the Dakotas can vary considerably between hydrologic areas, therefore, these data were compiled and assembled by flood region and hydrologic area. Maximum known floods are shown as plotted points on figures 14 to 21 and pertinent data are listed in table 1. For comparative purposes, flood discharges are plotted with curves of selected recurrence intervals, the curves being computed by methods outlined on page 3. These data may be used to estimate the maximum probable discharge or discharges for selected recurrence intervals that may be expected from areas smaller than those considered in the frequency studies.

Table 1.--Maximum stages and discharges at gaging stations and outstanding peak discharges at miscellaneous sites

Index no.	Stream and place of determination	Flood region and hydrologic area	Drainage area (square miles)		Period of known floods	Maximum stage and discharge			
			Total	Contributing		Date	Gage height (feet)	Discharge	
								Cfs	Cfs per square mile
0.1	Bois de Sioux River near White Rock, S.Dak.	A2	1,160	1,160	1942-56	June 3, 1952	10.36	1,410	1.22
1	Red River of the North at Wahpeton, N. Dak.	-	4,010	4,010	1897	----------	17.0	-----	----
					1942-56	Apr. 12, 1952	14.99	7,130	1.78
2	Wild Rice River near Mantador, N. Dak.	A2	1,540	1,010	1943-56	1943	12.8	-----	----
						Apr. 12, 1952	10.74	2,220	2.20
3	Antelope Creek at Dwight, N. Dak.	A2	267	224	1943-56	Apr. 8, 1952	16.31	3,670	16.4
4	Wild Rice River near Abercrombie, N. Dak.	A2	2,170	1,530	1897	----------	27.5	-----	----
					1933-56	Apr. 2, 1943	21.3	5,500	3.59
5	Red River of the North at Fargo, N. Dak.	-	6,800	6,130	1882, 1877, 1902-56	Apr. 7, 1897	40.1	25,000	4.08
6	Sheyenne River near Harvey, N. Dak.	A2	535	171	1943, 1946-56	Apr. 18, 1950	[a]6.95	1,430	8.36
7	Sheyenne River at Sheyenne, N. Dak.	A2	1,790	560	1930-51	Apr. 18, 1950	[b]8.51	3,940	7.04
8	Sheyenne River near Warwick, N. Dak.	A2	2,070	660	1950-56	Apr. 17, 1950	7.45	3,800	5.76
8.1	Edmore Coulee near Edmore, N. Dak.	A2	230	220	1956	Apr. 23, 1956	[a]6.32	875	3.98
8.2	Starkweather Coulee near Starkweather, N. Dak.	A2	119	117	1956	Apr. 21, 1956	[c]3.80	320	2.74
8.3	Towner No. 3 near Cando, N. Dak.	A2	5.25	5.25	1955-56	Apr. 18, 1956	3.98	210	40.0
8.4	Towner No. 4 near Cando, N. Dak.	A2	118	118	1955-56	Apr. 19,20, 1956	7.0	850	7.20
8.5	Towner No. 2 near Bisbee, N. Dak.	A2	46.8	46.8	1955-56	Apr. 19,21, 1956	[d]3.09	420	8.97
8.6	Mauvais Coulee near Maza, N. Dak.	A2	702	662	1956	Apr. 20, 1956	12.30	3,600	5.44
8.7	Little Coulee near Leeds, N. Dak.	A2	136	124	1956	Apr. 15, 1956	7.2	515	4.15
8.8	Mauvais Coulee near Churchs Ferry, N. Dak.	A2	2,520	1,500	1950-56	June 7, 1950	4.4	620	.41
9	Sheyenne River near Cooperstown, N. Dak.	A2	6,750	1,260	1945-56	Apr. 17, 1950	18.69	7,830	6.21
10	Sheyenne River below Baldhill Dam, N. Dak.	A2	7,880	1,900	1948, 1950-56	Apr. 27, 1948	-----	4,600	2.42
11	Sheyenne River at Valley City, N. Dak.	A2	8,180	2,070	1882, 1897 1919, 1938-56	April 1882	20.0	-----	----
						Apr. 28, 1948	17.51	4,580	2.21
12	Sheyenne River near Kindred, N. Dak.	A2	9,150	2,970	1947-48, 1950-56	1947 or 1948	22.1	3,600	1.21
13	Sheyenne River near West Fargo, N. Dak.	A2	9,250	3,070	1903-06, 1919 1930-56	May 22, 1950	[e]20.61	2,810	.92
13.1	Swan Creek at Casselton, N. Dak.	A2	71.1	71.1	1952-53	June 16, 1953	-----	600	8.44
14	Maple River at Mapleton, N. Dak.	A2	1,480	1,350	1944-56	June 17, 1953	[f]18.91	4,840	3.59
15	Rush River at Amenia, N. Dak.	A2	107	107	1947-56	Apr. 14, 1947	[g]10.96	1,230	11.5
16	Buffalo River near Dilworth, Minn.	A2	1,040	1,040	1931-56	Apr. 2, 1943	22.60	4,530	4.36
16.1	Elm River near Grandin, N. Dak.	A2	211	211	1950	Apr. 16, 1950	-----	1,810	8.58
17	Red River of the North at Halstad, Minn.	--	21,800	14,900	1897 1936-37 1942-56	----------	38.5	-----	----
						Apr. 16, 1947	[h]34.00	24,500	1.64
18	Goose River near Portland, N. Dak.	A2	531	397	1940-56	May 9, 1950	[i]22.98	8,090	20.4
19	Goose River at Hillsboro, N. Dak.	A2	1,220	1,090	1931-56	Apr. 19, 1950	[j]14.94	9,420	8.64
20	Sand Hill River at Climax, Minn.	A2	405	405	1943-56	Apr. 22, 1950	16.31	3,040	7.51
21	Red River of the North at Grand Forks, N. Dak.	--	30,100	23,100	1882-1956	Apr. 10, 1897	50.2	80,000	3.46
22	Turtle River at Manvel, N. Dak.	A2	602	525	1946-56	Apr. 19, 1950	21.5	28,000	53.3
23	Red River of the North at Oslo, Minn.	--	31,200	24,100	1936-56	May 10, 1950	31.83	63,000	2.61
24	Forest River near Fordville, N. Dak.	A1	531	396	1940-56	Apr. 18, 1950	14.48	16,400	41.4
25	Forest River near Minto, N. Dak.	A1	578	442	1932-42, 1944	Apr. 5, 1942	14.87	1,610	3.64
26	Forest River at Minto, N. Dak.	A1	719	583	1941-56	Apr. 18, 1950	11.80	16,600	28.5
27	South Branch Park River near Park River, N. Dak.	A1	214	214	1940-50	Apr. 18, 1948	11.80	11,000	51.4
28	South Branch Park River below Homme Dam, N. Dak.	A1	229	229	1950-56	Apr. 24, 1950	37.52	[k]13,000	56.8
28.1	Cart Creek at Mountain, N. Dak.	A1	16.9	16.9	1955-56	Apr. 1, 1955	6.88	392	23.2
28.2	Pembina No. 1, near Crystal, N. Dak.	A1	3.7	3.7	1955-56	Apr. 19, 1950	6.80	187	50.5
29	Park River at Grafton, N. Dak.	A1	716	716	1932-56	Apr. 19, 1950	20.13	12,600	17.6
30	Red River of the North at Drayton, N. Dak.	--	34,800	27,600	1936-56	May 12, 1950	41.58	86,500	3.13
30.1	Little Pembina River near Walhalla, N. Dak.	A1	194	194	1956	Apr. 21, 1956	10.0	2,510	12.9
31	Pembina River near Walhalla, N. Dak.	A1	3,110	3,110	1940-56	Apr. 18, 1950	19.2	20,400	6.56
32	Pembina River at Neche, N. Dak.	--	3,190	3,190	1904-56	Apr. 20, 1950	21.58	10,700	3.35
32.1	Herzog Creek near Concrete, N. Dak.	A1	18.9	18.9	1955-56	Apr. 2, 1955	9.74	260	13.8
33	Tongue River at Akra, N. Dak.	A1	148	148	1950-56	Apr. 18, 1950	[m]48.7	11,800	79.7
33.1	Tongue River at Cavalier, N. Dak.	A1	153	153	1939-50	May 8, 1950	4.58	1,340	8.76
34	Red River of the North at Emerson, Manitoba	--	40,200	33,000	1913-56	May 13, 1950	90.89	95,500	2.89
35	Long Creek near Crosby, N. Dak.	A2	1,800	600	1943-56	Apr. 23, 1948	16.10	6,240	10.4
36	Souris River near Sherwood, N. Dak.	A2	9,330	3,380	1930-56	Apr. 28, 1948	23.80	7,400	2.19
37	Souris River near Foxholm, N. Dak.	--	9,860	3,660	1937-56	May 16, 1948	14.79	3,040	.83
38	Des Lacs River at Foxholm, N. Dak.	A2	947	743	1946-56	Apr. 4, 1949	18.04	2,000	2.69
39	Souris River above Minot, N. Dak.	--	11,000	4,570	1904-56	Apr. 20, 1904	23	12,000	2.63
40	Souris River near Verendrye, N. Dak.	--	11,800	5,200	1937-56	Apr. 8, 1949	17.7	4,200	.81
41	Wintering River near Karlsruhe, N. Dak.	A2	740	250	1937-56	Apr. 7, 1949	[j]12.0	3,000	12.0
42	Souris River near Towner, N. Dak.	--	13,100	-----	1933-41	Apr. 1, 1939	[a]12.53	1,150	---
43	Souris River near Bantry, N. Dak.	--	13,400	-----	1937-56	Apr. 13, 1949	13.76	4,760	---
43.1	Willow Creek at Dunseith, N. Dak.	A2	142	142	1954-56	Apr. 5, 1955	15.30	366	2.58
43.2	Oak Creek Tributary 1 near Bottineau, N. Dak.	A2	3.4	3.4	1955	July 6, 1955	-----	851	250
43.3	Oak Creek Tributary 2 near Bottineau, N. Dak.	A2	7.0	7.0	1955	July 6, 1955	-----	761	109
43.4	Oak Creek Tributary 3 near Bottineau, N. Dak.	A2	1.2	1.2	1955	July 6, 1955	-----	373	311
43.5	Oak Creek Tributary 4 near Bottineau, N. Dak.	A2	7.7	7.7	1955	July 6, 1955	-----	2,330	303
44	Souris River near Westhope, N. Dak.	--	17,600	-------	1930-56	Apr. 18, 1949	[o]16.9	6,400	---
45	Little Minnesota River near Peever, S.Dak.	A3	447	447	1940-56	Apr. 8, 1952	[p]13.35	4,730	10.6

See footnotes at end of table, p. 23.

Table 1.--Maximum stages and discharges at gaging stations and outstanding peak discharges at miscellaneous sites--Continued

Index no.	Stream and place of determination	Flood region and hydrologic area	Drainage area (square miles)		Period of known floods	Maximum stage and discharge			
			Total	Contributing		Date	Gage height (feet)	Discharge	
								Cfs	Cfs per square mile
46	Whetstone River near Big Stone City, S. Dak.	A3	389	389	1910-12	June 1919	26	----	----
					1931-56	Apr. 8, 1952	q13.95	5,710	14.7
47	Missouri River near Williston, N. Dak.	--	164,500	164,500	1912	April 1912	28	----	----
					1929-56	Apr. 4, 1930	18.6	231,000	1.40
47.1	Little Muddy Creek below Cow Creek near Williston, N. Dak.	A4	875	775	1955-56	Mar. 30, 1955	12.15	3,750	4.84
48	Little Muddy Creek near Williston, N. Dak.	A4	920	820	1906-08, 1933, 1947-54	June 24, 1953	r13.8	2,820	3.44
48.1	Missouri River at Sanish, N. Dak.	--	166,000	166,000	1929-32	June 12, 1932	s14.2	100,000	.60
49	Little Missouri River near Alzada, Mont.	B4	780	780	1912-25, 1929-32, 1935-56	Apr. 4, 1944	---	t6,000	7.69
50	Little Beaver Creek near Marmarth, N. Dak.	A6	615	615	1939-56	Apr. 6 1952	13.9	12,700	20.7
51	Little Missouri River at Marmarth, N. Dak.	--	4,570	4,570	1939-56	Mar. 23, 1947	u23.4	45,000	9.85
51.1	Davis Creek near Medora, N. Dak.	A6	51.8	51.8	1955	June 26, 1955	----	5,480	106
51.2	Sally Creek near Medora, N. Dak.	A6	29.5	29.5	1955	June 26, 1955	----	3,270	111
52	Little Missouri River at Medora, N. Dak.	--	6,190	6,190	1904-12, 1914-16, 1929-34, 1946-56	Mar. 23, 1947	20.5	65,000	10.5
53	Beaver Creek at Wibaux, Mont.	A4	351	351	1929, 1938-56	June 7, 1929	----	30,000	85.5
54	Little Missouri River near Watford City, N. Dak.	--	8,490	8,490	1935-56	Mar. 25, 1947	24.0	110,000	13.0
55	Missouri River near Elbowoods, N. Dak.	--	179,800	179,800	1940-53	Apr. 5, 1952	25.2	360,000	2.00
56	Missouri River below Garrison Dam, N. Dak.	--	181,400	181,400	1948-56	Apr. 5, 1952	1,701.90	348,000	1.92
57	Knife River near Golden Valley, N. Dak.	A5	1,230	1,230	1903-56	Mar. 26, 27, 1943	26.7	11,500	9.35
58	Spring Creek at Zap, N. Dak.	A4	545	545	1924, 1947-56	Apr. 7, 1952	20.03	6,130	11.2
59	Knife River at Hazen, N. Dak.	A4	2,350	2,350	1884-1956	Mar. 26, 27, 1943	26.3	26,500	11.3
59.1	Burleigh No. 1 near Baldwin, N. Dak.	A4	3.2	3.2	1956	July 7, 1956	----	73.4	22.9
59.2	Burleigh No. 2 near Baldwin, N. Dak.	A4	2.3	2.3	1956	June 30, 1956	----	380	165
59.3	Baker Pond Tributary No. 2 near Bismarck, N. Dak.	A4	.47	.47	1954	June 26, 1954	----	86.5	184
60	Missouri River at Bismarck, N. Dak.	--	186,400	186,400	1881	Mar. 31, 1881	31.6	-----	----
					1929-56	Apr. 6, 1952	27.90	500,000	2.68
60.1	Norwegian Creek near Fryburg, N. Dak.	A5	16.7	16.7	1955	June 26, 1955	----	5,170	310
60.2	Norwegian Creek near Belfield, N. Dak.	A5	33.8	33.8	1955	June 26, 1955	----	5,860	173
61	Heart River near South Heart, N. Dak.	A5	315	315	1947-56	Apr. 6, 1954	21.73	5,030	16.0
62	Heart River at Lehigh, N. Dak.	A5	443	443	1943-56	Apr. 15, 1950	17.9	5,980	13.5
63	Green River near Gladstone, N. Dak.	A5	356	356	1946-56	Apr. 15, 1950	m18.3	5,260	14.8
64	Heart River near Richardton, N. Dak.	A5	1,240	1,240	1905-56	Apr. 16, 1950	28.05	23,400	18.9
64.1	Government Creek near Richardton, N. Dak.	A5	30.5	30.5	1950	Apr. 16, 1950	-----	4,300	141
65	Heart River below Heart Butte Dam, N. Dak.	A5	1,710	1,710	1904-56	Mar. 24, 1947	m21.5	25,000	14.6
66	Antelope Creek near Carson, N. Dak.	A5	221	221	1949-56	Apr. 16, 1950	17.95	11,100	50.2
67	Muddy Creek near Almont, N. Dak.	A5	456	456	1946-56	Apr. 17, 1950	30.7	20,200	44.3
68	Heart River near Lark, N. Dak.	A5	2,750	2,750	1947-56	Apr. 17, 1950	20.70	29,200	10.6
69	Sweetbriar Creek near Judson, N. Dak.	A5	157	157	1950-56	Apr. 17, 1950	12.5	5,910	37.6
70	Heart River near Mandan, N. Dak.	A5	3,310	3,310	1924, 1929-56	Apr. 19, 1950	v25.75	30,500	9.21
70.1	West Branch Long Lake Creek near Hazelton, N. Dak.	A4	17.4	17.4	1955-56	June 6, 1956	7.92	798	45.9
71	Apple Creek near Menoken, N. Dak.	A4	1,680	1,180	1946-56	Apr. 18, 1950	17.07	6,750	5.72
71.1	Little Heart near St. Anthony, N. Dak.	A5	190	190	1950	Apr. 16, 1950	-----	8,770	46.2
71.2	Missouri River Tributary near Huff, N. Dak.	A5	2.6	2.6	1956	June 5, 1956	-----	1,890	727
72	Cannonball River at Regent, N. Dak.	A5	580	580	1950-56	Apr. 16, 1950	26.1	20,300	35.0
72.1	Thirty Mile Creek near Bentley, N. Dak.	A5	258	258	1950	Apr. 16, 1950	-----	11,400	44.2
73	Cannonball River below Bentley, N. Dak.	A5	1,140	1,140	1889-56	Apr. 17, 1950	m34.0	50,900	44.6
73.1	Cannonball River near Heil, N. Dak.	A5	1,340	1,340	1950	Apr. 17, 18, 1950	23.5	-----	----
					1951-53	Apr. 7, 1952	w17.0	8,850	6.60
73.2	Cannonball River near Wade, N. Dak.	A5	1,650	1,650	1950	Apr. 18, 1950	----	44,000	26.7
74	Cedar Creek near Haynes, N. Dak.	A4	553	553	1950-56	Apr. 16, 1950	23.0	27,400	49.5
75	Cedar Creek near Pretty Rock, N. Dak.	A4	1,340	1,340	1943-56	Apr. 17, 1950	26.5	48,000	35.8
75.1	Cedar Creek near Swastika, N. Dak.	A4	1,650	1,650	1950	Apr. 18, 1950	----	43,800	26.5
76	Cannonball River at Breien, N. Dak.	A4	4,100	4,100	1900-56	Apr. 19, 1950	22.30	94,800	23.1
77	Beaver Creek at Linton, N. Dak.	A4	717	617	1950-56	Apr. 8, 1952	17.50	9,800	15.9
77.1	Spring Creek near Linton, N. Dak.	A4	30.9	30.9	1955-56	June 6, 1956	8.16	2,790	90.3
77.2	North Fork Grand River tributary near Bowman, N. Dak.	A5	14.9	14.9	1951	July 28, 1951	-----	3,600	242
77.3	North Fork Grand River near Bowman, N. Dak.	A5	114	114	1951	July 28, 1951	-----	5,300	46.5
77.4	Middle Fork Crooked Creek near Korinen, N. Dak.	A5	3.9	3.9	1951	July 28, 1951	-----	5,700	1,460
77.5	Crooked Creek near Ludlow, S. Dak.	A5	67.4	67.4	1951	July 28, 1951	-----	6,800	101
78	North Fork Grand River at Haley, N. Dak.	A5	509	509	1912-15, 1917, 1946-56	Apr. 7, 1952	x17.10	14,100	27.7

See footnotes at end of table, p. 23.

Table 1.--Maximum stages and discharges at gaging stations and outstanding peak discharges at miscellaneous sites--Continued

Index no.	Stream and place of determination	Flood region and hydrologic area	Drainage area (square miles)		Period of known floods	Maximum stage and discharge			
			Total	Contributing		Date	Gage height (feet)	Discharge	
								Cfs	Cfs per square mile
78.1	North Fork Grand River near Lodgepole, S. Dak.	A4	1,060	1,060	1952	Apr. 7, 1952	---	21,300	20.1
79	North Fork Grand River near White Butte, S. Dak.	A4	1,190	1,190	1946-56	Apr. 16, 1950	20.0	30,900	26.0
79.1	Comer Creek near Ladner, S. Dak.	A5	5.2	5.2	1951	July 28, 1951	----	7,500	1,440
80	South Fork Grand River near Cash, S. Dak.	A4	1,350	1,350	1946-56	Apr. 15, 1950	15.40	27,000	20.0
81	Grand River at Shade Hill, S. Dak.	A4	3,120	3,120	1944-56	Apr. 16, 1950	19.06	58,000	18.6
82	Grand River near Wakpala, S. Dak.	A4	5,510	5,510	1914-16, 1929-56	Apr. 18, 1950	22.75	82,200	14.9
83	Missouri River at Mobridge, S. Dak.	--	208,700	208,700	1929-56	Apr. 9, 1952	25.07	443,000	2.12
84	Moreau River at Bixby, S. Dak.	A4	1,570	1,570	1949-56	Apr. 1, 1952	17.8	15,300	9.75
85	Moreau River near Faith, S. Dak.	A4	2,660	2,660	1944-56	Apr. 9, 1944	20.9	26,000	9.77
86	Moreau River near Eagle Butte, S. Dak.	A4	4,320	4,320	1944-56	June 15, 1953	[y]23.0	30,300	7.01
87	Moreau River at Promise, S. Dak.	A4	5,220	5,220	1929-56	Apr. 5, 1952	[z]24.4	36,900	7.07
88	Beaver Creek near Newcastle, Wyo.	B7	1,320	1,320	1943, 1945-56	Mar. 27, 1943	14.0	1,840	1.39
89	Beaver Creek near Burdock, S. Dak.	B7	1,540	1,540	1905, 1929-32	May 31, June 3, 1929	[m]9.05	4,000	2.10
90	Cheyenne River at Edgemont, S. Dak.	--	7,143	7,143	1905, 1929-32, 1947-54	May 1, 1922 / July 30, 1905	12.0 / 8.5	----- / 13,000	----- / 1.82
90.1	Pine Creek near Ardmore, S. Dak.	B4	5.47	5.47	1956	June 17, 1956	7.17	1,110	203
91	Hat Creek near Edgemont, S. Dak.	B4	1,044	1,044	1905, 1951-56	May 23, 1954	11.98	9,430	9.03
92	Cheyenne River near Hot Springs, S. Dak.	--	8,710	8,710	1915-20, 1943-56	May 12, 1920	[m]29.2	114,000	13.1
92.1	Beef Creek near Oelrichs, S. Dak.	B4	12.8	12.8	1955	Sept. 20, 1955	-----	179	14.0
92.2	Antelope Hollow near Oelrichs, S. Dak.	B4	9.46	9.46	1955	Sept. 20, 1955	-----	64.2	6.79
93	Cheyenne River below Argostura Dam, S. Dak.	--	9,100	9,100	1946-56	June 22, 1947	[aa]10.4	9,520	1.05
94	Fall River at Hot Springs, S. Dak.	A7	137	137	1938-56	Sept. 4, 1938	[m]18.4	13,100	95.6
95	Beaver Creek near Buffalo Gap, S. Dak.	A9	130	130	1927 / 1938-56	---------- / Sept. 4, 1938	[m]8.0 / [m]16.46	----- / 11,700	----- / 90.0
95.1	French Creek near Custer, S. Dak.	A9	98	98	1945-47	July 10, 1947	3.45	[ab]394	4.02
95.2	French Creek near Fairburn, S. Dak.	A9	129	129	1945-47	May 2, 1946	4.75	519	4.02
95.3	Battle Creek near Keystone, S. Dak.	A9	66	66	1945-47	May 2, 1946	6.70	391	5.92
95.4	Battle Creek near Hermosa, S. Dak.	A9	108	108	1945-47	June 21, 1947	9.2	805	7.45
95.5	Squaw Creek near Custer, S. Dak.	A9	25.2	25.2	1945-47	June 21, 1947	4.50	206	8.17
95.6	Squaw Creek near Hermosa, S. Dak.	A9	27.5	27.5	1945-47	June 21, 1947	4.90	198	7.20
96	Battle Creek at Hermosa, S. Dak.	A9	178	178	1950-56	May 22, 1952	14.00	3,950	16.6
96.1	Battle Creek below Hermosa, S. Dak.	A9	285	285	1951-53	May 23, 1952	8.13	2,080	7.23
96.2	Spring Creek near Hill City, S. Dak.	A9	142	142	1938-40	Apr. 16, 1938	-----	500	3.52
96.3	Spring Creek near Keystone, S. Dak.	A9	159	159	1945-47	June 23, 1947	5.22	865	5.44
96.4	Spring Creek near Rapid City, S. Dak.	A9	171	171	1903-05, 1945-47	June 23, 1947	5.00	700	4.09
97	Spring Creek near Hermosa, S. Dak.	A9	199	199	1950-56	May 23, 1952	4.56	580	2.91
98	Castle Creek above Deerfield Reservoir, S. Dak.	A9	83	83	1949-56	May 22, 1952	5.81	615	7.41
99	Castle Creek below Deerfield Reservoir, S. Dak.	A9	96	96	1947-56	May 22, 1952	[h]3.87	200	2.08
99.1	Castle Creek Tributary No. 1, Site No. 1 near Rochford, S. Dak.	A9	1.25	1.25	1955	July 28, 1955	-----	2,190	1,750
99.2	Castle Creek Tributary No. 1, Site No. 2 near Rochford, S. Dak.	A9	1.75	1.75	1955	July 28, 1955	-----	1,720	983
99.3	Castle Creek Tributary No. 1, Site No. 3 near Rochford, S. Dak.	A9	2.20	2.20	1955	July 28, 1955	-----	5,620	2,560
99.4	Castle Creek Tributary No. 2 near Rochford, S. Dak.	A9	0.019	0.019	1955	July 28, 1955	-----	98.9	5,200
99.5	Iron Creek near Rochford, S. Dak.	A9	1.25	1.25	1955	July 28, 1955	-----	2,410	1,930
99.6	North Fork Castle Creek near Rochford, S. Dak.	A9	14.6	14.6	1955	July 28, 1955	-----	4,490	308
99.7	Castle Creek near Rochford, S. Dak.	A9	---------	[ac]32.6	1955	July 28, 1955	-----	8,500	261
99.8	Castle Creek at Mystic, S. Dak.	A9	---------	[ac]52.2	1955	July 28, 1955	-----	2,360	45.2
100	Rapid Creek below Pactola Dam, S. Dak.	A9	320	320	1929-56	May 22, 1952	-----	2,190	6.84
101	Rapid Creek above Canyon Lake, S. Dak.	A8	371	371	1947-56	May 23, 1952	8.08	2,600	7.01
102	Rapid Creek at Rapid City, S. Dak.	A8	410	410	1905-06, 1943-56	May 23, 1952	6.20	2,540	6.20
103	Rapid Creek below Hawthorn ditch, S. Dak.	A8	427	427	1947-53	May 23, 1952	9.19	2,140	5.01
104	Rapid Creek below Little Giant ditch, S. Dak.	A8	447	447	1947-51	June 24, 1947	[ad]5.55	904	2.02
105	Rapid Creek at Caputa, S. Dak.	A8	509	509	1947-53	May 24, 1952	11.79	2,040	4.01
106	Rapid Creek near Farmingdale, S. Dak.	A7	602	602	1947-56	June 21, 1947	8.4	2,640	4.39
106.1	Rapid Creek at Creston, S. Dak.	A7	710	710	1929-32	May 6, 1932	12.5	16,000	22.5
108.2	Boxelder Creek near Nemo, S. Dak.	A8	96	96	1045-47	May 2, 1946	5.75	1,180	12.3
106.3	Boxelder Creek at Blackhawk, S. Dak.	A8	128	128	1903-05 / 1945-47	1911 / May 2, 1946	10 / 6.2	----- / 1,320	----- / 10.3
107	Cheyenne River near Wasta, S. Dak.	--	12,800	12,800	1915, 1929-32, 1954-56	May 6, 1932	[ae]12.5	46,300	3.62
107.1	Elk Creek near Roubeix, S. Dak.	A8	21	21	1945-47	May 2, 1946	6.0	378	18.0
107.2	Elk Creek above Piedmont, S. Dak.	A8	49	49	1945-47	Aug. 1, 1945	7.0	1,810	36.9
108	Elk Creek near Elm Springs, S. Dak.	B4	540	540	1920 / 1950-56	May 1920 / Mar. 29, 1952	17 / 10.61	----- / 8,540	------ / 15.8
109	Belle Fourche River at Wyoming-South Dakota State line	B8	3,280	3,280	1947-56	June 23, 1947	[af]14.33	3,620	1.10

See footnotes at end of table, p. 23.

Table 1.--Maximum stages and discharges at gaging stetions and outstanding peak discharges at miscellaneous sites--Continued

Index no.	Stream and place of determination	Flood region and hydrologic area	Drainage area (square miles)		Period of known floods	Maximum stage and discharge			
			Total	Contributing		Date	Gage height (feet)	Discharge	
								Cfs	Cfs per square mile
109.1	Redwater Creek at Wyoming-South Dakota State line	A8	471	471	1929-31, 1936-37, 1954-56	July 17, 1937	11.5	3,250	6.90
109.2	Spearfish Creek near Spearfish, S. Dak.	A8	157	157	1904-06	June 5, 1904	7.00	5,000	31.8
110	Spearfish Creek at Spearfish, S. Dak.	A8	168	168	1947-56	May 22, 1952	[a]7.29	947	5.64
111	Redwater Creek above Belle Fourche, S. Dak.	A8	920	920	1946-56	June 22, 1947	8.98	2,800	3.04
112	Belle Fourche River near Belle Fourche, S. Dak.	--	4,310	4,310	1924, 1927-43	Apr. 9, 1924	7.8	22,400	5.20
113	Belle Fourche River near Fruitdale, S. Dak.	--	4,540	4,540	1946-56	June 23, 1947	11.03	7,460	1.64
114	Belle Fourche River near Sturgis, S. Dak.	--	5,870	5,870	1946-56	May 24, 1946	13.86	17,900	3.05
115	Bear Butte Creek near Sturgis, S. Dak.	B7	192	192	1946-56	May 24, 1946	12.07	1,420	7.40
116	Belle Fourche River near Elm Springs, S. Dak.	--	7,210	7,210	1927	May 1927	21.8	-----	----
117	Cheyenne River near Plainview, S. Dak.	--	21,600	21,600	1929-32, 1934-56	June 10, 1941	14.3	35,700	4.95
					1920	May 1920	17.5	-----	----
					1951-56	Mar. 30, 1952	10.55	41,400	1.92
118	Cherry Creek near Plainview, S. Dak.	A4	1,190	1,190	1946-56	Apr. 1, 1952	22.63	17,500	14.7
119	Cheyenne River near Eagle Butte, S. Dak.	--	24,500	24,500	1920	May 13, 1920	18.9	-----	----
					1929-56	May 24, 1933	15.00	104,000	4.24
120	Missouri River at Pierre, S. Dak.	--	243,500	243,500	1930-56	Apr. 10, 1952	25.35	440,000	1.81
121	North Fork Bad River at Philip, S. Dak.	A5	184	164	1927	May 1927	18.2	-----	----
					1939-44	June 4, 1942	14.7	1,640	10.0
122	Bad River near Midland, S. Dak.	A5	1,500	1,500	1946-56	Apr. 2, 1952	14.00	11,200	7.48
123	Bad River near Fort Pierre, S. Dak.	A5	3,107	3,107	1927, 1929-32, 1934-56	April 1927	30.89	50,000	16.1
123.1	Mush Creek near Pierre, S. Dak.	A2	14.6	14.6	1956	Aug. 10, 1956	-----	3,620	248
123.2	Pierre Area No. 2 near Pierre, S. Dak.	A2	0.42	0.42	1956	Aug. 10, 1956	-----	705	1,680
123.3	Pierre Area No. 3 near Pierre, S. Dak.	A2	0.20	0.20	1956	Aug. 10, 1956	-----	172	860
124	Medicine Creek (Upper) near Blunt, S. Dak.	A2	455	455	1917	----------	15	-----	----
					1950-56	Apr. 5, 1952	[ah]13.2	1,830	4.02
124.1	Pierre Area No. 4 near Pierre, S. Dak.	A2	1.64	1.64	1956	Aug. 7, 1956	6.99	976	595
124.2	Medicine Creek (Lower) at Kennebec, S. Dak.	A5	465	465	1952, 1955-56	April, 1952	17.0	3,500	7.53
124.3	Medicine Creek (Lower) tributary No. 1 near Reliance, S. Dak.	A5	4.2	4.2	1955	July 9, 1955	-----	377	89.8
124.4	Medicine Creek (Lower) tributary No. 2 near Reliance, S. Dak.	A5	.4	.4	1955	July 9, 1955	-----	530	1,320
125	Missouri River at Chamberlain, S. Dak.	--	250,800	250,800	1929, 1945-54	Apr. 11, 1952	25.55	440,000	1.75
126	White River near Oglala, S. Dak.	B2	2,200	2,200	1944-56	June 21, 1947	23.50	5,200	2.36
126.1	Badlands Area No. 1 at Imlay, S. Dak.	B5	14.0	14.0	1955-56	Sept. 19, 1955	-----	996	71.1
126.2	Badlands Area No. 2 near Conata, S. Dak.	B5	.17	.17	1955-56	Sept. 20, 1955	-----	305	1,790
127	White River near Interior, S. Dak.	--	4,120	4,120	1905-06, 1912-18, 1929-32, 1940-42	May 1, 1942	[ai]16.0	17,100	4.15
128	White River near Kadoda, S. Dak.	--	5,000	5,000	1942-56	June 4, 1942	16.24	32,000	6.40
128.1	South Fork White River near Martin, S. Dak.	B2	310	230	1932	May 5, 1932	13.3	-----	-----
					1938-40	May 23, 1939	11.37	440	1.91
128.2	Lake Creek above Refuge near Tuthill, S. Dak.	B2	58	23	1938-40	Apr. 27, 1938	[aj]2.96	57	2.48
128.3	Elm Creek near Tuthill, S. Dak.	B2	10	1	1938-40	Feb. 26, Mar. 5, 1939	[ak]2.64	4.0	4.0
128.4	Lake Creek below Refuge near Tuthill, S. Dak.	B2	120	80	1938-40	July 18, 1938	[am]4.69	97	1.62
129	South Fork White River near Rosebud, S. Dak.	B2	1,020	1,020	1944-56	May 17, 1944	13.92	4,470	4.38
130	South Fork White River below White River, S. Dak.	B5	1,570	1,570	1930-32, 1939-40, 1950-56	Mar. 29, 1952	[a]10.90	5,850	3.73
131	White River at Westover, S. Dak.	--	7,850	7,850	1913-18	Apr. 4, 1915	13.0	15,200	194
131.1	White River tributary near Reliance, S. Dak.	B5	6.5	6.5	1955	July 9, 10, 1955	-----	144	22.2
132	White River near Oacoma, S. Dak.	--	10,200	10,200	1929-56	Mar. 30, 1952	[an]17.6	51,900	5.09
133	Missouri River below Fort Randall Dam, S. Dak.	--	263,500	263,500	1881	April 1881	21.5	-----	-----
					1943, 1948-56	April 12, 1952	[ao]20.82	447,000	1.70
134	Keyapaha River near Hidden Timer, S. Dak.	B2	320	320	1948-53	Mar. 30, 1952	[ap]10.87	2,710	8.47
135	Keyapaha River at Wewela, S. Dak.	B2	1,070	1,070	1939-40, 1950-56	Mar. 31, 1952	[aq]13.5	5,430	5.07
136	Missouri River at Yankton, S. Dak.	--	279,500	279,500	1891	Apr. 5, 1881	30.5	-----	-----
					1931-56	Apr. 13, 1952	15.5	480,000	1.72
137	James River at New Rockford, N. Dak.	A2	596	406	1948	April 1948	13	-----	-----
					1951-56	Apr. 12, 1951	9.20	840	2.07
138	Pipestem Creek near Buchanan, N. Dak.	A2	925	475	1950-56	Apr. 17, 1950	[ar]11.89	4,480	9.43

See footnotes at end of table, p. 23.

Table 1.--Maximum stages and discharges at gaging stations and outstanding peak discharges at miscellaneous sites--Continued

Index no.	Stream and place of determination	Flood region and hydrologic area	Drainage area (square miles)		Period of known floods	Maximum stage and discharge			
			Total	Contributing		Date	Gage height (feet)	Discharge	
								Cfs	Cfs per square mile
139	James River at Jamestown, N. Dak.	--	2,840	1,890	1897-1956	May 13, 1950	15.82	6,390	3.38
140	James River at LaMoure, N. Dak.	--	5,740	2,940	1882-1956	May 16, 1950	15.34	5,730	1.95
141	James River at Columbia, S. Dak.	--	7,050	4,050	1946-56	May 24, 1950	16.89	5,420	1.34
142	Elm River at Westport, S. Dak.	A2	1,680	1,170	1947-56	Apr. 8, 1952	20.10	7,520	6.43
143	James River near Stratford, S Dak.	--	9,920	6,070	1950-56	May 14, 1950	aa18.13	5,580	.92
144	James River at Ashton, S. Dak.	--	11.000	6,810	1946-56	May 19, 1950	at19.59	5,170	.76
145	West Branch Snake Creek near Athol, S. Dak.	A2	1,430	1.090	1950-56	Apr. 9, 1952	16.42	2,200	2.02
146	Turtle Creek at Redfield, S. Dak.	A2	1,540	1,540	1946-56	Apr. 10, 1952	15.51	6,420	4.17
147	James River near Redfield, S. Dak.	--	14,800	10,200	1950-56	Apr. 11, 1952	22.12	6,100	.60
148	James River at Huron, S. Dak.	--	16,800	12,010	1881	Apr. 12, 1881	19.8	-----	-----
					1929-32, 1944-56	Apr. 15, 1952	15.23	5,580	.46
149	Sand Creek near Alpena, S. Dak.	B2	240	240	1950-56	Apr. 3, 1952	au14.1	1,130	4.71
150	James River near Forestburg, S. Dak.	--	18,600	13,810	1920, 1922	March 1920, March 1922	18	-----	-----
					1950-56	Apr. 15-17, 1952	15.46	6,290	.46
151	James River near Scotland, S. Dak.	--	21,550	16,760	1929-56	May 15, 1942	at16.23	10,800	.64
151.1	West Fork Vermillion River tributary No. 1, site No. 1, near DeSmet, S. Dak.	B3	0.87	0.87	1956	June 4, 1956	-----	817	939
151.2	West Fork Vermillion River tributary No. 2, near Howard, S. Dak.	B3	2.56	2.56	1956	June 4, 1956	-----	780	305
151.3	West Fork Vermillion River tributary No. 1, Site No. 3, near Howard, S. Dak.	B3	28.9	28.9	1956	June 4, 1956	-----	360	13.1
151.4	West Fork Vermillion River at Howard, S. Dak.	B3	83.0	83.0	1956	June 5, 1956	-----	420	5.06
152	Vermillion River near Wakonda, S. Dak.	B3	1,680	1,680	1946-56	June 21, 1954	av16.63	3,790	2.26
153	Big Sioux River at Watertown, S. Dak.	B3	1,800	400	1946-56	Apr. 9, 1952	v10.35	2,220	5.55
153.1	Big Sioux River near Brookings, S. Dak.	--	4,420	2,450	1954-56	Mar. 22, 1954	9.79	1,970	.80
153.2	Big Sioux River near Flandreau, S. Dak.	--	4,580	2,610	1929-32	Mar. 15, 1929	14.04	5,200	1.99
154	Big Sioux River near Bell Rapids, S. Dak.	--	5,060	3,090	1894-1956	Apr. 5, 1952	14.85	15,400	4.98
155	Skunk Creek near Sioux Falls, S. Dak.	B3	520	520	1949-56	Mar. 29, 1952	12.16	5,770	11.1
156	Big Sioux River at Sioux Falls, D. Dak.	--	5,750	3,780	1882-1956	Apr. 7, 1952	14.50	13,500	3.57
157	Big Sioux River at Akron, Iowa.	--	9,030	7,060	1929-56	Apr. 1, 1952	aw19.95	33,000	4.67
158	Missouri River at Sioux City, Iowa.	--	314,600	314,600	1929-31, 1939-56	Apr. 14, 1952	24.28	441,000	1.40

a Occurred on preceding day.
b Occurred Apr. 18, 19, 1948.
c Occurred Apr. 19, 1956.
d Occurred April 18, 1956.
e Occurred May 11, 1950.
f Occurred Apr. 6, 1952.
g Occurred Mar. 27, 1950.
h Occurred on following day.
i Occurred at different time than peak discharge and also occurred Apr. 18, 1950.
j Occurred at different time than peak discharge.
k Failure of emergency embankment at Homme Dam.
m Site and datum then in use.
n Also occurred on preceding day; backwater from ice.
o Occurred Apr. 20, 1949.
p Occurred Mar. 25, 1943.
q Occurred Apr. 11, 1947.
r Occurred Mar. 23, 1947.
s Occurred Mar. 19, 1929.
t Maximum daily discharge.
u Occurred Mar. 31, 1952.
v Occurred Apr. 4, 1952.
w Occurred Mar. 25, 1951.
x Occurred Apr. 15, 1950.
y Occurred Apr. 9, 1944.
z Occurred Mar. 25, 1947.
aa Occurred June 20, 1947, site and datum then in use.
ab Also occurred May 2, 1946.
ac Excludes drainage area above Deerfield Reservoir as the discharge at Deerfield Dam was only 3 cfs during the flood flow of July 28, 1955.
ad Occurred June 21, 1949.
ae Occurred June 13, 1915.
af Occurred Mar. 22, 1947.
ag Occurred Jan. 24, 1952.
ah Occurred between Mar. 26 and Mar. 29, 1950.
ai Occurred June 18, 1905, site and datum then in use.
aj Occurred Feb. 7, 1939.
ak Occurred Jan. 25, 1940.
am Occurred Mar. 9, 1939.
an Occurred Mar. 31, 1950.
ao Occurred Apr. 12, 1952.
ap Occurred Mar. 24, 1950.
aq Occurred Mar. 25, 1950.
ar Occurred Apr. 9, 1950.
as Occurred Apr. 19, 1952.
at Occurred Apr. 23, 1952.
au Occurred Mar. 28, 1950.
av Occurred June 13, 1947.
aw Occurred June 22, 1954.

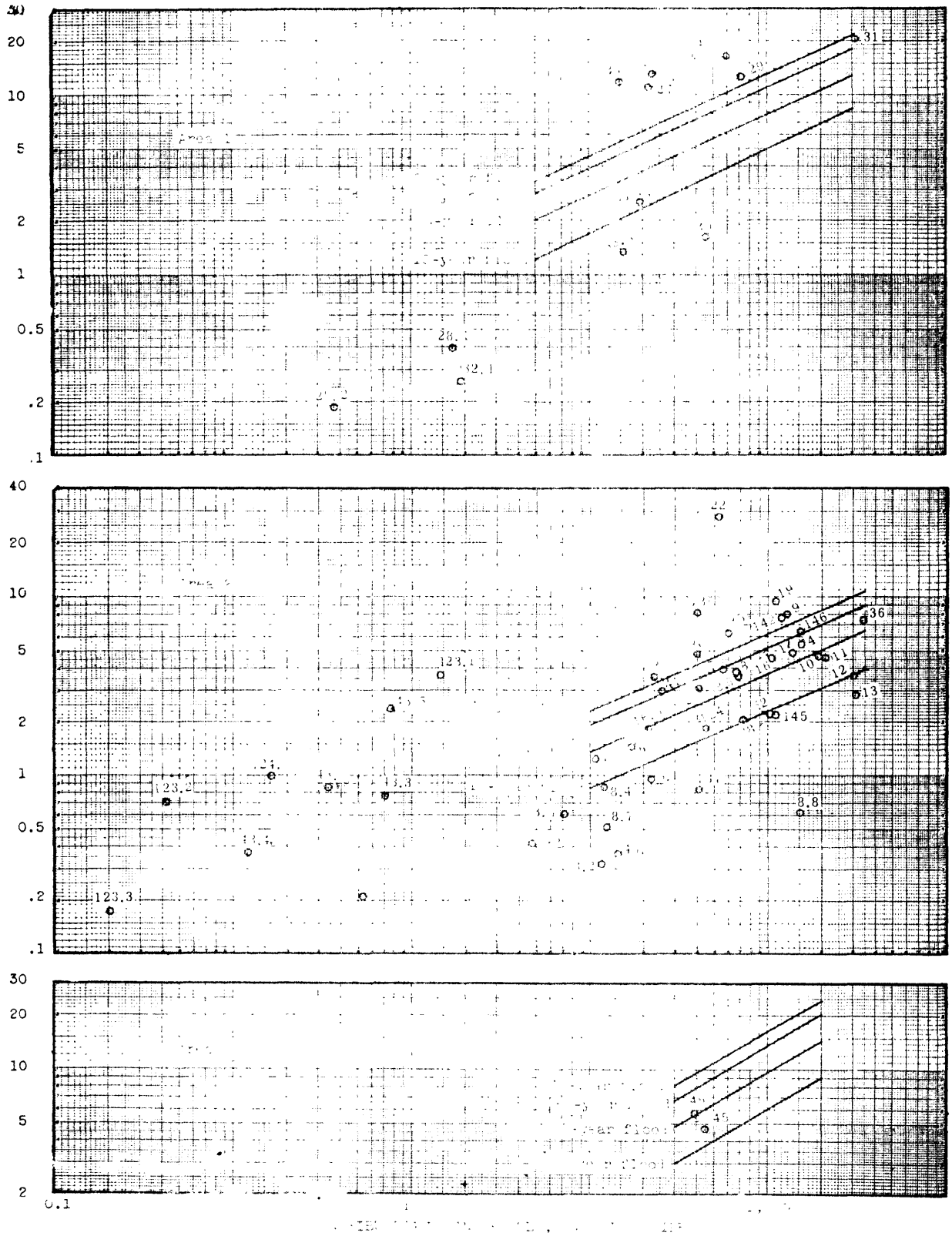

Figure 14 -- ...relation ... discharge to 10, 25, 50, and 100-year floods, region A, areas 1-3.

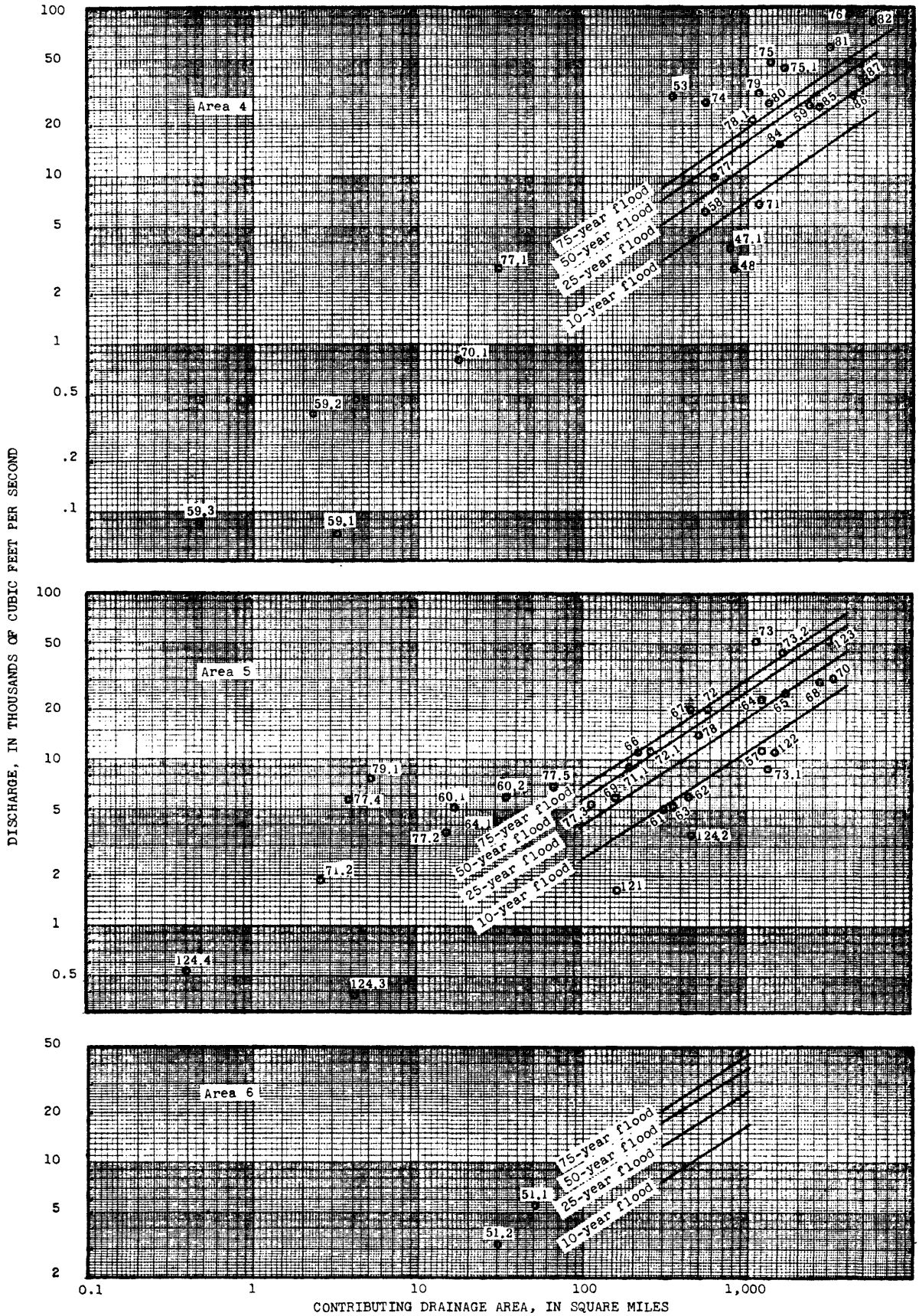

Figure 15.--Relation of maximum discharge to 10, 25, 50, and 75-year floods, region A, areas 4-6.

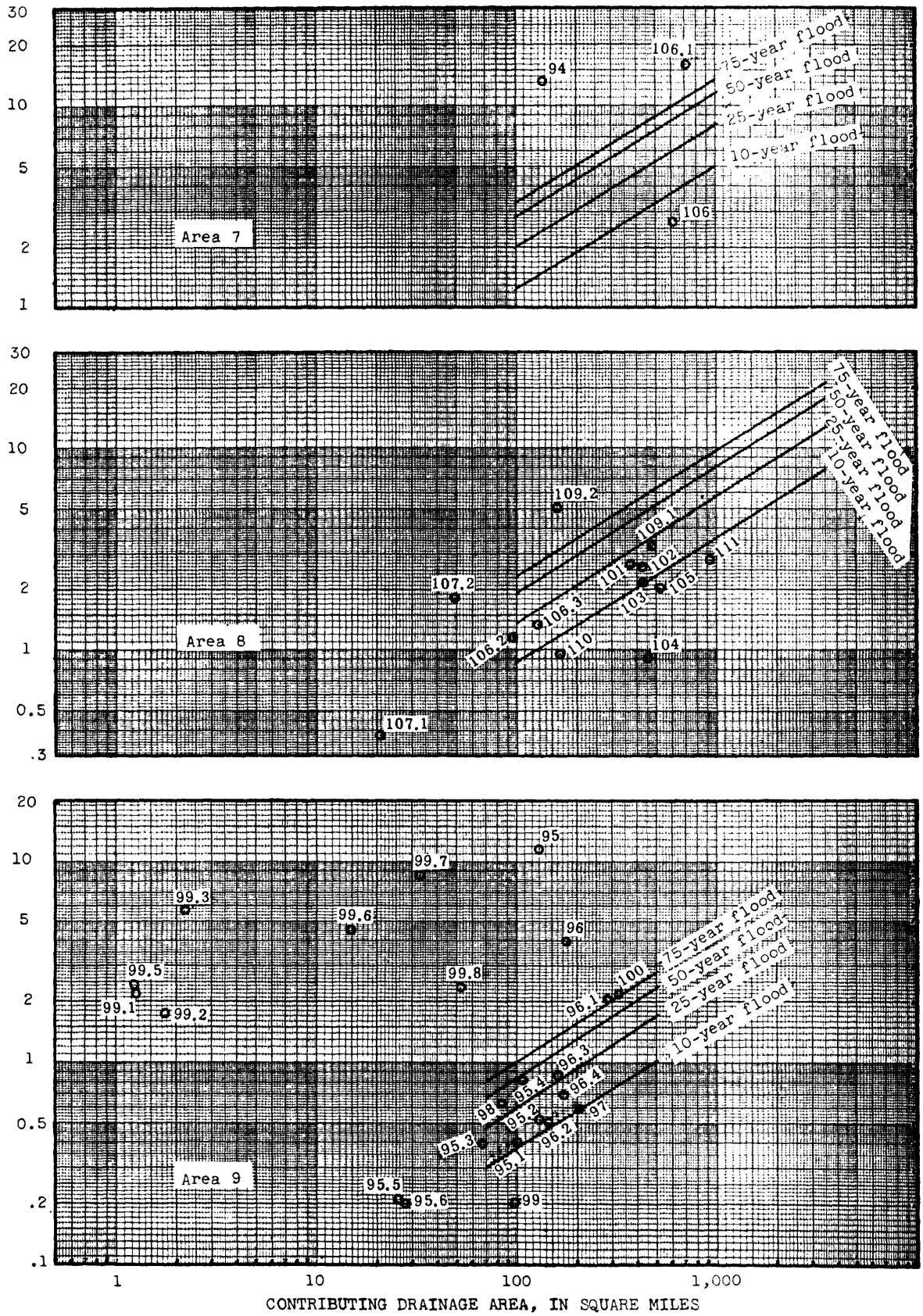

Figure 16.--Relation of maximum discharge to 10, 25, 50, and 75-year floods, region A, areas 7-9.

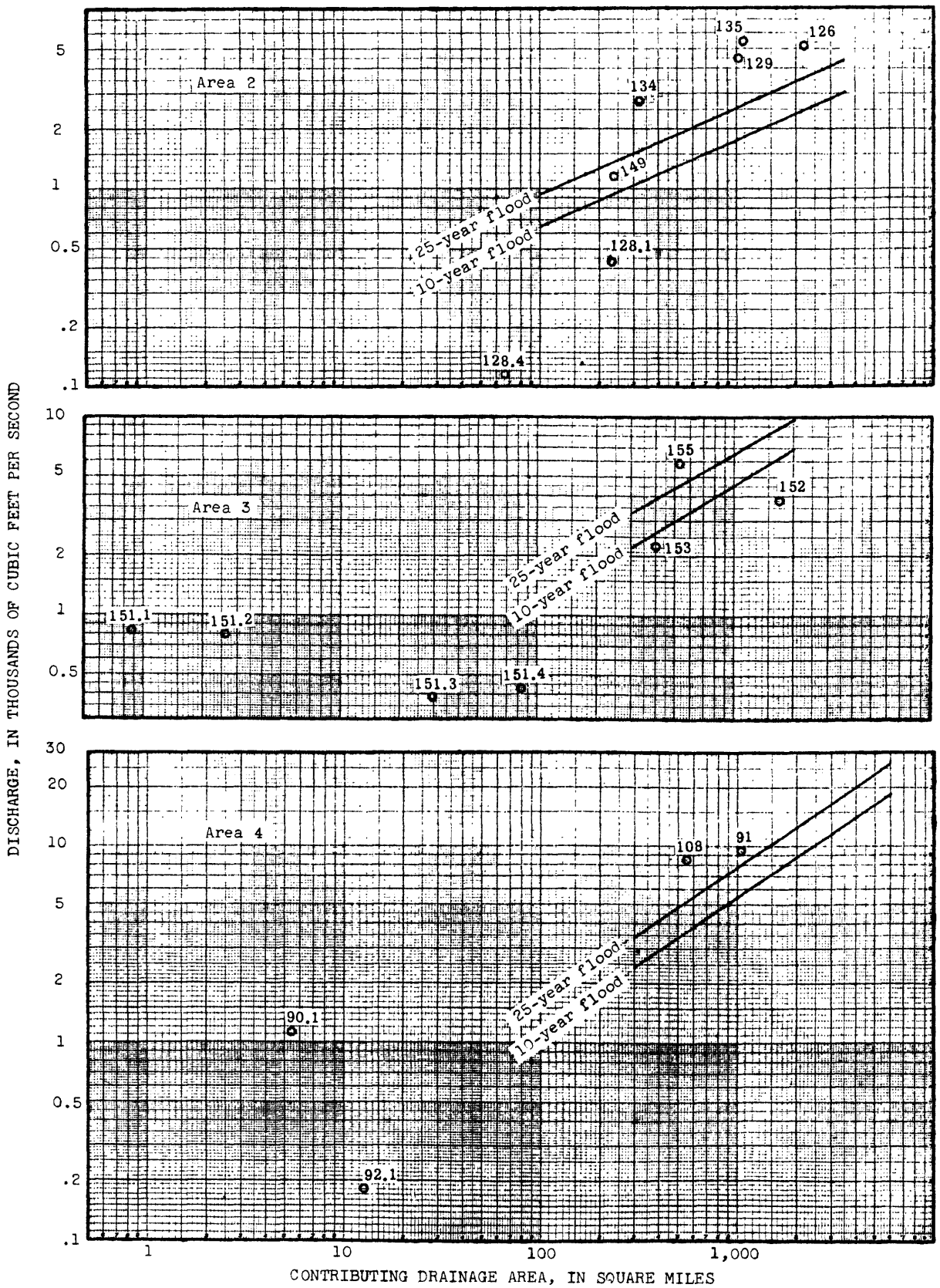

Figure 17.--Relation of maximum discharge to 10 and 25-year floods, region B, areas 2-4.

