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Summary of Significant Floods in the United States and Puerto Rico, 1994 Through 1998 Water Years

Scientific Investigations Report 2005–5194

U.S. Department of the Interior
U.S. Geological Survey

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By C.A. Perry

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Front cover: Spring 1997 flood on the Red River of the North in Grand Forks, North Dakota (photograph taken by Steven Norbeck, U.S. Geological Survey, Grand Forks, North Dakota).

Back cover: Aftermath of fire during spring 1997 flood in Grand Forks, North Dakota (photograph taken by U.S. Geological Survey personnel, Grand Forks, North Dakota).

Prepared by the U.S. Geological Survey in Lawrence, Kansas (http://ks.water.usgs.gov)

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Conversion Factors and Datums

Multiply	By	To obtain
acre	4,047	square meter
cubic foot per second	0.02832	cubic meter per second
cubic foot per second per square mile	0.01093	cubic meter per second per kilometer
foot	0.3048	meter
foot per second	0.3048	meter per second
inch	25.4	millimeter
inch per hour	25.4	millimeter per hour
mile	1.609	kilometer
mile per hour	1.609	kilometer per hour
square foot	0.09290	square meter
square mile	2.590	square kilometer
yard	0.9144	meter

Temperature can be converted to degrees Celsius (°C) or degrees Fahrenheit (°F) by the equations:

$°C = 5/9\,(°F - 32)$
$°F = 9/5\,(°C) + 32$.

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88).

Glossary

Although much of the terminology used in this report is widely understood, some terms have specialized meanings in hydrology or are unfamiliar outside of hydrologic usage. Most of the definitions given here are from Langbein and Iseri (1960), with slight modifications, and explain the terms as they are generally used by hydrologists in the U.S. Geological Survey.

Absorption The entrance of water into the soil or rocks by all natural processes. It includes the infiltration of precipitation or snowmelt.

Bank The margins of a channel. Banks are called right or left as viewed facing the direction of the flow.

Convective precipitation Precipitation that falls from storms with localized updrafts (thunderstorms).

Cubic feet per second A unit expressing rates of **discharge**. One cubic foot per second is equal to the **discharge** of a stream of rectangular cross section, 1 foot wide and 1 foot deep, flowing water at an average velocity of 1 foot per second.

Current meter An instrument for measuring the velocity of flowing water. The U.S. Geological Survey typically uses a rotating cup meter.

Discharge In its simplest concept, **discharge** means outflow; therefore, the use of this term is not restricted as to course or location, and it can be applied to describe the flow of water from a pipe or from a **drainage basin**. If the **discharge** occurs in some course or channel, it is correct to speak of the **discharge** of a canal or of a river.

Drainage area The **drainage area** of a stream at a specified location is that area, measured in a horizontal plane, that is enclosed by a drainage divide.

Drainage basin A part of the surface of the Earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded **surface water** together with all tributary surface streams and bodies of impounded **surface water**.

El Niño A warming of the eastern tropical Pacific Ocean that affects weather patterns worldwide.

Flood An overflow or inundation that comes from a river or other body of water (Barrows, 1948, p. 4) and causes or threatens damage. Any relatively high **streamflow** overtopping the natural or artificial banks in any reach of a stream (Leopold and Maddock, 1954, p. 249–251).

Flood plain The lowland that borders a river, usually dry but subject to flooding (Hoyt and Langbein, 1955, p. 12).

Flood stage The **stage** at which overflow of the natural banks of a stream begins to cause damage in the reach in which the elevation is measured.

Isohyetal map A map or chart showing lines that connect points that received the same amount of precipitation.

Overland flow The flow of rainwater or snowmelt over the land surface toward stream channels.

Peak flow The greatest rate of flow during a flood.

Regulation The artificial manipulation of the flow of a stream.

Reservoir A pond, lake, or basin, either natural or artificial, for the storage, regulation, and control of water.

Runoff That part of the precipitation that appears in surface streams.

Stage The height of a water surface above an established datum plane (also gage height).

Stage-discharge curve A graph showing the relation between the gage height, usually plotted as ordinate, and the amount of water flowing (**discharge**) in a channel, expressed as volume per unit of time, usually plotted as abscissa.

Stage-discharge relation The relation expressed by the **stage-discharge curve**.

Standardized Precipitation Index An index that is based on the probability of precipitation for any time scale.

Streamflow The **discharge** that occurs in a natural channel. Although the term **discharge** can be applied to the flow of a canal, the word “**streamflow**” uniquely describes the **discharge** in a surface stream course. The term "**streamflow**" is more general than **runoff** as **streamflow** may be applied to **discharge** whether or not it is affected by diversion or **regulation**.

Streamgage A gaging station where a record of **discharge** of a stream is obtained.

Surface runoff That part of the **runoff** that travels over the soil surface to the nearest stream channel. It also is defined as that part of the **runoff** of a **drainage basin** that has not passed beneath the surface following precipitation.

Surface water Water on the surface of the Earth.

Water equivalent of snow The amount of water that would be obtained if the snow should be completely melted. Water content may be merely the amount of liquid water in the snow at the time of observation (Wilson, 1942, p. 153–154).

Water year In U.S. Geological Survey reports, **water year** is the 12-month period, October 1 through September 30. The **water year** is designated by the year in which it ends. Thus, the year ending September 30, 1994, is called the "1994 **water year**."

Summary of Significant Floods in the United States and Puerto Rico, 1994 Through 1998 Water Years

By C.A. Perry

Abstract

This volume is a compilation of significant floods that occurred at streamgages throughout the United States and Puerto Rico from October 1, 1993, through September 30, 1998. A significant flood in this report refers to a peak-flow discharge (instantaneous or time averaged) that is in the top 5 percent of all the annual peak flows recorded at streamgages during their total period of record. Most of these floods are approximately equal to or greater than the 20-year recurrence interval flood (0.05 probability of occurrence in any 1 year) for that streamgage.

A summary of the most devastating floods according to number of lives lost and amount of damage is provided for each water year from 1994 through 1998. Significant interstate floods also are described. For each year, national maps are provided showing percentage of streamgages in each State recording the significant floods and standardized deviations from long-term (1950–95) mean precipitation.

Compilations arranged by State for each of the 50 United States and Puerto Rico also are presented. Each State compilation includes: (1) State maps to locate the streamgages recording significant floods and (2) tables of data that allow the reader to compare each significant flood during water years 1994 through 1998 with the maximum flood for the entire period of record at each streamgage.

Introduction

Maximum floodflows for selected locations are compiled annually by State and Puerto Rico offices of the U.S. Geological Survey (USGS). Each office publishes these data along with other data including daily flow, water-quality, and ground-water information in the USGS Water-Data Report series. The peak discharges for each streamgage also are placed in the Peak Flow File of the USGS National Water Information System (NWIS) and is available on the World Wide Web (http://water.data.usgs.gov/nwis). A publication was needed that compiled significant floods nationwide and provided a relative measure of the severity in a single publication. These publications have become the National Flood Summary series of which this volume is a part. This publication, in addition to providing a list of floods, provides a description of major or noteworthy floods and provides some information as to cause, loss of life, damage, and cost. During the period October 1, 1993, through September 30, 1998 (1994–98 water years) approximately 5,000 county declarations of disaster were tabulated for the United States; 54 percent of these declarations were for flooding and another 10 percent were for hurricanes during which flooding is inherent.

Innumerable combinations of variable meteorologic and physiographic factors produce floods of all degrees and severity. Some meteorologic factors that affect floods are the form, amount, duration, and intensity of precipitation; the amount of previous precipitation, which would affect the moisture absorption of the soil; the air temperature, which may cause frozen soil or may determine the rate of snowmelt; and the direction of storm movement. The principal physiographic features of a drainage basin that determine floodflows are drainage area, elevation, character of soil, shape, slope, direction of slope, and vegetative or other land cover. With the exception of vegetative cover and soil preconditions, the physiographic features are fixed for any given drainage basin. The combination of the magnitude and intensity of meteorologic phenomena, the antecedent moisture conditions, and the effect of inherent physiographic features on runoff determines what the magnitude of a flood will be.

Human factors also affect the magnitude of flooding. Levees, designed to protect parts of the flood plain from inundation, can raise flood elevations. Flood-control reservoirs store floodwaters and can lower flood elevations and peak discharges. Urban areas have increased impervious areas that can increase flood elevations and discharges significantly.

Flood damages frequently are difficult to assess. Dollar amounts given in this report should be used as a general indication of flood losses rather than as definite values. Even if detailed surveys and estimates have been made, there is little consistency among methods used and types of losses included. Some estimates may exclude certain locations (such as mountainous areas) or types of loss (either insured or uninsured) or type of property (either private or public). Some estimates include traffic interruptions and flood-mitigation costs; others include strictly physical damage. Estimates may be based on replacement costs or on depreciated values. For floods not described in detailed published reports, the only damage estimates available usually are the preliminary figures contained in newspapers, National Oceanic and Atmospheric Administration (NOAA) climatological data, or other sources published shortly after the flood. A statement that a disaster declaration was issued indicates that the damage was severe and that financial aid to victims was authorized by the governmental entity making the declaration.

Some of the flood descriptions in this volume give the amount of rainfall and duration of the storm associated with the flooding. Recurrence intervals for these storms may be determined from a rainfall-frequency atlas of the United States (U.S. Weather Bureau, 1961) or from a simplified set of equal-rainfall maps and charts contained in a report by Rostvedt (1965).

Continuing investigation of surface-water resources within the United States is performed by the USGS in cooperation with more than 800 agencies and organizations, including State agencies, the U.S. Army Corps of Engineers, the Bureau of Reclamation, and other Federal, tribal, or local agencies. The National Weather Service, in addition to collecting and compiling data on meteorological phenomena, also collect data on stream stages in some areas.

Previous Flood Summary Reports

During the 1950s and 1960s the USGS summarized floods of each year in an annual series of Water-Supply Papers entitled, "Summary of Floods In the United States." A summary was published for each calendar year from 1950 through 1969. Water-Supply Paper 1137–I, the first in the series (U.S. Geological Survey, 1954), states the purpose of the series as being:

> "To assemble in a single volume information relating to all known severe floods in the United States whether local or of wide areal extent. For floods that are described in... other publications of the Geological Survey or in reports by other Federal and State agencies, only very brief mention including references to the reports containing detailed descriptions, will be given here. Local floods for which no individual reports have been prepared are described briefly."

In the first volume of that Water-Supply Paper series, each flood was described in a maximum of three or four paragraphs. Later volumes contained longer articles including maps. The series was discontinued after the 1969 volume; however, in 1987 a program was begun to prepare and publish summaries for 1970 and succeeding years. Two National Flood Summary publications (one for the calendar years 1990 and for 1991 and one for 1992 through September 1993) were published with the longer article format. The period from January 1, 1970, to December 31, 1989, was published with an abbreviated format for the 50 United States, Puerto Rico, and the Virgin Islands. Water-Supply Papers 2474 and 2499 cover the periods 1990 to 1991 (Jordan and Combs, 1996) and 1992 to 1993 (Perry and Combs, 1998), respectively. Water-Supply Paper 2502 covers the calendar year period from 1970 to 1989 (Perry, Aldridge, and Ross, 2001). This volume is published in the abbreviated format for the 1994–98 water years. Much of the explanation contained in the next two sections of this volume is paraphrased from previous reports (Rostvedt, 1972; Jordan and Combs, 1996; Perry and Combs, 1998; Perry, Aldridge, and Ross, 2001).

Determination of Flood Stages and Discharges

The usual method of determining stream discharges at a streamgage is the application of a stage-discharge relation to a known stage. This relation usually is defined by current-meter measurements made through as wide a range of stage as possible (fig. 1). If the maximum discharge exceeds the range of the current-meter measurements, short extensions may be made to a graph of the stage-discharge relation by logarithmic extrapolation, by velocity-area studies, or by the use of other measurable hydraulic factors (Kennedy, 1983).

Maximum discharges that are substantially greater than the range of the defined stage-discharge relation at streamgage and maximum discharges at miscellaneous streamgages that have no developed stage-discharge relation generally are determined by various types of indirect measurements. In addition, adverse conditions often make it impossible to obtain current-meter or acoustic doppler measurements at some streamgages during major floods. Maximum discharges at these streamgages are determined, after the floods have subsided, by indirect methods, which involve determination of water-surface elevations from high-water marks, surveying cross sections, and computing

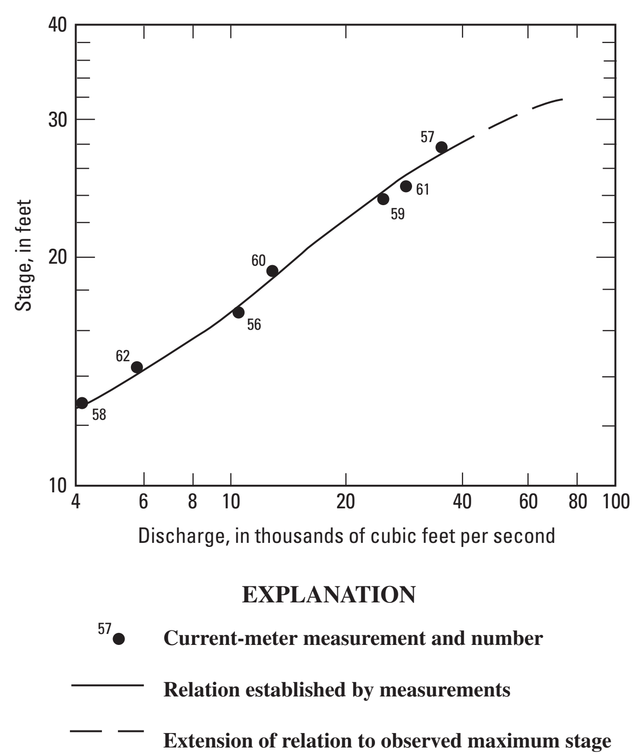

Figure 1. Example of a stage-discharge relation and upward extension of relation to observed maximum stage.

discharge from hydraulic equations rather than from direct measurement of stream velocity by use of a current meter or acoustic doppler. Indirect methods are described by Dalrymple and Benson (1967), Hulsing (1967), Matthai (1967), Bodhaine (1968), and Benson and Dalrymple (1987).

The accuracy of indirect measurements depends on streamgage conditions and the experience of personnel who select streamgage locations and make the surveys, and generally is poorer than for current-meter or acoustic-doppler measurements. The indirect measurements used in determining maximum discharges for floods are not identified as such in this volume. Information as to the source and quality of discharge data in this volume can be obtained from the USGS office in the State in which the reported streamgage is located.

Explanation of Data

The floods in this volume are described by State and in downstream order. The data for each State include: (1) a short narrative of selected floods that occurred during the 1994–98 water years and references for published reports on precipitation data, floods, and flood damage for the State, (2) a summary table of flood data for those streamgages with significant floods of approximately 20-year recurrence interval or greater during the 1994 through 1998 water years, and (3) a State map showing location of all streamgages where a significant flood was recorded.

In the example of a summary table (table 1), the first two columns identify the streamgage, which may be a continuous-record streamgage, a partial-record streamgage, or another streamgage at which data have been obtained. The first column gives the USGS permanent streamgage number (downstream-order number). The second column gives the name of the streamgage.

Total drainage in the summary table is the total area, as measured on a flat projection map, that constitutes the stream basin (divide to divide). The actual drainage area contributing to runoff may be smaller than the total drainage area if the total area includes areas of extremely rapid infiltration rates that do not produce surface runoff or closed subbasins within the larger basin that do not have surface outlets.

The column headed "Period of record" shows the water years for which the stage or discharge shown in the sixth and seventh columns is known to be a maximum. For most streamgages, this period corresponds to the period of systematic collection of streamflow data. For other streamgages, written or oral history may indicate that a flood stage was the highest since people have observed the stream or was the highest since some known date. For some streamgages, two or more periods are given. The use of two periods separated by a comma indicates a break in the period of record. Maximum stages or discharges during the intervening period are unknown.

The fifth column shows the water year in which the maximum stage and discharge for the indicated period occurred. The sixth and seventh columns show the stage and discharge of that maximum. Separate listings are made when maximum stage and maximum discharge did not occur concurrently.

The last five columns present data for the significant floods during the period October 1, 1993, through September 30, 1998. The data include the date on which the maximum occurred, maximum stage, and maximum discharge, whether the stream was regulated during the flood and, where available, the recurrence interval of the discharge.

The probability of a given discharge being equaled or exceeded in any given year frequently is used as an indication of a flood's relative magnitude and for comparison with floods at other streamgages. The relative magnitude also can be expressed in terms of recurrence interval, which is the reciprocal of the flood probability. A third way of expressing the relative flood magnitude is the percent chance of occurrence, which is 100 times the flood probability. A discharge that will be equaled or exceeded on an average (over a long period of time) of once in 10 years has a recurrence interval of 10 years; is termed a "10-year flood"; has a probability of 0.10; and has a 10-percent chance of occurring in any given year. A 100-year flood has a recurrence interval of 100 years; a probability of 0.01; and a 1-percent chance of occurring in any given year. Because recurrence interval is most commonly used by Federal agencies (for example, in the context of flood insurance), it is used in this volume even though percent chance avoids the unintended connotations of regularity of occurrence that accompany the term "recurrence interval."

Equivalence of flood probability and percent-chance values to selected recurrence-interval values are as follows:

Probability (dimensionless)	Percent chance	Recurrence interval (years)
0.50	50	2
.20	20	5
.10	10	10
.04	4	25
.02	2	50
.01	1	100

In addition to probability or percent chance of a given magnitude of discharge occurring in any 1 year, the probability or percent chance of occurrence during a given period of consecutive years also can be calculated. Results of such calculations for selected combinations of recurrence interval and length of period are as follows (*means greater than 99.9 but less than a 100-percent chance):

Table 1. Example of summary table presented in State or territory compilations.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; ST, state name; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05551212	Hypothetical Creek near Town, ST	21.0	1961–97	1961	13.1	--	02/02/94	12.22	4,200	N	25
							11/30/97	12.67	5,500		25–50
05555000	Hypothetical River at City, ST	1,212	1939, 1955–98	1995	21.21	82,800	09/12/95	21.21	82,800	N	>100
06930030	Hypo River near Metropolis, ST	3,333	1919–98	1943	33.33	99,900	12/23/96	25.55	33,000	Y	10–25

[1]Regulated during flood: N, no; Y, yes.

Recur-rence interval (years)	Percent chance for indicated time period, in years				
	5	10	50	100	500
2	97	99.9	*	*	*
10	41	65	99.5	*	*
50	10	18	64	87	*
100	5	10	39	63	99.3

Recurrence intervals during any given flood may differ from streamgage to streamgage because of nonuniform distribution of runoff and uncertainty in the computed recurrence values. Operational patterns for reservoirs generally are not defined adequately to permit recurrence intervals to be computed for maximum discharges on regulated streams.

Another method of indicating a flood's relative magnitude is by comparison of its maximum discharge and the stream's drainage area with values on a regional "envelope curve." A flood-envelope curve is one drawn on a graph in which maximum known discharges are plotted in relation to the drainage area of each streamgage (fig. 2). The envelope curve is a smooth curve drawn to equal or exceed all the plotted discharges in relation to the drainage areas. Envelope curves are given for 17 regions of the conterminous United States in Crippen and Bue (1977). This method is better than the formerly used calculation of "unit discharge" (division of the discharge by the drainage area) because unit discharges for greatly different sizes of drainage area are not comparable. If the unit discharges for a very small and a very large drainage area are the same, the unit discharge is much more unusual for the large drainage area.

The Standardized Precipitation Index (SPI) is an index that looks at the probability for precipitation for any time scale (McKee and others, 1993). Calculation of the SPI value is based on long-term precipitation records for a specific time period and can be done for any location desired. The record is put into probability and normal distributions so that the mean SPI value for that location is zero. Positive values are an indication of greater than median precipitation amount, whereas a negative value indicates a less than median precipitation amount. Because the SPI is standardized, both drought and wet conditions can be represented for all climate types.

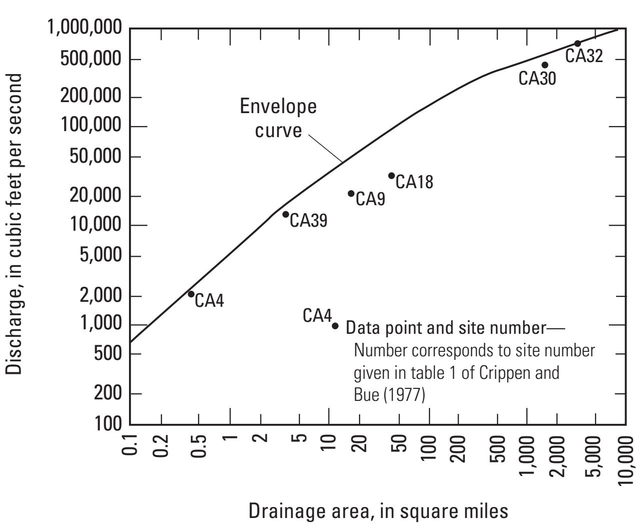

Figure 2. Maximum discharge in relation to drainage area and envelope curve for a region (modified from Crippen and Bue, 1977, p. 15).

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Summary of Floods By Water Year

1994 Water Year

The 1994 water year began quietly after the great floods in the Mississippi River Basin subsided during the late summer and fall of 1993. Figure 3 shows the percentage of streamgages in each State recording significant floods (top 5 percent of the peak-flow record) during 1994 water year. Georgia had 25 percent of its streamgages with significant flooding (top 5 percent) and Missouri had 21 percent. Alabama, Alaska, Delaware, Illinois, Indiana, North Carolina, Tennessee, and West Virginia had more than 5 percent of their total number of streamgages with significant flooding. Standardized precipitation deviations for the 1994 water year (fig. 4) show a similar trend. On the basis of 1950–95 long-term mean precipitation, much of the Southeast and the Northeast had above-normal annual precipitation. Most of the western two-thirds of the United States experienced below-normal precipitation.

Excessive rains during November 1993 in Missouri caused flooding on the Big, Bourbeuse, Current, Gasconade, James, Meramec, and Osage Rivers (see fig. 37 in the State compilations). Floods came again to this same region during April 1994. These floods extended into Illinois, with the Embarras, Illinois, Sangamon, and Vermilion Rivers flooding, and also into Indiana, with the Eel, Maumee, St. Mary, Tippecanoe, Vermilion, Wabash, and White Rivers flooding (see figs. 25 and 26 in the State compilations). These floods were part of a wet spring with floods in West Virginia during February 1994, and floods in Tennessee and North Carolina during March 1994.

Spring floods also occurred in North Dakota during April and May 1994 with melting of an excessive accumulation of winter snowfall. Spring floods also occurred in Alaska during May and June 1994. The Alaska flooding was exacerbated during August 1994 by excessive rainfall in the Koyukuk River Basin (see fig. 14 in the State compilations).

The 1994 tropical storm season started early with the first named storm, Tropical Storm Alberto (June 30 through July 7, 1994), affecting the southeastern States of Alabama, Florida, Georgia, and Mississippi. The remnants of Alberto also caused flooding in North Carolina, South Carolina, and Tennessee. Thirty-one deaths and more than $500 million in damage resulted from this slow-moving storm (Stamey, 1997). Tropical Storm Beryl lingered in the central Gulf Coast region during August 14–19, 1994, and caused flooding in Alabama, Florida, and Georgia.

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1995 Water Year

The 1995 water year recorded flooding in many States. Figure 5 shows the percentage of streamgages in each State recording significant floods (top 5 percent of the peak-flow record) during the 1995 water year. Wyoming had the highest percentage of streamgages with significant floods at 26 percent, and Colorado and South Dakota had 19 and 17 percent, respectively. Alaska, California, Florida, Georgia, Kansas, Louisiana, Nebraska, North Carolina, Oklahoma, South Carolina, Texas, Utah, Vermont, Virginia, and West Virginia all had from 6 to 15 percent of their streamgages recording significant floods. Standardized precipitation deviations for the 1995 water year (fig. 6) showed above-normal conditions in much of the country. The only areas that had a rainfall deficit were parts of the Northeast, the Southern Appalachian Mountains, western Tennessee, eastern Arkansas, and extreme southern Texas, and some of the areas around the Great Lakes.

The 1995 water year began with Tropical Storm Gordon (November 8–21, 1994) crossing the southern part of the Florida peninsula, moving northeastward into the Atlantic Ocean, then doubling back and striking Florida again near Melbourne (see fig. 21 in State compilations). Damage was estimated at $400 million (National Oceanic and Atmospheric Administration, 1994).

Pacific winter storms lashed southern California in January 1995 causing many streams to flood. Southern Utah experienced excessive snowfall in March 1995, which melted rapidly and caused flooding. Snowmelt also was a problem in South Dakota in the James River Basin (see fig. 54 in State compilations) in April 1995. During April and May 1995, intermittent intense thunderstorms from Louisiana and Texas, through Oklahoma and Kansas, and north to South Dakota caused floods and flash floods. New Orleans, Louisiana (fig. 30), experienced more than $3 billion in damage from the intense rains (National

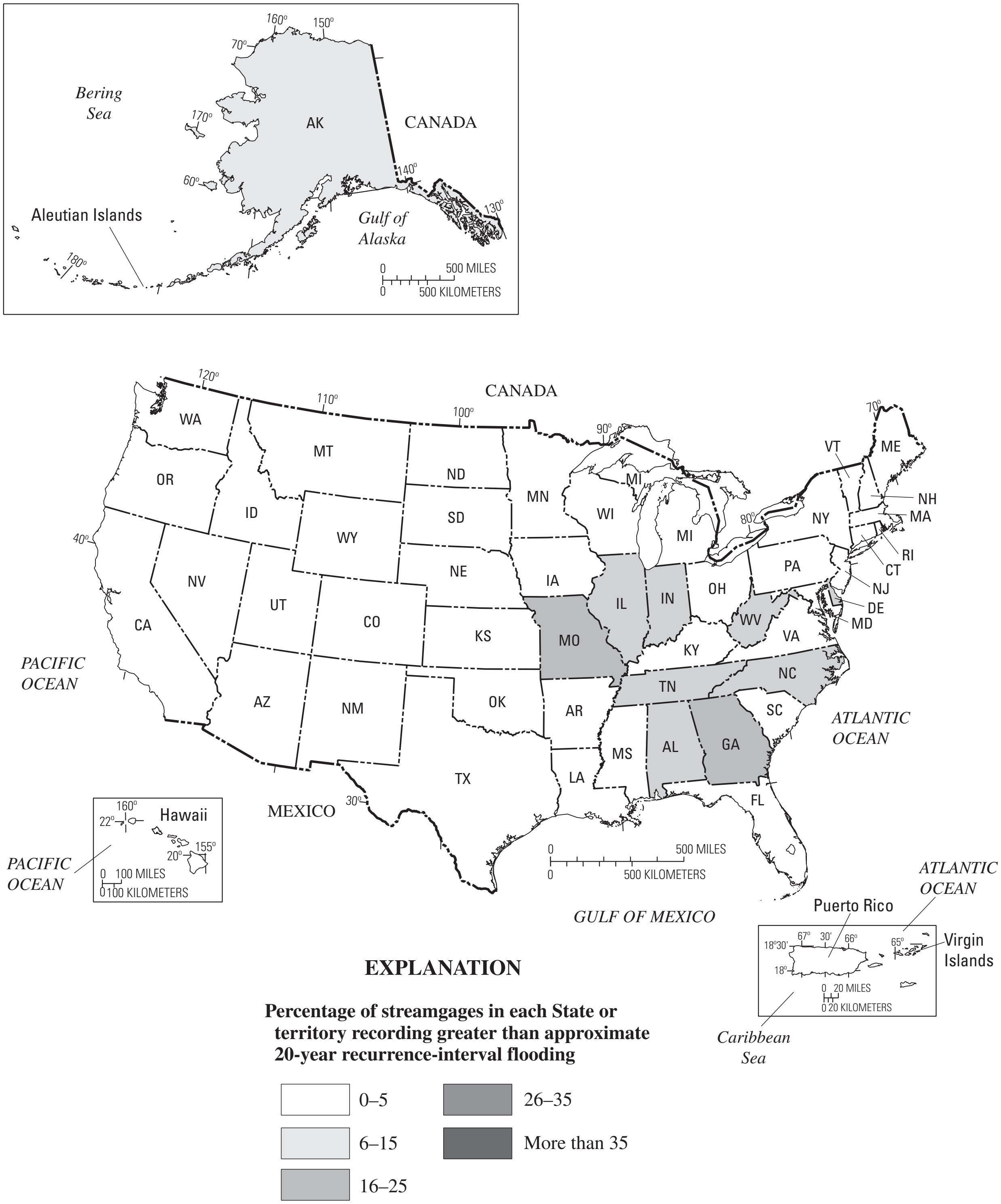

Figure 3. Percentage of streamgages in each State or territory recording greater than approximate 20-year recurrence-interval flooding during 1994 water year.

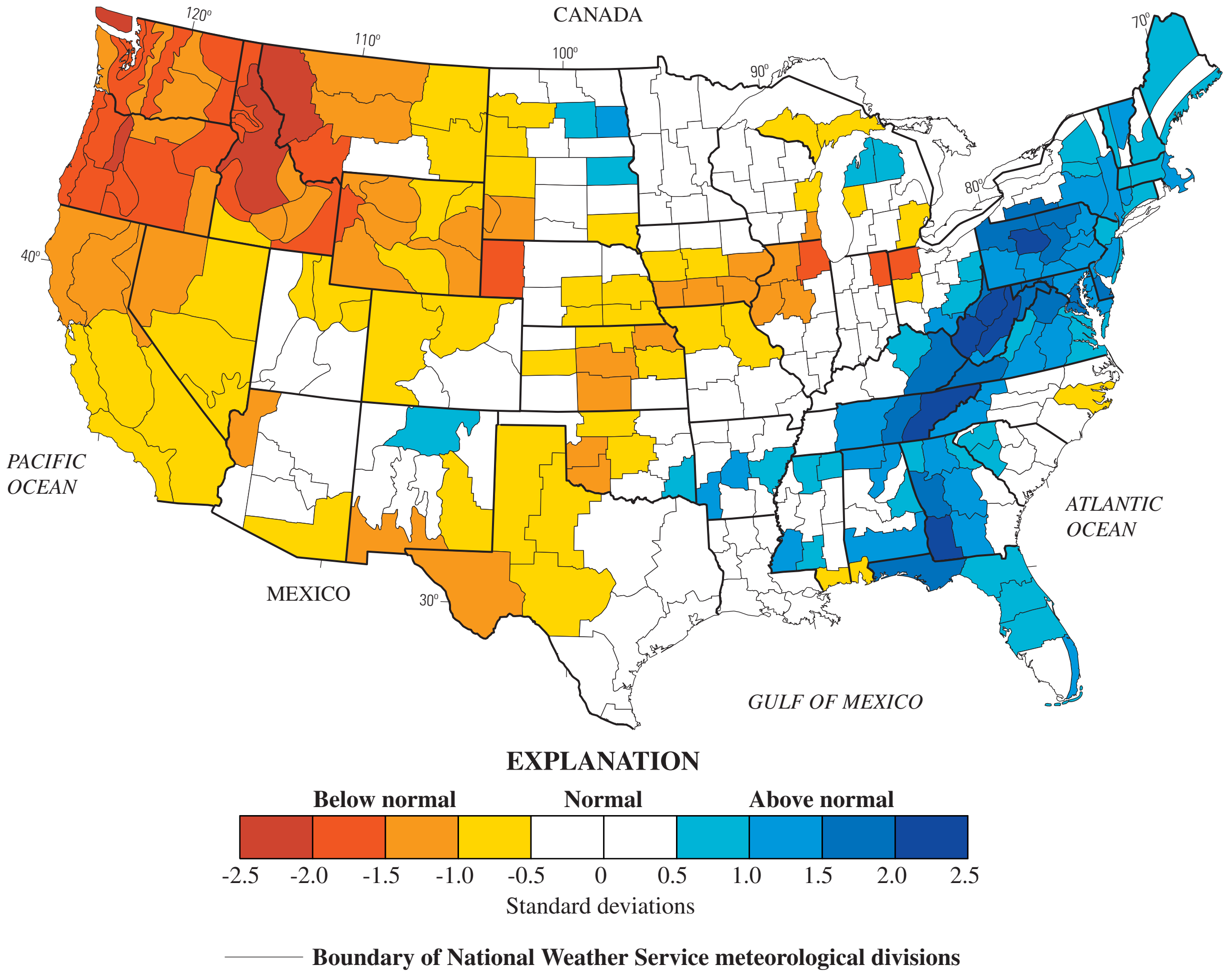

Figure 4. Standardized 1994 water year precipitation deviations from long-term mean precipitation (1950–95) in conterminous United States (source of data: National Oceanic and Atmospheric Administration, Climate Diagnostics Center, at URL http://www.cdc.noaa.gov/USclimate/USclimdivs.html).

Oceanic and Atmospheric Administration, 1995). In Dallas, Texas (see fig. 56 in State compilations), excessive rainfall and flash flooding caused 17 deaths (National Oceanic and Atmospheric Administration, 1995).

The mountains of Colorado and Wyoming had deep snowpacks from the 1994–95 winter that persisted into late spring 1995 because of cooler than normal temperatures. However, the snowpack melted rapidly in late May and June 1995 causing flooding on many streams originating in the Rocky Mountains. Excessive precipitation in the Midwest caused the Mississippi and Ohio Rivers to flood in May and June 1995 in Illinois, Kentucky, and Missouri (see figs. 25, 29, and 37 in State compilations).

The 1995 hurricane season in the Atlantic Ocean and Gulf of Mexico was quite active with 15 named storms through October 1, 1995. Hurricane Allison (June 3–6, 1995) struck the Panhandle of Florida, southern Georgia, and the eastern edge of North Carolina and South Carolina. Tropical Storm Dean (July 28–August 2, 1995) made landfall south of HouSston and moved northwest of Dallas (see fig. 56 in State compilations) and dissipated. Hurricane Erin (July 31–August 6, 1995) crossed the Florida peninsula from east to west, curved up to Mobile, Alabama (see fig. 13 in State compilations), crossed Mississippi, and then traveled up the Ohio River until it dissipated over West Virginia. Tropical Storm Jerry (August 22–28, 1995) traveled the length of the Peninsula of Florida, through central Georgia, and dissipated over eastern South Carolina. The center of Hurricane Marilyn (September 12–22, 1995) passed just east of Puerto Rico and caused flooding on the eastern part of the island.

