# FLOOD DISCHARGES

# IN THE UPPER MISSISSIPPI RIVER BASIN 1·9·9·3

U.S. GEOLOGICAL SURVEY CIRCULAR 1120-A

Front Cover—View of Highway 67, West Alton, Missouri,
(Srenco Photography, St. Louis, Mo.)
Back Cover—View of Spirit of St. Louis Airport,
Chesterfield, Mo. (Srenco Photography,
St. Louis, Mo.)
Field Hydrologist making streamflow
measurements (U.S. Geological Survey)

# FLOOD DISCHARGES IN THE UPPER MISSISSIPPI RIVER BASIN, 1993

By Charles Parrett, Nick B. Melcher, and Robert W. James, Jr.

Floods in the Upper Mississippi River Basin, 1993

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U.S. GEOLOGICAL SURVEY CIRCULAR 1120-A

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# FOREWORD

During spring and summer 1993, record flooding inundated much of the upper Mississippi River Basin. The magnitude of the damages—in terms of property, disrupted business, and personal trauma—was unmatched by any other flood disaster in United States history. Property damage alone is expected to exceed $10 billion. Damaged highways and submerged roads disrupted overland transportation throughout the flooded region. The Mississippi and the Missouri Rivers were closed to navigation before and after the flooding. Millions of acres of productive farmland remained under water for weeks during the growing season. Rills and gullies in many tilled fields are the result of the severe erosion that occurred throughout the Midwestern United States farmbelt. The hydrologic effects of extended rainfall throughout the upper Midwestern United States were severe and widespread. The banks and channels of many rivers were severely eroded, and sediment was deposited over large areas of the basin's flood plain. Record flows submerged many areas that had not been affected by previous floods. Industrial and agricultural areas were inundated, which caused concern about the transport and fate of industrial chemicals, sewage effluent, and agricultural chemicals in the floodwaters. The extent and duration of the flooding caused numerous levees to fail. One failed levee on the Raccoon River in Des Moines, Iowa, led to flooding of the city's water treatment plant. As a result, the city was without drinking water for 19 days.

As the Nation's principal water-science agency, the U.S. Geological Survey (USGS) is in a unique position to provide an immediate assessment of some of the hydrological effects of the 1993 flood. The USGS maintains a hydrologic data network and conducts extensive water-resources investigations nationwide. Long-term data from this network and information on local and regional hydrology provide the basis for identifying and documenting the effects of the flooding. During the flood, the USGS provided continuous streamflow and related information to the National Weather Service (NWS), the U.S. Army Corps of Engineers, the Federal Emergency Management Agency (FEMA), and many State and local agencies as part of its role to provide basic information on the Nation's surface- and ground-water resources at thousands of locations across the United States. The NWS has used the data in forecasting floods and issuing flood warnings. The data have been used by the Corps of Engineers to operate water diversions, dams, locks, and levees. The FEMA and many State and local emergency management agencies have used USGS hydrologic data and NWS forecasts as part of the basis of their local flood-response activities. In addition, USGS hydrologists are conducting a series of investigations to document the effects of the flooding and to improve understanding of the related processes. The major initial findings from these studies will be reported in this Circular series as results become available.

U.S. Geological Survey Circular 1120, *Floods in the Upper Mississippi River Basin, 1993*, consists of individually published chapters that will document the effects of the 1993 flooding. The series includes data and findings on the magnitude and frequency of peak discharges; precipitation; water-quality characteristics, including nutrients and man-made contaminants; transport of sediment; assessment of sediment deposited on flood plains; effects of inundation on ground-water quality; flood-discharge volume; effects of reservoir storage on flood peaks; stream-channel scour at selected bridges; extent of flood-plain inundation; and documentation of geomorphologic changes.

Robert M. Hirsch

Acting Director
August 27, 1993

# CONTENTS



## FIGURES



## TABLE



### CONVERSION FACTORS

| *Multiply* | *By* | *To obtain* |
|---|---|---|
| inch | 25.4 | millimeter |
| foot | 0.3048 | meter |
| mile | 1.609 | kilometer |
| acre | 4,047 | square meter |
| square mile | 2.590 | square kilometer |
| cubic foot per second | 0.02832 | cubic meter per second |

# Flood Discharges in the Upper Mississippi River Basin, 1993

By Charles Parrett, Nick B. Melcher, and Robert W. James, Jr.


## Abstract

From mid-June through early August 1993, flooding was severe in the upper Mississippi River Basin following a wet-weather pattern that persisted over the area for at least 6 months before the flood. The magnitude and timing of several intense rainstorms in late June and July, combined with wet antecedent climatic conditions, were the principal causes of the flooding.

Flood-peak discharges that equaled or exceeded the 10-year recurrence interval were recorded at 154 streamflow-gaging stations in the upper Mississippi River Basin. At 41 streamflow-gaging stations, the peak discharge was greater than the previous maximum known discharge. At 15 additional gaging stations, peak discharges exceeded the previous maximum regulated peak discharge. At 45 gaging stations, peak discharges exceeded 100-year recurrence intervals.


## INTRODUCTION

From mid-June through early August 1993, severe flooding in the upper Mississippi River Basin (fig. 1) followed heavy and persistent rainfall from January through July. The flooding was unusual because it came so late in the spring-summer runoff season and because of the large number of streamflow-gaging stations that had record or near-record peak discharges. Record peak discharges were recorded from mid-June through early August at U.S. Geological Survey (USGS) streamflow-gaging stations in the Minnesota River Basin in Minnesota; in the Iowa, the Skunk, the Des Moines, the Little

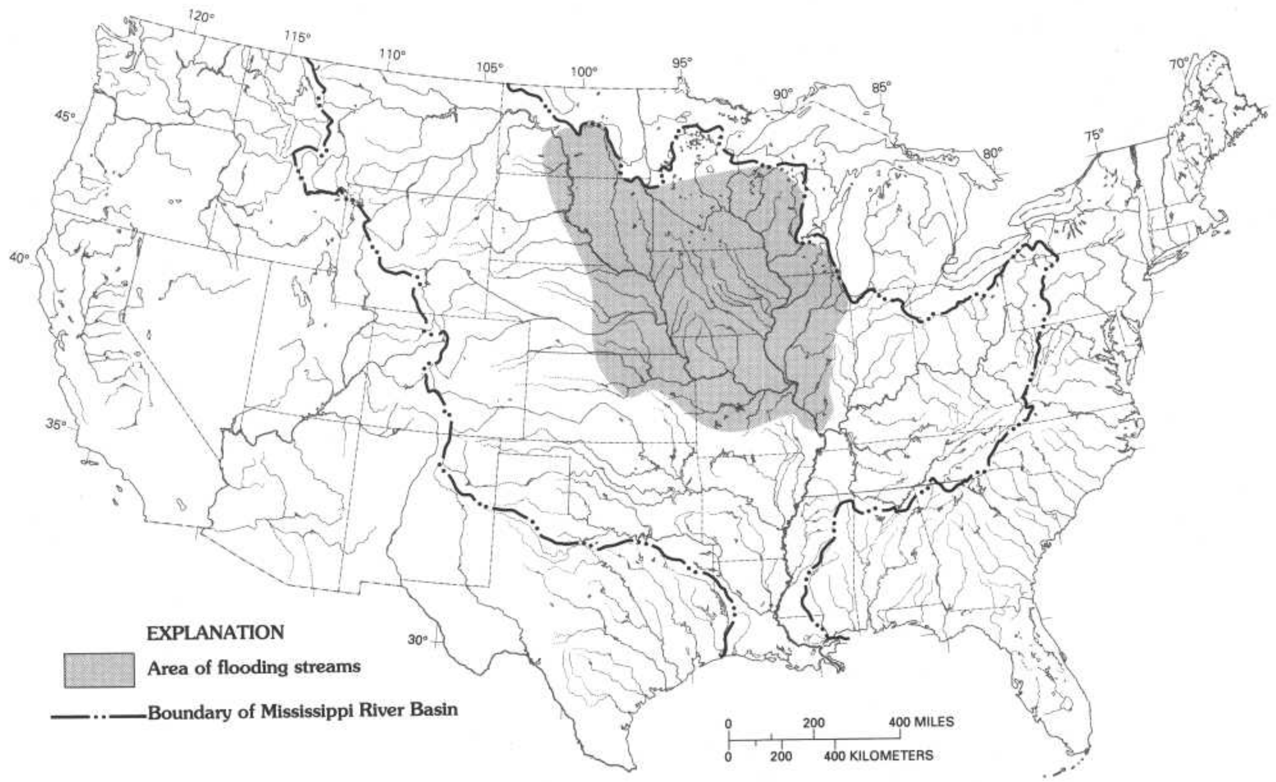


**Figure 1.** The Mississippi River Basin and general area of flooding streams, June to August 1993.

Sioux, and the Nishnabotna River Basins in Iowa; on the Mississippi River at Keokuk, Iowa; in the James River Basin in North and South Dakota; in the Platte River Basin in Nebraska; in the Kansas River Basin in Kansas; in the Grand River Basin in Missouri; and along the Missouri River from St. Joseph to Booneville, Missouri. Unusually high flood discharges were recorded at other locations throughout the area of flooding. The flooding also was unusual for its long duration and widespread and severe damage. At St. Louis, Missouri, the Mississippi River reached flood stage on June 26 and was still above flood stage in mid-August. Millions of acres of agricultural and urban lands in the upper Mississippi Basin were inundated for weeks, and unofficial damage estimates exceeded $10 billion.