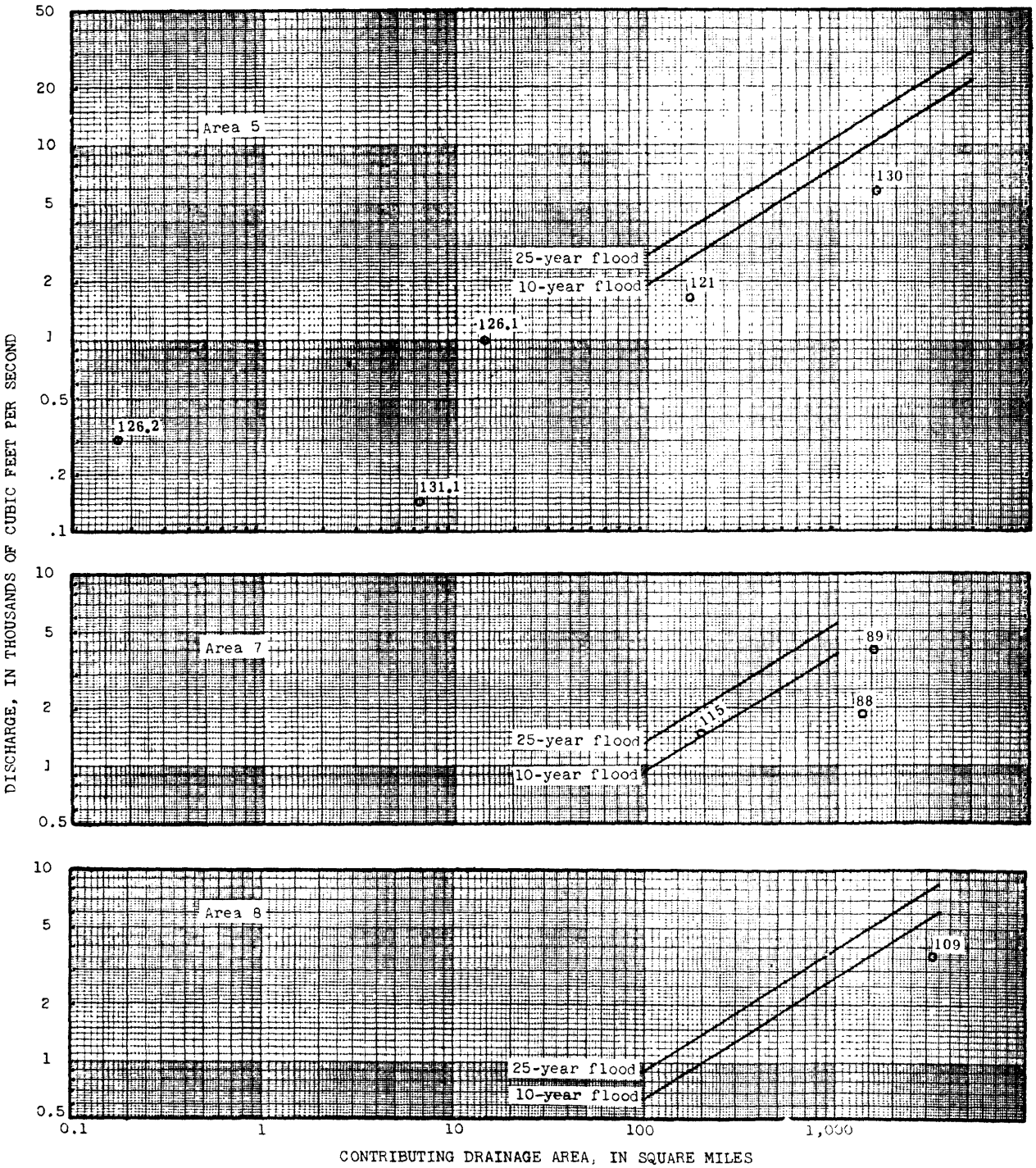

Figure 18.--Relation of maximum discharge to 10 and 25-year floods, region B, areas 5, 7, and 8.

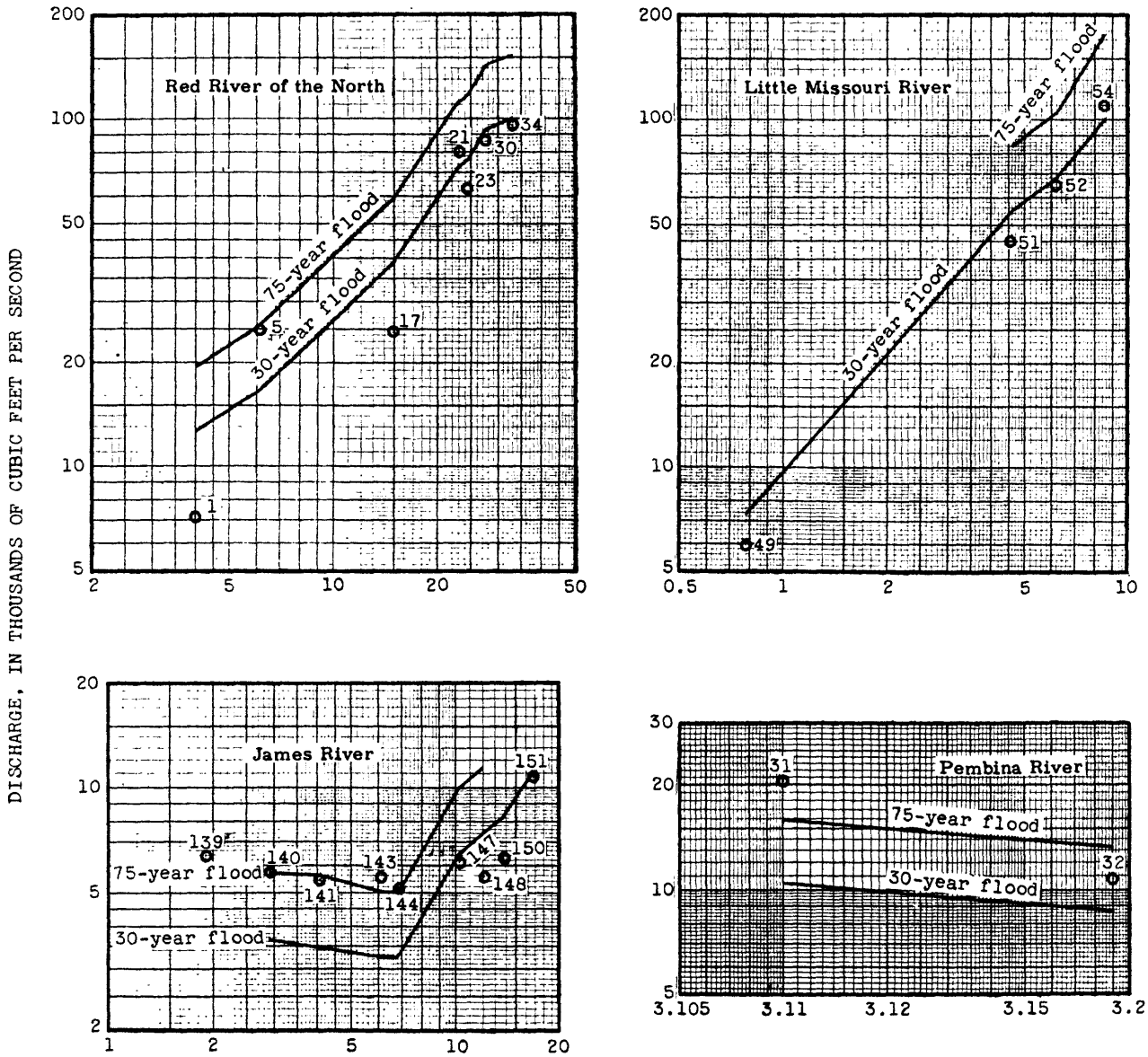

Figure 19.--Relation of maximum discharge to 30 and 75-year floods on main stems of Red River of the North and Little Missouri, James, and Pembina Rivers.

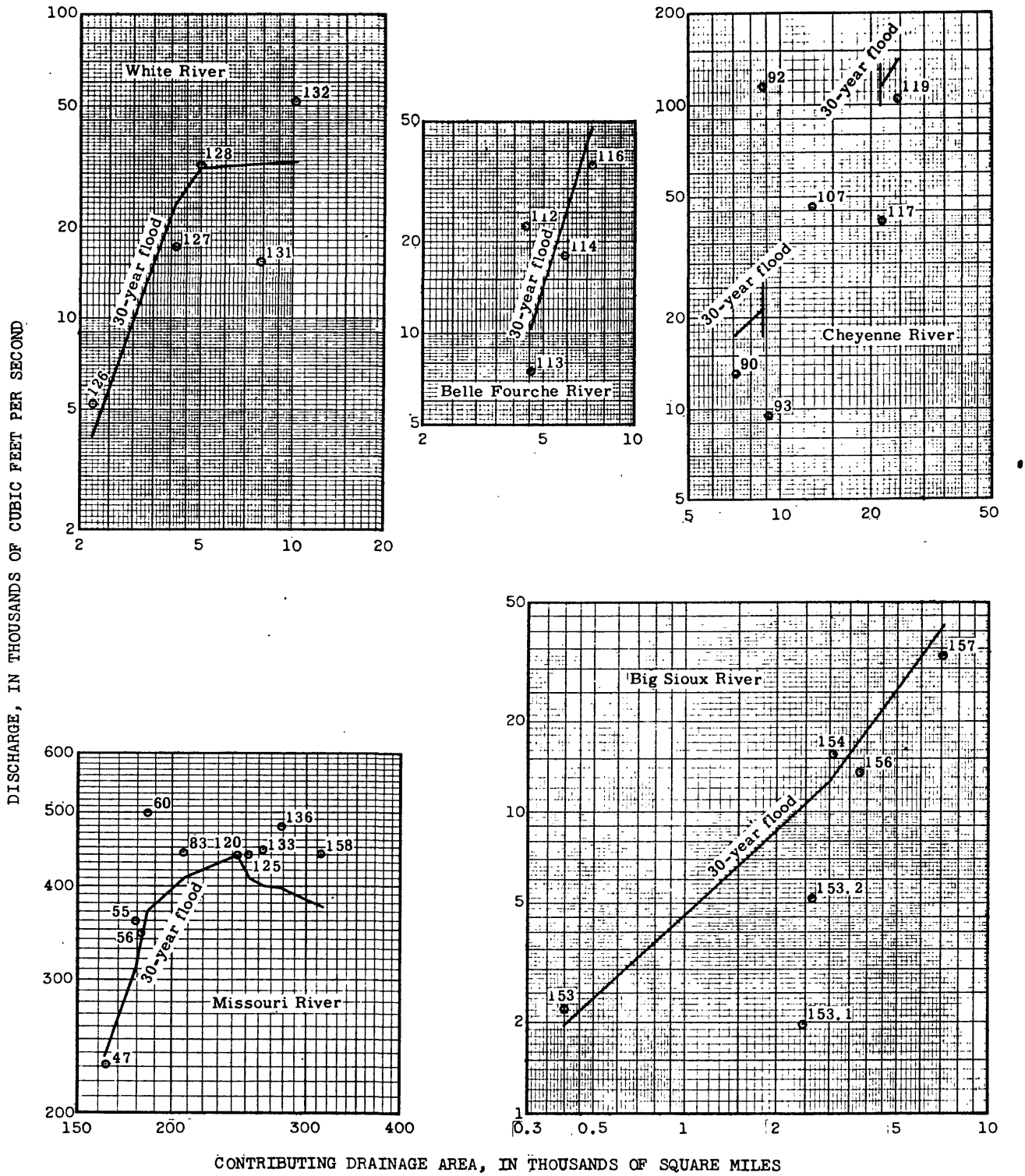

Figure 20.--Relation of maximum discharge to 30-year flood on main stems of White, Belle Fourche, Cheyenne, Missouri, and Big Sioux Rivers.

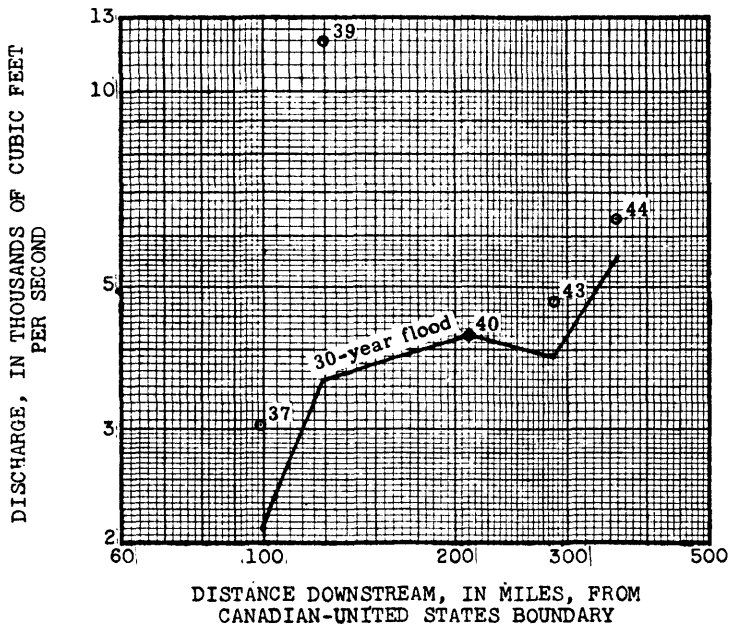

Figure 21.--Relation of maximum discharge to 30-year flood on Souris River.

LIMITATION OF REPORT

The results of a study of this type are analogous to actuarial tables used by an insurance company to help determine their rates. An actuarial table will not tell when a certain person will die. Likewise, these frequency relations based on past records will not predict the occurrence of a future flood at any one site. However, they provide a logical basis for selecting probable future floods.

Generally the longer the base period that is used the more reliable are the results obtained for the higher frequency floods. The available data justifies extending the curves only to the 75-year flood in region A and the 30-year flood in region B. Any extrapolation of these curves beyond these limits could introduce considerable error.

Lack of information of flood flows on small drainage areas (less than 100 square miles) limits the lower ends of the mean annual flood curves. Again, it is emphasized that extrapolation could result in serious errors.

Any major regulation or diversion on a stream above the site considered changes the flood-frequency and magnitude characteristics so that these curves are not applicable.

The U. S. Geological Survey, in cooperation with the North Dakota State Highway Department and the South Dakota Department of Highways, is presently engaged in a program of determining the annual maximum flow at approximately 120 sites on small drainage areas in the two States. Additional flood information is becoming available at 15 gaging stations established since 1950. In a few years it will be possible to delineate the hydrologic areas more accurately and to extend downwards the relationship curves of mean annual flood versus drainage area.

GAGING-STATION RECORDS

Stream gaging began in the Dakotas in 1882 when the Corps of Engineers, U. S. Army began to collect stage records on the Red River of the North at Grand Forks, N. Dak. A systematic stream-gaging program was begun in 1901 when the U. S. Geological Survey began collecting data at this station and on the Red River of the North at Pembina, N. Dak. Prior to this time all other data are of the historical type; that is, newspaper accounts, scattered stage records, and written accounts of outstanding events.

Stations used in the analysis are located on plate 1. The identifying number on this plate is shown next to the station name on figure 13 and in the station descriptions accompanying the tables in this section.

The base data collected at gaging stations consist of records of stage and measurements of discharge. The records of stage are obtained from direct water-surface observations with a nonrecording gage or from a water-stage recorder that produces a continuous record. Measurements of discharge are made directly with a current meter and sounding devices or by indirect methods from cross sections and profiles of high-water marks.

Flood peaks for 158 stations are listed in the tables in this section. Accompanying each table is a description of the location of the gage; size of the drainage area; statement as to the type of gage; datum and period of use of the gage; definition of the stage-discharge

relation; bankfull stage[1]; historical data; and pertinent remarks. For those stations east of the Missouri River the total drainage area and the size of the noncontributing area is given except in the case of some stations such as the Tongue River at Akra, N. Dak., where all of the area is believed to be contributing. The exceptions are three downstream stations on the Souris River where only the total drainage area is given and stations on the Pembina and the Missouri Rivers where the noncontributing area is insignificant. Total drainage areas are used west of the Missouri as there is little noncontributing area.

In addition to date, stage, and discharge given in the tables, the amount of backwater caused by ice cover or ice jams is also given. Annual peaks, when known, are given for each year of record. Peaks above a selected base are given for all years when a recording gage was operating and for some years when a nonrecording gage was in use.

Underlines in the tabular data have the following significance:

1. Line in "Water year" column means a break in the record.
2. Line beginning at "Date" column and extending through "Discharge" column means change in site and datum with no break in record.
3. Line in only "Gage height" column means change in datum only.
4. Line in "Date" and "Discharge" columns means change in site but no change in datum.
5. No underlines are used if changes in site and datum have been adjusted to present conditions.

The records for 24 stations listed in this section were not used in the analysis for reasons as explained by the footnotes.

8. Sheyenne River near Warwick, N. Dak.[a]
10. Sheyenne River below Baldhill Dam, N. Dak.[b]
12. Sheyenne River near Kindred, N. Dak.[b]
28. South Branch Park River below Homme Dam, N. Dak.[b]
38. Des Lacs River at Foxholm, N. Dak.[b]
42. Souris River at Towner, N. Dak.[b]
56. Missouri River below Garrison Dam, N. Dak.[b]
68. Heart River near Lark, N. Dak.[b]
69. Sweetbriar Creek near Judson, N. Dak.[c]
89. Beaver Creek near Burdock, S. Dak.[b]
93. Cheyenne River below Angostura Dam, S. Dak.[b]
96. Battle Creek at Hermosa, S. Dak.[c]
99. Castle Creek below Deerfield Dam, S. Dak.[b]
101. Rapid Creek above Canyon Lake, near Rapid City, S. Dak.[a]
103. Rapid Creek below Hawthorn ditch, at Rapid City, S. Dak.[a]
104. Rapid Creek below Little Giant ditch, near Rapid City, S. Dak.[a]
105. Rapid Creek at Caputa, S. Dak.[a]
112. Belle Fourche River near Belle Fourche, S. Dak.[c]
130. South Fork White River below White River, S. Dak.[b]
131. White River at Westover, S. Dak.[d]
134. Keyapaha River near Hidden Timber, S. Dak.[c]
137. James River at New Rockford, N. Dak.[e]
140. James River at LaMoure, N. Dak.[b]
146. Turtle Creek at Redfield, S. Dak.[e]

a. The drainage area of the station is within 25 percent of an upstream or downstream station so that the peak flows would not be independent events. When needed these records were used to compute peak flows at the upstream or downstream station.
b. Less than 5 years of record not affected by regulation during the base period 1929-55.
c. Less than 5 years of instantaneous peak discharge record.
d. Less than 5 years of record during the base period 1929-55.
e. Affected by lake and channel storage.

The following gaging-station records are not listed in this section since they had less than five years of record or were located on ditches.

Wild Rice River near Wild Rice, N. Dak.
Sheyenne River above Harvey, N. Dak.
Beaver Creek near Hatton, N. Dak.
South Fork Goose River near Portland, N. Dak.
Cart Creek at Mountain, N. Dak.
Herzog Creek near Concrete, N. Dak.
Tongue River near Pembina, N. Dak.
Willow Creek at Dunseith, N. Dak.
Blacktail Creek near Bonetrail, N. Dak.
Little Muddy Creek below Cow Creek near Williston, N. Dak.
White Earth River at White Earth, N. Dak.
Missouri River at Sanish, N. Dak.
Little Missouri River at Camp Crook, S. Dak.
Heart River below Dickinson Dam near Dickinson, N. Dak.
Cannonball River at Bentley, N. Dak.
Cannonball River near Heil, N. Dak.
Cedar Creek near Raleigh, N. Dak.
South Fork Grand River at Buffalo, S. Dak.
Moreau River near Whitehorse, S. Dak.
French Creek near Custer, S. Dak.
French Creek near Fairburn, S. Dak.
Battle Creek near Keystone, S. Dak.
Battle Creek near Hermosa, S. Dak.
Squaw Creek near Custer, S. Dak.
Squaw Creek near Hermosa, S. Dak.
Battle Creek below Hermosa, S. Dak.
Spring Creek near Hill City, S. Dak.
Spring Creek near Keystone, S. Dak.
Spring Creek near Rapid City, S. Dak.
Rapid Creek above Pactola Reservoir at Silver City, S. Dak.
Bennett ditch at Rapid City, S. Dak.
Leedy ditch at Rapid City, S. Dak.

1 Bankfull stage is normally the gage height at which the river overtops one or both of its banks in the vicinity of the gage and begins to inundate the surrounding land. It is considered synonymous with "Flood stage" as published in various reports published by the Weather Bureau and the Corps of Engineers. Bankfull stage is determined by field observations; minor flooding of unimportant low areas adjacent to the stream is often not considered in arriving at this stage.

Iowa ditch at Rapid City, S. Dak.
Lockhart ditch at Rapid City, S. Dak.
Hawthorn ditch at Rapid City, S. Dak.
Murphy ditch near Rapid City, S. Dak.
Cyclone ditch near Rapid City, S. Dak.
South Side ditch near Rapid City, S. Dak.
Little Giant ditch near Rapid City, S. Dak.
Lone Tree ditch near Rapid City, S. Dak.
St. Germain ditch at Caputa, S. Dak.
Hammerquist ditch near Farmingdale, S. Dak.
Corbin-Morse ditch at Rapid, S. Dak.
Rapid Creek at Creston, S. Dak.
Boxelder Creek near Nemo, S. Dak.
Boxelder Creek at Blackhawk, S. Dak.
Elk Creek near Rouboix, S. Dak.
Elk Creek above Piedmont, S. Dak.
Belle Fourche River at Belle Fourche, S. Dak.
Murray ditch at Wyoming-South Dakota state line.
Redwater Creek at Wyoming-South Dakota state line.
Spearfish Creek near Spearfish, S. Dak.
Spearfish Creek at Toomey's Ranch near Spearfish, S. Dak.
Redwater Canal at Minnesela, S. Dak.
Hay Creek at Belle Fourche, S. Dak.
Redwater Creek at Belle Fourche, S. Dak.
Inlet Canal near Belle Fourche, S. Dak.
Medicine Creek at Kennebec, S. Dak.
South Fork White River near Martin, S. Dak.
Lake Creek above refuge near Tuthill, S. Dak.
Elm Creek near Tuthill, S. Dak.
Lake Creek below refuge near Tuthill, S. Dak.
South Fork White River near Westover, S. Dak.
James River near Pingree, N. Dak.
Mud Creek near Stratford, S. Dak.
Turtle Creek near Tulare, S. Dak.
Dry Run near Frankfort, S. Dak.
Firesteel Creek near Mount Vernon, S. Dak.
James River near Alexandria, S. Dak.
Big Sioux River near Brookings, S. Dak.
Big Sioux River near Flandreau, S. Dak.
Wicksen Creek near Alcester, S. Dak.
Scott Creek near Alcester, S. Dak.

RED RIVER OF THE NORTH BASIN

(1)[1] Red River of the North at Wahpeton, N. Dak.

Location.--Lat 46°15'55", long 96°35'40", in NE¼ sec. 8, T. 132 N., R. 47 W., on left bank in Wahpeton, 800 ft downstream from confluence of Bois de Sioux and Otter Tail Rivers, and at mile 548.6.
Drainage area.--4,010 sq mi, approximately.
Gage.--Nonrecording gage prior to Oct. 28, 1950; recording gage thereafter. Prior to Aug. 6, 1943, Weather Bureau gage 800 ft upstream at different datum. Gage heights given herein converted to present datum. Datum of present gage is 942.97 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements.
Bankfull stage.--12 ft.
Historical data.--Maximum stage known, 17.0 ft in spring of 1897.
Remarks.--Flow regulated by several powerplants and numerous controlled lakes and ponds, of which Lake Traverse (the largest) has 137,000 acre-ft capacity available for flood control. Base for partial-duration series, 2,000 cfs. Only annual peaks are shown prior to Oct. 1, 1948.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1942	June 7, 1942	10.49		3,280	1949	July 10, 1949	9.24		2,290
1943	Apr. 2, 1943	14.75	-1.6	-	1950	Apr. 2, 1950	11.62		4,190
	Apr. 2-6, 1943	-		a5,000		May 10, 1950	11.49		4,110
1944	June 6, 1944	12.11		4,360					
1945	Mar. 17, 1945	11.44		3,910	1951	Apr. 7, 1951	14.01		6,090
					1952	Apr. 12, 1952	14.99		7,130
1946	Mar. 22, 1946	9.74		3,110	1953	June 21, 1953	9.87		3,150
1947	Apr. 12, 1947	11.90		4,610	1954	June 9, 1954	7.59		1,860
1948	Apr. 6, 1948	8.58	-.2	2,300	1955	Apr. 2, 1955	6.99	-0.9	1,150

aAbout.

(2) Wild Rice River near Mantador, N. Dak.

Location.--Lat 46°10'20", long 97°00'35", on south half of east line of sec. 12, T. 131 N., R. 51 W., on downstream side of county highway bridge 1½ miles west of Mantador.
Drainage area.--1,540 sq mi, approximately, of which 530 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Crest-stage indicator installed Nov. 19, 1954. Datum of gage is 997.78 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to shifting channel.
Bankfull stage.--8 ft.
Historical data.--Flood in spring of 1943 reached a stage of about 12.8 ft, from floodmarks. Lack of knowledge of ice effect prevents computation of discharge.
Remarks.--Some regulation by Fish and Wildlife Service wild-fowl refuges, of which Lake Tewauken is the largest. Some small diversions for irrigation. Maximum discharges for 1953 and 1954 probably occurred during periods of no gage-height record. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Spring, 1943	12.8		-	1949	Mar. 28, 1949	4.9	-0.6	105
1944	July 19,20, 1944	7.68		476	1950	Mar. 29, 1950	8.75	-3.7	-
1945	Mar. 20, 1945	9.57		938		Apr. 14, 1950	8.46	-.14	485
1946	Mar. 20, 1946	7.28	-1.1	-	1951	Apr. 4, 1951	7.15	-1.10	-
	Mar. 23, 1946	7.08	-.8	300		Apr. 4, 1951	7.10	-.90	275
1947	Apr. 21, 1947	8.84		554	1952	Apr. 12, 1952	10.74		2,200
1948	Apr. 6, 1948	5.75	-1.38	150					
					1955	Apr. 2, 1955	4.49	-.69	99

[1]Station number, plate 1.

RED RIVER OF THE NORTH BASIN

(3) Antelope Creek at Dwight, N. Dak.

Location.--Lat 46°18'50", long 96°44'05", in SE¼SE¼ sec. 20, T. 133 N., R. 48 W., on downstream side of bridge on former U. S. Highway 81 about a half a mile north of Dwight and 7 miles upstream from mouth.
Drainage area.--267 sq mi, approximately, of which 43 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Crest-stage indicator since Nov. 19, 1954. Altitude of gage is about 920 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to shifting channel.
Bankfull stage.--15 ft.
Historical data.--A stage of about 16.0 ft occurred in April 1943, from information obtained when the station was established in 1944. Lack of knowledge of amount of ice effect prevents computation of discharge.
Remarks.--Maximum stage and discharge for 1948 not available owing to lack of sufficient gage readings to define peak. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	April 1943	[a]16.0		-	1950	Apr. 2, 1950	12.9	-3.2	-
1944	July 5, 1944	6.98		460		May 9, 1950	9.9		893
1945	Mar. 19, 1945	9.5		868					
					1951	Apr. 4, 1951	13.26		1,700
1946	Mar. 21, 1946	12.33		1,360	1952	Apr. 8, 1952	16.31		3,670
1947	Apr. 12, 1947	11.34		1,160	1953	May 30, 1953	8.53		578
					1954	June 11, 1954	4.39		111
1949	Mar. 31, 1949	5.8		270	1955	Mar. 31, 1955	6.58		341
	July 8, 1949	6.3		-					

[a]About.

(4) Wild Rice River near Abercrombie, N. Dak.

Location.--Lat 46°28'05", long 96°47'00", in NE¼NE¼ sec. 36, T. 135 N., R. 49 W., on right bank 420 ft upstream from bridge on former U. S. Highway 81, three-quarters of a mile upstream from rubble masonry dam which serves as control, 3¼ miles northwest of Abercrombie, and 7 miles downstream from Antelope Creek.
Drainage area.--2,170 sq mi, approximately, of which 640 sq mi is probably noncontributing.
Gage.--Nonrecording gage April 1932 to Nov. 24, 1952; recording gage thereafter. Prior to Dec. 7, 1939, at site 420 ft downstream at datum 5.0 ft lower. Dec. 7, 1939, to Nov. 24, 1952, at site three-quarters of a mile downstream at present datum. Gage heights given herein adjusted to present site and datum. Datum of present gage is 907.94 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; affected by changing slope above a stage of about 3 ft (present datum). Stage-discharge relation below about 700 cfs altered by construction of a rubble masonry dam in fall and winter of 1936.
Bankfull stage.--16 ft, present datum.
Historical data.--Flood in spring of 1897 reached a stage of 27.5 ft, present site and datum, and a stage of 26.9 ft, present datum at site three-quarters of a mile downstream, from floodmarks pointed out by local residents.
Remarks.--Some regulation by Fish and Wildlife Service wild-fowl refuges, of which Lake Tewauken is the largest. Owing to the slope of the water surface there is a difference in elevation of water surfaces between the two sites varying from near zero at low flows to 0.6 ft for the extremely high stage of 1897. Base for partial-duration series, 300 cfs. Annual peaks only are shown prior to Oct. 1, 1952.

(4) Wild Rice River near Abercrombie, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1897	-	27.5		-	1946	Mar. 24, 1946	13.4		2,320
					1947	Apr. 12, 1947	[a]13.9		2,450
1933	Mar. 13, 1933	-0.9	-0.6	75	1948	Apr. 11, 1948	5.0		729
1934	Apr. 4, 1934	-2.3	-1.2	-	1949	Apr. 3, 1949	5.9	-1.5	650
	Apr. 7, 1934	-2.9	-.4	15	1950	Apr. 3, 1950	16.6	-3.3	2,300
1935	Mar. 16, 1935	5.2	-2.5	513					
					1951	Apr. 6, 1951	12.2	-.8	1,890
1936	Mar. 22, 1936	3.0	-1.0	415	1952	Apr. 12, 1952	20.9	-.3	5,400
1937	Apr. 9, 1937	3.7		540	1953	Mar. 23, 1953	4.62	-1.32	390
1938	Mar. 17, 1938	2.3		318		May 29, 1953	[b]14.45		2,500
1939	Mar. 25, 1939	10.2	-1.1	1,350		June 16, 1953	5.22		685
1940	Apr. 8, 1940	3.5	-.3	300		June 27, 1953	4.80		627
					1954	June 15, 1954	3.14		342
1941	June 11, 1941	4.2		608		July 2, 1954	5.93		800
1942	June 10, 1942	4.1		579	1955	Apr. 1, 1955	5.76	-1.7	[c]550
1943	Apr. 2, 1943	21.3		5,500					
1944	July 7, 1944	6.9		956					
1945	Mar. 19, 1945	15.3		2,840					

[a] Occurred on following day.
[b] Occurred at different time than peak discharge.
[c] About.

(5) Red River of the North at Fargo, N. Dak.
(Published as "Red River at Moorhead, Minn." in 1901)

Location.--Lat 46°52'10", long 96°47'00", in NE¼ sec. 7, T. 139 N., R. 48 W., on left bank just upstream from Island Park Dam in Fargo, 10 miles south of (24 miles upstream from) mouth of Sheyenne River, and at mile 452.1.
Drainage area.--6,800 sq mi, approximately, of which 670 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Prior to Sept. 1, 1914, at site half a mile downstream and at datum 6.55 ft lower. Sept. 1, 1914, to July 31, 1928, at present site and at datum 3.70 ft higher. Datum of present gage is 867.4 ft above mean sea level, datum of 1929. Gage heights for period Sept. 1, 1914, to July 31, 1928, adjusted to present datum.
Stage-discharge relation.--Defined by current-meter measurements below 16,200 cfs; subject to changes owing to shifting channel or control, changing slope, and ice effect. These changes were poorly defined for some years.
Bankfull stage.--12 ft, present site and datum.
Historical data.--Maximum stage known, 40.1 ft Apr. 7, 1897, site and datum then in use, discharge of 25,000 cfs computed on basis of recent measurements using open-water conditions. Flood of Apr. 11, 1882, reached a stage of 37.8 ft, discharge of 20,000 cfs computed on basis of recent measurements using open-water conditions.
Remarks.--Gage heights are based on graphs drawn through once or twice-daily gage readings except for the years 1902, 1903, and 1904, when only once-daily gage heights were available. Flow regulated by several powerplants and numerous controlled lakes and ponds, of which Lake Traverse (the largest) has 137,000 acre-ft capacity available for flood control. Only annual peaks are shown.

(5) Red River of the North at Fargo, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1882	-	37.8		20,000	1926	Mar. 24, 1926	8.0		1,600
					1927	Mar. 19, 1927	9.1		2,650
1897	Apr. 7, 1897	40.1		25,000	1928	Mar. 28, 1928	13.3	-2.0	3,840
					1929	Mar. 20,21, 1929	12.8		4,440
1902	May 23, 1902	10.5		1,180	1930	Mar. 17,18, 1930	10.0		1,340
1903	Apr. 6, 1903	13.9		2,450					
1904	Apr. 20, 1904	21.3	-1.7	5,220	1931	Apr. 3, 1931	8.55		365
1905	May 17, 1905	18.4		4,250	1932	Apr. 11, 1932	9.45		875
					1933	Apr. 5, 1933	9.04		605
1906	Apr. 9, 1906	15.5		3,050	1934	Apr. 10, 1934	8.55		323
1907	Mar. 31, 1907	29.8	-4.0	7,000	1935	Mar. 20, 1935	9.72		942
1908	June 13, 1908	14.7		2,600					
1909	Mar. 30,31, 1909	13.04	-2.1	-	1936	Apr. 14, 1936	9.90		1,050
	May 30, 1909	12.5		1,780	1937	Apr. 12,13, 1937	10.17		1,390
1910	Mar. 19, 1910	23.2	-3.7	-	1938	May 2, 1938	10.02		1,350
	Mar. 19 or 20, 1910	-		[a]5,000	1939	Mar. 31, 1939	13.00		3,870
					1940	Apr. 8, 1940	9.63		1,030
1911	Apr. 11, 1911	8.7		608					
1912	May 14, 1912	10.6		1,100	1941	Apr. 3, 1941	10.10		1,390
1913	July 8, 1913	11.9		1,560	1942	June 11, 1942	12.27		3,380
1914	June 12, 1914	16.1		3,140	1943	Apr. 7, 1943	28.40		16,000
1915	July 3, 1915	9.73		3,130	1944	June 10, 1944	14.26		4,150
					1945	Mar. 22, 1945	20.70		7,700
1916	Apr. 6, 1916	23.63	-3.5	-					
	July 11, 1916	21.04		7,740	1946	Mar. 27, 1946	17.13		5,970
1917	Apr. 3, 1917	17.8	-3.0	5,240	1947	Apr. 15, 1947	22.85		9,300
1918	Mar. 31, 1918	6.87		874		Apr. 15, 1947	22.93		
1919	Apr. 6, 1919	6.5		680	1948	Apr. 10, 1948	[b]12.45		3,390
1920	Mar. 28, 1920	17.2		6,200	1949	July 12, 1949	11.27		2,660
					1950	Apr. 7, 1950	[b]20.88		7,800
1921	Apr. 6, 1921	8.4		1,970					
1922	Apr. 11, 1922	14.7		5,200	1951	Apr. 11, 1951	[b]20.73		8,010
1923	June 29, 1923	11.6		3,960	1952	Apr. 15,16, 1952	[c]28.79		16,300
1924	Apr. 30, 1924	6.2		530	1953	June 1, 1953	17.90		6,720
1925	June 21, 1925	7.0		940		June 1, 1953	18.05		
					1954	July 4, 1954	10.53		1,920
					1955	Apr. 4, 1955	11.12		2,760

[a] About.
[b] Occurred at different time than peak discharge.
[c] Occurred only on Apr. 16, 1952.

(6) Sheyenne River near Harvey, N. Dak.

Location.--Lat 47°47'25", long 99°53'25", in SE¼SW¼ sec. 21, T. 150 N., R. 72 W., on left bank 90 ft north of Harvey Water Works, 0.4 mile upstream from small tributary, and 2¼ miles northeast of Harvey.
Drainage area.--535 sq mi, approximately, of which 364 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Prior to June 11, 1946, at site 3 miles upstream and at altitude 1,541 ft (from topographic map). Datum of present gage is 1,520.10 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements.
Bankfull stage.--5 ft.
Historical data.--High water of March, 1943, reached a stage of 3.2 ft, site and datum in use prior to June 11, 1946; discharge of 580 cfs computed on basis of later measurements using open-water conditions.
Remarks.--Only annual peaks are shown.

RED RIVER OF THE NORTH BASIN

(6) Sheyenne River near Harvey, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	March 1943	3.2		580	1951	Apr. 6, 1951	5.95	-0.60	-
						Apr. 7, 1951	5.85	-.40	340
1946	Mar. 21, 1946	2.26		132	1952	Apr. 3, 1952	5.30	-.23	-
1947	Mar. 23, 1947	5.44	-0.57	200		Apr. 7, 1952	5.23		258
1948	Apr. 18, 1948	6.45		1,220	1953	June 30, 1953	3.60		60
1949	Apr. 7, 1949	6.20		846	1954	June 17, 1954	5.57		351
1950	Apr. 17, 1950	6.95	-.40	-	1955	Mar. 31, 1955	4.76	-.33	120
	Apr. 18, 1950	6.62		1,430					

(7) Sheyenne River at Sheyenne, N. Dak.

Location.--Lat 47°50'20", long 99°07'03", in NE¼SE¼ sec. 5, T. 150 N., R. 66 W., at recreation-pond dam, 1 mile north of Sheyenne.
Drainage area.--1,790 sq mi, approximately, of which 1,230 sq mi is probably noncontributing.
Gage.--Nonrecording gage. April 1929 to July 1932, at present site and at different datum. February 1933 to June 1933, at site 300 ft downstream at different datum. Datum of present gage is 1,412.54 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to shifting channel, ice effect, aquatic growth, and wind action in pool above control.
Bankfull stage.--7 ft.
Historical data.--Flood in 1919 reached a stage about 3 ft higher than that of April 1948.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1930	Feb. 24, 1930	8.79	-0.3	990	1944	Sept. 1, 1944	4.94		537
					1945	Mar. 14, 1945	5.70		932
1931	Apr. 9, 1931	2.81		58					
					1946	Mar. 21, 1946	5.88		1,120
1933	Mar. 2, 1933	6.08	-1.30	296	1947	Mar. 25, 1947	6.22	-1.01	750
					1948	Apr. 18,19, 1948	8.51		3,840
1940	Apr. 16, 1940	3.92		63	1949	Apr. 9, 1949	7.15		2,080
					1950	Apr. 18, 1950	8.31		3,940
1941	Apr. 3, 1941	5.76		847					
1942	Apr. 5, 1942	6.38		1,140	1951	Apr. 9, 1951	6.25	-.53	1,420
1943	Mar. 27, 1943	7.22	-.80	1,150					

(8) Sheyenne River near Warwick, N. Dak.

Location.--Lat 47°48'20", long 98°42'57", on south quarter of line between secs. 15 and 16, T. 150 N., R. 63 W., on left bank on downstream side of bridge on county road, 3.3 miles south of Warwick.
Drainage area.--2,070 sq mi, approximately, of which 1,410 sq mi is probably noncontributing.
Gage.--Recording gage and rubble masonry control. Altitude of gage is 1,370 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 3,480 cfs.
Bankfull stage.--6 ft.
Remarks.--Base for partial-duration series, 200 cfs.

(8) Sheyenne River near Warwick, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1950	Apr. 17, 1950	7.45	3,800	1953	July 3, 1953	3.08	204
	May 14, 1950	5.66	1,650	1954	Feb. 28, 1954	3.07	213
	May 22, 1950	5.63	1,630		June 19, 1954	4.38	878
					July 3, 1954	3.68	490
1951	Apr. 11, 1951	5.01	1,240	1955	Apr. 3, 1955	5.04	1,330
1952	Apr. 8, 1952	4.17	737				

(9) Sheyenne River near Cooperstown, N. Dak.

Location.--Lat 47°26', long 98°02', in NE¼SE¼ sec. 27, T. 146 N., R. 58 W., on right bank 150 ft downstream from county bridge and 5 miles east of Cooperstown.
Drainage area.--6,750 sq mi, approximately, of which 5,490 sq mi is probably noncontributing.
Gage.--Nonrecording gage March 1945 to Aug. 2, 1950; recording gage thereafter. Datum of gage is 1,271.04 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark).
Stage-discharge relation.--Defined by current-meter measurements.
Bankfull stage.--14 ft.
Remarks.--Base for partial-duration series, 200 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1945	*Mar. 20, 1945	*10.5		*1,000	1951	Apr. 6, 1951	11.46	-0.80	926
						Apr. 19, 1951	11.05		989
1946	Mar. 24, 1946	11.70	-1.05	-	1952	Apr. 14, 1952	13.02	-.70	1,240
	Apr. 2, 1946	10.68		964		July 3, 1952	6.64		289
	July 28, 1946	7.05		382		July 21, 1952	5.83		226
1947	Apr. 8, 1947	13.89	-2.18	1,150	1953	June 22, 1953	5.95		240
	June 5, 1947	6.00		236		July 3, 1953	6.22		271
1948	Apr. 23, 1948	18.10		5,600	1954	Feb. 20, 1954	6.43	-.83	-
1949	Apr. 17, 1949	15.95		2,290		Mar. 7, 1954	6.66	-.95	210
	June 1, 1949	6.80		338		June 26, 1954	9.32		682
1950	Mar. 28, 1950	9.32	-3.10	251		July 9, 1954	7.38		389
	Apr. 17, 1950	18.69		7,830	1955	Apr. 11, 1955	11.41		1,060
	May 9, 10, 1950	17.03		3,460		June 7, 1955	6.92		346
	June 16, 1950	6.85		352					
	June 25, 1950	7.38		430					

*About.

(10) Sheyenne River below Baldhill Dam, N. Dak.

Location.--Lat 47°01'50", long 98°05'00", in NW¼ sec. 18, T. 141 N., R. 58 W., on right bank 600 ft downstream from Baldhill Dam, 8 miles northwest of Valley City, and at mile 270.5.
Drainage area.--7,880 sq mi, approximately, of which 5,980 sq mi is probably noncontributing.
Gage.--Recording gage. Datum of gage is 1,200.00 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and control changes.
Remarks.--Regulated by Lake Ashtabula since 1949 (usable capacity at normal pool elevation, 69,100 acre-ft; capacity at maximum pool elevation, 116,500 acre-ft). Annual peaks only are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1948	Apr. 27 or 28,1948	-	4,600	1952	Aug. 29,30, 1952	-	*400
1950	May 23, 1950	32.62	3,150	1953	July 16, 1953	29.41	1,900
				1954	Mar. 11, 1954	28.28	1,270
1951	Apr. 19, 1951	28.00	1,270	1955	Apr. 13, 1955	28.86	1,640

*About.

RED RIVER OF THE NORTH BASIN

(11) Sheyenne River at Valley City, N. Dak.

Location.--Lat 46°54'50", long 98°00'30", in SE¼NW¼ sec. 28, T. 140 N., R. 58 W., on left bank 100 ft downstream from College Dam in Valley City, 13 miles downstream from Baldhill Dam, and at mile 253.0.
Drainage area.--8,180 sq mi, approximately, of which 6,110 sq mi is probably noncontributing.
Gage.--Nonrecording gage March to August 1919 at site half a mile upstream at different datum, March to Oct. 13, 1938, at present site and datum; recording gage thereafter. Datum of present gage is 1,199.91 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).
Stage-discharge relation--Defined by current-meter measurements.
Bankfull stage.--12 ft.
Historical data.--Flood of April 1882 reached a stage of 20.0 ft as determined by Corps of Engineers, and flood of April 1897 reached a stage of 15.5 ft.
Remarks.--Flow regulated by Lake Ashtabula since August 1949 (usable capacity at normal pool elevation, 69,100 acre-ft; capacity at maximum pool elevation, 116,500 acre-ft). Base for partial-duration series, 200 cfs. Only annual peaks are shown 1919, 1938, and 1950-55.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1919	Apr. 18, 1919	14.9		2,750	1944	June 2, 1944	4.50		399
						July 17, 1944	3.92		264
1938	Mar. 29, 1938	3.90		244		Aug. 25, 1944	4.00		290
1939	Mar. 20, 1939	4.55	-0.70	236		Aug. 30, 1944	4.13		326
	Mar. 27, 1939	4.75	-.82	250		Sept.10, 1944	3.83		234
	Apr. 6, 1939	4.34		342	1945	Mar. 24, 1945	7.06		1,020
1940	Apr. 8, 1940	5.14	-.09	525					
	Apr. 18, 1940	4.02		267	1946	Mar. 26, 1946	7.56		1,160
						July 31, 1946	4.06		288
1941	Apr. 19, 1941	9.10		1,590	1947	Mar. 23, 1947	6.51	-0.40	850
	May 28, 1941	4.40		378		Apr. 11, 1947	10.19		1,910
	Sept. 4, 1941	4.22		336		June 7, 1947	3.93		253
1942	Apr. 17,18, 1942	7.72		1,190	1948	Apr. 28, 1948	17.51		4,580
	May 1, 1942	4.60		400	1949	Mar. 8, 1949	4.95		478
	May 27, 1942	4.21		317		Apr. 10, 1949	8.69		1,380
	June 3, 1942	4.08		289		Apr. 21, 1949	10.90		2,120
	June 6, 1942	4.91		452		June 3, 1949	4.27		334
	Aug. 30, 1942	4.97		461		July 5, 1949	5.47		606
1943	Mar. 27, 31,					July 8, 1949	5.63		638
	Apr. 1, 2, 1943	-		1,900		July 28, 1949	6.88		973
	May 4, 1943	4.02		276	1950	May 5, 1950	14.60		3,050
	June 16, 1943	5.73		721					
					1951	Apr. 19, 1951	8.08		1,270
					1952	Mar. 31, 1952	6.02		650
					1953	July 17, 1953	8.11		1,230
					1954	July 13, 1954	6.29		726
					1955	Apr. 14, 1955	9.04		1,490

(12) Sheyenne River near Kindred, N. Dak.

Location.--Lat 46°37'35", long 97°00'05", in NE¼NW¼ sec. 5, T. 136 N., R. 50 W., near center of span on downstream side of Great Northern Railway bridge, 1½ miles southeast of Kindred and at mile 68.1.
Drainage area.--9,150 sq mi, approximately, of which 6,180 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 929 ft above mean sea level (from Great Northern Railway profile).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--22 ft.
Remarks.--Regulated by Lake Ashtabula since 1949 (usable capacity at normal pool elevation, 69,000 acre-ft; capacity at maximum pool elevation, 116,500 acre-ft). Only annual peaks are shown.

(12) Sheyenne River near Kindred, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947					1951	Apr. 3, 1951	10.15	-2.8	-
or						May 5, 1951	7.70		1,010
1948	Spring	22.1		3,600	1952	Apr. 8, 1952	17.80	-2.45	2,240
					1953	July 3, 1953	6.44		679
1950	May 13, 14, 1950	20.5		3,210	1954	July 6, 1954	6.17		631
					1955	Apr. 19, 1955	8.80		1,120

(13) Sheyenne River at West Fargo, N. Dak.
(Published as "at or near Haggart" 1902-7, 1919)

Location.--Lat 46°53'20", long 96°54'55", in sec. 31, T. 140 N., R. 49 W., on left bank 80 ft downstream from county highway bridge, 1 mile north of West Fargo, 3 miles upstream from Maple River, and at mile 24.5.
Drainage area.--9,250 sq mi, approximately, of which 6,180 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to June 28, 1933; recording gage thereafter. March 1902 to June 1907 and March to August 1919, at private bridge, three-quarters of a mile upstream at different datum. Since September 1929, at present site and datum. Datum of present gage is 877.19 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel changes, ice effect, backwater from tributary inflow below the station, possible backwater from the Red River of the North, and changing slope.
Bankfull stage.--16 ft.
Remarks.--Flow regulated by Lake Ashtabula since August 1949 (usable capacity at normal pool elevation, 69,100 acre-ft; capacity at maximum pool elevation, 116,500 acre-ft). Records do not include overbank discharge (about 500 cfs maximum in May 1950) which leaves Sheyenne River in vicinity of Horace and flows into Red River of the North above Fargo during periods of high runoff. Base for partial-duration series, 400 cfs. Only annual peaks are shown 1903-6, 1919, 1930-33, and 1950-55.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1903	Apr. 11, 1903	14.7		1,570	1943	Apr. 1, 1943	19.35	-1.83	-
1904	Apr. 22, 1904	18.8	-0.5	-		Apr. 7-10, 1943	(a)		2,400
	Apr. 25, May 2,1904	18.4		1,950		June 5, 1943	10.95		1,040
1905	May 13, 1905	9.8		814		June 16, 1943	10.80		1,010
						Aug. 8, 1943	7.30		471
1906	Apr. 16, 1906	11.7		1,060	1944	Apr. 18, 1944	7.11		400
						May 22, 1944	10.10		861
1919	Apr. 28, 1919	16.8		2,220		June 9, 1944	7.61		467
					1945	Mar. 22, 1945	13.38		1,360
1930	Mar. 25, 1930	15.52	-2.5	-					
	Apr. 5, 1930	14.90	-.4	1,780	1946	Mar. 31, 1946	15.01		1,690
					1947	Apr. 18, 1947	20.53		2,800
1931	Apr. 7, 1931	7.84		390		June 13, 1947	b14.43		-
1932	Apr. 13, 1932	11.84		1,110		June 15, 1947	(b)		430
1933	Mar. 11, 1933	11.82	-2.20	680	1948	May 7, 1948	18.46		2,650
1934	Apr. 13, 1934	7.22		336	1949	Apr. 12, 1949	14.60		1,440
1935	Mar. 29, 1935	7.32	-.21	362		Apr. 29, 1949	16.19		1,980
					1950	May 11, 1950	b20.61		-
1936	Apr. 21, 1936	9.74		718		May 22, 1950	b19.99		2,810
1937	Apr. 18, 1937	7.40		485					
1938	Mar. 27, 1938	5.50		249	1951	Apr. 5, 1951	13.25	-.94	1,020
1939	Mar. 28, 1939	9.96	-2.10	-	1952	Apr. 9, 1952	b20.50		-
	Apr. 3, 4, 1939	(a)		600		Apr. 12, 1952	b20.28		2,510
1940	Apr. 18, 1940	7.88		555	1953	June 17, 1953	(b)		1,300
						June 20, 1953	b18.83		-
1941	Apr. 26, 1941	12.72		1,340	1954	July 7, 1954	9.11		565
	June 11, 1941	7.06		428	1955	Apr. 21, 1955	11.68		1,110
1942	Apr. 27, 1942	11.02		1,040					
	June 9, 1942	7.58		513					

[a] No defined peak gage height; peak discharge occurred at time of changing stage and decreasing ice effect.
[b] Backwater from tributary inflow below station.

RED RIVER OF THE NORTH BASIN

(14) Maple River at Mapleton, N. Dak.

Location.--Lat 46°53'20", long 97°03'20", in NE¼NE¼ sec. 1, T. 139 N., R. 51 W., near center of downstream side of county highway bridge in Mapleton, 10.5 miles upstream from mouth.
Drainage area.--1,480 sq mi, approximately, of which 130 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 886.7 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifts, movement of rocks on control, and ice effect.
Bankfull stage.--14 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1944	Apr. 8, 1944	8.16		177	1951	Apr. 4, 1951	14.15	-3.85	-
1945	Apr. 12, 1945	8.59		373		Apr. 7, 1951	12.5	-2.1	750
					1952	Apr. 6, 1952	18.91	-.77	-
1946	Mar. 21, 1946	13.15	-3.40	551		Apr. 6, 1952	18.90	-.69	3,850
1947	Apr. 14, 1947	18.04		3,880	1953	June 17, 1953	18.62		4,840
1948	Apr. 7, 1948	17.28	-3.56	1,500	1954	Mar. 21, 1954	8.62	-.77	200
1949	Apr. 3, 1949	14.75	-3.76	850	1955	Apr. 2, 1955	12.4	-3.6	500
1950	Apr. 2, 1950	17.73	-2.58	1,980					

(15) Rush River at Amenia, N. Dak.

Location.--Lat 47°00'40", long 97°13'10", on line between secs. 23 and 24, T. 141 N., R. 52 W., near center of span on upstream side of bridge on State Highway 18, 0.4 mile north of Amenia.
Drainage area.--107 sq mi.
Gage.--Nonrecording gage. Prior to Oct. 7, 1947, at site 150 ft downstream at same datum. Datum of gage is about 943 ft above mean sea level, datum of 1929 (from railroad profile).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--8 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Apr. 14, 1947	8.90		1,230	1951	Mar. 27, 1951	9.0	-4.9	-
1948	Apr. 8, 1948	10.20	-6.95	-		Mar. 28, 1951	8.60	-2.01	368
	Apr. 11, 1948	8.04	-.29	590	1952	Apr. 1, 1952	9.7	-1.9	600
1949	Mar. 29, 1949	9.63	-7.6	-	1953	June 16, 1953	8.63		1,050
	Mar. 31, 1949	7.5	-.7	400	1954	Feb. 25, 1954	6.51	-4.7	-
1950	Mar. 27, 1950	10.96	-8.7	-		Apr. 6, 1954	4.9		120
	Apr. 7, 1950	8.62	-.78	620	1955	Mar. 31, 1955	9.0	-3.9	200

(16) Buffalo River near Dilworth, Minn.

Location.--Lat 46°57'40", long 96°39'40", in SE¼SW¼ sec. 6, T. 140 N., R. 47 W., on left bank 4½ miles southeast of Kragnes, 6½ miles northeast of Dilworth, and 9 miles downstream from South Branch.
Drainage area.--1,040 sq mi, approximately.
Gage.--Nonrecording gage March 1931 to Apr. 5, 1937; recording gage thereafter. Altitude of gage is 870 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 4,000 cfs.
Bankfull stage.--12.5 ft.
Remarks.--Base for partial-duration series, 300 cfs. Only annual peaks are shown for 1931-36.

RED RIVER OF THE NORTH BASIN

(16) Buffalo River near Dilworth, Minn.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1931	Apr. 5, 1931	3.92	-1.5	-	1946	Mar. 21, 1946	17.61	-3.30	-
	Apr. 10, 1931	2.50	-.03	46		Mar. 22, 1946	17.05	-1.14	1,670
1932	Apr. 12, 1932	8.83	-2.0	313		July 9, 1946	8.73		484
1933	Apr. 3, 1933	9.02	-2.8	270	1947	Apr. 13, 1947	20.26		3,360
1934	Apr. 10, 1934	9.02	-1.4	376		June 16, 1947	9.21		529
1935	Mar. 21, 1935	9.09	-2.3	311	1948	Apr. 8, 1948	14.44		1,320
					1949	Apr. 8, 1949	11.17	-1.09	600
1936	Apr. 16, 1936	14.59		1,460	1950	Apr. 7, 1950	18.68	-.60	[a]2,600
1937	Apr. 14, 1937	9.00	-2.22	388		May 10, 1950	15.22		1,610
	May 3, 1937	6.10		322		May 20, 1950	12.01		936
1938	Mar. 22, 1938	9.22	-2.4	392					
	May 5, 1938	8.78		548	1951	Apr. 7, 1951	17.47		[b]2,230
1939	Mar. 29, 1939	15.77	-1.70	1,350		June 7, 1951	7.16		346
1940	Apr. 7, 1940	10.29	-1.96	513	1952	Apr. 10, 1952	21.24		4,310
						July 6, 1952	10.47		716
1941	Apr. 4, 1941	12.70	-1.86	787		July 24, 1952	12.00		935
1942	May 6, 1942	10.94		767		Aug. 7, 1952	7.12		342
	June 3, 1942	7.39		398		Aug. 18, 1952	7.12		342
	Aug. 30, 1942	6.30		300	1953	Mar. 30, 1953	12.05	-.18	787
1943	Apr. 2, 1943	22.60		4,530		Apr. 13, 1953	8.60		418
	May 30, 1943	7.33		374		May 25, 1953	8.22		384
	June 7, 1943	10.89		712		June 2, 1953	17.18		1,990
	July 3, 1943	9.95		603		June 20, 1953	18.43		2,430
	Aug. 10, 1943	6.36		303		Aug. 12, 1953	8.02		366
1944	Apr. 12, 1944	10.10	-.90	531	1954	Apr. 12, 1954	11.54		686
	May 13, 1944	7.67		402		May 5, 1954	8.71	-.06	422
	June 9, 1944	9.18		529	1955	Apr. 4, 1955	14.85		1,260
	July 18, 1944	12.33		923		July 17, 1955	13.32		1,010
	Aug. 20, 1944	12.81		1,000		Aug. 10, 1955	13.27		1,040
	Sept. 6, 1944	12.80		998					
1945	Mar. 20, 1945	19.38	-.68	2,660					
	Apr. 25, 1945	11.11		740					

[a] Mean daily discharge.
[b] Partly estimated.

(17) Red River of the North at Halstad, Minn.

Location.--Lat 47°21'10", long 96°50'50", on line between secs. 24 and 25, T. 145 N., R. 49 W., on downstream side of highway bridge half a mile west of Halstad, 2½ miles downstream from Wild Rice River, and at mile 375.2.
Drainage area.--21,600 sq mi, approximately, of which 6,900 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 826.65 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting, ice effect, and changing slope.
Bankfull stage.--26 ft.
Historical data.--Flood of 1897 reached a stage about 4½ ft higher than that of Apr. 17, 1947.
Remarks.--Some regulation by many controlled lakes and reservoirs on tributaries. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1897	-	[a]38.5		-	1946	Mar. 29,30, 1946	19.5		10,000
					1947	Apr. 16, 1947	[b]34.00		24,500
1936	Apr. 15, 1936	16.33		7,670	1948	Apr. 10, 1948	-		16,000
1937	Apr. 15, 1937	9.39	-0.69	2,660		Apr. 13, 1948	26.78		-
					1949	Apr. 7, 1949	16.53		7,710
1942	May 1942	12.86		5,060	1950	Apr. 11, 1950	32.00	(c)	-
1943	Apr. 11, 1943	31.31		21,800		May 11,12, 1950	-		18,700
1944	July 13, 1944	15.79		7,200					
1945	Mar. 23,24, 1945	23.6		13,300					

[a] About.
[b] Occurred on following day.
[c] Unknown.