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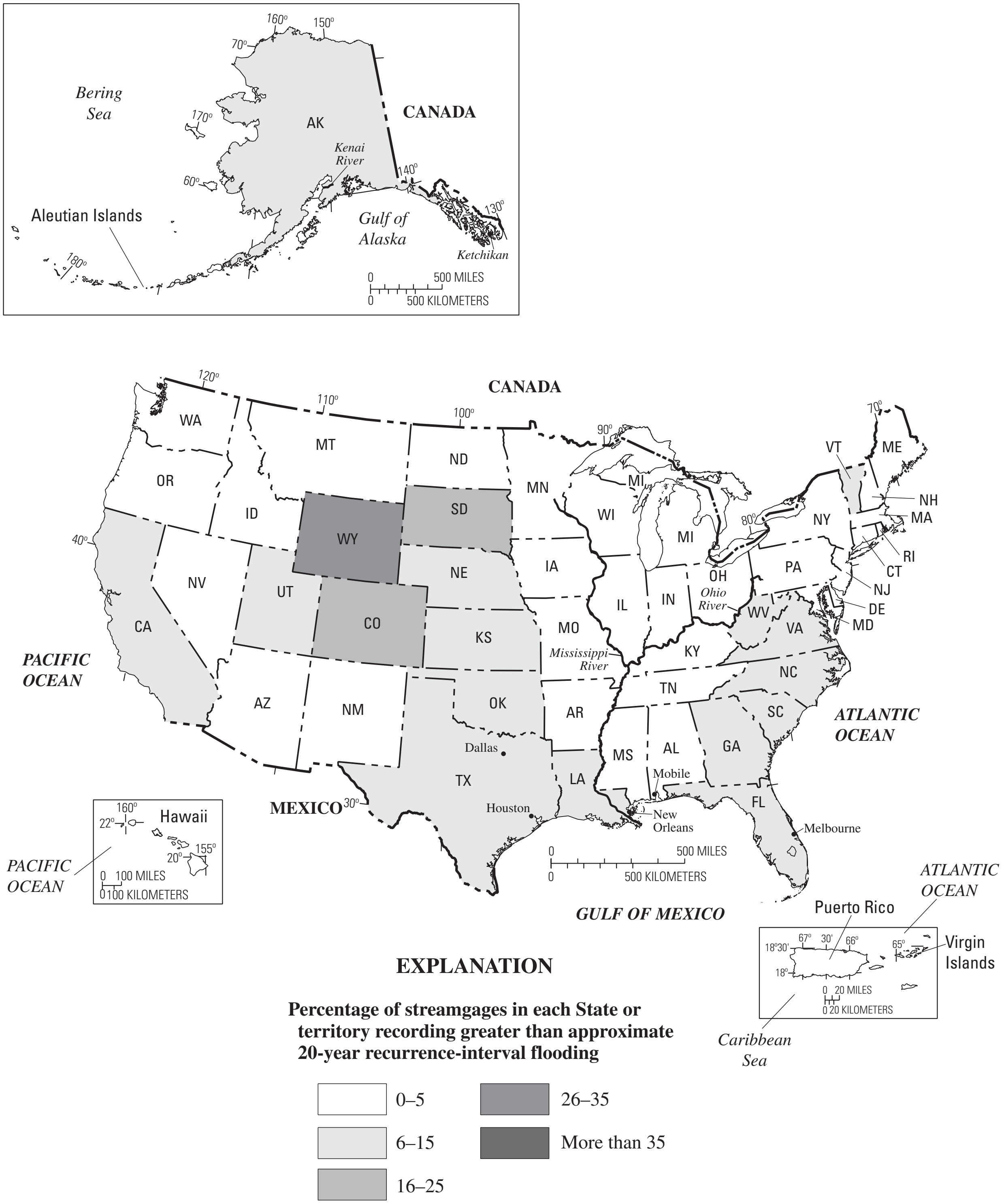

Figure 5. Percentage of streamgages in each State or territory recording greater than approximate 20-year recurrence-interval flooding during 1995 water year.

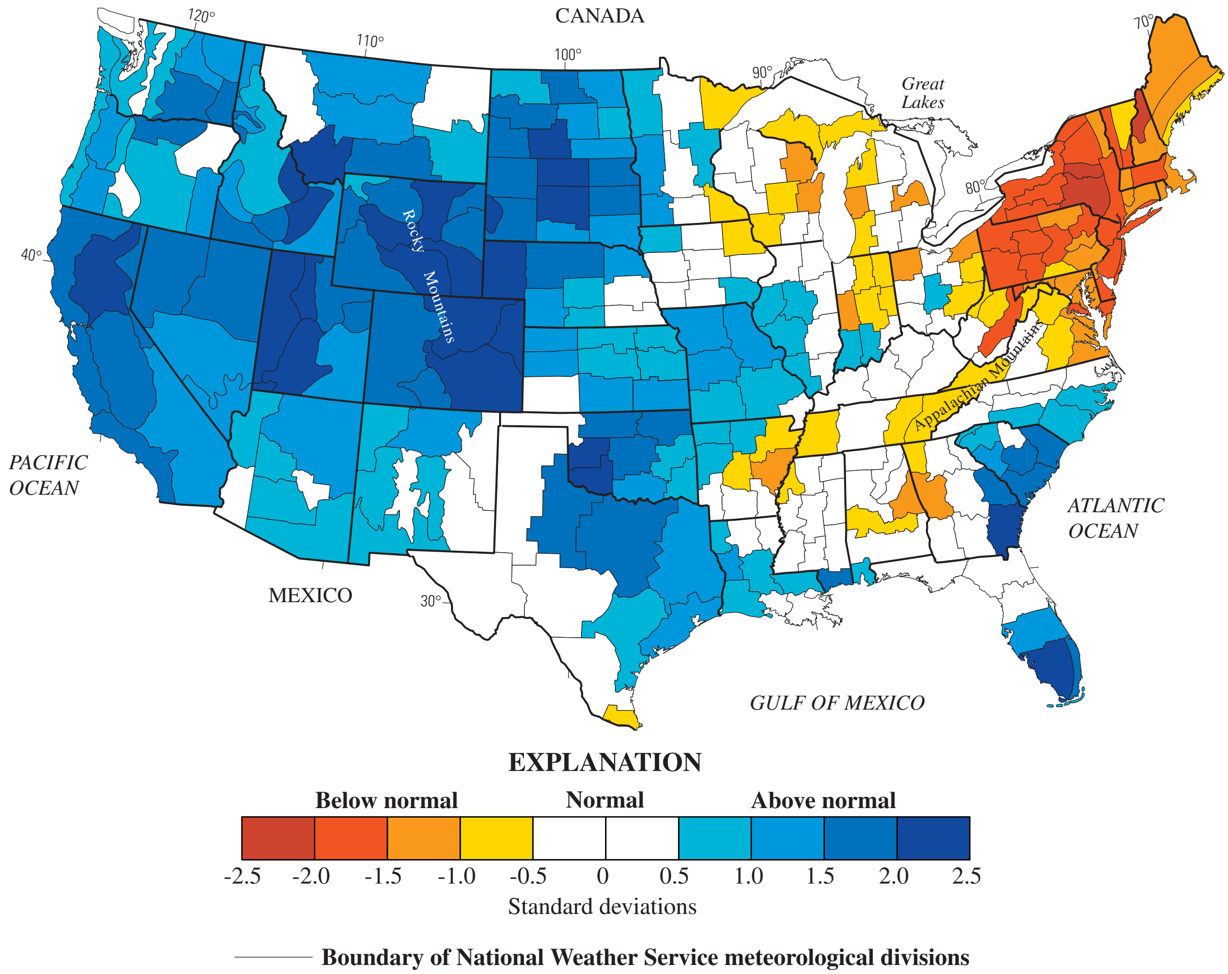

Figure 6. Standardized 1995 water year precipitation deviations from long-term mean precipitation (1950–95) in conterminous United States (source of data: National Oceanic and Atmospheric Administration, Climate Diagnostics Center, at URL http://www.cdc.noaa.gov/USclimate/USclimdivs.html).

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1996 Water Year

The 1996 water year had flooding in many of the States in the northern one-half of the country. Figure 7 shows the percentage of streamgages in each State recording significant floods (top 5 percent of the peak-flow record) during the 1996 water year. Hardest hit were the Eastern and Northeastern States from North Carolina to New York. West Virginia had 41 percent of its streamgages record significant floods during 1996. Streamgages in Idaho, Oregon, and Washington also had a high percentage of floods. This tendency for flooding extended eastward from Montana and Wyoming to Indiana. Standardized 1996 water year precipitation deviations showed an abundance

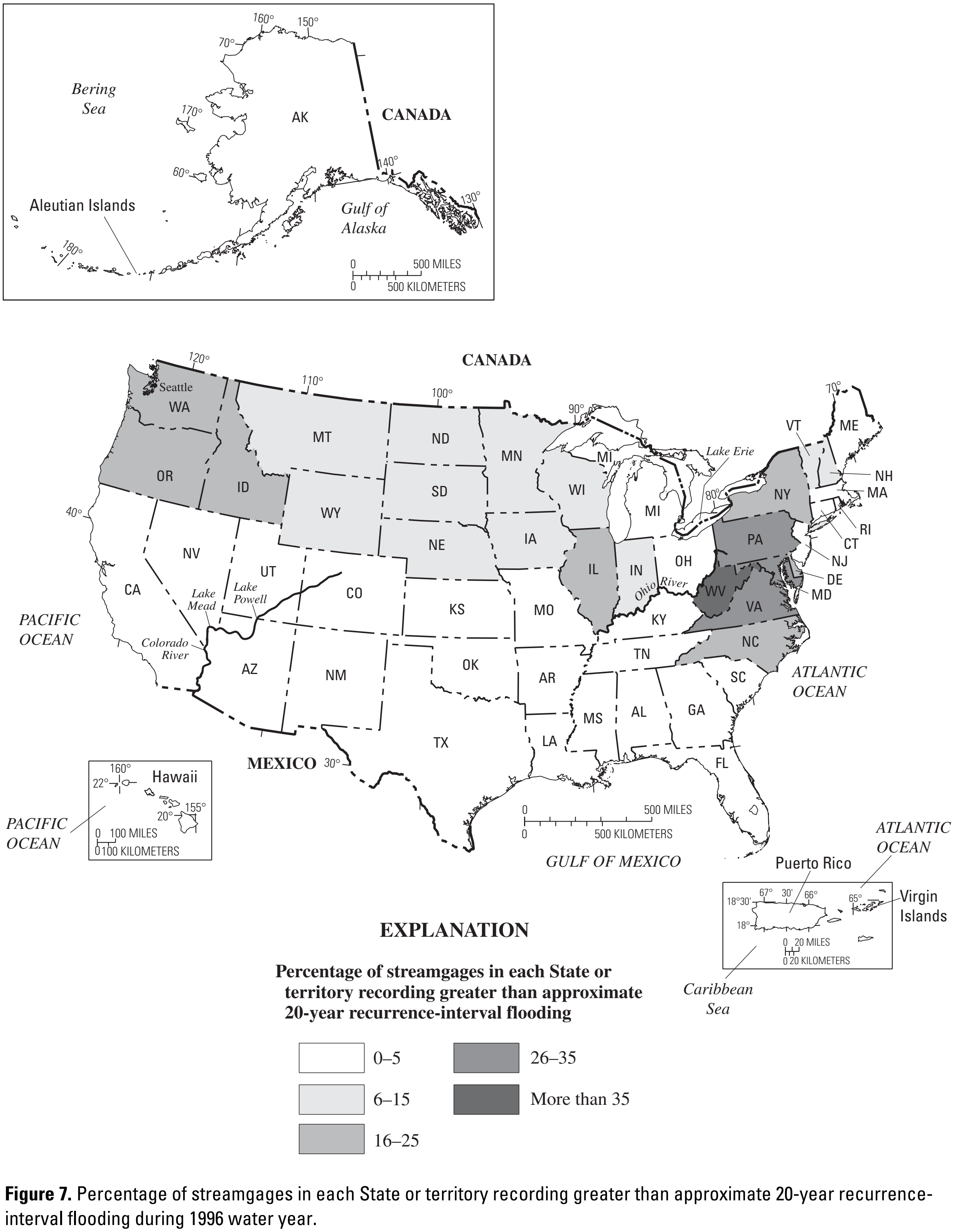

Figure 7. Percentage of streamgages in each State or territory recording greater than approximate 20-year recurrence-interval flooding during 1996 water year.

of precipitation in the Eastern States and in the Pacific Northwest (fig. 8).

The 1996 water year began with flooding from Hurricane Opal in eastern Alabama and western Georgia on October 4–5, 1995. The water year ended with a strong Pacific storm moving onshore over Oregon and Washington, and moving inland to Idaho and Wyoming. The worst flooding from this storm occurred in the Seattle area (fig. 7) and also in the southwestern part of Oregon. This storm and the many more to follow in January and February 1996 resulted in widespread flooding in the Pacific Northwest States. Many peak floods of record occurred from northern California to Washington and Idaho.

January 1996 was also the month for flooding in the Northeastern States of Virginia, Maryland, Delaware, New Jersey, Pennsylvania, New York, and Vermont. This major regional flood was a result of rain falling on a deep snowpack. There were 35 deaths from this flood. A major rain and snowmelt flood traveled down the Ohio River Valley from Pennsylvania to Kentucky in January 1996.

In March and April an artificial flood was released down the Colorado River below Lake Powell to Lake Mead to benefit river-bar formation (fig. 7). Many rivers in Illinois were above flood levels from May through July 1996 as a result of persistent summer thunderstorms. Hurricane Bertha (July 5–14, 1996) struck Puerto Rico, the Virgin Islands, and North and South Carolina causing flooding and 12 deaths. Hurricane Fran (August 23–September 6, 1996) caused the greatest flooding of any of the tropical storms for 1996. Hurricane Fran made landfall in southern North Carolina on September 5, travelled through the center of North Carolina, Virginia, and West Virginia, western Pennsylvania, and crossed Lake Erie into Canada. Many streamgages in these States had their highest flow of record during this time. Hardest hit were North Carolina, Virginia, Maryland, and Pennsylvania. Hurricane Hortense (September 3–16, 1996) caused flooding and 21 deaths in Puerto Rico.

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1997 Water Year

The 1997 water year saw flooding in many of the States in the northern and western parts of the country. Figure 9 shows

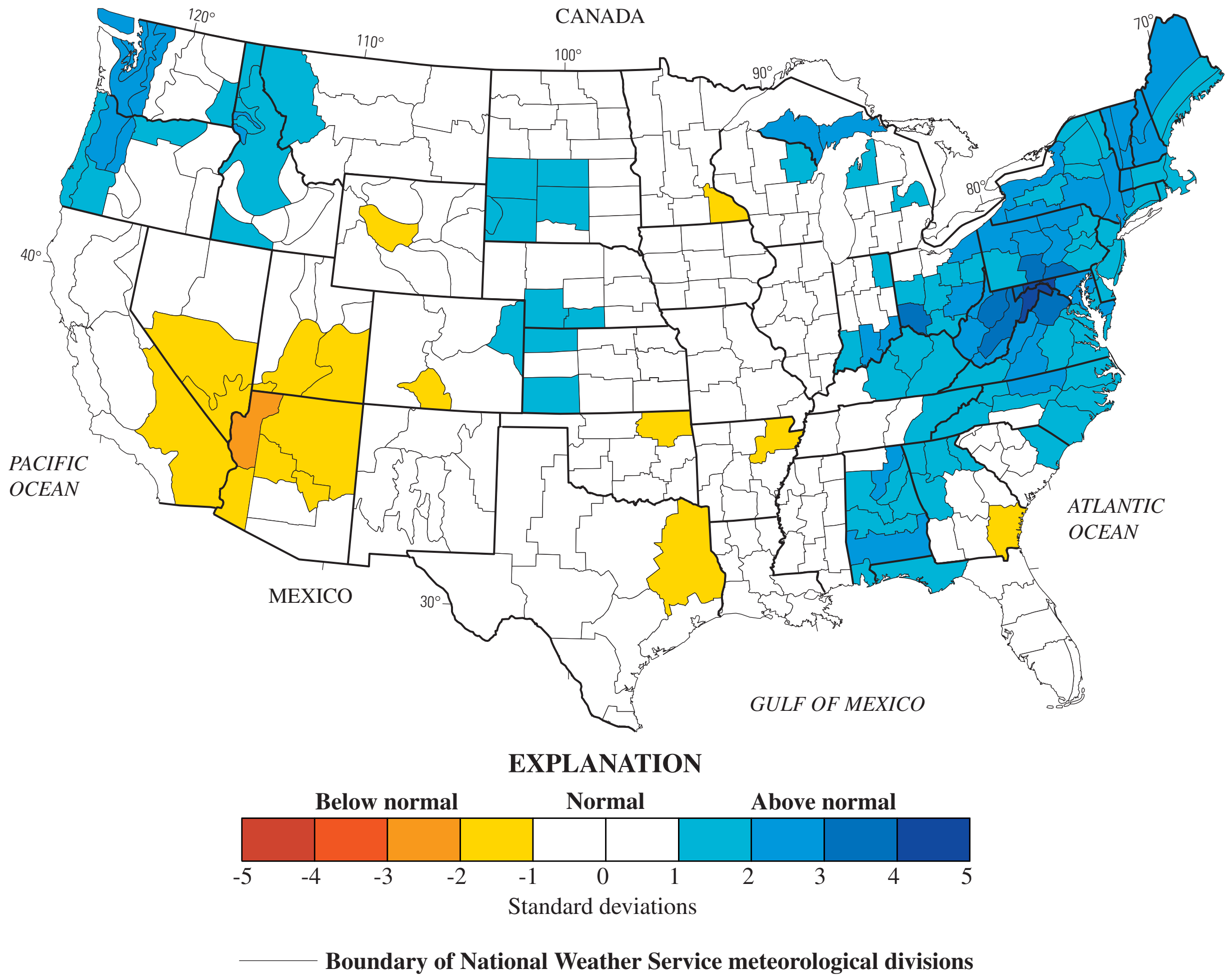

Figure 8. Standardized 1996 water year precipitation deviations from long-term mean precipitation (1950–95) in conterminous United States (source of data: National Oceanic and Atmospheric Administration, Climate Diagnostics Center, at URL http://www.cdc.noaa.gov/USclimate/USclimdivs.html).

the percentage of streamgages in each State recording significant floods (top 5 percent of the peak-flow record) during the 1997 water year. Extreme rain and snowmelt flooding occurred from Idaho to Minnesota. North Dakota had 40 percent of its streamgages experience a significant flood in 1997. Idaho and California had 36 and 28 percent of its streamgages, respectively, experience flooding. Standardized precipitation deviations for the 1997 water year showed much of the Western United States with above-normal precipitation. There were very few below-normal areas nationwide (fig. 10).

Excessive snowfall in November and December 1996 throughout the Pacific Northwest augmented flooding that began during a January 1997 warming in California, Idaho, Nevada, Oregon, and Washington. Excessive winter snowfall extended eastward into Montana, North Dakota, South Dakota, and Minnesota. The deep snowpack and warming temperatures in March 1997 started flooding on the Red River of the North (fig. 9). An intense blizzard in early April 1997 brought a severe drop in temperatures and 70-mile-per-hour winds that compounded the flooding problems. Additional runoff from the snow, sleet, and rain forced the Red River of the North to record levels. Severe flooding continued for more than a month in North Dakota and Minnesota.

Intense early spring thunderstorms during the first week of March 1997 from Arkansas to Pennsylvania caused extensive flooding in those States and in Indiana, Kentucky, Missouri, Ohio, Tennessee, and West Virginia. The Ohio River was above flood stage from Pittsburgh, Pennsylvania, to Cairo, Illinois (fig. 9). Severe flooding occurred on the Licking River in Kentucky.

The only tropical storm during the 1997 water year that affected the United States was Hurricane Danny (July 16–26, 1997). It made landfall on July 17 on the Louisiana Delta, skirting southern Mississippi, travelling the length of Alabama before turning east and cutting through northern Georgia, northern South Carolina, and going out to sea near the North Carolina/Virginia border. Flooding occurred in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina.

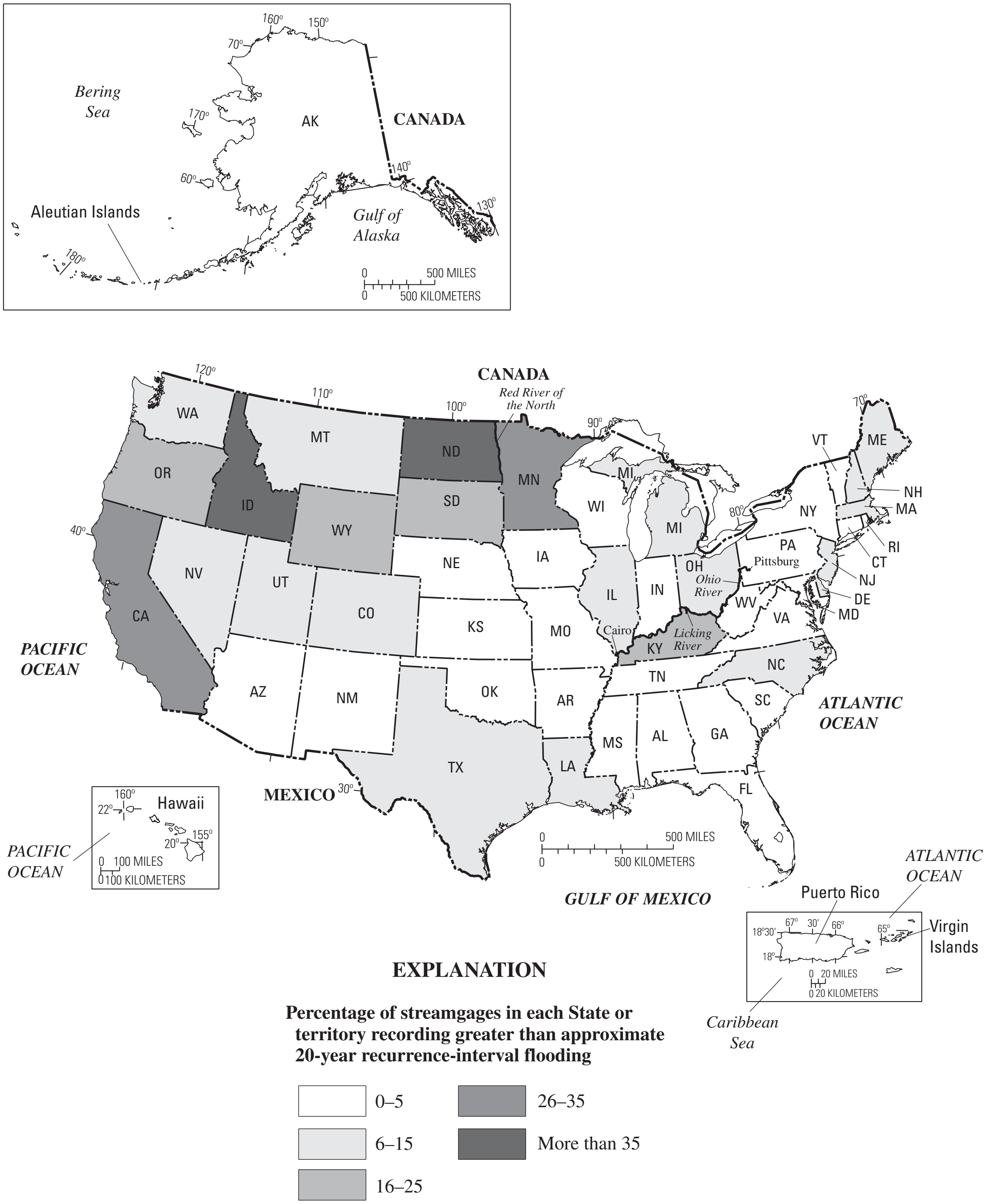

Figure 9. Percentage of streamgages in each State or territory recording greater than approximate 20-year recurrence-interval flooding during 1997 water year.

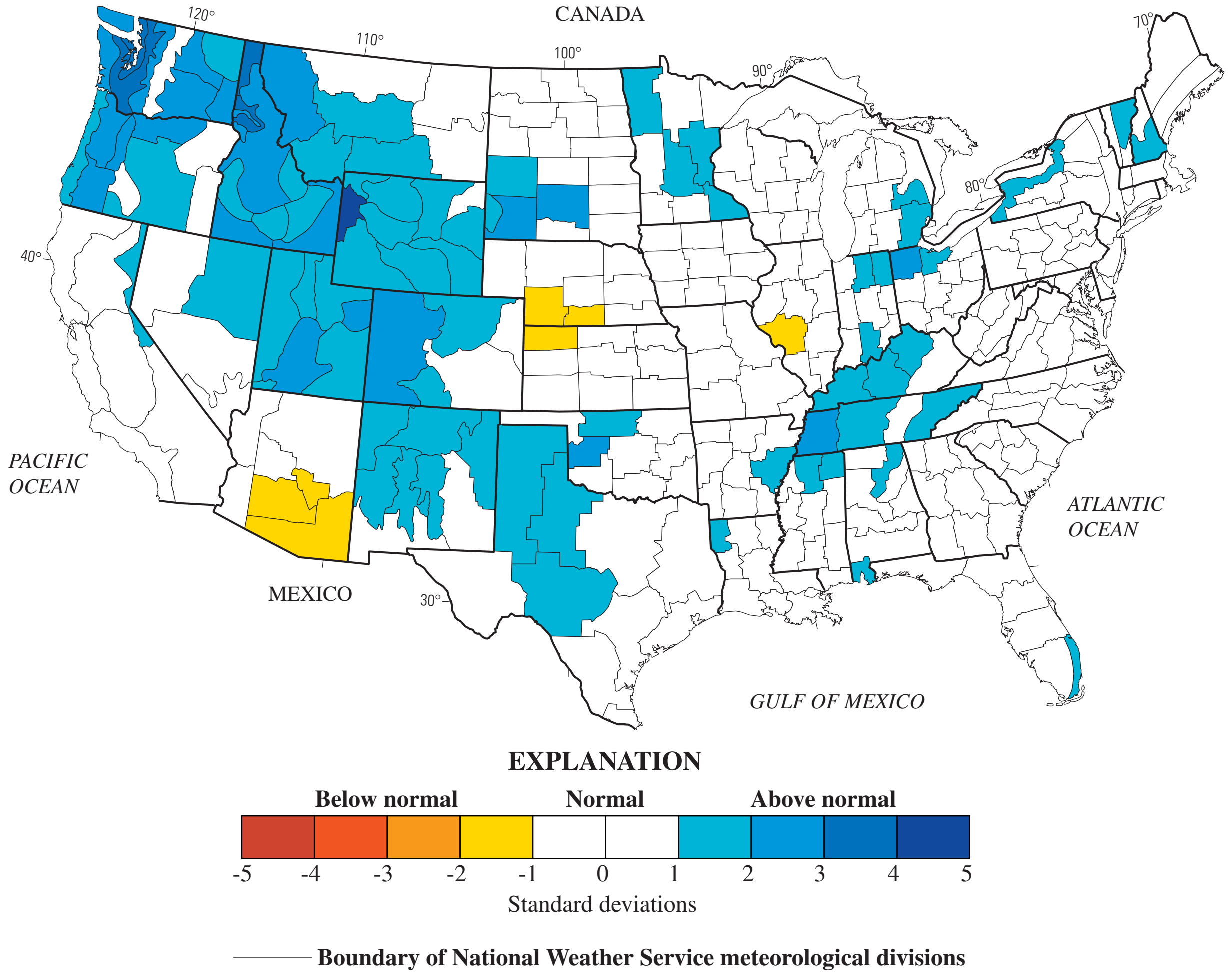

Figure 10. Standardized 1997 water year precipitation deviations from long-term mean precipitation (1950–95) in conterminous United States (source of data: National Oceanic and Atmospheric Administration, Climate Diagnostics Center, at URL http://www.cdc.noaa.gov/USclimate/USclimdivs.html).

On July 28, 1997, excessive rainfall in Colorado created flash floods in which five persons lost their lives. Flash floods in Arizona claimed 11 lives on August 12.

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1998 Water Year

The 1998 water year experienced flooding in the southeastern and northeastern parts of the United States. California also had some significant floods. Figure 11 shows the percentage of streamgages in each State recording significant floods (top 5 percent of the peak-flow record) during the 1998 water year. Much of the country had above-normal standardized precipitation deviations for the 1998 water year (fig. 12). The same areas just mentioned had above-normal precipitation of more than two standard deviations for the 12-month period from October 1997 to September 1998.

A major storm that struck the eastern United States during January 4–9, 1998, caused flooding from Texas and Oklahoma across the southeast, on up the eastern seaboard, and finally out to sea east of Maine. This storm was followed a month later in February 1998 by an intense Atlantic storm that caused coastal flooding from North Carolina to New Jersey. Strong February storms also caused record peak flows in California from the San Francisco Bay area on south to the Los Angeles area (fig. 11).

Although there were several episodes of severe weather in the spring and summer 1998, there were no significant floods. However, the 1998 hurricane season brought flooding to the Southeastern States by August. Hurricane Bonnie (August 19–30, 1998) came onshore in eastern North Carolina on August 27 and caused widespread wind damage and coastal flooding. Tropical Storm Charlie (August 21–24, 1998) brought torrential rain and flooding to southern Texas. Hurricane Earl (August 31–September 3, 1998) raced from the western Gulf of Mexico across Florida, Georgia, and South Carolina and caused minimal flooding. Tropical Storm Frances (September 8–13, 1998) wandered into southern Texas and caused flooding there. Hurricane Georges (September 15–October 1, 1998) first struck Puerto Rico on September 21 with high winds and torrential rainfall. Its track carried it up the center of the islands of Hispaniola and Cuba where it lost some of its intensity before making landfall in southern Mississippi. There, Georges turned abruptly east and tracked along the Gulf Coast until crossing Florida and dissipating. The storm surge and excessive rain caused flooding along the Gulf Coast.

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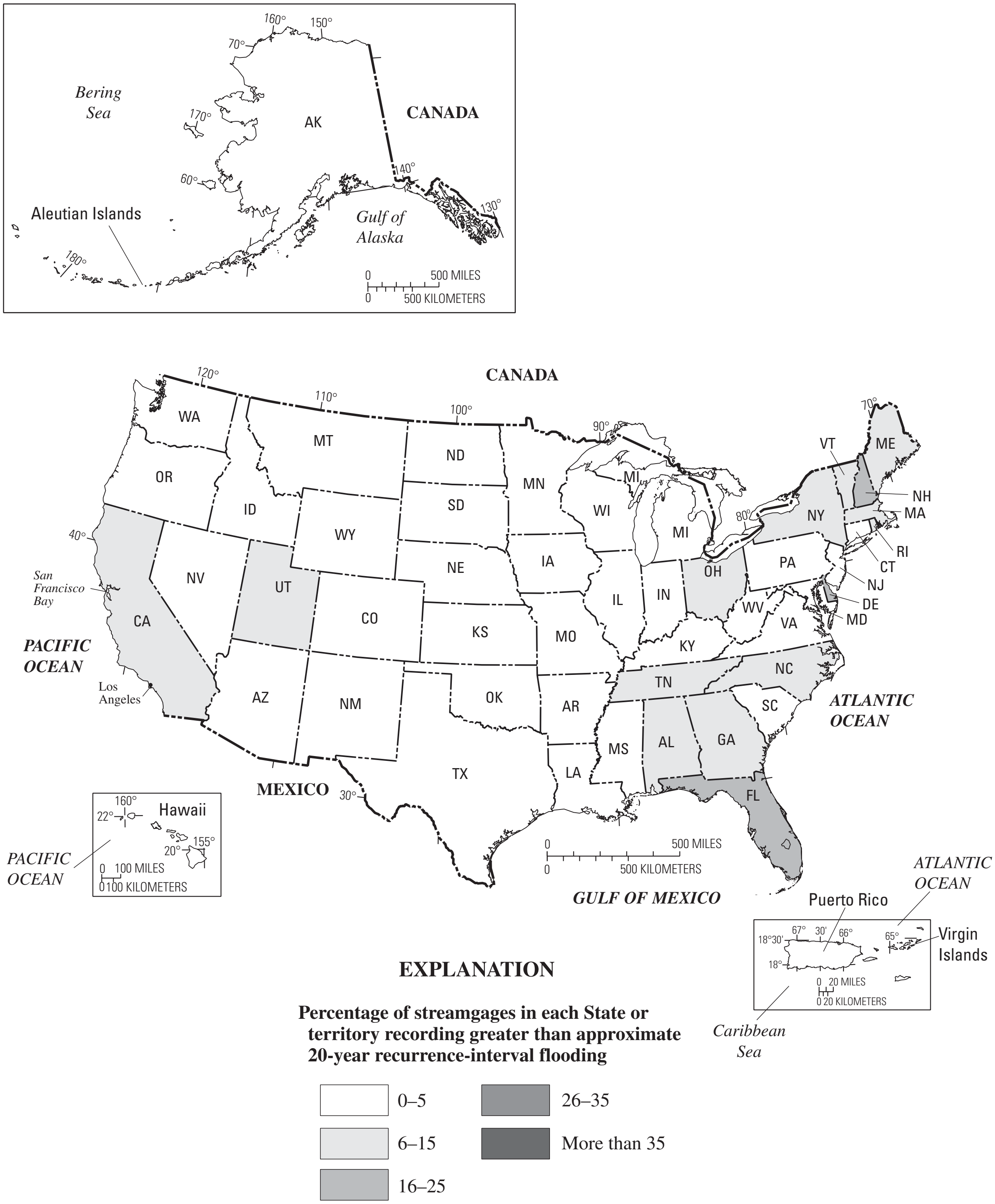

Figure 11. Percentage of streamgages in each State or territory recording greater than approximate 20-year recurrence-interval flooding during 1998 water year.

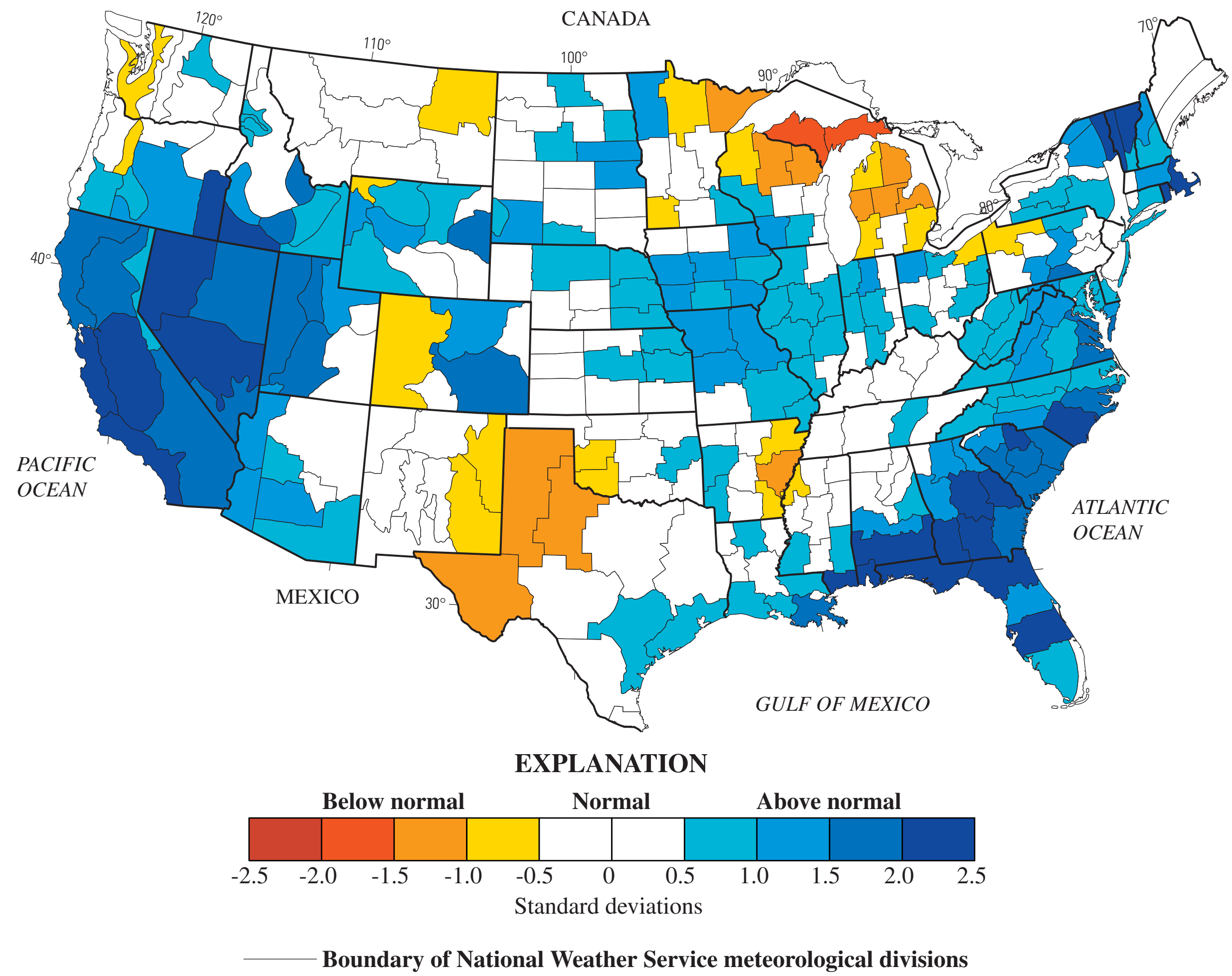

Figure 12. Standardized 1998 water year precipitation deviations from long-term mean precipitation (1950–95) in conterminous United States (source of data: National Oceanic and Atmospheric Administration, Climate Diagnostics Center, at URL http://www.cdc.noaa.gov/USclimate/USclimdivs.html).