### Purpose and Scope

As the principal Federal agency responsible for the collection of streamflow data, the USGS operates a network of about 7,300 continuous-record streamflow-gaging stations throughout the Nation. These streamflow records, some of which extend back to the 19th century, form the basis for the discussion of the 1993 flood in this report. This report describes the flooding in the upper Mississippi River Basin from mid-June through early August 1993 and the peak discharges at selected sites. Peak discharges for the 1993 flood are compared with previous maximum discharges and, for selected sites with long periods of record, are graphically compared with all previously known annual peak discharges.

### Flood Recurrence Interval

For comparative purposes, flood-peak discharges are referenced to a specific recurrence interval or probability of occurrence. The recurrence interval is the average number of years between occurrences of annual peak discharges that equal or exceed a specified discharge. For example, a discharge that has a 100-year recurrence interval is so large that an equal or greater annual peak discharge is expected, on average, only once in any 100-year period. Because of the random nature of flood events, the times between annual peak discharges of a certain magnitude are far from uniform; a large flood in one year does not preclude the occurrence of an even larger flood the next year. In any given year, the annual peak discharge has 1 chance in 100 of equaling or exceeding the 100-year flood (U.S. Interagency Advisory Committee on Water Data, 1982).

Recurrence intervals for the 1993 flood peaks presented in this report are generally determined by using the most current published USGS flood-frequency reports for States in the area of flooding. For Minnesota, South Dakota, Nebraska, and Kansas, however, published flood-frequency reports do not include recent data; consequently, the recurrence intervals for the 1993 peak discharges are based on unpublished flood-frequency analyses archived in the USGS District offices in these States. Recurrence intervals for the 1993 peak discharges on the Kansas River, the Missouri River, and Mississippi River are based on unpublished flood-frequency analyses completed by the U.S. Army Corps of Engineers (Gary Dyhouse, St. Louis District, U.S. Army Corps of Engineers, 1993, written commun.; Jerry Buehre, Kansas City District, U.S. Army Corps of Engineers, 1993, written commun.).

For this report, recurrence intervals have been categorized in ranges as follows: from 10 to 50 years, greater than 50 to 100 years, and greater than 100 years. Flood-frequency relations for streamflow-gaging stations in the area of flooding are expected to be updated on the basis of 1993 peak-discharge data.

## CAUSES AND CHRONOLOGY OF FLOODING

The area of significant flooding in the upper Mississippi River Basin from mid-June to early August 1993 includes southern Minnesota, southwestern Wisconsin, Iowa, western Illinois, northern Missouri, southern North Dakota, and eastern parts of South Dakota, Nebraska, and Kansas.

### Climatic Conditions

The areal extent and magnitude of the 1993 Mississippi River flood was due to a persistent wet-weather pattern that was throughout the upper Midwestern United States for at least 6 months preceding the flood. This persistent pattern resulted from an eastward-flowing jetstream that extended from central Colorado northeastward across Kansas to northern Wisconsin (National Weather Service, 1993).

Because of this jetstream, a weather-front convergence zone formed across the upper Midwestern

United States during the spring and summer months that preceded the flood. Moist, warm air from the Gulf of Mexico was drawn northward along this jetstream where it collided with cooler air masses drawn out of central Canada. The resultant unstable air masses persisted throughout the flooded area during spring and summer 1993 (National Weather Service, 1993). The climatic conditions that preceded this flood were remarkably similar to those that preceded the last large flood on the upper Mississippi River in April 1973 (Chinn and others, 1975).

## Antecedent Hydrologic Conditions

In many parts of the flooded area, rainfall totals for January through July 1993 were one and one-half to two times the January-through-July normal precipitation for 1961 to 1990 (David Miskus, National Weather Service, written commun., 1993; fig. 2). For Iowa, which is centrally located in the area of flooding, November 1992 to April 1993 was the second wettest November-to-April period in 121 years of record. Intense rainfall in late March and early April caused serious, localized flooding in the Cedar River Basin in Iowa, the Rock River Basin in Illinois, and the Big Sioux River Basin in South Dakota.

Rainfall and runoff were above average throughout the flooded area from April to June 1993, and streams were generally bankfull at the end of June. The monthly discharge volumes for the Mississippi River at Keokuk for April through June were more than 200 percent of normal (April–June 1961–90). By late June, most flood-control reservoirs in the upper Mississippi River Basin were at or near capacity, and soils throughout the flooded area were saturated from excessive precipitation.

## Chronology of the June to August 1993 Flooding

The magnitude and timing of several rainstorms in mid-June and July, combined with wet antecedent climatic conditions, were the principal causes of the severe flooding in the upper Mississippi River Basin. To illustrate the influence of the timing of runoff from these storms on the peak discharge on the Mississippi River, the peak discharges and their dates of occurrence for selected streamflow-gaging stations in the general area of flooding are shown in figure 3.

During June 17–18, 2 to 7 inches of rain fell throughout southern Minnesota, northern Iowa, and southwestern Wisconsin. Runoff from this storm caused flooding on the Minnesota and the Mississippi Rivers in Minnesota and the Chippewa and the Black Rivers in Wisconsin. As a result of these floodwaters, the discharge of the Mississippi River at Clinton, Iowa, peaked on July 5, 1993 (fig 3).

Two separate storms in early July caused large-scale flooding in Iowa. During the first storm on July 4–5, 2 to 5 inches of rain fell in central Iowa and caused lowland flooding on the Iowa, the Skunk, and the Des Moines Rivers. During the second storm on July 8–9, 2 to 8 inches of rain fell in central Iowa. Rivers throughout central Iowa had not receded from the July 4–5 storm, and the three major reservoirs in this part of the State were at capacity. The runoff from this storm, combined with the runoff from the July 4–5 storm, caused record or near-record peak discharges at streamflow-gaging stations throughout the Iowa, the Skunk, the Raccoon, and the Des Moines River Basins. The floodwaters from these rivers entered the Mississippi River at about the same time as the flood peak from the late June storm in northern basins reached Keokuk (fig. 3). The coincident timing of the flood peaks from these tributary rivers increased the peak discharge on the Mississippi River and aggravated flooding on the Mississippi River from Davenport, Iowa, to St. Louis. The discharge on the Mississippi River at St. Louis that resulted from these combined floodwaters peaked on July 20.

On July 15–16, 2 to 7 inches of rain fell in eastern North Dakota and western Minnesota and caused flooding in the upper reaches of the Minnesota River Basin in Minnesota and the James River Basin in North Dakota. Although peak discharges from this storm were not as large in the lower reaches of these basins as the peak discharges of late June, the floodwaters from the James River added to the flooding of late July on the Missouri River.

From July 22 to 24, 2 to 13 inches of rain fell in parts of Nebraska, Kansas, Missouri, Iowa, and Illinois. The runoff from this storm caused record peak discharges on the Platte River in Nebraska and contributed large flows to previously filled reservoirs in the Kansas River Basin in Kansas. Discharges also were near-record on the Nishnabotna River in Iowa and the Illinois River in Illinois. Peak discharges on the Kansas River were the largest since 1951, which is before significant river regulation began.

Before the July 22 to 24 storm, the Missouri River was at or near flood stage as a result of large tributary inflows earlier in the month from the James River in North and South Dakota, the Big Sioux River in South Dakota, and the Little Sioux River in Iowa. As a result, floodwaters from the Platte and