(17) Red River of the North at Halstad, Minn.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1951	Apr. 10, 1951	22.43		12,900	1954	Apr. 13, 1954	11.44		4,660
1952	Apr. 18, 1952	29.78		20,700	1955	Apr. 6, 1955	19.28	-3.7	7,200
1953	June 22, 1953	22.78		13,600					

(18) Goose River near Portland, N. Dak.

Location.--Lat 47°33', long 97°28', on line between secs. 12 and 13, T. 147 N., R. 54 W., on upstream side of highway bridge, 1½ miles downstream from Beaver Creek and 6½ miles northwest or Portland.
Drainage area.--531 sq mi, approximately, of which 134 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 978.76 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 6,700 cfs and extended to 8,100 cfs on the basis of a contracted-opening measurement; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--18 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1940	Apr. 16, 1940	7.88		487	1948	Apr. 21, 1948	21.30		4,700
					1949	Apr. 7, 1949	13.60	-0.47	1,200
1941	Apr. 9, 1941	12.59		1,130	1950	Apr. 18, 1950	22.98		-
1942	Apr. 5, 1942	11.51	-0.91	850		May 9, 1950	[c]22.98		8,090
1943	Mar. 26, 1943	14.90	-1.8	1,200					
1944	Apr. 10, 1944	5.10		169	1951	Mar. 30, 1951	12.5	-2.94	650
1945	Mar. 15, 1945	6.70		340	1952	Apr. 3, 1952	11.45	-1.42	600
					1953	July 4, 1953	7.77		367
1946	Mar. 20, 1946	9.14	-.91	530	1954	Feb. 25, 1954	5.15	-1.8	-
1947	Mar. 28, 1947	[a]7.84		[b]260		June 15, 1954	4.28		58
					1955	Mar. 31, 1955	10.8	- .8	600

[a]Occurred three days earlier.
[b]Mean daily discharge.
[c]Occurred at different time than peak discharge.

(19) Goose River at Hillsboro, N. Dak.

Location.--Lat 47°24'20", long 97°03'40", in NW¼ sec. 5, T. 145 N., R. 50 W., on left bank 50 ft upstream from Foogman Dam in Hillsboro and 22 miles upstream from mouth.
Drainage area.--1,220 sq mi, approximately, of which 130 sq mi is probably noncontributing.
Gage.--Nonrecording gage March 1931 to Sept. 25, 1941; recording gage thereafter. Mar. 17, 1931, to Mar. 20, 1935, at site 1,000 ft downstream and Mar. 21, 1935, to Mar. 28, 1940, at site 600 ft downstream at datum 11.45 ft lower. Datum of present gage is 879.52 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting, changing slopes and ice effect.
Bankfull stage.--7 ft.
Remarks.--Base for partial-duration series, 200 cfs. Only annual peaks are shown prior to Oct. 1, 1941.

RED RIVER OF THE NORTH BASIN

(19) Goose River at Hillsboro, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1882	April 1882	-		[a]6,700	1943	Mar. 29, 1943	8.84		3,480
						June 18, 1943	.96		220
1897	April 1897	-		[a]5,700	1944	Apr. 10,11, 1944	1.11		304
						Aug. 10, 1944	.96		230
1904	April 1904	-		[a]5,300	1945	Mar. 17, 1945	1.09		293
1916	April 1916	-		[a]4,700	1946	Mar. 22, 1946	3.22	-0.83	1,300
					1947	Mar. 26, 1947	1.86	-.20	680
1931	Apr. 7, 1931	4.20	-1.08	100		Apr. 13, 1947	5.30	-1.61	1,700
1932	Mar. 3, 1932	15.14	-4.04	959	1948	Apr. 16, 1948	10.63		4,180
1933	March 1933	10.4	-5.1	[b]300	1949	Apr. 8, 1949	3.38		1,640
						June 4, 1949	1.94		863
1935	June 14, 15, 1935	8.45		697	1950	Mar. 28, 1950	1.48	-.20	440
						Apr. 10, 1950	9.79	-5.36	2,100
1936	Apr. 16, 1936	13.06		1,660		Apr. 19, 1950	[c]14.94		9,420
1937	Apr. 15, 1937	3.57	-.15	46		May 10, 1950	[c]14.64		8,520
1938	Mar. 15, 1938	4.44	-.19	104					
1939	Mar. 26, 1939	11.0	-3.3	564	1951	Mar. 31, 1951	3.48	-1.34	1,130
1940	Apr. 17, 1940	1.66		710	1952	Apr. 4, 1952	3.33	-.68	1,300
						July 5, 1952	1.76		649
1941	Apr. 11, 1941	2.26		1,320	1953	June 15, 1953	1.08		261
1942	Apr. 6, 1942	2.27		1,140		July 6, 1953	1.36		408
	May 3, 1942	1.02		233	1954	June 15, 1954	.99		231
					1955	Apr. 3, 1955	2.44		1,220

[a]Determined by Corps of Engineers.
[b]About.
[c]Occurred at different time than peak discharge.

(20) Sand Hill River at Climax, Minn.

Location.--Lat 47°36'10", long 96°47'40", in SE¼SE¼ sec. 29, T. 148 N., R. 48 W., near center of span on upstream side of highway bridge, 1 mile southeast of Climax and 4 miles upstream from mouth.
Drainage area.--405 sq mi.
Gage.--Nonrecording gage. Datum of gage is 833.69 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers).
Stage-discharge relation.--Fairly well defined.
Bankfull stage.--6.5 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Apr. 7, 1943	10.48		941	1949	June 1, 1949	10.4		990
1944	Apr. 12, 1944	5.45	-1.45	-	1950	Apr. 22, 1950	16.31		3,040
	Aug. 18, 1944	4.73		226					
1945	Apr. 11, 1945	9.18		767	1951	Apr. 11, 1951	11.90	-1.32	1,250
					1952	Apr. 12, 1952	9.52	-1.89	544
1946	Mar. 27, 1946	-		675					
1947	Apr. 19, 1947	13.28		1,840	1954	Apr. 13, 1954	7.52	-1.20	-
1948	Apr. 13, 1948	13.67	-.87	-		June 15, 1954	7.36		489
	Apr. 14, 1948	13.88	-.70	1,640	1955	Apr. 8, 1955	10.35	-1.20	842

RED RIVER OF THE NORTH BASIN

(21) Red River of the North at Grand Forks, N. Dak.

Location.--Lat 47°56'26", long 97°02'47", in SE¼NE¼ sec. 33, T. 152 N., R. 50 W., on left bank 500 ft downstream from dam at Riverside Park, in Grand Forks, 2 miles downstream from Red Lake River and at mile 296.0.
Drainage area.--30,100 sq mi, approximately, of which 7,000 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to Nov. 3, 1933; recording gage thereafter. 1882-1892, in general vicinity of site of Northern Pacific Railway bridge, 1½ miles upstream (history not available, datum apparently the same as following gage). 1892 to Oct. 15, 1926, on Northern Pacific Railway bridge, at datum about 5½ ft higher than present datum, but published referred to datum only half a foot higher than present datum. Oct. 16, 1926, to Nov. 2, 1933, in vicinity of present gage, at datum 5 ft higher than present datum but published at present datum. Datum of present gage is 778.35 ft above mean sea level, datum of 1929. Gage heights given herein adjusted to present site and datum.
Stage-discharge relation.--Defined by current-meter measurements below 54,000 cfs; subject to changes owing to changing slope, channel shifts, and ice effect. As a result, the maximum discharge is poorly defined for some years.
Bankfull stage.--28 ft.
Remarks.--Flow regulated by many lakes and reservoirs on tributaries. Base for partial-duration series, 4,500 cfs. Only annual peaks are shown prior to Oct. 1, 1933.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1882	Apr. 18, 1882	48.0		68,800	1916	Apr. 17, 1916	41.0	-6.0	-
1883	Apr. 26, 1883	42.2		38,600		Apr. 23, 1916	37.7		29,000
1884	Apr. 16, 1884	31.1		20,600	1917	Apr. 8, 1917	33.9	-3.0	21,600
1885	Apr. 17, 1885	23.1		13,040	1918	Mar. 28, 1918	11.3		4,480
					1919	July 8, 1919	23.2		13,600
1886	May 3, 4, 1886	20.6		10,800	1920	Mar. 29, 1920	41.0	-3.0	-
1887	Apr. 15, 1887	16.3		7,300		Mar. 31, 1920	39.8	-1.0	30,300
1888	Apr. 19, 1888	29.5		19,000					
1889	Apr. 1,2, 1889	12.0	-1.5	3,000	1921	Apr. 10, 1921	20.9		11,500
1890	Apr. 15, 1890	10.6		3,470	1922	Apr. 11, 1922	28.72		19,000
					1923	Apr. 21, 1923	26.60	-1.0	-
1891	Apr. 13, 1891	17.7	-2.7	6,000		Apr. 22, 1923	26.15		16,200
1892	Apr. 17, 1892	33.4		23,000	1924	May 2, 1924	8.2		2,530
1893	Apr. 24, 1893	45.5		53,300	1925	June 12, 1925	19.0		9,690
1894	Apr. 24, 1894	26.9		16,450					
1895	Apr. 6, 1895	9.9	-2.9	2,000	1926	Mar. 28, 1926	18.1	-1.6	7,720
					1927	Mar. 21, 1927	21.7	-3.0	-
1896	May 30, 1896	32.0		21,600		Apr. 13, 1927	20.0		10,600
1897	Apr. 10, 1897	50.2		80,000	1928	Apr. 2, 1928	21.8		12,200
1898	Apr. 14, 1898	15.0	-3.0	4,500	1929	Mar. 23, 1929	28.3	-1.5	-
1899	Apr. 17, 1899	20.9	-3.0	9,000		Mar. 24, 1929	28.0	-1.0	17,100
1900	Apr. 10, 1900	13.2	-2.0	4,000	1930	Apr. 7, 1930	18.9		9,610
1901	Apr. 7, 1901	26.3	-2.3	14,000	1931	Apr. 10, 1931	6.48		1,630
1902	Mar. 30, 1902	26.0	-2.0	15,000	1932	Apr. 10, 1932	22.07	-2.25	10,400
1903	Apr. 11, 1903	28.0		18,800	1933	Apr. 3, 1933	15.18	-3.77	4,380
1904	Apr. 27, 1904	40.65		33,000	1934	Apr. 12, 1934	10.02		3,210
1905	May 16, 1905	26.11		16,800	1935	Mar. 29, 1935	13.07	-4.2	2,920
1906	Apr. 18, 1906	36.0		27,600	1936	Apr. 18, 1936	[a]25.0		14,500
1907	Apr. 7, 1907	39.95		30,400	1937	May 4, 1937	11.57		4,180
1908	Apr. 11, 1908	32.8		20,500	1938	May 12, 1938	[b]15.49		6,660
1909	July 30, 1909	18.8		9,260	1939	Apr. 6,7, 1939	20.13	-4.5	6,720
1910	Mar. 22, 1910	30.7		18,500	1940	Apr. 18, 1940	21.8	-1.9	10,000
1911	June 12, 1911	10.7		3,520	1941	Apr. 10-12, 1941	[c]27.86		13,400
1912	Apr. 8,9, 1912	12.73		4,730		June 15, 1941	19.90		8,700
1913	Apr. 8, 1913	26.7		17,200	1942	Apr. 5-6, 1942	[d]24.10		11,000
1914	June 16, 1914	17.5		8,240		May 5, 1942	[b]21.31		10,800
1915	July 3, 1915	30.8		21,500		June 15, 1942	13.41		5,540
						Sept. 4, 1942	11.90		4,740

[a]Occurred at different time than peak discharge.
[b]Occurred on following day.
[c]Occurred on Apr. 12, 1941.
[d]Occurred on Apr. 5, 1942.

(21) Red River of the North at Grand Forks, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Apr. 12, 1943	38.16		28,200	1949	Apr. 10, 1949	[a]29.11		15,200
	June 10, 1943	25.09		14,100		June 4, 1949	[b]24.01		13,500
1944	Apr. 16, 1944	18.60	-3.4	-		July 15, 1949	13.63		5,630
	Apr. 17, 1944	18.40	-2.8	7,070	1950	Apr. 25, 1950	43.97		43,800
	June 12, 1944	17.65		8,670		May 12, 1950	45.61		54,000
	July 15, 1944	18.91		9,680		July 1, 1950	23.08		13,500
	Aug. 13, 1944	19.79		10,400					
	Sept. 6, 1944	14.87		6,520	1951	Apr. 12, 1951	33.52		23,600
1945	Mar. 29, 1945	[b]32.00		21,300	1952	Apr. 19,20, 1952	[c]33.60		23,900
						July 7, 1952	18.57		9,330
1946	Mar. 27, 1946	[b]33.23		22,000		July 23, 1952	18.62		9,360
1947	Apr. 21, 1947	[b]40.71		35,000	1953	Apr. 2, 1953	14.03		6,070
	June 15, 1947	[b]29.00		19,000		June 6, 1953	17.97		9,150
	July 20, 1947	13.30		5,570		June 25, 1953	24.63		14,600
1948	Apr. 16, 1948	41.68		34,200	1954	Apr. 15, 1954	18.63		9,620
						June 17, 1954	11.90		4,740
					1955	Apr. 10, 1955	26.17		15,400

[a] Occurred at different time than peak discharge.
[b] Occurred on following day.
[c] Occurred on Apr. 21, 1952.

(22) Turtle River at Manvel, N. Dak.

Location.--Lat 48°04'40", long 97°10'50", in SE¼ sec. 10, T. 153 N., R. 51 W., on downstream side of bridge on State Highway 33, 0.3 mile west of Manvel and 10 miles upstream from mouth.
Drainage area.--602 sq mi, approximately, of which 77 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 799.28 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 4,300 cfs and extended to 28,000 cfs on basis of contracted-opening measurement; subject to changes owing to channel changes and ice effect.
Bankfull stage.--15 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Mar. 23, 1946	14.38	-3.11	700	1951	Apr. 2, 1951	14.80	-4.7	-
1947	Mar. 28, 1947	13.52	-5.42	-		Apr. 6, 1951	13.9	-.9	940
	Apr. 13, 1947	8.79		431	1952	Apr. 5, 1952	14.39	-5.0	-
1948	Apr. 19, 1948	17.88		7,130		Apr. 7, 1952	13.90	-3.85	600
1949	Apr. 9, 1949	16.35	-1.4	-	1953	June 22, 1953	7.48		219
	Apr. 10, 1949	15.83	-.62	1,600	1954	Mar. 9, 1954	9.84	-6.7	-
1950	Apr. 19, 1950	21.5		28,000		Apr. 11, 1954	8.45	-3.84	100
					1955	Apr. 5, 1955	16.27	-1.0	1,460

(23) Red River of the North at Oslo, Minn.

Location.--Lat 48°11'35", long 97°08'25", in sec. 31, T. 155 N., R. 50 W., on upstream side of main span of highway bridge in Oslo, at mile 271.1.
Drainage area.--31,200 sq mi, approximately, of which 7,100 sq mi is noncontributing.
Gage.--Nonrecording gage. Datum of gage is 777.65 ft above mean sea level, datum of 1929.
Stage-discharge relation--Defined by current-meter measurements below 53,000 cfs; subject to changes owing to changing slope, channel shifts, and ice effect.
Bankfull stage.--26 ft.
Remarks.--Flow regulated by many lakes and reservoirs on tributaries. For stages above 13 ft, discharge includes flow in bypass channel 1½ miles west of Oslo. Only annual peaks are shown.

(23) Red River of the North at Oslo, Minn.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1936	Apr. 18, 1936	[a]18.18	15,000	1946	Mar. 30, 1946	25.11	-
1937	May 4, 1937	6.47	4,070	1947	Apr. 22, 1947	[a]30.30	33,800
				1948	Apr. 17, 1948	[b]31.17	41,400
1942	Apr. 4, 1942	-	12,500	1949	Apr. 10, 1949	[c]24.08	18,700
	Apr. 7, 1942	20.11	-	1950	May 10, 1950	31.83	63,000
1943	Apr. 13, 1943	29.16	31,500				
				1951	Apr. 12, 1951	[d]25.59	24,800
1945	Mar. 26, 1945	-	24,000	1952	Apr. 20-22, 1952	[e]25.47	24,800
				1953	June 25, 1953	17.55	14,900
				1954	Apr. 15, 1954	12.39	9,790
				1955	Apr. 10, 1955	[b]19.75	16,400

[a] Occurred on following day.
[b] Occurred two days earlier.
[c] Occurred at different time than peak discharge.
[d] Occurred two days later.
[e] Occurred on Apr. 23, 1952.

(24) Forest River near Fordville, N. Dak.

Location.--Lat 48°12', long 97°44', on line between secs. 32 and 33, T. 155 N., R. 55 W., on right bank 50 ft upstream from highway bridge, half a mile downstream from South Branch, and 3 miles southeast of Fordville.
Drainage area.--531 sq mi, approximately, of which 135 sq mi is probably noncontributing.
Gage.--Nonrecording gage April 1940 to July 20, 1951; recording gage thereafter. Prior to July 21, 1951, at site 50 ft downstream at same datum. Altitude of gage is 1,040 ft (by barometer).
Stage-discharge relation--Defined by current-meter measurements below 5,600 cfs and extended to 16,400 cfs on basis of contracted-opening and slope-area measurements at 15,300 cfs and at 15,600 cfs; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--8 ft.
Remarks.--Base for partial-duration series, 200 cfs. Only annual peaks are shown prior to Oct. 1, 1951.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1940	Apr. 17, 1940	3.60	-0.84	130	1949	Apr. 7, 1949	5.64		1,470
					1950	Apr. 18, 1950	14.48		16,400
1941	Apr. 8, 1941	8.03	-.29	2,250					
1942	Apr. 4, 1942	9.73		3,650	1951	Mar. 28, 1951	5.5	-3.0	-
1943	June 9, July 13, 1943	[a]7.28		1,620		Mar. 29, 1951	4.9	-1.7	[b]500
1944	Apr. 5, 1944	5.89	-2.07	400	1952	Apr. 1, 1952	5.82	-2.36	[b]600
1945	Mar. 14, 1945	7.70	-5.0	-		July 1, 1952	3.94		825
	Mar. 27, 1945	3.15		243	1953	May 30, 1953	2.04		130
					1954	June 15, 1954	4.29		1,020
1946	Mar. 20, 1946	6.14	-.84	950		Aug. 21, 1954	2.41		240
1947	Mar. 23, 1947	7.40	-2.75	700	1955	Mar. 31, 1955	8.46	-.93	3,000
1948	Apr. 18, 1948	14.15		14,600					

[a] Occurred on Mar. 24, 1943.
[b] About.

(25) Forest River near Minto, N. Dak.

Location.--Lat 48°16'00", long 97°24'10", on line between secs. 1 and 12, T. 155 N., R. 53 W., 2.5 miles southwest of Minto.
Drainage area.--578 sq mi, approximately, of which 136 sq mi is probably noncontributing.
Gage.--Nonrecording gage.
Stage-discharge relation.--Defined by current-meter measurements below 1,300 cfs; subject to changes owing to channel shifting and ice effect.
Remarks.--Only annual peaks are shown.

RED RIVER OF THE NORTH BASIN

(25) Forest River near Minto, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1932	Apr. 9, 1932	11.4	-4.2	-	1938	Mar. 16, 1938	4.96		166
	Apr. 10, 1932	11.2	-3.95	400	1939	Mar. 28, 1939	9.44		-
1933	Apr. 2, 1933	12.95	-3.28	700	1940	Apr. 17, 1940	6.00	-0.49	244
1935	Mar. 28, 1935	8.99	-1.35	442	1941	Apr. 9, 1941	13.97		1,430
					1942	Apr. 5, 1942	14.87		1,610
1936	Apr. 15, 1936	11.88	-3.11	576					
1937	Apr. 13, 1937	4.08		112	1944	Apr. 10, 1944	12.93	-5.22	450

(26) Forest River at Minto, N. Dak.

Location.--Lat 48°16'10", long 97°22'10", in SE¼ sec. 31, T. 156 N., R. 52 W., on right bank 150 ft above Great Northern Railway bridge and 30 ft above dam in Minto.
Drainage area.--719 sq mi, approximately, of which 136 sq mi is probably noncontributing.
Gage.--Nonrecording gage April 1944 to July 14, 1954; recording gage thereafter. Prior to July 15, 1954, at site 400 ft upstream at same datum. Datum of gage is 806.95 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 6,300 cfs and extended to 11,500 cfs on basis of contracted-opening measurement, prior to April 1950; defined by current-meter measurements below 6,700 cfs and extended to 16,600 on basis of contracted-opening measurement, thereafter; subject to changes owing to ice effect.
Bankfull stage.--7 ft.
Remarks.--During periods of extremely high water some of the flow goes overland and there is a mingling of water from the various basins in the area. Figures listed herein are flow past the gage only. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1882	April 1882	-		[a]2,200	1947	Mar. 25, 1947	4.12	-0.28	1,100
					1948	Apr. 19, 1948	11.80		11,500
1897	April 1897	-		[a]1,850	1949	Apr. 7, 1949	8.19	-1.55	2,020
					1950	Apr. 18, 1950	11.80		16,600
1907	April 1907	-		[a]1,750					
					1951	Apr. 1, 1951	5.1	-1.8	-
1916	April 1916	-		[a]1,600		Apr. 5, 1951	3.6	-.1	900
					1952	Apr. 2, 1952	2.78	-.24	370
1944	Apr. 12, 1944	5.0	-2.0	650	1953	June 4, 1953	3.53		910
1945	Mar. 27, 1945	2.11		250	1954	June 16, 1954	2.61		391
					1955	Apr. 2, 1955	8.56	-.6	[b]4,200

[a] Determined by Corps of Engineers.
[b] About.

(27) South Branch Park River near Park River, N. Dak.

Location.--Lat 48°24'50", long 97°51'40", on line between secs. 15 and 16, T. 157 N., R. 56 W., at bridge on State Highway 32, half a mile upstream from small tributary and 4½ miles northwest of town of Park River.
Drainage area.--214 sq mi, approximately.
Gage.--Nonrecording gage.
Stage-discharge relation.--Defined by current-meter measurements below 3,900 cfs and extended on basis of contracted-opening measurements at 5,100 and 6,600 cfs and a partial current-meter measurement at 5,600 cfs; subject to changes owing to channel shifting, ice effect, and beaver activity.
Bankfull stage.--7 ft.
Remarks.--Only annual peaks are shown.

(27) South Branch Park River near Park River, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1940	Apr. 19, 1940	3.16		171	1946	Mar. 22, 1946	5.66	-1.26	-
						Mar. 21, 22, 1946			400
1941	Apr. 10, 1941	8.85		3,340	1947	July 25, 1947	4.30		518
1942	Apr. 3, 1942	8.30	-1.0	-	1948	Apr. 18, 1948	11.80		11,000
	Apr. 4, 1942	7.40		1,880	1949	Apr. 9, 1949	5.93		1,200
1943	Mar. 24, 1943	7.60	-2.24	900	1950	Apr. 19, 1950	10.1		5,970
1945	Mar. 14, 1945	6.60	-1.36	800					

(28) South Branch Park River below Homme Dam, N. Dak.

Location.--Lat 48°24', long 97°47', in SE¼ sec. 19, T. 157 N., R. 55 W., on right bank half a mile downstream from Homme Dam and 2 miles west of town of Park River.
Drainage area.--229 sq mi.
Gage.--Recording gage. Datum of gage is 1,000.00 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 5,500 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--35 ft.
Remarks.--Regulated by Homme Reservoir (usable capacity, 3,550 acre-ft) since September 1949; flood flow normally not materially affected. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 24, 1950	37.52		[a][b]13,000	1953	Jan. 16, 1953	24.30	-1.0	-
						Aug. 28, 1953	23.64		17
1951	Apr. 4, 1951	28.42	-1.2	[b]900	1954	June 14, 1954	25.73		386
1952	Sept. 10, 1952	24.75		106	1955	Apr. 1, 1955	28.50		1,600

[a]Result of failure of emergency embankment at site of Homme Dam.
[b]About.

(29) Park River at Grafton, N. Dak.

Location.--Lat 48°25'20", long 97°24'30", in NE¼ sec. 13, T. 157 N., R. 53 W., on right bank 30 ft upstream from Wakeman Avenue bridge in Grafton and 3.5 miles downstream from South Branch.
Drainage area.--716 sq mi, approximately.
Gage.--Nonrecording gage April 1931 to July 25, 1952; recording gage thereafter. Prior to Sept. 30, 1940, at site 30 ft downstream at same datum. Oct. 1, 1940, to Sept. 17, 1946, at site 2 miles downstream above masonry dam at same datum. Sept. 18, 1946, to July 25, 1952, at site 30 ft downstream at same datum. Datum of present gage is 807.39 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 11,600 cfs prior to 1950; defined by current-meter measurements below 8,300 cfs thereafter; subject to changes owing to channel and control changes and ice effect.
Bankfull stage.--16 ft.
Historical data.--Flood of April 1882 reached a stage of about 16 ft.
Remarks.--Base for partial-duration series, 200 cfs. Only annual peaks are shown prior to Oct. 1, 1952.

(29) Park River at Grafton, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1897	Apr. 15, 1897	[a]18.14		[a]3,480	1943	Mar. 28, 1943	13.15	-2.15	1,430
					1944	Apr. 11, 1944	6.20	-2.00	-
1916	April 1916	[a]17.64		[a]3,140		Apr. 12, 1944	5.55		563
					1945	Mar. 16, 1945	10.88	-1.50	1,180
1932	Apr. 9, 1932	11.05	-3.06	-					
	Apr. 10, 1932	-		750	1946	Mar. 22, 1946	11.45	-1.80	-
1933	Apr. 2, 1933	15.2		2,200		Mar. 23, 1946	11.40		1,490
1934	Apr. 9, 1934	6.61	-.71	393	1947	Apr. 4, 1947	9.70	-2.00	520
1935	Mar. 28, 1935	8.34	-2.04	443	1948	Apr. 19, 1948	20.06		11,700
					1949	Apr. 9, 1949	17.25	-.94	-
1936	Apr. 14, 1936	13.68	-2.58	1,200	1950	Apr. 19, 1950	20.13		12,600
1937	Apr. 10, 1937	8.2	-1.5	380					
					1951	Apr. 6, 1951	13.34		1,640
1939	Mar. 30, 1939	7.68	-2.62	150	1952	Apr. 5, 1952	6.66	-1.36	180
1940	Apr. 17, 1940	6.25	-.80	-	1953	June 5, 1953	5.45		125
	Apr. 20, 1940	5.83	-.18	210	1954	June 16, 1954	7.24		478
					1955	Apr. 3, 1955	16.84	-2.44	2,100
1941	Apr. 13, 1941	13.04		1,830		Apr. 23, 1955	7.16		273
1942	Apr. 6, 1942	15.46		4,310		June 5, 1955	-		453

[a]Determined by Corps of Engineers.

(30) Red River of the North at Drayton, N. Dak.

Location.--Lat 48°34'20", long 97°08'50", on line between secs. 24 and 25, T. 159 N., R. 51 W., on downstream end of the east pier of the interstate highway bridge, 1½ miles northeast of Drayton and at mile 207.
Drainage area.--34,800 sq mi, approximately, of which 7,200 sq mi is noncontributing.
Gage.--Nonrecording gage prior to Nov. 30, 1954; recording gage thereafter. Prior to Nov. 30, 1954, at site 1½ miles upstream at datum 1.59 ft higher. Datum of present gage is 755.00 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to changing slope, channel shifts, and ice effect.
Bankfull stage.--28 ft.
Remarks.--Flow regulated by many lakes and reservoirs on tributaries. Annual peaks only are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1936	Apr. 19, 1936	[a]24.26		16,600	1948	Apr. 21, 1948	[a]40.05		57,000
1937	May 5, 1937	[a]10.26		4,530	1949	Apr. 12, 1949	[f]31.65		27,900
					1950	May 12, 1950	41.58		86,500
1941	Apr. 15, 1941	32.0		22,800					
1942	Apr. 7, 1942	[b]31.56		21,900	1951	Apr. 15, 1951	[b]30.25		24,600
1943	Apr. 17, 1943	[c]33.66		28,700	1952	Apr. 24, 25, 1952	[g]28.83		23,900
1944	Apr. 18, 1944	21.05		12,300	1953	June 26, 1953	[a]20.17		14,700
1945	Apr. 2, 1945	[d]31.70		24,600	1954	Apr. 15, 1954	16.38		11,100
					1955	Apr. 9, 1955	27.42	[h]2	-
1946	Mar. 30, 1946	[e]29.71		23,000		Apr. 11, 1955	27.28		18,000
1947	Apr. 28, 1947	[a]33.12		29,300					

[a]Occurred on following day.
[b]Occurred two days later.
[c]Occurred Apr. 17-19, 1943.
[d]Occurred at different time than peak discharge.
[e]Occurred on Apr. 1, 2, 1946.
[f]Occurred three days later.
[g]Occurred Apr. 26, 1952.
[h]About.

(31) Pembina River near Walhalla, N. Dak.

Location.--Lat 48°53'32", long 97°59'09", in SE¼SW¼ sec. 35, T. 163 N., R. 57 W., on left bank 1½ miles downstream from Little Pembina River and 3½ miles southwest of Walhalla.
Drainage area.--3,110 sq mi, approximately.
Gage.--Nonrecording gage October 1939 to Nov. 10, 1943; recording gage thereafter. Altitude of gage is 970 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 7,000 cfs and extended to 20,400 cfs on basis of contracted-opening measurement; subject to change owing to ice effect and channel shifting.
Bankfull stage.--10 ft.
Remarks.--Base for partial-duration series, 400 cfs. Only annual peaks are shown prior to Oct. 1, 1943.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1940	Apr. 19, 1940	5.52	-0.59	1,000	1949	Apr. 12, 1949	10.82		4,040
						Apr. 19, 1949	13.18		5,840
1942	Apr. 5, 1942	12.45	-.5	5,000		May 30, 1949	5.73		1,180
1943	Apr. 4, 1943	6.21	-1.2	-	1950	Apr. 18, 1950	19.2		20,400
	June 3, 1943	6.15		1,420		May 9, 1950	17.23		11,000
1944	Apr. 11, 1944	6.88	-1.88	950		July 15, 1950	6.78		1,550
	May 25, 1944	4.32		685		July 31, 1950	4.56		619
	June 19, 1944	3.58		401					
	Aug. 4, 1944	6.28		1,470	1951	Mar. 29, 1951	6.90	-1.94	800
	Sept. 1, 1944	4.92		919		Mar. 29, 1951	7.25	-3.00	-
1945	Nov. 14, 1944	5.62		1,200		Apr. 5, 1951	8.22		2,310
	Mar. 13, 1945	8.2	-2.58	1,200	1952	Mar. 31, 1952	7.28	-2.57	700
	Mar. 26, 1945	9.20		3,020	1953	June 3, 1953	4.48		642
						Aug. 1, 1953	4.10		500
1946	Mar. 19, 1946	9.24	-.22	2,900	1954	Apr. 10, 1954	3.97	-.3	-
1947	Apr. 3, 1947	5.83		1,280		June 8, 1954	4.82		746
	Apr. 10, 1947	5.61		1,190		June 11, 1954	3.88		402
	June 26, 1947	3.59		405		June 16, 1954	5.27		1,080
	Aug. 17, 1947	5.57		1,170		July 6, 1954	5.45		1,160
1948	Apr. 19, 1948	14.94		7,280		Aug. 18, 1954	4.54		733
	Apr. 25, 1948	8.50		2,590	1955	Feb. 18, 1955	3.90	-1.64	-
	May 15, 1948	5.34		1,090		Apr. 2, 1955	11.33	-1.8	-
	July 3, 1948	4.24		654		Apr. 2, 1955	10.75	-1.0	3,400
	July 22, 1948	3.71		454		June 4, 1955	7.41		2,060
						July 6, 1955	6.01		1,340

(32) Pembina River at Neche, N. Dak.
(International gaging station)

Location.--Lat 48°59'20", long 97°33'05", in SE¼NW¼ sec. 31, T. 164 N., R. 53 W., on right bank 2 blocks east of State Highway 18 at north edge of Neche.
Drainage area.--3,190 sq mi, approximately.
Gage.--Nonrecording gage prior to Apr. 18, 1939; recording gage thereafter. Prior to May 24, 1932, at Great Northern Railway bridge 1 mile upstream at same datum. May 25, 1932, to Apr. 17, 1939, on State Highway 18 bridge 500 ft downstream from railway bridge at same datum. Altitude of gage is 805 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 5,300 cfs; subject to changes owing to channel shifting, control deterioration and repair, and ice effect. The rating is not defined above 800 cfs between 1914 and 1935.
Bankfull stage.--18 ft.
Remarks.--At extremely high discharges, over-bank flow upstream from Neche bypasses gage, some returning to Pembina River via Louden Coulee and Tongue River and some going to Red River via Plum Creek.
This station is one of the international gaging stations maintained by the United States under agreement with Canada. Base for partial-duration series, 400 cfs. Only annual peaks prior to Oct. 1, 1938.

(32) Pembina River at Neche, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1904	May 2, 1904	20.9		4,300
1905	Apr. 5, 1905	9.8		1,372
1906	Apr. 4, 1906	9.0	-2.0	-
	Apr. 4, 5, 1906	-		800
1907	May 14, 1907	13.6		2,190
1908	Apr. 10, 1908	7.7		927
1910	Mar. 15, 16, 1910	6.5		685
1911	Mar. 23, 1911	8.9	-2.2	-
	Mar. 23, 24, 1911	-		900
1912	July 29, 1912	8.5		1,000
1913	Apr. 7, 1913	21.5		3,870
1914	Apr. 4, 1914	6.0	-1.2	-
	Apr. 18, 1914	4.8		388
1915	Apr. 7, 1915	6.2	-1.3	180
1919	Apr. 8, 1919	18.3	-6.0	-
	Apr. 15, 1919	15.1		2,430
1920	Apr. 19, 1920	7.1	-1.4	-
	Apr. 19, 20, 1920	-		361
1921	Apr. 13, 1921	7.4		733
1922	Apr. 5, 1922	11.4	-2.5	-
	Apr. 7, 1922	10.0		1,300
1923	Apr. 20, 1923	17.8		3,120
1924	Apr. 20, 1924	6.7		674
1925	Mar. 28, 1925	18.3	-4.0	2,350
1926	Mar. 23, 1926	6.9	-2.5	-
	July 6, 1926	5.0		318
1927	May 12, 1927	17.8		3,110
1928	Mar. 24, 1928	11.8	-2.5	-
	Mar. 25, 1928	11.4	-2.0	1,270
1929	Mar. 21, 1929	9.0	-2.0	750
1930	Apr. 8, 1930	19.0	-2.2	2,900
1931	Apr. 9, 1931	13.0	-2.2	1,580
1932	Apr. 9, 1932	13.6	-4.2	1,240
1933	Apr. 2, 1933	12.16	-2.65	-
	May 26, 1933	10.09		1,180
1934	Apr. 9, 1934	9.76	-2.4	780
1935	Mar. 28, 1935	6.11	-1.2	-
	June 18, 1935	5.38		364
1936	Apr. 15, 1936	17.34		2,530
1937	Apr. 12, 1937	5.70	-1.5	-
	June 8, 1937	4.32		237
1938	Mar. 20, 1938	8.11		730
1939	Apr. 4, 1939	6.30	-.20	52
1940	Apr. 20, 1940	7.97		816
1941	Apr. 14, 1941	18.23		2,830
	Sept. 5, 1941	7.34		494
1942	Mar. 26, 1942	9.10	-1.55	600
	Apr. 7 or 8, 1942	19.96		3,550
	Apr. 16, 1942	18.74		3,060
1943	Mar. 27, 1943	12.82	-2.07	1,400
	Apr. 6, 1943	9.56	-1.25	890
	June 5, 1943	8.94		1,030
	July 14, 1943	8.12		826
1944	Apr. 12, 1944	8.74	-.71	800
	Apr. 13, 1944	9.27	-2.00	-
	Aug. 6, 1944	-		1,200
1945	Nov. 16, 1944	7.92		754
	Mar. 16, 1945	12.5	-1.75	1,400
	Mar. 29, 1945	16.54		2,440
1946	Mar. 24, 1946	16.27	-1.66	2,070
1947	Apr. 5, 1947	11.06	-1.56	1,200
	Apr. 11, 1947	10.19		1,320
	Aug. 18, 1947	7.72		690
1948	Apr. 21, 1948	20.36		3,770
	May 17, 1948	9.01		1,130
	July 5, 1948	7.41		530
	July 23, 1948	7.27		435
1949	Apr. 22, 1949	20.83		5,010
1950	Apr. 20, 1950	21.58	-.05	10,700
	May 12, 1950	20.65		5,320
	July 16, 1950	8.17		870
	Aug. 3, 1950	7.59		612
1951	Apr. 7, 1951	14.95	-.90	2,000
1952	Apr. 2, 1952	8.65	-1.5	-
	Apr. 3, 1952	8.18	-.74	550
1953	June 10, 1953,			
	Aug. 3, 1953	6.74		250
1954	June 10, 1954	7.47		582
	June 17, 1954	7.77		770
	July 7, 1954	7.97		846
	Aug. 18, 1954	7.29		530
1955	Apr. 5, 1955	20.11	-3.4	2,700
	June 6, 1955	10.23		1,400
	July 8, 1955	8.00		890

(33) Tongue River at Akra, N. Dak.
(Published as "at Cavalier" prior to October 1951)

Location.--Lat 48°46'40", long 97°42'55", in SE¼ sec. 11, T. 161 N., R. 55 W., on right bank 0.6 mile east of Akra and 4.2 miles west of Cavalier.
Drainage area.--148 sq mi.
Gage.--Nonrecording gage prior to July 10, 1954; recording gage thereafter. 1939 to July 20, 1946, at site 8½ miles downstream at State Highway 5 in Cavalier at datum 11.74 ft lower than next gage described. July 21, 1946, to 1949, at site 8 miles downstream at Great Northern Railway in Cavalier. Datum of this gage is 880.98 ft above mean sea level, datum of 1929, Emerson-Crookston supplementary adjustment of 1941. 1950 to July 9, 1954, at site 1½ miles upstream at datum 20.90 ft lower than present datum. Datum of present gage is 920.90 ft above mean sea level, datum of 1929 (levels by Soil Conservation Service).

(33) Tongue River at Akra, N. Dak.--Continued

Stage-discharge relation.--Defined by current-meter measurements below 580 cfs prior to 1947 and below 1,000 cfs 1947-49. Subsequent to 1949, defined by current-meter measurements below below 1,500 cfs and extended to 11,800 cfs on basis of contracted-opening measurement at site in use from 1950 to July 9, 1954. Subject to changes at all sites owing to ice effect and channel shifting.
Bankfull stage.--14 ft, present site and datum.
Historical data.--Flood of Apr. 18, 1950, is the highest known since the settlement of the region (about 1860).
Remarks.--Discharges given herein adjusted to present site.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1939	Apr. 1, 1939	4.10	-1.35	34	1949	Apr. 10, 1949	3.80		970
1940	Apr. 20, 1940	6.77		280	1950	Apr. 18, 1950	48.7		11,800
1941	Apr. 11, 1941	12.26		-	1951	(b)	-		410
1942	Apr. 5, 1942	12.4		-	1952	Apr. 1, 1952	38.48	-1.6	260
	Apr. 14, 1942	[a]12.3		-	1953	Mar. 24, 25,		-4.2	
1943	Mar. 26, 1943	11.11	-2.8	-		28, 29, 1953	36.53	to	-
	Mar. 27, 1943	11.10	-2.75	490				-3.8	
1944	Apr. 11, 1944	9.09	-2.0	-		May 31, 1953	35.86		178
	Apr. 12, 1944	8.82	-.88	440	1954	Apr. 6, 1954	36.22	-1.2	-
1945	Mar. 15, 1945	12.05	-1.8	-		June 12, 1954	35.53		187
	Mar. 27, 1945	11.41		920	1955	Apr. 2, 1955	13.23	-4.0	700
						Apr. 19, 1955	5.16		222
1946	Mar. 22, 1946	10.02	-.16	690		Apr. 21, 1955	5.35		240
						July 7, 1955	7.16		426
1948	Apr. 21, 1948	4.38		-					

[a]Stage at time of maximum discharge.
[b]About April 5, 1951.

(34) Red River of the North at Emerson, Manitoba
(International gaging station)

Location.--Lat 49°00'30", long 97°13'00", in sec. 2, T. 1, R. 2 E., on right bank, 1,500 ft downstream from Canadian National Railway bridge in Emerson, three-quarters of a mile downstream from international boundary, 3.6 miles downstream from Pembina River, and at mile 154.3.
Drainage area.--40,200 sq mi, approximately, of which 7,200 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to Apr. 11, 1953; recording gage thereafter. Prior to Apr. 11, 1953, on Canadian National Railway bridge 1,500 ft upstream at different datums. Datum of present gage is at mean sea level, datum of 1929, by Geodetic Survey of Canada. Elevations given herein converted to present datum.
Stage-discharge relation.--Defined by current-meter measurements' subject to changes owing to channel shifting and ice effect. For some years the discharge has been computed using the rate of change of stage as a factor so that the peak discharge occurs before the peak gage height.
Most of the data listed herein except for the 1950 water year is either a maximum observed discharge and elevation or maximum daily discharge and elevation. However, the rises at this station have characteristically flat crests so that there is very little difference between the momentary maximum discharge and elevation and the listed discharge and elevation.
Historical data.--The flood of 1861 reached an elevation of about 795 ft; the flood of 1882 reached an elevation of 790 ft, and the flood of 1897 reached an elevation of 791 ft.
Remarks.--This station is one of the international gaging stations maintained by Canada under agreement with the United States. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1913	Apr. 11, 12, 1913	774.52		25,600	1917	Apr. 11, 1917	775.33	-2.3	-
1914	June 19, 1914	758.36		7,260		Apr. 12, 1917	774.91		25,900
1915	July 9, 10, 1915	769.06		20,121	1918	Mar. 31, 1918	758.17	-5.3	-
						Apr. 3, 1918	754.42		4,990
1916	Apr. 24, 1916	785.74		46,180	1919	Apr. 9, 1919	767.38	-3.5	-
						July 12, 1919	764.22		13,410

(34) Red River of the North at Emerson, Manitoba--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1920	Apr. 8, 1920	778.62	-5.5	-	1936	Apr. 21, 1936	768.16		18,000
	Apr. 16, 1920	776.09		26,700	1937	May 7, 1937	756.55		5,840
					1938	Mar. 27, 1938	758.77	-2.8	
1921	Apr. 13, 1921	767.80	-4.4	-		May 20, 1938	758.05		7,530
	Apr. 15, 1921	763.65		12,800	1939	Apr. 10, 1939	760.77	-4.1	6,700
1922	Apr. 14, 15, 1922	[a]769.40		18,900	1940	Apr. 21, 1940	766.84	-.5	14,600
1923	Apr. 25, 26, 1923	[b]774.98		26,000					
1924	Apr. 28, 29, 1924	[a]757.25		6,320	1941	Apr. 16, 1941	776.94		27,800
1925	Apr. 1, 1925	768.00	-3.4	-	1942	Apr. 10, 1942	778.77		27,900
	June 21, 22, 1925	[b]767.80		17,500	1943	Apr. 20, 21, 1943	777.54		29,500
					1944	Apr. 19, 1944	766.82		12,300
1926	Apr. 1, 2, 1926	[a]761.02		8,000	1945	Apr. 1, 2, 1945	778.52	-2.0	-
1927	May 16, 1927	771.58		20,500		Apr. 4, 1945	778.02		29,400
1928	Apr. 6, 7, 1928	[a]767.91		16,800					
1929	Mar. 29, 1929	773.01	-4.0	-	1946	Apr. 3, 1946	774.27	-1.5	-
	Apr. 1, 1929	770.31		19,200		Apr. 5, 1946	773.97		24,100
1930	Apr. 10, 1930	772.51		20,800	1947	Apr. 28, 1947	[d]776.07		28,400
					1948	Apr. 27, 1948	787.62		51,800
1931	Apr. 7, 1931	760.80	-4.2	-	1949	Apr. 15, 1949	[d]777.13		29,200
	Apr. 10, 1931	759.29		7,940	1950	May 13, 1950	790.89		95,500
1932	Apr. 14, 1932	772.99	-2.4	-					
	Apr. 15, 1932	770.77		18,900	1951	Apr. 15-18, 1951	[e]774.55		26,000
1933	Apr. 9, 1933	765.19	-1.9	11,000	1952	Apr. 14, 1952	773.00	-1.4	-
	Apr. 10, 1933	767.52	-5.6	-		Apr. 24,26,27, 1952	-		24,200
1934	Apr. 12, 1934	755.17	-.7	-	1953	June 28, 1953	[d]763.7		14,500
	Apr. 13, 1934	755.10	-.3	4,800	1954	Apr. 16, 1954	763.04	-2.3	-
1935	Apr. 3, 1935	759.65	-3.8	-		Apr. 17, 1954	761.93		11,500
	Apr. 2-4, 1935	-		5,470	1955	Apr. 10, 1955	[d]772.25		24,000

[a]Occurred on first of these dates.
[b]Occurred on second of these dates.
[c]Occurred three days later.
[d]Occurred on following day.
[e]Occurred Apr. 18-19, 1951.

(35) Long Creek near Crosby, N. Dak.

Location.--Lat 48°58'30", long 103°16'04", in NW¼ sec. 3, T. 163 N., R. 97 W., on right bank at downstream side of county highway bridge, 1 mile downstream from small tributary and 5 miles northeast of Crosby.
Drainage area.--1,800 sq mi, approximately, of which 1,200 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to June 21, 1952; recording gage thereafter. Altitude of gage is 1,870 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to frequent changes owing to channel shifting, ice effect, and beaver activity.
Bankfull stage.--9 ft.
Historical data.--Maximum gage height known, 16.1 ft, Apr. 22, 23, 1948. Flood in 1904 reached about the same stage, from information by local residents.
Remarks.--Base for partial-duration series, 200 cfs. Only annual peaks are shown prior to Oct. 1, 1951.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Apr. 1, 1943	13.62		3,150	1948	Apr. 22, 1948	16.10	-0.6	-
1944	June 28, 1944	3.59		65		Apr. 23, 1948	16.10		6,240
					1949	Apr. 1, 1949	10.5	-4.1	-
1946	Mar. 13, 1946	8.27		678		Apr. 3, 1949			500
1947	Mar. 23, 1947	13.05	-6.0	-	1950	Apr. 16, 1950	10.65	-.65	1,100
	Apr. 11, 1947	9.30		936					

(35) Long Creek near Crosby, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1951	Apr. 18, 1951	12.4	-2.0	1,250	1954	Feb. 24, 1954	5.12	-0.42	121
1952	Apr. 2, 1952	9.70	-1.10	550	1955	Mar. 30, 1955	10.57	-1.3	850
	Apr. 10, 1952	8.08		436		Apr. 6, 1955	9.30		820
1953	June 10, 1953	9.93		912		Apr. 28, 1955	5.58		230
	June 20, 1953	6.28		251		May 5, 1955	5.76		274
	June 27, 1953	8.13		515		May 10, 1955	7.92		564
	June 30, 1953	8.49		622					

(36) Souris River near Sherwood, N. Dak.
(International gaging station)

Location.--Lat 48°59'24", long 101°57'28", in NE¼ sec. 33, T. 164 N., R. 87 W., on right bank 0.8 mile downstream from international boundary and 16 miles northwest of Sherwood.
Drainage area.--9,330 sq mi, approximately, of which 5,950 sq mi is probably noncontributing.
Gage.--Nonrecording gage 1930 to Apr. 8, 1935; recording gage and concrete control thereafter. Datum of gage is 1,604.00 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 5,000 cfs and extended to 7,400 cfs for records through 1950. Defined by current-meter measurements below 5,200 cfs after 1950. Subject to changes at lower stages owing to ice effect and debris on control and to movement of control by frost action, and at higher stages owing to ice effect and channel changes.
Bankfull stage.--18 ft.
Historical data.--Maximum stage known, 23.80 ft Apr. 28, 1948. Flood in 1927 reached a stage of about 22 ft, from information by local residents.
Remarks.--This is one of the international gaging stations maintained by the United States under agreement with Canada. Base for partial-duration series, 120 cfs. Only annual peaks are shown prior to Oct. 1, 1934.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1930	Apr. 11, 1930	9.70		956	1946	Mar. 30, 1946	16.88		2,010
					1947	Apr. 5, 1947	16.33	-2.66	1,520
1931	Apr. 14, 1931	1.17		19		Apr. 18, 19, 1947	18.29		2,250
						June 25, 1947	7.77		700
1933	Mar. 31, 1933	13.10	-0.3	1,370	1948	Apr. 13, 1948	5.22	-2.43	-
1934	Mar. 16, 1934	7.74	-3.5	344		Apr. 28, 1948	23.80		7,400
1935	Apr. 15, 1935	3.78	-1.70	121		July 26, 1948	3.05		148
	Apr. 24, 1935	2.57		170		Aug. 9, 1948	4.49		303
	July 5, 1935	2.78		200	1949	Apr. 11, 1949	20.56		2,720
	July 8, 1935	2.10		130		June 4, 1949	2.95		126
					1950	Apr. 18, 1950	14.25		1,610
1936	Apr. 25, 1936	10.82		1,270		May 14, 1950	5.74		449
1937	Apr. 14, 1937	2.60		125		June 17, 1950	3.18		165
1938	Mar. 20, 1938	10.19	-.80	1,040		June 23, 1950	4.11		261
	Mar. 27, 1938	9.36		1,040					
1939	Mar. 28, 1939	19.08		2,480	1951	May 10, 1951	19.23		2,680
1940	Apr. 15, 1940	3.58	-1.35	120	1952	Apr. 3, 1952	13.23	-1.86	1,200
					1953	Mar. 23, 1953	5.77	-1.67	260
1941	Apr. 6, 1941	7.38	-2.29	440		Mar. 31, 1953	7.06	-1.14	470
	Apr. 14, 1941	9.70		1,030		Apr. 6, 1953	10.94	-.60	1,050
	May 3, 1941	3.00		210		May 19, 1953	3.43		192
1942	Mar. 25, 1942	7.02	-2.60	350		June 19, 1953	12.28		1,340
	Apr. 5, 1942	15.54	-1.10	1,700		July 9, 1953	14.95		1,780
	Apr. 20, 1942	6.11		563	1954	Mar. 3, 1954	5.32	-1.59	220
	June 2, 1942	3.19		200		Mar. 16, 1954	4.78	-1.47	180
1943	Mar. 27, 1943	4.70	-1.51	200		Apr. 16, 1954	5.26	-.98	280
	Apr. 12, 1943	23.18		5,320		May 9, 1954	3.69		202
	June 21, 1943	3.68		222		June 12, 1954	8.53		799
1944	Apr. 9, 1944	4.29	-1.22	160		June 18, 1954	8.62		811
	June 10, 1944	2.87		136	1955	Apr. 5, 1955	23.05		5,210
	July 5, 1944	11.7		1,240		May 14, 1955	15.24		1,760
1945	Mar. 28, 1945	2.88	-.33	60		June 20, 1955	6.05		486
						July 9, 1955	4.35		288

RED RIVER OF THE NORTH BASIN

(37) Souris River near Foxholm, N. Dak.

Location.--Lat 48°22'20", long 101°30'18", in SW¼SE¼ sec. 34, T. 157 N., R. 84 W., on left bank 30 ft upstream from county highway bridge, 3 miles east of Foxholm, 19 miles upstream from Des Lacs River, and at mile 98.3 downstream from Canadian border (Geological Survey river plan and profile).
Drainage area.--9,860 sq mi, approximately, of which 6,200 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to Mar. 26, 1938; recording gage thereafter. Apr. 1, 1937, to Mar. 25, 1938, at site 600 ft downstream at datum about half a foot higher. Datum of present gage is 1,560.73 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements.
Bankfull stage.--8 ft.
Remarks.--Flow regulated since 1936 by Lake Darling (usable capacity, 108,500 acre-ft) and several smaller reservoirs (combined capacity, about 116,000 acre-ft). Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1937	May 17, 1937	[a]4.51		202	1946	Apr. 17, 1946	6.48		298
1938	Apr. 5, 1938	[b]7.52		464	1947	Apr. 28, 1947	12.39		1,350
1939	Apr. 17, 1939	[c]8.92		663	1948	May 16, 1948	14.79		3,040
1940	Oct. 20, 1939	7.81		504	1949	May 22, 1949	10.63		-
						Apr. 15, 1949	8.52		690
1941	Apr. 9, 1941	7.80	-1.20	-	1950	Apr. 26, 1950	12.14		1,290
	Apr. 19, 1941	7.57		486					
1942	Oct. 21,22,23, 1941	5.72		62	1951	May 14, 1951	13.98		2,120
1943	Apr. 25, 1943	14.50		2,990	1952	Apr. 24, 25, 1952	6.52		325
1944	Feb. 18, 1944	6.22	-.30	-	1953	July 13, 14, 1953	[d]13.18		1,480
	Apr. 17, 1944	6.09		200	1954	June 24, 1954	6.96		444
1945	Nov. 14, 1944	6.01		145	1955	Apr. 21, 1955	14.20		2,330

[a]Occurred two days later.
[b]Occurred on following day.
[c]Occurred at different time than peak discharge.
[d]Occurred July 14, 1953.

(38) Des Lacs River at Foxholm, N. Dak.

Location.--Lat 48°22'14", long 101°34'11", in NW¼ sec. 2, T. 156 N., R. 85 W., at county highway bridge in Foxholm.
Drainage area.--947 sq mi, of which 204 sq mi is probably noncontributing.
Gage.--Nonrecording gage Oct. 1, 1945, to Aug. 30, 1948; June 14, 1955 to Oct. 23, 1955; recording gage Aug. 31, 1948, to June 7, 1955. Oct. 1, 1945, to June 7, 1955, at former bridge over former channel, 200 ft southwest of present site at present datum. Datum of present gage is 1,632.98 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--20 ft.
Historical data.--Maximum stage known since 1886, about 18.8 ft in spring of 1939, from information by local residents.
Remarks.--Some regulation by a series of wild fowl refuge ponds, combined capacity about 64,000 acre-ft. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Mar. 23, 1946	5.62	-1.0	-	1951	Apr. 6, 1951	18.05	-1.0	1,800
	Mar. 28, 1946	5.46		113	1952	Apr. 1, 1952	14.31	-1.5	850
1947	Mar. 24, 1947	14.38	-1.9	640	1953	July 2, 1953	12.32		775
1948	Apr. 19, 1948	10.73		505	1954	Apr. 6, 1954	8.36	-2.0	205
1949	Apr. 4, 1949	18.04	-.5	2,000	1955	Mar. 31, 1955	13.91	-.8	900
1950	Apr. 16, 1950	13.83		1,010					

(39) Souris River above Minot, N. Dak.
(Published as Mouse River at Minot, 1903-24, Souris River at Minot, 1927-28, 1929-34, and Souris River near Minot, 1928-29)

Location.--Lat 48°14'45", long 101°22'15", near center of sec. 17, T. 155 N., R. 83 W., on right bank 180 ft downstream from county highway bridge, 3½ miles west of Minot, 7 miles downstream from Des Lacs River, and at mile 124.1 downstream from Canadian border (Geological Survey river plan and profile).
Drainage area.--11,000 sw mi, approximately, of which 6,430 sq mi is probably noncontributing.
Gage.--Nonrecording gage May 5, 1903, to Sept. 30, 1934; recording gage and concrete control thereafter. May 5, 1903, to Sept. 30, 1928; Oct. 1, 1929, to Sept. 30, 1934, gage at mile 135.0 in Minot at datum 12.5 ft lower. Oct. 1, 1928, to Sept. 30, 1929, gage at Saugstad bridge at mile 145.8, 5 miles southeast of Minot at datum 19.2 ft lower than present datum. Records are equivalent except those for periods of extreme low flow, as some industrial and sanitary waste enters river between the three sites. Datum of present gage is 1,545.75 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 8,100 cfs; subject to changes owing to control moving by frost action, changes to control structure, and man-made developments in flood plain.
Bankfull stage.--16 ft at site and datum in Minot and 14 ft at present site and datum.
Historical data.--Maximum stage known at present site and datum, about 23 ft in April 1904, from information by local residents. According to the Apr. 20, 1904, issue of the Minot Daily Optic, Minot, N. Dak., the river was at least 3 ft higher in 1881 than it was in 1904.
Remarks.--Records for 1924-27 furnished by State Engineer of North Dakota. Flow almost completely regulated since 1936 by Lake Darling and several smaller reservoirs (combined capacity, about 180,000 acre-ft. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1904	Apr. 20, 1904	21.9		12,000
1906	Apr. 10, 1906	9.4		1,090
1907	May 28-30, 1907	16.0		2,190
1908	Apr. 13, 1908	6.5		644
1909	Apr. 13-15, 1909	[a]9.45		1,090
1910	Apr. 1-4, 1910	4.85		207
1911	Apr. 29, 1911	7.65		744
1912	Apr. 20, 1912	10.4		1,200
1913	Apr. 4, 1913	10.5	-1.0	1,080
	Apr. 9, 1913	9.5		1,080
1914	Apr. 20, 1914	9.5		1,080
1915	June 26, 1915	4.9		41
1916	May 6, 7, 1916	19.05		4,260
1917	Apr. 29, 1917	11.4		1,270
1919	Apr. 18-20, 1919	15.0		1,860
1920	May 5, 6, 1920	17.1		2,560
1921	July 10, 11, 1921	8.5		790
1922	Apr. 21, 22, 1922	17.1		2,570
1923	Apr. 30, 1923, May 1-3, 1923	19.6		3,460
1924	Apr. 17, 1924	9.8		698
1925	Apr. 18, 1925	-		3,450
1926	June 30, 1926, July 1, 3, 1926	-		194
1927	Apr. 30, 1927	20.4		3,900
1928	Apr. 12, 1928	18.35		2,940
1929	June 7, 1929	3.00		430
1930	Apr. 15, 1930	9.40		920
	Apr. 14-16, 1930	-		920
1931	May 2-5, 1931	4.80		8.0
	Aug. 16-23, 1931	[b]5.0		-
	Sept. 12-30, 1931	[b]5.0		-
1932	June 8, 1932	7.20		260
1933	Apr. 6, 1933	10.00		1,040
1934	Mar. 23, 1934	7.25		328
	Mar. 22-25, 1934	-		328
1935	May 5, 1935	6.67		612
1936	Apr. 13, 1936	6.45	-0.8	-
	Apr. 14, 1936	5.82		356
1937	May 19, 1937	5.22		197
1938	Apr. 7, 1938	6.00		418
1939	Mar. 26, 1939	12.80	-.4	1,480
1940	Oct. 20, 1939	6.42		480
1941	Apr. 19, 1941	6.21		480
1942	Apr. 5, 1942	8.66	-1.84	620
1943	Apr. 26, 1943	15.29		2,480
1944	June 28, 1944	11.11		1,400
1945	Mar. 15, 1945	8.46	-2.24	487
1946	Apr. 18, 1946	5.46		254
1947	Apr. 3, 1947	12.54	-1.44	1,360
1948	May 17, 1948	16.34		2,700
1949	Apr. 6, 1949	16.56	-1.55	2,250
1950	Apr. 28, 1950	11.00		1,340
1951	Apr. 8, 1951	14.81	-.9	-
	May 16, 1951	14.40		2,280
1952	Apr. 1, 1952	11.98	-2.61	1,080
1953	July 2, 1953	15.21		2,320
1954	June 27, 1954	6.23		488
1955	Apr. 22, 1955	14.79		2,200

[a]Occurred Apr. 14, 1909.
[b]Backwater from industrial wastes.