Significant Floods by State or Territory

Alabama

The remnants of Tropical Storm Alberto stalled over the southeastern United States and produced a period of off-and-on torrential rains July 3–7, 1994. The off-and-on rains lasted for 5 days and produced significant flooding on the Pea River, the Choctawhatchee River, Catoma Creek, Conecuh River, Tallapoosa River, and Murder Creek (fig. 13). The torrential rains also produced extensive flash flooding in parts of southeastern Alabama. Two deaths occurred as a result of the excessive rain and flooding. Damage was $14 to $20 million (National Oceanic and Atmospheric Administration, 1994b).

Excessive rains of 8 to 14 inches just west of Mobile caused flash flooding on December 18, 1995. A 22-year-old man was killed when he was swept into a culvert while trying to clear debris from a drainage ditch (National Oceanic and Atmospheric Administration, 1995b).

Hurricane Danny moved inland from the Gulf of Mexico across Fort Morgan and into Mobile Bay during the early morning hours of July 18, 1997. The storm remained nearly stationary over Mobile Bay for 8 hours. Danny then crept east, making landfall near Weeks Bay. Danny then drifted north along the Alabama and Florida border, weakening to a depression by July 21. Danny continued to drift north through the State and passed into northern Georgia by July 23. Torrential rainfall fell in extreme southern Alabama. Observing sites reported from 30 to 40 inches across the area with Dauphin Island reporting 36.71 inches. Unofficial estimates of 35 to 40 inches of rainfall (National Oceanic and Atmospheric Administration, 1997a) were reported near the center of Danny as the storm moved across Weeks Bay. Record flooding caused major damage to homes along the Fowl and Fish Rivers. A streamgage on the Fowl River (National Oceanic and Atmospheric Administration, 1998b) recorded a stage of 12.6 feet, which is 1.5 times higher than the 100-year flood. At a streamgage on the Fish River near Silver Hill (streamgage 02378500, table 2) a stage of 22.8 feet was recorded, making this a 50-year flood. A storm-surge height of 5 to 6.5 feet was recorded.

A vigorous Gulf storm dumped 8 to 14 inches of rain (National Oceanic and Atmospheric Administration, 1998a) across parts of southern Alabama during March 8, 1998. The earthen levee near the city of Elba was breached. A 6-foot wall of water rushed into the city, and 2,000 residents were forced to evacuate. Four people were killed when their vehicles were swept away by floodwaters. The Choctawhatchee River at Newton (streamgage 02361000, table 2) crested near 34.6 feet on March 9. A man drowned when he jumped in to rescue a stranded motorist. Another man drowned when his vehicle was carried into the lake by a collapsing roadway (National Oceanic and Atmospheric Administration, 1998b).

Torrential rains from Tropical Storm/Depression Georges of 8 to 24 inches (National Oceanic and Atmospheric Administration, 1998a) during September 28–29, 1998, produced the worst flooding in southeastern Alabama since Hurricane Opal in 1995 (National Oceanic and Atmospheric Administration, 1998b). The Styx River near Elsanor (streamgage 02377570, table 2) crested at 28.6 feet, which was estimated to be greater than a 100-year flood.

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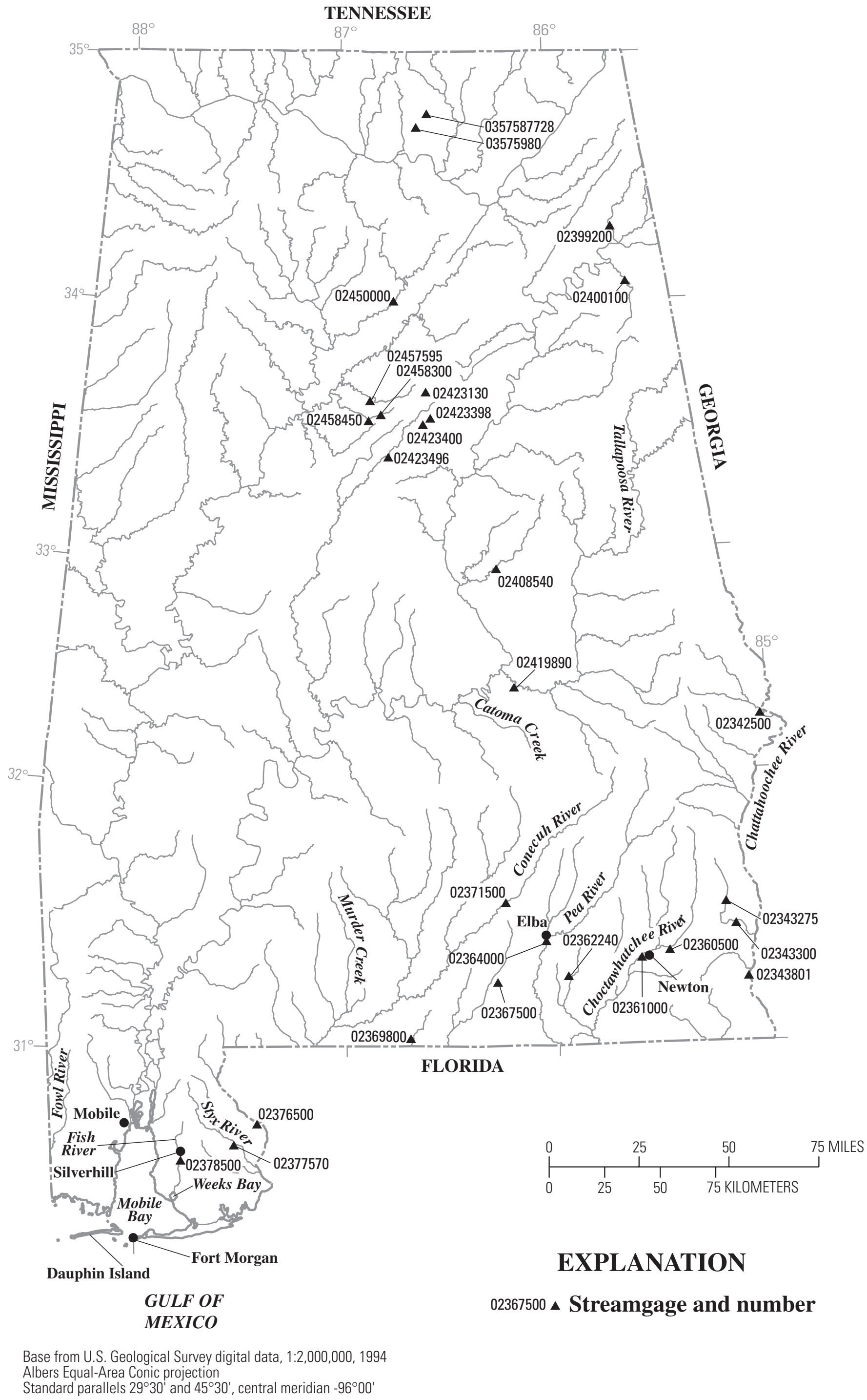


Figure 13. Location of streamgages with significant floods during 1994–98 water years for Alabama.

Table 2. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Alabama.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 13)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02342500	Uchee Creek near Fort Mitchell, AL	322	1947–98	1964	26.45	55,100	7/8/94	23.35	25,600	N	25
02343275	Abbie Creek near Abbeville, AL	48.7	1951–80, 1990, 1994	1994	13.00	30,000	7/6/94	13.00	30,000	N	>100
02343300	Abbie Creek near Haleburg, AL	146	1958–94	1994	37.00	35,000	7/6/94	37.00	35,000	N	>100
02343801	Chattahoochee River near Columbia, AL	8,210	1975–98	1994	123.98	202,000	7/7/94	123.98	202,000	Y	--
02360500	East Fork Choctawhatchee River near Midland City, AL	291	1953–63, 1966–70, 1990, 1994	1994	29.30	43,000	7/6/94	29.30	43,000	N	>100
02361000	Choctawhatchee River near Newton, AL	686	1922–27, 1929, 1935–98	1990 1929	40.30 42.00	87,500 70,000	7/7/94 3/9/98	37.78 34.58	60,800 39,200	N N	>100 50
02362240	Little Double Bridges Creek near Enterprise, AL	21.4	1986–98	1994	16.45	14,200	7/6/94	16.45	14,200	N	>100
02364000	Pea River at Elba, AL	959	1929–55, 1972–98	1929	43.50	65,000	3/6/98	39.23	45,000	N	35
02367500	Lightwood Knot Creek at Babbie, AL	114	1930–75 1990, 1998	1998	19.54	37,900	3/8/98	19.54	37,900	N	>100
02369800	Blackwater River near Bradley, AL	87.7	1968–98	1990	25.35	24,000	3/8/98	25.30	23,500	N	>100
02371500	Conecuh River at Brantley, AL	500	1929–98	1990 1929	24.44 26.00	25,700 25,000	3/10/98	22.62	17,000	N	15
02376500	Perdido River at Barrineau Park, FL	394	1929, 1942–98	1998	26.30	44,000	9/29/98	26.30	44,000	N	50–100
02377570	Styx River near Elsanor, AL	192	1988–98	1998	28.60	48,000	9/29/98	28.60	48,000	N	>100

Table 2. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Alabama.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 13)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02378500	Fish River near Silver Hill, AL	55.3	1954–69, 1971, 1987–98	1997	22.78	16,900	7/20/97	22.78	16,900	N	50
02399200	Little River near Blue Pond, AL	199	1948, 1958–98	1985	16.98	53,800	10/5/95	15.26	40,700	N	50
02400100	Terrapin Creek at Ellisville, AL	252	1963–98	1979	19.82	20,100	10/5/95	19.10	16,900	N	25
02408540	Hatchet Creek below Rockford, AL	263	1981–98	1996	27.90	27,800	10/5/95	27.90	27,800	N	10–25
02419890	Tallapoosa River near Montgomery-Montgomery Waterworks, AL	4,646	1973–98	1996 1990	34.59 42.13	90,800 --	3/10/98	34.59	90,800	N	--
02423130	Cahaba River at Trussville, AL	19.7	1989–98	1998	10.45	5,360	1/7/98	10.45	5,360	N	--
02423398	Little Cahaba River near Leeds, AL	19.4	1981, 1998 1989–98	1998	11.83	2,900	1/7/98	11.83	2,900	N	--
02423400	Little Cahaba River near Jefferson Park, AL	24.4	1987–98	1996	5.08	2,900	1/26/96	5.80	2,900	N	--
02423496	Cahaba River near Hoover, AL	226	1989–98	1996	33.37	12,200	3/7/96	33.37	12,200	N	2–5
02450000	Mulberry Fork near Garden City, AL	365	1929–98	1990	25.04	66,500	2/11/94	21.97	49,600	N	25
02457595	Fivemile Creek near Republic, AL	51.9	1989–98	1996	15.60	8,990	1/26/96	15.60	8,990	N	--
02458300	Village Creek at 24th Street at Birmingham, AL	26.0	1989–98	1998	12.68	5,860	1/7/98	12.68	5,860	N	--
02458450	Village Creek at Avenue West at Ensley, AL	33.5	1976–79 1989–98	1996 1979	13.70 14.00	6,320 5,450	2/26/96	13.70	6,320	N	--
0357587728	Dallas Branch at Coleman Street in Huntsville, AL	2.99	1985–98	1994	5.20	1,150	2/11/94	5.20	1,150	N	--
03575980	McDonald Creek at Patton Road near Huntsville, AL	9.64	1985–98	1998	11.59	3,530	5/7/98	11.59	3,530	N	10–25

[1]Regulated during flood: N, no; Y, yes.

Alaska

Southeastern Alaska experiences some of the largest rainfall totals in North America. However, because the Coast Mountains rise so rapidly from the Pacific Ocean, streams are generally short and steep, so regional floods resulting from these intense rains are rare although peak discharge often exceeds 300 cubic feet per second per square mile.

Two storms occurred during August 1994, and each resulted in more than 5 inches of rain (National Oceanic and Atmospheric Administration, 1994) throughout the upper Koyukuk River Basin (fig. 14). Major flooding occurred from Wiseman, in the headwaters, to Hughes, near the mouth of the Koyukuk. Three villages were entirely evacuated, one of which, Alatna, has since been relocated. The area was declared a national and State disaster. The flood had a recurrence interval of greater than 100 years. Peak flows of record were measured at four streamgages across central Alaska.

Remnants of Tropical Storm Oscar struck south-central Alaska on September 19–21, 1995. Rivers from Kodiak Island in the southwest to Valdez in the east to Palmer in the north experienced flows having recurrence intervals of 2 to greater than 100 years (table 3). Flood damage was remarkably scattered given that the storm affected such a large area. For example, rivers flowing into Knik Arm of Cook Inlet carried flows greater than the 100-year flood, yet streams in Anchorage did not overtop their banks. Around Cook Inlet, streamflow probably was augmented by snow and glacier melt, which resulted from a very high freezing level. Homes along the Kenai and Resurrection Rivers were inundated, but most structural damage was confined to roads and bridges.

A series of storms in June, July, and August 1997 caused localized flooding in the interior of Alaska, with flood damage to roads along the upper Yukon, upper Tanana, and Chisana Rivers. The Alaska Highway was closed for several days due to bridge abutments being washed out.

Reference

National Oceanic and Atmospheric Administration (NOAA), 1994, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

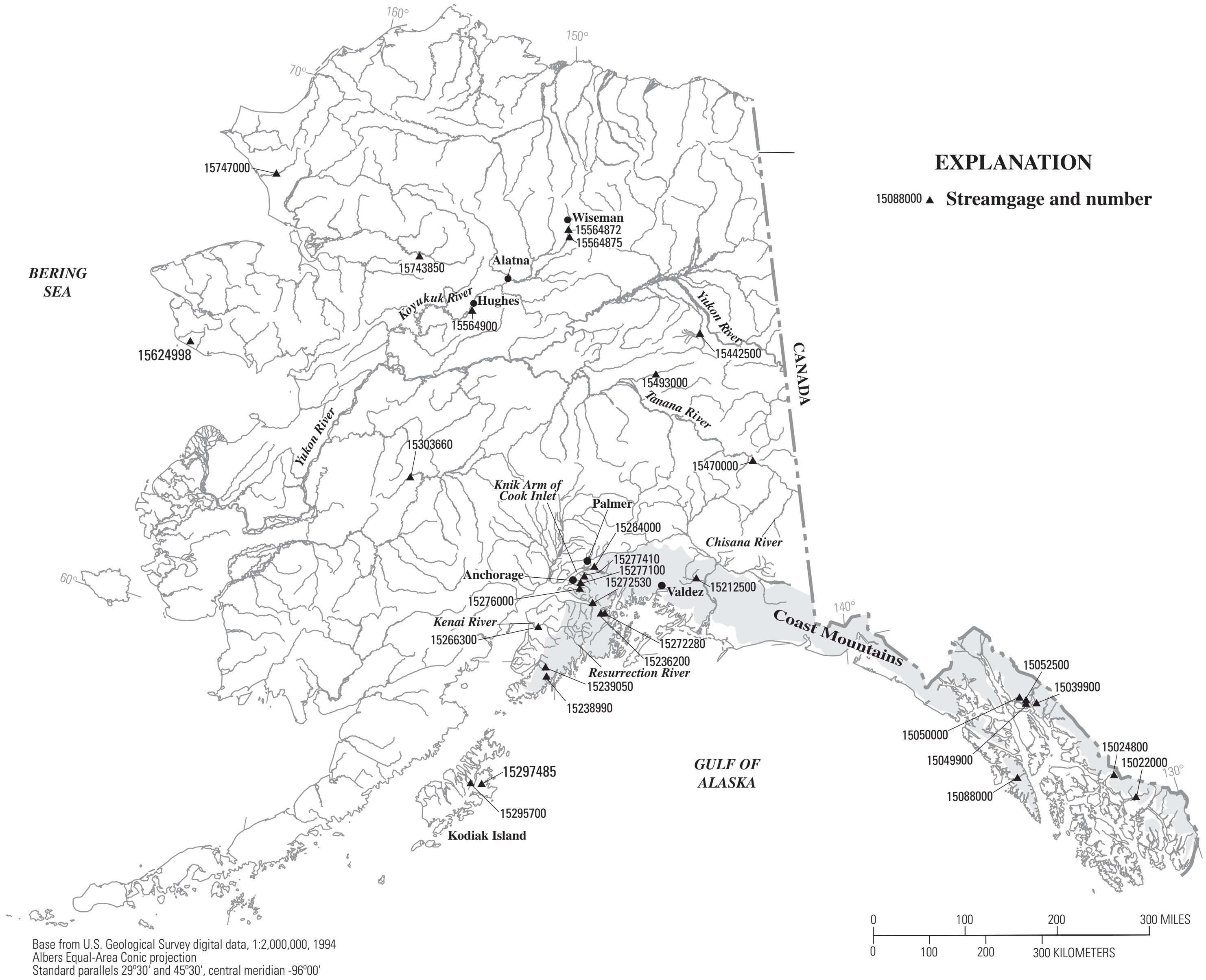


Figure 14. Location of streamgages with significant floods during 1994–98 water years for Alaska.

Table 3. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Alaska.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 14)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
15022000	Harding River near Wrangell, AK	67.4	1952–98	1994 1962	16.21 16.22	15,300 15,000	10/26/93	16.21	175,300	N	75–100
15024800	Stikine River near Wrangell, AK	19,920	1977–98	1994	30.60	351,000	9/23/94	30.60	351,000	N	50–100
15039900	Dorothy Lake outlet near Juneau, AK	11.0	1987–98	1995	13.05	990	9/10/95	13.05	990	N	10–25
15049900	Gold Creek near Juneau, AK	8.41	1985–97	1996	21.71	2,810	9/25/96	21.71	2,810	N	25–50
15050000	Gold Creek at Juneau, AK	9.76	1917–20, 1947–48, 1950–82, 1991, 1994, 1996, 1998	1996	8.14	2,950	9/25/96	8.14	2,950	N	25–50
15052500	Mendenhall River near Auke Bay, AK	85.1	1966–98	1995	11.18	16,000	9/11/95	11.18	16,000	N	50–75
15088000	Sawmill Creek near Sitka, AK	39.0	1921–22, 1929–42, 1946–57, 1994	1994 1948	-- 10.20	11,100 7,100	11/19/93	--	11,100	N	>100
15212500	Boulder Creek near Tiekel, AK	9.80	1964–98	1981 1964	11.72 12.28	1,330 450	9/22/95	10.58	484	N	10–15
15236200	Shakespeare Creek at Whittier, AK	1.61	1970–80, 1984–98	1995	14.90	690	9/20/95	14.90	690	N	25–50
15238990	Upper Bradley River near Nuka Glacier near Homer, AK	--	1980–98	1995	15.10	4,100	9/20/95	15.10	4,100	Y	--
15239050	Middle Fork Bradley River near Homer, AK	9.25	1980–98	1995	8.86	1,470	9/20/95	8.86	1,470	N	25–50

Table 3. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Alaska.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 14)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
15266300	Kenai River at Soldotna, AK	1,860	1965–98	1995	14.50	42,200	9/24/95	14.50	42,200	N	>100
15272280	Portage Creek at Portage Lake outlet near Whittier, AK	40.5	1984, 1989–98	1995	10.66	13,000	9/20/95	10.66	13,000	N	25–50
15272530	California Creek at Girdwood, AK	7.19	1967–84, 1986–93, 1995	1995 1967	16.04 20.83	760 593	9/21/95	16.04	760	N	30–40
15276000	Ship Creek near Anchorage, AK	90.5	1947–98	1989 1980	6.38 8.04	2,100 1,080	9/21/95	6.52	1,890	Y	30–35
15277100	Eagle River at Eagle River, AK	192	1966–80, 1995	1995	11.10	14,000	9/21/95	11.10	14,000	N	>100
15277410	Peters Creek near Birchwood, AK	87.8	1974–83, 1995	1995	10.40	5,000	9/21/95	10.40	5,000	N	>100
15284000	Matanuska River at Palmer, AK	2,070	1949–74, 1985–86, 1992, 1995	1971	13.60	82,100	9/22/95	13.04	46,000	N	>100
15295700	Terror River at mouth near Kodiak, AK	30.7	1964–68, 1982–98	1995	7.67	10,000	9/19/95	7.67	10,000	Y	--
15297485	Kizhuyak River near Port Lions, AK	47.5	1980–95	1995	11.20	6,560	9/19/95	11.20	6,560	Y	--
15303660	Gold Creek at Takotna,AK	6.31	1987–98	1998	7.49	69	7/8/98	7.49	69	N	2–5
15442500	Quartz Creek near Central, AK	17.2	1967, 1969–79, 1989–98	1995	23.08	700	7/15/95	23.08	700	N	25–50
15470000	Chisana River at Northway Junction, AK	3,280	1949–71, 1997	1997	13.75	14,500	8/7/97	13.75	14,500	N	>100

Table 3. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Alaska.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 14)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
15493000	Chena River near Two Rivers, AK	937	1967–98	1992 1967	22.04 26.60	20,000 --	6/26/94	23.65	18,300	N	10–15
15564872	Nugget Creek near Wiseman, AK	9.47	1975–88, 1990–98	1998	40.17	540	5/26/98	40.17	540	N	25–30
15564875	Middle Fork Koyukuk River near Wiseman, AK	1,200	1968, 1971–80, 1984–87, 1994	1994 1973	12.92 13.50	42,700 17,100	8/27/94	12.92	42,700	N	>100
15564900	Koyukuk River at Hughes, AK	18,400	1961–82, 1994	1994	34.60	330,000	8/31/94	34.60	330,000	N	>100
15624998	Arctic Creek above tributary near Nome, AK	1.13	1975, 1979–98	1998	19.06	182	8/20/98	19.06	182	N	25–30
15743850	Dahl Creek near Kobuk, AK	11.0	1986–98	1994 1990	-- 6.60	1,840 538	8/17/94	--	1,840	N	25–50
15747000	Wulik River below Tutak Creek near Kivalina, AK	705	1985–98	1994	12.21	38,500	8/17/94	12.21	38,500	N	15–20

[1]Regulated during flood: N, no; Y, yes.

Arizona

Two to 3 inches of rain fell over parts of Scottsdale on October 6, 1993 (National Oceanic and Atmospheric Administration, 1993a). The intense rain caused Indian Bend Wash (fig. 15) to overflow onto city streets and wash over the bridges on Camelback and Indian School Roads. A few motorists had to be rescued from their cars as they tried to cross the flooded wash.

A series of thunderstorms moved through the Yuma area during the early morning hours of August 21, 1994, and as much as 5 inches of rain led to the flooding of four homes about 8 miles south of Yuma. The Yuma County Extension Agent estimated nearly $1 million in damages, mainly to cotton crops (National Oceanic and Atmospheric Administration, 1994b).

Excessive rains fell on the Salt River and Verde River watersheds during February 13–15, 1995. This, combined with rain falling on snowpack in the higher mountains of central and northern Arizona, led to flooding and flash flooding. The Salt River and Verde River watersheds averaged 1.27 and 2.16 inches of rain, respectively, between the morning of February 13 and the morning of February 15 (National Oceanic and Atmospheric Administration, 1995a). During the night of February 14, remote rain gages in the Bradshaw Mountains reported as much as 5.12 inches of rain (National Oceanic and Atmospheric Administration, 1995a). Record flows were observed on the Verde River below Tangle Creek (streamgage 09508500, fig. 15) when the flow peaked at 108,000 cubic feet per second (table 4).

Excessive rains on March 6, 1995, produced flash flooding on Bright Angel Creek, and six employees of Phantom Ranch were stranded on an island in the middle of the creek. Rock and soil movement along the south rim of the Grand Canyon caused severe trail damage. The trans-canyon water pipeline running under the trail was broken when a 100-yard-long section of the trail gave way.

A strong Pacific storm on March 5–6, 1995, resulted in excessive rain falling over the central and northern mountains where soils were already saturated from previous rains. Between the afternoon of March 5 and the morning of March 6, 1995, a remote rain gage south of Prescott reported 4.92 inches (National Oceanic and Atmospheric Administration, 1995a). Many other locations received about 2 inches of rain. Near-record flows were observed on Oak Creek at Cornville and on Dry Beaver Creek (National Oceanic and Atmospheric Administration, 1995b). The flooding caused an estimated $1.3 million in damage (National Oceanic and Atmospheric Administration, 1995b).

Excessive rain during March 11–12, 1995, resulted in flooding along Beaver Dam Wash and the Virgin River in the vicinity of Littlefield. Erosion of the banks along the wash caused four mobile homes to be washed downstream. Damage to public property was estimated at $335,000 and private property at $1,290,000 (National Oceanic and Atmospheric Administration, 1995b).

A series of strong thunderstorms moving through Tucson brought widespread damage on August 11, 1995. Many power poles were knocked over, and roofs were torn off buildings. As much as 4 inches of rain accompanied these storms (National Oceanic and Atmospheric Administration, 1995b). Some areas received 0.75-inch-diameter hail. Washes in the area were running near bankfull. One woman attempting to drive through a flooded wash was swept to her death.

Eleven hikers and tourists were drowned in a flash flood in a narrow slot canyon 5 miles southeast of Page, on August 12, 1997. A severe thunderstorm 3 to 5 miles upstream produced very intense rain causing a 10- to 30-foot wall of water to crash down Antelope Canyon. The 11 who died were warned not to enter the canyon because of the flood potential from an approaching thunderstorm (National Oceanic and Atmospheric Administration, 1997b).

A flash flood on Phantom Creek killed two people and injured a third person on September 11, 1997. Runoff from the excessive rainfall several miles north of the flash flood site caught the three people as they were crossing Phantom Creek (National Oceanic and Atmospheric Administration, 1997b).

Three members of a Boy Scout troop perished after their sport utility vehicle was swept away on March 28, 1998. The scouts tried to cross a flooded wash near Sunflower (National Oceanic and Atmospheric Administration, 1997b).

A man was killed when he was caught in a flooded wash and drowned in the eastern part of Tucson on August 9, 1998 (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1993a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1993b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

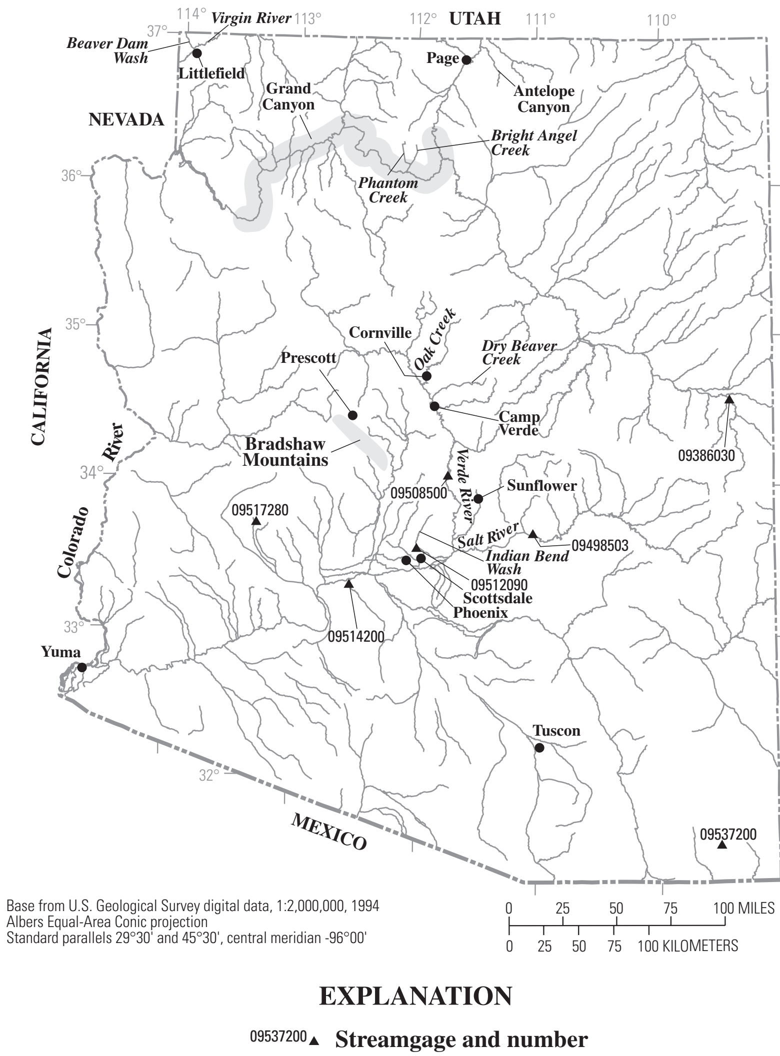


Figure 15. Location of streamgages with significant floods during 1994–98 water years for Arizona.

Table 4. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Arizona.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 15)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09386030	Little Colorado River above Zion Reservoir near Saint Johns, AZ	1,007	1976–98	1994	4.16	590	7/31/94	4.16	590	Y	--
09498503	South Fork Parker Creek near Roosevelt, AZ	1.09	1987–92, 1994–98	1995	4.10	87	3/6/95	4.10	87	N	10–25
09508500	Verde River below Tangle Creek above Horseshoe Dam, AZ	5,858	1891, 1906 1916, 1920 1925–98	1993	23.40	145,000	2/15/95	21.75	108,000	N	25
09512090	Indian Bend Wash at Shea Boulevard at Phoenix, AZ	24.5	1986–95, 1998	1994	3.89	4,700	10/6/93	3.89	4,700	N	25–50
09514200	Waterman Wash near Buckeye, AZ	420	1964–78, 1980–93, 1996–98	1997	7.80	9,400	8/8/97	7.80	9,400	N	100
09517280	Tiger Wash near Aguila, AZ	85.2	1963–79, 1983, 1991–95, 1997–98	1997 1970	10.17 10.20	8,070 4,550	9/26/97	10.17	8,070	N	100
09537200	Leslie Creek near McNeal, AZ	79.1	1970–77, 1982–98	1994	9.00	5,200	9/1/94	9.00	5,200	N	20

[1]Regulated during flood: N, no; Y, yes.

Arkansas

Flooding was reported across the entire city of Magnolia (fig. 16) on April 4–5, 1997. Rainfall in parts of southwestern Arkansas for a 24-hour period averaged slightly less than 12 inches. Many roads and bridges were washed out, resulting in $1 million in damage (National Oceanic and Atmospheric Administration, 1997b).

A local man was apparently fishing in the Cross Terre Rouge Creek when he was swept away and drowned by floodwaters on February 11, 1998 (National Oceanic and Atmospheric Administration, 1998b).

Excessive rain caused street flooding throughout Texarkana on May 28, 1998. A total of 10.48 inches of rain fell from the storm, which was a record for that date (National Oceanic and Atmospheric Administration, 1998a). Significant floods for Arkansas are listed in table 5.

References

National Oceanic and Atmospheric Administration (NOAA), 1997a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1997b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

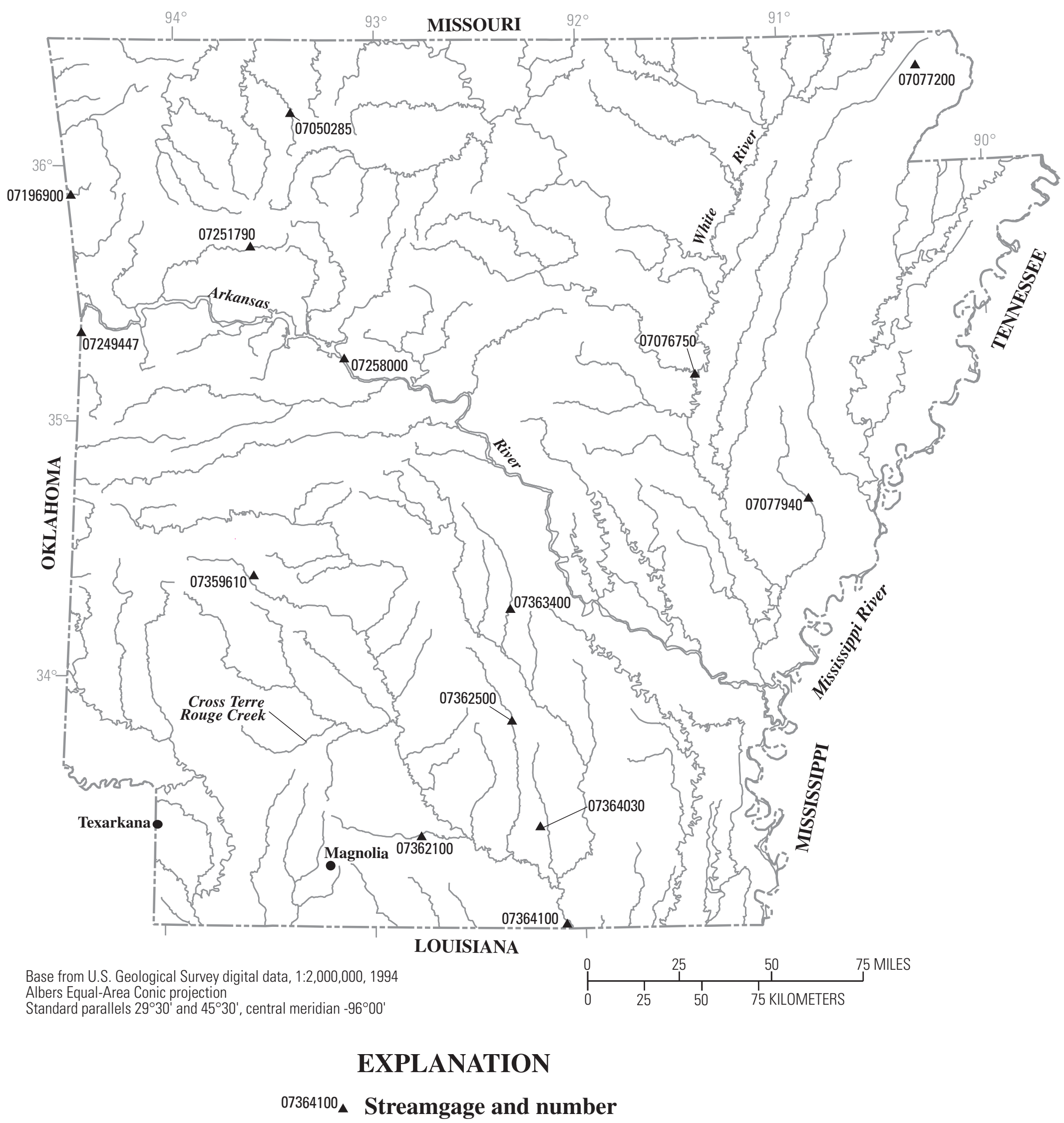


Figure 16. Location of streamgages with significant floods during 1994–98 water years for Arkansas.