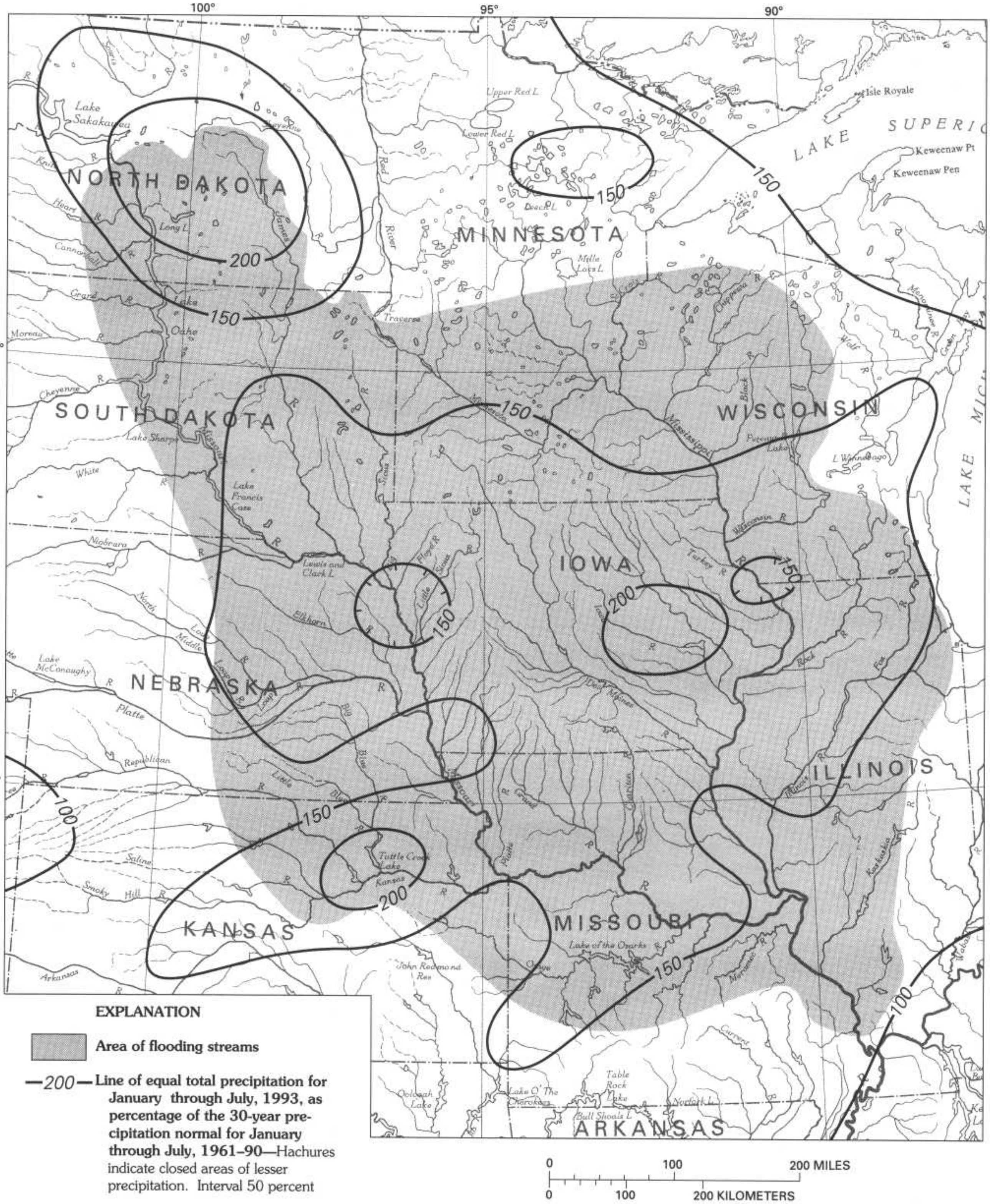


**Figure 2.** Areal distribution of total precipitation as a percentage of normal in the area of flooding in the upper Mississippi River Basin, January to July 1993.

the Kansas Rivers caused record or near-record peak discharges on the Missouri River at streamflow-gaging stations downstream from the confluence of the Platte River. The flood peak on the Missouri River reached Hermann, Missouri, on July 31 (fig. 3). The peak discharge from the Missouri River caused a second and greater peak discharge at the streamflow-gaging station on the Mississippi River at St. Louis on August 1.

Flood conditions on the Mississippi River differed above and below the confluence of the Ohio River. At Thebes, Illinois, just upstream from the confluence, severe flooding on the Mississippi River peaked on August 7. Downstream from the confluence, flooding on the Mississippi River was not severe because of less-than-average discharge contributed by the Ohio River and a substantially larger channel capacity in this reach of the Mississippi River. The discharge of the Ohio River was less than average during July and August as a result of generally dry conditions and low reservoir outflows throughout the Ohio River Basin.

## PEAK DISCHARGES FOR THE 1993 FLOOD

Flood data for 154 streamflow-gaging stations in the area of flooding are listed in table 1 (at end of report), and the locations of the streamflow-gaging stations and the ranges of computed recurrence intervals for the 1993 peak discharges are shown in figure 4.

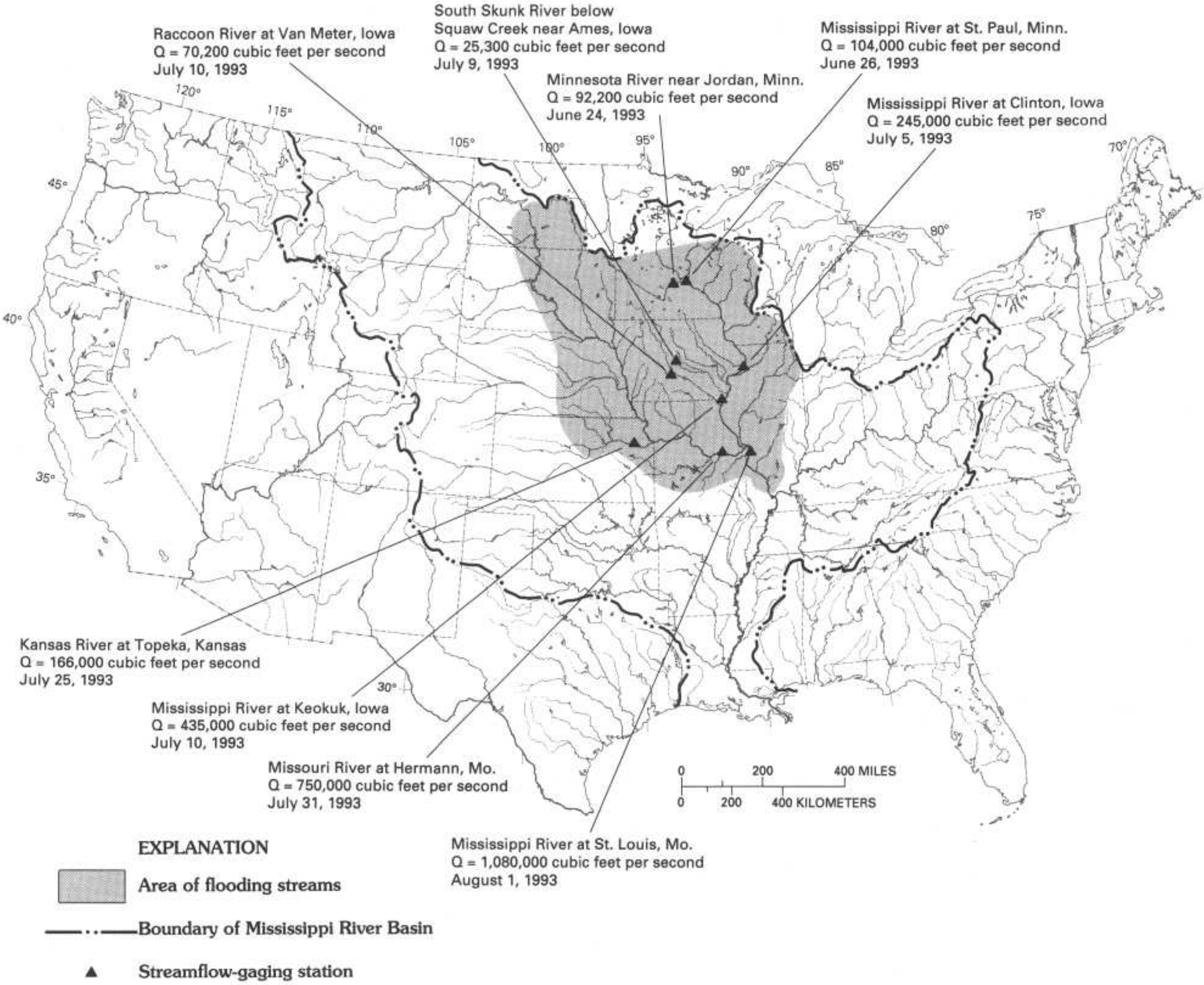


**Figure 3.** Peak discharges (Q) and dates of occurrence for the 1993 flood at selected streamflow-gaging stations in the upper Mississippi River Basin.