(40) Souris River near Verendrye, N. Dak.

Location.--Lat 48°09'35", long 100°43'45", in NW¼SW¼ sec. 17, T. 154 N., R. 78 W., on left bank 2.7 miles north of Verendrye, 7½ miles southwest of (19 miles upstream from) mouth of Wintering River, and at mile 210.5 downstream from Canadian border (Geological Survey river plan and profile).
Drainage area.--11,800 sq mi, approximately, of which 6,600 is probably noncontributing.
Gage.--Nonrecording gage prior to Mar. 5, 1938; recording gage thereafter. April 1, 1937, to Mar. 4, 1938, at present site at datum 1.97 ft higher. Gage heights given herein converted to present datum. Datum of present gage is 1,464.87 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 3,300 cfs and extended to 4,200 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--17 ft.
Remarks.--Flow regulated by Fish and Wildlife Service dams on the Souris and Des Lacs Rivers (combined capacity, about 181,000 acre-ft). Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1937	May 23, 1937	4.17		118	1946	Mar. 24, 1946	6.57	-1.4	376
	June 20, 1937	4.15		118	1947	Apr. 13, 1947	14.22	-2.8	1,350
1938	Mar. 2 or 3, 1938	8.30	-3.3	-	1948	May 22, 1948	14.95		2,300
	Apr. 10, 1938	5.04		342	1949	Apr. 8, 1949	17.7		4,200
1939	Mar. 30, 1939	13.58	-3.3	1,260	1950	May 16, 1950	14.45		2,150
1940	Oct. 24, 1939	5.32		396					
					1951	Apr. 12, 1951	15.55		2,710
1941	Apr. 22, 1941	5.44		426	1952	Apr. 5, 1952	15.38	-1.25	-
1942	Apr. 6, 1943	12.25	-2.8	1,100		Apr. 6, 1952	15.36	-1.20	2,050
1943	Mar. 28, 1943	16.32	-6.0	-	1953	July 7, 1953	14.89		2,150
	May 2, 1943	14.68		2,220	1954	Feb. 21, 1954	7.05	-1.30	-
1944	July 2, 1944	11.92		1,450		June 30, 1954	6.20		572
1945	Mar. 16, 1945	9.41	-2.4	660	1955	Apr. 26, 27, 1955	13.56		1,970

(41) Wintering River near Karlsruhe, N. Dak.

Location.--Lat 48°10'14", long 100°32'20", on line between secs. 10 and 11, T. 154 N., R. 77 W., on left bank 30 ft upstream from highway bridge, 4 miles upstream from mouth, and 7 miles northeast of Karlsruhe.
Drainage area.--740 sq mi, approximately, of which 490 sq mi is probably noncontributing.
Gage.--Recording gage. Altitude of gage is 1,480 ft, from river profile map.
Stage-discharge relation.--Defined by current-meter measurements below 770 cfs and extended to 3,000 cfs on basis of velocity-area study; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--5 ft.
Historical data.--Maximum gage height known, 12.0 ft Apr. 7, 1949 (channel choked with packed snow).
Remarks.--Some regulation by Fish and Wildlife Service dams on Cottonwood and Wintering Lakes (combined capacity, about 850 acre-ft). Base for partial-duration series, 25 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1937	June 13, 1937	[a]3.82		37	1943	March 1943	8.54	-1.20	472
1938	Mar. 15, 1938	5.51	-1.00	-		Apr. 2, 1943	7.48		530
	Mar. 17, 1938	5.07	-.39	66		Apr. 27, 1943	3.80		51
1939	Mar. 25-27, 1939	7.01	-3.3	46		May 16, 1943	3.24		33
1940	Mar. 19, 1940	4.72	-1.90	-		June 10, 1943	6.02		175
	May 15, 1940	2.92		11		June 19, 1943	5.33		124
						July 15, 1943	4.58		80
1941	Mar. 31, 1941	6.31	-3.5	-	1944	Apr. 10, 1944	5.25	-2.31	-
	Apr. 2, 1941	5.40	-2.3	26		June 28, 1944	3.71		49
	May 4, 1941	3.17		29		July 7, 1944	3.31		36
1942	Apr. 5, 1942	5.89	-2.8	-					
	Apr. 13, 1942	5.72		138	1946	Mar. 22, 1946	7.08	-3.1	-
	Apr. 19, 1942	5.31		113		Mar. 30, 1946	-		67
	May 3, 1942	3.36		38					
	May 6, 1942	3.25		34					

[a]Gage height but not discharge probably higher in March.

RED RIVER OF THE NORTH BASIN

(41) Wintering River near Karlsruhe, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Mar. 24, 1947	7.30	-3.0	-	1952	Apr. 7, 1952	7.80	-1.09	350
	Mar. 25, 1947	7.27	-2.62	80		July 2, 1952	4.35		61
	Mar. 31, 1947	5.92	-1.09	90		Aug. 31, 1952	4.83		84
	Apr. 16, 1947	5.76		159		Sept.18, 1952	3.98		47
	July 23, 24, 1947	5.26		117	1953	Mar. 30, 1953	6.31	-.65	-
1948	Apr. 17, 1948	8.80	-2.6	-		Apr. 3, 1953	5.71		141
	Apr. 19, 1948	7.15		405		May 11, 1953	4.66		73
	Apr. 28, 1948	6.26		222		May 30, 1953	4.12		49
1949	Apr. 7, 1949	[b]12.0		3,000		July 4, 1953	4.10		57
	June 2, 1949	3.80		38	1954	Mar. 14, 1954	4.74	-1.2	36
1950	Apr. 6, 1950	7.70	-4.3	-		Apr. 7, 1954	3.70	-.14	37
	Apr. 17, 1950	6.27	-.55	164		June 8, 1954	4.41		65
	Apr. 22, 1950	5.96		196		June 23, 1954	6.22		199
	May 16, 1950	6.99		474		Sept.16, 1954	3.37		28
	June 25, 1950	3.27		27	1955	Mar. 31, 1955	7.78	-2.2	-
						Apr. 5, 1955	6.15	-.10	176
1951	Apr. 5, 1951	8.03	-2.43	150		May 16, 1955	3.35		27
	Apr. 9, 1951	7.70	-.77	450		May 28, 1955	3.37		28
	June 7, 1951	3.27		32		June 4, 1955	3.39		29
	June 21, 22, 1951	4.03		55		June 9, 1955	3.37		28

[b] Occurred at different time than peak discharge.

(42) Souris River near Towner, N. Dak.
(Published as "at Towner" prior to 1935)

Location.--Lat 48°18'24", long 100°27'39", in SW¼NE¼ sec. 29, T. 156 N., R. 76 W., 150 ft upstream from former U. S. Highway 2 bridge, 2.4 miles upstream from present U. S. Highway 2 bridge, 3½ miles southwest of Towner, and at mile 248.0 downstream from Canadian border (Geological Survey river plan and profile).
Drainage area.--13,100 sq mi, approximately.
Gage.--Nonrecording gage prior to Oct. 28, 1934; recording gage thereafter. Prior to Oct. 28, 1934, at site about 10 miles downstream at datum 0.68 ft higher. Datum of gage is 1,443.50 ft.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Remarks.--Flow regulated since 1935-37 by Fish and Wildlife Service dams on Souris, Des Lacs, and Wintering Rivers (combined capacity, about 181,000 acre-ft). Diversion for irrigation of about 7,000 acres about 5 miles upstream at Eaton Dam since 1937. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1933	Apr. 10, 1933	9.02	-0.4	1,080	1937	June 25, 1937	[b]4.40		226
1934	Apr. 3, 1934	5.02	-1.0	-	1938	May 2, 1938	[a]6.73		431
	Apr. 3, 4, 1934			385	1939	Apr. 1, 1939	[c]12.53		1,150
1935	July 26, 1935	[a]5.78		334	1940	Oct. 27, 1939	5.91		311
1936	Apr. 15, 1936	[b]9.53		905	1941	May 6, 1941	6.58		-

[a] Occurred on following day.
[b] Occurred at different time than peak discharge.
[c] Occurred on preceding day.

(43) Souris River near Bantry, N. Dak.

Location.--Lat 48°30'20", long 100°26'04", in SE¼ sec. 14, T. 158 N., R. 76 W., on left bank 200 ft upstream from Nelson bridge, 8 miles east of Bantry, 18 miles upstream from Willow Creek, and at mile 284.8 below Canadian border (Geological Survey river plan and profile).
Drainage area.--13,400 sq mi, approximately.
Gage.--Nonrecording gage prior to Mar. 16, 1938; recording gage thereafter. Prior to Mar. 16, 1938, at same site at datum 0.17 ft lower. Gage heights given herein converted to present datum. Datum of present gage is 1,427.56 ft above mean sea level, datum of 1929, Emerson Crookston adjustment of 1941.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and shifting channel.
Bankfull stage.--7 ft.
Remarks.--Flow regulated by Fish and Wildlife service dams on Souris, Des Lacs, and Wintering Rivers (total capacity, about 181,000 acre-ft). Diversion for irrigation of about 7,600 acres at Easton Dam about 42 miles above station. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1937	July 6, 1937	2.69		118	1946	Apr. 1, 1946	7.17		607
1938	May 4, 1938	5.14		338	1947	Apr. 18, 1947	11.06		1,320
1939	Apr. 2, 1939	9.19	-1.8	-	1948	May 31, 1948	12.43		2,000
	Apr. 4, 1939	9.08	-.1	866	1949	Apr. 13, 1949	13.76		4,760
1940	Oct. 29, 1939	4.94		263	1950	May 23, 1950	12.22		1,910
1941	May 7, 1941	6.16		459	1951	Apr. 23, 1951	12.55		2,220
1942	Apr. 13, 1942	9.07	-.6	-	1952	Apr. 14, 1952	11.72		1,550
	Apr. 14, 1942	8.76		850	1953	July 17, 1953	12.33		1,770
1943	May 9-18, 1943	[a]12.25		1,910	1954	July 4, 1954	8.89		750
1944	July 5, 1944	-		1,600	1955	May 4, 1955	12.53		1,920
1945	Mar. 24, 1945	8.65		778					

[a] Occurred on May 15, 1943.

(44) Souris River near Westhope, N. Dak.
(International gaging station)

Location.--Lat 48°59'47", long 100°57'29", in SW¼SE¼ sec. 30, T. 164 N., R. 79 W., on left bank 1,200 ft upstream from second crossing of international boundary, 1 mile downstream from Fish and Wildlife Service dam 357, 7 miles northeast of Westhope, 11 miles downstream from Boundary Creek, and at mile 358.2 downstream from international boundary (Geological Survey river plan and profile).
Drainage area.--17,600 sq mi, approximately.
Gage.--Nonrecording gage prior to Mar. 28, 1938; recording gage thereafter. Prior to Mar. 28, 1938, gage at site 6.3 miles upstream at datum 2.52 ft higher. Datum of present gage is 1,402.52 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to constant changing owing to flat slopes, wind action, aquatic growth, beaver activity, and ice effect.
Remarks.--Flow regulated since spring of 1936 by Fish and Wildlife service dams on Souris, Des Lacs and Wintering Rivers, and Willow Creek (combined capacity, about 243,000 acre-ft). Diversion for irrigation of about 7,600 acres at Eaton Dam since 1937. This station is one of the international gaging stations maintained by the United States under agreement with Canada. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1930	Mar. 31, Apr. 1, 2, 1930	6.98		1,130	1936	Apr. 14, 1936	4.94	-1.9	139
					1937	Apr. 11, 1937	1.90		9.0
					1938	June 18, 1938	4.25		51
1931	Apr. 2, 1931	2.48	-1.52	-	1939	Mar. 31, 1939	6.94	-3.22	-
	Apr. 6, 7, 1931	-		118		June 16, 1939	4.40		27.5
1932	Apr. 6, 1932	4.10	-1.8	-	1940	Oct. 23, 25-28, 1939	4.24		29
	May 4, 1932	3.06		148		Aug. 5, 1940	4.35		-
1933	Apr. 17-21, 1933	[a]7.25		1,130	1941	June 12, 1941	4.24		36
1934	Apr. 7, 1934	6.02		524		Sept. 8, 1941	4.92		-
1935	July 7-9, 1935	[b]7.06		279					

[a] Occurred on Apr. 19, 1933.
[b] Occurred on July 9, 1935.

RED RIVER OF THE NORTH BASIN

(44) Souris River near Westhope, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1942	Apr. 10, 1942	8.96	-2.96	-	1949	Apr. 18, 1949	[d]16.9		6,400
	Apr. 21, 1942	7.94		1,100	1950	May 17, 1950	11.77		2,650
1943	May 6, 1943	11.89		-		May 23, 1950	12.31		-
	May 22,23, 1943	-		[c]2,240					
1944	July 9, 10, 1944	-		[c]2,000	1951	Apr. 29, 1951,			
1945	Mar. 31, 1945	-		[c]1,040		May 1, 1951	-		3,100
						May 8, 1951	13.98		-
1946	Apr. 4, 1946	8.04	-1.27	-	1952	Apr. 24,26,27, 1952	[e]8.89		1,420
	Apr. 8-13, 1946	-		[c]600	1953	Aug. 13, 1953	9.46		1,550
1947	Apr. 19-20, 1947	-		[c]1,800	1954	July 13, 1954	10.25		1,780
	Apr. 21, 1947	11.37		-		July 17, 1954	10.52		-
1948	May 1948	13.63		-	1955	Apr. 14, 1955	13.82		3,500
	Apr. 26, 1948	-		[c]2,900					

[c]Maximum daily discharge.
[d]Occurred two days later.
[e]Occurred Apr. 27, 1952.

MINNESOTA RIVER BASIN

(45) Little Minnesota River near Peever, S. Dak.

Location.--Lat 45°36'05", long 96°52'18", in SW¼ sec. 13, T. 125 N., R. 50 W., on right bank 2 miles northwest of town of Browns Valley, Minn., 3¼ miles upstream from proposed Lake Traverse diversion, 5.3 miles northeast of Peever, S. Dak., 7¼ miles downstream from Jorgenson River, and 8 miles upstream from Big Stone Lake.
Drainage area.--447 sq mi.
Gage.--Nonrecording gage October 1939 to Aug. 27, 1940; recording gage thereafter. Oct. 1, 1939, to Mar. 20, 1940, at site 4½ miles downstream at different datum. Mar. 21 to Apr. 12, 1940, at site 100 ft downstream at present datum, and Apr. 13 to Aug. 27, 1940, at present site and datum. Altitude of present gage is 1,000 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 3,500 cfs. Fairly stable except for small shifts due to accumulation of debris on control.
Bankfull stage.--11 ft.
Remarks.--Base for partial-duration series, 450 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1940	Mar. 30, 1940	5.65	-1.00	442	1946	Mar. 20, 1946	7.58	-1.4	-
						Mar. 21, 1946	6.35		1,040
1941	June 23, 1941	5.72		714	1947	Apr. 5, 1947	8.25		1,870
1942	May 2, 1942	8.00		1,750		Apr. 11, 1947	9.51		2,780
	May 14, 1942	9.39		2,650	1948	Mar. 24, 1948	8.84	-1.65	1,410
	May 18, 1942	6.40		990		Apr. 5, 1948	4.94		514
	June 7, 1942	9.80		2,960	1949	Mar. 5, 1949	5.64	-2.8	-
	June 12, 1942	5.55		672		Apr. 2, 1949	4.69		395
1943	Mar. 25, 1943	13.35	-1.85	4,320	1950	Apr. 1, 1950	[a]13.05		-
	Mar. 30, 1943	10.57		3,660		Apr. 8, 1950	(a)		-
	June 3, 1943	5.20		605					
	June 15, 1943	4.87		500	1951	Apr. 4, 1951	7.10	-.70	-
1944	Apr. 6, 1944	6.40	-2.4	-		Apr. 4, 1951	6.95		1,320
	Apr. 7, 1944	4.81		486	1952	Apr. 8, 1952	12.16		4,730
	May 4, 1944	4.89		515	1953	Mar. 18, 1953	5.64	-2.61	-
	July 18, 1944	4.76		472		June 16, 1953	5.57		818
1945	Mar. 13, 1945	7.49	-2.9	-	1954	May 27, 1954	8.55		2,300
	Mar. 17, 1945	6.42		1,040		May 31, 1954	7.48		1,710
	June 1, 1945	6.60		1,120	1955	Mar. 31, 1955	4.56	-1.37	-
	Aug. 17, 1945	4.71		457		Apr. 2, 1955	3.95	-.40	156

[a]Backwater from ice, discharge unknown.

MINNESOTA RIVER BASIN

(46) Whetstone River near Big Stone City, S. Dak.

Location.--Lat 45°17', long 96°29', in sec. 18, T. 121 N., R. 46 W., on right bank 20 ft downstream from highway bridge, 1½ miles west of Big Stone City and 2 miles upstream from Big Stone Lake.
Drainage area.--389 sq mi.
Gage.--Nonrecording gage prior to May 4, 1939; recording gage thereafter. Mar. 16, 1910, to Nov. 16, 1912, at site 2 miles downstream at different datum. Mar. 18, 1931, to May 3, 1939, at site 20 ft upstream at present datum. May 4, 1939, to Nov. 8, 1952, at site 80 ft downstream at present datum. Datum of present gage is 996.96 ft above mean sea level, adjustment of 1912.
Stage-discharge relation.--Defined by current-meter measurements below 3,000 cfs.
Bankfull stage.--10 ft.
Historical data.--Maximum stage known, about 26 ft in June 1919, present site and datum, from information by local residents.
Remarks.--Base for partial-duration series, 200 cfs. Only annual peaks are shown prior to Oct. 1, 1940.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1910	Mar. 8, 1910	11.6		2,070
1911	Mar. 19, 1911	1.85		52
1912	Apr. 15, 1912	5.2		507
1931	May 28, 1931	7.10		1,320
1932	Mar. 1, 1932	5.70	-1.6	244
1933	Mar. 2, 1933	3.84	-1.6	-
	June 6, 1933	2.84		45
1934	Mar. 19, 1934	4.60	-2.3	-
	June 9, 1934	3.32		90
1935	Mar. 5, 1935	7.65	-3.5	-
	June 18, 1935	4.6		391
1936	Mar. 10, 1936	5.96	-2.2	-
	Mar. 22, 1936	5.18	-.5	422
1937	May 21, 1937	10.10		2,900
1938	Mar. 14, 1938	6.00	-1.80	234
1939	Mar. 23, 1939	8.70	-1.10	1,500
1940	Mar. 30, 1940	7.95	-1.80	-
	Mar. 31, 1940	7.89	-1.29	1,040
1941	Mar. 12, 1941	5.05	-1.8	-
	Apr. 10, 1941	4.24		244
	Apr. 21, 1941	4.21		236
1942	Apr. 27, 1942	4.25		246
	Apr. 30, 1942	4.83		405
	May 2, 1942	7.68		1,440
	May 14, 1942	11.03		3,390
	May 18, 1942	7.26		1,250
	June 1, 1942	7.54		1,340
	June 7, 1942	11.50		3,740
	June 12, 1942	5.89		693
	June 27, 1942	4.72		331
	Sept. 2, 1942	4.76		344
1943	Feb. 23, 1943	8.92	-2.92	728
	Mar. 25, 1943	13.50		5,140
	Mar. 30, 1943	9.67		2,650
	June 2, 1943	9.81		2,710
	June 13, 1943	5.86		834
	June 15, 1943	5.91		852
1944	Mar. 25, 1944	8.08	-2.31	796
	Apr. 7, 1944	5.31	-.56	454
	Apr. 16, 1944	4.36		320
	Apr. 25, 1944	5.84		831
	May 4, 1944	6.28		1,010
	June 2, 1944	6.31		1,010
	June 5, 1944	5.62		736
	June 14, 1944	4.23		287
	July 18, 1944	5.78		812
1945	Mar. 12, 1945	7.07	-0.82	990
	May 24, 1945	4.28		299
	June 2, 1945	9.87		2,770
	June 12, 1945	4.54		408
1946	Mar. 15, 1946	7.94	-1.74	970
	Mar. 22, 1946	7.28	-.60	1,160
	Apr. 6, 1946	3.78		215
	June 27, 1946	3.90		263
	July 20, 1946	4.43		408
1947	Apr. 5, 1947	9.25	-1.25	1,780
	Apr. 11, 1947	13.95		5,500
	Apr. 18, 1947	5.58		742
	Apr. 25, 1947	4.97		524
1948	Mar. 25, 1948	10.87		3,370
	Mar. 30, 1948	5.79		815
	Apr. 5, 1948	4.67		434
	June 24, 1948	3.83		238
	July 20, 1948	4.89		508
	July 22, 1948	4.98		539
1949	Mar. 5, 1949	6.71	-4.4	-
	Mar. 29, 1949	4.75	-.50	332
	July 9, 1949	4.31		344
1950	Mar. 27, 1950	9.49	-3.74	796
	Apr. 1, 1950	7.35	-.43	1,250
	Apr. 16, 1950	5.70		778
1951	Apr. 4, 1951	9.19	-3.00	-
	Apr. 4, 1951	8.94	-2.62	1,100
	Apr. 15, 1951	3.70		211
	June 4, 1951	3.78		227
1952	Apr. 4, 1952	12.07		4,530
	Apr. 8, 1952	13.64		5,710
	Apr. 14, 1952	7.20		1,400
	June 29, 1952	6.75		1,200
1953	Mar. 19, 1953	6.94	-3.16	-
	Mar. 20, 1953	6.24	-2.41	238
	Apr. 22, 1953	3.71		212
	May 2, 1953	4.73		457
	June 24, 1953	6.56		1,110
1954	Apr. 7, 1954	3.82	-.10	214
	Apr. 28, 1954	4.64		432
	May 6, 1954	3.68		206
	May 31, 1954	6.13		962
	June 7, 1954	10.46		3,330
1955	Mar. 11, 1955	6.98	-2.18	-
	Mar. 12, 1955	6.62	-1.52	570

MISSOURI RIVER MAIN STEM

(47) Missouri River near Williston, N. Dak.

Location.--Lat 48°07', long 103°44', in sec. 31, T. 154 N., R. 101 W., on left bank 10 ft downstream from Lewis and Clark Highway bridge, 5 miles southwest of Williston, 25 miles downstream from Yellowstone River, and at mile 1,650.2.
Drainage area.--164,500 sq mi, approximately.
Gage.--Recording gage. Datum of gage is 1,830.20 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 120,000 cfs; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--20 ft.
Historical data.--Maximum stage known, about 28 ft in April 1912, from information by local residents.
Remarks.--Many diversions above station for irrigation. Flow regulated by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft), since 1937. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 22, 1929	16.4	[a]-10	-	1942	Mar. 13, 1942	9.70	-3.3	-
	June 8, 1929	10.8		109,000		June 13, 1942	9.45		69,500
1930	Apr. 4, 1930	18.6	-1.5	-	1943	Mar. 28, 1943	19.78	-8.5	-
	Apr. 4, 1930	18.0		231,000		Mar. 30, 1943	17.26		204,000
					1944	Mar. 24, 1944	15.73	-7.1	-
1931	June 13, 1931	7.75		52,000		June 22, 1944	11.69		121,000
1932	Apr. 1, 1932	11.08	-5.4	-	1945	Mar. 19-20, 1945	10.26	-3.0	-
	June 29, 1932	10.93		99,200		June 29, 1945	8.90		70,800
1933	Mar. 17, 1933	11.94	-4.5	-					
	June 21, 1933	10.78		92,400	1946	June 15, 1946	7.92		53,300
1934	Mar. 16, 1934	10.28	-1.2	58,900	1947	Mar. 23, 1947	18.6	-1.1	-
1935	Mar. 27, 1935	10.50	-4.3	-		Mar. 24, 1947	18.01	-.4	210,000
	June 19, 1935	9.59		84,100	1948	Mar. 26, 1948	12.00	-5.6	-
						June 10, 1948	9.54		78,300
1936	Mar. 9, 1936	18.20	-9.0	-	1949	Mar. 26, 1949	13.29	-6.8	-
	June 6, 1936	9.13		62,500		June 15, 1949	-		[b]49,700
1937	April 1937	10.65	-3.5	-	1950	Apr. 6, 1950	11.97	-4.4	-
	June 16, 1937	10.27		88,300		Apr. 17, 1950	11.08		110,000
1938	Mar. 14, 1938	18.22	-8.0	-					
	July 6, 1938	11.41		106,000	1951	Apr. 8, 1951	16.76	-7	-
1939	Mar. 24, 1939	15.28	-5.5	-		Apr. 8, 1951	12.5		140,000
	Mar. 26, 1939	14.05		152,000	1952	Apr. 1, 1952	17.76	-2.16	170,000
1940	Apr. 8, 1940	8.48	-3.8	--	1953	Apr. 3, 1953	9.93	-5.0	-
	June 10, 1940	7.74		45,200		June 19, 1953	9.14		73,400
					1954	Apr. 8, 1954	10.17	-.4	[a]70,000
1941	Apr. 1, 1941	13,74	-7.5	-	1955	Apr. 3, 1955	10.30	-.6	[a]70,000
	Sept. 9, 1941	7.34		47,100					

[a]About.
[b]Daily mean discharge.

LITTLE MUDDY CREEK BASIN

(48) Little Muddy Creek near Williston, N. Dak.
(Published as "Little Muddy River" prior to 1946)

Location.--Lat 48°12', long 103°36', on line between sec. 31, T. 155 N., R. 100 W., and sec. 6, T. 154 N., R. 100 W., on upstream side of highway bridge, 2.5 miles downstream from Camp Creek, 4 miles northeast of Williston, and 6 miles upstream from mouth.
Drainage area.--920 sq mi, approximately, of which 100 sq mi is probably noncontributing.
Gage.--Nonrecording gage. 1904-09 at site 2½ miles upstream, above Camp Creek, at different datum. 1932-33 at site half a mile upstream at different datum. Altitude of present gage is 1,850 ft (by interpolation between known altitudes along river channel).
Stage-discharge relation.--Defined by current-meter measurements below 900 cfs for the 1904-9 site, below 330 cfs for the 1932-33 site, and below 2,300 cfs for the 1946-54 site; subject to change owing to ice effect and aquatic growth.
Bankfull stage.--13 ft, present site and datum.
Historical data.--A stage of about 13 ft, present site and datum, was reached in 1904 and a stage of approximately 12 ft, present site and datum, was reached in years 1911, 1916, 1925, 1929, and 1935.
Remarks.--Some regulation by Lake Zahl, Fish and Wildlife Reservoir. The station was discontinued in October 1954 and a new station was established 6½ miles upstream. The records are not equivalent. The 1955 maximum discharge for the old site was computed by multiplying the maximum discharge for the new site by a factor of 0.97. Only annual peaks are shown.

LITTLE MUDDY CREEK BASIN

(48) Little Muddy Creek near Williston, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1906	June 7, 1906	7.0		1,800	1949	Mar. 28, 1949	12.0	-3.0	-
1907	Apr. 17, 1907	6.2		1,310		Mar. 28,			
1908	Apr. 5, 1908	6.8		1,670		Apr. 3, 1949	-		1,300
1933	Mar. 8-10, 1933	11.54	-1.74	798	1950	Apr. 7, 1950	11.36	-2.3	1,330
					1951	Apr. 4, 1951	11.92		2,330
1947	Mar. 23, 1947	13.8	-.7	[a]2,500	1952	Apr. 6, 1952	12.52		2,590
1948	Mar. 23, 1948	12.6	-1.6	1,950	1953	June 24, 1953	13.0		2,820
					1954	Feb. 10, 1954	9.85	-1.15	1,200
					1955	Mar. 30, 1955	-		3,640

[a]About.

LITTLE MISSOURI RIVER BASIN

(49) Little Missouri River near Alzada, Mont.

Location.--Lat 45°05', long 104°24', in NE¼SW¼ sec. 6, T. 9 S., R. 60 E., on right bank 1.9 miles downstream from Thompson Creek and 4 miles north of Alzada.
Drainage area.--780 sq mi, approximately.
Gage.--Nonrecording gage prior to June 14, 1947; recording gage thereafter. Datum of gage is 3,367 ft above mean sea level (river-profile survey).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel changes and ice effect.
Bankfull stage.--12 ft.
Remarks.--Several diversions of floodwaters for irrigation of hay meadows above station. Some storage in coulees. Base for partial-duration series, 1,100 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1912	Apr. 6, 1912	15.3	4,550	1922	Mar. 19, 1922	8.7	1,630
	Apr. 21, 1912	10.2	2,230		Apr. 8, 1922	9.94	2,000
	May 8, 1912	10.5	2,320		Apr. 15, 1922	7.8	1,390
	July 6, 1912	7.1	1,300		May 14, 1922	-	[a]
	Aug. 5, 1912	7.7	1,480		June 10, 1922	13.2	3,350
1913	Mar. 10, 1913	10.0	2,170		June 16, 1922	14.7	4,100
	Apr. 1, 1913	14.7	4,250		July 23, 1922	6.9	1,140
	Sept.18, 1913	11.8	2,830	1923	Mar. 30, 1923	7.32	1,260
1914	July 30, 1914	11.2	2,590		June 10, 1923	7.5	1,310
	Aug. 3, 1914	11.33	2,630		July 25, 1923	8.0	1,440
1915	Mar. 29, 1915	7.5	1,420		Aug. 11, 1923	8.2	1,490
	Apr. 7, 1915	7.6	1,450		Aug. 16, 1923	12.4	2,960
	June 13, 1915	13.4	3,600		Sept.30, 1923	14.68	4,090
	June 22, 1915	9.0	1,710	1924	Oct. 12, 1923	8.6	1,600
	July 7, 1915	9.1	1,740		Mar. 2, 1924	7.9	1,420
	Aug. 4, 1915	9.5	1,860		Apr. 8, 1924	15.28	4,420
				1925	Feb. 6, 1925	8.8	1,660
1916	Feb. 21, 1916	-	[a]		Feb. 25, 1925	7.3	1,250
	Mar. 12, 1916	8.18	1,490		Mar. 8, 1925	10.3	2,120
1917	Mar. 31, 1917	9.23	1,780		Mar. 25, 1925	7.05	1,180
	Apr. 11, 1917	13.18	3,250		June 3, 1925	9.80	1,950
1918	Mar. 15, 1918	11.97	2,770		June 9, 1925	8.42	1,550
	Mar. 19, 1918	8.3	1,520		June 17, 1925	15.5	4,540
	July 17, 1918	7.4	1,280				
1919	July 30, 1919	7.70	1,360	1929	Mar. 12, 1929	9.92	1,990
1920	March 1920	-	[a]		Mar. 23, 1929	11.3	2,500
	May 12, 1920	-	[a]		Mar. 31, 1929	13.0	3,250
	June 7, 1920	8.3	1,520		Apr. 7, 1929	13.1	3,400
	June 20, 1920	8.6	1,600		May 30, 1929	14.50	4,000
	July 2, 1920	7.9	1,420		June 3, 1929	9.0	1,710
				1930	Feb. 23, 1930	10.38	2,150
1921	June 29, 1921	6.07	915		June 3, 1930	7.4	1,280

[a]Crests of unknown magnitude, believed to have exceeded 1,100 cfs, occurred on this date.

LITTLE MISSOURI RIVER BASIN

(49) Little Missouri River near Alzada, Mont.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1931	May 28, 1931	3.43	164	1944	Apr. 4, 1944	-	[a]
1932	Feb. 27, 1932	7.5	1,310		May 20, 1944	-	[a]
	Apr. 24, 1932	14.9	4,210		June 6, 1944	-	[a]
	June 27, 1932	8.00	1,440		June 18, 1944	-	[a]
					June 24, 1944	13.0	3,040
1935	July 22, 1935	6.79	1,080	1945	Mar. 14, 1945	-	1,100
1936	Mar. 7, 1936	7.28	1,310	1946	May 24, 1946	13.1	3,080
1937	June 6, 1937	8.4	1,550		June 14, 1946	12.3	2,720
	June 14, 1937	12.05	2,800	1947	Mar. 22, 1947	-	[a]
	July 17, 1937	9.70	1,920		June 23, 1947	14.42	2,850
	July 20, 1937	7.3	1,250	1948	Mar. 27, 1948	9.82	1,200
1938	May 31, 1938	5.55	794		June 18, 1948	16.08	3,690
1939	Mar. 24, 1939	7.9	1,420	1949	Mar. 7, 1949	-	[a]
1940	Aug. 19, 1940	9.6	1,600		Mar. 22, 1949	12.85	2,230
				1950	Apr. 4, 1950	10.94	1,550
1941	Apr. 14, 1941	11.7	2,460		Apr. 12, 1950	11.82	1,860
	June 2, 1941	10.5	1,980		May 10, 1950	10.46	1,380
	June 11, 1941	12.54	2,820				
1942	May 15, 1942	7.9	1,140	1951	June 17, 1951	5.89	490
	May 18, 1942	10.0	1,800	1952	Apr. 1, 1952	10.51	1,400
	June 6, 1942	12.90	3,000	1953	May 29, 1953	11.34	1,630
1943	About Feb. 19,1943	-	[a]		June 18, 1953	10.74	1,590
	Mar. 27, 1943	11.81	2,500	1954	Apr. 6, 1954	8.28	792
	June 28, 1948	10.0	1,800	1955	Apr. 13, 1955	9.12	1,270
					May 19, 1955	11.23	1,780

[a]Crests of unknown magnitude, believed to have exceeded 1,100 cfs, occurred on this date.

(50) Little Beaver Creek near Marmarth, N. Dak.

Location.--Lat 46°16', long 103°58', in NE¼ sec. 7, T. 132 N., R. 106 W., on left bank 150 ft upstream from concreted ford, three-quarters of a mile downstream from Corral Creek, 3 miles southwest of Marmarth, and 5 miles upstream from mouth.
Drainage area.--615 sq mi, approximately.
Gage.--Nonrecording gage prior to June 28, 1951; recording gage thereafter. Prior to Mar. 15, 1941, at site half a mile upstream at datum 0.57 ft higher. Mar. 15, 1941, to May 20, 1947, at present site and datum. May 21, 1947, to June 27, 1951, at site half a mile upstream at present datum. Altitude of present gage is 2,739 ft (by barometer). Gage heights given herein adjusted to present site and datum.
Stage-discharge relation.--Defined by current-meter measurements below 4,500 cfs and extended to 12,700 cfs on basis of slope-area measurement; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--11 ft.
Remarks.--Base for partial-duration series, 2,000 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1939	July 6, 1939	10.0		5,500	1946	July 8, 1946	8.20		3,700
1940	Aug. 9, 1940	4.0		1,130					
					1948	Mar. 14, 1948	8.7	-2.95	2,200
1941	June 10, 1941	6.56		2,670		June 4, 1948	8.6		4,200
1942	May 30, 1942	6.11		2,440		June 14, 1948	11.0		6,700
1943	Feb. 20, 1943	9.3	-1.6	-		June 17, 1948	7.2		3,100
	Mar. 24, 1943	8.40		4,000		June 27, 1948	6.5		2,600
1944	June 22, 1944	12.5		9,260		Aug. 9, 1948	7.8		3,500
1945	Mar. 15, 1945	7.6	-1.0	2,700	1949	Mar. 23, 1949	8.1	-.65	3,300

(50) Little Beaver Creek near Marmarth, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 3, 1950	8.8	-2.5	2,500	1952	Apr. 6, 1952	13.9		12,700
	Apr. 7, 1950	9.1		4,600	1953	June 15, 1953	6.51		2,130
						June 20, 1953	6.56		2,170
1951	Sept. 3, 1951	6.21		2,230	1954	Sept. 6, 1954	9.49		4,820
	Sept. 4, 1951	5.88		2,040	1955	June 27, 1955	7.81		2,990

(51) Little Missouri River at Marmarth, N. Dak.

Location.--Lat 46°18', long 103°54', in SE¼ sec. 30, T. 133 N., R. 105 W., on upstream side of highway bridge in Marmarth, 1½ miles downstream from Little Beaver Creek.
Drainage area.--4,570 sq mi, approximately.
Gage.--Nonrecording gage. Prior to June 23, 1950, on former highway bridge 75 ft downstream at same datum. Datum of gage is 2,686.32 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 25,000 cfs.
Bankfull stage.--18 ft.
Historical data.--According to local residents, the greatest known flood occurred in June 1907 (stage unknown).
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1939	July 7, 1939	9.70		7,710	1946	June 23, 1946	11.00		10,800
1940	July 28, 1940	9.77		7,710	1947	Mar. 23, 1947	21.7		45,000
					1948	Mar. 15, 1948	13.49	-0.6	15,000
1941	June 11, 1941	11.1		9,990	1949	Mar. 24, 1949	11.2		11,700
1942	May 30, 1942	7.21		4,160	1950	Apr. 7, 1950	14.2		18,500
1943	Feb. 20, 1943	19.5		36,000					
1944	Apr. 5, 1944	17.80		29,600	1951	July 29, 1951	8.05		4,940
1945	Mar. 13, 1945	11.35		10,400	1952	Mar. 31, 1952	23.4	-2.65	41,300
					1953	June 19, 1953	10.44		10,000
					1954	Sept. 6, 1954	6.25		3,400
					1955	June 27, 1955	5.80		2,550

(52) Little Missouri River at Medora, N. Dak.

Location.--Lat 46°55', long 103°32', in NE¼ sec. 27, T. 140 N., R. 102 W., on left bank 600 ft downstream from bridge on U. S. Highway 10, a quarter of a mile northwest of Medora, and 1 mile upstream from Andrews Creek.
Drainage area.--6,190 sq mi, approximately.
Gage.--Nonrecording gage prior to Aug. 23, 1951; recording gage thereafter. May 12, 1903, to 1916, nonrecording gages used interchangeably at sites 950 ft and 750 ft upstream from present site at datum about 1 ft lower than present datum. Oct. 11, 1921, to Sept. 30, 1924, at site 600 ft upstream from present site at datum about 1 ft lower than present datum. Aug. 31, 1928, to Sept. 30, 1934, at site 600 ft upstream from present site and within 0.2 ft of present datum. Oct. 1, 1945, to Aug. 22, 1951, at site 600 ft upstream from present site and at present datum. Datum of present gage is 2,246.75 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 43,000 cfs; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--15 ft.
Historical data.--Flood in 1913 reached a stage of 15-18 ft, present datum, from information by local residents.
Remarks.--Records for the period 1909-12, 1914-16 were computed using the gage-height record published by the U. S. Weather Bureau and an open-water rating based on one discharge measurement made in 1912 and ratings used for the period 1903-8. Base for partial-duration series, 3,000 cfs. Only annual peaks are shown prior to Oct. 1, 1945.

(52) Little Missouri River at Medora, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1904	June 9, 1904	11.2		11,600	1947	Feb. 18, 1947	-		5,500
1905	July 2, 1905	10.2		8,500		Feb. 23, 24, 1947	9.7	-4.7	-
						Mar. 23, 1947	20.5		65,000
1906	June 8, 1906	12.0		13,900		Apr. 12, 1947	8.4		8,910
1907	June 24, 1907	16.0		29,000		June 24, 1947	8.73		9,340
1908	June 6, 1908	10.7		10,800	1948	Feb. 19, 1948	8.5	-.8	6,700
1909	May 31, 1909	11.5		12,400		Mar. 16, 1948	8.7	-.6	7,600
1910	Mar. 16, 1910	9.5		7,550		Mar. 20, 1948	8.1		7,900
						Mar. 23, 1948	13.5		24,100
1911	May 17, 1911	8.6		5,540		June 7, 1948	6.0		3,400
1912	July 8, 1912	8.7		5,750		June 19, 1948	6.1		3,700
						June 23, 1948	6.1		3,700
1914	Apr. 3, 1914	6.3		1,850	1949	Mar. 9, 1949	8.1	-1.1	5,200
1915	June 16, 1915	14.1		24,700		Mar. 21, 1949	13.0	-3.0	12,600
						Mar. 27, 1949	11.2		14,600
1916	Mar. 16, 1916	9.1		6,630	1950	Mar. 6, 1950	8.1		7,970
						Apr. 3, 1950	10.5	-3.0	6,560
1924	Apr. 4, 1924	13.8		18,500		Apr. 8, 1950	13.0		25,600
						Apr. 16, 1950	12.6		20,800
1929	June 7, 1929	17.2		38,700		May 11, 1950	7.0		5,610
1930	Feb. 25, 1930	8.4	-1.5	-					
	Sept.13, 1930	7.0		4,700	1951	Mar. 22, 1951	9.0	-3.0	3,820
						Mar. 22, 1951	8.5	-1.7	5,200
1931	June 22, 1931	4.52		1,610	1952	Apr. 1, 1952	18.35	-2.0	36,900
1932	Apr. 28, 1932	9.66		12,500		Apr. 8, 1952	17.32		42,500
1933	May 24, 1933	12.44		20,800	1953	Mar. 19, 1953	6.5	-.5	4,800
1934	June 12, 1934	4.50		1,850		June 17, 1953	5.00		3,210
						June 21, 1953	8.21		8,820
1946	May 30, 1946	6.18		3,910	1954	Apr. 7, 1954	5.99		4,320
	June 18, 1946	6.4		3,910	1955	June 27, 1955	13.90		25,620
	June 24, 1946	8.75		9,310					

(53) Beaver Creek at Wibaux, Mont.

Location.--Lat 46°59', long 104°11', in NE¼ sec. 12, T. 14 N., R. 59 E., on upstream side of bridge on U. S. Highway 10 at Wibaux, 12 miles upstream from Little Beaver Creek.
Drainage area.--351 sq mi.
Gage.--Nonrecording gage. Prior to Sept. 21, 1940, at sites about 500 ft upstream at different datums.
Stage-discharge relation.--Defined by current-meter measurements below 1,800 cfs and extended above on the basis of logarithmic plotting; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--12 ft.
Remarks.--Base for partial-duration series, 75 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1929	June 7, 1929	-	[a]30,000	1942	Mar. 10, 1942	-	[a]1,400
					Mar. 24, 1942	6.88	202
1938	1st week in March	-	(b)		Apr. 4, 1942	8.20	593
	Apr. 26, 1938	7.14	1,310		June 7, 1942	10.70	1,840
	May 22, 1938	3.88	123	1943	Feb. 22, 1943	-	[a]2,200
	July 1, 1938	5.36	544		Mar. 24, 1943	-	(b)
	Sept. 8, 1938	6.92	1,070		June 7, 1943	9.60	1,130
1939	Mar. 21, 1939	10.8	3,780		June 30, 1943	7.94	342
1940	Apr. 24, 1940	4.78	91	1944	Mar. 23, 1944	-	(b)
					Apr. 5, 1944	11.0	2,040
1941	Mar. 29, 1941	5.96	33		June 18, 1944	8.6	530
					June 23, 1944	9.2	880
					Nov. 7, 1944	8.2	335
					Nov. 13, 1944	8.0	250

[a] About.
[b] Crests of unknown magnitude, believed to have exceeded 75 cfs, occurred on this date.

LITTLE MISSOURI RIVER BASIN

(53) Beaver Creek at Wibaux, Mont.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1945	Feb. 9, 1945	-	(b)	1948	Mar. 15, 1948	-	(b)
	Mar. 13, 1945	-	(b)		Mar. 19, 1948	10.0	a1,300
	Mar. 21, 1945	8.0	281		July 4, 1948	11.5	2,380
	Mar. 30, 1945	7.8	222		July 13, 1948	7.6	204
	June 8, 1945	7.4	123		July 20, 1948	7.2	104
				1949	Mar. 23, 1949	11.7	1,700
1946	Mar. 30, 1946	-	(b)		Mar. 28, 1949	11.15	2,140
	July 10, 1946	8.5	480	1950	Mar. 5, 1950	-	(b)
	July 18, 1946	8.3	380		Mar. 24, 1950	-	(b)
1947	Feb. 17, 1947	-	(b)		Apr. 8, 1950	9.58	1,100
	Mar. 24, 1947	-	(b)				
	Apr. 11, 1947	10.3	1,580	1951	Mar. 24, 1951	11.16	400
	June 24, 1947	8.7	585	1952	Apr. 8, 1952	13.00	3,760
	June 27, 1947	8.4	430	1953	June 24, 1953	7.00	104
	July 17, 1947	8.2	360	1954	Feb. 6, 1954	8.54	350
	Aug. 6, 1947	8.0	a300		Apr. 7, 1954	10.16	1,210
				1955	Mar. 10, 1955	10.80	1,000
					Apr. 1, 1955	7.04	114
					Apr. 22, 1955	6.94	118

[a]About.
[b]Crests of unknown magnitude, believed to have exceeded 75 cfs, occurred on this date.

(54) Little Missouri River near Watford City, N. Dak.

Location.--Lat 47°36', long 103°16', in NW¼ sec. 35, T. 148 N., R. 99 W., on left pier at downstream side of bridge on U. S. Highway 85, 17½ miles south of Watford City and 18 miles upstream from Cherry Creek.
Drainage area.--8,490 sq mi, approximately.
Gage.--Recording and nonrecording gages. Datum of gage is 1,929.03 ft above mean sea level, datum of 1929. Due to faulty intake action, most of high-water records have been based on graphs drawn through readings of wire-weight gage.
Stage-discharge relation.--Defined by current-meter measurements below 41,000 cfs and extended above on basis of float measurement at 67,000 cfs; subject to changes owing to shifting channel and ice effect.
Bankfull stage.--20 ft.
Historical data.--Flood of Mar. 25, 1947, is the highest known flood since at least 1921.
Remarks.--Base for partial-duration series, 8,000 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1935	July 11, 1935	10.60		20,500	1946	Feb. 24, 1946	8.75	-0.75	8,000
					1947	Mar. 25, 1947	24.0		110,000
1936	Mar. 10, 1936	8.00		8,800		Apr. 14, 1947	8.18		9,760
1937	June 15, 1937	7.85		8,990		June 23, 1947	8.30		10,200
1938	Mar. 3, 1938	9.0	-2.0	-	1948	Mar. 17, 1948	14.6	-5.0	14,300
	Mar. 15, 1938	9.4		14,600		Mar. 24, 1948	11.56	-1.49	16,000
	June 18, 1938	9.4		14,600	1949	Mar. 9, 1949	11.36	-2.77	11,000
	June 30, 1938	8.15		9,380		Mar. 28, 1949	13.7	-1.00	26,000
1939	Mar. 22, 1939	13.05	-1.20	26,500	1950	Mar. 6, 1950	9.38	-.92	10,600
1940	Sept.23, 1940	6.83		4,270		Apr. 9, 1950	21.42	-2.85	60,000
						Apr. 17, 1950	10.80		18,500
1941	Mar. 20, 1941	8.0	-1.5	-					
	June 11, 1941	9.0		13,000	1951	Feb. 12, 1951	11.88	-1.50	a17,000
1942	Mar. 11, 1942	9.59	-.60	12,600		Mar. 25, 1951	13.94	-4.5	-
1943	Mar. 25, 1943	18		-		Mar. 27, 1951	13.82	-3.16	a18,000
1944	Mar. 24, 1944	9.0	-4.4	-	1952	Apr. 3, 1952	13.92		34,100
	Apr. 8, 1944	14.4		32,600		Apr. 10, 1952	15.53		42,200
	June 10, 1944	8.40		9,140	1953	Mar. 25, 1953	8.55	-2.0	-
	June 18, 1944	8.98		10,400		June 22, 1953	7.68		7,650
	June 25, 1944	10.3		14,700	1954	Feb. 20, 1954	8.00	-4.0	-
1945	Mar. 14, 1945	14.4	-.5	a30,000		June 14, 1954	8.37		10,200
					1955	June 28, 1955	9.96		17,600

[a]About.

MISSOURI RIVER MAIN STEM

(55) Missouri River near Elbowoods, N. Dak.

Location.--Lat 47°34', long 102°12', in NE¼NE¼ sec. 12, T. 147 N., R. 91 W., on downstream side of right span of bridge on State Highway 8, 2 miles downstream from Little Missouri River, 2½ miles west of Elbowoods, and at mile 1,504.0.
Drainage area.--179,800 sq mi, approximately.
Gage.--Recording gage Apr. 18, 1940, to Nov. 8, 1945; nonrecording gage at same site and datum prior to Apr. 18, 1940, and after Nov. 8, 1945. Datum of present gage is 1,716.13 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--17 ft.
Remarks.--Many diversions above the station for irrigation. Flow regulated by Fort Peck Dam (usable capacity, 18,800,000 acre-ft) since 1937. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1940	June 10, 1940	8.94		38,900	1946	June 15, 1946	10.45		58,800
					1947	Mar. 26, 1947	23.2	[a]-4	[a]260,000
1941	Apr. 10, 1941	9.0		65,000	1948	Mar. 25, 1948	15.14	[a]-7	-
1942	June 8, 1942	9.86		74,000		June 10 or 11, 1948	10.2		77,000
	June 15, 1942	10.12		74,000	1949	Apr. 3, 1949	19.05		-
1943	Mar. 31, 1943	21.08		-		Apr. 5, 1949	15.5		[a]170,000
	Mar. 31, 1943	20.96		241,000	1950	Apr. 10, 1950	17.30	[a]-7.5	-
1944	Apr. 5, 1944	17.2		-		Apr. 15, 1950	14.93		161,000
	June 25, 1944	13.10		116,000					
1945	Mar. 20, 1945	12.97	-3	-	1951	Apr. 6, 1951	16.03	-7	-
	June 30, 1945	9.86		70,200		Apr. 11, 1951	12.33		94,000
					1952	Apr. 5, 1952	25.2	-2	360,000
					1953	June 23, 1953	[b]10.92		75,900

[a]About.
[b]Occurred three days earlier.

(56) Missouri River below Garrison Dam, N. Dak.

Location.--Lat 47°23'08", long 101°23'36", in NW¼ sec. 16, T. 145 N., R. 84 W., on right bank, 4.3 miles north of Stanton, 5 miles upstream from Knife River, 9 miles downstream from Garrison Dam, and at mile 1,445.9.
Drainage area.--181,400 sq mi, approximately.
Gage.--Nonrecording gage Apr. 27, 1948, to July 4, 1949, and May 1, 1951, to June 24, 1952; recording gage July 5, 1949, to Apr. 30, 1951, and after June 24, 1952. Apr. 27, 1948, to July 4, 1949, and May 1, 1951, to June 24, 1952, at site 8¾ miles upstream at same datum. July 5, 1949, to Apr. 30, 1951, at site 0.6 mile upstream at same datum. Datum of present gage is at mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to frequent changes due to channel shifting and ice effect.
Bankfull stage.--1,687 ft.
Remarks.--Flow regulated by Garrison Reservoir (capacity, 23,000,000 acre-ft) since November 1953. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1948	Mar. 30, 1948	90.70		-	1952	Apr. 5, 1952	101.90	-12.9	-
1949	Apr. 3, 1949	94.56		209,000		Apr. 5, 1952	100.10		348,000
1950	Apr. 16, 1950	87.64		220,000	1953	June 20, 1953	80.52		-
						June 24, 1953	80.36		74,400
1951	Apr. 7, 1951	86.19	-6.0	-	1954	Oct. 26, 1953	78.60		40,600
	Apr. 9, 1951	84.25	-.8	[a]120,000	1955	Feb. 25, 1955	78.90		-
						May 13, 1955	78.70		47,400

[a]About.
Note.--Add 1,600 ft to gage heights to reduce to mean sea level.

KNIFE RIVER BASIN

(57) Knife River near Golden Valley, N. Dak.

Location.--Lat 47°09', long 102°03', in SE¼ sec. 34, T. 143 N., R. 90 W., on left bank 6 ft downstream from county highway bridge, 4½ miles downstream from Elm Creek, and 9 miles south of Golden Valley.
Drainage area.--1,230 sq mi, approximately.
Gage.--Nonrecording gage prior to May 1, 1946; recording gage thereafter. Datum of gage is 1,847.13 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).
Stage-discharge relation.--Defined by current-meter measurements below 9,000 cfs and extended above on basis of estimated velocity of flow in overflow section; subject to changes owing to shifting channel and ice effect.
Bankfull stage.--20 ft.
Historical data.--Flood of Mar. 26-27, 1943, is the highest known in the period 1903-55 according to stream-flow records for period 1903-24, and information by local residents.
Remarks.--Base for partial-duration series, 1,500 cfs. Only annual peaks are shown prior to Oct. 1, 1946.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Mar. 26-27, 1943	26.7		11,500	1949	Apr. 4, 1949	22.9	-1.0	6,400
1944	Apr. 2, 1944	18.75		4,460	1950	Mar. 26, 1950	16.52	-4.3	1,700
						Apr. 8, 1950	[a]16.5	-3.5	1,900
1947	Feb. 17, 1947	14.85	-3.0	1,600		Apr. 16, 1950	26.37		10,900
	Mar. 23, 1947	20.08	-3.1	3,500					
	Apr. 12, 1947	12.38		1,700	1951	Mar. 28, 1951	25.67	-2.6	7,200
	June 24, 1947	21.30		6,020		Apr. 4, 1951	16.05		3,020
1948	Mar. 20, 1948	16.77	-.9	3,000	1952	Apr. 7, 1952	25.63		9,740
	Mar. 23, 1948	19.0	-.4	4,370	1953	June 4, 1953	12.49		1,510
	Mar. 30, 1948	12.00		1,640	1954	Apr. 7, 1954	17.60	-.52	3,320
	June 5, 1948	14.50		2,420	1955	Mar. 13, 1955	10.37	-1.1	750

[a]About.

(58) Spring Creek at Zap, N. Dak.

Location.--Lat 47°17', long 101°55', in SW¼ sec. 14, T. 144 N., R. 89 W., on right bank 250 ft downstream from Northern Pacific Railroad bridge in Zap and 9 miles upstream from mouth.
Drainage area.--545 sq mi, approximately.
Gage.--Nonrecording gage prior to Oct. 1, 1947; recording gage thereafter. Prior to Oct. 1, 1945, at site 250 ft upstream at datum about 7 ft lower. Oct. 1, 1945, to Sept. 30, 1947, at site 250 ft upstream at datum 1.12 ft higher than present datum. Datum of present gage is 1,819.39 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Gage heights given herein for the period 1947-55 are converted to present site and datum.
Stage-discharge relation.--Defined by current-meter measurements below 55 cfs in 1924 and defined by current-meter measurements below 5,900 cfs for the period 1945 to 1955; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--14 ft.
Historical data.--Maximum stage known occurred in about 1902, from ice jam. Floods of February 1913 and March 1943 reached stages of about 20 and 19.5 ft respectively, according to local residents.
Remarks.--Flow regulated by Ilo Lake (capacity, 7,130 acre-ft). Effect of this regulation on flood peaks is minor. Base for partial-duration series, 1,000 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1924	June 27, 1924	16.3		878	1950	Mar. 25, 1950	12.35		1,600
						Apr. 17, 1950	18.80		4,580
1947	Mar. 23, 1947	13.3	-2.0	1,200					
	June 24, 1947	12.6		1,530	1951	Apr. 5, 1951	18.38	-0.6	3,900
1948	Mar. 24, 1948	11.82	-.3	1,380		June 7, 1951	13.21		1,720
	Mar. 29, 1948	11.53		1,380	1952	Apr. 7, 1952	20.03		6,130
	Apr. 4, 1948	11.10		1,280	1953	June 14, 1953	15.18		2,360
	June 3, 1948	11.67		1,430	1954	Apr. 5, 1954	12.80		1,610
1949	Apr. 7, 1949	16.0		2,890	1955	Apr. 20, 1955	8.79		664

KNIFE RIVER BASIN

(59) Knife River at Hazen, N. Dak.