Table 5. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Arkansas.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 16)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07050285	Osage Creek at Osage, AR	82.3	1988–98	1990	14.91	27,000	4/22/96	11.99	13,700	N	2–5
07076750	White River at Georgetown, AR	22,387	1913–98	1983 1949	28.87 32.80	179,000 --	12/18/94	20.96	59,900	Y	<2
07077200	Big Creek tributary near Boydsville, AR	1.58	1962–98	1998	9.94	790	7/25/98	9.94	790	N	20
07077940	Spring Creek near Aubrey, AR	38.0	1962–81, 1993–98	1997	16.11	2,050	4/5/97	16.11	2,050	N	10
07196900	Baron Fork at Dutch Mills, AR	40.6	1958–98	1986	14.81	20,900	1/4/98	13.85	17,500	N	5–10
07249447	Mill Creek at Fort Smith, AR	10.0	1981–98	1990	36.40	2,400	6/10/95	32.07	--	N	--
07251790	Mulberry River near Oark, AR	70.2	1988–98	1993	14.72	21,500	9/26/96	14.42	20,000	N	10–25
07258000	Arkansas River at Dardanelle, AR	153,670	1887–98	1943	43.60	683,000	6/16/95	33.38	205,000	Y	2
07359610	Caddo River near Caddo Gap, AR	132	1989–98	1994	26.27	97,200	12/3/93	26.27	97,200	N	50–100
07362100	Smackover Creek near Smackover, AR	385	1939–98	1974	24.97	52,700	4/6/97	24.08	41,700	N	50
07362500	Moro Creek near Fordyce, AR	240	1938, 1952–98	1958	16.47	26,800	4/6/97	16.39	26,000	N	50
07363400	Hurricane Creek below Sheridan, AR	261	1938–40, 1947–64, 1996–98	1997 1960	16.34 17.60	26,400	4/6/97	16.34	26,400	N	--

Table 5. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Arkansas.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 16)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07364030	L'aigle Creek tributary near Hermitage, AR	0.36	1963–88, 1990, 1992–93, 1995–98	1991	7.06	260	4/5/97	6.59	206	N	30–40
07364100	Ouachita River near Louisiana State line, AR	10,787	1912–85, 1987–95	1971 1945	18.66 44.20	17,400 --	10/25/94	--	12,800	Y	--

[1]Regulated during flood: N, no; Y, yes.

California

Frequent and powerful storms swept over the entire State of California from January to March 1995. El Niño conditions in the Pacific Ocean helped to spawn an unusual series of storms during this time that caused intense, prolonged, and in some cases, unprecedented precipitation across California. This series of storms caused widespread minor to record-breaking floods. Peaks of record occurred at several streamgages. Total damage for the period was estimated to be near $3 billion. There were 27 deaths attributed to the storms and flooding (Perry, 2000).

A powerful storm system dropped 3 to 6 inches of rain over portions of Los Angeles (fig. 17*C*) during the first weeks of January 1995. The Santa Ynez River washed out bridges in the Santa Ynez Valley. Flooding near Santa Barbara caused $92 million in damage (National Oceanic and Atmospheric Administration, 1995b). Many other cities in southern California had substantial damage from floodwaters. Three days of record-setting rainfall culminated in widespread flooding of small rivers in central California, January 11, 1995. More than 1,000 homes and small businesses were damaged near Sacramento (fig. 17*B*) with estimated damage of $50 million. One death also occurred when a homeless man was drowned in the flood. Total damage in California from the January 1995 flood exceeded $350 million (National Oceanic and Atmospheric Administration, 1995b).

Warm rain on top of snow brought large amounts of water from the mountains in Yosemite National Park. The resulting water surge produced the peak of record on the Merced River (streamgage 11264500, table 6). Sierra Nevada 24-hour rainfall reports on the morning of May 16, 1996, ranged from 2.0 to 2.5 inches (National Oceanic and Atmospheric Administration, 1996a). Snowmelt above 10,000 feet in the southern Sierra Nevada Mountains added to the rainfall runoff and caused the Merced River to crest at 8.84 feet, which is 3.1 feet above the stage when minor flooding begins. Damage estimates were in the $2–3 million range (National Oceanic and Atmospheric Administration, 1996b).

Several periods of rain beginning December 20, 1996, set up saturated conditions in northern California that led to flooding on January 1, 1997, as subtropical air moved in and melted snow up to the 8,000-foot level. As the runoff moved downstream and flood-control dams operated at near-maximum releases, stress on the Sacramento River (fig. 17*A*) and San Joaquin River (fig. 17*B*) levees resulted in numerous levee breaks, especially from January 4–10, 1997. Intense rains returned at the end of the month, beginning on the 22nd and lasting through the 27th. These storms produced flooding problems in the foothills of the Sierra Nevada Mountains and on the valley floor. Levees continued to break in the Sacramento-San Joaquin River delta as the floodwaters headed out to San Francisco Bay. Preliminary data indicated record peak stages were set at nine streamgages in the Sacramento-San Joaquin River system. The particular rivers included the Sacramento, San Joaquin, Feather, Cosumnes, and Toulumne Rivers. The variety and magnitude of the damage were huge. At least 120,000 people were evacuated, and five deaths occurred in interior northern California. Flooding in the estimated 250 square miles that were inundated, damaged or destroyed a minimum of 20,000 homes and 1,500 businesses. Damage was estimated at $1.6 billion, much of it in interior northern California. The flooding also virtually destroyed two large fish hatcheries, the Feather River fish hatchery and the San Joaquin fish hatchery (National Oceanic and Atmospheric Administration, 1997b).

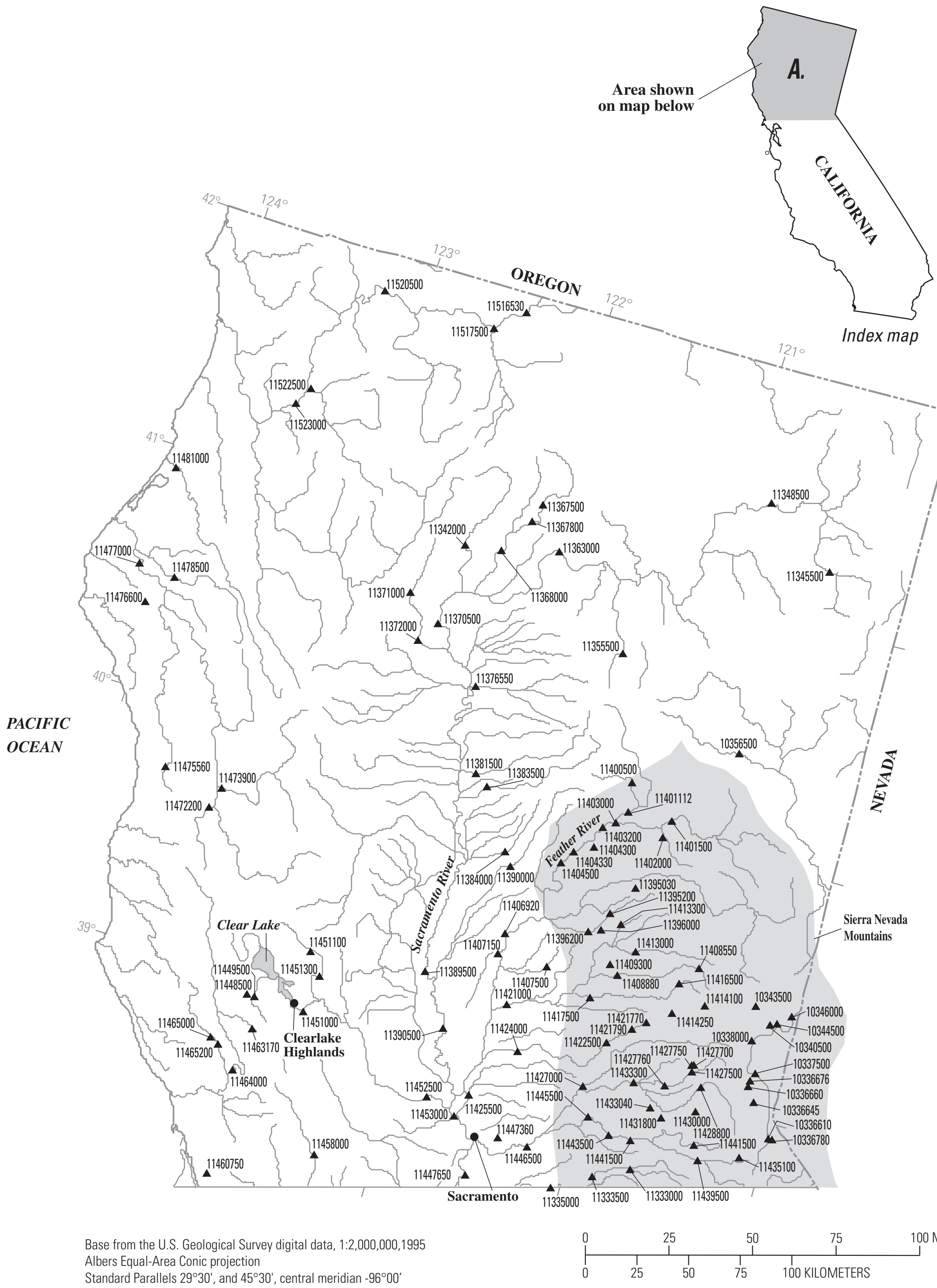
Excessive rainfall on a much above-normal snowpack subsequently during the first week of January 1997 also led to floods in the southern Sierra Nevada Mountains as well as the adjacent San Joaquin Valley. Especially hard hit was Yosemite National Park as the Merced River produced the largest flood in 80 years. The water level reached 23.43 feet at the streamgage near Yosemite (streamgage 11266500, table 6), indicating a discharge of 24,600 cubic feet per second on January 3, 1997. One drowning fatality occurred southwest of Yosemite National Park as a vehicle was swept from a roadway. Also adversely affected were Kings Canyon and Sequoia National Parks with substantial road and trail damage (National Oceanic and Atmospheric Administration, 1997b).

A severe thunderstorm packing torrential rains and golf-ball-size hail pummeled part of the San Bernardino Mountains during September 4, 1997, sending floodwaters rushing down creeks near Forest Falls (fig. 17*C*). That small community bore the brunt of the damage as tons of mud, boulders, and debris buried roads, mangled automobiles, and battered scores of homes. Total estimated damage was $3.2 million in Forest Falls (National Oceanic and Atmospheric Administration, 1997b).

A slow-moving, low-pressure center off the coast of southern California spawned late-night showers and thunderstorms on December 6, 1997. Rainfall generally ranged from 4 to 8 inches across the area (National Oceanic and Atmospheric Administration, 1997a), resulting in widespread flooding. The hardest hit area was the coastal plain southwest of the Santa Ana Mountains. It was the most intense rain recorded in at least 70 years. Collapsing hillsides and raging water triggered flooding that forced scores of people to flee their homes, while others climbed atop stalled automobiles to escape the rising waters. Total damage estimates for the Los Angeles area were over $17 million (National Oceanic and Atmospheric Administration, 1997b).

The Clear Lake region in northern California was hit hard by flooding on February 28, 1998. Clear Lake (fig. 17*A*) is a very slow-draining natural lake that rose 2.5 feet above flood stage. The town of Clear Lake suffered $5 million in flood damage (National Oceanic and Atmospheric Administration, 1998b). The flooding continued into March and April 1998.

Flooding in the San Joaquin Valley during the last week in February 1998 caused more than $40 million in damage (National Oceanic and Atmospheric Administration, 1998b). A fatality occurred when a man attempted to cross floodwaters on a bicycle. Another death occurred south of Tracy (fig. 17*B*) when floodwaters swept away a man on a hunting trip after his truck got stuck. Serious flooding also occurred in southern



EXPLANATION

11333500▲ Streamgage and number

Figure 17. (*A*) Location of streamgages with significant floods during 1994–98 water years for California.

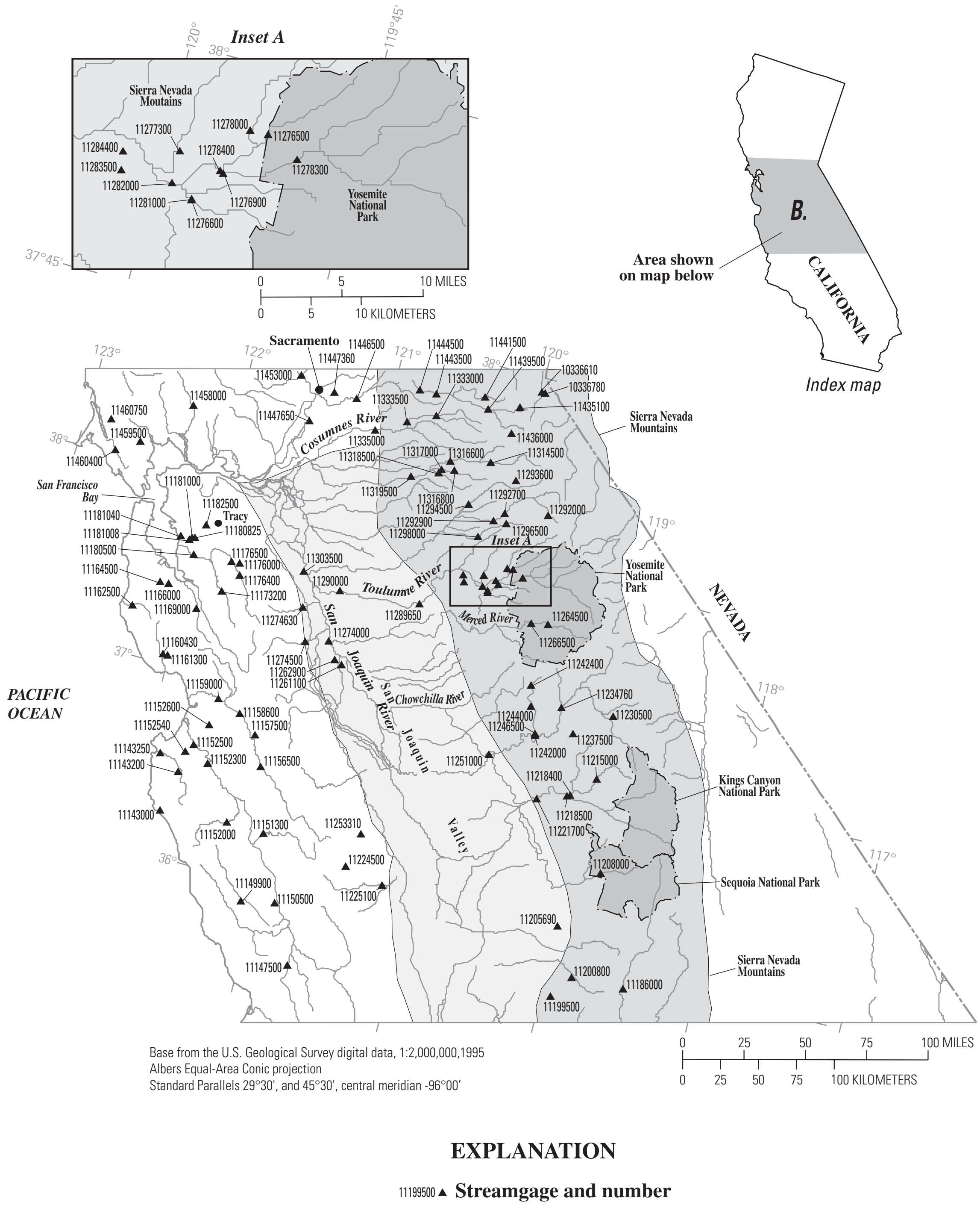
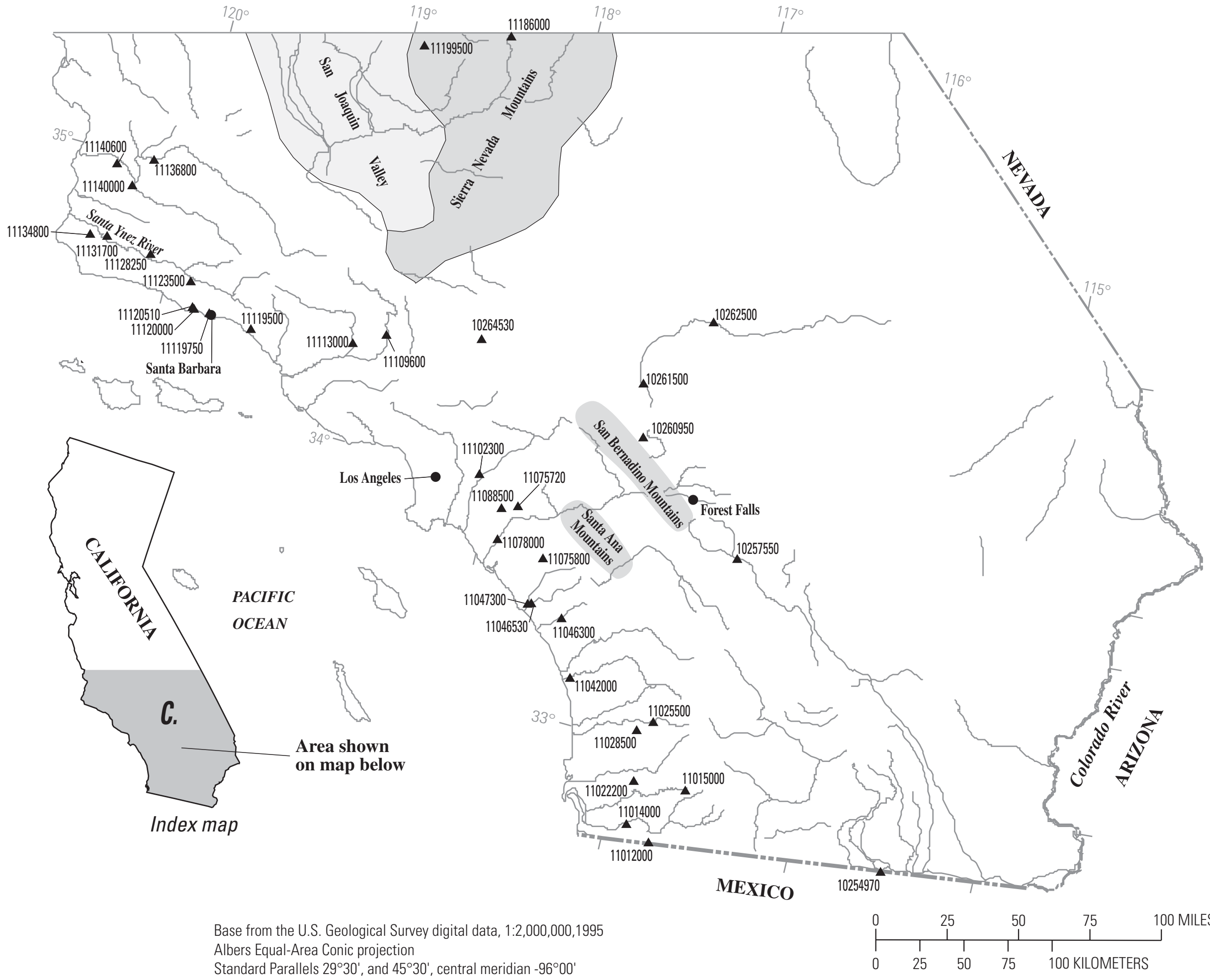


Figure 17. (*B*) Location of streamgages with significant floods during 1994–98 water years for California.—Continued



EXPLANATION

11012000 ▲ **Streamgage and number**

Figure 17. (*C*) Location of streamgages with significant floods during 1994–98 water years for California.—Continued

California during February 1998. Damage estimates to residences, businesses, property, infrastructure, agriculture, and the cost of emergency services, and for clean up exceeded \$100 million (National Oceanic and Atmospheric Administration, 1998b). Flooding, caused by record winter snowpack melt and spring rainstorms, continued in various parts of California from March through June 1998.

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Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10254970	New River at international boundary at Calexico, CA	--	1982–98	1997	14.73	833	9/25/97	14.73	833	N	5–10
10257550	Whitewater River at Windy Point near Whitewater, CA	264	1985–87, 1990–98	1995	8.32	2,530	1/10/95	8.32	2,530	Y	25–50
10260950	West Fork Mojave River above Mohave River Forks Reservoir near Hesperia, CA	.30	1975–98	1980	17.45	8,380	2/20/96	6.63	2,440	Y	--
10261500	Mojave River at lower narrows near Victorville, CA	513	1931–98	1938	16.70	70,600	2/24/98	9.25	24,000	Y	10–20
10262500	Mojave River at Barstow, CA	1,290	1931–85, 1987–98	1938	8.60	64,300	2/24/98	3.16	15,200	N	10–20
10264530	Pine Creek near Palmdale, CA	1.78	1959–73, 1978–91, 1996–98	1969	15.33	69	--/--/98	15.33	65	N	10–25
10336610	Upper Truckee River at South Lake Tahoe, CA	54.9	1972–74, 1978, 1980–98	1997	9.95	5,480	1/2/97	9.95	5,480	N	>100
10336645	General Creek near Meeks, CA	7.44	1981–98	1997	7.86	797	1/2/97	7.86	797	N	20
10336660	Blackwood Creek near Tahoe City, CA	11.2	1961–98	1997	9.82	2,940	1/1/97	9.82	2,940	N	>100
10336676	Ward Creek at Highway 89 near Tahoe Pines, CA	9.70	1973–98	1997	9.36	2,530	1/1/97	9.36	2,530	N	50–75
10336780	Trout Creek near Tahoe Valley, CA	36.7	1961–98	1963	11.14	535	1/2/97	9.33	535	N	20–30

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10337500	Truckee River at Tahoe City, CA	507	1901–98	1997	9.59	2,690	5/21/96 1/2/97	9.07 9.59	2,350 2,690	Y Y	20–30 25–50
10338000	Truckee River near Truckee, CA	552	1945–61, 1963, 1977–82, 1993–95, 1997–98	1997	9.97	11,900	1/2/97	9.97	11,900	Y	40–60
10340500	Prosser Creek below Prosser Creek Dam near Truckee, CA	52.9	1943–98	1956 1951	10.13 11.01	4,560 4,320	1/3/97	6.72	2,030	Y	25–50
10343500	Sagehen Creek near Truckee, CA	10.5	1954–98	1997	5.20	1,230	1/1/97	5.20	1,230	N	75–100
10344500	Little Truckee River below Boca Dam near Truckee, CA	173	1890, 1911–15, 1940–94, 1996–98	1951 1963	-- 6.16	5,000 2,590	1/8/97	6.14	2,720	Y	20–40
10346000	Truckee River at Farad, CA	932	1900–98	1951 1997	-- 13.13	17,500 14,900	1/2/97	13.13	14,900	Y	50–75
10356500	Susan River at Susanville, CA	184	1901, 1903–05, 1917–21, 1951–94, 1997	1970 1997	8.89 11.75	5,850 5,150	1/2/97	11.75	5,150	Y	20–30
11012000	Cottonwood Creek above Tecate Creek near Dulzura, CA	310	1937–98	1980	11.15	11,700	3/6/95	11.14	11,300	Y	50–75
11014000	Jamul Creek near Jamul, CA	70.2	1940, 1942–78, 1986–98	1995	7.59	5,870	3/5/95	7.59	5,870	N	40–60

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 17)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
11015000	Sweetwater River near Descanso, CA	45.4	1906–27, 1957–98	1927 1995	13.20 13.22	11,200 8,600	3/5/95	13.22	8,600	N	30–40
11022200	Los Coches Creek near Lakeside, CA	12.2	1984–98	1995	9.74	1,090	3/5/95	9.74	1,090	N	15–25
11025500	Santa Ysabel Creek near Ramona, CA	112	1912–22, 1944–71, 1973–98	1916 1980	6.00 14.25	28,400 10,700	3/5/95	12.45	8,000	Y	20–30
11028500	Santa Maria Creek near Ramona, CA	57.6	1914–20, 1947–98	1980 1916	14.39 15.90	15,200 7,140	3/5/95	8.80	5,270	N	10–20
11042000	San Luis Rey River at Oceanside, CA	557	1913–16, 1930–42, 1947–98	1916 1993	-- 21.70	95,600 25,700	3/6/95	19.97	19,500	Y	20–30
11046300	San Mateo Creek near San Clemente, CA	80.8	1953–67, 1969, 1994–98	1998	12.83	12,500	2/23/98	12.83	12,500	N	15–25
11046530	San Juan Creek at La Novia Street Bridge at San Juan Capistrano, CA	109	1986–98	1995	20.66	25,600	3/5/95	20.66	25,600	N	30–40
11047300	Arroyo Trabuco at San Juan Capistrano, CA	54.1	1973–77, 1984–88, 1996–98	1998	19.81	10,000	2/23/98	19.81	10,000	N	50–100
11075720	Carbon Creek below Carbon Canyon Dam, CA	19.5	1962–98	1983	5.11	796	2/24/98	4.48	573	Y	15–25
11075800	Santiago Creek at Modjeska, CA	13.0	1962–98	1969 1998	10.50 12.03	6,520 6,200	2/23/98	12.03	6,200	N	15–25

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11078000	Santa Ana River at Santa Ana, CA	1,700	1923–30, 1932–89, 1991–98	1938 1981	-- 16.00	46,300 6,200	1/4/95	9.09	31,700	Y	30–40
11088500	Brea Creek below Brea Dam near Fullerton, CA	21.6	1943–80, 1982–98	1980 1978	-- 6.34	1,700 1,060	2/7/98	6.03	1,390	Y	20–30
11102300	Rio Hondo below Whittier Narrows Dam, CA	124	1967–98	1969	13.82	38,800	1/10/95	13.80	38,700	Y	15–25
11109600	Piru Creek above Lake Piru, CA	372	1938, 1956–94, 1996–98	1998 1969	13.38 18.60	38,000 31,200	2/23/98	13.38	38,000	Y	30–40
11113000	Sespe Creek near Filmore, CA	251	1933–85, 1991–92, 1994–98	1978	22.40	73,000	1/10/95 2/3/98	16.46 16.31	65,000 62,500	N N	20–30 15–25
11119500	Carpinteria Creek near Carpinteria, CA	13.1	1941–77, 1979–94, 1996–98	1972 1969	14.10 18.90	8,880 4,560	2/23/98	10.77	5,930	N	25–35
11119750	Mission Creek near Mission Street near Santa Barbara, CA	8.38	1971–94, 1996–98	1998	5.67	3,090	2/23/98	5.67	3,090	N	20–30
11120000	Atascadero Creek near Goleta, CA	18.9	1942–98	1995 1975	12.45 13.30	10,200 2,380	3/10/95	12.45	10,200	N	50–75
11120510	San Jose Creek at Goleta, CA	9.42	1971–92,	1998 1998	5.68	2,470	2/7/98	5.68	2,470	N	10–20
11123500	Santa Ynez River below Los Laureles Canyon near Santa Ynez, CA	277	1948–94, 1996–98	1969	18.88	67,500	2/23/98	17.54	55,900	Y	20–30

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11128250	Alamo Pintado Creek near Solvang, CA	29.4	1969, 1971–85, 1990–92, 1995–98	1998	11.69	3,680	2/3/98	11.69	3,680	N	20–30
11131700	Santa Rita Creek near Lompoc, CA	14.1	1976–79, 1981–98	1998	10.57	723	2/23/98	10.57	723	N	10–25
11134800	Miguelito Creek at Lompoc, CA	11.6	1969, 1971–86, 1988–94, 1996–98	1998 1983	4.61 7.63	2,660 1,210	2/3/98	4.61	2,660	N	75–100
11136800	Cuyama River below Buckhorn Canyon near Santa Maria, CA	886	1904–05, 1960–98	1998	14.76	26,200	2/23/98	14.76	26,200	N	15–30
11140000	Sisquoc River near Garey, CA	471	1941–53, 1955–84, 1986–94, 1996–98	1983 1967	11.16 13.50	33,600 22,600	2/3/98	10.61	29,500	N	20–30
11140600	Bradley Ditch near Donovan Road at Santa Maria, CA	5.47	1971–78, 1980–92, 1998	1998 1978	5.69 5.85	848 379	2/3/98	5.69	848	N	40–60
11143000	Big Sur River near Big Sur, CA	46.5	1951–98	1978	14.30	10,700	3/10/95	11.71	6,690	N	20–30
11143200	Carmel River at Robles del Rio, CA	193	1956, 1958–98	1995	12.90	16,000	3/10/95 2/3/98	12.90 11.08	16,000 14,700	N N	>100 75–100
11143250	Carmel River near Carmel, CA	246	1963–98	1995	20.85	16,000	3/10/95 2/3/98	20.85 19.35	16,000 14,600	N N	75–100 25–50
11147500	Salinas River at Paso Robles, CA	390	1938, 1940–65, 1969–98	1995 1969	22.99 23.80	28,400 28,000	3/10/95	22.99	28,400	N	50–75

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11149900	San Antonio River near Lockwood, CA	217	1966–98	1995	14.25	23,600	3/10/95 2/3/98	14.25 14.19	23,600 23,100	N N	25–50 25–50
11150500	Salinas River near Bradley, CA	2,535	1949–98	1995	23.44	120,000	3/11/95	23.44	120,000	Y	50–75
11151300	San Lorenzo Creek below Bitter-water Creek near King City, CA	233	1959–98	1969	15.33	11,500	3/10/95	14.78	11,100	N	20–30
11152000	Arroyo Seco near Soledad, CA	244	1906–98	1958 1914	14.40 20.50	28,300 17,500	3/10/95	16.44	27,300	N	20–30
11152300	Salinas River near Chualar, CA	4,042	1977–98	1995	19.70	92,000	3/11/95	19.70	92,000	Y	75–100
11152500	Salinas River near Spreckels, CA	4,156	1862, 1911, 1914, 1930–56, 1958–60, 1962–98	1995 1862	30.29 31.00	95,000 --	3/12/95	30.29	95,000	Y	25–50
11152540	El Toro Creek near Spreckels, CA	31.9	1962–98	1998	7.11	669	3/10/95 2/3/98	7.08 7.11	664 669	N N	10–20 10–20
11152600	Gabilan Creek near Salinas, CA	36.7	1971–98	1998 1974	5.17 11.13	1,030 898	2/3/98	5.17	1,030	N	20–30
11156500	San Benito River near Willow Creek School, CA	249	1938, 1940–98	1995	14.55	9,660	3/10/95	14.55	9,660	N	30–40
11157500	Tres Pinos Creek near Tres Pinos, CA	207	1938, 1940–83, 1997–98	1998	16.00	27,200	2/3/98	16.00	27,200	N	75–100
11158600	San Benito River at Highway 156 near Hollister, CA	607	1971–98	1998	13.48	34,500	2/3/98	13.48	34,500	N	50–75
11159000	Pajaro River at Chittenden, CA	1,186	1938, 1940–98	1998	33.73	25,100	2/3/98	33.73	25,100	N	50–75

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11160430	Bean Creek near Scotts Valley, CA	8.81	1989–98	1998	10.85	1,710	2/3/98	10.85	1,710	N	10–15
11161300	Carbonera Creek at Scotts Valley, CA	3.60	1985–98	1997	11.89	1,620	12/10/96	11.89	1,620	N	50–75
11162500	Pescadero Creek near Pescadero, CA	45.9	1952–98	1998	22.47	10,600	2/3/98	22.47	10,600	N	25–50
11164500	San Francisquito Creek at Stanford University, CA	37.4	1931–41, 1951–98	1998 1956	13.40 13.60	7,200 5,560	2/3/98	13.40	7,200	N	75–100
11166000	Matadero Creek at Palo Alto, CA	7.26	1953–91, 1993–98	1998	10.00	2,560	2/2/98	10.00	2,560	N	>100
11169000	Guadalupe River at San Jose, CA	146	1930–98	1995	17.40	11,000	3/10/95	17.40	11,000	Y	25–50
11173200	Arroyo Hondo near San Jose, CA	77.1	1969–81, 1995–98	1998	15.85	7,340	2/3/98	15.85	7,340	N	10–20
11176000	Arroyo Mocho near Livermore, CA	38.2	1913–30, 1956, 1964–98	1983 1986	8.80 10.44	2,250 1,660	3/10/95	9.29	2,000	N	10–20
11176400	Arroyo Valle below Lang Canyon near Livermore, CA	130	1964–98	1986 1969	7.36 8.90	8,790 5,340	3/10/95 2/3/98	7.18 6.73	8,490 7,750	N N	10–20 10–20
11176500	Arroyo Valley near Livermore, CA	147	1913–24, 1926–28, 1930, 1956 1958–98	1956	13.93	18,200	2/4/98	9.17	2,980	Y	15–25
11180500	Dry Creek at Union City, CA	9.39	1917–19, 1959–98	1995	5.32	1,680	1/9/95 2/3/98	5.32 5.15	1,680 1,500	N N	20–30 15–25
11180825	San Lorenzo Creek above Don Castro Reservoir near Castro Valley, CA	18.0	1981–91, 1993–94, 1998	1998	15.48	3,890	2/3/98	15.48	3,890	N	25–35

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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Streamgage number (fig. 17)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
11181000	San Lorenzo Creek at Hayward, CA	37.5	1940, 1942, 1947–83, 1998	1998	21.85	8,140	2/3/98	21.85	8,140	N	20–30
11181008	Castro Valley Creek at Hayward, CA	5.51	1972–98	1998	9.12	1,550	2/2/98 1/2/97	9.12 8.15	1,550 1,240	N N	50–75 10–20
11181040	San Lorenzo Creek at San Lorenzo, CA	44.6	1968–78, 1988–98	1998	14.27	10,300	2/3/98	14.27	10,300	N	75–100
11182500	San Ramon Creek at San Ramon, CA	5.89	1953–98	1963	16.98	1,600	2/3/98	13.81	1,530	N	20–30
11186000	Kern River near Kernville, CA	846	1912–98	1967	22.77	60,000	1/3/97	16.69	46,300	Y	50–75
11199500	White River near Ducor, CA	90.6	1943, 1945–53, 1972–98	1998 1973	4.53 6.12	2,720 1,330	2/23/98	4.53	2,720	N	30–40
11200800	Deer Creek near Fountain Springs, CA	83.3	1967, 1969–98	1967	12.54	5,330	1/3/97 2/23/98	10.32 10.24	3,790 3,710	N N	10–20 10–20
11205690	Lewis Creek near Lindsay, CA	21.5	1974–88, 1992–94, 1996–98	1997	26.75	1,550	1/3/97	26.75	1,550	N	30–50
11208000	Marble Fork Kaweah River at Potwisha Camp, CA	51.4	1950–88, 1993–98	1956	13.40	12,500	1/2/97	11.57	6,760	N	25–35
11215000	North Fork Kings River near Cliff Camp, CA	181	1922–88, 1998	1938	18.00	14,000	7/8/98	11.01	4,060	Y	15–25
11218400	North Fork Kings River below Dinky Creek near Balch Camp, CA	387	1960–98	1963	19.20	27,400	1/2/97	18.43	24,900	Y	20