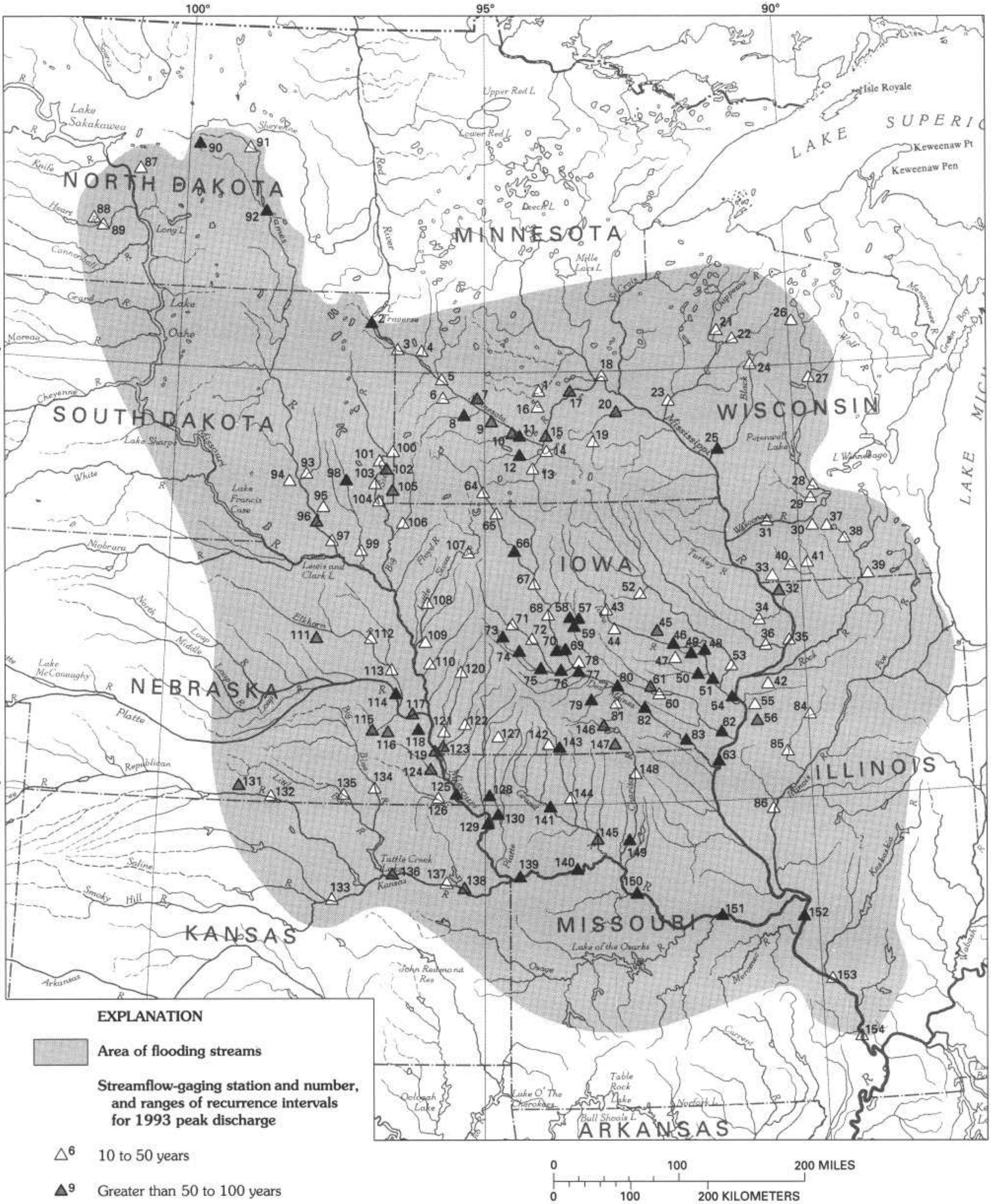


**Figure 4.** Location of selected streamflow-gaging stations and ranges in recurrence interval for the 1993 peak discharges in the upper Mississippi River Basin.

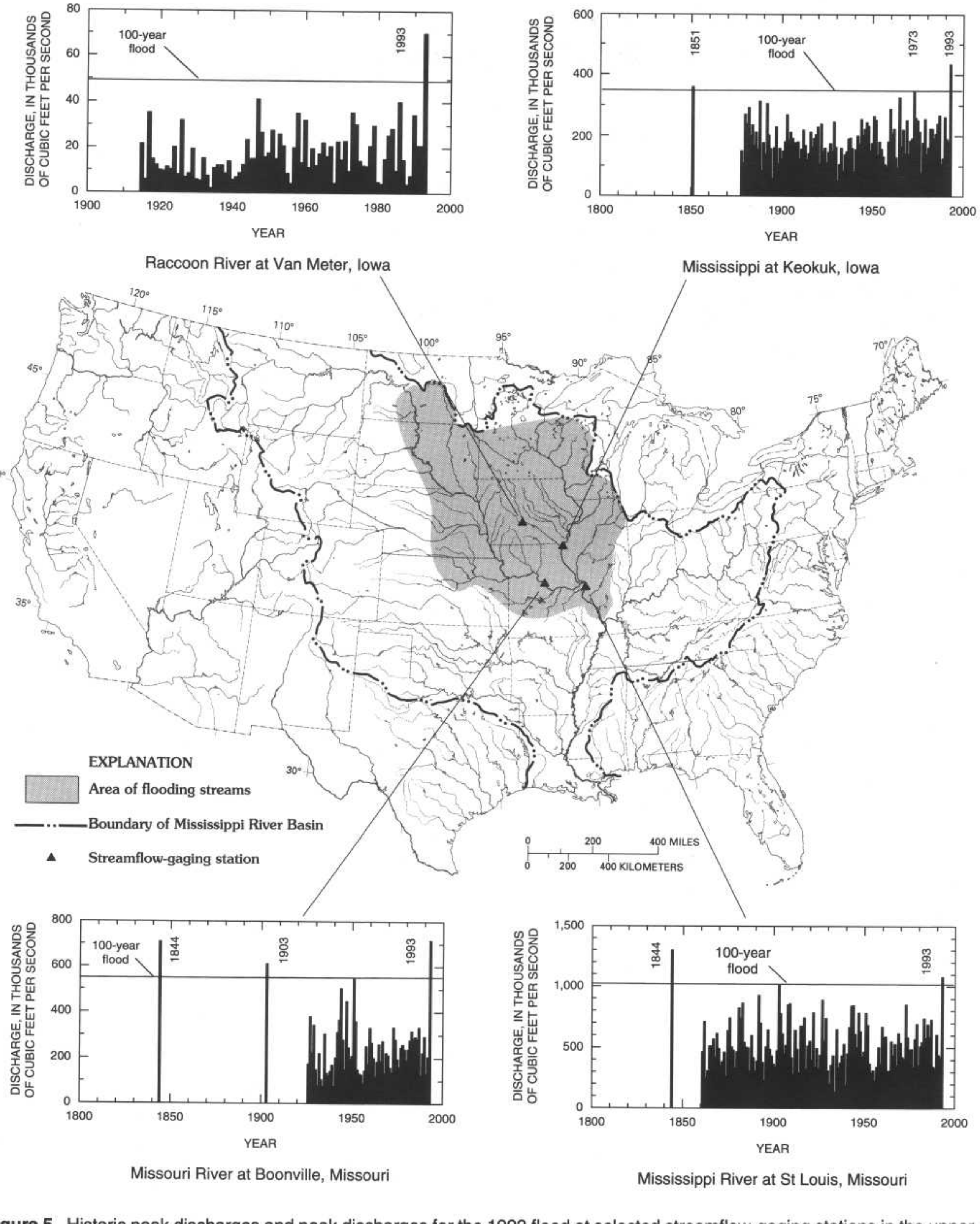


**Figure 5.** Historic peak discharges and peak discharges for the 1993 flood at selected streamflow-gaging stations in the upper Mississippi River Basin.

## Criteria for Selection

The streamflow-gaging stations that are shown in figure 4 and table 1 generally are located on major streams and had peak discharges with recurrence intervals of 10 years or greater from June to August 1993. After additional stage-discharge analyses are completed, some June to August 1993 peak discharges might be updated, and some additional streamflow-gaging stations, where 1993 peak discharges occurred during the antecedent hydrologic months of March to May and secondary peak discharges occurred from June to August, may be identified.

Although the focus of this report is on peak discharge, data on peak stage also are included in table 1 because peak stage is the primary indicator of overbank flooding and is used to define the limits of inundation. The inclusion of peak-stage data is of particular interest for several sites on the Mississippi and the Missouri River mainstems, where the peak stages in 1993 substantially exceeded the previous maximum known stages. Because of the effect of man-made and natural changes in the channel and flood plain, some sites that had record stages in 1993 had less-than-record peak discharges.

## Comparison With Historic Floods

As shown in table 1, 41 streamflow-gaging stations in the area of flooding had record peak discharges in 1993. In addition, 15 other stations had peak discharges that exceeded the previous maximum regulated discharge. At 45 stations, peak discharges had recurrence intervals of greater than 100 years.

Historic annual peak discharges and 1993 peak discharges at four streamflow-gaging stations that have long records of discharge are shown in figure 5. As shown in the figure, the 1993 peak discharge for the Raccoon River at Van Meter, Iowa, is remarkable because it was almost twice as large as any previous peak discharge in almost 80 years of record.

At two sites on the Mississippi River, the 1993 peak discharges were record or near-record discharges. The 1993 peak discharge for the Mississippi River at Keokuk was substantially greater than previous record peak discharges in 1973 and 1851. Although the 1993 peak discharge for the Mississippi River at St. Louis was not a record discharge, it was substantially larger than that for the large flood of 1973. The 1993 peak discharge for the Mississippi River at St. Louis was also slightly greater than that in 1903 and only slightly less than the estimated record peak discharge in 1844.

The 1993 peak discharge for the Missouri River at Boonville, Missouri, also was a record discharge, which exceeded previous historic flood-peak discharges in 1951, 1903, and 1844. Because floodwaters upstream from Lewis and Clark Lake were contained in 1993 by the Missouri River dam system, the large peak discharge at Boonville is particularly notable.