Location.--Lat 47°17', long 101°37', in SE¼ sec. 18, T. 144 N., R. 86 W., on right bank at upstream side of county highway bridge, 0.5 mi south of Hazen and 2 miles upstream from Antelope Creek.
Drainage area.--2,350 sq mi, approximately.
Gage.--Nonrecording gage prior to Sept. 25, 1947; recording gage thereafter. Datum of gage is 1,712.35 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 17,000 cfs and extended above on basis of contracted-opening and flow-over-road measurement at 23,000 cfs; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--21 ft.
Historical data.--Floods of 1943, 1950, and 1952 are the only major floods known since at least 1884.
Remarks.--Base for partial-duration series, 1,500 cfs. Only annual peaks are shown prior to Oct. 1, 1945.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1930	Feb. 21, 1930	23.2	-6.4	3,100	1948	Mar. 24, 1948	23.62	-0.92	7,070
						Mar. 30, 1948	18.26		4,320
1931	Sept.22, 1931	11.6		1,450		Apr. 4, 1948	19.62		4,760
1932	June 14, 1932	11.10		1,300		June 6, 1948	13.25		2,290
1933	Mar. 8, 1933	15.6	-5.0	-	1949	Apr. 3, 1949	24.1	-4.0	-
	Mar. 17, 1933	14.50		2,200		Apr. 6, 1949	23.3		7,760
					1950	Mar. 26, 1950	18.61	-4.2	2,720
1938	July 5, 1938	23.00		7,540		Apr. 8, 1950	16.10	-3.10	2,220
1939	Mar. 24, 1939	24.47		9,300		Apr. 17, 1950	25.93		22,700
1940	July 29, 1940	10.92		1,150					
					1951	Mar. 30, 1951	25.36	-1.41	9,000
1941	June 9, 1941	20.23		4,110		Apr. 5, 1951	23.67	-.45	7,600
1942	June 7, 1942	17.1		3,120		Aug. 29, 1951	11.77		1,580
1943	Mar. 26, 27, 1943	26.3		26,500	1952	Apr. 7, 1952	25.83		20,200
1944	Apr. 3, 1944	23.39		8,010	1953	June 3, 1953	16.01		2,860
1945	Mar. 15, 1945	23.99		8,690		June 14, 1953	17.31		3,440
					1954	Feb. 6, 1954	13.86	-3.0	-
1946	Mar. 3, 1946	19.30	-1.4	3,500		Apr. 8, 1954	18.06		3,880
1947	Feb. 18, 1947	16.77	-4.8	1,760	1955	Mar. 13, 1955	11.35		[a]1,400
	Mar. 25, 1947	21.95	-4.6	3,660					
	Apr. 4, 1947	14.70	-3.4	1,580					
	Apr. 13, 1947	14.20		7,460					
	June 25, 1947	21.70		6,000					

[a]About.

MISSOURI RIVER MAIN STEM

(60) Missouri River at Bismarck, N. Dak.

Location.--Lat 46°48'51", long 100°49'12", in SE¼ sec. 31, T. 139 N., R. 80 W., on left bank 40 ft upstream from Bismarck city water filter plant, 2,100 ft downstream from northern Pacific Railway bridge, 1.6 miles northwest of Bismarck Post Office, 3.6 miles upstream from Heart River, and at mile 1,377.8.
Drainage area.--186,400 sq mi, approximately.
Gage.--Nonrecording gage October 1927 to Oct. 16, 1928, Apr. 10, 1936, to Apr. 4, 1937, and July 24 to Sept. 30, 1937; recording gage Oct. 17, 1928, to Apr. 9, 1936, Apr. 5 to July 23, 1937, and Oct. 1, 1937, to present. October 1927 to Oct. 16, 1928, at site 2,100 ft upstream at datum 4.24 ft higher; Oct. 17, 1928, to Sept. 30, 1934, at present site at datum 4.24 ft higher; Oct. 1, 1934, to Apr. 9, 1936, at present site and datum; Apr. 10, 1936, to Sept. 30, 1937, at site 2,000 ft downstream at datum 0.47 ft lower; since Oct. 1, 1937, at present site and datum. Gage heights herein converted to present site and datum. Datum of present gage is 1,618.38 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to frequent and considerable channel shifting and ice effect.
Bankfull stage.--19 ft.
Historical data.--Maximum stage known, 31.6 ft Mar. 31, 1881 (ice jam), present site and datum.
Remarks.--Regulated by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft) 1938 to November 1953, and Garrison Reservoir (capacity, 23,000,000 acre-ft) thereafter. Only annual peaks are shown.

MISSOURI RIVER MAIN STEM

(60) Missouri River at Bismarck, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 27, 1929	22.0	-10.0	-	1942	June 16, 1942	12.5		77,400
	June 10, 1929	13.06		122,000	1943	Apr. 1, 1943	22.2	-1.8	-
1930	Mar. 6, 1930	15.62	-7.5	-		Apr. 3, 1943	21.86		282,000
	Apr. 5, 1930	11.32		78,000	1944	Apr. 7, 1944	16.90		136,000
					1945	Mar. 18, 1945	14.5	-3.8	-
1931	June 10, 1931	9.55		47,200		June 30, 1945	10.9		73,400
1932	June 13, 1932	12.57		118,000					
1933	Mar. 21, 1933	13.77	-3.8	-	1946	Mar. 27, 1946	10.93	-1.5	-
	June 21, 1933	12.2		88,800		Mar. 28, 1946	9.03		59,600
1934	Mar. 20, 1934	11.65	-.1	79,200	1947	Mar. 29, 1947	21.80		262,000
1935	July 13, 1935	13.15		116,000	1948	Apr. 1, 1948	15.84	-7.0	-
						June 12, 1948	11.85		76,400
1936	Mar. 20, 1936	16.50	-6.5	-	1949	Apr. 3, 1949	18.15	-1.5	-
	Apr. 15, 1936	12.65		117,000		Apr. 6, 1949	16.21		157,000
1937	June 18, 1937	12.65		98,900	1950	Apr. 17, 1950	18.72		192,000
1938	Mar. 19, 1938	20.4		190,000					
1939	Mar. 28, 1939	22.2		222,000	1951	Apr. 4, 1951	16.30	-6.0	-
1940	June 11, 1940	10.19		56,600		Apr. 5, 1951	16.06	-.7	130,000
					1952	Apr. 6, 1952	27.90		500,000
1941	June 11, 1941	9.96		51,600	1953	June 24, 1953	[a]11.13		78,200
	June 22, 1941	10.00		-	1954	Aug. 17, 1954	9.73		40,600
	Sept.10, 1941	9.50		51,600	1955	May 14, 1955	9.08		48,100

[a] Occurred three days earlier.

HEART RIVER BASIN

(61) Heart River near South Heart, N. Dak.
(Published as "near Dickinson" prior to June 1, 1947)

Location.--Lat 46°52', long 102°57', in SW¼ sec. 8, T. 139 N., R. 97 W., on left bank half a mile downstream from North Creek and 2 miles east of South Heart.
Drainage area.--315 sq mi.
Gage.--Nonrecording gage prior to June 1, 1947; recording gage thereafter. Datum of gage is 2,429.45 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to June 1, 1947, at bridge 6 miles downstream at different datum.
Stage-discharge relation.--Defined by current-meter measurements below 3,800 cfs; subject to changes owing to ice effect.
Bankfull stage.--18 ft.
Remarks.--Base for partial-duration series, 200 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Feb. 17, 1947	13.33	-2.90	840	1950	Mar. 7, 1950	9.20	-1.1	450
	Mar. 24, 1947	17.0	-.8	2,200		Mar. 23, 1950	12.55	-3.1	630
	Mar. 30, 1947	9.0	-2.3	327		Apr. 16, 1950	21.67		4,970
	Apr. 12, 1947	14.5		1,720		May 11, 1950	6.87		281
	June 23, 1947	16.09		1,860					
	July 1, 1947	11.30		886	1951	Feb. 22, 1951	8.03	-1.2	300
1948	Mar. 16, 1948	8.36	-2.0	236		Mar. 26, 1951	17.09	-.3	2,100
	Mar. 20, 1948	14.78		1,550	1952	Apr. 1, 1952	20.05		3,300
	Mar. 23, 1948	15.15		1,640	1953	June 22, 1953	7.32		334
	Mar. 29, 1948	8.27		450		Aug. 20, 1953	12.46		1,120
	June 3, 1948	13.56		1,310	1954	Apr. 6, 1954	21.73		5,030
1949	Mar. 31, 1949	17.75		2,400	1955	Mar. 14, 1955	6.35	-.41	210
						Apr. 21, 1955	6.52		263
						June 28, 1955	16.12		1,910

HEART RIVER BASIN

(62) Heart River at Lehigh, N. Dak.

Location.--Lat 46°52', long 102°43', in NE¼ sec. 7, T. 139 N., R. 95 W., on upstream side of county highway bridge in Lehigh, 150 ft downstream from Northern Pacific Railway bridge, 10 miles downstream from Dickinson Dam, and 10 miles upstream from Green River.
Drainage area.--443 sq mi.
Gage.--Nonrecording gage. Datum of gage is 2,328.39 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).
Stage-discharge relation.--Defined by current-meter measurements below 4,900 cfs; subject to changes owing to channel shifting and ice effect.
Remarks.--Regulated by Dickinson Reservoir (usable capacity, 24,600 acre-ft) since May 23, 1950. Peaks for water years 1953-55 computed by multiplying maximum discharge for station below Dickinson Dam by factor of 1.05. Base for partial-duration series, 600 cfs. Only annual peaks are shown for 1943, 1950-55.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Mar. 25, 1943	17.7		5,420	1948	Mar. 21, 1948	12.2	-1.4	1,520
1944	Mar. 26, 1944	9.35	-3.0	-		Mar. 24, 1948	12.1	-1.0	1,640
	Apr. 2, 1944	10.24		1,180		June 4, 1948	8.94		895
	June 20, 1944	10.52		1,280	1949	Apr. 2, 1949	14.9	-.2	3,800
	June 28, 1944	10.87		1,420	1950	Apr. 15, 1950	17.90		5,980
1945	Feb. 14, 1945	10.4	-3.5	-					
	Mar. 13, 1945	17.7	-1.3	4,500	1951	Mar. 26, 1951	15.0	-2.9	-
	Mar. 27, 1945	9.74		932		Mar. 26, 1951	14.7	-1.9	2,600
					1952	Apr. 3, 1952	14.30		3,520
1946	Mar. 4, 1946	7.06	-3.5	-	1953	Aug. 21, 1953	-		500
	June 26, 1946	3.95		20	1954	Apr. 7, 1954	-		4,200
1947	Feb. 17, 1947	11.30	-1.8	950	1955	June 29, 1955	-		1,500
	Mar. 24, 1947	15.7		4,040					
	Apr. 12, 1947	11.20		1,680					
	June 24, 1947	11.16		1,660					
	July 2, 1947	8.62		811					

(63) Green River near Gladstone, N. Dak.

Location.--Lat 46°53', long 102°37', in SW¼ sec. 36, T. 140 N., R. 95 W., on right bank half a mile upstream from bridge on U. S. Highway 10, 3½ miles northwest of Gladstone, 3½ miles upstream from mouth, and 8 miles downstream from Spring Creek.
Drainage area.--356 sq mi.
Gage.--Nonrecording gage prior to June 27, 1953; recording gage thereafter. Prior to June 27, 1953, at datum 4.15 ft lower; Oct. 1, 1945, to July 5, 1949, on former Highway 10 bridge over former channel 700 ft east of present bridge, and July 6, 1949, to June 26, 1953, on Highway 10 bridge half a mile downstream from present site. Altitude of present gage is 2,320 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 4,500 cfs prior to 1954; subject to changes owing to shifting channel and ice effect. After 1953, the rating is poorly defined by current-meter measurements below 2,900 cfs.
Bankfull stage.--13 ft present site and datum.
Historical data.--Maximum stage known, about 20 ft March 1943 site and datum used prior to June 27, 1953.
Remarks.--Base for partial-duration series, 500 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Feb. 28, 1946	5.42	-2.42	140	1951	Mar. 27, 1951	16.7	-0.4	3,800
	Mar. 5, 1946	4.32	-1.32	140	1952	Apr. 3, 1952	15.7		3,440
1947	Mar. 25, 1947	15.44	-1.6	2,300	1953	June 14, 1953	7.70		847
1948	Mar. 24, 1948	12.7	-.9	1,770	1954	Apr. 7, 1954	15.93		4,290
	Mar. 29, 1948	9.9	-.7	1,160	1955	Mar. 15, 1955	4.82	-1.30	-
	June 4, 1948	10.8		1,520		Apr. 22, 1955	4.52	-.52	280
1949	Apr. 5, 1949	16.9		3,780					
1950	Mar. 24, 1950	8.4	-2.3	520					
	Apr. 15, 1950	18.3		5,260					

HEART RIVER BASIN

(64) Heart River near Richardton, N. Dak.

Location.--Lat 46°44'46", long 102°18'27", in NE¼ sec. 29, T. 138 N., R. 92 W., on right bank 10 ft upstream from bridge on Stage Highway 8, half a mile downstream from Blacktail Creek, and 9½ miles south of Richardton.
Drainage area.--1,240 sq mi, approximately.
Gage.--Nonrecording gage prior to July 8, 1947; recording gage thereafter. 1905-10, at site at old bridge 300 ft downstream at datum 2.77 ft lower than present datum. 1911, at site 1 mile downstream (gage set to read same as gage used 1905 to 1910). 1912-21, at site 500 ft below the 1911 staff gage (set to read 20 ft higher than 1911 staff gage). During the period 1912-21, the 1905-10 chain gage (with 20.00 ft added to readings) was used interchangeably with the cantilever chain gage. Apr. 14, 1943, to Sept. 30, 1955, gage at present site and datum. Datum of present gage is 2,153.67 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 19,000 cfs; subject to change owing to shifting channel and ice effect.
Bankfull stage.--20 ft.
Remarks.--Flow regulated by Dickinson Reservoir (usable capacity, 24,600 acre-ft) since May 1950. Regulation is only minor at high discharges. Base for partial-duration series, 1,500 cfs. Only annual peaks are shown prior to Oct. 1, 1945.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1905	July 5, 1905	10.0		1,000	1943	Mar. 25, 1943	24.2		11,700
1906	June 10, 1906	25.9		10,500	1944	June 18, 1944	15.6		4,470
1907	Mar. 22, 1907	14.5		2,500	1945	Mar. 14, 1945	22.57		9,920
1908	May 24, 1908	10.5		1,130					
1909	June 2, 1909	18.0		4,250	1946	Mar. 2, 1946	8.80	-0.5	900
1910	Mar. 14, 1910	19.4	-0.8	4,600		Mar. 5, 1946	8.86	-.9	-
					1947	Feb. 17, 1947	15.73	-6.0	-
1911	Mar. 19, 1911	5.7		200		Mar. 23, 1947	21.0	-1.0	7,500
1912	Mar. 30, 1912	42.9	-5.0	-		Apr. 2, 1947	13.82		3,440
	Mar. 31, 1912	40.7	-2.3	4,500		June 24, 1947	15.55		4,440
1913	Apr. 2, 1913	42.1	-2.0	5,500	1948	Mar. 15, 1948	12.98	-1.0	2,500
1914	June 29, 1914	31.7		1,550		Mar. 20, 1948	14.72	-.5	3,660
1915	June 15, 1915	32.6		1,820		Mar. 24, 1948	15.00	-.6	3,760
1916	Feb. 23, 1916	35.7	-2.0	-		Mar. 30, 1948	10.4		1,740
	Apr. 4, 1916	34.7		2,470		June 5, 1948	11.6		2,190
1917	Mar. 30, 1917	33.7	-2.0	-		July 21, 1948	16.5		5,010
	Apr. 1, 1917	33.7	-1.0	1,850	1949	Mar. 28, 1949	15.38	-.4	4,100
	Apr. 1-3, 1917	-		1,850		Apr. 6, 1949	18.8		6,540
1918	Aug. 22, 1918	34.1		2,200	1950	Mar. 6, 1950	10.95	-3.2	-
1919	Apr. 1, 1919	29.6		966		Mar. 24, 1950	14.28	-3.5	1,870
1920	Mar. 25, 1920	32.4	-2.4	-		Apr. 16, 1950	28.05		23,400
	Mar. 29, 1920	31.5		1,500					
					1951	Mar. 27, 1951	19.52		7,900
1921	June 19, 1921	28.6		714	1952	Apr. 3, 1952	20.43		7,990
						Aug. 27, 1952	10.66		1,590
1938	July 5, 1938	[a]26.0		16,000	1953	June 15, 1953	12.97		2,880
					1954	Apr. 7, 1954	19.65		7,390
					1955	June 29, 1955	10.28		1,420

[a]Present site and datum.

(65) Heart River below Heart Butte Dam, near Glen Ullin, N. Dak.
(Published as "near Glen Ullin" prior to Oct. 1, 1949)

Location.--Lat 46°35'50", long 101°48'05", in NE¼ sec. 13, T. 136 N., R. 89 W., on right bank 0.5 mile downstream from Heart Butte Dam, 10 miles upstream from Heart Butte Creek, 14 miles south of Glen Ullin, and 14 miles north of Elgin.
Drainage area.--1,710 sq mi, approximately.
Gage.--Nonrecording gage prior to Aug. 24, 1943; recording gage thereafter except for the water years 1945 to 1947 when the recorder was not functioning at the time of the maximum discharge. For 1945 the crest was picked from a graph based on once-daily gage readings, and for 1947 the crest was picked from a floodmark. Prior to June 1, 1947, at site 4 miles upstream at different datum. Datum of present gage is 1,998.87 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).
Stage-discharge relation.--At upstream site, defined by current-meter measurements below 7,800 cfs and extended above on basis of float measurement at 18,000 cfs and slope-area measurement at 20,000 cfs. At lower site in 1947, defined by current-meter measurements below 3,700 cfs and extended above on basis of later measurements and ratings. After 1947 at lower site, defined by current-meter measurements below 6,000 cfs. All ratings are subject to changes owing to channel shifting and ice effect.

(65) Heart River below Heart Butte Dam, near Glen Ullin, N. Dak.--Continued

Historical data.--Flood of Mar. 24, 1947, is the highest known since at least 1904.
Remarks.--Flow regulated by Heart Butte Reservoir (usable capacity, 421,250 acre-ft) since Sept. 29, 1949. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Mar. 25, 1943	18.77		20,000	1950	Apr. 17, 1950	7.55	-1.35	-
1944	Apr. 1, 1944	13.26		7,280		Apr. 19, 1950	6.92		3,840
1945	Mar. 14, 1945	15.45		11,500					
					1951	Mar. 29, 1951	6.42		3,440
1946	Mar. 3, 1946	-		(a)	1952	Apr. 9, 1952	6.99		4,100
1947	Mar. 24, 1947	21.5	-0.8	25,000	1953	June 16, 1953	3.18		699
1948	Mar. 19, 1948	11.48	-1.0	b9,900	1954	Apr. 10, 1954	6.08		3,270
1949	Mar. 28, 1949	10.78	-1.04	7,300	1955	June 14, 15, 1955	2.14		176

[a]Probably less than 1,000 cfs.
[b]Release of water when ice jam broke.

(66) Antelope Creek near Carson, N. Dak.

Location.--Lat 46°32', long 101°39', in NW¼NE¼ sec. 8, T. 135 N., R. 87 W., near center of span on upstream side of county road bridge, 4 miles upstream from mouth and 8 miles northwest of Carson.
Drainage area.--221 sq mi.
Gage.--Nonrecording gage. Crest-stage indicator since July 29, 1954. Altitude of gage is 1,974 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 1,500 cfs and extended above on basis of slope-area measurement at 11,100 cfs; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--15 ft.
Historical data.--Flood of Mar. 25, 1943, reached a stage of 17.1 ft, the highest known prior to 1950.
Remarks.--Base for partial-duration series, 200 cfs. Only annual peaks prior to Oct. 1, 1950.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1949	Mar. 28, 1949	13.84	-1.7	1,300	1953	June 16, 1953	13.06		1,540
1950	Apr. 16, 1950	17.95		11,100	1954	Apr. 7, 1954	5.90		252
					1955	June 2, 1955	7.50		377
1951	Mar. 27, 1951	15.5	-.8	2,900		July 28, 1955	7.15		365
1952	Apr. 3, 1952	15.7	-.67	3,280					
	June 29, 1952	a8.5		500					
	Aug. 26, 1952	a11		a900					
	Aug. 30, 1952	15.05		3,300					

[a]About.

(67) Muddy Creek near Almont, N. Dak.

Location.--Lat 46°42', long 101°28', in SW¼ sec. 7, T. 137 N., R. 85 W., on right bank 450 ft downstream from county highway bridge, 2 miles downstream from Hailstone Creek, 3 miles southeast of Almont, and 12 miles upstream from mouth.
Drainage arge.--456 sq mi.
Gage.--Nonrecording gage prior to Sept. 5, 1952; recording gage thereafter. Altitude of gage is 1,864 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 3,100 cfs and extended to 20,200 cfs on basis of slope-area measurement; subject to changes owing to shifting channel, beaver dam building, and ice effect.
Bankfull stage.--22 ft.
Historical data.--The flood of Apr. 17, 1950, is the highest known since at least 1895. Flood of June 26, 1914, and the spring flood of 1943 were about 4 ft lower than the 1950 flood, from information by local residents.
Remarks.--Base for partial-duration series, 200 cfs.

HEART RIVER BASIN

(67) Muddy Creek near Almont, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Mar. 3, 1946	12.8	-1.4	750	1951	Mar. 30, 1951	19.5	-1.5	1,800
	June 30, 1946	9.08		405		Apr. 5, 1951	19.0		2,050
1947	Feb. 18, 1947	12	-2.9	400	1952	Apr. 8, 1952	21.86		3,350
	Mar. 23, 1947	17.17	-1.07	1,600		June 29, 1952	16.2		1,700
	Apr. 12, 1947	11.0	-1.8	410		Aug. 31, 1952	14.0		[a]1,200
	Apr. 18, 1947	6.95		206	1953	Mar. 18, 1953	10.28	-1.07	360
	June 23, 1947	12.9		1,020		May 2, 1953	7.86		218
1948	Mar. 24, 1948	19.20	-.6	2,250		June 4, 1953	7.58		205
	Mar. 29, 1948	13.96	-.9	1,180		June 17, 1953	12.60		836
	Apr. 5, 1948	12.0		992		June 21, 1953	9.38		396
	July 14, 1948	7.70		337		Sept. 3, 1953	7.96		242
1949	Apr. 1, 1949	15.41		1,400	1954	Feb. 5, 1954	8.57		301
	May 29, 1949	8.50		330		Mar. 30, 1954	8.93		312
1950	Mar. 26, 1950	10.62	-7.6	-		Apr. 6, 1954	14.07		1,170
	Apr. 9, 1950	11.25	-3.6	250	1955	Mar. 12, 1955	11.68	-1.21	560
	Apr. 17, 1950	30.7		20,200		June 2, 1955	12.49		864
	May 12, 1950	12.04		780		July 9, 1955	7.59		239
	June 9, 1950	8.47		263					

[a]About.

(68) Heart River near Lark, N. Dak.

Location.--Lat 46°36'00", long 101°22'30", in S½ sec. 9, T. 136 N., R. 85 W., on right bank 20 ft downstream from bridge on State Highway 31, 1 mile downstream from Muddy Creek, and 10 miles north of Lark.
Drainage area.--2,750 sq mi, approximately.
Gage.--Nonrecording gage prior to Nov. 16, 1948; recording gage thereafter. Datum of gage is 1,802.83 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 11,000 cfs and extended above on basis of contracted-opening measurement at 29,200 cfs; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--15 ft.
Remarks.--Regulated by Heart Butte Reservoir (usable capacity, 421,250 acre-ft) since September 1949. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Mar. 25, 1947	15.85	-0.5	10,400	1951	Mar. 26, 1951	14.9	-0.7	[a]9,000
1948	Mar. 23, 1948	13.99	-1.1	-	1952	Apr. 7, 1952	15.62		11,800
	Mar. 24, 1948	13.25	-.1	7,500	1953	June 15, 1953	11.53		5,440
1949	Mar. 29, 1949	14.72		9,810	1954	Apr. 10, 1954	9.60		3,500
1950	Apr. 17, 1950	20.70		29,200	1955	Mar. 12, 1955	9.23	-2.7	1,100

[a]About.

(69) Sweetbriar Creek near Judson, N. Dak.

Location.--Lat 46°51', long 101°15', in SW¼ sec. 14, T. 139 N., R. 84 W., on right bank 80 ft downstream from bridge on U. S. Highway 10, 2 miles northeast of Judson and 16 miles upstream from mouth.
Drainage area.--157 sq mi.
Gage.--Nonrecording gage prior to July 20, 1955; recording gage thereafter. Prior to July 20, 1955, on upstream side of bridge 80 ft upstream at same datum. Altitude of gage is 1,886 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 2,000 cfs and extended above on basis of contracted-opening measurement at 5,910 cfs; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--10 ft.
Remarks.--Base for partial-duration series, 200 cfs.

(69) Sweetbriar Creek near Judson, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 17, 1950	12.5		5,910	1954	Feb. 4, 1954	5.2	-0.2	300
						Mar. 19, 1954	5.8	-.2	440
1952	Apr. 7, 1952	9.55		2,300		Apr. 5, 1954	7.8		1,100
	June 29, 1952	4.45		254	1955	Mar. 11, 1955	5.28	-.6	240
1953	June 16, 1953	8.48		1,450		June 2, 1955	11.11		3,400

(70) Heart River near Mandan, N. Dak.

Location.--Lat 46°50'01", long 100°58'22", in NW¼NE¼ sec. 25, T. 139 N., R. 82 W., on right bank 25 ft downstream from bridge on U. S. Highway 10, 3 miles west of Mandan, and 4 miles downstream from Sweetbriar Creek.
Drainage area.--3,310 sq mi, approximately.
Gage.--Nonrecording gage 1924 to Sept. 12, 1948; recording gage thereafter. 1924 gage on old highway bridge near present site and at datum 2.79 ft lower; March 1928 to Mar. 27, 1943, on old highway bridge at present datum; Apr. 9, 1943, to Mar. 16, 1948, on Northern Pacific Railway bridge 300 ft upstream at present datum. Datum of present gage is 1,638.70 ft above mean sea level, datum of 1929. Gage heights given herein converted to present site and datum.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to frequent and considerable channel shifting, dike construction, and ice effect.
Bankfull stage.--18 ft.
Remarks.--Flow regulated by Heart Butte Reservoir (usable capacity, 421,250 acre-ft) since Sept. 29, 1949. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1924	Apr. 7, 1924	9.76		3,300	1944	Apr. 4, 1944	22.75	-7.0	-
	June 19, 1924	10.86		-		Apr. 4, 1944	-		[b]12,000
					1945	Mar. 13, 1945	22.3	-2.3	-
1929	Mar. 20, 1929	11.8	-1.4	-		Mar. 14, 1945	21.5		14,800
	June 3, 1929	10.56		2,750					
1930	Mar. 17, 18, 1930	[a]20.40	-	-	1946	Mar. 3, 1946	[a]13.99		-
					1947	Mar. 27, 1947	[a]22.16		-
1931	June 30, 1931	5.70		209	1948	Mar. 21, 1948	23.31	-6.40	-
1932	Feb. 28, 1932	11.55		3,400		Mar. 23, 1948	22.02		16,100
1933	Mar. 3, 1933	17.6	-9.2	-	1949	Mar. 29, 1949	21.95	-4.8	-
	Mar. 19, 1933	16.38	-6.0	2,530		Mar. 29, 1949	-		[b]16,000
					1950	Apr. 19, 1950	23.64		30,500
1938	July 7, 1938	16.9		7,320					
1939	Mar. 22, 1939	23.4	-5.6	-	1951	Mar. 28, 1951	24.35	-9.0	-
	Mar. 23, 1939	17.9		10,600		Apr. 3, 1951	17.73		[b]14,000
1940	May 2, 1940	11.07		3,700	1952	Apr. 4, 1952	25.75	-10.5	-
						Apr. 4, 1952	25.5	-2.5	[b]30,000
1941	Mar. 27, 1941	16.72	-5.0	-	1953	June 16, 1953	11.35		6,200
	June 11, 1941	15.3		7,480	1954	Apr. 10, 1954	9.52		3,720
1942	June 10, 1942	11.9		3,350	1955	Mar. 13, 1955	9.36	-1.4	-
1943	Mar. 27, 1943	24.7		21,400		June 2, 1955	8.05		1,350

[a]Backwater from ice.
[b]Release of water when ice jam broke.

APPLE CREEK BASIN

(71) Apple Creek near Menoken, N. Dak.

Location.--Lat 46°47'40", long 100°39'25", in NW¼NE¼ sec. 9, T. 138 N., R. 79 W., on left bank 75 ft downstream from bridge on former U. S. Highway 10, 4 miles upstream from Hay Creek, 6.3 miles west of Menoken, and 6.4 miles east of Bismarck.
Drainage area.--1,680 sq mi, approximately, of which 500 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to Oct. 1, 1953; recording gage thereafter. During the period Apr. 1, 1950, to Sept. 30, 1953, the nonrecording gage was located on the upstream side of the bridge. At high stages the steel of the bridge becomes submerged causing a difference in stage above and below the bridge. These stages have been corrected to equivalent stages below the bridge in the listing of peak stage. Datum of gages is 1,638.61 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to shifting channel and ice effect.
Bankfull stage.--15 ft.
Remarks.--Base for partial-duration series, 200 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Mar. 10, 1946	12.66		-	1952	Apr. 5, 1952	15.87	-0.67	1,540
1947	Mar. 26, 1947	13.20	-0.96	800		June 11, 1952	6.99		255
	Apr. 15, 1947	7.7		308		July 1, 1952	9.66		523
1948	Apr. 7, 1948	15.80		2,340	1953	Mar. 23, 1953	6.40	-.6	-
1949	Apr. 5, 1949	12.4	-.5	750		May 30, 1953	8.7		415
1950	Apr. 7, 1950	15.00	-4.75	560		June 16, 1953	14.59		1,160
	Apr. 18, 1950	17.07		6,750	1954	Feb. 11, 1954	6.64	-1.5	-
	May 14, 1950	16.0		2,720		June 8, 1954	6.88		275
					1955	Mar. 14, 1955	7.3	-1.17	225
1951	Apr. 7, 1951	16.13		3,200					
	Sept. 2, 1951	7.4		292					

[a]Backwater from ice.

CANNONBALL RIVER BASIN

(72) Cannonball River at Regent, N. Dak.

Location.--Lat 46°26', long 102°33', in NE¼NE¼ sec. 13, T. 134 N., R. 95 W., on right bank 400 ft upstream from highway bridge on county highway and 0.3 mile north of Regent.
Drainage area.--580 sq mi, approximately.
Gage.--Recording gage. Datum of gage is 2,422.90 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 4,100 cfs and extended to 20,300 cfs on basis of slope-area measurement; subject to changes owing to shifting channel and ice effect.
Bankfull stage.--14 ft.
Remarks.--Base for partial-duration series, 400 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 16, 1950	26.1		[a]20,300	1953	June 15, 1953	14.07		4,230
						June 20, 1953	7.48		864
1951	Mar. 22, 1951	10.05	-1.3	1,300	1954	Apr. 6, 1954	9.59		1,690
1952	Apr. 7, 1952	15.77		5,420		Aug. 26, 1954	8.34		1,200
	May 26, 1952	10.40		-	1955	June 29, 1955	8.27		1,170
	June 23, 1952	11.85		-		Aug. 6, 1955	5.84		464
	Aug. 27, 1952	10.78		-					

[a]Annual peak only.

CANNONBALL RIVER BASIN

(73) Cannonball River below Bentley, N. Dak.
(Published as "near New Leipzig" prior to Oct. 1, 1951)

Location.--Lat 46°21'30", long 102°02'30", in SW¼SW¼ sec. 6, T. 133 N., R. 90 W., on left bank a quarter of a mile downstream from Thirty Mile Creek, 2 miles north and 1 mile east of Bentley.
Drainage area.--1,140 sq mi, approximately. Prior to Oct. 1, 1952, 1,180 sq mi, approximately, at site 8 miles downstream.
Gage.--Nonrecording gage prior to Nov. 7, 1947; recording gage thereafter. Prior to Oct. 1, 1951, at site 8 miles downstream at datum 2,222.90 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Altitude of present gage is 2,250 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements at site 8 miles downstream below 12,000 cfs and extended above on basis of slope-area measurement at 15,000 cfs and slope-area and contracted-opening measurements at 51,800 cfs. Defined by current-meter measurements at present site below 8,000 cfs. Stage-discharge relation at both sites subject to changes owing to shifting channel and ice effect.
Remarks.--Some diversions and storage in small lakes above station; minor effect on flood flow. All discharges listed herein have been adjusted to the present site by a drainage-area relation. Base for partial-duration series, 500 cfs. Only annual peaks are shown prior to Oct. 1, 1946.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Mar. 25 or 26, 1943	26.9		14,700	1950	Mar. 27, 1950	10.63	-3.5	-
1944	Apr. 7, 1944	19.1		6,490		Apr. 17, 1950	34.0		50,900
1945	Mar. 14, 1945	16.70		4,300		May 12, 1950	8.72		644
						June 8, 1950	8.20		529
1946	July 4, 1946	6.70		227	1951	Feb. 26, 1951	9.24	-.8	590
1947	Feb. 17, 1947	13.9	-4.0	1,050		Mar. 25, 1951	18.99		6,210
	Mar. 24, 1947	20.50		7,860	1952	Apr. 7, 1952	19.81		7,930
	Apr. 12, 1947	12.7		2,240		June 25, 1952	6.90		763
	June 23, 1947	14.9		3,330		June 28, 1952	7.22		851
1948	Mar. 1, 1948	8.52	-2.2	-	1953	June 3, 1953	5.84		503
	Mar. 16, 1948	17.21	-4.1	2,460		June 17, 1953	15.05		4,300
	Mar. 20, 1948	12.16	-.26	1,870		June 22, 1953	7.47		922
1949	Mar. 9, 1949	8.15	-2.6	-	1954	Apr. 7, 1954	11.11	-1.0	-
	Mar. 28, 1949	18.3	-1.5	-		Apr. 8, 1954	10.90		2,250
	Mar. 30, 1949	17.4		5,260		Aug. 28, 1954	6.72		717
	Aug. 21, 1949	10.10		1,230	1955	Mar. 12, 1955	6.16	-1.0	-
						June 30, 1955	7.48		905

(74) Cedar Creek near Haynes, N. Dak.

Location.--Lat 46°09', long 102°28', in W½ sec. 20, T. 131 N., R. 94 W., on left bank 30 ft downstream from new bridge on State Highway 8 and 12½ miles north of Haynes.
Drainage area.--553 sq mi.
Gage.--Nonrecording gage on former bridge prior to May 20, 1951; recording gage thereafter. Prior to May 20, 1951, at site 400 ft upstream at present datum. Altitude of gage is 2,470 ft (by barometer).
Stage-discharge relation--Defined by current-meter measurements below 7,200 cfs and extended above on basis of slope-area measurement at 26,900 cfs at site 9 miles upstream; subject to changes owing to channel shifting and ice effect.
Remarks.--Maximum discharge for 1950 determined at site 9 miles upstream and converted to station site by a drainage-area relation. Base for partial-duration series, 400 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 16, 1950	23		[a]27,400	1953	May 29, 1953	15.19		1,480
						June 16, 1953	16.84		2,140
1951	Mar. 27, 1951	14.2	-1.1	1,000		June 21, 1953	15.19		1,480
1952	Apr. 7, 1952	21.25		7,870	1954	Apr. 9, 1954	11.04		696
						Aug. 26, 1954	12.61		946
					1955	July 29, 1955	9.40		435

[a]Annual peak only.

CANNONBALL RIVER BASIN

(75) Cedar Creek near Pretty Rock, N. Dak.

Location.--Lat 46°02', long 101°49', in S½ sec. 33, T. 130 N., R. 89 W., on left bank on downstream side of county highway bridge, 7 miles north of Keldron, S. Dak., 10½ miles south of abandoned townsite of Pretty Rock, and 15 miles downstream from Timber Creek.
Drainage area.--1,340 sq mi, approximately.
Gage.--Nonrecording gage prior to Oct. 17, 1947; recording gage thereafter. Datum of gage is 2,155.17 ft above mean sea level (levels by Corps of Engineers).
Stage-discharge relation.--Defined by current-meter measurements below 7,800 cfs and extended above on basis of slope-area measurement at 48,000 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--16 ft.
Remarks.--Base for partial-duration series, 500 cfs. Only annual peaks are shown prior to Oct. 1, 1945.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Mar. 24, 1943	21.8		14,300	1950	Apr. 7, 1950	6.60	-2.4	-
1944	Apr. 10, 1944	14.9		4,450		Apr. 17, 1950	26.5		48,000
1945	Mar. 15, 1945	12.71	-3.73	1,700		June 8, 1950	5.98		657
1946	June 24, 1946	4.95		349	1951	Mar. 26, 1951	20.89	-2.2	7,600
1947	Feb. 17, 1947	10.78	-3.55	1,040		June 6, 1951	7.5		1,160
	Feb. 21, 1947	9.15	-3.50	533	1952	Apr. 4, 1952	20.91	-3.5	-
	Mar. 24, 1947	17.50	-4.75	3,300		Apr. 9, 1952	19.31		9,720
	Apr. 3, 1947	5.85	-.10	564	1953	May 29, 1953	11.10		2,440
	Apr. 14, 1947	9.12		1,760		May 31, 1953	7.88		1,290
	June 23, 1947	12.7		3,280		June 3, 1953	9.62		1,830
1948	Feb. 27, 1948	5.92	-1.50	-		June 18, 1953	10.34		2,050
	Mar. 15, 1948	14.00	-4.28	2,000		June 22, 1953	10.77		2,270
	Mar. 20, 1948	12.76	-3.2	1,930	1954	Apr. 11, 1954	5.75		588
1949	Mar. 8, 1949	10.60	-3.0	980		Aug. 30, 1954	5.75		588
	Apr. 2, 1949	18.0	-4.2	3,800	1955	June 30, 1955	4.25		221

(76) Cannonball River at Breien, N. Dak.
(Published as "at or near Stevenson" prior to 1928 and as "near Timmer" 1928-34)

Location.--Lat 46°23', long 100°56', in sec. 36, T. 134 N., R. 82 W., on right bank 600 ft upstream from bridge on Stage Highway 6, 950 ft downstream from Louise Creek, and 0.5 mile south of Breien.
Drainage area.--4,100 sq mi, approximately. 3,670 sq mi, approximately, at site used prior to 1935.
Gage.--Nonrecording gage 1906-8, 1916-18, 1922, 1924, 1928-34, at site 7¾ miles upstream from present site. Altitude of this gage was about 1,710 ft. Nonrecording gage 1912-15 at site 8¾ miles upstream from present site. This gage read about 10 ft higher than the gage 1 mile downstream. Gage heights prior to 1935 given herein adjusted to site and datum used prior to 1912 and after 1915. Recording gage since 1935 at present site. Datum of present gage is 1,676.54 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Prior to 1935, defined by current-meter measurements below 3,900 cfs and extended to 11,000 cfs on basis of slope-area and contracted-opening measurements at 94,800 cfs. After 1934, defined by current-meter measurements below 20,000 cfs and extended to 94,800 cfs on basis of slope-area and contracted-opening measurements at 94,800 cfs. Subject to changes at both sites owing to ice effect and channel shifting.
Bankfull stage.--11 ft.
Historical data.--Flood of Apr. 19, 1950, is the greatest known since at least 1900.
Remarks.--Some diversions and some storage in several small lakes above station. Discharges given herein converted to present site by a drainage-area relation. Base for partial-duration series, 2,000 cfs. Only annual peaks prior to Oct. 1, 1934.

CANNONBALL RIVER BASIN

(76) Cannonball River at Breien, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1906	June 6, 1906	[a]10.8		6,760
1907	Feb. 20, 1907	9.8		-
	June 8, 1907	8.4		3,650
1908	Mar. 20, 1908	9.2		4,440
1912	Mar. 28, 1912	[a]13.0		-
	Apr. 2, 1912	11.5		8,030
1913	Apr. 3, 1913	9.1		4,550
1914	June 27, 1914	9.8		5,450
1915	June 4, 1915	10.5		6,410
1916	Mar. 18, 1916	[a]11		-
	Apr. 13, 1916	8.9		4,120
1917	Apr. 5, 1917	9.4	-4.0	-
	Apr. 13-14, 1917	6.6	-.4	1,680
1918	Mar. 18, 1918	10.5	-2.0	3,700
1922	Apr. 7, 1922	9.4		4,650
1924	Apr. 3, 1924	7.6	-.4	-
	Aug. 21, 1924	7.3		2,580
1928	Sept.14, 1928	8.3		3,380
1929	Mar. 18, 1929	11.1		6,890
1930	Feb. 20, 1930	12.7	-3.12	-
	Mar. 18, 1930	9.01	-.5	3,400
1931	June 22, 1931	6.08		1,220
1932	June 10, 1932	12.66		11,000
1933	Mar. 30, 1933	11.82	-4.6	2,110
1934	Mar. 22, 1934	3.92	-1.0	-
	June 8, 1934	3.47		80
1935	June 16, 1935	5.72		2,170
	July 12, 1935	6.80		2,920
1936	Mar. 9, 1936	6.50	-2.5	-
	Mar. 10, 1936	5.80		2,230
1937	Mar. 4, 1937	5.51	-.5	-
	Mar. 7, 1937	6.04		2,450
	June 6, 1937	10.44		7,270
	June 14, 1937	14.28		14,800
	June 17, 1937	9.30		5,840
	June 22, 1937	8.85		5,210
1938	June 21, 1938	6.07		2,500
	June 27, 1938	6.6		2,920
	July 3, 1938	8.14		4,410
	July 6, 1938	7.80		4,080
	July 9, 1938	8.49		4,850
1939	Mar. 22, 1939	9.06	-.9	4,520
	June 18, 1939	6.67		3,000
	June 28, 1939	5.57		2,120
1940	Mar. 30, 1940	6.12	-1.0	-
	Apr. 29, 1940	5.20		1,840
1941	Mar. 10, 1941	7.2	-1.3	2,500
	Mar. 27, 1941	8.08		4,690
	June 7, 1941	5.94		2,500
	June 11, 1941	11.56		9,060
1942	May 18, 1942	5.00		1,830
1943	Mar. 1, 1943	8.20	-2.3	[b]2,500
	Mar. 27, 1943	17.4		28,200
	June 3, 1943	5.32		2,030
	June 14, 1943	10.70		7,800
	July 5, 1943	5.5		2,170
1944	Apr. 1, 1944	12.45	-2.0	7,500
	Apr. 6, 1944	12.12		10,200
	June 18, 1944	5.99		3,070
	June 21, 1944	6.57		3,620
	June 27, 1944	7.02		4,000
	July 1, 1944	5.84		2,890
1945	Mar. 15, 1945	11.85	-2.0	-
	Mar. 16, 1945	10.15		7,000
1946	July 6, 1946	5.6		2,320
1947	Feb. 20, 1947	9.58	-5.48	-
	Mar. 26, 1947	15.0	-2.5	11,000
	Apr. 15, 1947	6.26		2,990
	June 25, 1947	8.09		4,740
1948	Mar. 17, 1948	14.9	-2.9	10,000
	Mar. 20, 1948	13.25		12,500
	Mar. 23, 1948	11.92		9,850
1949	Mar. 7, 1949	6.85		3,400
	Mar. 12, 1949	7.40	-1.2	2,900
	Mar. 30, 1949	11.1	-.4	-
	Apr. 1, 1949	10.99		8,320
	May 29, 1949	7.71		4,150
1950	Mar. 25, 1950	6.51	-2.9	-
	Apr. 7, 1950	11.50		9,400
	Apr. 19, 1950	22.30		94,800
	May 9, 1950	5.81		2,860
	Aug. 14, 1950	7.0		3,800
1951	Mar. 27, 1951	14.80		17,200
	June 14, 1951	7.03		3,830
	Aug. 30, 1951	7.59		4,390
1952	Apr. 7, 1952	15.42		21,300
1953	Mar. 21, 1953	10.5	-.5	[b]8,500
	May 29, 1953	10.85		10,100
	June 16, 1953	8.32		5,960
	June 19, 1953	7.35		4,600
	June 24, 1953	6.06		3,130
1954	Apr. 10, 1954	5.06		2,610
1955	Mar. 10, 1955	3.50	-1.0	720

[a]Backwater from ice.
[b]About.

BEAVER CREEK BASIN

(77) Beaver Creek at Linton, N. Dak.

Location.--Lat 46°16', long 100°14', on line between secs. 17 and 18, T. 132 N., R. 76 W., near center of span on downstream side of bridge on U. S. Highway 83, 0.7 mile south of railway station in Linton and 1 mile upstream from Spring Creek.
Drainage area.--717 sq mi, of which 100 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 1,690.55 ft above mean sea level, datum of 1929.
Stage-discharge realtion.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--13 ft.
Historical data.--1943 spring flood reached a stage of 15.5 ft, from information by local resident.
Remarks.--Base for partial-duration series, 500 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Mar. 28, 1950	10.65	-2.4	-	1952	Apr. 8, 1952	17.5		9,800
	Apr. 7, 1950	16.50		4,500	1953	Mar. 22, 1953	11.35	-1.05	790
	Apr. 17, 1950	15.30		2,640		June 17, 1953	17.05		5,650
	May 12, 1950	11.06		965	1954	Feb. 11, 1954	8.55		-
	June 27, 1950	11.73		1,030		June 13, 1954	8.00		396
					1955	Mar. 15, 1955	9.80		570
1951	Mar. 30, 1951	15.6	-.9	-		July 6, 1955	9.95		717
	Apr. 1, 1951	15.17		2,550					
	Apr. 6, 1951	14.10		1,950					

GRAND RIVER BASIN

(78) North Fork Grand River at Haley, N. Dak.

Location.--Lat 45°57', long 103°07', in SW corner of sec. 30, T. 129 N., R. 99 W., on left bank 10 ft downstream from county highway bridge, about 300 ft south of post office at Haley, 1 mile north of the South Dakota State line.
Drainage area.--509 sq mi.
Gage.--Nonrecording gage prior to June 19, 1951; recording gage thereafter. Mar. 29, 1912, to September 1917, on highway bridge at present site at datum about 3 ft higher than present datum; Oct. 23, 1945, to June 18, 1951, on highway bridge at present site and datum. Altitude of present gage is 2,664 ft (by barometer). Gage heights given herein adjusted to present site and datum.
Stage-discharge relation.--1912-17, poorly defined by current-meter measurements to 5,800 cfs; 1946-55, defined by current-meter measurements below 4,500 cfs; 1946-52, extended on basis of slope-area measurement at 11,300 cfs; since 1952, extended on basis of one discharge measurement at 8,100 cfs, 50 percent of which was a current-meter measurement and 50 percent was by indirect measurement of flow over roadway outside of main channel. All ratings subject to changes owing to channel shifting and ice effect.
Bankfull stage.--12 ft.
Remarks.--Base for partial-duration series, 200 cfs. Only annual peaks are shown prior to Oct. 23, 1945.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1912	Mar. 29, 1912	10.4		1,400	1948	Feb. 18, 1948	9.40	-1.4	[a]500
1913	Mar. 31, 1913	13.5		8,100		Mar. 16, 1948	12	-.8	[a]2,000
1914	June 21 or 22, 1914	15.0		6,500		July 16, 1948	6.8		245
1915	June 13, 1915	13.3		4,000	1949	Mar. 24, 1949	14.0	-3.2	1,700
						Mar. 28, 1949	11.0	-.1	1,770
1917	Apr. 7, 1917	9.25	-0.8	-		July 13, 1949	6.62		211
	Apr. 7 or 8, 1917	8.85	-.3	650	1950	Mar. 6, 1950	11.41	-.6	1,710
						Apr. 8, 1950	12.89	-1.9	1,830
1946	June 29, 1946	5.40		72		Apr. 15, 1950	17.10		11,300
1947	Feb. 16, 1947	10.30	-1.0	930		May 8, 1950	7.59		428
	Mar. 23, 1947	14.40		5,640		May 10, 1950	9.27		931
	Apr. 11, 1947	12.28		2,920					
	June 23, 1947	10.00		1,250	1951	Mar. 25, 1951	10.22	-1.47	775
	July 12, 1947	7.2		325		July 30, 1951	12.81		2,680
						Sept. 6, 1951	7.42		380

[a]About.

(78) North Fork Grand River at Haley, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1952	Mar. 3, 1952	6.69	-2.11	-	1953	May 29, 1953	8.59		578
	Apr. 7, 1952	17.03		14,100		June 15, 1953	12.23		2,210
	July 2, 1952	6.71		240		June 20, 1953	12.58		2,510
						July 20, 1953	9.38		789
						Aug. 30, 1953	6.92		242
					1954	Apr. 7, 1954	9.07		711
					1955	July 28, 1955	8.38		608

(79) North Fork Grand River near White Butte, S. Dak.

Location.--Lat 45°48'10", long 102°21'35", in NW¼NW¼ sec. 11, T. 21 N., R. 14 E., on left bank 100 ft upstream from county highway bridge, a quarter of a mile upstream from nearest tributary, and 9¾ miles south of White Butte.
Drainage area.--1,190 sq mi, approximately.
Gage.--Nonrecording gage Nov. 28, 1945, to Aug. 28, 1947, and Apr. 17, 1950, to June 11, 1951; recording gage Aug. 29, 1947, to Apr. 16, 1950, and June 12, 1951, to present. Prior to June 11, 1951, at site 100 ft downstream at same datum. Altitude of present gage is 2,275 ft (by barometer).
Stage-discharge relation.--Prior to 1952, defined by current-meter measurements below 4,300 cfs and extended above on basis of slope-area measurement at 30,900 cfs; defined by current-meter measurements below 19,000 cfs thereafter. Subject to changes owing to ice effect and channel shifting.
Bankfull stage.--14 ft.
Remarks.--Base for partial-duration series, 400 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	July 2, 1946	3.44		72	1951	Mar. 23, 1951	7.20	-1.5	-
1947	Feb. 17, 1947	7.02	-2.25	480		Mar. 27, 1951	6.58		1,190
	Mar. 24, 1947	12.35	-1.1	7,040		July 31, 1951	6.97		1,450
	Apr. 13, 1947	6.1		1,260	1952	Apr. 8, 1952	17.0		21,500
	June 23, 1947	7.0		1,700		May 27, 1952	5.67		440
1948	Feb. 21, 1948	5.78	-1.2	500	1953	May 29, 1953	7.90		2,850
	Feb. 27, 1948	6.36	-1.6	600		June 16, 1953	8.82		4,270
	Mar. 16, 1948	10.26	-3.0	-		June 21, 1953	8.92		4,430
	Mar. 17, 1948	7.47		2,000		July 22, 1953	6.80		1,460
1949	Mar. 8, 1949	8.26	-2.75	930	1954	Apr. 8, 1954	5.55		689
	Mar. 25, 1949	11.1	-3.2	-		Aug. 26, 1954	5.17		405
	Mar. 28, 1949	8.46	-.4	2,600	1955	July 8, 1955	4.20		61
1950	Mar. 7, 1950	8.50	-1.5	1,700					
	Apr. 7, 1950	6.58	-1.4	800					
	Apr. 10, 1950	10.8	-3.3	2,000					
	Apr. 16, 1950	20.0		30,900					
	May 12, 1950	6.3		915					
	Aug. 13, 1950	6.09		764					

(80) South Fork Grand River near Cash, S. Dak.

Location.--Lat 45°38'55", long 102°38'45", in NE¼SW¼SE¼ sec. 33, T. 20 N., R. 12 E., on downstream end of left pier of county highway bridge, 1 mile upstream from Little Nasty Creek, 4 miles north of Cash, 10 miles south of Lodgepole, 12 miles northwest of Bison, and 16 miles downstream from Big Nasty Creek.
Drainage area.--1,350 sq mi, approximately.
Gage.--Nonrecording gage prior to Oct. 25, 1946; recording gage thereafter. Altitude of present gage is 2,416 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 14,000 cfs and extended above on basis of slope-area measurement at 27,000 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--12 ft.
Remarks.--Base for partial-duration series, 500 cfs.

GRAND RIVER BASIN

(80) South Fork Grand River near Cash, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Feb. 26, 1946	5.11	-2.1	-	1950	Mar. 7, 1950	6.77	-0.35	1,900
	May 25, 1946	5.5		1,040		Apr. 7, 1950	10.87		7,000
	June 13, 1946	4.95		686		Apr. 15, 1950	15.40		27,000
1947	Feb. 17, 1947	8.6	-3.0	1,120		May 3, 1950	5.28		528
	Feb. 18, 1947	9.4	-5.0	-		May 10, 1950	5.77		1,190
	Mar. 22, 1947	14.35	-3.3	-					
	Mar. 23, 1947	11.2		8,000	1951	Mar. 25, 1951	6.34	-.45	1,000
	Apr. 1, 1947	4.9		657		July 30, 1951	5.25		575
	Apr. 11, 1947	6.1		1,570	1952	Feb. 14, 1952	5.8	-1.8	-
	June 21, 1947	5.40		971		Apr. 2, 195[illegible]	11.57		4,690
	June 24, 1947	7.34		3,000		Apr. 6, 1952	13.59		15,600
	June 27, 1947	5.75		1,240	1953	Mar. 14, 1953	6.31	-1.1	-
1948	Feb. 18, 1948	8.1	-1.6	2,000		May 29, 1953	6.11		1,360
	Mar. 14, 1948	13.1	-6.1	2,500		June 16, 1953	6.36		1,580
	Mar. 19, 1948	11.0	-5.5	1,000		June 20, 1953	7.02		2,160
	May 25, 1948	5.06		746		July 21, 1953	7.11		2,240
	June 19, 1948	5.02		715	1954	Apr. 7, 1954	5.30		752
	July 16, 1948	4.63		523	1955	Mar. 11, 1955	5.55	-.7	-
1949	Mar. 8, 1949	7.15	-.35	2,300		June 29, 1955	5.30		700
	Mar. 23, 1949	7.48		3,200					
	Mar. 28, 1949	5.58		1,120					

(81) Grand River at Shadehill, S. Dak.

Location.--Lat 45°46', long 102°11', in SE¼ sec. 19, T. 21 N., R. 16 E., near left bank on downstream side of pier at bridge on State Highway 73 at Shadehill, 1 mile downstream from Shadehill Dam, 5 miles downstream from confluence of North and South Forks, and 12 miles south of Lemmon.
Drainage area.--3,120 sq mi, approximately.
Gage.--Nonrecording gage prior to Sept. 1, 1947; recording gage thereafter. Feb. 23, 1943, to June 12, 1946, at site on old highway bridge 50 ft upstream at present datum. June 13, 1946, to Aug. 30, 1947, at site on upstream side of present highway bridge at present datum. Datum of gage is 2,186.46 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--12 ft.
Remarks.--Flow completely regulated by Shadehill Reservoir (usable capacity, 350,769 acre-ft) since July 1, 1950. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	Feb. 20 or 21, 1943	18.7		-	1949	Mar. 28, 1949	10.60	-0.3	4,800
1944	Apr. 7, 1944	17.2		18,000	1950	Apr. 16, 1950	19.06		58,000
1945	Mar. 12, 1945	15.5	-3.0	-					
	Mar. 14, 1945	12.79		8,680	1951	Mar. 22, 1951	4.85	-1.4	-
						Aug. 30, 1951	3.97		71
1946	May 25, 1946	5.75		637	1952	Apr. 9, 1952	10.45		5,150
1947	Mar. 23, 1947	18.0	-1.5	-	1953	June 22, 1953	8.43		2,830
	Mar. 23, 1947	16.9		16,100	1954	Apr. 10, 1954	4.25		252
1948	Mar. 15, 1948	13.5	-2.0	-	1955	Sept.20, 1955	3.62		29
	Mar. 16, 1948	12.8	-1.0	6,800					

(82) Grand River near Wakpala, S. Dak.