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11218500	Kings River below Northfork near Trimmer, CA	1,342	1951–92, 1997	1956	23.08	85,200	1/2/97	21.58	73,900	Y	40–50
11221700	Mill Creek near Piedra, CA	127	1958–94, 1997	1997 1967	8.70 9.53	12,000 11,000	1/2/97	8.70	12,000	N	10–20
11224500	Los Gatos Creek above Nunez Canyon near Coalinga, CA	95.8	1946–98	1995 1993	-- 12.08	5,700 3,820	3/10/95	--	5,700	N	25–35
11225100	Los Gatos Creek below Jacalitos Creek near Coalinga, CA	407	1959–67, 1969, 1995	1995 1969	-- 14.27	25,000 20,200	3/10/95	--	25,000	N	>100
11230500	Bear Creek near Lake Thomas at Edison, CA	52.5	1922–88, 1992–98	1982	8.35	3,660	1/2/97	6.84	1,760	N	10–20
11234760	San Joaquin River above Shakeflat Creek near Big Creek, CA	1,003	1960–88, 1992–98	1997	32.00	80,000	5/16/96 1/2/97	20.44 32.00	24,700 80,000	Y Y	10–25 >75
11237500	Pitman Creek below Tamarack Creek, CA	22.9	1928–98	1997	12.65	5,500	5/16/96 1/2/97	11.04 12.65	3,540 5,500	N N	25–50 75–100
11242000	San Joaquin River above Willow Creek near Auberry, CA	1,295	1951–98	1997	65.17	99,200	1/2/97	65.17	99,200	Y	>75
11242400	North Fork Willow Creek near Sugar Pine, CA	16.9	1966–98	1980	7.41	2,750	1/2/97	7.01	2,540	N	20–30
11244000	North Fork Willow Creek near Bass Lake, CA	50.8	1940–97, 1999	1997	9.10	3,770	3/11/95 1/2/97	-- 9.10	2,300 3,770	Y Y	15–25 30–50
11246500	Willow Creek at mouth near Auberry, CA	130	1951–88, 1992–98	1956 1997	28.50 31.65	15,700 --	3/10/95	19.38	8,460	Y	10–20
11251000	San Joaquin River below Friant, CA	1,676	1908–17, 1920–98	1938 1997	-- 22.97	77,200 60,300	1/3/97	22.97	60,300	Y	>50
11253310	Cantua Creek near Cantua Creek, CA	46.4	1958–98	1983 1995	5.72 7.13	3,420 2,970	3/10/95	7.13	2,970	N	25–50

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

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			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
11261100	Salt Slough at Highway165 near Stevinson, CA	--	1986, 1988–94, 1996–98	1998 1997	71.25 72.30	771 677	2/17/98	71.25	771	N	10–20
11262900	Mud Slough near Gustine, CA	--	1986–98	1998 1997	11.11 12.03	1,060 718	2/8/98	11.11	1,060	N	20–40
11264500	Merced River at Happy Isles Bridge near Yosemite, CA	181	1916–98	1997	13.27	10,100	5/16/96 1/2/97	8.84 13.27	5,900 10,100	N N	<10 50–75
11266500	Merced River at Pohono Bridge near Yosemite, CA	321	1917–98	1997	23.43	24,600	1/3/97	23.43	24,600	N	75–100
11274000	San Joaquin River near Newman, CA	9,520	1868, 1914–98	1997	66.14	36,200	1/28/97	66.14	36,200	Y	50–75
11274500	Orestimba Creek near Newman, CA	134	1932–98	1995 1963	9.51 9.72	12,000 8,300	3/10/95 2/3/98	9.51 8.80	12,000 9,470	N N	40–60 20–30
11274630	Del Puerto Creek near Patterson, CA	72.6	1959–98	1998	14.92	5,270	3/10/95 2/3/98	11.62 14.92	3,400 5,270	N N	20–30 50–75
11276500	Tuolumne River near Hetch Hetchy, CA	457	1915–98	1997	15.08	16,400	7/9/95 1/3/97	14.37 15.08	13,600 16,400	Y Y	25–50 75–100
11276600	Tuolumne River above Early intake near Mather, CA	484	1943, 1971–98	1997	22.98	17,700	1/3/97	22.98	17,700	Y	75–100
11276900	Tuolumne River below Early intake near Mather, CA	487	1967–98	1997	12.33	18,200	7/9/95 1/3/97	11.33 12.33	13,800 18,200	Y Y	20–40 >75
11277300	Cherry Creek below Valley Dam near Hetch Hetchy, CA	118	1957–98	1996	11.15	5,120	5/16/96	11.15	5,120	Y	25–50
11278000	Eleanor Creek near Hetch Hetchy, CA	78.4	1915–98	1997	26.74	19,500	1/2/97	26.74	19,500	Y	>75

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Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11278300	Cherry Creek near Early intake, CA	226	1957–98	1997	18.46	33,200	1/2/97	18.46	33,200	Y	>75
11278400	Cherry Creek below Dion River Holm Power Plant near Mather, CA	234	1963–98	1997	25.40	33,500	1/2/97	25.40	33,500	Y	>75
11281000	South Fork Tuolumne River near Oakland Recreation Camp, CA	87.0	1923–98	1956 1997	10.90 12.51	12,000 11,500	1/3/97	12.51	12,000	N	25–50
11282000	Middle Tuolumne River at Oakland Recreation Camp, CA	73.5	1917–98	1997	13.02	6,300	3/10/95 1/3/97	10.10 13.02	3,430 6,300	N N	20–30 >75
11283500	Clavey River near Buck Meadows, CA	144	1960–83, 1987–94, 1997	1997	28.66	47,000	1/3/97	28.66	47,000	N	>75
11284400	Big Creek above Whites Gulch near Groveland, CA	16.4	1965, 1970–98	1986	7.03	2,620	1/2/97	6.94	2,500	N	10–20
11289650	Tuolumne River below Lagrange Dam near Lagrange, CA	1,538	1971–98	1997	28.43	58,900	1/3/97	28.43	58,900	Y	>50
11290000	Tuolumne River at Modesto, CA	1,884	1895, 1940, 1943–98	1951 1997	69.19 71.21	57,000 55,800	1/4/97	71.21	55,800	Y	>50
11292000	Middle Fork Stanislaus River at Kennedy Meadows near Dardanelle, CA	47.5	1939–45, 1947–98	1996	8.37	3,310	1/2/97	8.37 7.99	3,310 2,890	Y Y	>50 >50
11292700	Middle Fork Stanislaus River at Hells Half Acre Bridge, CA	287	1956–98	1997	18.02	24,600		18.02	24,600	Y	50–75
11292900	Middle Fork Stanislaus River below Beardsley Dam, CA	316	1957–98	1997	19.31	28,200	5/16/96 1/2/97	14.64 19.31	15,000 28,200	Y Y	25–50 >75

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			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11293600	North Fork Stanislaus River below Diversion Dam near Big Meadows, CA	28.8	1988–98	1996	7.92	3,220	5/16/96	7.92	3,220	Y	5–10
11294500	North Fork Stanislaus River near Avery, CA	163	1915–22, 1929–98	1963	15.00	36,000	1/2/97	14.94	35,600	Y	25–50
11296500	South Fork Stanislaus River at Strawberry, CA	44.8	1912–16, 1939–98	1997	12.34	7,820	5/16/96 1/2/97	8.82 12.34	3,510 7,820	Y Y	25–50 >75
11298000	South Fork Stanislaus River near Long Barn, CA	66.9	1938–88, 1992–98	1997	13.03	12,900	5/16/96 1/2/97	8.93 13.03	4,410 12,900	Y Y	15–25 >75
11303500	San Joaquin River near Vernalis, CA	13,536	1924, 1930–98	1951 1997	-- 34.88	79,000 75,600	1/5/97	34.88	75,600	Y	>50
11314500	North Fork Mokelumne River below Salt Springs Dam, CA	170	1927–33, 1935–98	1996	17.66	17,000	5/16/96 1/3/97	17.66 13.04	17,000 7,910	Y Y	>75 20–25
11316600	North Fork Mokelumne River above Tiger Creek, CA	333	1987–98	1997	12.49	38,500	1/2/97	12.49	38,500	Y	25–50
11316800	Forest Creek near Wilseyville, CA	20.8	1961–98	1986	8.12	2,020	1/2/97	7.59	1,930	N	30–40
11317000	Middle Fork Mokelumne River at West Point, CA	68.4	1912–98	1997 1914	9.28 10.00	5,040 2,550	1/2/97	9.28	5,040	N	30–40
11318500	South Fork Mokelumne River near West Point, CA	75.1	1934–98	1997 1956	12.72 14.80	7,610 6,920	1/2/97	12.72	7,610	N	30–40
11319500	Mokelumne River near Mokelumne Hill, CA	544	1901, 1903–04, 1928–98	1997	25.60	41,300	1/2/97	25.60	41,300	Y	>100
11333000	Camp Creek near Somerset, CA	62.6	1955–98	1997	20.30	22,400	1/2/97	20.30	22,400	Y	>75

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11333500	North Fork Cosumnes River near El Dorado, CA	205	1912–41, 1949–87, 1997	1997	21.40	42,000	1/2/97	21.40	42,000	Y	>100
11335000	Cosumnes River at Michigan Bar, CA	536	1907–98	1997	18.54	93,000	1/2/97	18.54	93,000	N	>100
11342000	Sacramento River at Delta, CA	425	1945–98	1974	27.20	69,800	1/9/95 1/1/97	20.16 25.21	43,100 62,300	N N	15–25 50–75
11345500	South Fork Pit River near Likely, CA	247	1932–98	1971	6.05	1,620	6/12/98	5.22	1,050	N	15–25
11348500	Pit River near Canby, CA	1,431	1904, 1929–98	1904	15.00	13,000	1/2/97	11.82	7,280	N	10–20
11355500	Hat Creek near Hat Creek, CA	162	1926–94, 1997	1938	7.75	3,320	1/3/97	7.41	1,460	N	20–25
11363000	Pit River at Big Bend, CA	4,710	1911–98	1970 1986	18.17 18.70	49,000 43,800	1/4/97	18.36	41,200	N	25–30
11367500	McCloud River near McCloud, CA	358	1932–98	1997	11.22	15,400	1/1/97	11.22	15,400	N	50–75
11367800	McCloud River at Ah-Di-Na near McCloud, CA	427	1956, 1965–98	1997	14.77	31,700	1/1/97	14.77	31,700	N	50–75
11368000	McCloud River above Shasta Lake, CA	604	1946–98	1997	29.00	51,300	1/1/97	29.00	51,300	N	50–75
11370500	Sacramento River at Keswick, CA	6,468	1939–98	1940 1997	-- 32.71	186,000 79,200	1/4/97	32.71	79,200	Y	20–25
11371000	Clear Creek at French Gulch, CA	115	1951–93, 1997	1974	14.99	14,600	1/2/97	14.67	11,500	N	40–50
11372000	Clear Creek near Igo, CA	228	1941–98	1956	13.75	24,500	1/1/97	12.11	15,900	Y	40–50

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11376550	Battle Creek below Coleman Fish Hatchery near Cottonwood, CA	357	1962–96, 1998	1970	14.75	24,300	4/29/95	13.49	20,600	N	20–30
11381500	Mill Creek near Los Molinos, CA	131	1929–98	1938	23.40	36,400	1/1/97	17.10	20,600	N	40–50
11383500	Deer Creek near Vina, CA	208	1912–15, 1921–98	1997 1938	15.56 19.20	24,000 23,800	1/1/97	15.56	24,000	N	35–40
11384000	Big Chico Creek near Chico, CA	72.4	1931–86, 1997	1997	15.67	13,100	1/1/97	15.67	13,100	N	>100
11389500	Sacramento River at Colusa, CA	12,090	1941–98	1983 1942	68.50 69.20	51,800 49,000	2/5/98	68.02	50,300	Y	20–25
11390000	Butte Creek near Chico, CA	147	1931–98	1997	15.06	35,600	1/1/97	15.06	35,600	N	50–75
11390500	Sacramento River below Wilkins Slough near Grimes, CA	12,920	1939–98	1986 1940	52.50 52.75	32,700 27,000	1/4/97	52.68	31,600	Y	20–25
11395030	South Fork Feather River below Little Grass Valley Dam, CA	25.9	1928–33, 1961–98	1997	14.80	7,370	1/1/97	14.80	7,370	Y	75–100
11395200	South Fork Feather River below diversion dam near Strawberry Valley, CA	37.7	1961–98	1997 1986	-- 14.92	11,300 8,870	1/1/97	--	11,300	Y	75–100
11396000	Lost Creek near Clipper Mills, CA	30.0	1928–41, 1949–98	1997	13.50	5,760	1/1/97	13.50	5,760	Y	>100
11396200	South Fork Feather River below Forbestown Dam, CA	87.5	1963–98	1997	17.64	21,800	1/1/97	17.64	21,800	Y	>75
11400500	Butt Creek below Almanor-Butt Creek Tunnel near Prattville, CA	69.3	1937–59, 1965–98	1997	6.22	4,080	1/1/97	6.22	4,080	N	50–75
11401112	North Fork Feather River below Beldon Dam, CA	612	1970–98	1997	9.17	3,460	1/1/97	9.17	3,460	Y	20–30

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11401500	Indian Creek near Crescent Mills, CA	739	1906–08, 1912–17, 1931–93, 1997	1997	21.60	40,000	1/1/97	21.60	40,000	N	50–75
11402000	Spanish Creek above Blackhawk Creek at Keddie, CA	184	1934–98	1997	15.68	22,100	1/2/97	15.68	22,100	N	>100
11403000	East Branch of North Fork Feather River near Rich Bar, CA	1,025	1951–61, 1965–82, 1997	1997 1965	-- 16.56	88,800 48,300	1/2/97	--	88,800	N	>100
11403200	North Fork Feather River below Rock Creek Diversion Dam, CA	1,773	1986–98	1997	31.85	91,600	1/2/97	31.85	91,600	Y	50–75
11404300	Grizzly Creek below diversion dam, CA	14.4	1986–98	1997 1986	7.33 9.54	6,300 5,870	1/1/97	7.33	6,300	Y	>100
11404330	North Fork Feather River below Grizzly Creek, CA	1,914	1986–98	1997	29.97	115,000	1/1/97	29.97	115,000	Y	>100
11404500	North Fork Feather River at Pulga, CA	1,953	1912–98	1997	41.65	105,400	1/1/97	41.65	105,400	Y	75–100
11406920	Thermalito Afterbay Release to Feather River, CA	--	1986–89, 1991–98	1997	11.45	21,600	1/2/97	11.45	21,600	Y	--
11407150	Feather River near Gridley, CA	3,676	1956, 1965–98	1997 1965	100.42 100.43	163,000 151,000	1/2/97	100.42	163,000	Y	25–50
11407500	South Honcut Creek near Bangor, CA	30.6	1951–86, 1997	1965	19.25	17,600	1/1/97	15.40	12,500	N	75–100
11408550	Middle Yuba River below Milton Dam, CA	39.9	1926–34, 1936–53, 1955–64, 1988–98	1963 1997	5.25 17.10	10,200 8,610	1/2/97	17.10	8,610	Y	25–50

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			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11408880	Middle Yuba River below Our House Dam, CA	145	1969–98	1997	30.70	27,500	1/2/97	30.70	27,500	Y	25–50
11409300	Oregon Creek at Camptonville, CA	23.0	1968–98	1997 1986	11.31 11.56	5,170 4,550	1/1/97	11.31	5,170	N	25–50
11413000	North Yuba River below Goodyear Bar, CA	250	1931–98	1997	25.65	45,500	1/2/97	25.65	45,500	N	50–75
11413300	Slate Creek below diversion dam near Strawberry, CA	49.4	1961–98	1997	17.20	17,300	1/1/97	17.20	17,300	Y	50–75
11414100	Fordyce Creek below Fordyce Dam near Cisco, CA	31.7	1967–98	1974	7.90	4,660	5/16/96	7.86	4,590	Y	25–50
11414250	South Yuba River at Langs Crossing near Emigrant Gap, CA	120	1966–98	1997	23.60	34,200	5/16/96 1/1/97	20.99 23.60	24,000 34,200	Y Y	10–15 20–30
11416500	Canyon Creek below Bowman Lake, CA	28.3	1927–98	1997	13.01	5,500	5/18/96 1/2/97	8.51 13.01	3,150 5,500	Y Y	15–25 50–75
11417500	South Yuba River at Jones Bar near Grass Valley, CA	308	1941–48, 1956, 1960–98	1965 1956	25.00 28.70	53,600 --	1/1/97	24.25	49,700	Y	50–100
11421000	Yuba River near Marysville, CA	1,339	1943–44, 1946–98	1965 1997	90.15 91.64	180,000 151,000	1/2/97	91.64	151,000	Y	25–50
11421770	Bear River below Drum Afterbay near Blue Canyon, CA	12.3	1967–96, 1998	1982	4.64	7,530	2/5/96	3.90	3,660	Y	--
11421790	Bear River below Dutch Flat Afterbay near Dutch Flat, CA	21.5	1966–98	1986 1995	-- 5.90	4,240 2,090	1/1/97	--	4,070	Y	25–50

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11422500	Bear River below Rollins Dam near Colfax, CA	105	1912–13, 1916–17, 1950–53, 1964–94, 1996–98	1997 1986	18.01 20.62	34,300 22,500	1/2/97	18.01	34,300	Y	>100
11424000	Bear River near Wheatland, CA	292	1929–98	1986 1997	21.60 23.72	48,000 34,900	1/2/97	23.72	34,900	Y	25–50
11425500	Sacramento River at Verona, CA	21,251	1930–98	1997 1986	42.09 42.11	94,000 92,900	3/13/95 1/2/97	37.95 42.09	81,000 94,000	Y Y	15–25 25–50
11427000	North Fork American River at North Fork Dam, CA	342	1942–98	1965	11.87	65,400	1/1/97	11.82	64,800	N	25–50
11427500	Middle Fork American River at French Meadows, CA	47.9	1952–98	1963	14.20	21,500	5/16/96 1/2/97	11.61 11.17	6,050 4,140	Y Y	25–50 15–25
11427700	Duncan Creek near French Meadows, CA	9.94	1961–98	1965 1997	10.60 10.59	3,650 3,630	1/1/97	10.59	3,630	N	20–30
11427750	Duncan Creek below diversion dam near French Meadows, CA	10.5	1965–98	1965 1997	8.74	3,640	1/1/97	8.59 8.59	3,360 3,360	Y	15–25
11427760	Middle Fork American River above Middle Fork Power Plant near Foresthill, CA	87.8	1966–98	1997	14.60	13,900	1/2/97	14.60	13,900	Y	50–75
11428800	Rubicon River below Hell Hole Dam, CA	114	1967–98	1997	--	28,800	5/16/96 1/2/97	-- --	12,300 28,000	Y Y	10–20 20–30
11430000	South Fork Rubicon River below Gerle Creek near Georgetown, CA	47.6	1911–14, 1962–98	1997	12.65	12,600	1/1/97	12.65	12,600	Y	75–100
11431800	Pilot Creek above Stumpy Meadows Reservoir, CA	11.7	1961–98	1986 1963	7.15 8.05	3,510 2,070	1/2/97	6.53	2,720	N	20–30

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 17)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
11433040	Pilot Creek below Mutton Canyon near Georgetown, CA	21.1	1962–98	1997	10.95	7,830	1/2/97	10.95	7,830	Y	75–100
11433300	Middle Fork American River near Foresthill, CA	52.4	1959–98	1965	69.00	310,000	1/2/97	29.56	123,000	Y	>100
11435100	Pyramid Creek at Twin Bridges, CA	8.76	1971–98	1997	7.22	2,920	1/2/97	7.22	2,920	Y	>100
11436000	Silver Lake outlet near Kirkwood, CA	15.2	1923–98	1997	7.79	2,170	5/17/96 1/2/97	5.52 7.79	892 2,170	Y Y	10–20 >100
11439500	South Fork American River near Kyburz, CA	193	1923–98	1997	14.26	25,000	1/2/97	14.26	25,000	Y	>100
11441500	South Fork Silver Creek near Ice House, CA	27.5	1925–98	1996	7.64	7,530	5/16/96 1/2/97	7.64 7.34	7,530 4,440	Y Y	>100 50–75
11443500	South Fork American River near Camino, CA	493	1923–98	1997	--	62,300	1/2/97	--	62,300	Y	>100
11444500	South Fork American River near Placerville, CA	598	1912–20, 1965–98	1997 1914	-- 19.00	71,000 15,000	1/2/97	--	71,000	Y	>100
11445500	South Fork American River near Lotus, CA	673	1951–95, 1997	1997	26.90	90,000	1/1/97	26.90	90,000	Y	>100
11446500	American River at Fair Oaks, CA	1,888	1862, 1905–17, 1919–98	1951 1862	31.85 38.00	180,000 --	1/2/97	26.40	117,000	Y	15–25
11447360	Arcade Creek near Del Paso Heights, CA	31.4	1964–78, 1996–98	1998	15.63	3,320	2/3/98	15.63	3,320	N	50–100
11447650	Sacramento River at Freeport, CA	--	1909, 1949–98	1986 1951	25.00 30.14	117,000 104,000	1/3/97	23.83	115,000	Y	50–100

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11448500	Adobe Creek near Kelseyville, CA	6.36	1955–78, 1997	1997	10.23	2,320	1/1/97	10.23	2,320	N	>100
11449500	Kelsey Creek near Kelseyville, CA	36.6	1947–94, 1996–98	1995	13.80	8,600	3/9/95	13.80	8,600	N	20–30
							1/1/97	13.72	8,450	N	20–30
11451000	Cache Creek near Lower Lake, CA	528	1945–98	1998	11.01	10,200	1/1/97	10.88	9,730	Y	25–50
							2/17/98	11.01	10,200	Y	50–75
11451100	North Fork Cache Creek at Hough Spring near Clearlake Oaks, CA	60.2	1fc972–98	1997	14.14	13,200	1/1/97	14.14	13,200	N	25–50
11451300	North Fork Cache Creek near Clearlake Oaks, CA	121	1986–98	1998	10.61	7,950	2/11/98	10.61	7,950	Y	20–30
				1997	10.62	6,280					
11452500	Cache Creek at Yolo, CA	1,139	1903–98	1958	85.35	41,400	3/9/95	85.37	36,400	Y	20–30
				1995	85.37	36,400					
11453000	Yolo Bypass near Woodland, CA	--	1942, 1951–97	1986	34.87	374,000	1/3/97	34.84	357,000	Y	25–50
11458000	Napa River near Napa, CA	218	1930–32, 1960–98	1986	30.20	37,100	3/9/95	30.50	32,600	Y	50–75
				1995	30.50	32,600					
11459500	Novato Creek at Novato, CA	17.6	1947–98	1982	14.52	5,000	2/3/98	13.70	3,380	Y	20–30
11460400	Lagunitas Creek at Samuel P. Taylor State Park, CA	34.3	1983–98	1998	10.00	5,830	2/3/98	10.00	5,830	Y	50–75
11460750	Walker Creek near Marshall, CA	31.1	1982, 1984–98	1982	15.90	14,600	2/2/98	14.21	10,500	Y	15–25
11463170	Big Sulphur Creek at Geysers Resort near Cloverdale, CA	13.1	1981–98	1997	9.78	8,010	1/1/97	9.78	8,010	N	>100
11464000	Russian River near Healdsburg, CA	793	1938, 1940–98	1995	26.23	73,000	1/9/95	26.23	73,000	Y	25–50
				1938	30.80	--					

Table 6. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in California.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 17)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
11465000	Dry Creek below Warm Springs Dam near Geyserville, CA	131	1940–42, 1982–98	1940 1998	-- 10.38	22,500 5,590	2/11/98	10.38	5,590	Y	10–20
11465200	Dry Creek near Geyserville, CA	162	1960–98	1963	17.50	32,400	1/8/95	15.48	7,600	Y	5–10
11472200	Outlet Creek near Longvale, CA	161	1957–94, 1997	1965	30.60	77,900	1/1/97	23.20	36,700	N	25–50
11473900	Middle Fork Eel River near Dos Rios, CA	745	1966–98	1997 1966	31.46 32.86	135,000 70,200	1/1/97	31.46	135,000	N	20–30
11475560	Elder Creek near Branscomb, CA	6.50	1965, 1968–98	1965	11.41	3,660	12/30/96	9.88	2,480	N	20–30
11476600	Bull Creek near Weott, CA	28.1	1961–98	1997 1965	12.84 20.61	7,830 6,520	12/31/96	12.84	7,830	N	25–35
11477000	Eel River at Scotia, CA	3,113	1911–15, 1917–98	1965	72.00	752,000	1/9/95	51.30	368,000	N	10–20
11478500	Van Duzen River near Bridgeville, CA	222	1940–98	1965	22.60	48,700	1/9/95	19.72	43,700	N	20–40
11481000	Mad River near Arcata, CA	485	1911–13, 1951–98	1965	30.71	81,000	12/30/95	24.17	54,700	Y	5–15
11516530	Klamath River below Iron Gate Dam, CA	4,630	1961–98	1965	13.63	29,400	1/1/97	13.08	20,500	Y	15–25
11517500	Shasta River near Yreka, CA	793	1934–42, 1945–98	1965 1938	12.92 19.40	21,500 1,930	1/1/97	12.27	10,900	N	75–100
11520500	Klamath River near Seiad Valley, CA	6,940	1913–25, 1927, 1952–98	1965	33.75	165,000	1/1/97	28.72	117,000	N	20–30
11522500	Salmon River at Somes Bar, CA	751	1912, 1914–15, 1927–29, 1931–98	1965	43.41	133,000	1/1/97	28.46	70,800	N	40–60
11523000	Klamath River at Orleans, CA	8,475	1927–29, 1931–98	1965	76.50	307,000	1/1/97	37.79	258,000	N	25–50

[1]Regulated during flood: N, no; Y, yes.

Colorado

Widespread frontal weather systems crossing Colorado repeatedly produced snow and rain in April and May 1995. Although some streams experienced flooding as a result of rain, the majority of flooding resulted from additions to the mountain snowpack and cool temperatures that delayed the snowmelt runoff until June. When normal summer temperatures occurred, the rapid snowmelt caused widespread flooding with many streamgages recording the peak of record (table 7).

Severe storms brought flooding rain, damaging winds, and large hail the evening of July 9, 1996. From 2 to 4.5 inches of rain fell in a short period of time on the east side of Pueblo (fig. 18), causing widespread flooding of low spots and roof collapses of three businesses (National Oceanic and Atmospheric Administration, 1996a).

Forest fires in Colorado can compound the hazards of flooding. On May 18, 1996, an intense forest fire burned several hundred acres of the Buffalo Creek watershed near the town of Buffalo Creek. On July 12, as much as 4.3 inches of rain fell over the burned area, resulting in a flood that killed two people and caused millions of dollars in damage due to flooding and the removal of massive amounts of sediment eroded from the burned area (National Oceanic and Atmospheric Administration, 1996b).

During the second week of June 1997 intense thunderstorms over the Rocky Mountains and eastward cause widespread flooding in the South Platte, Arkansas, and Colorado River Basins. Several streamgages recorded peaks of record as rainfall and snowmelt combined for record discharges (table 7).

More than 8 inches of rainfall were measured in southwestern Fort Collins during the evening hours of July 28, 1997 (National Oceanic and Atmospheric Administration, 1997a), as a series of storms developed, dumping excessive rain over the same area. A flash flood in Fort Collins killed 5 people and injured 40 others when a 10- to 15-foot wall of water surged through two mobile home parks. The wall of water destroyed 108 homes and damaged 481 others, 86 severely. Four women were killed while attempting to evacuate their homes and flee the floodwaters. Another died when she tried to go back into the park to rescue her pets. Floodwaters caused extensive damage at the Colorado State University campus in Fort Collins. Total estimated damage throughout the Fort Collins area was approximately $190 million (National Oceanic and Atmospheric Administration, 1997b).

Estimated rainfall of 5 to 6 inches was reported north of Weldona during the evening hours of July 29, 1997. The resulting flooding reached a maximum between 10:00 p.m. and 12:00 a.m. when the Weldona Valley Ditch flowed out of its banks. The ensuing floodwaters, as much as 4 feet deep, inundated the entire town of Weldona. Approximately 50 families had to be evacuated, many from their rooftops. Although no dollar estimate was available, 48 homes and at least 30 vehicles were damaged. Several homes had to be condemned. In addition, $2 million in damage was reported to roads, businesses, and public buildings (National Oceanic and Atmospheric Administration, 1997b).

Thunderstorms drenched the Pawnee National Grasslands, north of Stoneham, with 6 to 8 inches of rainfall July 30, 1997 (National Oceanic and Atmospheric Administration, 1997a). Runoff from the storms eventually turned Pawnee Creek into a huge river. The wall of water, 12 feet high and 200 feet wide, made its way downstream flooding the towns of Atwood and Sterling. At least 13,700 acres of cropland were damaged. Damage estimates of at least $12.9 million were reported to property (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1996a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1996b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

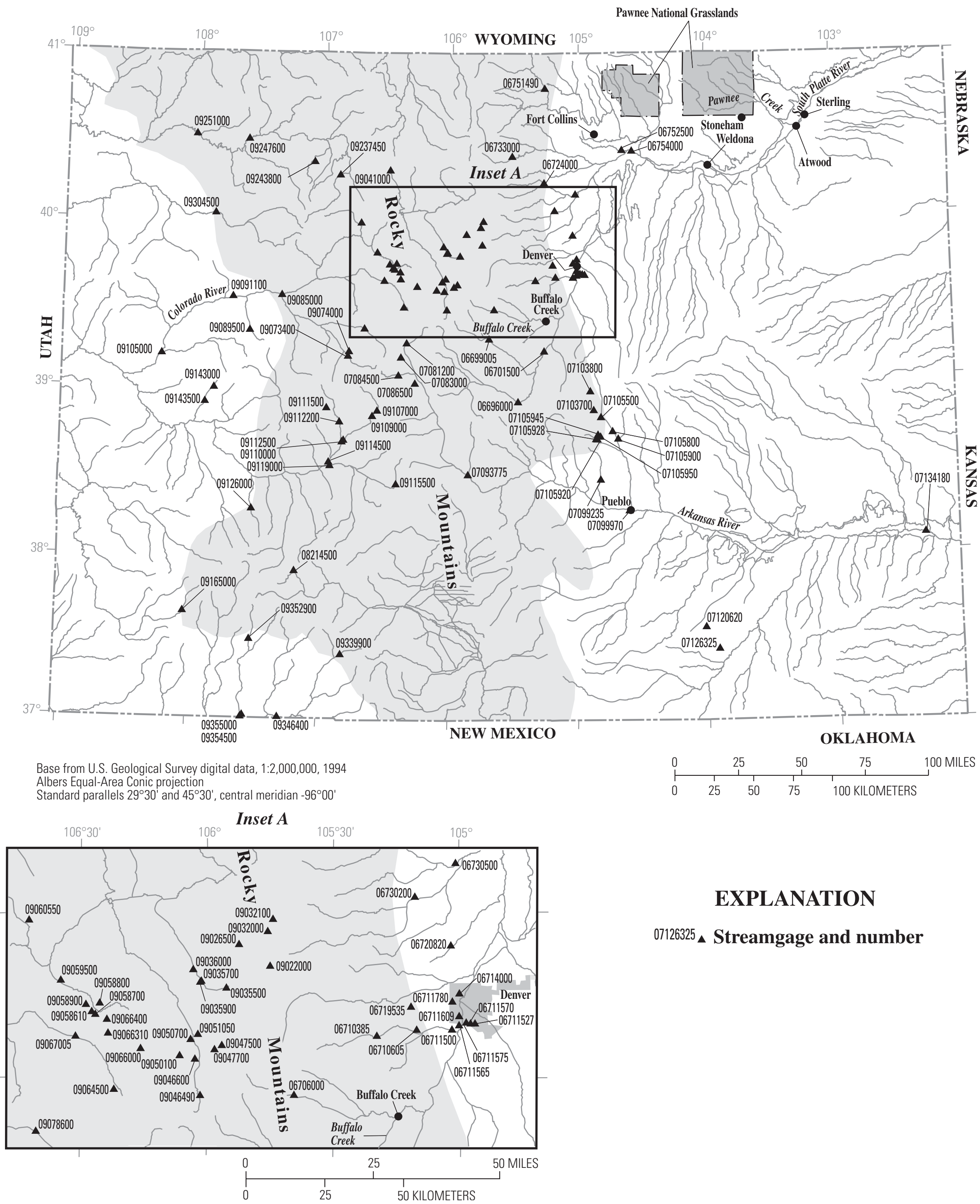

Figure 18. Location of streamgages with significant floods during 1994–98 water years for Colorado.