At all four sites shown in figure 5, the 1993 peak discharge was greater than the discharge with a 100-year recurrence interval. At the Mississippi River at St. Louis, the 1993 peak discharge was slightly greater than the discharge with the 100-year recurrence interval. At the Raccoon River at Van Meter, however, the 1993 peak discharge was about 40 percent greater than the discharge with a 100-year recurrence interval.

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**Table 1.** Summary of peak stages and dicharges at selected streamflow-gaging stations in the upper Mississippi River Basin

[mi², square miles; ft, feet; ft3/s, cubic feet per second; >, greater than]

| Site number | Station number | Station name | Drainage area (mi²) | Flood data | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Flood of June–August 1993 | | | | Previous maximum discharge | | |
| | | | | Peak stage (ft)) | Peak discharge (ft³/s) | Date | Recurrence interval range (years) | Peak stage (ft) | Maximum discharge (ft³/s) | Date |
| 1 | 05278930 | Buffalo Creek neart Glencoe, Minn. | 374 | 10.89 | 3,380 | 06/19 | 10– 50 | 11.78 | 4,300 | 09/1991 |
| 2 | 05290000 | Little Minnesota River near Peever, S. Dak. | 447 | 13.58 | [1]8,900 | 07/25 | >100 | [2]13.35 | 4,730 | [3]04/1952 |
| 3 | 05292000 | Minnesota River at Ortonville, Minn. | 1,160 | 9.96 | 2,950 | 07/28 | 10– 50 | 12.92 | 3,060 | 04/1952 |
| 4 | 05294000 | Pomme De Terre River at Appleton, Minn. | 905 | 9.57 | 2,400 | 07/10 | 10– 50 | [3]14.58 | 5,520 | [3]07/1969 |
| 5 | 05311000 | Minnesota River at Montevideo, Minn. | 6,180 | 16.46 | 11,500 | 08/04 | 10– 50 | [2]21.68 | 35,100 | 04/1969 |
| 6 | 05313500 | Yellow Medicine Rivert near Granite Falls, Minn. | 653 | 10.84 | 8,340 | 06/21 | 10– 50 | 17.50 | 25,200 | 06/1919 |
| 7 | 05316500 | Redwood River near Redwood Falls, Minn. | 629 | 15.73 | 12,600 | 06/18 | (>50)–100 | 15.92 | 19,700 | 06/1957 |
| 8 | 05316570 | Beaver Creek at Beaver Falls, Minn. | 194 | 14.29 | [1]2,750 | 06/17 | >100 | [2]11.33 | 1,070 | 04/1985 |
| 9 | 05316700 | Spring Creek near Sleepy Eye, Minn. | 31.3 | 17.91 | [1]960 | 06/17 | (>50)–100 | 17.79 | 930 | 04/1965 |
| 10 | 05317000 | Cottonwood River near New Ulm, Minn. | 1,280 | 18.87 | 24,200 | 06/19 | (>50)–100 | [2]20.86 | 28,700 | [3]04/1969 |
| 11 | 05317200 | Liattle Cottonwood River near Courtland, Minn. | 230 | 10.46 | [1]3,540 | 06/20 | >100 | 8.96 | 1,340 | 03/1985 |
| 12 | 05319500 | Wantonwan River near Garden City, Minn. | 812 | 15.89 | 14,400 | 06/20 | >100 | 18.72 | 19,000 | 04/1965 |
| 13 | 05320000 | Blue Earth River near Rapidan, Minn. | 2,430 | 13.32 | 20,300 | 06/20 | 10– 50 | 21.36 | 43,100 | 04/1965 |
| 14 | 05320500 | Le Sueur River near near Rapidan, Minn. | 1,100 | 13.33 | 11,500 | 06/21 | 10– 50 | 22.72 | 24,700 | [3]04/1965 |
| 15 | 05325000 | Minnesota River at Mankato, Minn. | 14,900 | 30.11 | 75,600 | 06/21 | (>50)–100 | 29.9 | 110,000 | 04/1881 |
| 16 | 05326100 | Middle Branch Rush River near Gaylord, Minn. | 68.5 | 19.93 | [1]1,380 | 06/17 | 10– 50 | 19.78 | 920 | 06/1983 |
| 17 | 05330000 | Minnesota River near Jordan, Minn. | 16,200 | 33.52 | 92,200 | 06/24 | (>50)–100 | 35.07 | 117,000 | 06/1965 |
| 18 | 05331000 | Mississippi River at St. Paul, Minn. | 36,800 | 19.13 | 104,000 | 06/26 | 10– 50 | 26.01 | 171,000 | 04/1965 |
| 19 | 05353800 | Straight River near Faribault, Minn. | 442 | 11.16 | 5,920 | 06/17 | >10– 50 | [2]12.74 | 6,030 | [3]07/1990 |
| 20 | 05355200 | Cannon River at Welch, Minn. | 1,320 | 13.19 | 18,800 | 06/17 | (>50)–100 | 14.01 | 36,100 | 04/1965 |
| 21 | 05360500 | Flameau River near Bruce, Wis. | 1,860 | 10.11 | 16,500 | 06/21 | 10– 50 | 10.90 | 17,600 | [3]04/1986 |
| 22 | 05362000 | Jump River at Sheldon, Wis. | 576 | 13.20 | 16,400 | 06/21 | 10– 50 | 18.80 | 46,000 | 08/1941 |
| 23 | 05369500 | Chippewa River at Durand, Wis. | 9,010 | 15.76 | 90,100 | 06/23 | 10– 50 | 18.40 | 123,000 | [3]04/1967 |
| 24 | 05381000 | Black River at Neilsville, Wis. | 749 | 19.28 | 30,300 | 06/20 | 10– 50 | 23.80 | 48,800 | 09/1938 |
| 25 | 05382000 | Black River near Galesville, Wis. | 2,080 | 16.64 | 64,000 | 06/21 | >100 | [4]15.46 | 65,500 | [3]04/1967 |
| 26 | 05393500 | Spirit River at Spirit Falls, Wis. | 81.6 | 7.4 | 2,700 | 06/21 | 10– 50 | 10.00 | 4,180 | 09/1942 |

See footnotes at end of table.

**Table 1.** Summary of peak stages and dicharges at selected streamflow-gaging stations in the upper Mississippi River Basin—Continued