Location.--Lat 45°39'55", long 100°38'20", in NW¼SE¼ sec. 26, T. 20 N., R. 28 E., on downstream side of left pier of bridge on U. S. Highway 12, 5 miles west of Wakpala, 8 miles upstream from Deep Bank Creek, and 21 miles upstream from mouth.
Drainage area.--5,510 sq mi, approximately.
Gage.--Nonrecording gage 1914-16, August 1928 to March 1937, and April 1944 to June 1948; recording gage, March 1937 to March 1944, and June 1948 to date. 1914-16, at site 12 miles downstream from present site at different datum. August 1928 to Sept. 30, 1936, at site 17 miles downstream from present site at different datum. Oct. 1, 1936, to Mar. 31, 1944, at site 12 miles downstream from present site at datum 2.00 ft lower than datum used August 1928 to Sept. 30, 1936. Since Apr. 1, 1944, at present site and datum. Altitude of present gage is 1,584 ft (by barometer). Gage heights given herein for the period August 1928 to Sept. 30, 1936, adjusted to datum used Oct. 1, 1936, to Mar. 31, 1944.
Stage-discharge relation.--Defined by current-meter measurements below 3,200 cfs for the period 1914-16; below 9,000 cfs for the period 1928-43; below 19,000 cfs for the period 1944-49; and below 80,000 cfs for the period 1950-55. Subject to changes owing to channel shifting and ice effect.
Bankfull stage.--17 ft, present site and datum.
Remarks.--Regulated by Shadehill Reservoir (usable capacity, 350,769 acre-ft) since July 1, 1950. Records are equivalent at the three sites used during the period of record. Base for partial-duration series, 1,400 cfs. Only annual peaks are shown prior to Oct. 1, 1936, and subsequent to Sept. 30, 1950.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1914	June 15, 1914	12.4		4,000
1915	June 18, 1915	18.8		7,600
1916	Apr. 20, 1916	10.6		3,260
1929	Mar. 12, 1929	19.0	-7.0	-
	Mar. 14, 1929	12.3		7,630
1930	Mar. 14, 1930	[a]20.5		-
1931	June 12, 1931	5.94		843
1932	June 11, 1932	12.0		7,230
1933	Mar. 19, 1933	[a][b]9.0		-
	May 27, 1933	8.30		2,140
1934	Mar. 23, 1934	7.26		1,360
1935	July 24, 1935	9.08		3,800
1936	Mar. 10, 1936	7.63		2,010
1937	Mar. 7, 1937	7.00		1,960
	Apr. 8, 1937	7.43		2,360
	Apr. 16, 1937	9.41		4,510
	June 8, 1937	11.87		8,060
	June 15, 1937	14.98		13,700
	June 21, 1937	9.90		5,160
	July 15, 1937	6.88		1,850
1938	During period of Feb. 28-Mar. 5,1938	6.5	-.3	-
	June 29, 1938	10.06		5,730
	July 3, 1938	13.92		9,110
	July 7, 1938	12.70		7,520
	Sept. 6, 1938	12.10		6,740
1939	Mar. 24, 1939	14.60	-2.3	7,000
	July 8, 1939	10.37		4,600
1940	Mar. 31, 1940	11.60	-3.0	-
	Mar. 31, 1940	8.99		2,970
	Apr. 30, 1940	7.53		1,400
	July 30, 1940	9.40		3,420
1941	Mar. 10, 1941	8.00	-.45	1,400
	June 8, 1941	11.53		6,030
	June 13, 1941	13.49		9,100
1942	Apr. 5, 1942	7.84		1,700
	May 3, 1942	8.97		3,080
	May 19, 1942	10.43		4,840
	June 4, 1942	9.61		3,660
	June 30, 1942	7.61		1,460
	July 30, 1942	8.85		2,900
1943	Feb. 23, 1943	15.8		13,000
	Mar. 25, 1943	17.7	-2.5	-
	Mar. 26, 1943	17.2		15,800
	June 5, 1943	6.70		1,780
	June 9, 1943	6.46		1,590
	June 16, 1943	10.66		5,790
	July 5, 1943	6.40		1,540
	Sept. 4, 1943	7.55		2,500
1944	Apr. 9, 10, 1944	19.5		32,000
	June 19, 1944	13.36		11,500
	June 23, 1944	12.6		9,950
	June 28, 1944	11.3		7,410
	July 10, 1944	7.35		1,840
1945	Mar. 11, 1945	17.3	-8.6	-
	Mar. 15, 1945	18.37	-5.7	10,000
	Mar. 27, 1945	8.65		3,280
	June 8, 1945	8.77		3,540
1946	July 4, 1946	6.44		1,000
1947	Feb. 18, 1947	9.08	-2.5	-
	Mar. 25, 1947	17.0		19,000
	Apr. 14, 1947	7.15		2,090
	June 8, 1947	8.55		3,550
	June 23, 1947	11.8		12,400
	June 29, 1947	8.72		4,390
1948	Mar. 18, 1948	12.1	-.7	7,700
	Mar. 19, 1948	14.0	-3.4	-
	Mar. 23, 1948	9.1		4,250
	June 19, 1948	7.6		2,410
1949	Mar. 8, 1949	12.66	-.9	8,300
	Mar. 25, 1949	15.1	-2.7	9,500
	Mar. 28, 1949	11.9		10,200
	May 2, 1949	7.0		1,660
	May 30, 1949	7.2		1,950
1950	Mar. 11, 1950	7.41	-.5	1,700
	Mar. 26, 1950	9.38	-.8	3,600
	Apr. 8, 1950	14.19		13,300
	Apr. 18, 1950	22.75		82,200
	May 10, 1950	8.61		6,010
	Aug. 14, 1950	8.95		4,580
1951	Mar. 26, 1951	11.28	-.2	10,000
1952	Apr. 1, 1952	14.0	-2.9	-
	Apr. 2, 1952	12.82		17,900
1953	June 17, 1953	15.96		32,000
1954	June 7, 1954	8.73		3,410
1955	Sept. 23, 1955	7.25		755

[a] Backwater from ice.
[b] At least this high.

MISSOURI RIVER MAIN STEM

(83) Missouri River near Mobridge, S. Dak.

Location.--Lat 45°32', long 100°29', in sec. 7, T. 18 N., R. 30 E., on downstream end of second pier from right bank of bridge on U. S. Highway 12, 3 miles west of Mobridge, 3 miles downstream from Grand River, and at mile 1,250.6.
Drainage area.--208,700 sq mi, approximately.
Gage.--Nonrecording gage prior to Feb. 19, 1934, and Nov. 26, 1942, to May 12, 1944; recording gage Feb. 19, 1934, to Nov. 25, 1942, and May 13, 1944, to present. Mar. 28, 1929, to Sept. 30, 1931, at present site at datum 0.80 ft higher; Oct. 1, 1931, to date, at present site and datum. Datum of present gage is 1,527.19 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Gage heights given herein adjusted to present datum.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to considerable channel shifting and ice effect.
Bankfull stage.--16 ft.
Remarks.--Flow regulated 1938 to November 1953 by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft) and thereafter by Garrison Reservoir (capacity, 23,000,000 acre-ft). Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 30, 1929	-		164,000	1944	Apr. 5, 1944	16.58	-5.0	-
1930	Mar. 22, 1930	12.7	-5.5	-		Apr. 8, 1944	13.33		186,400
	Apr. 6, 1930	9.29		93,100	1945	Mar. 18, 1945	15.84	-7.6	-
						Mar. 19, 1945			87,500
1931	June 16, 1931	8.56		42,200					
1932	June 14, 1932	11.26		119,000	1946	Mar. 18, 1946	11.46	-4.0	-
1933	June 24, 1933	11.20		89,800		June 18, 1946	9.41		55,800
1934	Mar. 21, 1934	9.01		71,000	1947	Mar. 31, 1947	18.30		250,000
1935	July 13, 1935	11.65		122,000	1948	Mar. 31, 1948	17.69	-7.7	-
						Apr. 4, 1948	13.34		152,000
1936	Mar. 18, 1936	12.65	-2.0	-	1949	Apr. 1, 1949	15.05	-5.0	-
	Apr. 16, 1936	10.42		122,000		Apr. 4, 1949	14.95	-1.0	172,000
1937	June 18, 1937	10.80		105,000	1950	Apr. 19, 1950	17.14		251,000
1938	Mar. 20, 1938	14.65	-1.4	188,000					
1939	Mar. 30, 1939	14.65		212,000	1951	Apr. 4, 1951	14.83	-6.0	-
1940	June 12, 1940	9.28		61,800		Apr. 6, 1951	12.26		137,000
					1952	Apr. 9, 1952	25.07		443,000
1941	June 11, 1941	9.75		73,000	1953	June 21, 1953	11.17		90,000
1942	June 10, 1942	11.13		82,300	1954	Oct. 28, 1953	8.64		45,000
1943	Mar. 28, 1943	19.55	-6.0	-	1955	May 26, 1955	9.00		48,500
	Apr. 5, 1943	19.10		282,000					

MOREAU RIVER BASIN

(84) Moreau River at Bixby, S. Dak.

Location.--Lat 45°08'32", long 102°33'38", in SE¼SW¼ sec. 29, T. 14 N., R. 13 E., on right bank 0.3 mile downstream from highway bridge, 0.4 mile south of Bixby, and 3½ miles downstream from proposed Bixby dam site.
Drainage area.--1,570 sq mi, approximately.
Gage.--Nonrecording gage, Apr. 17 to June 24, 1948, and Oct. 1, 1950, to Oct. 11, 1952; recording gage June 25, 1948, to Sept. 30, 1950 (recording gage operated to Mar. 31, 1952, but record of little value after Sept. 30, 1950), and Oct. 12, 1952, to date. Apr. 17 to June 24, 1948, and Oct. 1, 1950, to Sept. 9, 1952, at bridge a quarter of a mile upstream from present site at present datum. June 25, 1948, to Sept. 30, 1950, at site 300 ft downstream from bridge at present datum and since Sept. 10, 1952, at present site and datum. Datum of present gage is 2,431.02 ft above mean sea level, datum of 1929 (Bureau of Reclamation bench mark).
Stage-discharge relation.--Prior to 1953, defined by current-meter measurements below 12,000 cfs and extended above on basis of slope-area measurement at 15,300 cfs; thereafter, defined by current-meter measurements below 500 cfs and extended above on basis of slope-area measurement at 15,300 cfs. Subject to changes at both sites by ice effect and channel shifting.
Bankfull stage.--17 ft.
Remarks.--Base for partial-duration series, 500 cfs.

MOREAU RIVER BASIN

(84) Moreau River at Bixby, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1949	Mar. 10, 1949	7.80	-3.0	720
	Mar. 23, 1949	11.0		5,420
	Mar. 28, 1949	7.55		2,330
	Apr. 7, 1949	5.25		872
1950	Apr. 3, 1950	13.53	-4.5	3,500
	Apr. 7, 1950	12.74		7,610
	Apr. 16, 1950	14.65		10,500
	May 5, 1950	5.24		867
	May 7, 1950	5.28		889
	May 11, 1950	6.38		1,520
1951	Mar. 29, 1951	5.1	-0.6	-
	Aug. 13, 1951	5.60		1,060
1952	Feb. 11, 1952	10.34	-2.5	2,500
	Apr. 1, 1952	17.8		15,300
1953	Mar. 17, 1953	7.08	-1.3	1,300
	May 5, 1953	4.51		614
	May 29, 1953	4.76		722
	June 15, 1953	6.36		1,670
	June 17, 1953	8.03		2,980
	June 21, 1953	5.47		1,110
	July 27, 1953	4.38		557
1954	June 7, 1954	-		[a]1,500
1955	Sept.21, 1955	4.56		632

[a]Maximum daily discharge; annual peak only.

(85) Moreau River near Faith, S. Dak.

Location.--Lat 45°11'50", long 102°09'10", in N½NW¼ sec. 10, T. 14 N., R. 16 E., on upstream side of bridge on State Highway 73, 2¾ miles downstream from Rabbit Creek, and 13½ miles northwest of Faith.
Drainage area.--2,660 sq mi, approximately.
Gage.--Nonrecording gage. Prior to Oct. 5, 1949, at bridge a quarter of a mile upstream at same datum. Altitude of gage is 2,235 ft (by barometer).
Stage-discharge relation.--Prior to 1950, defined by current-meter measurements below 5,300 cfs and extended on basis of slope-area measurement at 26,000 cfs; thereafter, defined by current-meter measurements. Subject to changes during both periods owing to ice effect and channel shifting.
Bankfull stage.--16 ft.
Remarks.--Base for partial-duration series, 700 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1944	Apr. 9, 1944	20.9		26,000
	June 6, 1944	6.7		2,010
	June 14, 1944	6.35		1,710
	June 18, 1944	19.6		23,000
	June 24, 1944	9.0		4,200
	July 13, 1944	7.15		2,500
1945	Mar. 15, 1945	11.01		6,280
	June 9, 1945	5.4		1,040
	June 16, 1945	5.0		817
1946	May 26, 1946	6.7		2,010
	June 2, 1946	5.9		1,460
	June 15, 1946	5.3		984
	June 21, 1946	7.1		2,370
	June 27, 1946	5.2		926
	June 30, 1946	5.5		1,110
1947	Oct. 8, 1946	5.05		1,010
	Feb. 16, 1947	14.4	-4.0	5,600
	Mar. 23, 1947	13.07	-1.0	-
	Mar. 23, 1947	12.5	-.3	7,930
	Apr. 2, 1947	5.2		984
	Apr. 5, 1947	4.8		767
	Apr. 12, 1947	5.5		1,170
	June 21, 1947	9.1		4,300
	June 24, 1947	9.95		5,160
	July 11, 1947	6.0		1,610
1948	Mar. 16, 1948	11.0	-4.4	1,900
	Mar. 19, 1948	10.3	-3.7	1,900
	June 20, 1948	6.45		2,010
	June 25, 1948	5.1		1,040
1949	Mar. 8, 1949	8.3	-1.1	2,500
	Mar. 23, 1949	11.0		6,280
	Apr. 3, 1949	5.5		1,300
1950	Apr. 4, 1950	10.1		6,400
	Apr. 7, 1950	13.5		11,000
	Apr. 17, 1950	18.0		23,000
	May 8, 1950	4.87		1,340
	May 12, 1950	5.62		1,970
	May 18, 1950	4.30		845
1951	Mar. 26, 1951	4.83	-0.13	1,080
	Aug. 13, 1951	6.50		2,300
	Aug. 17, 1951	4.28		757
1952	Feb. 14, 1952	6.72	-1.1	1,700
	Mar. 30, 1952	20.3	-5.0	-
	Apr. 2, 1952	17.2		25,000
	June 22, 1952	4.8		1,440
	June 28, 1952	5.5		1,900
	July 3, 1952	4.1		970
	Aug. 17, 1952	3.6		704
1953	Mar. 19, 1953	6.85	-.6	2,500
	May 3, 1953	5.0		1,600
	May 30, 1953	4.8		1,460
	June 15, 1953	14.6		12,700
	June 18, 1953	9.0		5,110
	June 21, 1953	8.3		4,360
	July 27, 1953	4.0		905
1954	Apr. 7, 1954	4.4		1,050
	May 24, 1954	5.3		1,660
	May 29, 1954	5.02		1,470
	June 4, 1954	4.38		1,080
	June 7, 1954	6.10		2,460
	June 11, 1954	4.22		980
1955	Sept.22, 1955	4.08		826

MOREAU RIVER BASIN

(86) Moreau River near Eagle Butte, S. Dak.

Location.--Lat 45°11'20", long 101°13'05", in NW¼NW¼SW¼ sec. 8, T. 14 N., R. 24 E., on right bank at downstream side of bridge on State Highway 63, 4 miles downstream from Meadow Creek, and 13 miles north of Eagle Butte.
Drainage area.--4,320 sq mi, approximately.
Gage.--Nonrecording gage prior to June 19, 1947; recording gage thereafter. Altitude of gage is 1,792 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Remarks.--Base for partial-duration series, 1,100 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1944	Apr. 9, 1944	23.0		27,000	1949	Mar. 9, 1949	9.1	-1.2	3,700
	June 7, 1944	9.7		5,190		Mar. 28, 1949	12.62		9,400
	June 16, 1944	7.1		2,380	1950	Apr. 8, 1950	14.42		12,500
	June 19, 1944	17.1		16,900		Apr. 18, 1950	20.23		22,200
	June 26, 1944	9.8		5,300		May 9, 1950	8.68		4,100
	July 14, 1944	7.5		2,780					
1945	Mar. 14, 1945	13.1	-5.0	-	1951	Mar. 27, 1951	11.50	-3.0	4,200
	Mar. 17, 1945	10.5		6,290		June 8, 1951	5.65		1,310
	June 9, 1945	6.8		2,290		Aug. 14, 1951	7.50		3,040
						Aug. 31, 1951	7.40		2,920
1946	May 27, 1946	7.0		2,470	1952	Feb. 14, 1952	10.5	-2.0	4,070
	June 4, 1946	6.0		1,590		Apr. 4, 1952	21.7		27,400
	June 23, 1946	6.5		2,020		June 29, 1952	5.68		1,440
	June 29, 1946	5.8		1,430	1953	Mar. 18, 1953	10.9	-.17	8,160
	July 2, 1946	5.7		1,360		Mar. 22, 1953	10.54		7,880
1947	Feb. 16, 1947	15.0	-4.5	-		May 2, 1953	6.64		2,730
	Feb. 17, 1947	12.6	-1.4	6,840		June 9, 1953	7.07		3,040
	Mar. 22, 1947	17.86	-6.0	-		June 15, 1953	22.01		30,300
	Mar. 24, 1947	14.36		10,800		June 22, 1953	9.52		6,980
	Apr. 6, 1947	7.3		2,470		Aug. 21, 1953	5.58		1,650
	Apr. 11, 1947	6.4		1,760	1954	May 25, 1954	5.30		1,460
	June 22, 1947	13.2		10,600		May 29, 1954	5.17		1,360
1948	Mar. 15, 1948	12.50	-5.0	-		June 5, 1954	4.87		1,120
	May 17, 1948	8.24	-.25	3,420		June 8, 1954	6.72		2,990
	Apr. 24, 1948	5.71		1,360		June 11, 1954	6.96		3,090
	June 22, 1948	6.03		1,590	1955	Sept.25, 1955	3.73		452
	July 20, 1948	6.1		1,930					

(87) Moreau River at Promise, S. Dak.

Location.--Lat 45°20', long 100°36', in sec. 17, T. 16 N., R..29 E., on upstream side of highway bridge, 170 ft downstream from Chicago, Milwaukee, St. Paul and Pacific Railroad bridge, 0.5 mile downstream from Virgin Creek, and three-quarters of a mile north of Promise.
Drainage area.--5,220 sq mi, approximately.
Gage.--Nonrecording gage 1928 to Nov. 7, 1934, July 21, 1944, to July 11, 1948, and May 21, 1953, to present; recording gage Nov. 8, 1934, to July 20, 1944, and July 12, 1948, to May 20, 1953. Prior to Nov. 8, 1934, at present site and datum. Nov. 8, 1934, to July 20, 1944, at site 150 ft upstream at present datum. July 12, 1948, to May 20, 1953, at downstream side of bridge at present datum. Datum of present gage is 1,587.01 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and ice effect.
Bankfull stage.--17 ft.
Remarks.--Base for partial-duration series, 1,300 cfs.

MOREAU RIVER BASIN

(87) Moreau River at Promise, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 14, 1929	11.5		5,780
	Mar. 24, 1929	11.56		5,850
	Mar. 28, 1929	8.8		3,750
	May 31, 1929	8.0		3,870
	June 2, 1929	8.3		4,290
	June 7, 1929	7.3		2,990
1930	Feb. 24, 1930	-		[a]1,400
	Apr. 19, 1930	5.9		1,640
	May 9, 1930	5.4		1,390
	June 24, 1930	9.06		3,980
1931	Apr. 2, 1931	5.30		1,370
1932	Mar. 2, 1932	7.5		2,870
	Mar. 24, 1932	8.6	-2.0	2,240
	Apr. 28, 1932	8.5		3,570
	May 3, 1932	9.1		3,990
	June 2, 1932	5.5		1,530
	June 4, 1932	7.5		2,870
	June 8, 1932	5.3		1,410
	June 12, 1932	11.4		5,600
	June 18, 1932	7.5		2,870
	June 29, 1932	7.3		2,730
	Aug. 18, 1932	10.0		4,620
1933	Apr. 24, 1933	6.7		2,310
	May 15, 1933	5.3		1,410
	May 26, 1933	16.80		9,960
1934	June 26, 1934	3.60		630
1935	June 6, 1935	9.45		4,200
	July 10, 1935	8.80		3,780
	July 22, 1935	5.92		1,770
1936	June 8, 1936	5.12		1,310
1937	Mar. 6, 1937	8.30		3,160
	Apr. 7, 1937	5.37		1,380
	Apr. 15, 1937	6.16		1,830
	June 7, 1937	12.57		6,300
	June 16, 1937	15.80		9,100
	July 15, 1937	11.60		5,500
	July 18, 1937	11.25		5,190
1938	May 23, 1938	5.95		1,600
	June 24, 1938	10.32		4,500
	July 8, 1938	6.16		1,710
	Sept. 6, 1938	9.46		3,920
	Sept.10, 1938	6.52		1,950
1939	Mar. 24, 1939	7.67	-.8	2,130
	June 27, 1939	7.22		2,320
1940	May 3, 1940	4.55		1,060
	June 9, 1940	4.58		1,060
1941	Apr. 30, 1941	5.70		1,710
	June 1, 1941	8.81		3,420
	June 4, 1941	6.64		1,950
	June 8, 1941	14.36		7,180
	June 13, 1941	20.04		12,900
1942	May 1, 1942	12.73		5,610
	May 17, 1942	15.43		8,130
	June 6, 1942	17.0		9,730
	July 2, 1942	8.95		2,640
	July 29, 1942	10.37		3,690
	Aug. 2, 1942	7.88		1,880
1943	Feb. 23, 1943	20.0		12,900
	Mar. 1, 1943	10.44		4,100
	Mar. 24, 1943	18.30		11,000
	Mar. 28, 1943	17.65		10,300
	June 14, 1943	18.43		11,200
	July 7, 1943	13.0		6,100
1944	Apr. 11, 1944	23.2		22,800
	June 8, 1944	10.34		4,860
	June 20, 1944	18.75		12,800
	June 27, 1944	-		(b)
	July 15, 1944	-		(b)
1945	Feb. 15, 1945	14.2	-10.0	-
	Mar. 14, 1945	21.08	-14.5	-
	Mar. 17, 1945	13.7	-1.5	6,500
	June 7, 1945	10.7		5,200
1946	May 29, 1946	6.45		1,820
	June 5, 1946	6.2		1,660
	June 24, 1946	6.94		2,220
	June 28, 1946	6.6		1,980
	June 30, 1946	6.1		1,590
	July 3, 1946	6.2		1,660
1947	Feb. 16, 1947	12.5	-1.5	6,000
	Feb. 18, 1947	21.4	-12.0	-
	Mar. 25, 1947	24.4		29,500
	Mar. 30, 1947	9.6	-.6	4,060
	Apr. 6, 1947	9.7		4,690
	Apr. 11, 1947	7.1		2,380
	Apr. 15, 1947	6.1		1,590
	June 23, 1947	16.0		11,700
1948	Mar. 19, 1948	19.79	-5.8	[a]9,000
	Apr. 25, 1948	8.4		2,810
	June 23, 1948	6.4		1,450
1949	Mar. 9, 1949	11.30	-.7	[a]5,000
	Mar. 26, 1949	22.05	-9.0	-
	Mar. 29, 1949	16.20	-.5	11,300
1950	Mar. 26, 1950	11.3	-2.5	3,200
	Apr. 8, 1950	18.0		13,600
	Apr. 19, 1950	21.8		20,900
	May 8, 1950	13.1		7,470
1951	Mar. 28, 1951	12.78	-5.0	-
	Mar. 28, 1951	11.33	-2.0	[a]3,600
	June 20, 1951	7.43		1,970
	Aug. 14 or 15, 1951	7.8		[a]2,300
	Aug. 30, 1951	9.02		3,440
1952	Feb. 16, 1952	12.8	-1.4	[a]5,700
	Apr. 5, 1952	24.16		36,900
1953	Mar. 23, 1953	13.59		8,730
	May 2, 1953	8.95		3,700
	June 10, 1953	10.06		4,810
	June 15, 1953	23.80		34,300
	June 21, 1953	11.54		6,400
1954	June 12, 1954	9.60		4,350
1955	Mar. 10, 1955	6.90	-1.50	700

[a]About.
[b]Unknown, but probably greater than base discharge.

(88) Beaver Creek near New Castle, Wyo.

Location.--Lat 43°32'05", long 104°06'35", in NW¼ sec. 18, T. 41 N., R. 60 W., on right bank 1 mile upstream from Sheep Creek and 23 miles south of New Castle.
Drainage area.--1,320 sq mi, approximately.
Gage.--Nonrecording gage prior to Nov. 1, 1945; recording gage thereafter. Altitude of gage is 3,650 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements.
Bankfull stage.--14 ft.
Remarks.--Water rights totaling 260 cfs (priorities 1881-1940) for irrigation of about 18,000 acres adjudicated for diversion above station. There are 1,350 small reservoirs above the station used for storage of stock and irrigation water (total capacity, about 11,000 acre-ft). Base for partial-duration series, 500 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1943	Mar. 27, 1943	14.0	[a]1,840	1950	Apr. 12, 1950	7.08	574
					May 11, 1950	6.73	551
1945	June 30, 1944	6.66	[a]529				
				1951	July 31, 1951	6.46	503
1946	May 30, 1946	-	545		Aug. 14, 1951	6.74	536
	June 12, 1946	-	588		Sept. 7, 1951	6.90	554
	June 18, 1946	-	1,020	1952	May 24, 1952	8.97	869
	June 30, 1946	-	534		July 15, 1952	8.20	740
	July 7, 1946	11.76	1,390	1953	May 31, 1953	12.75	1,590
1947	Feb. 18, 1947	[b]9.00	-		June 17, 1953	7.74	674
	June 21, 1947	8.57	740		June 22, 1953	12.98	1,640
	June 23, 1947	7.37	615		Aug. 2, 1953	10.16	1,090
1948	June 15, 1948	12.18	1,480	1954	Aug. 8, 1954	7.13	599
	June 29, 1948	7.65	636	1955	Mar. 11, 1955	7.90	542
	July 11, 1948	6.69	530		Apr. 12, 1955	6.06	525
	Aug. 15, 1948	9.77	1,020		May 19, 1955	12.48	1,630
1949	Mar. 24, 1949	8.81	759				
	June 4, 1949	6.94	558				
	June 6, 1949	12.10	1,460				

[a]Annual peak only.
[b]Ice jam.

(89) Beaver Creek near Burdock, S. Dak.
(Published as "near Edgemont", 1905-6)

Location.--Lat 43°26'55", long 104°00'55", in SE¼SE¼ sec. 8, T. 7 S., R. 1 E., near center of span on downstream side of highway bridge, 1 mile downstream from Pass Creek and 2 miles west of Burdock.
Drainage area.--1,540 sq mi, approximately.
Gage.--Nonrecording gage. April 1905 to November 1906, at site half a mile upstream at different datum. April 1929 to Feb. 26, 1930, at site 200 ft upstream at datum 1.00 ft higher than 1931-32 datum. Datum of gage, 1931-32, is 3,546.1 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 320 cfs at 1905-6 site and below 1,800 cfs at 1929-32 sites.
Bankfull stage.--10 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1905	July 29, 1905	9.4	3,100	1930	Feb. 20, 1930	8.37	3,570
1929	May 31, 1929	9.05	4,000	1931	June 11, 1931	4.20	1,120
	June 3, 1929	9.05	4,000	1932	June 18, 1932	8.50	3,720

CHEYENNE RIVER BASIN

(90) Cheyenne River at Edgemont, S. Dak.

Location.--Lat 43°18'20", long 103°49'15", in SW¼SE¼SE¼ sec. 36, T. 8 S., R. 2 E., near right bank on downstream side of pier of bridge on U. S. Highway 18 at Edgemont, 300 ft downstream from Chicago, Burlington & Quincy Railroad bridge and 600 ft upstream from Cottonwood Creek.
Drainage area.--7,143 sq mi.
Gage.--Nonrecording gage June 1903 to November 1906, April 1928 to February 1933, and October 1946 to October 1947; recording gage thereafter. Prior to 1907, at site 20 ft upstream at datum 2.7 ft lower; gage heights given herein converted to present datum. Datum of present gage is 3,416.56 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--6 ft.
Historical data.--Maximum stage known, 12.0 ft May 1, 1922, from floodmarks at railraod bridge. Flood of May 12, 1920, reached a stage of 11.0 ft, from floodmarks at railroad bridge.
Remarks.--Base for partial-duration series, 1,500 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1905	July 30, 1905	8.5	13,000	1951	June 19, 1951	4.27	2,160
					June 23, 1951	4.49	2,510
1929	June 3, 1929	7.86	10,500		July 3, 1951	5.44	4,000
1930	Aug. 18, 1930	5.00	4,090		July 30, 1951	4.35	2,440
					Aug. 1, 1951	5.32	3,910
1931	Oct. 4, 1930	4.8	3,690		Sept. 5, 1951	4.56	2,580
1932	June 18, 1932	5.70	5,560		Sept. 8, 1951	4.20	2,090
				1952	May 24, 1952	6.3	[a]6,700
1947	June 22, 1947	4.70	2,800		June 4, 1952	4.96	3,820
1948	June 18, 1948	5.15	3,490		June 28, 1952	7.29	8,940
	June 23, 1948	4.24	2,230	1953	May 31, 1953	3.75	2,050
	July 18, 1948	4.60	2,370	1954	May 22, 1954	5.57	5,150
1949	June 7, 1949	3.82	1,510		Aug. 6, 1954	3.62	1,520
1950	June 19, 1950	4.00	1,820	1955	Apr. 12, 1955	4.29	2,360
	July 22, 1950	3.81	1,550		Apr. 15, 1955	4.19	2,220
					May 18, 1955	3.94	1,850
					June 4, 1955	3.69	1,520
					Aug. 8, 1955	6.02	5,660

[a]About.

(91) Hat Creek near Edgemont, S. Dak.

Location.--Lat 43°14'46", long 103°35'14", in SW¼SE¼SE¼ sec. 24, T. 9 S., R. 4 E., at bridge on State Highway 87, 2 miles upstream from mouth, 2 miles west of Heppner, and 12½ miles southeast of Edgemont.
Drainage area.--1,044 sq mi.
Gage.--Nonrecording gage April 1905 to July 1906 and November 1950 to April 1951; recording gage thereafter. April 1905 to April 1906, at site 1,000 ft downstream at different datum; May to July 1906, at site three-quarters of a mile upstream at different datum. Datum of present gage is 3,295.71 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Prior to 1906, defined by current-meter measurements below 85 cfs and extended above by float measurement at 2,000 cfs. After 1950, defined by current-meter measurements below 2,600 cfs and extended above by slope-area measurement at 9,430 cfs. Subject to changes owing to ice effect and channel shifting. Large shift in 1955 caused by irrigation diversion dam being constructed about a mile downstream.
Bankfull stage.--7 ft.
Remarks.--Base for partial-duration series, 1,000 cfs.

CHEYENNE RIVER BASIN

(91) Hat Creek near Edgemont, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1905	Aug. 12, 1905	11.0		[a]9,150	1953	Mar. 12, 1953	4.45	-0.7	-
						Mar. 13, 1953	4.19		636
1951	June 19, 1951	6.72		1,760	1954	May 23, 1954	11.98		9,430
	July 4, 1951	5.40		1,110	1955	Aug. 12, 1955	9.68		3,670
	July 29, 1951	8.17		2,640		Sept.21, 1955	8.25		1,790
1952	Mar. 10, 1952	6.21	-2.0	-					
	June 5, 1952	6.75		1,790					
	June 30, 1952	5.17		1,080					

[a]Annual peak only.

(92) Cheyenne River near Hot Springs, S. Dak.

Location.--Lat 43°18'19", long 103°33'43", in SE¼SE¼ sec. 31, T. 8 S., R. 5 E., near right bank on downstream side of bridge on State Highway 87, a quarter of a mile downstream from Cascade Creek and 10 miles southwest of Hot Springs.
Drainage area.--8,710 sq mi, approximately.
Gage.--Nonrecording gage April 1915 to September 1920 and March 1943 to June 1954; recording gage September 1914 to March 1915 and after June 1954. Prior to September 1920, at site 3 miles downstream at different datum. Datum of present gage is 3,190.89 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Prior to 1920, defined by current-meter measurements below 19,000 cfs and extended above by slope-area measurement at 114,000 cfs. After 1943, defined by current-meter measurements throughout. Subject to changes owing to channel shifting.
Bankfull stage.--20 ft.
Remarks.--Base for partial-duration series, 2,000 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1915	June 12, 1915	19.7	39,200	1949	Feb. 27, 1949	7.93	2,070
					Mar. 2, 1949	8.54	2,850
1916	June 21, 1916	7.2	6,140		Mar. 5, 1949	8.20	2,220
1917	May 22, 1917	10.8	16,100	1950	June 19, 1950	7.92	1,930
1918	July 14, 1918	12.0	19,000				
1919	July 5, 1919	8.8	10,300	1951	June 19, 1951	9.00	3,420
1920	May 12, 1920	29.2	114,000		June 24, 1951	9.12	3,610
					July 3, 1951	10.03	5,400
1943	June 14, 1943	10.66	9,140		July 30, 1951	10.4	6,250
1944	July 11, 1944	11.0	9,000		Aug. 1, 1951	9.90	5,190
1945	June 7, 1945	9.0	3,750		Sept. 5, 1951	8.95	3,420
					Sept. 9, 1951	8.80	3,050
1946	June 19, 1946	9.86	5,770	1952	May 24, 1952	10.79	6,950
1947	June 22, 1947	10.50	7,430		June 4, 1952	9.57	4,290
1948	Mar. 16, 1948	7.96	2,360		June 28, 1952	11.72	9,450
	Mar. 20, 1948	7.94	2,210	1953	May 31, 1953	7.57	1,620
	June 18, 1948	9.05	3,750	1954	May 23, 1954	10.90	7,380
	June 24, 1948	8.78	3,020	1955	Apr. 12, 1955	8.49	2,750
	July 19, 1948	8.25	2,520		Apr. 16, 1955	8.79	3,120
					May 18, 1955	8.11	2,290
					Aug. 9, 1955	10.15	5,150
					Aug. 12, 1955	8.52	2,580

CHEYENNE RIVER BASIN

(93) Cheyenne River below Angostura Dam, S. Dak.

Location.--Lat 43°20'45", long 103°26'10", in NE¼NW¼NW¼ sec. 20, T. 8 S., R. 6 E., on right bank 800 ft downstream from Angostura Dam, 4¾ miles upstream from Fall River, and 6½ miles southeast of Hot Springs.
Drainage area.--9,100 sq mi, approximately.
Gage.--Nonrecording gage November 1945 to October 1946; recording gage thereafter. Prior to July 1953, at site 4¾ miles downstream at different datum. Datum of present gage is 3,058.02 ft above mean sea level (Bureau of Reclamation bench mark).
Stage-discharge relation.--Defined by current-meter measurements below 3,100 cfs and extended above by logarithmic plotting; subject to changes owing to channel shifting and to backwater from Fall River at downstream site.
Remarks.--Flow regulated by Angostura Reservoir (capacity, 194,200 acre-ft) since Oct. 3, 1949. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1946	June 19, 1946	7.25	5,000	1951	Oct. 1-3, 1950	5.16	[b]25
1947	June 20, 1947	[a]10.4	-	1952	Apr. 10, 1952	5.60	228
	June 22, 1947	9.45	9,520	1953	Dec. 14, 1952	5.99	421
1948	June 19, 1948	7.98	4,050	1954	Mar. 12, 1954	5.66	159
	Aug. 13, 1948	[a]9.60	-	1955	May 20, 1955	8.29	1,570
1949	Mar. 5, 1949	8.27	4,550				
1950	July 26, 1950	5.57	197				

[a]Backwater from Fall River.
[b]Daily mean discharge.

(94) Fall River at Hot Springs, S. Dak.

Location.--Lat 43°25'50", long 103°28'35", in NW¼ sec. 24, T. 7 S., R. 5 E., on left bank 30 ft downstream from Seventh Street bridge in Hot Springs and 6 miles upstream from mouth.
Drainage area.--137 sq mi.
Gage.--Nonrecording gage November 1937 to June 1939; recording gage thereafter. Prior to June 1939, at site one block upstream at datum 3.00 ft higher. Datum of present gage is 3,413.20 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 50 cfs and extended above by weir formula and slope-area measurements at 460, 8,000, and 13,000 cfs. Change in relation occurred owing to channel improvements after 1947 flood.
Bankfull stage.--13 ft.
Remarks.--Regulated by Cold Brook Reservoir (capacity 6,000 acre-ft) since April 1953.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1938	Sept. 4, 1938	18.4	[a]13,100	1945	June 10, 1945	2.65	286
1939	June 15, 1939	1.97	[b]103		July 26, 1945	2.64	266
1940	Apr. 27, 1940	3.47	691				
	July 11, 1940	3.44	677	1946	May 2, 1946	2.75	314
	July 16, 1940	2.16	157		July 17, 1946	2.54	232
	Sept.23, 1940	2.23	179	1947	June 20, 1947	11.12	8,300
	Sept.30, 1940	2.15	154		July 10, 1947	2.84	439
					July 16, 1947	2.39	256
1941	Apr. 13, 1941	3.20	569		July 22, 1947	2.15	172
	Aug. 6, 1941	9.13	4,700	1948	Aug. 13, 1948	5.57	1,720
1942	June 2, 1942	2.29	199	1949	Aug. 17, 1949	1.96	132
	June 4, 1942	2.66	339	1950	July 5, 1950	2.57	141
1943	Mar. 23, 1943	3.13	538				
	May 29, 1943	2.13	146	1951	Aug. 14, 1951	2.72	[b]200
	June 13, 1943	2.50	274	1952	May 18, 1952	2.15	46
1944	May 24, 1944	2.30	198	1953	Sept. 1, 1953	2.44	119
	June 12, 1944	2.65	234	1954	May 22, 1954	2.24	65
				1955	Sept.19, 1955	3.19	558

[a]Annual peak only
[b]About.

CHEYENNE RIVER BASIN

(95) Beaver Creek near Buffalo Gap, S. Dak.

Location.--Lat 43°28'00", long 103°18'20", in NE¼SE¼ sec. 5, T. 7 S., R. 7 E., on left bank 1½ miles south of Buffalo Gap and 4½ miles upstream from mouth.
Drainage area.--130 sq mi, approximately.
Gage.--Nonrecording gage November 1937 to June 1939; recording gage thereafter. Prior to June 1939, at site three-quarters of a mile downstream at different datum. Altitude of present gage is 3,150 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 11 cfs and extended to 11,700 cfs by slope-area measurement at site three-quarters of a mile downstream. Defined by current-meter measurements below 20 cfs and extended by velocity-area determination at 500 cfs and slope-area measurement at 2,750 cfs at present site. Subject to changes at both sites owing to ice effect and channel shifting.
Bankfull stage.--7 ft.
Historical data.--Flood in 1927 reached a stage of 18.0 ft at site and datum used prior to June 1939, from information by local residents.
Remarks.--Diversions for irrigation above station may appreciably affect low peaks. Base for partial-duration series, 24 cfs. Only annual peaks are shown prior to Oct. 1, 1939.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1938	Sept. 4, 1938	16.46		11,700	1946	Feb. 6, 1946	3.56	-0.4	-
1939	June 21, 1939	[a]4.90		-		May 2, 1946	4.25		102
	June 21, 1939	4.08		65	1947	Jan. 3, 1947	3.86	-.8	-
1940	Jan. 26, 1940	4.22	-1.0	-		June 20, 1947	7.36		1,240
	Apr. 27, 1940	4.44		116		June 30, 1947	4.10		87
	June 16, 1940	4.45		102		July 11, 1947	3.84		59
						July 22, 1947	5.28		330
1941	Apr. 13, 1941	6.41		856	1948	Feb. 12, 1948	3.67	-.7	-
	Apr. 17, 1941	3.98		68		July 14, 1948	3.36		25
	June 9, 1941	3.61		31	1949	Jan. 20, 1949	4.45	-1.4	-
	June 15, 1941	3.80		43		July 14, 1949	3.34		21
	Aug. 7, 1941	4.07		70	1950	Feb. 2, 1950	4.30	-1.4	-
1942	Jan. 8, 1942	4.17	-1.1	-		Aug. 13, 1950	3.81		38
	June 2, 1942	3.95		52					
	June 4, 1942	3.87		41	1951	Feb. 14, 1951	4.04	-1.0	-
	July 18, 1942	4.44		91		June 23, 1951	3.85		25
	July 27, 1942	4.14		62		Sept. 7, 1951	4.68		85
1943	Mar. 17, 1943	3.77	-.8	-	1952	Jan. 1, 1952	4.77	-1.8	-
	Mar. 25, 1943	4.05		81		May 23, 1952	4.01		51
	Apr. 10, 1943	3.99		72		June 3, 1952	3.67		26
	June 7, 1943	4.16		80	1953	Jan. 16, 1953	4.16	-.8	-
	June 13, 1943	4.31		96					[b]11
	June 27, 1943	3.79		30	1954	Jan. 25, 1954	4.50	-1.0	-
	June 30, 1943	3.78		29		Aug. 20, 1954	6.25		670
	July 4, 1943	3.87		35	1955	Feb. 19, 1955	3.74	-.4	-
1944	Jan. 30, 1944	3.70	-.6	-		Aug. 10, 1955	10.15		2,750
	May 25, 1944	3.61		23		Sept. 20, 1955	4.57		121
1945	Jan. 1, 1945	3.81	-.7	-					
	June 11, 1945	3.97		64					

[a]Backwater from downstream tributary.
[b]Maximum daily discharge; occurred on many days.

(96) Battle Creek at Hermosa, S. Dak.

Location.--Lat 43°49'45", long 103°11'15", in SW¼SW¼ sec. 32, T. 2 S., R. 8 E., on right bank 250 ft downstream from Chicago and North Western Railway bridge, three-quarters of a mile south of Hermosa, and 2½ miles downstream from Squaw Creek.
Drainage area.--178 sq mi.
Gage.--Nonrecording gage. Altitude of gage is 3,290 ft (from topographic map). July 1949 to November 1950, at site half a mile upstream at different datum.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--8 ft.
Remarks.--Only annual peaks are shown.

(96) Battle Creek at Hermosa, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	July 2, 1950	3.01		149	1953	June 19, 1953	5.56		519
					1954	Mar. 14, 1954	1.55	-0.5	-
1951	June 24, 1951	2.85		163		Aug. 26, 1954	1.20		7
1952	May 22, 1952	14.00		2,950	1955	June 17, 1955	1.37		16

(97) Spring Creek near Hermosa, S. Dak.

Location.--Lat 43°56'35", long 103°09'10", in SE¼SE¼SE¼ sec. 21, T. 1 S., R. 8 E., on right bank 150 ft upstream from highway bridge, a quarter of a mile upstream from Chicago and North Western Railway bridge, and 7½ miles north of Hermosa.
Drainage area.--199 sq mi.
Gage.--Nonrecording gage. Altitude of gage is 3,275 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 110 cfs and extended above by logarithmic plotting; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--8 ft.
Remarks.--Considerable loss in sink holes in reach 10 to 15 miles above station. Flow regulated by Lake Sheridan (capacity, 12,657 acre-ft), 24 miles above station. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Aug. 12, 1950	1.54		69	1953	June 19, 1953	2.50		205
					1954	Aug. 12, 1954	3.52		378
1951	Mar. 9, 1951	1.26	-0.7	-	1955	Many days	.42		-
	June 19, 20, 1951	.70		2.0		Mar. 30, 1955	-		(a)
1952	May 23, 1952	4.56		580					

[a] Occurred during period of no gage-height record; discharge probably less than 1 cfs.

(98) Castle Creek above Deerfield Reservoir, near Hill City, S. Dak.
(Published as "above Deerfield Reservoir, near Deerfield" 1948 to 1953)

Location.--Lat 44°00'50", long 103°49'25", in SW¼ sec. 25, T. 1 N., R. 2 E., on right bank 50 ft downstream from highway bridge, 250 ft downstream from South Fork Castle Creek, 600 ft upstream from high-water line of Deerfield Reservoir, 2½ miles southwest of Deerfield Dam, and 14 miles northwest of Hill City.
Drainage area.--83 sq mi, approximately.
Gage.--Nonrecording gage June to August 1948; recording gage thereafter. Altitude of gage is 5,910 ft (from reservoir elevation).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--5 ft.
Remarks.--Base for partial-duration series, 50 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1949	Dec. 22, 23, 1948	3.38	-1.7	-	1952	Mar. 29, 1952	2.96	-1.4	-
	June 2, 1949	2.56		48		May 22, 1952	5.81		615
1950	Mar. 8, 1950	2.97	-1.4	-	1953	Dec. 30, 1952	3.22	-1.6	-
	Apr. 7, 1950	3.28		100		Aug. 15, 1953	2.42		37
	Apr. 14, 1950	3.38		108	1954	Jan. 23, 1954	3.66	-2.0	-
	Aug. 11, 1950	2.74		62		May 23, 1954	2.18		27
					1955	Apr. 10, 1955	4.64	-2.0	-
1951	Feb. 10, 1951	3.46	-1.9	-		Apr. 16, 1955	2.87		58
	Apr. 6, 1951	2.64		55					

(99) Castle Creek below Deerfield Dam, S. Dak.

Location.--Lat 44°01'50", long 103°46'35", in NW¼SE¼ sec. 20, T. 1 N., R. 3 E., on right bank at downstream side of highway bridge, 500 ft upstream from Dutchman Creek, 800 ft downstream from Deerfield Dam, and 12½ miles northwest of Hill City.
Drainage area.--96 sq mi, approximately.
Gage.--Recording gage. July 1946 to October 1947, at site 700 ft downstream at datum 3.77 ft lower, October 1947 to August 1948 at site 850 ft downstream at datum 5.77 ft lower. Altitude of gage is 5,805 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to spillway overflow bypassing gage and returning to channel about 100 ft downstream from gage.
Remarks.--Flow regulated by Deerfield Reservoir (usable capacity, 15,143 acre-ft). Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1947	June 24, 1947	2.77	151	1952	May 22, 1952	-	[a]200
1948	June 30, 1948	3.43	67		May 23, 1952	[b]3.87	-
1949	Apr. 5-14, 1949	2.42	41	1953	Oct. 7-12, 1952	1.98	-
1950	Apr. 15-17, 1950	-	[a]47		May 22, 1953	-	[a]30
	July 11-22, 1950	[b]2.37	-		June 15, 1953	-	[a]30
				1954	July 18-20, 1954	2.92	65
1951	May 14-21, 1951	2.03	22	1955	July 9, 1955	2.81	60

[a]Maximum daily discharge; includes spillway overflow.
[b]Backwater from spillway overflow.

(100) Rapid Creek below Pactola Dam, S. Dak.
(Published as "near Pactola" 1929-31, 1947-53, and as "at Big Bend" 1932-42)

Location.--Lat 44°04'35", long 103°28'55", in SW¼NE¼ sec. 2, T. 1 N., R. 5 E., on right bank 2,000 ft downstream from Pactola Dam, 4 miles upstream from Deer Creek, and 13 miles west of Rapid City.
Drainage area.--320 sq mi, approximately. 319 sq mi at 1929-31 site; 332 sq mi at 1932-42 site, 315 sq mi, approximately, at 1947-52 site.
Gage.--Nonrecording gage April 1929 to March 1932, July 1946 to August 1947; recording gage April 1932 to December 1942 and subsequent to August 1947. At sites 3,500 ft upstream 1929-31; 7 miles downstream 1932-42; and 2 miles upstream 1946-53 at different datums. Datum of present gage is 4,406.00 ft above mean sea level (Bureau of Reclamation bench mark).
Stage-discharge relation.--Defined by current-meter measurements below 200 cfs 1929-31; below 800 cfs 1932-42; and throughout subsequent to 1947. Subject to changes at all sites owing to ice effect and channel shifting.
Bankfull stage.--7 ft.
Historical data.--Flood of May 12, 1920, reached a stage of 7.75 ft at 1932-42 site and datum.
Remarks.--Flow at 1929-31 site affected by power flume which diverted water from Rapid Creek three-quarters of a mile upstream from gaging station. Maximum discharges probably not appreciably affected by regulation at powerplant upstream 1932-39, or by Deerfield Reservoir (usable capacity, 15,143 acre-ft) since 1947. Discharges given herein converted to present site by drainage-area relation.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	June 3, 1929	-		[a]795	1936	Apr. 10, 1936	3.84	-2.4	-
1930	Apr. 9-10, 1930	-		[a]194		Apr. 13, 1936	1.61		100
					1937	July 12, 1937	1.51		84
1931	Apr. 8, 1931	-		[a]155	1938	Jan. 22, 1938	1.72	-1.0	-
1932	Apr. 24, 1932	3.30		682		Apr. 16, 1938	1.52		86
1933	May 24, 1933	5.20		1,540	1939	Apr. 24, 1939	1.30		62
1934	Feb. 1, 1934	2.04	-0.5	-	1940	Feb. 6, 1940	2.70	-2.0	-
	Feb. 11, 1934	1.71		117		Aug. 27, 1940	2.40		245
1935	June 1, 1935	2.65		437					

[a]Combined discharge of Rapid Creek and Dakota Power and Light Co. flume.

(100) Rapid Creek below Pactola Dam, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1941	June 11, 1941	3.34		540	1951	June 14, 1951	2.67		97
1942	May 16, 1942	3.03		409	1952	May 22, 1952	6.74		2,190
					1953	June 15 or 20, 1953	-		[b,c]150
1947	June 23, 1947	5.90		954		Aug. 1, 1953	[b]6.52		-
1948	June 22, 1948	3.80		250	1954	Mar. 13, 1954	4.86	-1.2	
1949	June 2, 1949	3.59		233		May 23, 1954	4.34		94
1950	Apr. 15, 1950	3.55		233	1955	July 29, 1955	7.36		378

[b]Affected by backwater from temporary construction fill downstream.
[c]Estimated.

(101) Rapid Creek above Canyon Lake near Rapid City, S. Dak.

Location.--Lat 44°03'05", long 103°18'50", in NE¼NE¼ sec. 18, T. 1 N., R. 7 E., on right bank at bridge on Rapid Canyon Road, 1 mile southwest of city limits of Rapid City, and 2¾ miles downstream from Victoria Creek.
Drainage area.--371 sq mi.
Gage.--Nonrecording gage July 1946 to October 1947; recording gage thereafter. Datum of gage is 3,407.39 ft above mean sea level (levels by Corps of Engineers).
Stage-discharge relation.--Defined by current-meter measurements below 1,300 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--7 ft.
Remarks.--Peaks probably not affected appreciably by regulation of Deerfield Reservoir (usable capacity, 15,143 acre-ft). Base for partial-duration series, 230 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Apr. 1, 1947	3.59	-0.8	-	1951	Mar. 27, 1951	3.81	-1.5	-
	June 23, 1947	5.82		950		June 15, 1951	2.62		77
1948	June 22, 1948	3.43		245	1952	Mar. 24, 1952	5.00	-2.9	-
	July 13, 1948	3.43		233		May 23, 1952	8.08		2,600
1949	Mar. 19, 1949	4.43	-2.2	-	1953	Mar. 12, 1953	2.94	-1.1	-
	June 3, 1949	3.36		230		June 16, 1953	2.65		152
	Aug. 15, 1949	3.63		290	1954	Jan. 31, 1954	3.22	-1.8	-
1950	Mar. 30, 1950	4.37	-2.2	-		Aug. 12, 1954	2.53		140
	Apr. 15, 1950	3.33		209	1955	Mar. 18, 1955	3.81	-2.4	-
						July 9, 1955	3.31		294
						July 29, 1955	3.44		326

(102) Rapid Creek at Rapid City, S. Dak.

Location.--Lat 44°05'10", long 103°14'25", in SW¼SE¼ sec. 35, T. 2 N., R. 7 E., on right bank 200 ft downstream from Oskosh Street Bridge in Rapid City and 3.7 miles downstream from Canyon Lake.
Drainage area.--410 sq mi, approximately.
Gage.--Nonrecording gage June 1903 to November 1906; recording gage subsequent to July 1942. At site one mile downstream at different datum prior to 1907. Altitude of present gage is 3,210 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 560 cfs 1903-6. Defined by current-meter measurements throughout subsequent to 1942. Subject to changes at both sites owing to ice effect and channel shifting.
Bankfull stage.--9 ft.
Historical data.--Flood of May 12-13, 1920, reached a stage of 13.6 ft, from floodmark.
Remarks.--Flow regulated by Canyon Lake (spring and fall only, for recreational purposes) and by Deerfield Reservoir (usable capacity, 15,143 acre-ft) since 1945. Maximum flows probably not affected appreciably. Base for partial-duration series, 180 cfs.

CHEYENNE RIVER BASIN

(102) Rapid Creek at Rapid City, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1905	July 26, 1905	4.65		[a]2,500	1947	Apr. 1, 1947	2.05		187
						June 18, 1947	2.47		306
1906	Aug. 2, 1906	3.5		[a]980		June 24, 1947	3.75		1,170
						July 23, 1947	2.23		272
1943	Mar. 26, 1943	2.45		387	1948	June 22, 1948	2.29		294
	Mar. 30, 1943	2.32		329		July 13, 1948	2.23		283
	Apr. 11, 1943	2.93		625		Aug. 13, 1948	2.67		472
	June 8, 1943	2.17		266	1949	Jan. 4, 1949	2.34	-1.4	-
	June 13, 1943	3.50		936		June 3, 1949	2.27		276
	June 26, 1943	2.39		356		July 5, 1949	2.21		286
	July 9, 1943	2.03		206		Aug. 15, 1949	2.89		563
1944	May 11, 1944	2.22		232	1950	Mar. 19, 1950	2.11	-1.0	-
	May 24, 1944	2.15		204		Apr. 9, 1950	2.13		221
	June 12, 1944	2.30		270		Apr. 16, 1950	2.20		246
	June 17, 1944	2.10		184		Apr. 20, 1950	2.07		209
1945	June 9, 1945	2.24		215					
	July 11, 1945	2.15		180	1951	Oct. 9, 1950	1.89		143
	July 22, 1945	2.27		228	1952	Apr. 8, 1952	1.99		183
	Aug. 1, 1945	2.56		381		May 23, 1952	6.20		2,540
	Aug. 4, 1945	2.20		198		June 27, 1952	2.38		198
						July 9, 1952	2.40		208
1946	May 3, 1946	3.19		592	1953	May 9, 1953	2.46		216
	June 2, 1946	2.83		395		June 14, 1953	2.66		276
	June 19, 1946	3.30		564		June 19, 1953	3.85		824
	July 7, 1946	2.76		362	1954	Jan. 10, 1954	2.48	-.8	-
	July 18, 1946	4.24		1,000		June 10, 1954	2.23		172
					1955	July 9, 1955	3.37		550
						July 29, 1955	2.74		285
						Aug. 10, 1955	4.03		878

[a]Annual peak only.

(103) Rapid Creek below Hawthorn ditch at Rapid City, S. Dak.

Location.--Lat 44°04'00", long 103°10'25", in NW¼NW¼NE¼ sec. 8, T. 1 N., R. 8 E., on right bank at downstream side of highway bridge, half a mile upstream from diversion to Murphy ditch, 1½ miles downstream from diversion to Hawthorn ditch, and 2 miles southeast of Rapid City.
Drainage area.--427 sq mi.
Gage.--Recording gage. Prior to Nov. 28, 1947, at site 700 ft downstream at datum 0.25 ft lower. Altitude of present gage is 3,150 ft (from Bureau of Reclamation topographic survey).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Remarks.--Diversions above station for irrigation of about 3,000 acres. Base for partial-duration series, 180 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	May 31, 1947	1.83		188	1951	Feb. 4, 1951	3.54	-1.2	-
	June 24, 1947	4.40		1,110		Aug. 23, 1951	3.19		148
	July 23, 1947	1.93		200	1952	Feb. 18, 1952	3.60	-1.4	-
1948	June 22, 1948	3.85		255		May 23, 1952	9.19		2,140
	July 13, 1948	3.85		248		June 27, 1952	3.46		235
	Aug. 13, 1948	4.53		436	1953	Feb. 19, 1953	3.76	-1.5	-
1949	Jan. 5, 1949	6.37	-4.0	-		May 9, 1953	3.45		215
	June 3, 1949	3.68		253		June 15, 1953	3.83		313
	July 6, 1949	3.99		275		June 19, 1953	6.20		1,030
	July 10, 1949	3.65		195		June 26, 1953	3.70		304
	Aug. 15, 1949	6.12		938		Aug. 2, 1953	3.71		285
1950	Feb. 3, 1950	4.37	-2.2	-					
	Apr. 10, 1950	3.26		194					
	Apr. 15, 1950	3.63		268					
	Apr. 20, 1950	3.37		216					

CHEYENNE RIVER BASIN

(104) Rapid Creek below Little Giant ditch near Rapid City, S. Dak.

Location.--Lat 44°02'30", long 103°07'30", in SW¼SW¼ sec. 14, T. 1 N., R. 8 E., on left bank at downstream side of highway bridge, half a mile downstream from diversion to Little Giant ditch, three-quarters of a mile downstream from diversion to South Side ditch, and 5¼ miles southeast of Rapid City.
Drainage area.--447 sq mi.
Gage.--Nonrecording gage August 1946 to October 1947; recording gage thereafter. Altitude of gage is 3,050 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Remarks.--Diversions above station for irrigation of about 7,000 acres. Base for partial-duration series, 180 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	June 24, 1947	5.20		[a]904	1950	Mar. 28, 1950	4.43	-2.0	-
1948	June 22, 1948	3.46		280		Apr. 10, 1950	3.11		192
	July 13, 1948	3.19		209		Apr. 15, 1950	3.27		238
	Aug. 14, 1948	3.40		268		Apr. 20, 1950	3.12		195
1949	Jan. 21, 1949	5.55	-3.2	-					
	Apr. 13, 1949	3.03		184	1951	Feb. 4, 1951	3.72	-1.4	-
	June 2, 1949	3.72		364		June 23, 1951	2.95		103
	July 6, 1949	3.32		195					
	Aug. 15, 1949	4.28		510					

[a]Annual peak only.

(105) Rapid Creek at Caputa, S. Dak.