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06696000	South Platte River near Lake George, CO	963	1930–89, 1992–98	1970	8.34	3,000	7/4/95	5.37	997	Y	--
06699005	Tarryall Creek below Rock Creek near Jefferson, CO	230	1983–89, 1991–92, 1994–97	1995 1987	6.18 7.00	850 654	6/30/95	6.18	850	N	25
06701500	South Platte River below Cheesman Lake, CO	1,752	1926–98	1970	13.40	4,640	7/2/95	8.60	2,310	Y	--
06706000	North Fork South Platte River below Geneva Creek at Grant, CO	127	1909–13, 1943–89, 1991–98	1995 1950	2.48 4.52	1,160 464	6/18/95	2.48	1,160	Y	5
06710385	Bear Creek above Evergreen, CO	104	1984–98	1995 1987	5.39 4.02	573 312	6/18/95	5.39	573	N	25
06710605	Bear Creek above Bear Creek Lake near Morrison, CO	176	1986–98	1995	6.45	841	6/9/95	6.45	841	N	5–10
06711500	Bear Creek at mouth at Sheridan, CO	260	1927–89, 1991–98	1969	9.50	8,150	6/4/95	7.50	3,550	Y	--
06711565	South Platte River at Englewood, CO	3,387	1983–88, 1990–98	1995	7.21	9,710	6/4/95	7.21	9,710	Y	--
06711570	Harvard Gulch at Colorado Boulevard at Denver, CO	--	1981–89, 1991, 1993–98	1996 1988	13.34 14.02	673 597	7/12/96	13.34	673	N	25
06711572	Harvard Gulch below University Boulevard at Denver, CO	--	1981–88, 1993–98	1996	14.55	981	7/12/96	14.55	981	N	10–15
06711575	Harvard Gulch at Harvard Park at Denver, CO	--	1981–91, 1993–98	1996	16.25	1,100	7/12/96	16.25	1,100	N	25

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
06711609	Sanderson Gulch at Navajo Street at Denver, CO	--	1987–91, 1993–98	1998	13.05	1,230	7/25/98	13.05	1,230	N	25–50
06711780	Lakewood Gulch at Denver, CO	--	1981–91, 1997–96, 1998	1998 1984	14.80 17.24	1,180 930	8/19/98	14.80	1,180	N	25
06714000	South Platte River at Denver, CO	3,861	1895–1901, 1903–06, 1909–98	1965	15.00	40,300	7/25/98	10.90	12,600	Y	--
06719535	Lena Gulch at upper site at Golden, CO	--	1986–91, 1993–98	1997 1991	10.93 11.86	396 373	7/27/97	10.93	396	N	10
06720820	Big Dry Creek at Westminster, CO	43.8	1987–92, 1994–95, 1997–98	1997	6.08	378	8/4/97	6.08	378	Y	--
06724000	St. Vrain Creek at Lyons, CO	212	1888–91, 1895–1998	1941 1995	-- 7.85	10,500 4,200	5/29/95	7.85	4,200	N	50
06730200	Boulder Creek at North 75th Street near Boulder, CO	304	1987–98	1995	7.85	1,950	5/17/95	7.85	1,950	Y	--
06730500	Boulder Creek at mouth near Longmont, CO	439	1927–49, 1951–55, 1979–90, 1992–93, 1995–98	1938	6.94	4,410	5/17/95	5.29	2,300	N	10–25
06733000	Big Thompson River at Estes Park, CO	137	1947–98	1982 1965	-- 6.89	5,500 1,640	6/18/95	6.80	1,870	N	25–50
06751490	North Fork Cache La Poudre River at Livermore, CO	539	1987–90, 1992–98	1995	13.17	2,170	5/30/95	13.17	2,170	N	10–25

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06752500	Cache La Poudre River near Greeley, CO	1,877	1903, 1916–17, 1919, 1924–98	1983	8.92	6,360	6/19/95	8.30	4,050	Y	--
06754000	South Platte River near Kersey, CO	9,598	1902–03, 1905–12, 1914–98	1973	11.73	31,500	5/31/95	11.00	22,900	Y	--
07081200	Arkansas River near Leadville, CO	98.8	1968–83, 1990–98	1997 1978	4.38 4.47	1,360 894	6/9/97	4.38	1,360	Y	--
07083000	Halfmoon Creek near Malta, CO	23.6	1947–98	1984 1979	3.77 7.76	615 274	7/11/95	3.82	546	N	50
07084500	Lake Creek above Twin Lakes Reservoir, CO	75.0	1946–52, 1954–58, 1960–62, 1964–98	1978 1990	5.08 5.77	3,270 1,940	6/18/95	5.06	2,900	Y	--
07086500	Clear Creek above Clear Creek Reservoir, CO	67.1	1946–52, 1954–95	1995	5.29	1,300	7/12/95	5.29	1,300	N	50
07093775	Badger Creek at lower station near Howard, CO	211	1981–98	1996 1984	.73 8.05	2,990 2,470	7/8/96	.73	2,990	N	10–20
07099235	Turkey Creek near Stone City, CO	71.5	1979–83, 1987–88, 1990, 1992–95, 1997–96, 1998	1995	6.29	83	5/30/95	6.29	83	Y	--
07099970	Arkansas River at Moffat Street at Pueblo, CO	4,778	1989–98	1994	14.18	10,400	6/3/94	14.18	10,400	N	50

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
07103700	Fountain Creek near Colorado Springs, CO	103	1958–98	1964	5.27	2,630	10/3/94	5.14	1,760	N	10–25
07103800	West Monument Creek at Air Force Academy, CO	14.9	1970–98	1997	3.24	169	6/10/97	3.24	169	Y	--
07105500	Fountain Creek at Colorado Springs, CO	392	1976–98	1994	12.12	10,100	9/2/94	12.12	10,100	N	50
07105800	Fountain Creek at Security, CO	495	1965, 1967–98	1965	11.30	25,000	6/14/97	10.08	10,600	N	10
07105900	Jimmy Camp Creek at Fountain, CO	65.6	1976–98	1994	9.51	4,810	6/3/94	9.51	4,810	N	10–25
07105920	Little Fountain Creek above Keaton Reservoir near Fort Carson, CO	11.0	1979–85, 1987–88, 1996–98	1997	4.19	914	6/9/97	4.19	914	N	25–50
07105928	Little Fountain Creek near Fort Carson, CO	11.8	1979–89, 1996–98	1997	7.29	914	6/10/97	7.29	914	Y	--
07105945	Rock Creek above Fort Carson Reservation, CO	6.79	1979–98	1997	9.71	770	6/10/97	9.71	770	N	25
07105950	Rock Creek near Fort Carson, CO	7.79	1979–88, 1990–98	1997	7.28	770	6/10/97	7.28	770	N	25–50
07120620	Big Arroyo near Thatcher, CO	--	1983–92, 1995–98	1997	5.78	1,780	8/11/97	5.78	1,780	N	10
07126325	Taylor Arroyo below Rock Crossing near Thatcher, CO	48.4	1983–89, 1991–92, 1994–98	1998	13.71	9,090	9/30/98	13.71	9,090	N	50–100
07134180	Arkansas River near Granada, CO	23,707	1982–98	1998 1996	11.69 12.38	3,590 3,190	8/1/98	11.69	3,590	Y	--

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08214500	North Clear Creek below Continental Reservoir, CO	51.7	1929–81, 1983–86, 1988–91, 1993–98	1997 1952	3.43 3.66	514 362	6/18/95 5/15/97	2.81 3.43	380 514	Y Y	-- --
09022000	Fraser River at upper station near Winter Park, CO	10.5	1969–73, 1985–86, 1988–90, 1992–98	1997 1972	2.08 2.15	291 181	6/8/97	2.08	291	N	>100
09026500	St. Louis Creek near Fraser, CO	32.9	1935–98	1995 1952	2.80 2.89	558 470	6/17/95 6/21/96	2.80 2.72	558 499	Y Y	-- --
09032000	Ranch Creek near Fraser, CO	19.9	1935–89, 1991–98	1997	6.71	548	6/4/97	6.71	548	Y	--
09032100	Cabin Creek near Fraser, CO	4.87	1984–98	1997 1995	2.38 2.39	162 113	6/8/97	2.38	162	Y	--
09035500	Williams Fork below Steelman Creek, CO	16.3	1934–41, 1966–98	1995 1983	5.64 5.80	516 403	7/11/95	5.64	516	Y	--
09035700	Williams Fork above Darling Creek near Leal, CO	35.0	1966–98	1995 1998	6.94 7.18	751 297	6/17/95	6.94	751	Y	--
09035900	South Fork of Williams Fork near Leal, CO	27.3	1966–98	1995	4.17	574	6/17/95	4.17	574	N	50–100
09036000	Williams Fork near Leal, CO	89.5	1934–98	1952 1971	4.23 4.96	1,720 1,300	6/17/95	4.29	1,510	N	25
09041000	Muddy Creek near Kremmling, CO	87.4	1938–43, 1956–71, 1994–98	1996	8.54	1,120	5/18/96	8.54	1,120	N	50–100
09046490	Blue River at Blue River, CO	42.4	1984–98	1995	3.23	681	6/18/95	3.23	681	Y	--

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09046600	Blue River near Dillon, CO	121	1958–98	1995	6.91	1,390	6/18/95	6.91	1,390	Y	--
09047500	Snake River near Montezuma, CO	57.7	1943–46, 1952–98	1952 1972	3.51 3.88	1,250 730	6/21/95	3.71	1,110	N	50
09047700	Keystone Gulch near Dillon, CO	9.10	1958–98	1995	3.47	311	6/17/95 5/25/96	3.47 3.13	311 130	N N	>100 25
09050100	Tenmile Creek below North Tenmile Creek at Frisco, CO	93.3	1958–98	1965	6.15	1,910	6/17/95	5.14	1,760	N	50
09050700	Blue River below Dillon, CO	335	1960–98	1984 1983	3.88 3.95	2,010 1,990	7/14/95	3.76	2,000	Y	--
09051050	Straight Creek below Laskey Gulch near Dillon, CO	18.3	1987–98	1995	5.78	416	6/17/95	5.78	416	N	50–100
09058610	Dickson Creek near Vail, CO	3.41	1972–98	1997	3.29	52	6/1/97	3.29	52	N	25
09058700	Freeman Creek near Minturn, CO	2.94	1965–98	1984 1976	2.21 2.60	82 35	6/3/95	2.30	58	N	25
09058800	East Meadow Creek near Minturn, CO	3.61	1965–82, 1984–93, 1995–98	1995 1975	1.86 2.13	107 74	6/17/95	1.86	107	N	>100
09058900	Moniger Creek near Minturn, CO	.76	1966–74, 1977–85, 1987–90, 1995–76, 1986, 1991–94, 1997–98	1989 1993	2.05 2.56	29 --	--/--/94	1.90	19	N	10
09059500	Piney River near State Bridge, CO	86.2	1945–83, 1986–98	1983	5.82	1,220	6/1/97	5.63	1,190	N	50

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09060550	Rock Creek at Crater, CO	72.6	1985–98	1996	4.67	746	5/18/96	4.67	746	N	25–50
09064500	Homestake Creek near Red Cliff, CO	58.2	1911–14, 1916–18, 1944–96, 1998–97	1918	6.20	1,300	6/17/95	3.82	843	Y	--
09066000	Black Gore Creek near Minturn, CO	12.6	1948–56, 1964–86, 1988–98	1995 1952	5.06 5.42	370 365	6/17/95	5.06	370	N	25–50
09066310	Gore Creek lower station at Vail, CO	77.1	1989–98	1997	11.50	1,840	6/4/97	11.50	1,840	N	10–25
09066400	Red Sandstone Creek near Minturn, CO	7.32	1964–98	1995 1983	4.58 4.66	223 215	6/17/95	4.58	223	N	25
09067005	Eagle River at Avon, CO	395	1989–98	1997 1993	4.03 5.14	3,930 3,860	6/6/97	4.03	3,930	N	10
09073400	Roaring Fork River near Aspen, CO	108	1965–98	1995	5.97	2,230	7/11/95	5.97	2,230	Y	--
09074000	Hunter Creek near Aspen, CO	41.1	1950–56, 1970–87, 1989–98	1985 1953	2.33 7.02	1,170 1,010	6/17/95	3.29	1,080	N	25
09078600	Fryingpan River near Thomasville, CO	134	1976–95	1995	4.58	1,570	6/18/95	4.58	1,570	Y	--
09085000	Roaring Fork River at Glenwood Springs, CO	1,451	1906–09, 1912, 1914–81, 1983–98	1957 1921	8.64 8.70	19,000 17,600	7/13/95	8.31	13,000	Y	--
09089500	West Divide Creek near Raven, CO	64.6	1956–98	1984	5.83	1,410	5/15/95	4.62	912	N	10–25

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09091100	Mamm Creek near Silt, CO	--	1980–91, 1993, 1995	1995	13.47	595	5/29/95	13.47	595	N	25–50
09105000	Plateau Creek near Cameo, CO	592	1936–83, 1986–98	1983 1995	8.51 8.73	5,010 4,900	6/16/95	8.73	4,900	N	25–50
09107000	Taylor River at Taylor Park, CO	128	1930–34, 1988–98	1995	4.08	1,400	6/18/95	4.08	1,400	N	25–50
09109000	Taylor River below Taylor Park Reservoir, CO	254	1939–98	1957	7.56	2,270	7/14/95	7.22	1,910	Y	--
09110000	Taylor River at Almont, CO	477	1913, 1916, 1918–87, 1989–98	1920 1957	5.00 5.32	3,760 3,590	7/15/95	4.92	2,530	Y	--
09111500	Slate River near Crested Butte, CO	68.9	1940–51, 1994–98	1995	5.84	1,550	6/17/95	5.84	1,550	N	50
09112200	East River below Cement Creek near Crested Butte, CO	238	1964–72, 1980–81, 1994–98	1995 1980	5.06 8.30	4,350 3,360	6/18/95	5.06	4,350	N	50–100
09112500	East River at Almont, CO	289	1913, 1916, 1918–21, 1935–98	1921 1995	6.60 8.41	6,500 4,430	6/18/95	8.41	4,430	N	10–25
09114500	Gunnison River near Gunnison, CO	1,012	1912–14, 1916–28, 1945–98	1918 1957	-- 6.74	11,400 9,320	6/18/95	5.56	7,620	N	25
09115500	Tomichi Creek at Sargents, CO	149	1917–22, 1938–72, 1993–98	1995 1917	4.03 4.05	964 662	6/18/95	4.03	964	N	50
09119000	Tomichi Creek at Gunnison, CO	1,061	1938–85, 1987–98	1984	5.49	4,620	6/18/95	5.14	2,420	N	25

Table 7. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Colorado.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 18)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09126000	Cimarron River near Cimarron, CO	66.6	1955–98	1957	8.32	1,790	6/5/97	3.91	1,620	Y	--
09143000	Surface Creek near Cedaredge, CO	27.4	1940–98	1995 1957	3.79 3.96	892 517	6/15/95	3.79	892	N	50–100
09143500	Surface Creek at Cedaredge, CO	39.0	1917–76, 1978–98	1941 1984	2.50 3.44	1,190 862	6/15/95	3.06	764	N	10–25
09165000	Dolores River below Rico, CO	105	1952–96	1984 1952	5.95 6.15	2,170 2,120	6/17/95	5.87	2,140	N	10–25
09237450	Yampa River above Stagecoach Reservoir, CO	257	1989–98	1998	5.96	765	3/26/98	5.96	765	N	10–25
09243800	Foidel Creek near Oak Creek, CO	8.61	1976–80, 1983, 1985–98	1996	4.47	65	5/5/96	4.47	65	N	10
09247600	Yampa River below Craig, CO	1,750	1985–98	1997	10.78	12,900	6/4/97	10.78	12,900	N	10
09251000	Yampa River near Maybell, CO	3,410	1904–05, 1916–98	1984	12.42	25,100	6/4/97	11.18	18,800	N	50
09304500	White River near Meeker, CO	755	1901, 1910–98	1984 1901	6.12 6.50	6,950 5,000	6/17/95	5.61	5,280	N	10–25
09339900	East Fork San Juan above Sand Creek near Pagosa Springs, CO	64.1	1957–96	1970	6.75	2,260	6/17/95	5.93	1,290	N	10
09346400	San Juan River near Carracas, CO	1,230	1962–98	1970	8.34	9,730	3/6/95	8.10	8,590	N	10–25
09352900	Vallecito Creek near Bayfield, CO	72.1	1963–92, 1994–98	1970	6.51	7,050	6/15/95	3.16	1,630	N	5
09354500	Los Pinos River at La Boca, CO	510	1951–85, 1987–98	1957	8.95	6,400	3/6/95	7.61	3,590	N	25
09355000	Spring Creek at La Boca, CO	58.0	1951–98	1970 1995	4.62 5.28	1,980 1,740	3/6/95	5.28	1,740	N	50

[1]Regulated during flood: N, no; Y, yes.

Connecticut

The excessive rainfall, snowmelt, and ice jams on January 29, 1994, combined to produce floods and flash floods along small rivers and streams throughout Connecticut. The Yantic River (fig. 19) reached a flood stage of 8 feet at Norwich (National Oceanic and Atmospheric Administration, 1994) during the early evening of January 28 and continued to rise to 13 feet in the early morning hours of January 29. The Pomperaug River rose to 4 to 6 feet over bankfull in Southbury (National Oceanic and Atmospheric Administration, 1994) causing streets to be closed and a number of people to be evacuated from their homes. Property damage was reported. An ice jam against a bridge on the Shetucket River in Baltic (National Oceanic and Atmospheric Administration, 1994) resulted in a flash flood when water levels rose 6 feet in a matter of minutes, flooding at least 75 homes and threatening others. A 2.5-mile ice jam was reported on the Shetucket River.

Excessive rain of more than 6 inches on April 16, 1996, caused flooding on the Wepawaug River in Milford, the Quinnipiac River in Southington and Wallingford, the Farm River in East Haven and North Branford, the Muddy River, and Harbor Brook in Meriden (National Oceanic and Atmospheric Administration, 1996). MacKenzie Reservoir, at the headwaters of the Muddy River, overtopped its emergency spillway. Five hundred forty-seven homes and 28 businesses suffered damage. The total uninsured flood damage was about $1.5 million (National Oceanic and Atmospheric Administration, 1996). Floods on streamgaged rivers are listed in table 8.

Reference

National Oceanic and Atmospheric Administration (NOAA), 1994–96, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

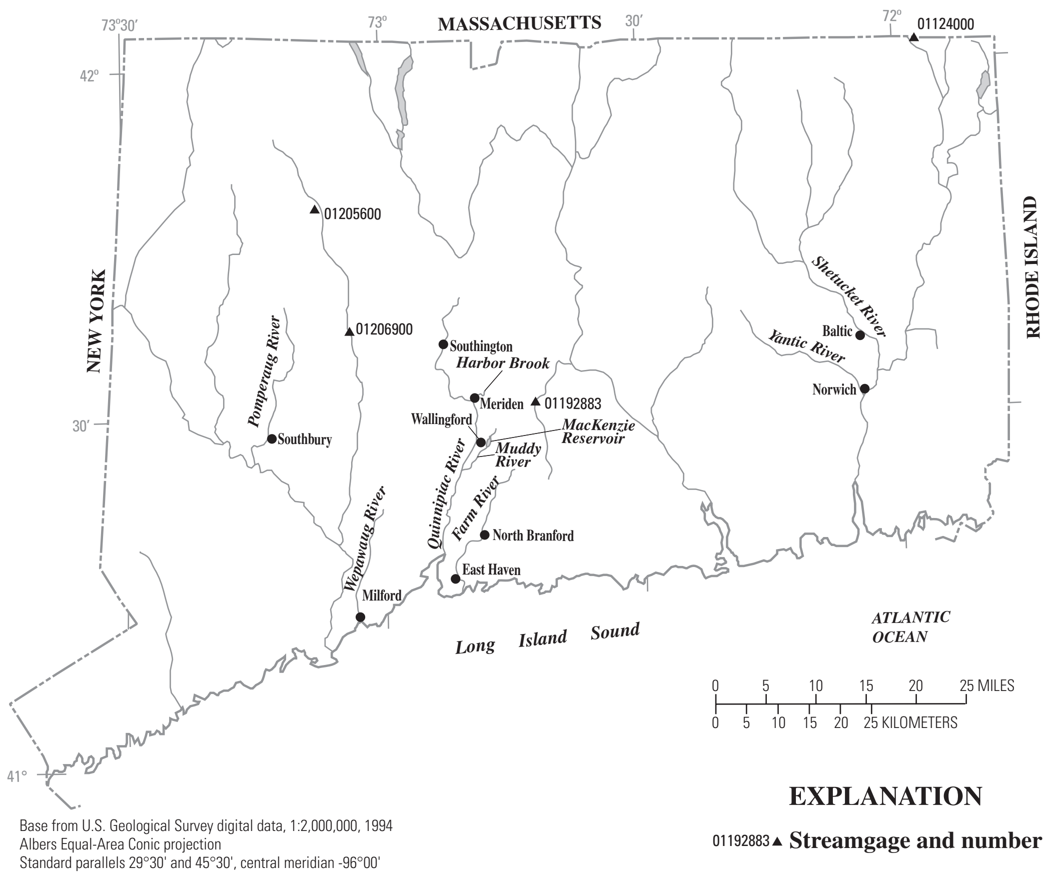

Figure 19. Location of streamgages with significant floods during 1994–98 water years for Connecticut.

Table 8. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Connecticut.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 19)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01124000	Quinebaug River at Quinebaug, CT	155	1932–98	1955	18.96	49,300	3/9/98	7.50	3,810	Y	--
01192883	Coginchaug River at Middlefield, CT	29.8	1981–98	1996	12.46	2,260	4/16/96	12.46	2,260	Y	--
01205600	West Branch Naugatuck River at Torrington, CT	33.8	1955, 1957–97	1955	16.70	16,500	1/27/96	8.60	3,000	Y	--
01206900	Naugatuck River at Thomaston, CT	99.8	1955–98	1955	27.00	53,400	1/29/94	6.62	4,380	Y	--

[1]Regulated during flood: N, no; Y, yes.

Delaware

An intensifying storm moving offshore late on March 2, 1994, became a true "nor'easter," hammering the Delaware coastline prior to high tide late in the day. For a 2-hour period late on March 2, the storm surge caused extensive beach erosion from South Bethany to Dewey Beach (fig. 20). At Dewey Beach, substantial flood damage was incurred to beachfront property after many dunes were breached by the heavy surf. Damage along the Atlantic Coast of Delaware was estimated at $500 thousand to $1 million (National Oceanic and Atmospheric Administration, 1994).

On January 19, 1996, excessive rainfall in northern Delaware caused flooding in and near the city of Wilmington. A streamgage (01480015, table 9) had a peak of record.

Reference

National Oceanic and Atmospheric Administration (NOAA), 1994, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

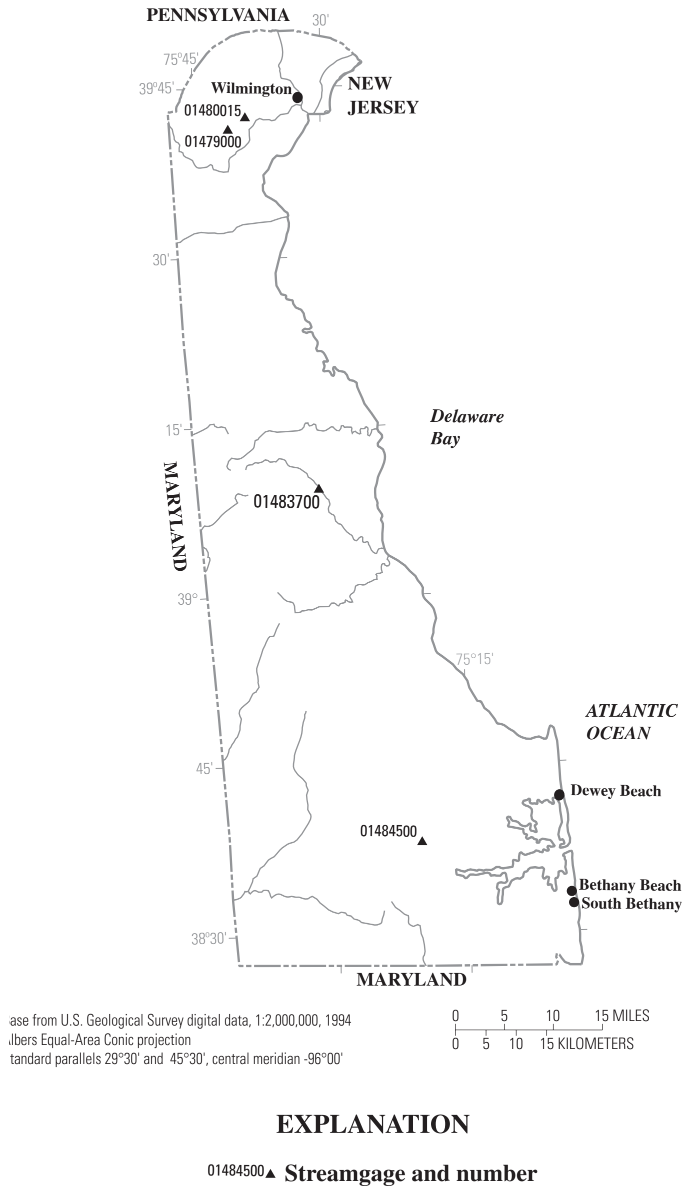

Figure 20. Location of streamgages with significant floods during 1994–98 water years for Delaware.

Table 9. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Delaware.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 20)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01479000	White Clay Creek near Newark, DE	89.1	1932–36, 1943–57, 1960–98	1989 1972	16.55 17.74	11,600 9,080	1/19/96	15.90	9,150	N	<50
01480015	Red Clay Creek near Stanton, DE	52.4	1989–98	1996	19.38	5,330	1/19/96	19.38	5,330	N	<5
01483700	Saint Jones River at Dover, DE	31.9	1958–98	1960	9.45	1,900	2/24/98	5.54	1,400	N	>2
01484500	Stockley Branch at Stockley, DE	5.24	1943–98	1994	5.52	303	3/3/94 1/28/98	5.52 5.06	303 238	N N	50 >25

[1]Regulated during flood: N, no; Y, yes.

Florida

Tropical Storm Alberto formed in the southeastern Gulf of Mexico on July 1,1994, and moved north crossing the Florida Panhandle near Destin (fig. 21) on July 3. The maximum storm tide was 5 feet, and the immediate rainfall totaled 2 to 7 inches. Tropical depression Alberto meandered around east-central Alabama and west-central Georgia for 72 hours with rainfall that locally exceeded 20 inches in southwest Georgia (National Oceanic and Atmospheric Administration, 1994a). River flooding in Georgia and Alabama spread into the Florida Panhandle on July 5 and, along with 6 to 14 inches of additional rain from the remnants of Alberto (National Oceanic and Atmospheric Administration, 1994a), caused extensive flooding. Flood crests exceeded 100-year recurrence intervals on the Apalachicola (streamgage 02359170) and Chipola (streamgage 02359000, table 10) Rivers. The first flood crest on the Apalachicola River occurred on July 10 and on the Chipola River on July 10–12. Damage to buildings, roads, water systems, and other public property was estimated at $40 million (National Oceanic and Atmospheric Administration, 1994b).

Tropical Storm Beryl formed in the northeastern Gulf of Mexico and moved slowly east-northeast, crossing the Florida Panhandle coastline near Panama City on July 15, 1994. The maximum reported storm tide of 2.9 feet and the greatest rainfall total of 10.69 inches were reported at Apalachicola (National Oceanic and Atmospheric Administration, 1994a), but somewhat higher values likely occurred to the east of this location. Beryl weakened to a tropical depression as it moved northeast into extreme southwest Georgia on July 16. There were no deaths and only one injury directly attributable to Beryl. Damage was estimated at $5.9 million (National Oceanic and Atmospheric Administration, 1994b).

In November 1994, Tropical Storm Gordon moved slowly west-northwest reaching the lower Florida Keys late on November 15. On November 16, Gordon turned northeast and accelerated, moving inland near Fort Myers in the morning and exiting into the Atlantic Ocean just north of Vero Beach in the late afternoon. After becoming a hurricane off the coast of North Carolina, then weakening to a tropical depression and moving south and west, Gordon moved ashore a second time just north of Melbourne on November 21. Two persons died when their cars plunged into canals near Miami. Gordon's total damage was estimated at about $400 million (National Oceanic and Atmospheric Administration, 1994b).

Moderate to extensive flooding occurred near Fort Myers from Tropical Storm Jerry's outer rain band on August 24 and 25, 1995. Citrus crop losses of $15 million resulted from Jerry's excessive rainfall. Approximately $4 million worth of property damage occurred (National Oceanic and Atmospheric Administration, 1995b).

Thirty-hour rainfall totals of 8 to 14 inches on September 26–27, 1997 (National Oceanic and Atmospheric Administration, 1997a), near Tampa caused flooding of roads, highways, homes, commercial buildings, and low-lying areas. Damage from the flooding totaled $5.3 million (National Oceanic and Atmospheric Administration, 1997b). In St. Petersburg, a 13-year-old died after being swept into a storm drain while playing in floodwaters. A 36-year old man drowned when his truck hydroplaned, flipped over, and slid into a flooded drainage canal east of Arcadia.

Excessive rainfall from a frontal systems caused serious flooding in central and northern Florida including the Panhandle region in February and March 1998. Almost $400 million in damage resulted from the floods and severe storms throughout the State (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

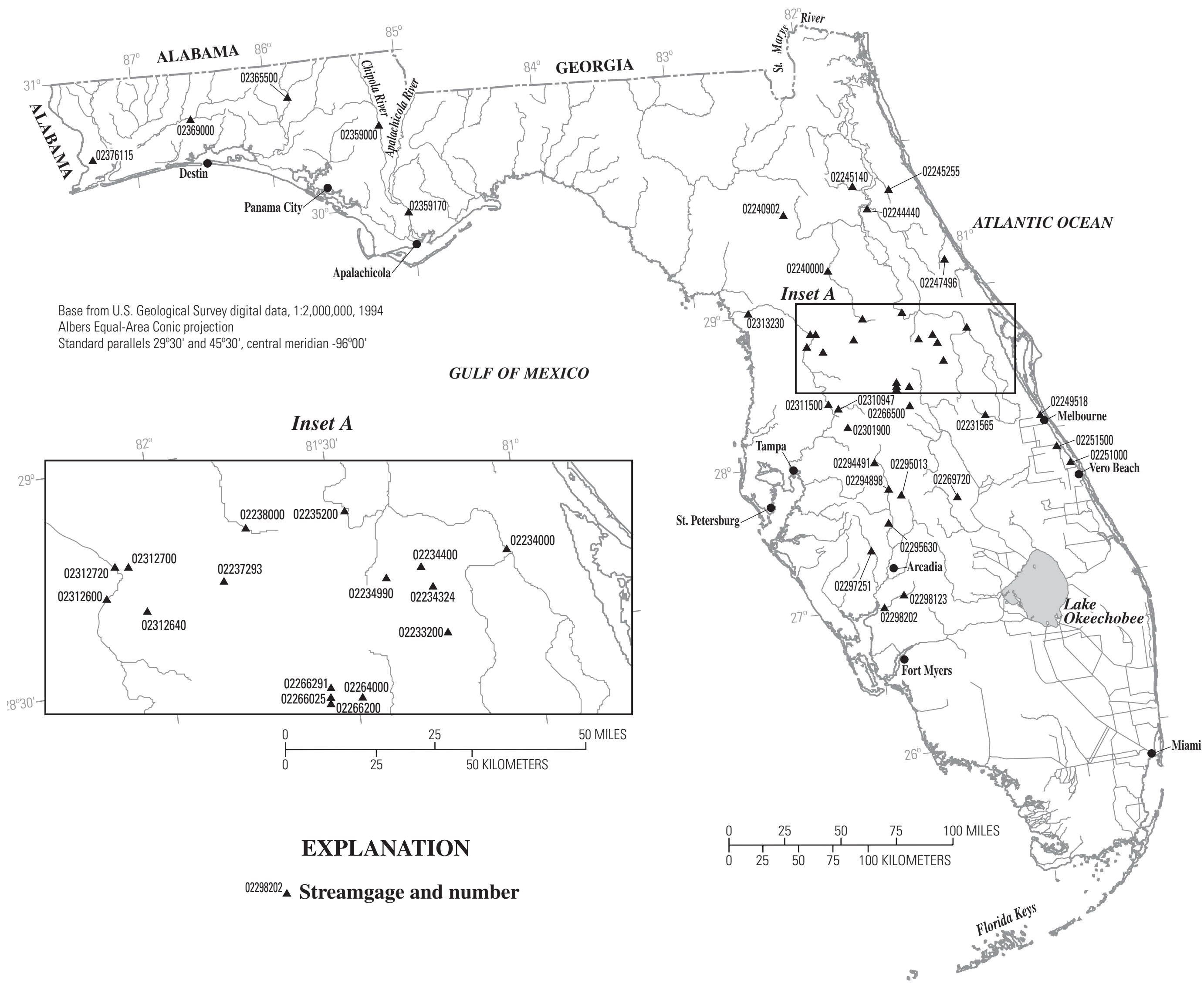

Figure 21. Location of streamgages with significant floods during 1994–98 water years for Florida.

Table 10. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Florida.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 21)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood	Recurrence interval (years)
02231565	Crabgrass Creek near Holopaw, FL	30.2	1985, 1987–88, 1991–95, 1997–98	1995	8.94	1,840	11/15/94	8.94	1,840	N	10–25
02233200	Little Econlockhatchee River near Union Park, FL	27.1	1960–98	1960	11.64	1,640	11/17/94	11.07	1,300	N	10–25
02234000	Saint Johns River above Lake Harney near Geneva, FL	2,043	1982–98	1995 1993	-- 7.75	9,880 7,760	11/22/94	--	9,880	N	10–25
02234324	Howell Creek near Slavia, FL	29.2	1973–79, 1982–98	1995 1993	36.05 37.98	699 454	7/25/95	36.05	699	N	25–50
02234400	Gee Creek near Longwood, FL	12.8	1972–79, 1985–98	1995	16.16	459	7/25/95	16.16	459	N	25–50
02234990	Little Wekiva River near Altamonte Springs, FL	90.7	1972–79, 1983–98	1995	30.58	1,070	11/16/94	30.58	1,070	N	200–500
02235200	Blackwater Creek near Cassia, FL	126	1962–98	1968	9.93	749	11/18/94	8.91	613	N	10–25
02237293	Palatlakaha River at structure M-1 near Okahumpka, FL	221	1971–75, 1977–98	1998 1977	-- 74.18	727 --	2/20/98	--	727	Y	10–25
02238000	Haines Creek at Lisbon, FL	648	1926, 1942–80, 1986–98	1998 1926	-- 65.30	1,560 --	2/26/98	--	1,560	Y	100–200
02240000	Ocklawaha River near Conner, FL	1,196	1931–46, 1964–98	1982 1933	8.46 9.14	4,430 3,700	2/17/98	7.67	3,480	N	10
02240902	Prairie Creek near Gainesville, FL	114	1979–80, 1994–98	1998	8.77	1,290	2/25/98	8.77	1,290	N	50–100
02244440	Dunns Creek near Satsuma, FL	585	1980, 1982–84, 1986, 1991–98	1995	--	8,570	9/10/95	--	8,570	N	25–50
02245140	Simms Creek near Bardin, FL	47.3	1974–89, 1991–98	1997 1974	14.96 15.47	2,840 1,410	10/8/96	14.96	2,840	N	25–50

Table 10. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Florida.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 21)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02245255	Deep Creek near Hastings, FL	20.7	1975–89, 1991–98	1998	8.58	880	2/16/98	8.58	880	N	100–200
02247496	Thayer Canal near Daytona Beach, FL	33.0	1989–98	1995	26.03	283	11/16/94	26.03	283	N	10–25
02249518	Crane Creek at U.S. Highway 1 at Melbourne, FL	18.1	1987–98	1995	--	2,150	8/2/95	--	2,150	N	100–200
02251000	South Prong Saint Sebastian Creek near Sebastian, FL	35.0	1966–72, 1994–98	1995	19.96	2,560	11/16/94	19.96	2,560	N	25–50
02251500	North Prong Saint Sebastian Creek near Micco, FL	28.5	1987–98	1998	10.24	2,060	11/14/97	10.24	2,060	N	10–25
02264000	Cypress Creek at Vineland, FL	29.3	1946–98	1960	4.66	309	2/23/98	3.69	179	N	10–25
02266025	Reedy Creek above S-46 near Vineland, FL	25.4	1987–98	1998	--	115	2/17/98	--	115	Y	10–25
02266200	Whittenhorse Creek near Vineland, FL	12.4	1967–98	1998	95.17	97	12/29/97	95.17	97	N	25–50
02266291	Lateral-405 above S-405A near Doctor Phillips, FL	19.6	1987–98	1998	--	200	12/27/97	--	200	Y	25–50
02266500	Reedy Creek near Loughman, FL	177	1940–59, 1969–98	1998 1969	4.22 4.25	1,090 790	12/30/97	4.22	1,090	Y	>500
02269720	Morgan Hole Creek near Avon Park, FL	13.9	1971–75, 1978–93, 1995, 1997–98	1998	8.23	1,420	11/17/97	8.23	1,420	N	10–25
02294491	Saddle Creek at Structure P-11 near Bartow, FL	53	1964–96	1995	15.90	894	9/14/94 8/15/95	15.10 15.90	534 894	Y	2–5 2–5
02294898	Peace River at Fort Meade, FL	480	1974–96	1995	78.54	2,150	8/10/95	78.54	2,150	Y	2–5
02295013	Bowlegs Creek near Fort Meade, FL	47.2	1964–68, 1991–96	1994	8.34	742	9/21/94	8.34	742	N	5–10

Table 10. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Florida.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 21)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02295630	Thompson Branch near Wauchula, FL	5.22	1984–91, 1993–96	1995 1988	9.91 10.04	396 --	8/2/95	9.91	396	N	5–10
02297251	Horse Creek near Limestone, FL	130	1981–88, 1990–96	1994	59.24	3,450	9/16/94	59.24	3,450	N	5–10
02298123	Prairie Creek near Fort Ogden, FL	233	1964–68, 1978–96	1995 1980	13.75 14.19	5,320 4,280	8/26/95	13.75	5,320	N	25–50
02298202	Shell Creek near Punta Gorda, FL	373	1965–87, 1994–96	1995	7.86	8,650	6/23/95	7.86	8,650	Y	25–50
02301900	Fox Branch near Socrum, FL	9.50	1965–98	1998 1978	8.21 8.22	1,790 569	12/27/97	8.21	1,790	N	50–100
02310947	Withlacoochee River near Cumpressco, FL	280	1968–98	1998 1987	-- 14.03	3,250 2,260	12/29/97	--	3,250	N	50–100
02311500	Withlacoochee River near Dade City, FL	390	1984–98	1998	77.55	3,900	12/31/97	77.55	3,900	N	10–25
02312600	Withlacoochee River near Floral City, FL	995	1984–98	1998	44.07	5,010	1/8/98	44.07	5,010	N	10–25
02312640	Jumper Creek Canal near Bushnell, FL	40.0	1964–98	1998	7.21	238	2/18/98	7.21	238	N	25–50
02312700	Outlet River at Panacoochee Retreats, FL	420	1963–98	1998 1970	-- 42.49	821 520	3/21/98	--	821	N	25–50
02312720	Withlacoochee River at Wysong Dam at Carlson, FL	1,520	1966–80, 1982–98	1998	41.54	4,910	1/16/98	41.54	4,910	N	25–50
02313230	Withlacoochee River at Inglis Dam near Dunnellon, FL	2,020	1970–98	1998	--	6,000	3/20/98	--	6,000	Y	25
02359000	Chipola River near Altha, FL	781	1913, 1922–27, 1930–31, 1944–94, 1996	1926	33.55	25,000	7/11/94	29.60	14,200	N	>100

Table 10. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Florida.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 21)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02359170	Apalachicola River near Sumatra, FL	19,200	1978–94, 1996	1994	15.05	221,000	7/13/94	15.05	221,000	N	>100
02365500	Choctawhatchee River at Caryville, FL	3,499	1928–95	1929	27.10	206,000	7/9/94	23.85	164,000	N	--
02369000	Shoal River near Crestview, FL	3,474	1939–94, 1996	1975	15.58	25,200	7/8/94	14.82	24,400	N	--
02376115	Elevenmile Creek near Pensacola, FL	27.8	1988–98	1998	16.94	12,800	9/28/98	16.94	12,800	N	--

[1]Regulated during flood: N, no; Y, yes.