| Site number | Station number | Station name | Drainage area ($mi^2$) | Flood data: Flood of June–August 1993: Peak stage (ft)) | Peak discharge ($ft^3/s$) | Date | Recurrence interval range (years) | Previous maximum discharge: Peak stage (ft) | Maximum discharge ($ft^3/s$) | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 27 | 05398000 | Wisconsin River at Rothschild, Wis. | 4,020 | 27.48 | 44,400 | 06/21 | 10– 50 | [5]18.46 | 49,200 | 04/1965 |
| 28 | 05404000 | Wisconsin River near Wisconsin Dells, Wis. | 8,090 | 18.16 | 59,100 | 06/24 | 10– 50 | 23.83 | 72,200 | 09/1938 |
| 29 | 05405000 | Baraboo River near Baraboo, Wis. | 609 | 22.78 | 6,360 | 07/18 | 10– 50 | [6,7]17.50 | 7,900 | 03/1917 |
| 30 | 05406500 | Black Earth Creek at Black Earth, Wis. | 45.6 | 6.13 | 1,320 | 07/06 | 10– 50 | 6.58 | 1,750 | 07/1954 |
| 31 | 05407000 | Wisconsin River at Muscoda, Wis. | 10,400 | 10.35 | 59,600 | 06/25 | 10– 50 | [4]11.48 | 80,800 | 09/1938 |
| 32 | 05414820 | Sinsinawa River near Menominee, Ill. | 39.6 | 13.18 | 11,300 | 07/05 | (>50)–100 | 13.34 | 11,600 | 06/1969 |
| 33 | 05415000 | Galena River at Buncombe, Wis. | 125 | 16.7 | 16,000 | 07/06 | 10– 50 | 19.57 | 29,700 | 06/1969 |
| 34 | 05418500 | Maquoketa River near Maquoketa, Iowa. | 1,553 | 32.59 | 38,000 | 07/06 | 10– 50 | [5]24.7 | 48,000 | 06/1944 |
| 35 | 05420500 | Mississippi River at Clinton, Iowa. | 85,600 | [2]22.98 | 245,000 | [3]07/05 | 10– 50 | 24.65 | 307,000 | 04/1965 |
| 36 | 05422000 | Wapsipinicon River near DeWitt, Iowa. | 2,330 | 12.86 | 24,100 | 07/09 | 10– 50 | 14.19 | 31,100 | 06/1990 |
| 37 | 05427948 | Pheasant Branch at Middleton, Wis. | 18.3 | 8.92 | [1]746 | 07/06 | 10– 50 | 8.54 | 516 | [3]03/1975 |
| 38 | 05429500 | Yahara River near McFarland, Wis. | 327 | [2]6.75 | 615 | 07/25 | 10– 50 | [2,5]6.33 | 867 | [3]04/1959 |
| 39 | 05431486 | Turtle Creek at Carvers Rock Road near Clinton, Wis. | 199 | 10.38 | 5,580 | 06/30 | 10– 50 | [7]12.85 | 16,500 | 04/1973 |
| 40 | 05432500 | Pecatonica River at Darlington, Wis. | 273 | 18.22 | 12,400 | 07/06 | 10– 50 | 20.71 | 22,000 | 07/1950 |
| 41 | 05433000 | East Branch Pecatonica River near Blanchardville, Wis. | 221 | 16.54 | 6,560 | 07/06 | 10– 50 | 15.74 | 11,700 | 02/1948 |
| 42 | 05448000 | Mill Creek at Milan, Ill.... | 62.4 | 10.29 | 7,680 | 06/25 | 10– 50 | 12.65 | 9,300 | 04/1973 |
| 43 | 05451500 | Iowa River at Marshalltown, Iowa. | 1,564 | 20.55 | 19,200 | 07/10 | 10– 50 | 20.47 | 42,000 | [3]06/1918 |
| 44 | 05451700 | Timber Creek near Marshalltown, Iowa. | 118 | 17.10 | 8,250 | 07/09 | 10– 50 | 17.69 | 12,000 | 08/1977 |
| 45 | 05452000 | Salt Creek near Elberon, Iowa. | 201 | 20.85 | 28,000 | 07/09 | (>50)–100 | 20.00 | 35,000 | [3]06/1947 |
| 46 | 05453100 | Iowa River at Marengo, Iowa. | 2,794 | 20.27 | [1]39,000 | 07/19 | >100 | 19.79 | 30,800 | [3]03/1960 |
| 47 | 05454300 | Clear Creek near Coralville, Iowa. | 98.1 | 14.82 | 6,910 | 07/06 | 10– 50 | 16.36 | 10,200 | 06/1990 |
| 48 | 05454500 | Iowa River at Iowa City, Iowa. | 3,271 | 28.52 | [8]28,200 | 08/10 | >100 | [6,9]24.1<br>[10]28.21 | [6,9]70,000<br>[10]26,900 | 06/1851<br>07/1993 |
| 49 | 05455100 | Old Mans Creek near Iowa City, Iowa. | 201 | 18.58 | [1]27,000 | 07/06 | >100 | 17.25 | 13,500 | 06/1982 |
| 50 | 05455500 | English River at Kalona, Iowa. | 573 | 22.55 | [1]33,000 | 07/06 | >100 | 21.45 | 20,000 | 09/1965 |
| 51 | 05455700 | Iowa River at Lone Tree, Iowa. | 4,293 | 22.94 | [1]57,000 | 07/07 | >100 | 20.27 | 35,700 | [3]05/1974 |
| 52 | 05463500 | Black Hawk Creek at Hudson, Iowa. | 303 | 17.1 | 9,600 | 07/09 | 10– 50 | 18.23 | 19,300 | 07/1969 |

See footnotes at end of table.

**Table 1.** Summary of peak stages and dicharges at selected streamflow-gaging stations in the upper Mississippi River Basin—Continued

| Site number | Station number | Station name | Drainage area (mi²) | Flood data: Flood of June–August 1993: Peak stage (ft) | Peak discharge (ft³/s) | Date | Recurrence interval range (years) | Previous maximum discharge: Peak stage (ft) | Maximum discharge (ft³/s) | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 53 | 05465000 | Cedar River near Conesville, Iowa. | 7,785 | 16.83 | 67,700 | 07/07 | 10– 50 | 16.85 | 70,800 | [3]04/1961 |
| 54 | 05465500 | Iowa River at Wapello, Iowa. | 12,499 | 29.53 | [1]107,000 | 07/07 | >100 | 28.91 | 94,000 | [3]06/1947 |
| 55 | 05467000 | Pope Creek near Keithsburg, Ill. | 174 | [2]29.08 | 6,860 | 07/24 | 10– 50 | [2]28.61 | 8,900 | [3]04/1973 |
| 56 | 05469000 | Henderson Creek near Oquawka, Ill. | 432 | [2]32.58 | 30,100 | 07/25 | (>50)–100 | 31.05 | 34,600 | 07/1982 |
| 57 | 05470000 | South Skunk River near Ames, Iowa. | 315 | 14.15 | [1]11,500 | 07/09 | >100 | 13.90 | 8,630 | [3]06/1954 |
| 58 | 05470500 | Squaw Creek at Ames, Iowa. | 204 | 18.54 | [1]21,000 | 07/09 | >100 | 15.97 | 12,500 | 06/1990 |
| 59 | 05471000 | South Skunk River below Squaw Creek near Ames, Iowa. | 556 | 25.53 | [1]25,300 | 07/09 | >100 | 25.57 | 14,700 | 06/1975 |
| 60 | 05471500 | South Skunk River near Oskaloosa, Iowa. | 1,635 | 25.10 | 20,400 | 07/15 | 10– 50 | 25.80 | 37,000 | 05/1944 |
| 61 | 05472500 | North Skunk River near Sigourney, Iowa. | 730 | 24.72 | 22,600 | 07/06 | (>50)–100 | 25.33 | 27,500 | 03/1960 |
| 62 | 05474000 | Skunk River at Augusta, Iowa. | 4,303 | 23.68 | 54,400 | 07/10 | >100 | 27.05 | 66,800 | 04/1973 |
| 63 | 05474500 | Mississippi River at Keokuk, Iowa. | 119,000 | 27.15 | [1]435,000 | 07/10 | >100 | 21.0 | 360,000 | 06/1851 |
| 64 | 05476000 | Des Moines River at Jackson, Minn. | 1,220 | 16.67 | 8,250 | 07/07 | 10– 50 | 19.45 | 15,700 | 04/1969 |
| 65 | 05476500 | Des Moines River at Esterville, Iowa. | 1,372 | 15.38 | 10,200 | 06/30 | 10– 50 | 17.68 | 16,000 | 04/1969 |
| 66 | 05476750 | Des Moines River at Humboldt, Iowa. | 2,256 | 15.22 | [1]19,000 | 07/13 | >100 | 15.40 | 18,000 | 04/1969 |
| 67 | 05480500 | Des Moines River at Fort Dodge, Iowa. | 4,190 | 15.73 | 31,000 | 07/14 | 10– 50 | 19.62 | 35,600 | [3]04/1965 |
| 68 | 05481300 | Des Moines River near Stratford, Iowa. | 5,452 | 25.64 | 42,100 | 07/11 | 10– 50 | 29.7 | 57,400 | 06/1954 |
| 69 | 05481650 | Des Moines River near Saylorville, Iowa. | 5,841 | 24.12 | [8]42,700 | 07/11<br>07/19 | >100 | [9]24.50<br>[10]20.72 | [8]60,000<br>[9]30,100 | 06/1954<br>06/1984 |
| 70 | 05481950 | Beaver Creek near Grimes, Iowa. | 358 | 16.58 | [1]15,500 | 07/10 | >100 | 14.73 | 7,980 | 06/1986 |
| 71 | 05482135 | North Raccoon River near Newell, Iowa. | 233 | 15.99 | 2,250 | 07/11 | 10– 50 | 16.73 | 2,850 | 06/1984 |
| 72 | 05482500 | North Raccoon River near Jefferson, Iowa. | 1,619 | 19.23 | 16,800 | 07/10 | 10– 50 | 22.3 | 29,100 | 06/1947 |
| 73 | 05483450 | Middle Raccoon River near Bayard, Iowa. | 375 | 28.71 | [1]24,000 | 07/09 | >100 | 24.70 | 14,600 | [3]07/1973 |
| 74 | 05483600 | Middle Raccoon River at Panora, Iowa. | 440 | 20.04 | [1]22,400 | 07/09 | >100 | 15.50 | 15,300 | 06/1986 |
| 75 | 05484000 | South Raccoon River at Redfield, Iowa. | 994 | 26.98 | [1]44,000 | 07/10 | >100 | [5]29.04 | 35,000 | 07/1958 |
| 76 | 05484500 | Raccoon River at Van Meter, Iowa. | 3,441 | 26.34 | [1]70,200 | 07/10 | >100 | 22.69 | 41,200 | [3]06/1947 |
| 77 | 05485500 | Des Moines River below Raccoon River at Des Moines, Iowa. | 9,879 | 34.29 | [1]116,000 | 07/11 | >100 | [7] [9]20.80<br>[10]28.46 | [9]77,000<br>[10]58,400 | 06/1947<br>06/1984 |

See footnotes at end of table.