Location.--Lat 43°59'20", long 102°59'40", in SW¼NW¼SW¼ sec. 1, T. 1 S., R. 9 E., on left bank 5 ft downstream from highway bridge, three-quarters of a mile southwest of Caputa, 1¾ miles downstream from diversion to St. Germain ditch, and 3½ miles downstream from Dry Creek.
Drainage area.--509 sq mi.
Gage.--Nonrecording gage August 1946 to June 1947; recording gage thereafter. Altitude of gage is 2,900 ft (Bureau of Reclamation topographic survey).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--9 ft.
Remarks.--Diversions above station for irrigation of about 10,000 acres. Base for partial-duration series, 180 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	June 25, 1947	8.67		[a]1,330	1951	Feb. 11, 1951	4.58	-1.6	-
1948	Mar. 12, 1948	5.77	-2.8	-		June 24, 1951	3.84		141
	June 15, 1948	4.38		240	1952	Mar. 23, 1952	5.93	-2.9	-
	June 22, 1948	5.05		351		May 24, 1952	11.79		2,040
	July 14, 1948	4.01		190		June 28, 1952	4.32		218
	Aug. 14, 1948	4.16		211	1953	Mar. 13, 1953	5.58	-2.2	-
1949	Mar. 6, 1949	10.78	-7.4	-		May 10, 1953	4.22		194
	Apr. 14, 1949	4.08		181		June 15, 1953	4.55		244
	May 1, 1949	4.12		182		June 20, 1953	8.55		1,180
	June 2, 1949	5.81		488		Aug. 2, 1953	4.10		182
	Aug. 16, 1949	5.05		355					
1950	Mar. 29, 1950	8.21	-5.0	-					
	Apr. 15, 1950	4.56		256					
	May 9, 1950	4.36		215					
	Aug. 13, 1950	4.05		192					

[a]Annual peak only.

(106) Rapid Creek near Farmingdale, S. Dak.

Location.--Lat 43°56'35", long 102°51'15", in SW¼SW¼SW¼ sec. 19, T. 1 S., R. 11 E., on right bank at downstream side of highway bridge, 2 miles southeast of Farmingdale and 3¼ miles downstream from Antelope Creek.
Drainage area.--602 sq mi.
Gage.--Nonrecording gage July 1946 to September 1947; recording gage thereafter. Altitude of gage is 2,740 ft (from Bureau of Reclamation topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--10 ft.
Remarks.--Diversions for irrigation of about 10,000 acres above station. Base for partial-duration series, 180 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	June 21, 1947	8.4		[a]2,640	1951	Mar. 15, 1951	4.74	-1.7	-
						June 23, 1951	3.62		161
1948	Feb. 16, 1948	4.12	-1.0	-	1952	Jan. 30, 1952	5.02	-2.0	-
	June 17, 1948	5.80		885		May 22, 1952	6.30		930
	June 22, 1948	5.07		572		May 24, 1952	8.19		1,770
	Aug. 12, 1948	4.16		285		June 28, 1952	3.74		191
1949	Mar. 21, 1949	6.97	-2.0	[b]500	1953	Apr. 30, 1953	4.05		246
	June 3, 1949	4.54		419		June 16, 1953	3.81		195
	Aug. 16, 1949	3.60		208		June 20, 1953	6.38		962
1950	Feb. 8, 1950	4.93	-1.9	-		Aug. 2, 1953	8.35		1,790
	Apr. 1, 1950	4.12	-.2	[b]200	1954	Aug. 11, 1954	3.89		204
	Apr. 16, 1950	4.00		285	1955	Mar. 4, 1955	4.12	-1.3	-
	May 9, 1950	4.03		268		July 11, 1955	4.15		267
	Sept.20, 1950	3.87		217		Aug. 11, 1955	4.92		461
						Sept.21, 1955	4.50		302

[a]Annual peak only.
[b]About.

(107) Cheyenne River near Wasta, S. Dak.

Location.--Lat 44°04'48", long 102°24'00", in NE¼NE¼NW¼ sec. 2, T. 1 N., R. 14 E., on downstream side of third pier from left bank of bridge on U. S. Highway 16, 200 ft downstream from Chicago and North Western Railway bridge, 3 miles east of Wasta, and 7 miles downstream from Box Elder Creek.
Drainage area.--12,800 sq mi, approximately.
Gage.--Nonrecording gage July 1914 to June 1915, August 1928 to June 1932, March 1934 to December 1940; recording gage thereafter. Datum of gage is 2,262.78 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined below 32,000 cfs by current-meter measurements made by South Dakota State Engineer's office prior to 1928; thereafter, defined by current-meter measurements below 11,000 cfs and extended above on basis of an incomplete discharge measurement at gage height 8.65 ft. Subject to changes owing to ice effect and channel shifting; large change occurred at high stages between 1915 and 1928.
Bankfull stage.--14 ft.
Historical data.--Flood in May 1920 reached a stage of about 16 ft, from information and photographs by local residents.
Remarks.--Flow regulated by Angostura Reservoir (capacity, 194,200 acre-ft) since October 1949. Base for partial-duration series, 3,300 cfs. Only annual peaks are shown prior to Oct. 1, 1940.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1915	June 13, 1915	12.5		[a]34,200	1932	May 6, 1932	11.28		46,300
1929	June 2, 1929	8.00		16,800	1934	June 27, 1934	5.50		5,300
1930	Feb. 21, 1930	5.5	-0.4	-	1935	June 1, 1935	10.60		43,000
	Apr. 17, 1930	5.16		5,000					
					1936	Mar. 4, 1936	5.28	-1.7	1,680
1931	Oct. 6, 1930	4.20		2,560	1937	July 14, 1937	8.20		20,000

[a]Maximum discharge observed during period Oct. 1 to July 2.

(107) Cheyenne River near Wasta, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1938	Sept. 7, 1938	6.70		9,500	1946	May 2, 1946	8.71		26,100
1939	May 25, 1939	6.90		10,700		May 24, 1946	7.14		14,700
1940	Feb. 29, 1940	5.55	-3.0	-		June 18, 1946	7.34		16,000
	Apr. 28, 1940	5.48		3,720	1947	June 10, 1947	5.92		8,180
1941	Apr. 14, 1941	6.41		7,630		June 18, 1947	4.59		3,660
	Apr. 16, 1941	5.50		4,780		June 22, 1947	10.25		40,100
	June 10, 1941	8.00		18,200		June 30, 1947	6.49		11,100
	June 12, 1941	6.62		8,550	1948	Mar. 18, 1948	4.90		[b]4,500
	July 3, 1941	5.23		4,200		June 17, 1948	5.20		5,490
	July 14, 1941	6.65		11,400		June 22, 1948	5.48		6,920
1942	Oct. 26, 1941	5.72		5,300		June 26, 1948	5.28		5,830
	Apr. 25, 1942	5.93		6,420		Aug. 13, 1948	5.03		5,000
	May 1, 1942	8.23		20,200	1949	Mar. 5, 1949	8.91	-3.5	-
	May 4, 1942	7.07		11,700		Mar. 6, 1949	6.60	-.6	[b]8,600
	May 7, 1942	7.23		12,900		Mar. 23, 1949	4.23		3,310
	May 12, 1942	10.8		44,000		May 1, 1949	4.94		4,860
	May 13, 1942	10.8		44,000	1950	May 9, 1950	5.55		6,760
	May 18, 1942	6.61		10,800					
	June 2, 1942	6.11		7,000	1951	June 19, 1951	5.24		5,740
	June 6, 1942	7.44		14,200		June 23, 1951	4.73		4,340
1943	Mar. 26, 1943	6.82	-2.3	-		Sept. 2, 1951	4.36		3,420
	Mar. 27, 1943	4.85		3,850	1952	Mar. 29, 1952	6.00	-1.3	[b]4,200
	May 30, 1943	5.41		5,480		May 22, 1952	8.54		24,700
	June 7, 1943	5.43		6,360		May 26, 1952	4.83		4,550
	June 10, 1943	6.06		8,870		June 4, 1952	6.22		9,580
	June 16, 1943	6.50		11,000	1953	Mar. 10, 1953	6.45	-2.4	-
1944	Apr. 3, 1944	5.08	-2.5	-		Mar. 12, 1953	4.78	-.2	4,010
	May 25, 1944	4.78		4,230		May 1, 1953	5.12		6,050
	June 12, 1944	8.5		24,300		June 20, 1953	6.00		9,480
	July 12, 1944	6.00		8,640		Aug. 3, 1953	5.10		6,310
1945	Mar. 13, 1945	4.51	-.9	-	1954	June 7, 1954	3.66		2,410
	Mar. 25, 1945	5.30		5,830	1955	June 10, 1955	4.52		4,040
	Aug. 4, 1945	4.87		4,380		Aug. 11, 1955	5.40		6,010
						Sept.20, 1955	9.45		24,300

[b]About.

(108) Elk Creek near Elm Springs, S. Dak.

Location.--Lat 44°14'50", long 102°29'55", in NE¼SW¼ sec. 1, T. 3 N., R. 13 E., near center of span on downstream side of highway bridge, 2 miles downstream from small tributary, 5 miles southeast of Elm Springs, and 7 miles upstream from mouth.
Drainage area.--540 sq mi, approximately.
Gage.--Nonrecording gage. Datum of gage is 2,304.99 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 5,100 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--6 ft.
Historical data.--Flood in May 1920 reached a stage of about 17 ft, from information by local residents.
Remarks.--Base for partial-duration series, 400 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 7, 1950	5.40		521	1953	Mar. 13, 1953	5.54		453
	Apr. 15, 1950	6.10		852		May 1, 1953	5.83		540
	May 9, 1950	5.60		656		May 3, 1953	6.83		1,160
						June 19, 1953	9.86		5,250
1951	Sept. 2, 1951	4.9		328	1954	June 10, 1954	6.25		838
1952	Mar. 21, 1952	8.5	-4.5	-	1955	Sept.20, 1955	5.10		270
	Mar. 29, 1952	10.61		8,540					
	May 23, 1952	5.81		434					
	May 25, 1952	6.19		586					

CHEYENNE RIVER BASIN

(109) Belle Fourche River at Wyoming - South Dakota State line

Location.--Lat 44°45'00", long 104°02'45", in NE¼NW¼NW¼ sec. 18, T. 9 N., R. 1 E., on left bank a quarter of a mile downstream from State line, 3½ miles downstream from Oak Creek, and 11 miles northwest of Belle Fourche, S. Dak.
Drainage area.--3,280 sq mi, approximately.
Gage.--Recording gage. Datum of gage is 3,095.7 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--14 ft.
Remarks.--Flow regulated by Keyhole Reservoir (usable capacity 199,900 acre-ft) since March 1952. Base for partial-duration series, 1,000 cfs. Only annual peaks are shown subsequent to Sept. 30, 1951.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Mar. 22, 1947	14.33	-5.1	-	1950	Apr. 2, 1950	7.86	-2.1	-
	Mar. 23, 1947	9.89		2,230		Apr. 7, 1950	8.10		1,440
	Apr. 2, 1947	8.27		1,520		Apr. 13, 1950	9.20		1,820
	June 18, 1947	7.46		1,210		May 10, 1950	9.51		2,000
	June 23, 1947	12.51		3,620		May 12, 1950	8.56		1,610
1948	Mar. 20, 1948	12.36	-6.2	-					
	Mar. 20, 1948	9.40		2,000	1951	Sept. 6, 1951	8.47		1,480
	Mar. 26, 1948	9.36		2,000	1952	Mar. 31, 1952	9.69		2,030
	June 18, 1948	9.98		2,280	1953	Aug. 5, 1953	12.68		3,170
	July 11, 1948	7.85		1,320	1954	Apr. 6, 1954	5.19		389
1949	Mar. 20, 1949	11.00	-5.0	-	1955	Apr. 12, 1955	8.71		1,490
	Mar. 25, 1949	9.83		2,180					
	Mar. 29, 1949	7.23		1,030					
	Apr. 8, 1949	7.49		1,140					
	June 5, 1949	7.01		1,030					

(110) Spearfish Creek at Spearfish, S. Dak.

Location.--Lat 44°29'00", long 103°51'15", in SE¼NW¼ sec. 15, T. 6 N., R. 2 E., on right bank in city park in Spearfish, 300 ft downstream from fish hatchery and nearest tributary and 12 miles upstream from mouth.
Drainage area.--168 sq mi.
Gage.--Nonrecording gage October to December 1946; recording gage thereafter. Altitude of gage is 3,640 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--9 ft.
Historical data.--Flood of June 5, 1904, reached a stage of 7.00 ft, site and datum of former gage near Spearfish, 1 mile upstream (drainage area, 157 sq mi); discharge, about 5,000 cfs.
Remarks.--Base for partial-duration series, 125 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Feb. 8, 1947	4.90	-0.5	-	1952	Jan. 24, 1952	7.29	-2.8	-
	June 22, 1947	6.73		891		Apr. 27, 1952	5.03		126
1948	June 14, 1948	5.70		336		May 22, 1952	6.81		947
	June 24, 1948	5.89		417	1953	May 9, 1953	5.26		194
1949	Feb. 13, 1949	5.70	-1.2	-		May 21, 1953	5.07		146
	May 6, 1949	5.32		176		May 28, 1953	5.40		252
1950	Jan. 5, 1950	6.67	-2.0	-		June 15, 1953	5.09		144
	May 22, 1950	5.09		116		June 19, 1953	5.56		301
					1954	Jan. 17, 1954	6.39	-1.9	-
1951	Feb. 1, 1951	6.61	-2.0	-		May 30, 1954	5.15		147
	June 17, 1951	5.37		215	1955	Feb. 24, 1955	5.54	-1.0	-
						June 11, 1955	5.20		181

CHEYENNE RIVER BASIN

(111) Redwater Creek above Belle Fourche, S. Dak.

Location.--Lat 44°40'05", long 103°49'55", in NW¼SE¼ sec. 11, T. 8 N., R. 2 E., on right bank at upstream side of bridge on U. S. Highway 212 in Belle Fourche, a quarter of a mile upstream from Hay Creek and half a mile upstream from mouth.
Drainage area.--920 sq mi.
Gage.--Nonrecording gage October 1945 to December 1946; recording gage thereafter. Altitude of gage is 3,000 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--10 ft.
Remarks.--Diversions for irrigation of about 5,000 acres above station. Base for partial-duration series, 500 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	May 2, 1946	6.3		[a]1,300	1950	Feb. 2, 1950	6.21	-1.9	-
	May 24, 1946	6.24		1,260		Apr. 6, 1950	4.83		340
	May 31, 1946	8.55		2,550					
	June 11, 1946	7.35		1,640	1951	Jan. 31, 1951	5.61	-1.6	-
	June 18, 1946	7.40		1,640		June 14, 1951	4.63		269
	July 3, 1946	5.75		740	1952	Jan. 23, 1952	6.27	-2.3	-
1947	Feb. 8, 1947	6.64	-2.0	-		Mar. 28, 1952	5.60		590
	Mar. 17, 1947	6.13		834		May 23, 1952	6.62		1,120
	June 22, 1947	8.98		2,800	1953	Mar. 2, 1953	5.45	-1.2	-
1948	Feb. 13, 1948	7.06	-2.5	-		May 29, 1953	5.93		748
	July 11, 1948	5.73		672		June 20, 1953	6.13		852
1949	Feb. 24, 1949	7.11	-2.6	-	1954	[b]	9.45	[c]	-
	Mar. 4, 1949	6.29		985		May 31, 1954	4.72		270
	Mar. 21, 1949	5.49		587	1955	June 11, 1955	5.35		483

[a]About.
[b]Occurred between Jan. 22 and Feb. 1, 1954.
[c]Unknown; probably greater than 4.8 ft.

(112) Belle Fourche River near Belle Fourche, S. Dak.

Location.--Lat 44°41'30", long 103°49'30", in sec. 2, T. 8 N., R. 2 E., on left bank at diversion dam of Belle Fourche irrigation project, 1½ miles northeast of Belle Fourche.
Drainage area.--4,310 sq mi, approximately.
Gage.--Nonrecording gage.
Stage-discharge relation.--Discharge computed as sum of flow over diversion dam, from wier formula, and flow through Inlet Canal, from rated diversion gate openings.
Remarks.--Records furnished by Bureau of Reclamation. All peaks are maximums observed; gage-height record not available. Peaks include flow of Belle Fourche River at diversion dam plus diverted flow through Inlet Canal. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1924	Apr. 9, 1924	-	22,400	1936	Mar. 5, 1936	-	1,440
				1937	July 17, 1937	-	5,350
1927	May 13, 1927	-	8,250	1938	June 28, 1938	-	590
1928	Mar. 12, 1928	-	9,660	1939	Mar. 23, 1939	-	1,070
1929	Apr. 8, 1929	-	15,000	1940	June 4, 1940	-	2,700
1930	June 9, 1930	-	2,060				
				1941	June 10, 1941	-	8,960
1931	June 11, 1931	-	848	1942	May 14, 1942	-	3,740
1932	Apr. 24, 1932	-	6,310	1943	Mar. 28, 1943	-	5,520
1933	May 25, 1933	-	5,090				
1934	June 10, 1934	-	596				
1935	June 2, 1935	-	1,090				

CHEYENNE RIVER BASIN

(113) Belle Fourche River near Fruitdale, S. Dak.

Location.--Lat 44°41'30", long 103°43'55", in NW¼NW¼ sec. 3, T. 8 N., R. 3 E., near right bank on downstream side of pier of bridge on U. S. Highway 212, 2½ miles northwest of Fruitdale and 8 miles downstream from point of diversion to Belle Fourche Reservoir.
Drainage area.--4,540 sq mi, approximately.
Gage.--Nonrecording gage November 1945 to April 1947; recording gage thereafter. Prior to October 1948, at site 100 ft upstream at same datum. Altitude of gage is 2,925 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 3,800 cfs and extended above by logarithmic plotting; subject to changes owing to ice effect, channel shifting, and backwater from beaver dams.
Bankfull stage.--12 ft.
Remarks.--At a point 8 miles above station, water is diverted to Belle Fourche Reservoir (usable capacity, 185,200 acre-ft) through Inlet Canal. Maximum discharge experienced in Inlet Canal 1945-55 was 1,510 cfs Mar. 29, 1952. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	June 1, 1946	9.7		5,710	1951	Sept. 7, 1951	5.66		1,680
1947	June 23, 1947	11.03		7,460	1952	Mar. 31, 1952	6.10		2,280
1948	June 18, 1948	6.98		2,720	1953	Aug. 6, 1953	7.83		4,070
1949	Mar. 5, 1949	9.74	-4.5	-	1954	Nov. 26, 1953	3.50		110
	Mar. 25, 1949	6.26		2,280	1955	Apr. 12, 1954	4.44		597
1950	Apr. 6, 1950	6.78	-2.8	-					
	May 10, 1950	5.36		1,530					

(114) Belle Fourche River near Sturgis, S. Dak.

Location.--Lat 44°30'50", long 103°07'50", in SW¼NE¼ sec. 3, T. 6 N., R. 8 E., near right bank on downstream side of pier of bridge on State Highway 24, half a mile upstream from Bear Butte Creek and 20 miles northeast of Sturgis.
Drainage area.--5,870 sq mi, approximately.
Gage.--Nonrecording gage October 1945 to October 1946; recording gage thereafter. Altitude of gage is 2,525 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 11,000 cfs and extended above by logarithmic plotting; subject to changes owing to ice effect and channel shifting.
Remarks.--At a point 70 miles above station, water is diverted to Belle Fourche Reservoir (usable capacity, 185,200 acre-ft) through Inlet Canal. Base for partial-duration series, 1,500 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	May 24, 1946	13.86		[a]17,900	1950	Apr. 5, 1950	10.35	-4.6	-
1947	Oct. 6, 1946	6.67		2,730		Apr. 8, 1950	8.27		5,170
	Oct. 9, 1946	6.73		2,730		Apr. 15, 1950	8.12		4,820
	Feb. 19, 1947	-		[b]3,000		May 11, 1950	6.53		2,330
	Mar. 18, 1947	8.23		5,530					
	Mar. 21, 1947	9.46		7,830	1951	June 20, 1951	5.70		1,330
	Mar. 31, 1947	5.91		2,130	1952	Mar. 28, 1952	11.97	-3.7	-
	Apr. 5, 1947	7.13		3,770		Mar. 30, 1952	8.92		6,300
	June 23, 1947	12.53		14,400		May 23, 1952	6.20		1,850
1948	Mar. 21, 1948	9.46	-3.3	-	1953	May 29, 1953	7.98		4,620
	Mar. 22, 1948	7.77		4,220		June 16, 1953	9.1		6,640
	June 19, 1948	7.61		4,060		June 20, 1953	8.97		6,390
	June 22, 1948	6.53		2,520		Aug. 4, 1953	7.22		3,350
1949	Mar. 6, 1949	12.30	-5.0	[a]3,500		Aug. 6, 1953	7.69		4,120
	Mar. 23, 1949	-		[a]5,500	1954	May 23, 1954	7.08		3,160
						June 6, 1954	6.55		2,370
						June 21, 1954	5.89		1,610
					1955	Mar. 10, 1955	5.73	-1.5	-
						July 24, 1955	5.24		848

[a] Annual peak only.
[b] Estimated.

CHEYENNE RIVER BASIN

(115) Bear Butte Creek near Sturgis, S. Dak.

Location.--Lat 44°28'35", long 103°15'50", in SW¼SW¼ sec. 15, T. 6 N., R. 7 E., on upstream side of highway bridge, 1½ miles downstream from Spring Creek, 8½ miles upstream from mouth, and 12¾ miles northeast of Sturgis.
Drainage area.--192 sq mi.
Gage.--Nonrecording. Datum of gage is 2,768.12 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 1,000 cfs and extended above by logarithmic plotting. Controlled at medium and high flow by arch bridge opening. Subject to changes owing to ice effect and channel shifting.
Bankfull stage.--8 ft.
Historical data.--Flood of May 20, 1883 (maximum known), and one in 1909 were greater than flood of May 24, 1946, from information by local residents.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	May 24, 1946	12.07		1,420	1950	Apr. 5, 1950	6.45	-2.9	-
1947	June 22, 1947	10.20		1,020		Apr. 15, 1950	4.68		249
1948	Mar. 15, 1948	5.26	-2.4	-					
	June 23, 1948	4.85		263	1951	May 13, 1951	5.92		352
1949	Mar. 21, 1949	11.8	-6.0	-	1952	May 23, 1952	8.30		701
	May 28, 1949	7.75		636	1953	June 20, 1953	7.05		560
					1954	June 7, 1954	4.90		215
					1955	Apr. 11, 1955	3.62		88

(116) Belle Fourche River near Elm Springs, S. Dak.

Location.--Lat 44°22'10", long 102°33'55", in NE¼NE¼ sec. 29, T. 5 N., R. 13 E., near right bank on downstream side of pier of highway bridge, 4¼ miles northwest of Elm Springs and 5½ miles downstream from Hay Creek.
Drainage area.--7,210 sq mi, approximately.
Gage.--Nonrecording gage August 1928 to June 1932, March 1934 to July 1939; recording gage thereafter. Datum of gage is 2,171.60 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 27,000 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--15 ft.
Historical data.--Maximum stage known, 21.8 ft in May 1927. Flood in spring of 1933 reached a stage of about 20 ft, from floodmarks.
Remarks.--At a point 130 miles above station, water is diverted to Belle Fourche Reservoir (usable capacity, 185,200 acre-ft) through Inlet Canal. Base for partial-duration series, 3,500 cfs. Only annual peaks are shown prior to Oct. 1, 1939.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	June 3, 1929	11.30		25,500	1942	May 1, 1942	6.65		7,600
1930	June 25, 1930	5.26		5,480		May 14, 1942	6.87		8,340
						May 18, 1942	9.00		14,500
1931	July 3 or 4, 1931	8.4		15,100		June 6, 1942	6.42		7,120
1932	Apr. 25, 1932	7.90		14,400		June 28, 1942	4.87		3,670
					1943	Mar. 29, 1943	6.52		7,360
1934	June 9, 1934	2.38		595		June 10, 1943	5.96		6,180
1935	June 1, 1935	11.15		24,800		June 14, 1943	11.1		21,900
					1944	Mar. 28, 1944	13.75	-9.0	-
1936	Mar. 6, 1936	5.40	-3.0	-		Apr. 6, 1944	10.3		19,000
	July 26, 1936	5.06		4,890		May 20, 1944	4.93		3,670
1937	July 13, 1937	12.3		29,300		June 5, 1944	6.88		8,340
1938	June 24, 1938	5.79		6,910		June 9, 1944	4.96		3,880
1939	Mar. 21, 1939	4.03	-.5	1,740		June 13, 1944	8.46		12,900
1940	Apr. 29, 1940	4.63		3,530		June 18, 1944	11.2		22,200
	June 5, 1940	5.38		5,510		June 23, 1944	7.75		11,400
						July 9, 1944	5.60		5,600
1941	Apr. 15, 1941	8.50		12,900	1945	Mar. 15, 1945	8.97		13,300
	June 2, 1941	9.30		15,500		Mar. 25, 1945	6.95		[a]8,000
	June 7, 1941	9.54		16,200		June 10, 1945	7.08		8,210
	June 10, 1941	14.3		35,700		June 14, 1945	5.63		4,710

[a]About.

CHEYENNE RIVER BASIN

(116) Belle Fourche River near Elm Springs, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	May 2, 1946	8.58		12,200	1950	Apr. 4, 1950	8.2		(b)
	May 24, 1946	12.56		25,500		Apr. 7, 1950	6.66		6,980
	June 1, 1946	10.68		18,500		Apr. 15, 1950	6.74		7,240
	June 19, 1946	11.22		22,200		May 9, 1950	5.00		3,760
1947	Oct. 7, 1946	4.86		3,680		Aug. 11, 1950	6.04		5,580
	Mar. 17, 1947	9.59	-6.0	-					
	Mar. 19, 1947	5.42		4,840	1951	June 20, 1951	3.40		1,930
	Apr. 5, 1947	5.99		6,180	1952	Apr. 1, 1952	9.5		14,400
	June 23, 1947	10.71		20,400	1953	Mar. 12, 1953	5.15	-1.6	-
1948	Mar. 22, 1948	7.10	-1.5	-		May 3, 1953	5.09		3,990
	Mar. 22, 1948	6.88		8,280		May 29, 1953	5.94		5,310
	June 20, 1948	5.29		4,700		June 17, 1953	6.23		5,900
	June 23, 1948	4.79		3,630		June 21, 1953	7.41		8,740
	Aug. 9, 1948	6.72		7,760		Aug. 7, 1953	5.37		4,270
1949	Mar. 7, 1949	8.47	-2.5	a6,000	1954	May 23 or 24, 1954	-		(b)
	Mar. 23, 1949	9.29	-1.5	-		June 7, 1954	5.01		3,700
	Mar. 23, 1949	8.30		12,800		June 10, 1954	8.09		10,500
	Mar. 27, 1949	7.18		9,350	1955	July 9, 1955	4.57		3,090
	Apr. 7, 1949	4.93		4,170					

[a]About.
[b]Unknown; greater than 3,500 cfs.

(117) Cheyenne River near Plainview, S. Dak.

Location.--Lat 44°31'25", long 101°59'30", in NE¼SW¼ sec. 31, T. 7 N., R. 18 E., on downstream side of third pier from right end of bridge on State Highway 73, 1¼ miles downstream from Ash Creek and 10 miles southeast of Plainview.
Drainage area.--21,600 sq mi, approximately.
Gage.--Nonrecording gage October 1950 to March 1951; recording gage thereafter. Datum of gage is 1,877.65 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 24,000 cfs and extended above by logarithmic plotting; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--13 ft.
Historical data.--Maximum stage known, about 17½ ft late in May 1920, from information by local residents. Flood in May 1927 reached a stage of about 14 ft, from information by local residents.
Remarks.--Base for partial-duration series, 4,500 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1951	June 20, 1951	5.82		4,930	1953	Mar. 11, 1953	7.22	-2.0	-
	June 24, 1951	5.82		4,930		Mar. 12, 1953	6.52		5,930
1952	Mar. 29, 1952	10.62	-4.0	-		May 1, 1953	7.02		7,630
	Mar. 30, 1952	10.55		41,400		May 4, 1953	7.38		8,940
	May 23, 1952	8.99		18,800		May 30, 1953	6.57		5,780
	May 26, 1952	6.33		5,470		June 18, 1953	6.68		5,710
	June 4, 1952	7.32		8,260		June 20, 1953	8.97		15,700
						Aug. 5, 1953	6.64		6,220
					1954	June 10, 1954	7.68		9,710
					1955	Mar. 12, 1955	7.20	-3.4	-
						Aug. 12, 1955	6.38		5,840
						Sept. 21, 1955	9.53		21,000

(118) Cherry Creek near Plainview, S. Dak.

Location.--Lat 44°44'35", long 102°03'10", in SW¼NE¼ sec. 16, T. 9 N., R. 17 E., on left bank 5 ft downstream from bridge on State Highway 73, a quarter of a mile downstream from small tributary, 6½ miles downstream from Red Owl Creek, and 11 miles northeast of Plainview.
Drainage area.--1,190 sq mi, approximately.
Gage.--Nonrecording gage November 1945 to June 1948; recording gage thereafter. Datum of gage is 2,158.06 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--15 ft.
Remarks.--Base for partial-duration series, 1,000 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	May 26, 1946	9.05		1,180	1952	Feb. 13, 1952	10.13	-4.0	-
1947	Feb. 16, 1947	14.25	-6.0	-		Apr. 1, 1952	22.63		17,500
	June 25, 1947	11.65		2,540	1953	Mar. 22, 1953	12.24		2,380
1948	June 5, 1948	9.2		1,280		May 4, 1953	8.96		1,030
1949	Mar. 27, 1949	12.88		2,980		June 1, 1953	10.22		1,570
1950	Apr. 8, 1950	12.90		2,980		June 16, 1953	16.91		5,960
	Apr. 17, 1950	12.45		2,760		June 20, 1953	14.58		3,880
						Aug. 7, 1953	8.74		1,030
1951	Sept. 7, 1951	8.29		996	1954	June 12, 1954	10.89		1,800
					1955	Mar. 11, 1955	8.03		771

(119) Cheyenne River near Eagle Butte, S. Dak.

Location.--Lat 44°41'40", long 101°13'05", in NE¼SE¼ sec. 32, T. 9 N., R. 24 E., on downstream side of fourth pier from left abutment of bridge on State Highway 63, 0.5 mile upstream from Hermaphrodite Creek and 21 miles south of Eagle Butte.
Drainage area.--24,500 sq mi, approximately.
Gage.--Nonrecording gage August 1928 to November 1934; recording gage thereafter. Datum of gage is 1,601.57 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 30,000 cfs and extended above by logarithmic plotting; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--16 ft.
Historical data.--Flood of May 13, 1920, reached a stage of 18.9 ft and that of May 9, 1927, reached a stage of 18.1 ft; from information by local residents.
Remarks.--Base for partial-duration series, 5,500 cfs. Only annual peaks are shown prior to Oct. 1, 1934.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	June 3, 1929	10.12		49,600	1937	Mar. 16, 1937	6.10	-2.5	-
	June 6, 1929	10.12		-		June 13, 1937	6.61		10,900
1930	Feb. 24, 1930	5.95		6,260		June 15, 1937	5.81		7,150
						June 19, 1937	7.14		14,200
1931	July 4, 1931	5.80		8,600		July 13, 1937	11.79		64,400
1932	May 7, 1932	10.9		53,000		July 18, 1937	7.53		18,200
1933	May 24, 1933	15.00		104,000	1938	Mar. 1, 1938	5.40	-2.4	-
1934	July 28, 1934	4.48		3,080		June 24, 1938	7.28		16,300
1935	Apr. 27, 1935	5.65		6,770		Sept. 7, 1938	5.55		6,770
	May 21, 1935	5.77		7,530	1939	May 23, 1939	6.23		10,400
	May 23, 1935	5.40		6,110		May 26, 1939	6.94		14,500
	May 30, 1935	5.67		7,150		July 3, 1939	5.28		6,400
	June 2, 1935	10.80		51,600	1940	Mar. 29, 1940	6.80	-3.5	-
						Apr. 29, 1940	4.95		5,100
1936	Mar. 7, 1936	7.05	-0.7	[a]10.000					

[a]About.

CHEYENNE RIVER BASIN

(119) Cheyenne River near Eagle Butte, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1941	Apr. 16, 1941	7.35		16,200	1947	Feb. 17, 1947	8.03	-0.9	[a]8,500
	June 3, 1941	7.52		14,700		Mar. 20, 1947	6.9	-.1	[a]7,000
	June 8, 1941	7.99		17,700		Mar. 24, 1947	6.93		7,830
	June 11, 1941	12.2		59,000		Apr. 6, 1947	6.69		7,140
	July 15, 1941	5.73		6,480		June 11, 1947	6.54		6,020
1942	Apr. 26, 1942	5.38		5,760		June 23, 1947	12.3		50,000
	Apr. 29, 1942	5.27		5,760		July 1, 1947	8.26		14,300
	May 2, 1942	9.85		37,600	1948	Mar. 19, 1948	9.56	-3.0	-
	May 7, 1942	7.39		16,400		Mar. 21, 1948	7.16		10,400
	May 14, 1942	10.35		37,600		Mar. 23, 1948	6.54		6,900
	May 18, 1942	9.80		31,600		June 23, 1948	6.71		8,850
	June 6, 1942	8.67		22,400		June 28, 1948	6.09		5,600
1943	Feb. 23, 1943	6.13		7,050	1949	Mar. 7, 1949	9.72		31,800
	Mar. 30, 1943	6.75		10,700		Mar. 24, 1949	8.85		24,000
	June 11, 1943	7.85		16,400	1950	Apr. 1, 1950	6.70		8,250
	June 15, 1943	9.70		30,700		Apr. 5, 1950	7.25		12,400
1944	Apr. 2, 1944	10.0	-2.8	-		Apr. 8, 1950	7.53		14,500
	Apr. 3, 1944	7.60		14,800		Apr. 16, 1950	7.37		13,800
	Apr. 7, 1944	8.91		24,000		May 10, 1950	7.34		13,100
	June 6, 1944	6.34		7,700					
	June 10, 1944	6.22		6,260	1951	Mar. 27, 1951	9.46	-3.0	-
	June 13, 1944	8.44		21,400		Mar. 28, 1951	7.32	-.5	[a]9,400
	June 19, 1944	9.42		28,000	1952	Feb. 10, 1952	7.59	-2.0	-
	June 22, 1944	7.81		15,200		Apr. 2, 1952	11.36		38,500
	June 24, 1944	7.80		15,200		May 23, 1952	7.64		15,100
	July 10, 1944	6.43		6,180		June 5, 1952	6.09		5,760
	July 13, 1944	6.42		6,130	1953	Mar. 12, 1953	9.70	-1.0	23,200
1945	Mar. 14, 1945	8.96	-1.5	-		Mar. 22, 1953	7.36		12,400
	Mar. 16, 1945	8.46		20,200		May 3, 1953	7.16		11,200
	Mar. 26, 1945	7.77		15,200		June 17, 1953	6.83		8,040
	June 11, 1945	7.31		14,400		June 21, 1953	8.45		19,000
	June 15, 1945	6.64		8,520	1954	June 11, 1954	6.83		9,350
					1955	Mar. 12, 1955	6.46	-1.5	-
1946	May 3, 1946	9.11		25,400		Sept.22, 1955	8.55		17,600
	May 25, 1946	10.47		38,500					
	June 2, 1946	9.14		25,400					
	June 15, 1946	7.05		8,210					
	June 20, 1946	10.16		35,500					
	June 24, 1946	8.47		17,800					
	June 27, 1946	7.75		11,600					
	July 18, 1946	6.84		7,370					

[a]About.

MISSOURI RIVER MAIN STEM

(120) Missouri River at Pierre, S. Dak.

Location.--Lat 44°22'25", long 100°22'05", in SW¼ sec. 32, T. 111 N., R. 79 W., near left bank on downstream side of pier of Chicago and North Western Railway bridge at Pierre, 1.2 miles upstream from Bad River and at mile 1,117.6.
Drainage area.--243,500 sq mi, approximately.
Gage.--Nonrecording gage October 1929 to March 1932; recording gage thereafter. Prior to Mar. 11, 1932, at same site at datum 2.00 ft higher; gage heights given herein converted to present datum. Datum of present gage is 1,414.41 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--15 ft.
Remarks.--Flow regulated by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft) since November 1937 and by Garrison Reservoir (capacity, 23,000,000 acre-ft) since November 1953. Only annual peaks are shown.

MISSOURI RIVER MAIN STEM

(120) Missouri River at Pierre, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1930	Mar. 12, 1930	8.81	-2.5	-	1941	June 13, 1941	12.94		132,000
	Apr. 7, 1930	8.75		74,600	1942	June 11, 1942	10.95		91,900
					1943	Apr. 6, 1943	19.65		281,000
1931	June 12, 1931	8.58		46,400	1944	Apr. 9, 1944	15.58		191,000
1932	June 15, 1932	10.96		121,000	1945	Mar. 20, 1945	10.50		108,000
1933	May 28, 1933	10.29		119,000					
	June 25, 1933	10.40		-	1946	June 20, 1946	10.05		83,000
1934	Feb. 28, 1934	10.65	-3.0	-	1947	Apr. 1, 1947	16.50		241,000
	June 19, 1934	8.63		50,900	1948	Mar. 24, 1948	14.07	-1.0	-
1935	July 14, 1935	12.25		131,000		Mar. 24, 1948	13.47		154,000
					1949	Apr. 5, 1949	15.00		187,000
1936	Mar. 19, 1936	10.90	-1.0	-	1950	Apr. 21, 1950	18.44		269,000
	Apr. 17, 1936	10.00		104,000					
1937	June 20, 1937	12.00		120,000	1951	Apr. 8, 1951	12.26		127,000
1938	Mar. 22, 1938	12.95		171,000	1952	Apr. 10, 1952	25.35		440,000
1939	Mar. 31, 1939	14.20		197,000	1953	June 22, 1953	12.43		112,000
1940	June 13, 1940	9.46		60,800	1954	Oct. 29, 1953	8.05		46,600
					1955	May 29, 1955	8.77		48,800

BAD RIVER BASIN

(121) North Fork Bad River at Philip, S. Dak.

Location.--Lat 44°02', long 101°41', in SW¼SW¼ sec. 14, T. 1 N., R. 20 E., near center of span on downstream side of highway bridge, half a mile west of Philip and 1¼ miles upstream from confluence with Cottonwood Creek.
Drainage area.--164 sq mi, approximately.
Gage.--Nonrecording gage. Datum of gage is 2,154.19 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 1,100 cfs; subject to changes owing to backwater from Cottonwood Creek.
Bankfull stage.--15 ft.
Historical data.--Flood in May 1927 reached a stage of 18.2 ft, from information by local residents.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1939	May 25, 1939	10.5	1,000	1942	June 4, 1942	14.7	1,640
1940	Apr. 30, 1940	2.15	3.6	1943	June 14, 1943	13.72	1,470
				1944	Apr. 7, 1944	6.40	352
1941	May 1, 1941	9.15	762				
	June 11, 1941	[a]10.2	-				

[a]Backwater from Cottonwood Creek.

(122) Bad River near Midland, S. Dak.

Location.--Lat 44°04'05", long 101°07'45", in SE¼SE¼ sec. 5, T. 1 N., R. 25 E., near center of span on downstream side of highway bridge, three-fifths of a mile downstream from Ash Creek, 1¼ miles east of Midland, and 2¼ miles downstream from Mitchell Creek.
Drainage area.--1,500 sq mi, approximately.
Gage.--Nonrecording gage. Datum of gage is 1,833.42 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--15 ft.
Remarks.--Base for partial-duration series, 500 cfs.

BAD RIVER BASIN

(122) Bad River near Midland, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	June 20, 1946	5.74		[a]1,020	1952	Feb. 14, 1952	4.87	-1.0	550
1947	June 24, 1947	6.15		[a]1,480		Apr. 2, 1952	14.00		11,200
1948	Mar. 16, 1948	5.00	-1.2	-		Apr. 5, 1952	13.60		10,300
	May 10, 1948	4.50		640		Apr. 7, 1952	12.10		7,560
	June 17, 1948	10.5		5,080		May 24, 1952	5.00		836
	June 21, 1948	8.90		3,660		June 4, 1952	6.64		1,890
	June 24, 1948	6.75		1,840		June 28, 1952	9.12		3,840
1949	Mar. 10, 1949	6.30	-1.1	1,000	1953	Mar. 14, 1953	9.38		5,380
	Mar. 24, 1949	7.05		1,970		Mar. 18, 1953	8.43		4,250
1950	Mar. 25, 1950	9.38		4,040		Mar. 21, 1953	9.40		5,400
	Apr. 1, 1950	11.00		5,570		May 3, 1953	10.16		6,340
	May 6 or 7, 1950	8.60		3,300		June 15, 1953	6.45		2,380
						Aug. 3, 1953	7.5		3,330
1951	Mar. 28, 1951	3.84		542		Aug. 5, 1953	4.95		1,050
	June 8, 1951	5.50		1,200	1954	May 25, 1954	5.04		1,050
	Sept. 4, 1951	4.51		793	1955	Mar. 9, 1955	7.03	-1.6	-
						Mar. 9, 1955	6.56	-.1	2,200
						May 29, 1955	5.59		1,440
						Sept.23, 1955	5.5		1,120

[a]Annual peak only.

(123) Bad River near Fort Pierre, S. Dak.

Location.--Lat 44°19'40", long 100°23'00", in NW¼ sec. 10, T. 4 N., R. 31 E., on right bank on downstream side of pier of highway bridge, 2½ miles south of Fort Pierre, 4¾ miles downstream from Willow Creek, and 5 miles upstream from mouth.
Drainage area.--3,107 sq mi.
Gage.--Nonrecording gage August 1928 to June 1932, March 1934 to July 1951; recording gage thereafter. Datum of gage is 1,427.83 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 33,000 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--16 ft.
Historical data.--Flood in April 1927 reached a stage of 30.89 ft, from floodmark (discharge, about 50,000 cfs). Flood in July 1905 reached a stage about 2 ft higher than that of 1927 (House Document 189). Roughly estimated discharge for 1905 flood is 70,000 cfs. Floods in 1915 and June 1920 reached stages of 29.6 ft and 27.4 ft, respectively.
Remarks.--Base for partial-duration series, 1,100 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Apr. 25, 1929	21.18		11,800	1945	Mar. 2, 1945	10.72	-5.4	-
1930	Aug. 19, 1930	20.20		10,200		June 13, 1945	6.35		1,240
1931	Jan. 30, 1931	8.40		2,300	1946	July 2, 1946	12.53		4,600
1932	May 7, 1932	17.24		7,350	1947	Mar. 21, 1947	11.4	-4.8	-
						June 22, 1947	8.79		2,290
1934	July 26, 1934	9.98		3,100	1948	Feb. 26, 1948	7.38	-.5	1,100
1935	Apr. 26, 1935	12.60		4,480		Mar. 15, 1948	15.0	-5.0	2,600
						Mar. 19, 1948	10.95	-.7	2,700
1936	Mar. 11, 1936	5.11		844		May 10, 1948	9.45		2,350
1937	June 13, 1937	21.85		12,400		June 18, 1948	13.97		5,380
1938	Sept. 8, 1938	17.6		8,700		June 21, 1948	12.00		3,830
1939	Mar. 20, 1939	9.80	-2.2	-		June 24, 1948	12.00		3,830
	Aug. 27, 1939	9.00		2,720		July 20, 1948	8.52		1,800
1940	Apr. 1, 1940	5.83		1,070		Aug. 9, 1948	15.96		7,180
					1949	Mar. 8, 1949	7.6		1,360
1941	June 11, 1941	11.22		4,100		Mar. 22, 1949	11.6	-4.4	-
1942	May 1, 1942	27.8		34,200		Mar. 27, 1949	10.81		3,350
1943	Mar. 23, 1943	16.04		6,930		Apr. 10, 1949	6.91		1,100
	June 14, 1943	15.96		6,930		June 1, 1949	7.75		1,620
1944	Apr. 1, 1944	10.75		3,930					

BAD RIVER BASIN

(123) Bad River near Fort Pierre, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Oct. 11, 1949	7.90		1,540	1953	Mar. 14, 1953	19.78		10,100
	Mar. 5, 1950	9.00		(a)		Mar. 21, 1953	18.88		10,500
	Mar. 17, 1950	15.15		(a)		May 2, 1953	19.80		11,700
	Mar. 25, 1950	21.20		12,700		June 15, 1953	11.25		3,020
	Apr. 2, 1950	23.40		16,700		Aug. 2, 1953	9.37		2,110
	May 8, 1950	16.95		8,120		Aug. 5, 1953	11.19		3,260
	Sept.21, 1950	19.80		10,800	1954	June 11, 1954	23.35		16,600
					1955	Mar. 10, 1955	22.90	-1.5	-
1951	Mar. 27, 1951	12.63		4,420		Mar. 14, 1955	8.67	-.3	1,620
	June 8, 1951	19.50		10,500		June 1, 1955	13.68		5,120
	June 24, 1951	9.62		2,330		June 4, 1955	11.16		3,240
	July 3, 1951	15.60		6,680		June 28, 1955	9.43		2,170
1952	Oct. 4, 1951	15.13		6,260					
	Apr. 1, 1952	27.24	-3.0	-					
	Apr. 7, 1952	27.03		28,100					
	June 5, 1952	11.38		3,410					
	June 23, 1952	8.30		1,620					
	June 29, 1952	12.55		4,260					

[a]Unknown; greater than 1,100 cfs.

MEDICINE CREEK BASIN

(124) Medicine Creek near Blunt, S. Dak.

Location.--Lat 44°33'45", long 99°54'40", in NW¼ sec. 31, T. 113 N., R. 75 W., on left bank at downstream side of highway bridge, 3 miles upstream from South Fork Medicine Creek and 5 miles northeast of Blunt.
Drainage area.--455 sq mi, approximately.
Gage.--Nonrecording gage March to October 1950; recording gage thereafter. Altitude of gage is 1,612 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--10 ft.
Historical data.--Flood in 1917 reached a stage of about 15 ft, from information by local residents.
Remarks.--Base for partial-duration series, 50 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Mar. 26-29, 1950	13.2	(a)	-	1953	Mar. 14, 1953	11.89	-2.2	-
	Mar. 30, 1950	12.79	-1.0	1,350		Mar. 17, 1953	11.58	-1.7	330
						Mar. 22, 1953	11.27	-1.0	444
1951	Mar. 28, 29, 1951	9.00	-2.0	-		May 2, 1953	8.47		52
	Aug. 16, 1951	8.55		52		Aug. 2, 1953	11.04		458
1952	Apr. 5, 1952	12.34		1,830	1954	June 13, 1954	7.91		12
					1955	Mar. 11, 1955	12.04	-1.2	526

[a]Unknown; greater than -1.5 ft.

MISSOURI RIVER MAIN STEM

(125) Missouri River at Chamberlain, S. Dak.

Location.--Lat 43°48'40", long 99°20'10", in NE¼ sec. 16, T. 104 N., R. 71 W., near left bank on downstream side of bridge on U. S. Highway 16 at Chamberlain, and at mile 1,012.8.
Drainage area.--250,800 sq mi, approximately.
Gage.--Nonrecording gage Aug. 19, 1928, to Sept. 30, 1929, Mar. 7 to Aug. 26, 1945, and Jan. 19 to Sept. 30, 1954; recording gage Aug. 27, 1945, to Jan. 18, 1954. August 1928 to September 1929 at site 1,800 ft upstream at datum 4.00 ft higher; gage heights given herein converted to present datum. Mar. 7, 1945, to May 26, 1953, at site 600 ft upstream, and May 27, 1953, to Jan. 18, 1954, at site 1,800 ft upstream; both at present datum. Datum of gage is 1,320.11 ft above mean sea level, datum of 1929.

MISSOURI RIVER MAIN STEM

(125) Missouri River at Chamberlain, S. Dak.--Continued

Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting, and to highway construction fill downstream during 1953. Affected by backwater from Fort Randall Reservoir after about mid July 1954.
Bankfull stage.--18 ft.
Historical data.--Flood of April 7, 1943, reached a stage of 19.3 ft (U. S. Weather Bureau readings).
Remarks.--Flow regulated by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft) since November 1937 and by Garrison Reservoir (capacity, 23,000,000 acre-ft) since November 1953.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1929	Mar. 30, 1929	13.26	-	1949	Apr. 6, 1949	15.02	177,000
	June 4, 1929	13.06	151,000	1950	Apr. 22, 1950	18.80	250,000
1945	Mar. 21, 1945	11.45	107,800	1951	Apr. 8, 1951	11.52	113,000
				1952	Apr. 11, 1952	25.55	440,000
1946	June 21, 1946	10.35	81,000	1953	June 18, 1953	13.97	112,000
1947	Apr. 2, 1947	16.22	213,000	1954	Oct. 30, 1953	8.66	47,500
1948	Mar. 25, 1948	11.82	122,000		Sept.30, 1954	[a]13.83	-

[a]Backwater from Fort Randall Reservoir.

WHITE RIVER BASIN

(126) White River near Oglala, S. Dak.

Location.--Lat 43°15'10", long 102°49'30", in SW¼NE¼ sec. 24, T. 38 N., R. 47 W., on right bank at downstream side of highway bridge, 3 miles downstream from Blacktail Creek and 7 miles northwest of Oglala.
Drainage area.--2,200 sq mi, approximately.
Gage.--Nonrecording gage May 1943 to May 1947; recording gage thereafter. Datum of gage is 2,853.54 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 2,800 cfs and extended above by velocity-area studies; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--19 ft.
Remarks.--Base for partial-duration series, 800 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1944	June 14, 1944	17.12		[a]1,370	1950	May 10, 1950	10.50		455
1945	Mar. 26, 1945	13.68		[a]968					
					1951	July 30, 1951	12.63		733
1946	May 3, 1946	14.32		[a]1,040	1952	Mar. 13, 1952	11.70	-4.5	-
1947	June 21, 1947	23.50		5,200		Mar. 31, 1952	10.42		513
	June 30, 1947	19.35		2,010	1953	Mar. 13, 1953	14.42	-1.4	-
	July 10, 1947	19.05		1,880		Mar. 14, 1953	13.99	-.5	830
1948	Mar. 20, 1948	13.91	-3.0	-	1954	May 26, 1954	12.05		672
	Aug. 9, 1948	13.16		832	1955	June 17, 1955	13.46		807
1949	Mar. 4, 1949	20.60		2,670		Sept.21, 1955	19.19		2,110
	Mar. 5, 1949	20.63		-					
	Mar. 22, 1949	14.15		892					

[a]Annual peak only.

WHITE RIVER BASIN

(127) White River near Interior, S. Dak.

Location.--Lat 43°42'30", long 102°01'10", in SE¼ sec. 12, T. 4 S., R. 17 E., on right bank 700 ft upstream from highway bridge, 2 miles upstream from Potato Creek and 2½ miles southwest of Interior.
Drainage area.--4,120 sq mi, approximately.
Gage.--Nonrecording gage. June 24, 1904, to Nov. 30, 1906, at site about 5 miles downstream at different datum. Sept. 1, 1911, to Sept. 30, 1918, at site 700 ft downstream at datum 1.98 ft lower. Aug. 9, 1928, to June 30, 1932, and Sept. 24, 1939, to June 4, 1942, at site 700 ft downstream at same datum. Gage heights for 1912-18 given herein converted to present datum. Altitude of gage is 2,330 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements below 7,100 cfs and extended above by logarithmic plotting; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--12 ft.
Remarks.--Annual peaks only are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1905	June 18, 1905	16.0		16,500	1918	July 17, 1918	7.0		5,500
1906	Aug. 20, 1906	7.4		3,410	1929	Mar. 5, 1929	7.5		6,300
					1930	Aug. 16, 1930	8.6		8,510
1912	Mar. 20, 1912	8.9	(a)	-					
	Mar. 22, 1912	7.9		8,230	1931	Oct. 3, 1930	6.0		3,670
1913	June 14, 1913	6.0		4,720	1932	May 6, 1932	10.0		11,500
1914	June 30, 1914	5.4		3,650					
1915	June 12, 1915	11.0		13,300	1940	Mar. 15, 1940	5.00	-1.0	-
						July 26, 1940	4.66		1,940
1916	May 21, 1916	8.8		9,120					
1917	Mar. 23, 1917	9.8	-4.0	-	1941	June 10, 1941	7.7		8,730
	May 26, 1917	7.4		6,500	1942	May 1, 1942	12.4		17,100

[a]Unknown; probably greater than -1.0 ft.

(128) White River near Kadoka, S. Dak.

Location.--Lat 43°45'10", long 101°31'30", in SE¼SE¼ sec. 30, T. 3 S., R. 22 E., Black Hills meridian, near center of span on downstream side of bridge on State Highway 73, 5 miles upstream from Pass Creek, 5½ miles downstream from Cottonwood Creek, and 5¾ miles south of Kadoka.
Drainage area.--5,000 sq mi, approximately.
Gage.--Nonrecording gage July 19, 1942, to June 13, 1949, and since Mar. 9, 1955; intermittent recording gage and nonrecording gage June 14, 1949, to Mar. 8, 1955. Prior to Mar. 9, 1955, at site a quarter of a mile downstream at same datum. Datum of present gage is 2,122.18 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 16,000 cfs and extended above by logarithmic plotting; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--16 ft.
Historical data.--Flood of June 4, 1942, reached a stage of 16.24 ft, from floodmarks (discharge 32,000 cfs, from rating curve extended above 16,000 cfs). Floods of Mar. 8, 1905, and spring of 1927 were 1 or 2 ft higher than flood of June 4, 1942, from information by local residents.
Remarks.--Base for partial-duration series, 3,600 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1943	May 30, 1943	10.25		8,080	1949	Mar. 7, 1949	9.40		6,840
1944	Mar. 24, 1944	12.2	-4.0	-		Aug. 18, 1949	7.70		4,250
	June 12, 1944	11.60		13,100	1950	Mar. 23, 1950	8.08	-0.5	3,800
1945	Aug. 5, 1945	7.55		3,700		May 9, 1950	8.84		5,630
1946	June 19, 1946	9.95		7,940	1951	Mar. 23, 1951	8.33		4,850
1947	June 23, 1947	12.20		16,500		June 2, 1951	7.56		4,280
1948	Feb. 19, 1948	10.0	-2.0	4,500		June 7, 1951	13.83		21,700
	June 17, 1948	8.4		5,000		June 20, 1951	8.55		7,150
	June 23, 1948	9.75		8,690		June 24, 1951	7.55		5,280
	June 26, 1948	8.50		5,960		Sept. 2, 1951	8.63		5,280

(128) White River near Kadoka, S. Dak.--Cpntinued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1952	Mar. 29, 1952	11.35		11,800	1954	May 23, 1954	8.78		7,710
	May 23, 1952	11.19		13,500	1955	Mar. 10, 1955	12.43	-4.2	-
	June 28, 1952	10.53		11,400		Mar. 11, 1955	9.54	-.5	5,150
1953	Feb. 6, 1953	11.43	-1.5	9,600		May 27, 1955	8.80		4,770
	Mar. 10, 1953	11.96	-1.5	10,800		Sept.21, 1955	13.28		14,400
	Mar. 12, 1953	9.14	-.3	6,790					
	May 2, 1953	10.46		10,800					
	July 28, 1953	13.08		18,800					
	Aug. 2, 1953	13.2		19,300					

(129) South Fork White River near Rosebud, S. Dak.

Location.--Lat 43°19'30", long 100°53'05", in NW¼ sec. 28, T. 39 N., R. 30 W., on left bank at downstream side of bridge on U. S. Highway 18, 4½ miles downstream from Rosebud Creek and 6½ miles northwest of Rosebud.
Drainage area.--1,020 sq mi, approximately.
Gage.--Nonrecording gage May 1943 to May 1948; recording gage thereafter. Altitude of gage is 2,295 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 810 cfs and extended above by velocity-area studies; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--17 ft.
Remarks.--Base for partial-duration series, 330 cfs. Only annual peaks are shown prior to Oct. 1, 1947.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1944	May 17, 1944	13.92		4,470	1951	Mar. 22, 1951	6.24	-1.2	340
1945	Mar. 10, 1945	9.96	-3.5	-		Mar. 26, 1951	6.35	-1.9	-
	Mar. 12, 1945			[a]700	1952	Mar. 17, 1952	7.63	-1.6	650
						Mar. 23, 1952	4.97		365
1946	Feb. 18, 1946	6.99	-3.0	-		Mar. 29, 1952	6.75		942
	Aug. 28, 1946	5.8		566	1953	Feb. 10, 1953	7.00	-3.0	-
1947	Mar. 10, 1947	6.53	-2.5	-		Mar. 3, 4, 1953	7.00	-2.5	-
	Mar. 14, 15, 1947	-		[a]417		Mar. 15, 1953	4.91		436
1948	Mar. 11, 1948	7.33	-3.0	-		Mar. 18, 1953	5.13		510
	Aug. 13, 1948	5.52		498		May 3, 1953	5.10		500
1949	Mar. 4, 1949	10.28	-2.5	1,250	1954	Jan. 14, 1954	5.93	-2.0	-
	Mar. 5, 1949	11.87	-4.5	-		Mar. 19, 1954	4.38		311
	May 31, 1949	5.27		392	1955	Mar. 10, 1955	9.47	-4.0	-
1950	Feb. 18, 1950	7.75	-2.5	400		Mar. 11, 1955	9.33	-3.1	770
	Mar. 16, 1950	7.92	-.5	1,100		Mar. 14, 1955	5.75		635
	Mar. 23, 1950	9.98		2,220		Mar. 29, 1955	5.00		443
	Mar. 31, 1950	5.88		596		June 2, 1955	4.74		368
	July 18, 1950	5.56		491		June 16, 1955	5.07		462

[a]Daily mean discharge.

(130) South Fork White River below White River, S. Dak.
(Published as "near White River" 1929-32 and "at White River" 1938-40)

Location.--Lat 43°36'00", long 100°43'50", in NE¼SE¼ sec. 23, T. 42 N., R. 29 W., on right bank 1 mile upstream from small tributary, 2 miles downstream from Pine Creek, and 2½ miles northeast of White River.
Drainage area.--1,570 sq mi, approximately; 1,380 sq mi, approximately at 1930-32 site; 1,420 sq mi, approximately, 1939-40 site.
Gage.--Nonrecording gage April 1929 to June 1932 and February to July 1938; recording gage August 1938 to September 1940 and since October 1949. At sites 7½ miles upstream 1929-32 and 2½ miles upstream 1938-40; at different datums. Altitude of present gage is 1,906 ft (by barometer).