Georgia

The remnants of Tropical Storm Alberto entered Georgia July 4, 1994, and for the next 2 days the system stalled out in the west-central part of the State. Maximum rainfall of 27.61 inches occurred at Americus (fig. 22) (National Oceanic and Atmospheric Administration, 1994a). The worst flooding occurred along the Flint, Chattahoochee, and Ocmulgee Rivers and their tributaries. More than 50 streamgages in Georgia recorded their peak of record during this flood (table 11). A total of 55 counties were declared Federal disaster areas. The death toll in Georgia was 31, of which most occurred in vehicles that were swept away by floodwaters (Stamey, 1997).

The remnants of Tropical Storm Jerry produced 10 to 14 inches of rain across the southeastern counties of Georgia from August 24 to 27, 1995 (National Oceanic and Atmospheric Administration, 1995a). The excessive rain produced flash flooding, coastal flooding at times of high tide, and river flooding afterwards. Total damage throughout the area was estimated at $3.5 million (National Oceanic and Atmospheric Administration, 1995b).

An intense Gulf storm produced 5 to 12 inches of rain across much of southwestern Georgia on March 7–9, 1998 (National Oceanic and Atmospheric Administration, 1998a), which caused widespread flooding. Eighteen counties were declared Federal disaster areas. Near Fitzgerald, floodwaters claimed the life of a man whose vehicle was overturned by the floodwaters (National Oceanic and Atmospheric Administration, 1998b).

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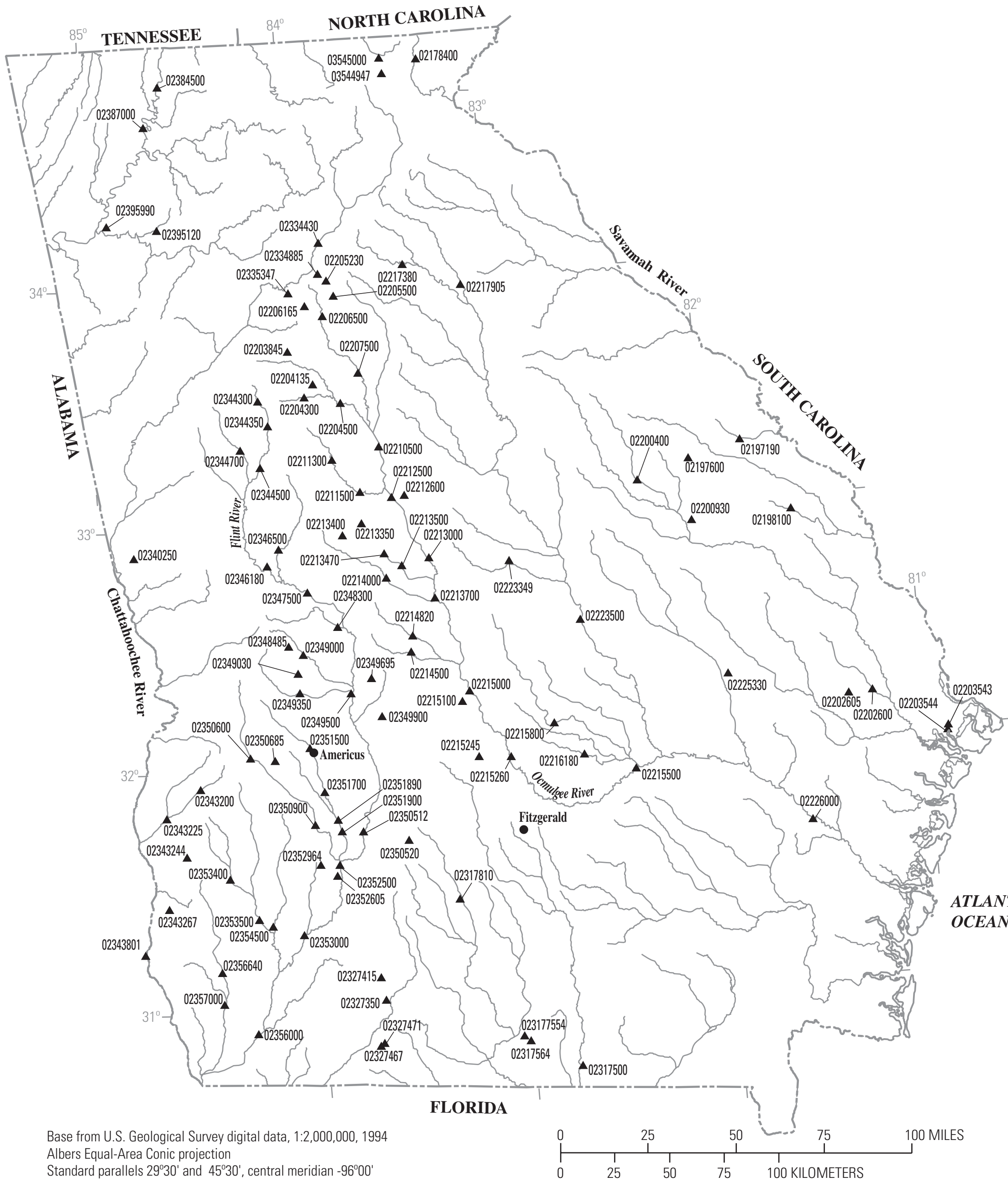

EXPLANATION

02327467▲ **Streamgage and number**

Figure 22. Location of streamgages with significant floods during 1994–98 water years for Georgia.

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 22)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02178400	Tallulah River near Clayton, GA	56.6	1965–98	1995	7.19	13,060	2/16/95	7.19	13,060	N	>100
02197190	McBean Creek at U.S. Route 25 near McBean, GA	41.4	1963–98	1991	7.52	3,160	3/9/98	5.04	586	N	2
02197600	Brushy Creek near Wrens, GA	28.0	1959–98	1991	14.02	11,400	2/18/95	8.32	1,970	N	100
02198100	Beaverdam Creek near Sardis, GA	30.8	1987–98	1998	8.49	4,070	3/9/98	8.49	4,070	N	25
02200400	Rocky Comfort Creek at State Route 88 near Grange, GA	188	1979–98	1998	16.00	5,250	3/10/98	16.00	5,250	N	25
02200930	Spring Creek near Louisville, GA	14.2	1965–98	1991	10.38	2,200	3/9/98	8.04	1,430	N	>50
02202600	Black Creek near Blitchton, GA	232	1980–98	1995	15.28	11,100	10/14/94	15.28	11,100	N	>100
02202605	Mill Creek at State Route 119 near Pembroke, GA	5.39	1979–96	1995	5.98	657	10/12/94	5.98	657	N	--
02203543	Wilshire Canal at Tibet Avenue at Savannah, GA	.95	1979–96	1996	11.87	882	7/5/96	11.87	882	N	--
02203544	Wilshire Canal tributary at Windsor Road at Savannah, GA	.18	1979–96	1996	6.41	127	7/5/96	6.41	127	N	--
02203845	Shoal Creek tributary at Glendale Drive near Atlanta, GA	.84	1963–65, 1973–78, 1980–96	1994	7.19	797	9/18/94	7.19	797	N	--
02204135	Camp Creek tributary at State Route 155 near Stockbridge, GA	.28	1977–98	1994	9.02	190	7/5/94	9.02	190	N	10
02204300	Little Cotton Indian Creek near Stockbridge, GA	50.0	1951–71, 1994	1994	18.84	8,600	7/5/94	18.84	8,600	N	100
02204500	South River near McDonough, GA	456	1940–65, 1976–82, 1994	1994	28.70	41,000	7/6/94	28.70	41,000	N	>100
02205230	Wolf Creek (Dean Road) near Suwanee, GA	.37	1987–98	1996	8.47	220	10/5/95	8.47	220	N	--

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

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Streamgage number (fig. 22)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02205500	Pew Creek near Lawrenceville, GA	2.23	1954–63, 1995–98	1998 1996	6.57 13.39	694 --	4/9/98	6.57	694	N	--
02206165	Jackson Creek tributary #2 near Lilburn, GA	.10	1987–92, 1994–98	1995	11.51	101	9/14/95	11.51	101	N	--
02206500	Yellow River near Snellville, GA	134	1943–98	1996	19.75	12,800	10/5/95	19.75	12,800	N	>100
02207500	Yellow River near Covington, GA	378	1936, 1945–65, 1976–98	1994 1936	28.70 29.90	41,000 30,000	7/6/94	28.70	41,000	N	>100
02210500	Ocmulgee River near Jackson, GA	1,420	1912, 1920 1940–65, 1976–82, 1988–98	1920 1994	26.80 26.87	69,000 68,500	7/6/94	26.87	68,500	Y	--
02211300	Towaliga River near Jackson, GA	105	1961–83, 1990,1994	1994	26.50	20,000	7/5/94	26.50	20,000	N	>100
02211500	Towaliga River near Forsyth, GA	315	1929–31, 1945–66, 1990,1994	1994 1966	-- 22.15	60,000 15,000	7/6/94	--	60,000	N	<100
02212500	Ocmulgee River at Juliette, GA	1,960	1886, 1916–21, 1949, 1975–88, 1990, 1994	1994	41.45	100,000	7/6/94	41.45	100,000	N	>100
02212600	Falling Creek near Juliette, GA	72.2	1965–98	1994	23.25	7,920	7/5/94	23.25	7,920	N	25
02213000	Ocmulgee River at Macon, GA	2,240	1887, 1893–1998	1994	35.40	107,000	7/6/94	35.40	107,000	N	>100

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

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Streamgage number (fig. 22)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02213350	Tobesofkee Creek below Forsyth, GA	53.4	1963–72, 1974–87, 1990, 1994	1994	11.99	13,000	7/6/94	11.99	13,000	N	>100
02213400	Little Tobesofkee Creek near Forsyth, GA	16.8	1951–61, 1990, 1994	1994	11.00	4,900	7/6/94	11.00	4,900	N	<25
02213470	Tobesofkee Creek above Macon, GA	156	1967–78, 1990, 1994	1994	26.00	31,000	7/6/94	26.00	31,000	N	>100
02213500	Tobesofkee Creek near Macon, GA	182	1929, 1938–98	1994	39.50	54,000	7/6/94	39.50	54,000	N	>100
02213700	Ocmulgee River near Warner Robins, GA	2,690	1973–74, 1976–97	1994	21.75	105,000	7/8/94	21.75	105,000	N	>100
02214000	Echeconnee Creek near Macon, GA	147	1938–43, 1951–78, 1990, 1994	1994	20.00	64,700	7/6/94	20.00	64,700	N	>100
02214500	Big Indian Creek at Perry, GA	108	1944–77, 1981, 1994	1994	21.00	28,000	7/6/94	21.00	28,000	N	>100
02214820	Mossy Creek at U.S. 41 near Perry, GA	92.9	1979–94, 1996–98	1994	19.86	24,000	7/6/94	19.86	24,000	N	>100
02215000	Ocmulgee River at Hawkinsville, GA	3,800	1877, 1909–80, 1983–96	1994	40.91	100,000	7/9/94	40.91	100,000	N	>100
02215100	Tucsawhatchee Creek near Hawkinsville, GA	163	1984–98	1998	17.56	9,240	3/9/98	17.56	9,240	N	100
02215245	Folsom Creek tributary near Rochelle, GA	1.44	1964–98	1970	7.16	434	6/7/95	6.12	380	N	25
02215260	Ocmulgee River at Abbeville, GA	4,460	1902, 1905–65, 1988–96	1994	23.10	100,000	7/11/94	23.10	100,000	N	>100

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

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Streamgage number (fig. 22)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02215500	Ocmulgee River at Lumber City, GA	5,180	1891, 1909–98	1925	25.70	98,400	7/15/94	24.59	92,900	N	100
02215800	Gum Qamp Creek near Chauncey, GA	221	1984–98	1998 1991	9.73 9.91	5,810 4,940	3/9/98	9.73	5,810	N	<25
02216180	Turnpike Creek (U.S. Highway 319 & 441) near McRae, GA	49.2	1983–98	1998	11.82	4,980	3/9/98	11.82	4,980	N	>100
02217380	Mulberry River (Georgia Highway 11) near Winder, GA	142	1976, 1984–98	1998 1984	12.73 13.79	6,800 5,710	2/4/98	12.73	6,800	N	--
02217905	Tanyard Creek at Baxter Street at Athens, GA	.42	1979–96	1996	9.56	821	7/14/96	9.56	821	N	--
02223349	Big Sandy Creek tributary near Irwinton, GA	.50	1977–98	1995	3.57	87	2/18/95	3.57	87	N	25
02223500	Oconee River at Dublin, GA	4,400	1894–1998	1936	33.00	96,700	3/11/98	32.00	85,000	Y	25
02225330	Beaver Creek near Cobbtown, GA	9.58	1965–98	1991 1993	8.04 8.25	2,030 --	3/9/98	6.48	1,050	N	50
02226000	Altamaha River at Doctortown, GA	13,600	1925–98	1925	18.60	300,000	3/19/98	15.55	135,000	N	<25
02317500	Alapaha River at Statenville, GA	1,400	1928–98	1948	29.80	27,300	3/15/98	29.50	18,700	N	25
02317564	Dukes Bay Canal (SR 94) at Valdosta, GA	1.27	1987–96	1995	7.27	383	10/2/94	7.27	383	N	--
023177554	Onemile Branch (Wainwright Drive) at Valdosta, GA	2.66	1987–96	1995 1987	8.54 8.56	886 789	10/2/94	8.54	886	N	--
02317810	Arnold Creek tributary near Tifton, GA	.47	1965–95, 1997–98	1995	5.46	219	10/3/94	5.46	219	N	--
02327350	Ochlockonee River tributary near Coolidge, GA	1.81	1965–98	1965	6.14	789	10/2/94	5.49	706	N	--
02327415	Little Ochlockonee River at State Route 111 near Moultrie, GA	44.8	1981–94, 1996–98	1998	10.29	6,060	3/9/98	10.29	6,060	N	>100

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

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			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02327467	Oquina Creek (Wolf Street) at Thomasville, GA	1.07	1986–96	1995	6.28	366	10/2/94	6.28	366	N	--
02327471	Bruces Branch (North Hansell Street) at Thomasville, GA	.12	1986–95	1994	8.26	201	8/16/94	8.26	201	N	--
02334430	Chattahoochee River at Buford Dam near Buford, GA	1,040	1972–98	1994 1972	5.90 7.88	12,100 9,670	10/25/93	5.90	12,100	Y	--
02334885	Suwanee Creek at U.S. Route 23 at Suwanee, GA	46.8	1985–98	1996	12.04	4,350	10/5/95	12.04	4,350	N	--
02335347	Crooked Creek tributary #2 (Holcomb Bridge Road) near Norcross, GA	.19	1987–98	1996	5.98	260	10/5/95	5.98	260	N	--
02340250	Flat Shoal Creek (Georgia Highway 18) near West Point, GA	204	1948–49, 1961, 1969, 1971, 1981, 1984–98	1996	22.95	8,170	3/8/96	22.95	8,170	N	<10
02343200	Pataula Creek near Lumpkin, GA	70.0	1949–78, 1990, 1994	1994	12.30	17,500	7/6/94	12.30	17,500	N	>100
02343225	Pataula Creek near Georgetown, GA	295	1949, 1951–78, 1990, 1994	1994	14.30	65,000	7/6/94	14.30	65,000	N	>100
02343244	Cemochechobee Creek (S 1576) near Coleman, GA	15.3	1984–98	1994	11.84	5,160	7/4/94	11.84	5,160	N	>100
02343267	Temple Creek at State Route 39 near Blakely, GA	2.78	1978–98	1994	6.13	746	7/6/94	6.13	746	N	>100
02343801	Chattahoochee River near Columbia, AL	8,210	1975–98	1994	123.98	202,000	7/7/94	123.98	202,000	Y	--
02344300	Camp Creek near Fayetteville, GA	17.2	1961–73, 1994	1994	13.89	6,300	7/5/94	13.89	6,300	N	>100

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 22)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
02344350	Flint River near Lovejoy, GA	130	1986–98	1994	23.60	19,000	7/5/94	23.60	19,000	N	>100
02344500	Flint River near Griffin, GA	272	1929, 1937–98	1994	24.22	31,500	7/6/94	24.22	31,500	N	>100
02344700	Line Creek near Senoia, GA	101	1965–98	1994	20.10	28,400	7/5/94	20.10	28,400	N	>100
02346180	Flint River near Thomaston, GA	1,220	1900–27, 1929, 1939–50, 1952–56, 1961, 1967–94	1929 1994	-- 21.83	62,000 55,000	7/7/94	21.83	55,000	N	100
02346500	Potato Creek near Thomaston, GA	186	1938–73, 1990,1994	1994	12.00	28,000	7/6/94	12.00	28,000	N	>100
02347500	Flint River near Culloden, GA	1,850	1913–27, 1929–31, 1937–98	1994	45.73	100,000	7/6/94	45.73	100,000	N	>100
02348300	Patsiliga Creek near Reynolds, GA	139	1963–84, 1994	1994 1964	-- 9.09	25,000 3,320	7/6/94	--	25,000	N	>100
02348485	Whitewater Creek at Georgia 137 near Butler, GA	17.3	1979–98	1994	10.78	518	7/5/94	10.78	518	N	<50
02349000	Whitewater Creek below Rambulette Creek near Butler, GA	93.4	1944–77, 1981, 1994	1957	7.01	2,160	7/6/94	7.00	2,150	N	<50
02349030	Cedar Creek at U.S. 19 near Rupert, GA	41.1	1979–98	1994	7.50	2,400	7/6/94	7.50	2,400	N	>100
02349350	Buck Creek at U.S. 19 near Ellaville, GA	146	1979–98	1994	11.31	7,800	7/6/94	11.31	7,800	N	100
02349500	Flint River at Montezuma, GA	2,900	1897, 1905–98	1994	34.11	136,000	7/8/94	34.11	136,000	N	>100

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 22)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
02349695	Horsehead Creek at State Route 224 near Montezuma, GA	.72	1977–98	1994	6.96	200	7/6/94	6.96	200	N	25
02349900	Turkey Creek at Byromville, GA	45.0	1951–98	1994	14.29	5,820	7/6/94	14.29	5,820	N	100
02350512	Flint River at State Highway 32 near Oakfield, GA	3,880	1988–98	1994	40.10	112,000	7/10/94	40.10	112,000	N	>100
02350520	Abrams Creek tributary near Doles, GA	3.77	1965–75, 1991, 1994	1994	7.06	840	7/6/94	7.06	840	N	>100
02350600	Kinchafoonee Creek at Preston, GA	197	1943, 1948–78, 1987–98	1990	12.16	14,500	7/6/94	11.66	12,400	N	100
02350685	Choctahatchee Creek tributary at U.S. 280 near Plains, GA	.32	1977–79, 1981–98	1994	9.25	625	7/6/94	9.25	625	N	>100
02350900	Kinchafoonee Creek near Dawson, GA	527	1943, 1948–66, 1973, 1985–98	1994	26.56	29,500	7/7/94	26.56	29,500	N	>100
02351500	Muckalee Creek near Americus, GA	140	1948, 1963–83, 1994	1994	19.50	33,500	7/6/94	19.50	33,500	N	>100
02351700	Muckalee Creek near Smithville, GA	265	1929, 1948, 1951–66, 1994	1994	22.72	35,000	7/6/94	22.72	35,000	N	>100
02351890	Muckalee Creek at State Route 195 near Leesburg, GA	362	1943, 1948, 1980–98	1994 1948	29.10 234.66	64,400 15,000	7/7/94	29.10	64,400	N	>100
02351900	Muckalee Creek near Leesburg, GA	405	1943, 1948, 1951–65, 1980–86, 1994	1994	29.83	72,000	7/7/94	29.83	72,000	N	>100

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 22)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
02352500	Flint River at Albany, GA	5,310	1893–1998	1994	43.00	120,000	7/11/94 3/10/98	43.00 36.92	120,000 86,100	N N	>100 90
02352605	Emily Avenue Canal at Albany, GA	.16	1987–96	1994 1990	2.85	112	8/16/94	2.85 2.94	112 71	N	--
02352964	Percosin Creek tributary at Deans Drive at Albany, GA	.05	1987–96	1995	3.66	20	7/26/95	3.66	20	N	--
02353000	Flint River at Newton, GA	5,740	1925, 1929, 1938–98	1994	45.25	100,000	7/13/94	45.25	100,000	N	>100
02353400	Pachitla Creek near Edison, GA	188	1916, 1928, 1948, 1950–78, 1981, 1989–98	1994	14.22	43,000	7/6/94 3/9/98	14.22 11.85	43,000 17,500	N N	>100 >100
02353500	Ichawaynochaway Creek at Milford, GA	620	1906–07, 1916, 1925, 1940–98	1994	23.20	53,000	7/7/94 3/9/98	23.20 19.59	53,000 22,800	N N	>100 >100
02354500	Chickasawhatchee Creek at Elmodel, GA	320	1916, 1940–49, 1952–65, 1970–83, 1994, 1996–98	1994	20.00	16,000	7/8/94	20.00	16,000	N	>100
02356000	Flint River at Bainbridge, GA	7,570	1897, 1905–96	1994 1925	37.20 40.90	108,000 101,000	7/14/94	37.20	108,000	N	>100
02356640	Spring Creek at U.S. 27 at Colquitt, GA	281	1981–95, 1997–98	1998	15.91	20,500	3/10/98	15.91	20,500	N	>100
02357000	Spring Creek near Iron City, GA	485	1938–78, 1983–98	1998	24.40	34,500	3/10/98	24.40	34,500	N	>100

Table 11. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Georgia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 22)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02384500	Conasauga River near Eton, GA	252	1954–58,	1990	20.50	33,200	3/28/94	20.52	30,000	N	100
02387000	Conasauga River at Tilton, GA	687	1886, 1938–98	1886	34.00	40,000	3/29/94	28.42	29,100	N	25
02395120	Two Run Creek at State Route 20 near Kingston, GA	33.1	1981–98	1996	8.42	3,960	1/27/96	8.42	3,960	N	>10
02395990	Etowah River tributary at Atteiram Drive at Rome, GA	.37	1979–97	1997	7.53	206	6/28/97	7.53	206	N	--
03544947	Brier Creek near Hiawassee, GA	1.67	1984–98	1998	4.18	990	1/7/98	4.18	990	N	>10
03545000	Hiawassee River at Presley, GA	45.5	1942–98	1952	15.24	5,700	1/7/98	11.76	4,880	N	>10

[1]Regulated during flood: N, no; Y, yes.

Hawaii

Excessive rains with 8- to 15-inch totals in 24 hours (National Oceanic and Atmospheric Administration, 1994a) caused localized flash flooding on March 24, 1994, on Maui (fig. 23). Two people were presumed drowned when they were swept away from their vehicle attempting to cross Kauaula Stream.

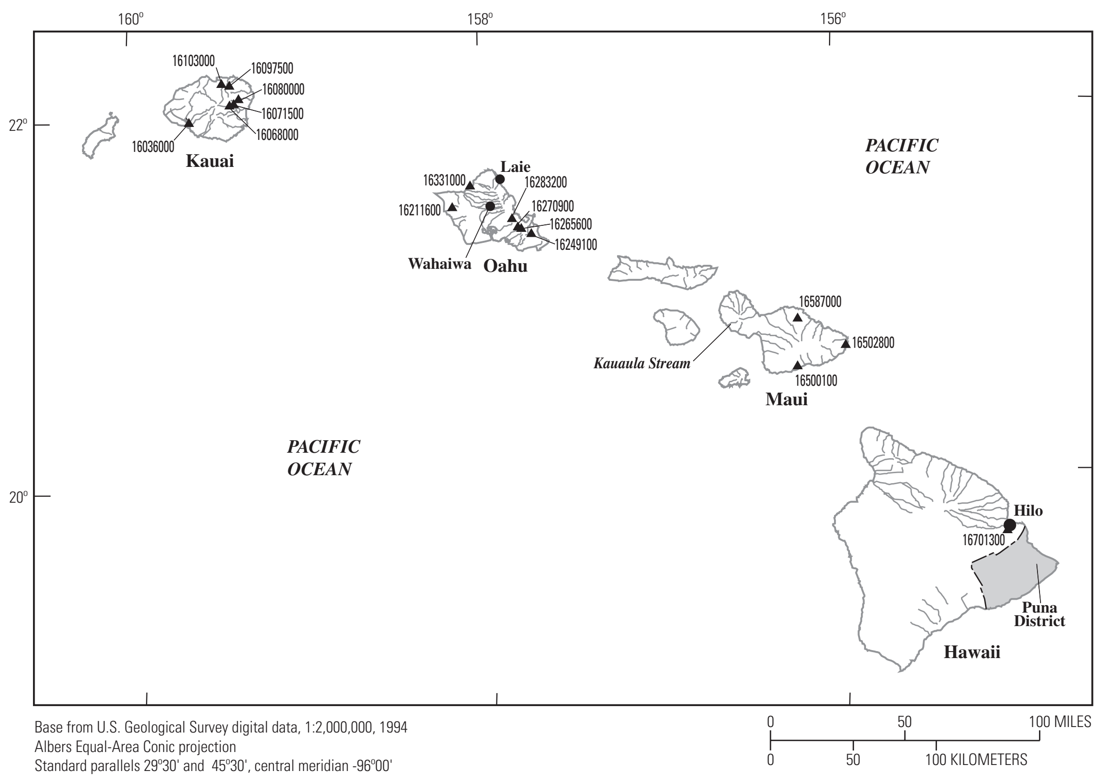
Night and early morning thundershowers over Oahu on April 12, 1994, caused localized street flooding in central and northern Oahu. As much as 6 inches of rainfall were reported at Wahaiwa (National Oceanic and Atmospheric Administration, 1994a). A group of boy scouts was surprised by a rapid water rise of 2 to 4 feet while walking near a nearly dry creek near Laie, and one was swept away and drowned.

Moisture transported onto the Big Island of Hawaii from the outer shower bands of a tropical depression and enhanced by upslope flow produced intense showers and thunderstorms on August 12, 1994. While extreme runoff occurred from 7 to 15 inches of rainfall in Hilo and the Puna District, greater rainfall likely occurred at ungaged, higher elevations (National Oceanic and Atmospheric Administration, 1994a). Flooding was characterized by some Hilo residents as the worst in more than 40 years. Of an estimated $3.4 million in total damage, roads, culverts, bridges, and businesses accounted for $1.8 million. Two homes were destroyed, 14 suffered major damage, and 200 had minor damage (National Oceanic and Atmospheric Administration, 1994b). Streamgages with significant floods are listed in table 12.

References

National Oceanic and Atmospheric Administration (NOAA), 1994a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Admospheric Administration (NOAA), 1994b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

16249100▲ **Streamgage and number**

Figure 23. Location of streamgages with significant floods during 1994–98 water years for Hawaii.

Table 12. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Hawaii.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 23)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
16036000	Makaweli River near Waimea, Kauai, HI	26.0	1943, 1945–98	1975	15.51	26,000	11/3/95	13.80	21,500	N	20
16068000	East Branch of North Fork Wailua River near Lihue, Kauai, HI	6.27	1916–98	1956	14.70	18,400	2/13/94 11/3/95	11.70 9.53	12,300 7,650	N N	>100 20
16071500	Left Branch Opaekaa Stream near Kapaa, Kauai, HI	.65	1961–98	1992 1969	6.60 7.72	1,060 221	2/13/94	6.50	1,020	N	35
16080000	Kapaa Stream at Kapahi Ditch intake near Kapaa, Kauai, HI	3.86	1937, 1939–40, 1942, 1944–75, 1977–96	1992	5.66	9,660	2/13/94	5.14	7,580	N	40
16097500	Halaulani Stream at altitude 400 feet near Kilauea, Kauai, HI	1.90	1958–98	1994	9.76	4,140	2/13/94	9.76	4,140	N	50
16103000	Hanalei River near Hanalei, Kauai, HI	19.1	1962–98	1996	15.81	44,600	9/30/95 11/3/95	14.66 15.81	26,600 44,600	N N	5 50
16211600	Makaha Stream near Makaha, Oahu, HI	2.31	1960–98	1997	9.54	2,680	11/14/96	9.54	2,680	N	>100
16249100	Kaelepulu Stream tributary at Kailua, Oahu, HI	.16	1963–98	1988	7.53	467	1/25/96	7.04	423	N	10
16265600	Right Branch of Kamooalii Stream near Kaneohe, Oahu, HI	1.11	1985–97	1996 1988	11.64 12.40	2,800 1,310	1/25/96	11.64	2,800	N	>50
16270900	Luluku Stream at altitude 220 feet near Kaneohe, Oahu, HI	.44	1967–83, 1985–87, 1989–98	1996 1971	4.10 6.18	957 651	1/25/96	4.10	957	N	60

Table 12. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Hawaii—Continued.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 23)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
16283200	Kahaluu Stream near Ahuimanu, Oahu	0.99	1984–98	1994	6.05	728	9/18/94	6.05	728	N	10–25
16331000	Waimea Gulch near Kawailoa Camp, Oahu, HI	2.23	1968–98	1980	11.20	2,030	1/19/97	9.32	857	N	20
16500100	Kepuni Gulch near Kahikinui House, Maui, HI	1.91	1963–94, 1996–98	1994	13.68	2,320	9/18/94	13.68	2,320	N	100
16502800	Moomoonui Gulch at Hana, Maui, HI	.90	1963–98	1993	14.71	2,480	3/24/94	14.54	2,200	N	15
16587000	Honopou Stream near Huelo, Maui, HI	.64	1911, 1913–14, 1916–96, 1998	1931	7.28	5,710	7/30/97	5.79	3,030	N	15
16701300	Waiakea Stream at Hilo, Hawaii, HI	35.8	1969–75, 1979, 1994–98	1994	10.90	3,670	8/12/94	10.90	3,670	N	25

[1]Regulated during flood: N, no; Y, yes.

Idaho

Significant flooding occurred during the last week of November through the first week of December 1995 in northern Idaho. Warm temperatures, 4 to 7 inches of rainfall (National Oceanic and Atmospheric Administration, 1995a), and snowmelt at elevations above 5,000 feet caused increased runoff levels. Lake Coeur d'Alene (fig. 24) was 9 feet above normal.

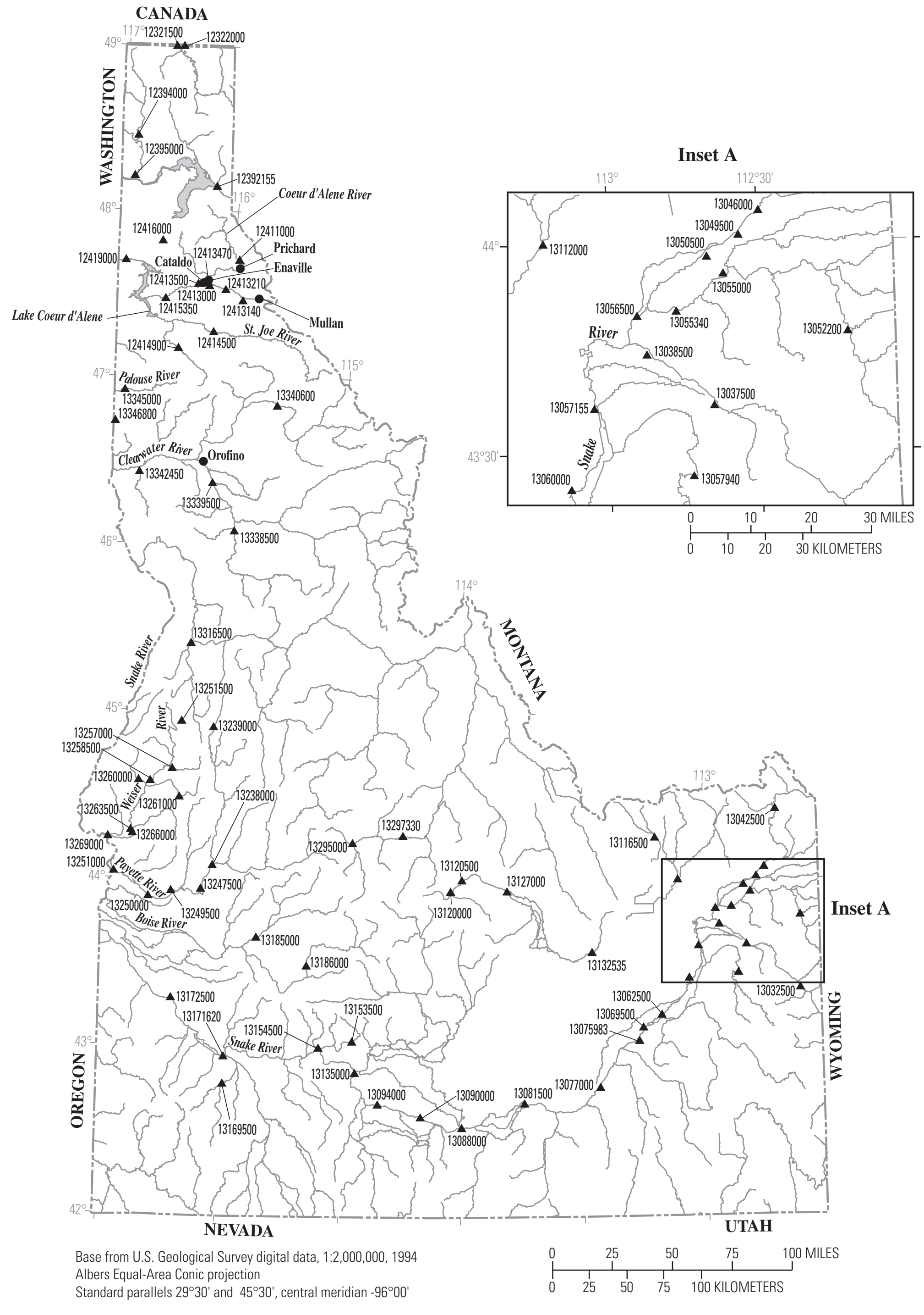
Major flooding took place the second week of February 1996 in northern Idaho. Conditions that developed in late January contributed significantly to the flood. Large amounts of snow fell over the lower elevations during the third week of January, especially in northern Idaho where valley locations reported 10 additional inches of snow with as much as 2.5 feet of snow on the ground. During the last week in January temperatures dropped into the single digits for highs and -20 to -30 ^{o}F for lows (National Oceanic and Atmospheric Administration, 1996a); this resulted in ice buildup along many of the rivers. During the first week of February temperatures drastically warmed, but lows remained below freezing so snowmelt began slowly. Excessive rains also fell on February 6–10 (National Oceanic and Atmospheric Administration, 1996a). Five-day totals were 8.00 inches at Prichard, 6.14 inches at Mullan, and 4.00 inches at other locations. The warm temperatures and excessive rain accelerated low-elevation snowmelt resulting in serious flooding. The ice jams caused serious falls and rises along the rivers as well. The worst flooding occurred in the Clearwater River Basin around the town of Orofino. The flooding of the Palouse, St. Joe, and Coeur d'Alene Rivers along with their tributaries caused major damage. Major ice jams caused serious rises along the North Fork Coeur d'Alene River at Enaville (streamgage 12413000, table 13) and the Coeur d'Alene River near Cataldo (streamgage 12413500, table 13), resulting in the evacuation of the towns of Enaville and Cataldo (National Oceanic and Atmospheric Administration, 1996a). This event is close to the flood of record on the St. Joe River. Total damage was more than $44 million (National Oceanic and Atmospheric Administration, 1996b).