**Table 1.** Summary of peak stages and dicharges at selected streamflow-gaging stations in the upper Mississippi River Basin—Continued

| Site number | Station number | Station name | Drainage area (mi²) | Flood data: Flood of June–August 1993: Peak stage (ft)) | Peak discharge (ft³/s) | Date | Recurrence interval range (years) | Previous maximum discharge: Peak stage (ft) | Maximum discharge (ft³/s) | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 78 | 05485640 | Fourmile Creek at Des Moines, Iowa. | 92.7 | 15.36 | [1]6,400 | 07/09 | 10– 50 | 14.84 | 5,340 | 06/1974 |
| 79 | 05487980 | White Breast Creek near Dallas, Iowa. | 342 | 30.11 | 25,300 | 07/06 | >100 | 33.45 | 37,300 | 07/1982 |
| 80 | 05488500 | Des Moines River near Tracy, Iowa. | 12,479 | 24.16 | [8]109,000 | 07/12 | >100 | [9]26.50<br>[10]18.11 | [9]155,000<br>[10]42,600 | 06/1947<br>06/1984 |
| 81 | 05489000 | Cedar Creek near Bussey, Iowa. | 374 | 28.46 | 29,000 | 07/05 | 10– 50 | 34.61 | 96,000 | 07/1982 |
| 82 | 05489500 | Des Moines River at Ottumwa, Iowa. | 13,374 | 22.13 | [8]112,000 | 07/12 | >100 | [7] [9]22<br>[10]14.64 | [9]140,000<br>[10]47,800 | [3]05/1903<br>06/1984 |
| 83 | 05490500 | Des Moines River at Keosauqua, Iowa. | 14,038 | 32.66 | [8]108,000 | 07/13 | >100 | [5] [9]27.85<br>[10]28.02 | [9]146,000<br>[10]72,200 | 06/1903<br>04/1973 |
| 84 | 05569500 | Spoon River at London Mills, Ill. | 1,072 | 25.92 | 24,000 | 07/25 | 10– 50 | 28.03 | 41,000 | 06/1974 |
| 85 | 05570000 | Spoon River at Seville, Ill... | 1,636 | 33.09 | 34,400 | 07/26 | 10– 50 | [2]33.0 | 37,300 | [3]08/1924 |
| 86 | 05586100 | Illinois River at Valley City, Ill. | 26,742 | [2]25.92 | 97,500 | [3]08/01 | 10– 50 | 28.61 | 123,000 | 05/1943 |
| 87 | 06341800 | Painted Woods Creek near Wilton, N. Dak. | 427 | 8.12 | 1,570 | 07/23 | 10– 50 | 9.64 | 4,050 | 04/1979 |
| 88 | 06347500 | Big Muddy Creek near Almont, N. Dak. | 456 | 30.94 | 8,680 | 07/23 | 10– 50 | [6]30.7 | 20,200 | 04/1950 |
| 89 | 06348000 | Heart River near Lark, N. Dak. | 2,750 | 16.85 | 12,800 | 07/23 | 10– 50 | 20.7 | 29,200 | 04/1950 |
| 90 | 06467600 | James River near Manfred, N. Dak. | 253 | 9.40 | [1]2,600 | 07/23 | >100 | [2]9.20 | [11]2,000 | 04/1979 |
| 91 | 06468170 | James River near Grace City, N. Dak. | 1,060 | 13.49 | [1]3,520 | 07/28 | 10– 50 | 12.00 | 3,100 | 04/1969 |
| 92 | 06470000 | James River at Jamestown, N. Dak. | 2,820 | 13.60 | [8]1,300 | 07/23 | >100 | [7] [9]15.82<br>[10]8.76 | [9]6,390<br>[10]996 | 05/1950<br>06/1983 |
| 93 | 06477150 | Rock Creek near Fulton, S. Dak. | 240 | 14.34 | 1,880 | 07/06 | 10– 50 | [4]10.21 | 2,040 | 04/1969 |
| 94 | 06478052 | Enemy Creek near Mitchell, S. Dak. | 163 | 14.97 | 4,050 | 07/06 | 10– 50 | 15.15 | 4,280 | 06/1984 |
| 95 | 06478390 | Wolf Creek near Clayton, S. Dak. | 396 | 17.39 | 5,390 | 07/05 | 10– 50 | 18.01 | 6,520 | 06/1984 |
| 96 | 06478500 | James River near Scotland, S. Dak. | 20,653 | 19.94 | 19,300 | 07/06 | (>50)–100 | 20.45 | 29,400 | 06/1984 |
| 97 | 06478513 | James River near Yankton, S. Dak. | 20,942 | 21.15 | 15,600 | 07/08 | 10– 50 | 24.34 | 26,400 | 06/1984 |
| 98 | 06478540 | Little Vermillion River near Salem, S. Dak. | 78.6 | 11.95 | [1]3,300 | 07/04 | >100 | [2]9.88 | 900 | 06/1984 |
| 99 | 06479000 | Vermillion River near Wakonda, S. Dak. | 2,170 | 17.33 | 14,000 | 07/07 | 10– 50 | 17.62 | 17,000 | 06/1984 |
| 100 | 06479980 | Medary Creek near Brookings, S. Dak. | 200 | 11.78 | [1]3,300 | 07/05 | 10– 50 | 11.27 | 2,590 | 06/1984 |
| 101 | 06480000 | Big Sioux River near Brookings, S. Dak. | 3,898 | 13.44 | 11,300 | 07/06 | 10– 50 | 14.77 | 33,900 | 04/1969 |
| 102 | 06480400 | Spring Creek near Flandreau, S. Dak. | 63.2 | 16.84 | [1]4,500 | 07/03 | (>50)–100 | 15.72 | 2,030 | 06/1984 |
| 103 | 06481000 | Big Sioux River near Dell Rapids, S. Dak. | 4,483 | 15.78 | 18,800 | 07/06 | 10– 50 | 16.47 | 41,300 | 04/1969 |

See footnotes at end of table.

**Table 1.** Summary of peak stages and dicharges at selected streamflow-gaging stations in the upper Mississippi River Basin—Continued

| Site number | Station number | Station name | Drainage area (mi²) | Flood data: Flood of June–August 1993: Peak stage (ft)) | Peak discharge (ft³/s) | Date | Recurrence interval range (years) | Previous maximum discharge: Peak stage (ft) | Maximum discharge (ft³/s) | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 104 | 06482020 | Big Sioux River at North Cliff Avenue at Sioux Falls, S. Dak. | 5,216 | 23.84 | 18,000 | 07/07 | 10– 50 | 27.45 | 40,700 | 04/1969 |
| 105 | 06482745 | Beaver Creek at Valley Springs, S. Dak. | 104 | 24.19 | [6]2,000 | 07/05 | (>50)–100 | 24.21 | [6]2,000 | 05/1993 |
| 106 | 06483500 | Rock River near Rock Valley, Iowa | 1,592 | 19.77 | 28,500 | 07/12 | 10– 50 | [7]17.32 | 40,400 | 04/1969 |
| 107 | 06605850 | Little Sioux River at Linn Grove, Iowa. | 1,548 | 20.77 | [1]16,400 | 07/02 | 10– 50 | 19.58 | 13,100 | 06/1984 |
| 108 | 06606600 | Little Sioux River at Correctionville, Iowa. | 2,500 | 23.82 | 22,600 | 07/18 | 10– 50 | 25.86 | 29,800 | 04/1965 |
| 109 | 06608500 | Soldier River at Pisgah, Iowa. | 407 | 27.58 | [1]23,000 | 07/10 | 10– 50 | 28.17 | 22,500 | 06/1950 |
| 110 | 06609500 | Boyer River at Logan, Iowa. | 871 | 22.20 | 25,500 | 07/10 | 10– 50 | [2]25.22 | 30,800 | 06/1990 |
| 111 | 06799230 | Union Creek at Madison, Nebr. | 174 | 25.52 | 14,500 | 07/09 | (>50)–100 | 25.72 | 15,100 | 06/1990 |
| 112 | 06799350 | Elkhorn River at West Point, Nebr. | 5,100 | 13.94 | 29,500 | 07/09 | 10– 50 | [2]16.09 | 33,000 | [3]06/1969 |
| 113 | 06800500 | Elkhorn River at Waterloo, Nebr. | 6,900 | 15.28 | 30,400 | 07/11 | 10– 50 | [7]16.60 | 100,000 | 06/1944 |
| 114 | 06801000 | Platte River at Ashland, Nebr. | 84,200 | 21.45 | 114,000 | 07/25 | >100 | 19.23 | [12]130,000 | 03/1993 |
| 115 | 06803500 | Salt Creek at Lincoln, Nebr. | 684 | 26.52 | [1]30,000 | 07/24 | (>50)–100 | 26.15 | 28,200 | 06/1951 |
| 116 | 06803510 | Little Salt Creek near Lincoln, Nebr. | 43.6 | 20.5 | [1]8,300 | 07/23 | (>50)–100 | 20.02 | 8,000 | [3]07/1985 |
| 117 | 06805500 | Platte River at Louisville, Nebr. | 85,800 | 11.90 | [1]160,000 | 07/25 | (>50)–100 | 12.45 | 144,000 | [3]06/1984 |
| 118 | 06806500 | Weeping Water Creek at Union, Nebr. | 241 | 31.15 | [1]70,000 | 07/23 | >100 | 29.80 | 60,300 | 05/1950 |
| 119 | 06807000 | Missouri River at Nebraska City, Nebr. | 410,000 | 27.19 | [8]196,000 | 07/23 | (>50)–100 [5] | [9]27.66<br>[10]24.78 | [9]414,000<br>[10]182,000 | 04/1952<br>06/1984 |
| 120 | 06807410 | West Nishnabotna River at Hancock, Iowa. | 609 | 23.53 | [1]27,000 | 07/10 | 10– 50 | 22.12 | 26,400 | 09/1972 |
| 121 | 06808500 | West Nishnabotna River at Randolph, Iowa. | 1,326 | 23.60 | 22,100 | 07/23 | 10– 50 | 24.50 | 40,800 | 05/1987 |
| 122 | 06809500 | East Nishnabotna River near Red Oak, Iowa. | 894 | 21.88 | 21,400 | 07/23 | 10– 50 | 27.43 | 38,000 | 09/1972 |
| 123 | 06810000 | Nishnabotna River above Hamburg, Iowa. | 2,806 | 30.56 | 37,700 | 07/25 | (>50)–100 | 28.27 | 55,500 | [3]06/1947 |
| 124 | 06811500 | Little Nemaha River at Auburn, Nebr. | 793 | 26.3 | 92,000 | 07/25 | (>50)–100 | 27.65 | 164,000 | 05/1950 |
| 125 | 06813500 | Missouri River at Rulo, Nebr. | 414,900 | 25.37 | [8]307,000 | 07/24 | >100 | [9]25.60<br>[10]24.40 | [9]358,000<br>[10]242,000 | 04/1952<br>06/1984 |
| 126 | 06815000 | Big Nemaha River at Falls City, Nebr. | 1,340 | 29.80 | 59,000 | 07/06 | 10– 50 | 31.40 | 71,600 | 10/1973 |
| 127 | 06817000 | Nodaway River at Clarinda, Iowa. | 762 | 22.92 | 27,900 | 07/22 | 10– 50 | 25.3 | 31,100 | 06/1947 |
| 128 | 06817700 | Nodaway River near Graham, Mo. | 1,380 | 26.14 | [1]70,000 | 07/23 | >100 | 23.34 | 26,600 | 09/1989 |
| 129 | 06818000 | Missouri River at St. Joseph, Mo. | 420,300 | 32.07 | [8]335,000 | 07/26 | >100 | [9]26.82<br>[10]23.83 | [9]397,000<br>[10]207,000 | 04/1952<br>05/1987 |