WHITE RIVER BASIN

(130) South Fork White River below White River, S. Dak.--Continued

Stage-discharge relation.--Defined by current-meter measurements below 600 cfs 1929-32 and below 280 cfs 1938-40; extended above by velocity-area studies. Defined by current-meter measurements throughout at present site. Subject to changes at all sites owing to ice effect and channel shifting.
Bankfull stage.--7 ft.
Remarks.--Peaks affected by regulation at small powerplant 3 miles upstream subsequent to 1938. Discharge given herein converted to present site by drainage-area relation. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1930	May 11, 1930	5.16		1,390	1950	Mar. 24, 1950	8.93		-
1931	Feb. 4, 1931	3.48		438	1951	Mar. 24, 1951	4.07	-1.8	-
1932	May 6, 1932	8.22		4,110		Aug. 1, 1951	3.59		1,830
					1952	Mar. 28, 1952	10.90	-5.2	-
1939	Mar. 12, 1939	7.88	-5.0	-		Mar. 29, 1952	6.15		5,850
	May 23, 1939	4.25		909	1953	Mar. 12, 1953	4.93	-1.7	-
1940	Mar. 16, 1940	4.21	-2.0	-		Apr. 30, 1953	4.16		2,820
	June 3, 1940	3.41		[a]565	1954	Mar. 17, 1954	3.23		[a]1,870
					1955	Mar. 10, 1955	6.35	-2.5	-
						Mar. 11, 1955	4.03		2,840

[a]Affected by regulation.

(131) White River at Westover, S. Dak.
(Published as "near Westover" 1913-17)

Location.--Lat 43°44'30", long 100°39'50", in SW¼ sec. 33, T. 3 S., R. 29 E., at bridge on U. S. Highway 83, half a mile southeast of Westover and 2 miles downstream from South Fork White River.
Drainage area.--7,850 sq mi, approximately.
Gage.--Nonrecording gage. Datum of gage is 1,755.8 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 9,100 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--12 ft.
Remarks.--All gage heights are maximums observed. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1913	Apr. 14, 1913	10.9		6,660	1917	Mar. 22, 1917	15.1	-5.0	-
1914	May 4, 1914	9.6		3,630		May 27, 1917	11.0		8,600
1915	Apr. 4, 1915	13.0		15,200	1918	Feb. 25, 1918	11.9	-2.6	-
						June 1, 1918	10.8		7,550
1916	Feb. 18, 1916	11.8	-1.5	-					
	May 25, 1916	10.6		7,700					

(132) White River near Oacoma, S. Dak.

Location.--Lat 43°44'45", long 99°30'20", in NE¼NW¼ sec. 10, T. 103 N., R. 73 W., on left bank a quarter of a mile downstream from bridge on State Highway 47, 8 miles southwest of Oacoma, 8½ miles downstream from Black Dog Creek, and 16 miles upstream from mouth.
Drainage area.--10,200 sq mi, approximately.
Gage.--Nonrecording gage Aug. 24, 1928, to May 18, 1934, and May 10, 1942, to Sept. 30, 1951; recording gage May 19, 1934, to May 9, 1942, and since Oct. 1, 1951. August 1928 to September 1951 at site 12 miles downstream at different datum. October 1951 to May 1955 at site 1 mile downstream at different datum. Altitude of present gage is 1,375 ft (from topographic map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--15 ft.
Remarks.--Base for partial-duration series, 5,500 cfs. Only annual peaks are shown prior to Oct. 1, 1933, and Oct. 1, 1941, to Sept. 30, 1947.

WHITE RIVER BASIN

(132) White River near Oacoma, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 10, 1929	6.6		10,800	1944	Mar. 23, 1944	13.10	-7.8	-
1930	Mar. 10, 1930	14.02	-10.3	-		June 14, 1944	7.04		14,600
	May 13, 1930	6.85		12,100	1945	Mar. 12, 1945	5.05		6,200
1931	Oct. 6, 1930	5.02		5,470	1946	June 20, 1946	4.87		5,530
1932	May 8, 1932	6.8		12,100	1947	Mar. 15, 1947	7.65	-3.4	-
1933	Sept. 1, 1933	5.30		6,580		June 25, 1947	6.28		11,400
1934	June 20, 1934	5.00		5,680	1948	Mar. 21, 1948	5.60	-1.0	-
1935	Apr. 11, 1935	5.52		8,100		June 17, 1948	6.05		12,200
	Apr. 27, 1935	7.30		14,400		June 24, 1948	5.59		11,400
	May 21, 1935	6.60		11,200	1949	Mar. 1, 1949	9.4	-6.0	-
	June 2, 1935	7.55		15,800		Mar. 8, 1949	5.46		10,200
					1950	Mar. 31, 1950	17.6	-9.5	[a]20,000
1936	Mar. 4, 1936	7.36	-2.0	-		May 10, 1950	6.30		11,100
	Mar. 5, 1936	6.40	-.8	7,210					
1937	Mar. 6, 1937	8.68	-4.0	-	1951	June 8, 1951	5.50		7,700
	June 19, 1937	5.94		8,500		June 21, 1951	5.65		8,100
	July 15, 1937	5.15		5,640		June 25, 1951	5.50		7,700
	July 20, 1937	5.79		7,920	1952	Mar. 19, 1952	8.90		(b)
1938	Mar. 13, 1938	8.70	-6.3	-		Mar. 30, 1952	15.40		51,900
	May 20, 1938	6.20		9,540		May 24, 1952	6.50		11,300
1939	Mar. 20, 1939	10.62	-6.5	-		June 29, 1952	6.68		9,970
	May 28, 1939	5.32		6,160	1953	Mar. 12, 1953	11.28		29,900
1940	Mar. 19, 1940	7.00	-3.0	-		Mar. 14, 1953	8.92		17,700
	May 1, 1940	4.35		3,140		Mar. 18, 1953	6.87		10,600
						May 3, 1953	9.82		19,100
1941	June 2, 1941	5.66		7,970		July 29, 1953	6.49		9,360
	June 12, 1941	6.50		10,800		Aug. 3, 1953	6.47		9,290
	July 5, 1941	6.21		9,960	1954	May 25, 1954	5.04		4,990
1942	May 8, 1942	10.7		35,300	1955	Mar. 9, 1955	8.60	-3.4	-
1943	June 1, 1943	4.68		6,980		Mar. 12, 1955	6.74		9,330
						Sept.22, 1955	6.19		10,200

[a]Estimated.
[b]Unknown; greater than 5,500 cfs.

MISSOURI RIVER MAIN STEM

(133) Missouri River below Fort Randall Dam, S. Dak.

Location.--Lat 42°58'55", long 98°29'35", in SW¼NE¼ sec. 28, T. 35 N., R. 10 W., sixth principal meridian, on right bank 6 miles downstream from Randall Creek, 7 miles downstream from Fort Randall Dam, 12 miles south of Lake Andes, and at mile 915.
Drainage area.--263,500 sq mi, approximately.
Gage.--Recording gage. Datum of gage is 1,230.00 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting.
Bankfull stage.--13 ft.
Historical data.--Flood of April 1943 reached a stage of about 16.5 ft. Maximum stage known, in April 1881, was about 5 ft higher than that of April 1943.
Remarks.--Flow regulated by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft) prior to December 1952 and by Fort Randall Reservoir (usable capacity, 9,706,000 acre-ft) thereafter. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1948	Mar. 26, 1948	9.07	103,000	1951	Apr. 8, 1951	9.88	134,000
	June 18, 1948	10.06	-	1952	Apr. 12, 1952	20.82	447,000
1949	Apr. 6, 1949	12.36	182,000	1953	June 24, 1953	11.96	109,000
1950	Apr. 23, 1950	-	[a]249,000	1954	Aug. 1, 1954	5.29	-
					Sept.30, 1954	5.07	34,300
				1955	Aug. 5, 1955	6.15	41,900

[a]Based on records for site near Geddes, 23 miles upstream.

NIOBRARA RIVER BASIN

(134) Keyapaha River near Hidden Timber, S. Dak.

Location.--Lat 43°12'13", long 100°21'20", in SE¼NE¼ sec. 2, T. 37 N., R. 26 W., on left bank A-frame of cableway, 3 miles southeast of Hidden Timber, 3 miles downstream from confluence of Antelope Creek and Rock Creek, 7½ miles upstream from Eagle Creek, and 10½ miles south of Okreek.
Drainage area.--320 sq mi, approximately.
Gage.--Nonrecording gage. Altitude of gage is 2,330 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 380 cfs and extended above by slope-area measurement at 2,710 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--10 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1948	Mar. 15, 1948	6.87	-2.3	150	1951	Mar. 24, 1951	5.41		[a]225
1949	Feb. 26, 1949	8.08	-5.0	-	1952	Mar. 30, 1952	10.6		2,710
	Mar. 4, 1949	7.32	-3.2	120	1953	Mar. 14, 1953	-		[a]1,000
1950	Mar. 24, 1950	10.87		1,680					

[a]Daily mean discharge.

(135) Keyapaha River at Wewela, S. Dak.

Location.--Lat 43°01'40", long 99°46'45", in NE¼SE¼ sec. 24, T. 95 N., R. 76 W., near left bank on downstream side of bridge on U. S. Highway 183, three-quarters of a mile north of Wewela, 4½ miles upstream from Holt Creek, and 11½ miles downstream from Lost Creek.
Drainage area.--1,070 sq mi, approximately.
Gage.--Nonrecording gage. Datum of gage is 2,049.78 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--11 ft.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1939	Mar. 14, 1939	4.45	-1.1	-	1951	July 4, 1951	4.29		262
	Mar. 16, 1939	4.32		378	1952	Mar. 31, 1952	[a]13.45		5,430
1940	Apr. 29, 1940	3.29		239	1953	Mar. 15, 1953	7.70		2,020
					1954	Mar. 22, 1954	-		400
1950	Apr. 25, 1950	13.5	-3.4	2,500	1955	Mar. 10, 1955	9.77	(b)	-
						July 29, 1955	7.02		1,880

[a]Occurred on preceding day.
[b]Greater than -2.8 ft.

MISSOURI RIVER MAIN STEM

(136) Missouri River at Yankton, S. Dak.

Location.--Lat 42°52', long 97°24', between sec. 18, T. 93 N., R. 55 W., and sec. 13, T. 93 N., R. 56 W., on downstream end of left bridge pier of Meridian Highway Bridge on U. S. Highway 281 in Yankton, 5.8 miles upstream from James River, 6.1 miles downstream from Gavins Point Dam, and at mile 840.4.
Drainage area.--279,500 sq mi, approximately.
Gage.--Nonrecording gage November 1930 to September 1932; recording gage thereafter. Datum of gage is 1,159.68 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--12 ft.
Historical data.--Maximum stage known, 30.5 ft Apr. 5, 1881 (ice jam).
Remarks.--Flow regulated by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft) November 1937 to December 1952 and by Fort Randall (usable capacity, 9,706,000 acre-ft) or Gavins Point Reservoirs (usable capacity, 385,100 acre-ft) thereafter. Only annual peaks are shown.

MISSOURI RIVER MAIN STEM

(136) Missouri River at Yankton, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1931	June 15, 1931	17.22		46,500	1943	Apr. 8, 1943	[a]13.60		282,000
1932	Mar. 22, 1932	14.80	-10.2	-	1944	Apr. 9, 1944	10.82		172,700
	June 18, 1932	9.68		124,000	1945	Mar. 12, 1945	8.20	-3.0	-
1933	May 29, 1933	8.21		111,000		Mar. 22, 1945	7.63		98,300
	June 28, 1933	8.64		-					
1934	Mar. 3, 1934	10.30	-1.7	112,000	1946	June 22, 1946	8.57		87,300
1935	July 16, 1935	8.90		130,000	1947	Apr. 3, 1947	11.00		176,000
					1948	Mar. 21, 1948	9.05	-2.0	-
1936	Mar. 21, 1936	7.85	-.6	-		Mar. 26, 1948	8.60		110,000
	Apr. 18, 1936	7.60		102,000	1949	Apr. 7, 1949	[b]10.55		173,000
1937	June 22, 1937	9.60		112,000	1950	Apr. 24, 1950	11.60		237,000
1938	Mar. 24, 1938	9.20		146,000					
	July 12, 1938	10.15		-	1951	Apr. 7, 1951	8.43		134,000
1939	Apr. 1, 1939	[a]10.10		176,000	1952	Apr. 13, 1952	15.5		480,000
1940	June 15, 1940	7.42		50,800	1953	June 25, 1953	8.59		112,000
					1954	June 7, 1954	4.79		38,600
1941	June 14, 1941	10.29		137,000	1955	Mar. 11, 1955	5.61	-2.5	-
1942	May 15, 1942	10.20		126,000		Aug. 25, 1955	4.85		38,500

[a]Occurred on following day.
[b]Occurred three days later.

JAMES RIVER BASIN

(137) James River at New Rockford, N. Dak.

Location.--Lat 47°41'05", long 99°07'30", on line between sec. 32 and 33, T. 149 N., R. 66 W., on right bank 90 ft downstream from bridge on U. S. Highway 281 at New Rockford and 7 miles upstream from small tributary.
Drainage area.--596 sq mi, of which 190 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to Aug. 8, 1951; recording gage thereafter. Datum of gage is 1,500.00 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 470 cfs; subject to changes due to ice effect.
Bankfull stage.--10 ft.
Historical data.--Maximum stage known since at least 1925, about 13 ft in April 1948, from information by local resident. Flood of April 1950 reached a stage of 11.3 ft, from floodmarks.
Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1951	Apr. 12, 1951	9.20		840	1954	June 16, 1954	6.85		21
1952	Apr. 8, 1952	8.85	-0.17	380	1955	Apr. 8-9, 1955	7.52		75
1953	July 11, 1953	6.36		4.1					

(138) Pipestem Creek near Buchanan, N. Dak.

Location.--Lat 47°03'59", long 98°55'07", at north line of sec. 4, T. 141 N., R. 65 W., on left bank 30 ft downstream from bridge on county road and 4½ miles west of Buchanan.
Drainage area.--925 sq mi, of which 450 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to July 11, 1950; recording gage thereafter. Datum of gage is 1,467.01 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--8 ft.
Remarks.--Base for partial-duration series, 200 cfs.

(138) Pipestem Creek near Buchanan, N. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 6, 1950	11.28	-3.37	900	1952	Apr. 4, 1952	9.48	-1.5	-
	Apr. 9, 1950	11.89	-5.52	-		Apr. 4, 1952	9.4	-.92	1,100
	Apr. 17, 1950	10.77		4,480	1953	Mar. 14, 1953	5.1	-2.0	-
	May 12, 1950	10.34		3,440		June 20, 1953	4.41		116
					1954	June 7, 1954	7.27		539
1951	Apr. 4, 1951	8.38	-2.2	-		June 12, 1954	6.02		316
	Apr. 6, 1951	7.84		826	1955	Mar. 31, 1955	7.20	-.9	-
						Apr. 2, 1955	6.77		491

(139) James River at Jamestown, N. Dak.

Location.--Lat 46°53'45", long 98°41'28", in NW¼SW¼ sec. 31, T. 140 N., R. 63 W., on right bank 80 ft downstream from Asylum bridge at southeast corner of Jamestown and 2.5 miles downstream from Pipestem Creek.

Drainage area.--2,840 sq mi, of which 950 sq mi is probably noncontributing.

Gage.--Nonrecording gage prior to Oct. 1, 1949; recording gage thereafter. June 1928 to August 1933 at site 80 ft upstream at datum 5.00 ft lower. August 1937 to September 1939 and March 1943 to Sept. 30, 1949, at site 80 ft upstream at present datum. Datum of present gage is 1,375.27 ft above mean sea level, datum of 1929. Gage heights given herein converted to present site and datum.

Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.

Bankfull stage.--12 ft.

Historical data.--Flood of Apr. 27, 1897, was about the same magnitude as flood of May 13, 1950. Flood of Mar. 27, 1902, was about 2 ft lower and flood of Apr. 11, 1919, was about 1 ft lower than the 1950 flood. Floods also occurred in 1876, 1881, 1882, 1883.

Remarks.--Flow regulated by Arrowood and Jim Lakes (combined capacity, 16,000 acre-ft) and by Jamestown Reservoir since 1954 (capacity, 229,500 acre-ft). Base for partial-duration series, 200 cfs. Only annual peaks are shown prior to Oct. 1, 1949, and subsequent to Oct. 1, 1954.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1928	July 5, 1928	7.4		786	1948	Apr. 23, 1948	[a]14.31		3,250
1929	Mar. 14, 1929	9.2		1,100	1949	Apr. 4, 1949	10.06		1,350
1930	Mar. 11, 1930	6.8	-0.7	580	1950	Apr. 7, 1950	12.85	-1.52	1,680
						Apr. 17, 1950	15.73		6,020
1931	Apr. 6, 1931	2.44		91		May 13, 1950	15.82		6,390
1932	Feb. 28, 1932	7.38	-.4	722		June 12, 1950	6.17		589
1933	Feb. 28, 1933	6.78	-.3	642		June 26, 1950	4.51		328
1938	Mar. 15, 1938	3.90		162	1951	Mar. 29, 1951	9.63	-.55	1,100
1939	Mar. 24, 1939	4.65		250		Apr. 5, 1951	9.48		1,180
					1952	Apr. 4, 1952	10.18		1,360
1943	Mar. 31, 1943	12.77	-.8	1,900		Apr. 8, 1952	11.12		1,620
1944	May 28, 1944	5.58		370	1953	May 30, 1953	6.48		617
1945	Mar. 14, 1945	5.62		434		June 15, 1953	6.14		559
						June 20, 1953	6.63		642
1946	Mar. 23, 1946	4.41		-		June 27, 1953	5.69		486
	Apr. 10, 1946	4.37		159	1954	June 8, 1954	6.95		637
1947	Mar. 24, 1947	7.60	-1.1	-	1955	Apr. 3, 1955	6.10		552
	Apr. 12, 1947	6.93		697					

[a]Occurred on following day.

JAMES RIVER BASIN

(140) James River at La Moure, N. Dak.

Location.--Lat 46°21'20", long 98°18'15", at northeast corner of sec. 11, T. 133 N., R. 61 W., on left bank 80 ft downstream from State Highway 13, half a mile west of La Moure, and 12 miles upstream from Cottonwood Creek.
Drainage area.--5,740 sq mi, approximately, of which 2,800 sq mi is probably noncontributing.
Gage.--Nonrecording gage prior to Sept. 2, 1951; recording gage thereafter. Datum of gage is 1,290.00 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes at high stages owing to channel shifting and ice effect.
Bankfull stage.--14 ft.
Historical data.--A long-time local resident states that the 1950 flood was the highest since 1882, with stage in either 1942 or 1943 being almost as high due to large ice jams.
Remarks.--Flow regulated by Arrowood and Jim Lakes (combined capacity, 16,000 acre-ft) and by Jamestown Reservoir since 1954 (capacity, 229,500 acre-ft). Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	May 16, 1950	15.34		5,730	1952	Apr. 9, 1952	15.15	-2.0	-
						Apr. 11, 1952	14.85	-1.04	3,600
1951	Apr. 3, 1951	11.45	-2.88	-	1953	June 18, 1953	9.51		1,250
	Apr. 8, 1951	11.02	-.12	2,000	1954	July 5, 1954	8.90		845
					1955	Apr. 5, 1955	8.62		639

(141) James River at Columbia, S. Dak.

Location.--Lat 45°37'05", long 98°19'30", in NE¼NW¼ sec. 29, T. 125 N., R. 62 W., near center of span on downstream side of highway bridge, three-quarters of a mile northwest of Columbia, 2½ miles upstream from Chicago and North Western Railway bridge, and 3½ miles upstream from Elm River.
Drainage area.--7,050 sq mi, approximately, of which 3,000 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 1,274.54 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and backwater from Elm River.
Bankfull stage.--10 ft.
Remarks.--Peak gage heights for Apr. 18, 1947, June 27, 1953, and June 17, 1954, affected by backwater from Elm River. Occasional reverse flow caused by Elm River (maximum, 1,860 cfs Apr. 8, 1952). Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1946	May 25, 1946	7.56	121	1951	Apr. 21, 1951	13.51	1,040
1947	Apr. 18, 1947	15.20	-	1952	Apr. 17-18, 1952	16.53	3,580
	May 2, 1947	14.29	1,170	1953	June 27, 1953	13.74	-
1948	May 10, 1948	15.59	1,950		July 3, 1953	13.05	766
1949	Apr. 27, 1949	12.61	857	1954	June 17, 1954	10.08	-
1950	May 24-25, 1950	16.89	5,420		July 6, 1954	8.30	185
				1955	July 19, 1955	8.14	143

(142) Elm River at Westport, S. Dak.

Location.--Lat 45°39'20", long 98°29'50", in SW¼NW¼ sec. 12, T. 125 N., R. 64 W., on right bank 12 ft downstream from bridge on U. S. Highway 281, half a mile north of Westport, three-quarters of a mile upstream from Chicago, Milwaukee, St. Paul and Pacific Railroad bridge, 9½ miles downstream from Willow Creek, and 30½ miles upstream from mouth.
Drainage area.--1,680 sq mi, approximately, of which 510 sq mi is probably noncontributing.
Gage.--Nonrecording gage October 1, 1945, to Aug. 5, 1951, and Apr. 8 to Sept. 9, 1952; recording gage Aug. 6, 1951, to Apr. 7, 1952, and since Sept. 10, 1952. Datum of gage is 1,309.3 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--8 ft.
Remarks.--Flow regulated for Aberdeen municipal water supply by Elm Lake and other small reservoirs (combined capacity, about 16,000 acre-ft). Base for partial-duration series, 100 cfs.

(142) Elm River at Westport, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1947	Apr. 14, 1947	11.45		[a]2,100	1951	Apr. 2, 1951	9.40	-2.0	550
1948	Mar. 13, 1948	8.27	-1.3	400	1952	Apr. 8, 1952	20.10		7,520
	Mar. 29, 1948	12.51		2,870	1953	Mar. 19, 1953	8.68	-.7	700
1949	Mar. 12, 1949	8.25	-1.1	450		June 20, 1953	10.00		1,420
	Apr. 2, 1949	8.20		840		June 24, 1953	9.73		1,320
1950	Mar. 28, 1950	8.12	-1.2	400	1954	June 14, 1954	10.50		1,560
	Apr. 6, 1950	11.74	-2.1	1,400	1955	Mar. 12, 1955	6.40	-.5	160
	Apr. 20, 1950	6.50		314		Mar. 19, 1955	7.62	-1.0	300
	May 11, 1950	10.79		1,870		Apr. 4, 1955	5.91		168
	May 23, 1950	6.76		329		July 12, 1955	6.12		220
						July 16, 1955	7.08		453

[a]Annual peak only.

(143) James River near Stratford, S. Dak.

Location.--Lat 45°14'30", long 98°23'30", in NE¼NE¼NE¼ sec. 3, T. 120 N., R. 63 W., on right bank 30 ft downstream from highway bridge, 6¾ miles southwest of Stratford and 8¾ miles upstream from Mud Creek.
Drainage area.--9,990 sq mi, approximately, of which 3,920 sq mi is probably noncontributing.
Gage.--Nonrecording gage March 1950 to August 1951; recording gage thereafter. Datum of gage is 1,254.29 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting and changes in highway embankment.
Bankfull stage.--14 ft.
Remarks.--Base for partial-duration series, 400 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1950	May 14 or 15,1950	17.8	[a]5,580	1953	July 13, 1953	15.16	718
				1954	June 28, 29, 1954	11.33	321
1951	May 19, 1951	15.47	870	1955	July 28, 1955	9.63	185
1952	Apr. 19-20, 1952	18.13	4,970				

[a]Annual peak only.

(144) James River at Ashton, S. Dak.

Location.--Lat 44°59'55", long 98°28'50", in NW¼NE¼ sec. 36, T. 118 N., R. 64 W., near center of span on downstream side of highway bridge, half a mile east of Ashton, 6 miles upstream from Snake Creek, and 14 miles upstream from Turtle Creek.
Drainage area.--11,000 sq mi, approximately, of which 4,190 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Datum of gage is 1,244.4 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect, backwater from Snake and Turtle Creeks, and backwater from return of overbank flow.
Bankfull stage.--15 ft.
Remarks.--Peak gage heights for Mar. 25, 26, 1948, and Aug. 3, 1953, affected by backwater from Snake and Turtle Creeks. Occasional reverse flow caused by Snake and Turtle Creeks (maximum, 1,500 cfs Apr. 10, 1952). Only annual peaks are shown.

(144) James River at Ashton, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Mar. 28, 1946	7.12		494	1951	May 18, 1951	9.39		840
1947	May 22-23, 1947	8.83		786	1952	Apr. 23-24, 1952	19.59		4,860
1948	Mar. 25-26, 1948	13.78		-	1953	Aug. 3, 1953	10.64		1,000
	May 16, 17, 1948	10.90		[a]1,110	1954	June 30,			
1949	May 21, 1949	7.94		579		July 1, 1954	6.34		[a]317
1950	May 19, 1950	19.14		5,170	1955	Mar. 15, 1955	8.56	-4.0	-
						July 30, 1955	5.84		194

[a]Daily mean discharge.

(145) West Branch Snake Creek near Athol, S. Dak.

Location.--Lat 45°03'20", long 98°44'10", in SE¼NE¼ sec. 11, T. 118 N., R. 66 W., on left bank at upstream side of highway bridge, 3 miles downstream from confluence of Nixon River and Perry Creek, and 7½ miles northwest of Athol.
Drainage area.--1,430 sq mi, approximately, of which 340 sq mi is probably noncontributing.
Gage.--Nonrecording gage March 1950 to April 1951; recording gage thereafter. Prior to May 1951, at site half a mile upstream at datum 4.78 ft higher. Altitude of present gage is 1,325 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--10 ft.
Remarks.--Base for partial-duration series, 75 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Mar. 27, 1950	8.68	-2.5	-	1953	Mar. 23, 1953	12.50	-0.5	480
	Apr. 3, 1950	8.05		395		June 20, 1953	10.53		153
	May 12, 1950	5.63		102		July 30, 1953	13.99		955
						Aug. 6, 1953	13.06		601
1951	Mar. 28, 1951	5.90	-.6	70		Aug. 11, 1953	12.52		416
1952	Apr. 9, 1952	16.42	-.5	2,200	1954	June 8, 1954	9.37		63
	Apr. 28, 1952	9.59		88	1955	Mar. 12, 1955	11.88	-.5	290

(146) Turtle Creek at Redfield, S. Dak.

Location.--Lat 44°53'00", long 98°30'45", in SW¼SE¼ sec. 3, T. 116 N., R. 64 W., on left bank 15 ft downstream from bridge on U. S. Highway 281, at north edge of Redfield, and 6¾ miles upstream from mouth.
Drainage area.--1,540 sq mi, approximately.
Gage.--Nonrecording gage October 1945 to May 1951; recording gage thereafter. Datum of gage is 1,259.3 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--9 ft.
Remarks.--Peaks are probably affected by offstream storage in Twin Lakes and by regulation at Lake Redfield (capacity, 1,570 acre-ft). Base for partial-duration series, 50 cfs.

(146) Turtle Creek at Redfield, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Mar. 2, 1946	4.45		-	1952	Mar. 15, 1952	5.41		[a]58
	July 10, 1946	4.05		24		Mar. 25, 1952	5.37		[a]54
1947	Apr. 11, 1947	6.52		60		Apr. 10, 1952	15.51		6,420
1948	Mar. 23, 1948	12.38		3,160		June 28, 1952	7.24		350
	June 27, 1948	7.00		255	1953	Feb. 27, 1953	5.35		59
	July 21, 1948	6.37		133		Mar. 14, 1953	6.92		278
1949	Mar. 5, 1949	5.58		45		Mar. 18, 1953	7.41		393
1950	Mar. 31, 1950	11.30	-0.3	2,340		Mar. 23, 1953	7.98		577
	Apr. 11, 1950	7.51		398		Apr. 12, 1953	5.81		111
	Apr. 30, 1950	5.78		86		May 7, 1953	7.16		335
	May 13, 1950	7.09		296		June 15, 1953	5.51		78
	May 22, 1950	8.90		1,020		June 20, 1953	5.56		78
						July 28, 1953	5.51		74
1951	Mar. 31, 1951	7.53		433	1954	June 7, 1954	5.56		95
	Apr. 22, 1951	5.53		51	1955	Mar. 11, 1955	5.80		108
						Mar. 15, 1955	7.32		369
						June 9, 1955	5.45		73

[a]Release from Lake Redfield.

(147) James River near Redfield, S. Dak.

Location.--Lat 44°55'10", long 98°25'50", in SW¼NW¼ sec. 28, T. 117 N., R. 63 W., on right bank just downstream from highway bridge, 4½ miles northeast of Redfield, and 5¼ miles downstream from Tuttle Creek.
Drainage area.--14,800 sq mi, approximately, of which 4,600 sq mi is probably noncontributing.
Gage.--Nonrecording gage March 1950 to July 1951; recording gage thereafter. Datum of gage is 1,236.3 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--20 ft.
Remarks.--Base for partial-duration series, 800 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	May 22, 1950	20.68		[a]5,290	1953	Mar. 18, 1953	11.19	-2.4	-
						Mar. 24, 1953	10.47		1,350
1951	Apr. 2, 1951	8.87	-1.8	-		Aug. 4, 1953	11.01		1,310
	May 18-19, 1951	8.32		831	1954	Mar. 27, 1954	7.77	-3.3	-
1952	Apr. 11, 1952	22.12		6,100		July 5, 1954	5.78		330
	Apr. 24, 1952	20.96		5,300	1955	Mar. 16, 1955	9.67	-2.7	525
	June 28, 1952	10.58		1,380		July 30, 1955	[b]10.01		-

[a]Annual peak only.
[b]Backwater from temporary dam downstream.

(148) James River at Huron, S. Dak.

Location.--Lat 44°21'55", long 98°11'45", in SW¼SE¼NE¼ sec. 6, T. 110 N., R. 61 W., on right bank 15 ft upstream from city dam, 135 ft downstream from Chicago and North Western Railway bridge, and 165 ft upstream from bridge on U. S. Highway 14, at Huron.
Drainage area.--16,800 sq mi, approximately, of which 4,790 sq mi is probably noncontributing.
Gage.--Nonrecording gage August 1928 to June 1932 and August 1943 to October 1951; recording gage thereafter. Prior to August 1943, 165 ft downstream at same datum. Datum of gage is 1,223.44 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and backwater from return of overbank flow. Controlled below 1,500 cfs since August 1943 by masonry dam.
Bankfull stage.--9 ft.
Historical data.--Maximum stage known, 19.8 ft between Apr. 11 and 13, 1881, from U. S. Weather Bureau publication.
Remarks.--Base for partial-duration series, 1,000 cfs. Only annual peaks are shown prior to August 1943.

(148) James River at Huron, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 20, 1929	12.00	-1.2	2,650	1948	Mar. 27, 1948	14.48		4,630
1930	May 13, 1930	5.12		560		May 20, 1948	8.84		1,220
					1949	May 18, 1949	8.44		672
1931	Apr. 24, 1931	4.10		345	1950	Apr. 7, 1950	12.18	-0.8	3,020
1932	Mar. 4, 1932	9.52	-4.2	650		May 24-25, 1950	14.30		4,840
1944	Mar. 31, 1944	10.48		2,460	1951	Apr. 5, 1951	8.70		900
	Apr. 8, 1944	9.66		1,920	1952	Apr. 15, 1952	15.23		5,580
	May 14, 1944	8.90		1,270		June 30, 1952	9.12		1,440
1945	Mar. 21, 1945	9.68		1,920	1953	Mar. 20, 1953	9.74		1,950
	June 6, 1945	9.06		1,450		Aug. 6, 1953	10.86		2,690
					1954	July 6, 1954	8.24		373
1946	Mar. 21, 1946	9.60		1,850	1955	Mar. 13-14, 1955	8.65		835
1947	Apr. 11, 1947	9.00		1,360		Mar. 15, 1955	9.60	-1.0	-

(149) Sand Creek near Alpena, S. Dak.

Location.--Lat 44°09'20", long 98°26'10", in NE¼NE¼ sec. 19, T. 108 N., R. 63 W., on left bank 5 ft downstream from highway bridge, 4 miles southwest of Alpena, 7 miles upstream from Chicago, Milwaukee, St. Paul and Pacific Railroad bridge, and 10½ miles upstream from interlink with Cain Creek.
Drainage area.--240 sq mi, approximately.
Gage.--Nonrecording gage March 1950 to September 1951; recording gage thereafter. Altitude of gage is 1,315 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--11 ft.
Remarks.--Base for partial-duration series, 50 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Mar. 28, 1950	14.1	-2.0	1,000	1953	Mar. 17, 1953	10.22	-0.5	190
						May 3, 1953	9.62		174
1951	Mar. 28, 1951	11.70	-.5	750		June 9, 1953	10.63		434
	May 21, 1951	9.52		285		July 12, 1953	10.82		504
	June 5, 1951	8.87		128	1954	June 11, 1954	8.85		64
	July 1, 1951	9.82		363		June 17, 1954	9.43		136
1952	Apr. 3, 1952	12.68	-.1	1,130	1955	Mar. 12, 1955	12.10		788
	Apr. 9, 1952	12.30		1,050					

(150) James River near Forestburg, S. Dak.

Location.--Lat 43°58'45", long 98°04'05", in SW¼SW¼NW¼ sec. 20, T. 106 N., R. 60 W., on right bank 5 ft downstream from highway bridge, 3¾ miles northeast of Forestburg, 4½ miles downstream from Chicago, Milwaukee, St. Paul and Pacific Railroad bridge, and 5¼ miles downstream from Sand Creek.
Drainage area.--18,600 sq mi, approximately, of which 4,790 sq mi is probably noncontributing.
Gage.--Nonrecording gage March 1950 to September 1951; recording gage thereafter. Altitude of gage is 1,205 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect.
Bankfull stage.--12 ft.
Historical data.--Floods of March 1920 and March 1922 reached a stage of about 18 ft, from information by local residents.
Remarks.--Base for partial-duration series, 1,000 cfs.

(150) James River near Forestburg, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1950	Apr. 10, 1950	13.39		3,180	1952	Apr. 15-17, 1952	15.46		6,290
	May 30, 1950	15.06		5,180		July 2, 1952	8.62		1,220
					1953	Mar. 19, 1953	11.17		2,080
1951	Mar. 31, 1951	10.84	-0.9	1,600		Aug. 12, 1953	11.10		2,060
	July 1, 1951	8.67		1,230	1954	July 6, 1954	4.86		332
					1955	Mar. 19, 1955	9.69	-1.[illegible]	[illegible]210

(151) James River near Scotland, S. Dak.

Location.--Lat 43°11'00", long 97°37'55", in SW¼SW¼ sec. 30, T. 97 N., R. 57 W., on left bank 50 ft upstream from highway bridge, 500 ft upstream from Dawson Creek, and 5 miles northeast of Scotland.
Drainage area.--21,550 sq mi, approximately, of which 4,790 sq mi is probably noncontributing.
Gage.--Nonrecording gage September 1928 to December 1934; recording gage thereafter. Altitude of gage is 1,165 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and changes in highway embankment. Large change occurred between 1942 and 1950 floods; stage-discharge relation for intervening years not defined above 13 ft stage.
Bankfull stage.--11 ft.
Remarks.--Base for partial-duration series, 1,000 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 31, 1929	11.92		2,970	1944	Mar. 16, 1944	11.30	-4.5	1,100
	Apr. 26, 1929	8.28		1,670		Apr. 1, 1944	11.19		2,370
	May 30, 1929	8.80		1,850		May 5, 1944	10.99		2,290
1930	May 12, 1930	5.63		856		May 25, 1944	9.60		1,790
						June 5, 1944	8.91		1,590
1931	Apr. 28, 1931	3.12		289		June 13, 1944	14.14		5,270
1932	Mar. 2, 1932	11.40		2,500		July 15, 1944	11.69		2,590
	Mar. 29, 1932	7.64		1,450		Aug. 3, 1944	10.26		2,030
1933	July 23, 1933	4.08		441		Aug. 31, 1944	6.81		1,100
1934	Sept.25, 1934	7.22		1,110	1945	Mar. 13, 1945	10.46	-1.1	1,730
1935	June 29, 1935	3.12		296		Mar. 31, 1945	8.79		1,570
						Apr. 18, 1945	8.36		1,470
1936	Mar. 10, 1936	8.30	-2.2	-		May 20, 1945	6.78		1,100
	May 23, 1936	10.29		2,240		June 18, 1945	11.49		2,500
1937	Mar. 20, 1937	6.69		1,040					
	Apr. 25, 1937	7.06		1,140	1946	Mar. 22, 1946	8.92		1,760
	June 27, 1937	8.42		1,460	1947	Apr. 16, 1947	11.37		2,460
	Aug. 20, 1937	10.72		2,180		June 10, 1947	9.41		1,730
1938	Mar. 3, 1938	10.52		2,100		June 23, 1947	8.57		1,520
	May 25, 1938	7.67		1,360	1948	Mar. 5, 1948	7.29	-5.3	-
1939	Apr. 1, 1939	4.82		622		Apr. 4-5, 1948	15.26		5,510
1940	June 24, 1940	5.94		910		June 28, 1948	11.97		3,040
						July 23, 1948	7.63		1,280
1941	Mar. 10, 1941	4.99		710		Aug. 2, 1948	8.63		1,520
1942	May 15, 1942	15.50		10,800	1949	Mar. 9, 1949	14.56	-2.9	2,600
	June 21, 1942	8.51		1,490		Mar. 22, 1949	7.39		1,010
	July 10, 1942	8.56		1,520		Mar. 30, 1949	11.67		2,590
	Aug. 5, 1942	7.62		1,260		Apr. 8, 1949	13.18		3,600
1943	Mar. 8, 1943	8.00		1,350	1950	Mar. 7, 1950	-		1,500
	Apr. 14-15, 1943	12.65		3,110		Apr. 1, 1950	15.89		6,280
	June 12, 1943	10.28		2,030		June 6, 1950	14.56		4,720
	June 16, 1943	10.86		2,250		Aug. 4, 1950	7.99		1,550
						Sept.22, 1950	8.10		1,580

JAMES RIVER BASIN

(151) James River near Scotland, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1951	Mar. 29, 1951	15.00		5,200	1953	Mar. 28, 1953	8.99		1,830
	May 21, 1951	8.54		1,660		May 8, 1953	8.06		1,550
	June 5, 1951	11.00		2,460		June 9, 1953	9.35		1,940
	June 19, 1951	9.96		2,130		July 2, 1953	7.56		1,410
	July 8, 1951	13.10		3,300		Aug. 18, 1953	9.14		1,880
1952	Feb. 17, 1952	10.94	-2.8	1,500	1954	June 20, 1954	[a]12.22		-
	Apr. 23, 1952	16.23		6,480		June 20, 1954	11.35		2,160
	July 7, 1952	7.16		1,240	1955	Mar. 13, 1955	10.18		2,220

[a]Backwater from Dawson Creek.

VERMILLION RIVER BASIN

(152) Vermillion River near Wakonda, S. Dak.

Location.--Lat 42°59'20", long 96°57'50", in SW¼NW¼ sec. 2, T. 94 N., R. 52 W., on left bank 40 ft downstream from bridge on State Highway 19, 3½ miles downstream from Frog Creek, 7¼ miles southeast of Wakonda, and 16½ miles downstream from Turkey Ridge Creek.
Drainage area.--1,680 sq mi, approximately.
Gage.--Nonrecording gage October 1945 to September 1954; recording gage thereafter. Altitude of gage is 1,160 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and flow from levee breaks upstream bypassing gage.
Bankfull stage.--14 ft.
Remarks.--Base for partial-duration series, 1,000 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Feb. 24, 1946	10.88	-2.0	-	1951	Mar. 30, 1951	[a]16.25		-
	Mar. 16, 1946	10.67		730		Apr. 5, 1951	14.83		2,650
1947	Apr. 15-16, 1947	15.00		2,190		July 6, 1951	[a]16.24		-
	June 13, 1947	16.63		3,010		July 8, 1951	15.69		2,530
1948	Mar. 3, 1948	15.83	-3.0	1,100		Sept. 9, 1951	13.06		1,190
	Mar. 18, 1948	15.76		2,440	1952	Feb. 17, 1952	13.54	-0.4	1,200
	Aug. 2, 1948	12.62		1,060		Mar. 22, 1952	15.10	-.9	1,750
1949	Mar. 5, 1949	[a]15.90		-		Mar. 31, 1952	[a]16.37		-
	Mar. 8, 1949	15.28		2,650		Apr. 4, 1952	15.40		3,280
	Mar. 29, 1949	12.50		1,120	1953	Mar. 14, 1953	13.60	-.9	1,100
	Apr. 8, 1949	13.20		1,290		June 11, 1953	15.23		1,900
1950	Mar. 25, 1950	13.99	-.7	-	1954	June 19, 1954	[a]16.56		-
	Mar. 27, 1950	13.84		1,470		June-21, 1954	15.83		3,790
					1955	Mar. 13, 1955	12.42		1,080

[a]Peak gage height only; caused by levee break.

BIG SIOUX RIVER BASIN

(153) Big Sioux River at Watertown, S. Dak.

Location.--Lat 44°56'30", long 97°08'50", in SW¼SW¼NW¼ sec. 13, T. 117 N., R. 53 W., near center of span on upstream side of highway bridge, 1 mile downstream from inlet-outlet to Lake Kampeska, 2½ miles northwest of Watertown, and 8½ miles upstream from Willow Creek.
Drainage area.--1,800 sq mi, approximately, of which 1,400 sq mi is probably noncontributing.
Gage.--Nonrecording gage. Altitude of gage is 1,710 ft (from river profile map).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and backwater from debris lodging on fence downstream.
Bankfull stage.--8 ft.
Remarks.--Water is stored naturally offstream in Lake Kampeska (capacity 35,500 acre-ft) during periods when river is rising and then naturally released, in part, when river if falling. Only annual peaks are shown.

BIG SIOUX RIVER BASIN

(153) Big Sioux River at Watertown, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1946	Mar. 15, 1946	8.25	-1.9	-	1951	Mar. 29, 1951	7.80	-2.0	-
	Mar. 15, 1946	7.70		684		Apr. 7, 8, 1951	6.34		229
1947	Apr. 13, 1947	8.93		952	1952	Apr. 4, 1952	10.35	-5.0	-
1948	Mar. 26, 1948	8.30		762		Apr. 9, 1952	10.30	-.3	2,220
1949	Apr. 2, 1949	6.07		229	1953	July 28, 1953	8.92		876
1950	Mar. 27, 1950	7.22	-.8	320	1954	June 7, 1954	7.55		624
					1955	Mar. 10, 1955	7.58	-1.5	273

(154) Big Sioux River near Dell Rapids, S. Dak.

Location.--Lat 43°47'25", long 96°44'45", in NW¼NW¼ sec. 29, T. 104 N., R. 49 W., on right bank at downstream side of highway bridge, a quarter of a mile downstream from confluence of divided channels, 1¾ miles upstream from nearest tributary, and 3 miles southwest of Dell Rapids.
Drainage area.--5,060 sq mi, approximately, of which 1,970 sq mi is probably noncontributing.
Gage.--Nonrecording gage May 1948 to November 1949; recording gage thereafter. Prior to October 1951, at datum 0.04 ft lower. Gage heights given herein are adjusted to present datum. Altitude of gage is 1,455 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--12 ft.
Historical data.--In 1952, a local resident of Dell Rapids for 61 years stated that the flood of April 1952 was the greatest and that of April 1951 was the next greatest within his memory.
Remarks.--Base for partial-duration series, 1,000 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1949	Mar. 28, 1949	10.08	-1.8	2,040	1953	Mar. 15, 1953	8.34	-1.4	1,350
	Apr. 6, 1949	9.46		2,700		Mar. 22, 1953	7.71		1,740
1950	Apr. 1, 1950	11.83	-2.2	2,800		May 5, 1953	7.72		1,640
	Apr. 20, 1950	6.57		1,210		May 15, 1953	7.09		1,350
	May 12, 1950	6.04		1,030		May 25, 1953	8.05		1,800
	June 12, 1950	6.62		1,260		June 27, 1953	6.83		1,320
						Aug. 6, 1953	7.07		1,410
1951	Apr. 1, 1951	12.47	-1.3	3,750		Aug. 11, 1953	6.23		1,030
	Apr. 4, 1951	14.32		12,300	1954	Mar. 19, 1954	11.22	-.8	2,740
	June 28, 1951	8.27		1,690		Mar. 25, 1954	10.65		2,960
	July 4, 1951	6.75		1,110	1955	Mar. 12, 1955	7.94	-1.0	1,110
1952	Apr. 5, 1952	14.85		15,400		Mar. 16, 1955	8.72	-1.0	1,380
	June 17, 1952	8.88		1,980					
	July 6, 1952	7.03		1,220					
	July 21, 1952	6.59		1,050					

(155) Skunk Creek near Sioux Falls, S. Dak.

Location.--Lat 43°32'35", long 96°48'30", in NW¼NW¼ sec. 23, T. 101 N., R. 50 W., on left bank at downstream side of bridge on U. S. Highway 16, 600 ft upstream from nearest tributary, 2½ miles upstream from mouth, and 4 miles west of Sioux Falls.
Drainage area.--520 sq mi, approximately.
Gage.--Nonrecording gage May 1948 to October 1949; recording gage thereafter. Altitude of gage is 1,418 ft (by barometer).
Stage-discharge relation.--Defined by current-meter measurements below 3,700 cfs; subject to changes owing to ice effect and channel shifting.
Bankfull stage.--7 ft.
Remarks.--Base for partial-duration series, 500 cfs.

(155) Skunk Creek near Sioux Falls, S. Dak.--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1949	Mar. 5, 1949	7.81	-0.4	1,940	1952	Feb. 12, 1952	5.17	-0.8	-
	Mar. 28, 1949	5.37		853		Mar. 20, 1952	7.19	-2.1	750
	Apr. 6, 1949	5.73		1,060		Mar. 29, 1952	12.16		5,770
1950	Mar. 25, 1950	5.66		1,030		Apr. 22, 1952	5.08		813
	May 19, 1950	5.19		803	1953	Mar. 11, 1953	6.64	-1.8	700
	June 12, 1950	4.75		592		June 8, 1953	6.97		1,880
						June 27, 1953	8.28		2,770
1951	Mar. 29, 1951	9.25	-1.5	2,150	1954	Mar. 19, 1954	7.19		2,000
	Apr. 4, 1951	7.78		2,150	1955	Mar. 9, 1955	6.05	-1.0	797
	June 18, 1951	5.46		928					
	June 26, 1951	9.48		3,070					

(156) Big Sioux River at Sioux Falls, S. Dak.

Location.--Lat 43°30', long 96°44', in S½ sec. 32, T. 101 N., R. 49 W., on left bank 5 ft downstream from highway bridge, 0.25 mile downstream from Great Northern Railway bridge, 1 mile southwest of Sioux Falls, and 3 miles downstream from Skunk Creek.
Drainage area.--5,750 sq mi, approximately, of which 1,970 sq mi is probably noncontributing.
Gage.--Main channel. Nonrecording gage August 1943 to September 1954; recording gage thereafter. Datum of gage is 1,392.83 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Auxiliary nonrecording gage on bypass canal since March 1953.
Stage-discharge relation.--Defined by current-meter measurements. Main channel subject to changes owing to ice effect and channel shifting.
Bankfull stage.--10 ft.
Historical data.--Flood of Apr. 7, 1952, was greatest since at least 1881 according to records of Sioux Falls City Engineer.
Remarks.--During periods of high stage, part of flow leaves channel above gage and bypasses gage through a bypass canal which returns to main channel at a point about 8 miles below gage. Records prior to March 1951 do not include bypass flow. Base for partial-duration series, 2,600 cfs.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1944	Feb. 26, 1944	10.24		5,250	1949	Mar. 5, 1949	9.67	-3.0	-
	May 24, 1944	7.08		2,640		Apr. 6, 1949	8.25		3,140
	July 11, 1944	8.30		3,540	1950	Mar. 26, 1950	8.1	-2.6	-
1945	Feb. 15, 1945	9.4	-2.4	-		Apr. 3, 1950	7.33		2,560
	Mar. 12, 1945	9.4	-2.3	2,640					
	Mar. 18, 1945	7.19		2,700	1951	Mar. 30, 1951	11.17	-1.1	4,700
	June 4, 1945	7.06		2,710		Apr. 6, 1951	14.30		13,100
						June 26, 1951	8.51		3,340
1946	Mar. 14, 1946	8.0	-1.0	-	1952	Mar. 30, 1952	12.85	-.2	7,900
	Mar. 19-20, 1946	8.20		3,460		Apr. 2, 1952	11.65		7,660
1947	Apr. 17, 1947	8.86		3,320		Apr. 7, 1952	14.50		13,500
	June 10, 1947	10.80		5,000	1953	Mar. 16, 1953	7.74	-1.2	-
1948	Feb. 28, 1948	13.9		(a)		June 27, 1953	8.28		3,360
	Mar. 18, 1948	9.75	-1.0	3,440	1954	Mar. 20, 1954	8.79	-.55	3,870
	Mar. 26, 1948	9.92		4,250		Mar. 26, 1954	7.97		3,240
	July 21, 1948	8.55		3,380	1955	Mar. 10, 1955	8.83	-4.0	-
	July 29, 1948	10.00		4,330		Mar. 10, 1955	8.43	-2.6	1,820

[a]Discharge unknown; greater than 2,600 cfs.

BIG SIOUX RIVER BASIN

(157) Big Sioux River at Akron, Iowa

Location.--Lat 42°49'40", long 96°33'50", in W½ sec. 31, T. 93 N., R. 48 W., on left bank 300 ft downstream from highway bridge in Akron and 2¾ miles upstream from Union Creek.
Drainage area.--9,030 sq mi, approximately, of which 1,970 sq mi is probably noncontributing.
Gage.--Nonrecording gage October 1928 to December 1934; recording gage thereafter. Datum of gage is 1,118.90 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements below 25,000 cfs; extended above by velocity-area studies of 1942 and 1952 floods. Subject to extensive changes due to levee breaks in vicinity of the gage.
Bankfull stage.--15 ft.
Remarks.--Base for partial-duration series, 3,500 cfs. Only annual peaks are shown prior to Oct. 1, 1934.

Peak stages and discharges

Water year	Date	Gage height (feet)	Ice effect (feet)	Discharge (cfs)
1929	Mar. 15, 1929	18.63		20,800
1930	June 6, 1930	9.92		3,740
1931	Aug. 9, 1931	5.60		1,390
1932	Mar. 1, 1932	18.04		16,900
1933	Sept. 5, 1933	17.8		14,200
1934	June 8, 1934	16.08		10,600
1935	Mar. 7, 1935	12.24	-3.5	-
	Mar. 10, 1935	10.06	-1.1	3,000
1936	Mar. 12, 1936	18.63		18,000
	May 26, 1936	11.79		5,300
	Sept.16, 1936	12.92		6,720
1937	Mar. 10, 1937	12.99	-1.2	5,300
	Apr. 14, 1937	12.23		4,880
	May 26, 1937	13.14		5,760
1938	Mar. 5, 1938	12.90	-1.5	4,200
	Mar. 18, 1938	17.21		11,200
	May 6, 1938	10.58		3,540
	July 4, 1938	17.53		12,700
	Sept.12, 1938	11.03		3,800
	Sept.17, 1938	16.58		9,800
1939	Mar. 17, 1939	15.45	-1.9	6,300
	Mar. 21, 1939	11.59		4,370
1940	Mar. 22, 1940	11.06	-4.3	-
	Apr. 2, 1940	17.32		11,700
1941	Mar. 4, 1941	10.98	-2.0	-
	Mar. 12, 1941	13.24		5,550
	Mar. 25, 1941	13.52		5,820
	Apr. 2, 1941	11.78		4,350
1942	May 16, 1942	12.98		4,870
	May 30, 1942	15.74		7,940
	June 4, 1942	19.23		21,400
	June 29, 1942	13.96		5,810
	Aug. 2, 1942	18.28		16,600
	Aug. 31, 1942	15.23		7,280
	Sept. 5, 1942	16.18		8,620
	Sept.21, 1942	11.52		3,680
1943	Feb. 24, 1943	15.17		7,200
	Mar. 27, 1943	11.86		3,920
	June 18, 1943	17.35		12,000
	June 27, 1943	14.69		6,630
	July 7, 1943	11.65		3,920
	Aug. 15, 1943	12.03		4,160
1944	Feb. 29, 1944	18.24		15,900
	May 7, 1944	12.95		4,820
	May 15, 1944	14.60		6,600
	May 21-22, 1944	11.24		3,510
	June 4, 1944	11.45		3,640
	June 12, 1944	17.18		11,600
	June 18, 1944	17.01		11,100
	July 15, 1944	16.51		9,840
	Aug. 7, 1944	12.89		4,770
1945	Feb. 20, 1945	12.03		4,150
	Mar. 14, 1945	17.42		12,300
	May 23, 1945	10.86		3,500
	May 30, 1945	12.07		4,220
	June 17, 1945	16.48		9,820
	July 16, 1945	11.40		3,790
1946	Mar. 5, 1946	15.28		8,970
	Mar. 17, 1946	15.05		8,400
	Apr. 22, 1946	11.45		4,040
1947	Apr. 14, 1947	14.44		7,400
	May 2, 1947	12.90		5,120
	June 15, 1947	16.84		10,500
	June 26, 1947	12.86		4,660
	July 2, 1947	12.43		4,290
1948	Mar. 2, 1948	18.50	-4.0	6,500
	Mar. 21, 1948	16.87		10,800
	May 12, 1948	11.08		3,610
	July 25, 1948	14.49		6,600
	Aug. 2, 1948	11.58		3,910
1949	Mar. 8, 1949	17.08		11,400
	Mar. 31, 1949	16.22		9,170
	Apr. 9, 1949	17.11		11,400
1950	Mar. 7, 1950	12.56	-.8	4,000
	Mar. 28, 1950	13.36		5,260
	June 18, 1950	13.40		5,450
1951	Apr. 6, 1951	19.66		28,800
	July 1, 1951	16.08		8,390
	July 4, 1951	15.54		7,580
1952	Feb. 15, 1952	11.81	-.2	4,300
	Mar. 22, 1952	16.10		9,650
	Apr. 1, 1952	19.75		33,000
	Apr. 10, 1952	17.71		16,500
	June 19, 1952	10.92		3,840
	July 7, 1952	15.36		8,180
1953	Mar. 16, 1953	14.22		6,780
	May 28, 1953	12.71		5,090
	June 8, 1953	19.33		21,800
	June 30, 1953	13.31		5,560
	Aug. 7, 1953	13.04		5,340
1954	Mar. 22, 1954	18.11		15,600
	June 22, 1954	19.95		21,700
1955	Mar. 11, 1955	12.25		4,940

MISSOURI RIVER MAIN STEM

(158) Missouri River at Sioux City, Iowa

Location.--Lat 42°29', long 96°25', in sec. 17, T. 29 N., R. 9 E., sixth principal meridian, on right bank on upstream side of bridge on U. S. Highway 77 at Sioux City, 2.5 miles downstream from Big Sioux River.
Drainage area.--314,600 sq mi, approximately.
Gage.--Nonrecording gage September 1928 to September 1931; recording gage since August 1938. Datum of gage is 1,076.96 ft above mean sea level, datum of 1929.
Stage-discharge relation.--Defined by current-meter measurements; subject to changes owing to channel shifting.
Bankfull stage.--16 ft.
Historical data.--Flood of Apr. 23, 1881, reached a stage of 22.5 ft.
Remarks.--Flow regulated by Fort Peck Reservoir (usable capacity, 18,800,000 acre-ft) November 1937 to December 1952, and by Fort Randall (usable capacity, 9,706,000 acre-ft) or Gavins Point (usable capacity, 285,100 acre-ft) Reservoirs thereafter. Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)	Water year	Date	Gage height (feet)	Discharge (cfs)
1929	Apr. 1, 1929	12.40	190,000	1946	June 21-22, 1946	8.60	87,900
1930	Mar. 6, 1930	9.40	108,000	1947	Apr. 4, 1947	15.10	178,000
				1948	Mar. 27, 1948	9.60	115,000
1931	June 16, 1931	9.79	54,700		June 27, 1948	9.80	-
				1949	Apr. 10, 1949	15.72	178,000
1939	Apr. 3, 1939	14.35	168,000	1950	Apr. 25, 1950	18.44	252,000
1940	June 16, 1940	8.90	55,700				
				1951	Apr. 8, 1951	13.04	152,000
1941	June 15, 1941	13.00	121,000	1952	Apr. 14, 1952	[a]24.28	441,000
1942	June 8, 1942	13.77	127,000	1953	June 19, 1953	9.19	-
1943	Apr. 10, 1943	18.72	212,000		June 25, 1953	9.16	109,000
1944	Apr. 12, 1944	15.45	180,300	1954	June 21, 1954	6.83	51,300
1945	Mar. 22, 1945	9.35	116,400	1955	Mar. 12, 1955	5.79	56,200
					July 10, 1955	6.19	-

[a]Occurred at different time than peak discharge.

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UNITED STATES DEPARTMENT OF THE INTERIOR
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59-80

FLOODS IN NORTH AND SOUTH DAKOTA, FREQUENCY AND MAGNITUDE PLATE I

MAP OF NORTH AND SOUTH DAKOTA SHOWING LOCATION OF GAGING STATIONS AND MISCELLANEOUS SITES WHERE A PEAK DISCHARGE IS KNOWN