See footnotes at end of table.

**Table 1.** Summary of peak stages and dicharges at selected streamflow-gaging stations in the upper Mississippi River Basin—Continued

| Site number | Station number | Station name | Drainage area ($mi^2$) | Flood data: Flood of June–August 1993: Peak stage (ft)) | Flood data: Flood of June–August 1993: Peak discharge ($ft^3/s$) | Flood data: Flood of June–August 1993: Date | Flood data: Flood of June–August 1993: Recurrence interval range (years) | Flood data: Previous maximum discharge: Peak stage (ft) | Flood data: Previous maximum discharge: Maximum discharge ($ft^3/s$) | Flood data: Previous maximum discharge: Date |
|---|---|---|---|---|---|---|---|---|---|---|
| 130 | 06820500 | Platte River near Agency, Mo. | 1,760 | 36.07 | [1]60,800 | 07/25 | >100 | 35.05 | 53,000 | 07/1965 |
| 131 | 06851500 | Thompson Creek at Riverton, Nebr. | 279 | 14.65 | 12,000 | 07/18 | (>50)–100 | [4]13.22 | 12,200 | 07/1950 |
| 132 | 06853020 | Republican River at Guide Rock, Nebr. | 22,090 | 15.40 | 9,600 | 07/19 | 10– 50 | [6]20.73 | 29,200 | 06/1957 |
| 133 | 06879100 | Kansas River at Fort Riley, Kans. | 44,870 | 27.93 | [8]85,500 | 07/26 | 10– 50 | [7] [9]30.53<br>[10]23.74 | [9]298,000<br>[10]59,400 | 07/1951<br>[3]10/1973 |
| 134 | 06881500 | Big Blue River at Beatrice, Nebr. | 3,900 | 28.8 | 29,000 | 07/26 | 10– 50 | 31.27 | 55,100 | 06/1984 |
| 135 | 06884000 | Little Blue River at Fairbury, Nebr. | 2,350 | 21.22 | 25,500 | 07/27 | 10– 50 | 24.33 | 54,000 | 07/1992 |
| 136 | 06887500 | Kansas River at Wamego, Kans. | 55,280 | 27.33 | [8]171,000 | 07/26 | (>50)–100 | [9]30.56<br>[10]18.70 | [9]400,000<br>[10]72,900 | 07/1951<br>10/1973 |
| 137 | 06889000 | Kansas River at Topeka, Kans. | 56,720 | 34.90 | [8]166,000 | 07/25 | 10– 50 | [9]40.80<br>[10]27.29 | [9]469,000<br>[10]130,000 | 07/1951<br>10/1973 |
| 138 | 06891000 | Kansas River at Lecompton, Kans. | 58,460 | 24.65 | [8]186,000 | 07/27 | (>50)–100 | [9]30.23<br>[10]22.73 | [9]483,000<br>[10]140,000 | 07/1951<br>10/1973 |
| 139 | 06893000 | Missouri River at Kansas City, Mo. | 485,200 | 48.87 | [8]541,000 | 07/27 | >100 | [9]38.0<br>[10]28.86 | [6] [9]625,000<br>[10]313,000 | 06/1844<br>09/1973 |
| 140 | 06895500 | Missouri River at Waverly, Mo. | 487,200 | 31.15 | [1]600,000 | 07/28 | >100 | [9]28.20<br>[10]29.22 | [9]549,000<br>[10]276,000 | 07/1951<br>[3]07/1965 |
| 141 | 06897500 | Grand River near Gallatin, Mo. | 2,250 | 41.5 | [1]89,900 | 07/08 | >100 | 35.0 | 69,100 | [3]06/1947 |
| 142 | 06897950 | Elk Creek near Decatur City, Iowa. | 52.5 | 29.10 | [1]21,500 | 07/09 | 10– 50 | 28.22 | 18,000 | [3]07/1990 |
| 143 | 06898000 | Thompson River at Davis City, Iowa. | 701 | 20.53 | 30,300 | 07/05 | >100 | 24.29 | 57,000 | 09/1992 |
| 144 | 06899500 | Thompson River at Trenton, Mo. | 1,670 | 23.00 | 56,000 | 07/06 | 10– 50 | 25.7 | 95,000 | 06/1947 |
| 145 | 06902000 | Grand River near Sumner, Mo. | 6,880 | [2]42.14 | 150,000 | 07/10 | (>50)–100 | 39.5 | 180,000 | 06/1947 |
| 146 | 06903400 | Chariton River near Chariton, Iowa. | 182 | 22.37 | 14,200 | 07/05 | (>50)–100 | 29.32 | 37,700 | 09/1992 |
| 147 | 06903700 | South Fork Chariton River near Promise City, Iowa. | 168 | 25.30 | 19,500 | 07/05 | (>50)–100 | 34.84 | 70,600 | 09/1992 |
| 148 | 06904500 | Chariton River at Novinger, Mo. | 1,370 | 25.71 | 21,500 | 07/25 | 10– 50 | 28.50 | 22,900 | 06/1947 |
| 149 | 06905500 | Chariton River near Prarie Hill, Mo. | 1,870 | 21.93 | 31,500 | 07/01 | >100 | 21.96 | 31,900 | 04/1973 |
| 150 | 06909000 | Missouri River at Boonville, Mo. | 501,700 | 36.97 | [1]750,000 | 07/29 | >100 | [9]32.82<br>[10]31.85 | [9]710,000<br>[10]334,000 | [3]06/1844<br>10/1986 |
| 151 | 06934500 | Missouri River at Hermann, mo. | 524,200 | 36.97 | [8]750,000 | 07/31 | >100 | [9]35.50<br>[10]35.79 | [9]892,000<br>[10]549,000 | 06/1844<br>[3]10/1986 |
| 152 | 07010000 | Mississippi River at St. Louis, Mo. | 697,000 | 49.58 | 1,080,000 | 08/01 | >100 | 43.23 | [6]1,300,000 | [3]06/1844 |
| 153 | 07020500 | Mississippi River at Chester, Ill. | 708,600 | 49.59 | 950,000 | 08/06 | 10– 50 | 43.32 | [6]1,350,000 | [3]06/1844 |
| 154 | 07022000 | Mississippi River at At Thebes, Ill. | 713,200 | 45.50 | 975,000 | 08/07 | 10– 50 | 45.14 | [6]1,375,000 | 07/1844 |

[1]Peak discharge for 1993 exceeds the previous maximum known discharge.
[2]Backwater.
[3]Date of maximum discharge. Maximum stage was on different date.
[4]Gage at different site and same datum.
[5]Gage at different datum.
[6]Estimated.
[7]Gage at different site and datum.
[8]Peak discharge for 1993 exceeds the previous maximum known regulated discharge.
[9]Before regulation.
[10]After regulation.
[11]About.
[12]Estimated, includes bypass flow caused by ice jam upstream from site.



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