Above-normal snowfall occurred in northern Idaho during November and December 1996. Most locations had more than 2 to 3 feet of snow with larger amounts at higher elevations. Considerable snow also fell in southern and central Idaho. Wet Pacific storm systems brought precipitation totals two to five times the normal for December. Snowmelt caused by rapidly warming temperatures and persistent rains during the last week of December caused flooding throughout the State during the first week in January 1997. Major flooding occurred on the Weiser, Payette, Snake, and Boise Rivers. The State of Idaho was declared a major disaster area. The total flood damage was $25 million. In May 1997 the snow pack at the higher elevations melted resulting in significant flooding in northern Idaho and an additional $4 million in damage (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1995a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1995b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

13088000▲ **Streamgage and number**

Figure 24. Location of streamgages with significant floods during 1994–98 water years for Idaho.

Table 13. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Idaho.

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 24)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
12321500	Boundary Creek near Porthill, ID	97	1929–98	1997 1998	5.88 15.25	3,780 2,760	4/24/96 6/1/97	5.86 5.88	3,740 3,780	N N	50–75 50–75
12322000	Kootenai River at Porthill, ID	13,700	1894, 1925–98	1948 1894	66.16 72.70	125,000 --	5/14/97	--	61,400	Y	2–5
12392155	Lightning Creek at Clark Fork, ID	115	1989–98	1996 1998	-- 10.60	4,970 3,260	2/9/96	--	4,970	N	25–50
12394000	Priest River near Coolin, ID	611	1949–98	1997 1974	8.02 8.44	9,280 8,900	6/3/97	8.02	9,280	N	>100
12395000	Priest River near Priest River, ID	902	1904, 1931–81, 1983–98	1997	9.13	10,800	5/18/97	9.13	10,800	N	75–100
12411000	North Fork Coeur d'Alene River above Shoshone Creek near Prichard, ID	335	1951–98	1974	11.60	22,000	2/9/96	10.24	17,000	N	40–50
12413000	North Fork Coeur d'Alene River at Enaville, ID	895	1912, 1934, 1938, 1940–98	1974	81.32	61,000	2/9/96	76.95	56,600	N	40–50
12413140	Placer Creek at Wallace, ID	14.9	1968–97	1996	14.81	2,200	2/9/96	14.81	2,200	Y	>100
12413210	South Fork Coeur d'Alene River at Elizabeth Park near Kellogg, ID	--	1987–98	1996	35.50	9,600	2/9/96	35.50	9,600	N	>50
12413470	South Fork Coeur d'Alene River near Pinehurst, ID	299	1988–98	1996	17.43	11,700	2/9/96	17.43	11,700	N	--
12413500	Coeur d'Alene River near Cataldo, ID	1,223	1911–12, 1921–72, 1974, 1987–98	1974	58.23	79,000	2/9/96	51.62	70,000	N	>100
12414500	St. Joe River at Calder, ID	1,030	1911–12, 1921–98	1934 1938	92.50 93.20	53,000 46,000	2/9/96	15.22	39,200	N	50–75
12414900	St. Maries River near Santa, ID	275	1966–98	1996	13.75	12,300	2/9/96	13.75	12,300	N	50–75

Table 13. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Idaho.—Continued

[mi[2], square miles; ft, feet above an arbitrary datum; ft[3]/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 24)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
12415350	Wolf Lodge Creek near Coeur d'Alene, ID	39.4	1986–95	1995	11.91	865	2/20/95	11.91	865	N	--
12416000	Hayden Creek below North Fork near Hayden Lake, ID	22.0	1948–53, 1959, 1962–97	1982	5.69	1,280	2/9/96	5.60	1,250	N	30–40
12419000	Spokane River near Post Falls, ID	3,840	1913–98	1934 1917	-- 79.23	50,100 39,800	5/19/97	24.92	43,900	Y	20–25
13032500	Snake River near Irwin, ID	5,225	1934–36, 1939–41, 1949–97	1997	15.25	40,400	6/19/97	15.25	40,400	Y	>100
13037500	Snake River near Heise, ID	5,752	1911–98	1927 1997	-- 11.26	60,000 43,500	6/13/97	11.26	43,500	Y	>100
13038500	Snake River at Lorenzo, ID	5,810	1924–27, 1978–98	1927 1997	9.85 13.79	43,000 38,300	6/22/97	13.79	38,300	Y	25–50
13042500	Henrys Fork near Island Park, ID	481	1933–98	1984 1946	6.06 6.15	3,030 2,770	5/17/95	5.77	2,870	Y	50–75
13046000	Henrys Fork near Ashton, ID	1,040	1890–91, 1903–09, 1920–98	1984 1959	6.50 8.34	8,140 3,300	5/12/95 5/12/97	5.82 6.02	6,090 6,620	Y Y	15–20 35–40
13049500	Falls River near Chester, ID	520	1920–98	1981	7.83	7,730	5/17/96	6.56	5,760	N	20–25
13050500	Henrys Fork at Saint Anthony, ID	1,770	1919–98	1984	8.62	13,200	5/30/97	7.57	10,600	Y	20–25
13052200	Teton River above South Leigh Creek near Driggs, ID	335	1962–98	1997 1983	5.14 5.17	2,980 2,460	6/11/97	5.14	2,980	N	>100
13055000	Teton River near Saint Anthony, ID	890	1890–93, 1903–09, 1920–96, 1978–98	1976	42.20	1,700,000	6/11/97	6.78	6,360	N	20–25
13055340	South Fork Teton River near Rexburg, ID	--	1982–98	1997	10.68	3,410	6/11/97	10.68	3,410	N	--

Table 13. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Idaho.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 24)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
13056500	Henrys Fork near Rexburg, ID	2,920	1909–23, 1925–98	1976 1984	-- 12.05	79,000 16,400	5/18/96	11.26	13,800	Y	35–40
13057155	Snake River above Eagle Rock near Idaho Falls, ID	--	1988–98	1997	18.91	48,600	6/16/97	18.91	48,600	N	--
13057940	Willow Creek below Tex Creek near Ririe, ID	568	1978–79, 1986–98	1997	6.73	2,420	5/7/97	6.73	2,420	N	--
13060000	Snake River near Shelley, ID	9,790	1890, 1892–94, 1915–98	1894 1976	-- 19.12	75,000 67,300	6/17/97	16.05	47,800	Y	>100
13062500	Snake River at Blackfoot, ID	9,950	1978–98	1997	13.55	43,200	6/17/97	13.55	43,200	Y	50–100
13069500	Snake River near Blackfoot, ID	11,310	1911–98	1976	15.44	53,500	6/18/97	14.80	42,300	Y	75–100
13075983	Spring Creek at Sheepskin Road near Fort Hall, ID	--	1980–98	1998 1995	-- 5.41	605 169	6/8/98	--	605	N	--
13077000	Snake River at Neeley, ID	13,600	1906–98	1918 1997	-- 11.46	48,400 46,100	6/19/97	11.46	46,100	Y	50–75
13081500	Snake River near Minidoka, ID	15,700	1896–99, 1901–98	1897 1918	12.60 16.02	47,500 45,900	6/21/97	15.49	42,900	Y	25–30
13088000	Snake River at Milner, ID	17,180	1909–98	1918 1921	-- 21.21	40,000 27,000	6/21/97	--	31,200	Y	40–50
13090000	Snake River near Kimberly, ID	--	1924–98	1997	23.27	34,200	6/21/97	23.27	34,200	Y	75–100
13094000	Snake River near Buhl, ID	--	1947–98	1997	14.65	37,100	6/22/97	14.65	37,100	Y	>100
13112000	Camas Creek at Camas, ID	400	1925–98	1998 1984	7.49 7.61	1,490 1,320	5/12/95 5/16/98	6.91 7.49	1,220 1,490	N N	20–25 45–50
13116500	Medicine Lodge Creek near Small, ID	270	1921–23, 1941–48, 1985–98	1995	9.09	481	6/19/95	9.09	481	N	50–100
13120000	North Fork Big Lost River at Wild Horse near Chilly, ID	114	1944–98	1997 1965	5.65 6.39	1,560 1,420	6/5/97	5.65	1,560	N	30–35

Table 13. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Idaho.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 24)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
13120500	Big Lost River at Howell Ranch near Chilly, ID	450	1904–14, 1920–98	1967	6.02	4,420	7/10/95	5.17	3,690	N	10–15
13127000	Big Lost River below Mackay Reservoir near Mackay, ID	813	1904–06, 1912–14, 1919–98	1986	6.08	2,990	7/12/95	5.65	2,880	Y	20–25
13132535	Big Lost River at Lincoln Boulevard Bridge near Atomic City, ID	--	1984–91, 1993, 1995	1995 1993	-- 16.56	428 288	7/16/95	--	428	N	--
13135000	Snake River below Lower Salmon Falls near Hagerman, ID	--	1938–98	1997	18.81	38,500	6/21/97	18.81	38,500	Y	>100
13153500	Malad River near Bliss, ID	--	1899, 1985–98	1997 1899	-- 4.00	5,390 3,625	1/2/97	--	5,390	N	--
13154500	Snake River at King Hill, ID	35,800	1909–98	1918	16.30	47,200	6/22/97	15.51	42,200	Y	>100
13169500	Big Jacks Creek near Bruneau, ID	253	1939–49, 1963, 1966–98	1997 1943	5.82 12.40	2,950 2,100	1/2/97	5.82	2,950	N	50–75
13171620	Snake River below CJ Strike Dam near Grand View, ID	40,800	1985–98	1997	14.88	44,000	6/20/97	14.88	44,000	Y	--
13172500	Snake River near Murphy, ID	41,900	1914–98	1918	13.95	47,300	6/17/97	13.66	40,300	Y	20–25
13185000	Boise River near Twin Springs, ID	830	1871–72, 1911–98	1872 1965	-- 12.20	22,700 18,800	1/1/97	10.81	12,800	N	15–20
13186000	South Fork Boise River near Featherville, ID	635	1943, 1945–98	1997 1956	7.74 8.62	8,030 7,580	5/17/97	7.74	8,030	N	20–25
13238000	Payette River near Banks, ID	1,200	1922–73, 1997	1965	15.46	20,800	1/1/97	--	19,100	Y	50–75
13239000	North Fork Payette River at McCall, ID	144	1909–17, 1920–98	1974	8.16	4,950	5/18/96 5/18/97	7.82 7.62	4,570 4,320	Y Y	30–35 15–20
13247500	Payette River near Horseshoe Bend, ID	2,230	1906–16, 1920–98	1965	16.35	27,000	1/2/97	15.63	24,400	Y	20–25
13249500	Payette River near Emmett, ID	2,680	1926–98	1965	15.88	32,700	1/2/97	15.30	30,500	Y	50–60

Table 13. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Idaho.—Continued

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Streamgage number (fig. 24)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
13250000	Payette River near Letha, ID	2,760	1979–86, 1994–98	1997 1996	-- 15.97	27,000 17,900	1/2/97	--	27,000	Y	>50
13251000	Payette River near Payette, ID	3,240	1936–98	1997 1965	-- 13.80	32,000 30,900	1/2/97	--	32,000	Y	>100
13251500	Weiser River at Tamarack, ID	36.5	1937–71, 1974–75, 1997	1997 1956	-- 7.17	1,520 1,320	1/1/97	--	1,520	N	>100
13257000	Middle Fork Weiser River near Mesa, ID	86.5	1911–13, 1920–21, 1937–49, 1956, 1981–82, 1985–88, 1997	1997 1948	-- 4.10	2,340 994	1/1/97	--	2,340	N	>50
13258500	Weiser River near Cambridge, ID	605	1939–98	1997	14.54	22,800	5/18/96 1/1/97	13.16 14.54	8,850 22,800	N N	10–15 >100
13260000	Pine Creek near Cambridge, ID	54.0	1939–62, 1997	1997 1958	-- 4.50	970 850	1/1/97	--	970	N	50–75
13261000	Little Weiser River near Indian Valley, ID	81.9	1923–27, 1938–71, 1997	1997 1965	-- 6.08	2,230 1,480	1/1/97	--	2,230	N	>100
13263500	Weiser River above Crane Creek near Weiser, ID	1,160	1921–52, 1997	1997 1932	-- 10.80	31,100 16,900	1/2/97	--	31,100	N	>100
13266000	Weiser River near Weiser, ID	1,460	1890–91, 1895–1904, 1911–14, 1953–98	1997	17.20	34,500	1/2/97	17.20	34,500	N	>100
13269000	Snake River at Weiser, ID	69,200	1910–98	1952	14.67	84,500	1/3/97	14.49	84,100	Y	15–20

Table 13. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Idaho.—Continued

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Streamgage number (fig. 24)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
13295000	Valley Creek at Stanley, ID	147	1911–13, 1921–72, 1974, 1993–98	1956 1921	3.92 4.40	2,000 1,850	6/10/97	3.64	1,760	N	20–25
13297330	Thompson Creek near Clayton, ID	29.1	1973–98	1997 1982	4.07 5.74	442 329	5/15/97	4.07	442	N	20–30
13316500	Little Salmon River at Riggins, ID	576	1948, 1951–54, 1957–98	1974 1997	11.05 12.00	12,600 10,500	1/1/97	12.00	10,500	N	50–55
13338500	South Fork Clearwater River at Stites, ID	1,150	1911–12, 1964–98	1964	10.30	17,500	2/7/96	8.82	12,100	N	10–15
13339500	Lolo Creek near Greer, ID	243	1980–98	1996	17.01	5,990	2/9/96	17.01	5,990	N	50–100
13340600	North Fork Clearwater River near Canyon Ranger Station, ID	1,360	1967–98	1996	17.58	37,500	11/30/95 5/17/97	17.58 17.35	37,500 36,200	N N	40–50 30–40
13342450	Lapwai Creek near Lapwai, ID	235	1975–98	1996 1986	9.70 10.22	5,010 3,380	2/9/96	9.70	5,010	N	20–30
13345000	Palouse River near Potlatch, ID	317	1915–19, 1967–98	1996	22.15	14,600	2/9/96	22.15	14,600	N	>100
13346800	Paradise Creek at University of Idaho at Moscow, ID	17.7	1979–98	1996	11.26	970	2/9/96	11.26	970	N	30–40

[1]Regulated during flood: N, no; Y, yes.

Illinois

Very intense rainfall fell over most of central Illinois during April 11–12, 1994. Rainfall amounts ranged from 1.40 to 5.28 inches in less than 6 hours at most measurement locations (National Oceanic and Atmospheric Administration, 1994a). Flooding resulted along the Vermilion, Embarras, Sangamon, and Illinois Rivers (fig. 25) and their tributaries due to the very intense rain. Two people died after trying to drive their cars across flooded roadways. Danville's water-treatment plant also flooded causing $10 million in damage (National Oceanic and Atmospheric Administration, 1994b). Fifteen streamgages had significant flood discharges in April 1994 (table 14). Although flood levels did not reach 1993 crest values, levels still were high enough to cause widespread lowland flooding and flooding in towns near the Illinois and Mississippi Rivers.

The Illinois, Big Muddy, and Sangamon Rivers and many of their tributaries began to rise above flood stage on May 14, 1995, due to excessive amounts of rainfall in the preceding 2 weeks over central and southern Illinois. The flooding continued into June as even more rain fell over the area during the last half of May and first part of June. Damage in and near Lincoln was $2 million (National Oceanic and Atmospheric Administration, 1995b). The Mississippi River flooded tens of thousands of acres of cropland. Flooding in the Cairo area was considerably worse in 1995 than in 1993 because the Ohio River also was above flood stage. At the confluence of the Ohio and Mississippi Rivers at Cairo, a State park was totally underwater. The flooding on the Mississippi upstream from Cairo did not reach the levels of the 1993 flood. The U.S. Coast Guard halted all barge traffic from Cairo northward for over a week. This action was taken in an effort to prevent wake damage, especially to levees, which were in danger of overtopping. The closure of the river was very costly to the barge industry. The Mississippi River crested at 47 feet, about 14 feet above flood stage, at Cape Girardeau, Missouri, on May 24. The Ohio River crested at 55.6 feet at Cairo on May 25. Extensive flooding of bottom lands resulted as the Ohio River crested well above flood stage. Thousands of acres of crops were submerged. One of the major differences between the floods of 1993 and 1995 was the length of occurrence. The flood of 1993 covered two periods—a spring flood and then the major summer flooding, which continued into September. Although many rivers were still above flood stage at the end of May 1995, river stages fell rapidly and were not above flood stage after June 1995. Another difference was the lack of levees that remained along the rivers. Many agricultural levees destroyed by the flood of 1993 were not rebuilt. Many of the remaining levees were quickly overtopped or washed away in 1995 (National Oceanic and Atmospheric Administration, 1995b).

Slow-moving thunderstorms dumped between 6 and 10 inches of rain near Beardstown on May 8, 1996 (National Oceanic and Atmospheric Administration, 1996a). The resulting flash flooding washed out several roads. Sixty-six homes sustained damage, ranging from water in the basement to structural collapse. No injuries were reported, and damage was estimated at $2 million (National Oceanic and Atmospheric Administration, 1996b).

The Wabash River was above flood stage for most of May 1996 near Crossville (National Oceanic and Atmospheric Administration, 1996b). On May 7, the river crested at 20.9 feet, 5.9 feet above flood stage. A 9-mile long earthen levee protecting bottomland farm fields was breached at the same time the river crested. This breach resulted in an additional 5,000 acres of flooded cropland near Grayville. The levee near Mt. Carmel was breached. Two counties were declared Federal disaster areas as a result of the flooding.

Record-breaking rainfall over parts of north-central and northeastern Illinois resulted in unprecedented flash flooding July 17–18, 1996. The area of most-intense rain, in excess of 5 inches, fell in a corridor from near Rockford through Aurora and Joliet to the southern suburbs of Chicago (National Oceanic and Atmospheric Administration, 1996a). The 16.91 inches that fell at Aurora set a 24-hour record for the State of Illinois. Much of this area had from 7 to 11 inches of rainfall. Eleven northeastern Illinois counties were declared a Federal disaster. Twenty USGS streamgages recorded all-time record streamflows (table 14). As a result of the flood, a total of $103 million in disaster housing grants were issued, $49 million in personal property and small business loans were approved, and $6 million in small business loans were approved. There also were more than $2 million in State grants approved. Crop damage was likely in the tens of millions of dollars. Two deaths were directly attributed to the flood (National Oceanic and Atmospheric Administration, 1996b).

Excessive rainfall occurred on February 20–22, 1997. Between 3 to 4 inches of rain fell over parts of northern Illinois (National Oceanic and Atmospheric Administration, 1997a). Widespread flooding resulted from excessive rains falling on frozen soil. The upper Illinois River crested within a foot of the record from Morris downstream to LaSalle (National Oceanic and Atmospheric Administration, 1997b) on February 22. A 63-year-old woman died when she drove her car into a barricaded, flooded viaduct under railroad tracks in a south suburb of Chicago. The single largest effect of the excessive rains was felt along the Rock River where record flooding occurred. Near Joslin (streamgage 05446500, table 14), the Rock River reached a record crest of 18.88 feet.

A massive flood crest moved down the Ohio River during the first few weeks of March 1997. Approximately 10 inches of rain fell within a 1- to 3-day period in the middle Ohio River Valley from the Louisville, Kentucky, area to Cincinnati, Ohio. This resulted in the worst river flood in about 30 years along the Illinois shore, and one of the five worst on record (National Oceanic and Atmospheric Administration, 1997a).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

Figure 25. Location of streamgages with significant floods during 1994–98 water years for Illinois.

Table 14. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Illinois.

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Streamgage number (fig. 25)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03336645	Middle Fork Vermilion River above Oakwood, IL	432	1979–98	1994	20.46	15,500	4/13/94	20.46	15,500	N	25–50
03338780	North Fork Vermilion River near Bismarck, IL	262	1989–98	1994	22.45	20,100	4/12/94	22.45	20,100	N	5–10
03339000	Vermilion River near Danville, IL	1,290	1915–21, 1929, 1931–98	1939 1994	28.59 31.56	48,700 47,900	4/13/94	31.56	47,900	N	>100
03343400	Embarras River near Camargo, IL	186	1961–98	1994	17.33	8,040	4/12/94 5/11/96	17.33 16.43	8,040 6,740	N N	50–100 25
03378000	Bonpas Creek at Browns, IL	228	1941–98	1961	26.04	7,500	11/15/93	23.60	6,490	N	25–50
03378635	Little Wabash River near Effingham, IL	240	1967–98	1996	21.19	17,800	5/8/96	21.19	17,800	N	>100
03379500	Little Wabash River below Clay City, IL	1,131	1915–98	1950	26.67	47,000	5/19/95	26.08	43,700	N	30
03380500	Skillet Fork at Wayne City, IL	464	1909–12, 1915–21, 1929–98	1990 1961	25.75 25.80	59,400 51,000	5/18/95	23.71	38,100	N	40
05438500	Kishwaukee River at Belvidere, IL	538	1940–98	1994	14.19	11,900	2/20/94	14.19	11,900	N	25
05439500	South Branch Kishwaukee River near Fairdale, IL	387	1937, 1940–98	1996	13.37	25,400	2/20/94 7/18/96 2/21/97	10.31 13.37 10.71	8,790 25,400 9,940	N N N	10 >100 20
05440000	Kishwaukee River near Perryville, IL	1,099	1938, 1940–98	1996 1938	23.54 23.85	24,200 --	2/21/94 7/18/96 2/22/97	20.71 23.54 19.76	17,100 24,200 17,400	N N N	10–25 50–100 10–25
05443500	Rock River at Como, IL	8,753	1915–76, 1978–86, 1991–98	1973	15.66	59,700	5/29/96	13.58	48,300	N	25
05446000	Rock Creek at Morrison, IL	164	1940–71, 1978–98	1946 1997	-- 17.76	5,770 5,050	2/21/97	17.76	5,050	N	100

Table 14. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Illinois.—Continued

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Streamgage number (fig. 25)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05446500	Rock River near Joslin, IL	9,549	1940–98	1993 1997	18.35 18.88	46,500 41,000	5/31/96	18.73	44,800	N	10–25
05495500	Bear Creek near Marcelline, IL	349	1944–98	1996 1985	28.36 28.38	35,500 29,500	5/8/96	28.36	35,500	N	>100
05525500	Sugar Creek at Milford, IL	446	1949–98	1951 1994	20.90 28.16	22,900 19,400	4/12/94	28.16	19,400	N	10–25
05528230	Indian Creek at Prairie View, IL	36.0	1960–61, 1963–65, 1967–71, 1973–76, 1990–96	1996	7.10	1,800	5/17/96	7.10	1,800	N	200–500
05531500	Salt Creek at Western Springs, IL	115	1946–98	1987	10.54	3,540	2/21/97	9.35	2,510	N	25–50
05532500	Des Plaines River at Riverside, IL	630	1914–98	1987	9.90	9,770	2/22/97	8.45	6,990	N	20
05533000	Flag Creek near Willow Springs, IL	16.5	1960–98	1961	13.71	2,680	7/18/96	10.37	2,300	N	25–50
05533400	Sawmill Creek near Lemont, IL	13.0	1961–79, 1986–98	1996	17.53	3,070	7/18/96	17.53	3,070	N	200–300
05534400	North Branch Chicago River at Bannockburn, IL	15.8	1960–76, 1996	1996	17.54	3,070	7/18/96	17.54	3,070	N	--
05535000	Skokie River at Lake Forest, IL	13.0	1952–98	1997 1982	7.24 8.35	496 435	2/21/97	7.24	496	N	50–100
05535070	Skokie River near Highland Park, IL	21.1	1967–98	1987 1997	9.09 9.13	895 894	2/21/97	9.13	894	N	50–100
05536000	North Branch Chicago River at Niles, IL	100	1951–98	1987	11.35	2,590	2/21/97	10.63	2,260	N	25–50

Table 14. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Illinois.—Continued

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Streamgage number (fig. 25)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05536215	Thorn Creek at Glenwood, IL	24.7	1950–98	1996 1968	-- 11.26	2,700 2,600	7/18/96	--	2,700	N	25–50
05536255	Butterfield Creek at Flossmoor, IL	23.5	1948–55, 1957–98	1996	12.59	2,220	7/18/96	12.59	2,220	N	25–50
05536275	Thorn Creek at Thornton, IL	104	1947–98	1957 1981	16.00 17.06	4,700 4,140	7/18/96	16.24	4,470	N	30
05536500	Tinley Creek near Palos Park, IL	11.2	1951–55, 1957–98	1996 1955	10.25 10.30	2,010 1,930	7/18/96	10.25	2,010	N	50–100
05536995	Chicago Sanitary and Ship Canal at Romeoville, IL	739	1985–98	1997 1996	23.95 25.08	19,466 19,448	2/21/97 7/18/96	23.95 25.08	19,466 19,448	Y Y	-- --
05537500	Long Run near Lemont, IL	20.9	1951–98	1996	11.10	5,310	7/18/96	11.10	5,310	N	>500
05540060	Kress Creek at West Chicago, IL	18.1	1961–80, 1986–98	1996	9.24	1,980	7/18/96	9.24	1,980	N	>500
05540095	West Branch Du Page River near Warrenville, IL	90.4	1969–98	1996	6.41	3,470	7/18/96	6.41	3,470	N	200–500
05540130	West Branch Du Page River near Naperville, IL	123	1989–98	1996	14.31	6,620	7/18/96	14.31	6,620	N	>500
05540195	Saint Joseph Creek at U.S. Route 34 at Lisle, IL	11.1	1989–98	1996	12.89	1,280	7/18/96	12.89	1,280	N	>500
05540250	East Branch Du Page River at Bolingbrook, IL	75.8	1989–98	1996	23.75	3,980	7/18/96	23.75	3,980	N	>500
05540275	Spring Brook at 87th Street near Naperville, IL	9.90	1988–98	1996	10.77	1,750	7/18/96	10.77	1,750	N	25–50
05540500	Du Page River at Shorewood, IL	324	1941–98	1996	14.03	17,300	7/18/96	14.03	17,300	N	>500

Table 14. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Illinois.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 25)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05543500	Illinois River at Marseilles, IL	8,259	1892, 1894–98, 1900, 1904–98	1997 1922	16.85 20.10	95,000 60,600	2/22/97	16.85	95,000	Y	100–200
05548280	Nippersink Creek near Spring Grove, IL	192	1960, 1966–98	1986	14.26	2,910	2/21/94	13.66	2,830	N	10–25
05549850	Flint Creek near Fox River Grove, IL	37.0	1960, 1962–76, 1990–96	1996	5.88	690	5/21/96	5.88	690	N	>500
05550500	Poplar Creek at Elgin, IL	35.2	1952–98	1997	6.78	1,180	2/21/97	6.78	1,180	N	200
05551200	Ferson Creek near Saint Charles, IL	51.7	1961–83, 1985–98	1997	8.77	2,580	7/18/96 2/21/97	7.79 8.77	1,990 2,580	N N	10–25 50–100
05551700	Blackberry Creek near Yorkville, IL	70.2	1961–98	1996	13.16	5,510	7/18/96	13.16	5,510	N	>500
05552500	Fox River at Dayton, IL	2,642	1915–24, 1926–98	1996 1955	24.47 24.63	55,400 47,100	7/19/96 2/22/97	24.47 21.46	55,400 41,200	N N	>500 200–500
05556500	Big Bureau Creek at Princeton, IL	196	1937–98	1974	16.01	12,500	2/21/97	15.73	12,000	N	50
05557500	East Bureau Creek near Bureau, IL	99.0	1937–91, 1993–98	1997 1938	17.09 17.39	9,260 6,200	2/21/97	17.09	9,260	N	100–200
05558300	Illinois River at Henry, IL	13,543	1982–98	1997 1982	27.19 30.75	117,000 104,000	2/23/97	27.19	117,000	Y	--
05568800	Indian Creek near Wyoming, IL	62.7	1960–98	1974 1997	13.81 23.00	6,540 4,710	2/21/97	23.00	4,710	N	25–50
05570910	Sangamon River at Fisher, IL	240	1979–98	1994	21.58	13,000	4/12/94	21.58	13,000	N	25–50
05572000	Sangamon River at Monticello, IL	550	1908–13, 1915–98	1927 1994	18.50 19.06	19,000 15,900	4/13/94	19.06	15,900	N	30

Table 14. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Illinois.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 25)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05573540	Sangamon River at Route 48 at Decatur, IL	938	1983–98	1994 1983	21.12 23.04	17,100 12,400	4/15/94	21.12	17,100	Y	--
05576000	South Fork Sangamon River near Rochester, IL	867	1950–98	1994	32.40	20,300	4/14/94	32.40	20,300	N	50–100
05576500	Sangamon River at Riverton, IL	2,618	1908–12, 1915–27, 1929–31, 1933–73, 1975–79, 1981–98	1943 1927	31.52 32.04	68,700 41,000	4/13/94	28.28	46,300	N	50–100
05577500	Spring Creek at Springfield, IL	107	1948–98	1996	16.23	10,700	5/8/96	16.23	10,700	N	50–100
05583000	Sangamon River near Oakford, IL	5,093	1910–12, 1915–18, 1921–22, 1926–29, 1931–98	1943	25.63	123,000	4/15/94	23.21	78,100	N	50–100
05585000	La Moine River at Ripley, IL	1,293	1921–98	1985 1995	29.07 29.15	28,000 26,100	5/18/95 5/8/96	29.15 29.07	26,100 26,100	N N	25–50 25–50
05586000	North Fork Mauvaise Terre Creek near Jacksonville, IL	29.1	1950–90, 1992–98	1994 1990	12.35 12.77	7,160 4,600	4/12/94 5/8/96	12.35 12.04	7,160 5,670	N N	50–100 25–50
05586500	Hurricane Creek near Roodhouse, IL	2.30	1951–90, 1992–95	1957	11.77	1,700	4/12/94	10.95	995	N	25–50
05587000	Macoupin Creek near Kane, IL	868	1921–33, 1941–98	1994 1991	28.32 --	40,100 13,700	4/12/94	28.32	40,100	N	50–100
05587900	Cahokia Creek at Edwardsville, IL	212	1969–98	1979	24.74	8,200	5/18/95	21.75	7,310	N	--
05591200	Kaskaskia River at Cooks Mills, IL	473	1971–98	1994	17.30	9,950	4/13/94	17.30	9,950	N	10–25

Table 14. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Illinois.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 25)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05591550	Whitley Creek near Allenville, IL	34.6	1980–98	1996	12.62	3,200	4/29/96	12.62	3,200	N	100
05591700	West Okaw River near Lovington, IL	112	1980–98	1996	16.40	10,300	5/8/96	16.40	10,300	N	100–200
05592000	Kaskaskia River at Shelbyville, IL	1,054	1908–13, 1939, 1941–98	1957	22.37	25,900	3/22/98	12.99	5,580	Y	2–5
05592575	Hickory Creek near Brownstown, IL	44.2	1989–98	1994	16.43	6,250	11/14/93	16.43	6,250	N	5–10
05593000	Kaskaskia River at Carlyle, IL	2,719	1908–12, 1915, 1930–98	1943	33.70	54,400	5/10/96 4/10/98	23.34 23.39	12,300 12,200	Y Y	<2 <2
05593575	Little Crooked Creek near New Minden, IL	84.3	1968–98	1995	21.76	11,900	5/17/95 4/29/96	21.76 21.42	11,900 11,300	N N	10–25 10–25
05594100	Kaskaskia River near Venedy Station, IL	4,393	1970–98	1995	25.79	50,300	5/19/95	25.79	50,300	Y	--
05594800	Silver Creek near Freeburg, IL	464	1971–98	1995	25.38	15,300	5/19/95	25.38	15,300	N	25–50
05595200	Richland Creek near Hecker, IL	129	1970–98	1996	44.40	23,400	4/29/96	44.40	23,400	N	>500
05595730	Rayse Creek near Waltonville, IL	88.0	1980–98	1994	17.73	21,200	11/14/93	17.73	21,200	N	10–25
05597000	Big Muddy River at Plumfield, IL	794	1909–12, 1915–98	1961 1983	29.56 31.84	42,900 11,800	5/1/96	31.83	14,200	Y	5–10
05597500	Crab Orchard Creek near Marion, IL	31.7	1952–98	1996	13.60	9,270	5/11/96 5/31/97	13.60 13.21	9,270 6,970	N N	>500 >500
05599500	Big Muddy River at Murphysboro, IL	2,169	1916–17, 1919, 1931–98	1996 1961	36.33 37.77	33,800 33,300	5/2/96	36.33	33,800	Y	25–50

[1]Regulated during flood: N, no; Y, yes.

Indiana

Widespread excessive rain and embedded thunderstorms began late April 10, 1994, and continued periodically through April 12, producing anywhere from 3 to 7 inches of rain across much of the State (National Oceanic and Atmospheric Administration, 1994a). As a result, flooding occurred across many parts of Indiana. The main exceptions were in the extreme north and extreme south. Record flooding occurred April 12–15 on Mud Pine and Sugar Creeks, along Big Pine Creek, and along the Vermilion River (fig. 26). The Vermilion River exceeded its record flood of 1939 by 3 to 4 feet (National Oceanic and Atmospheric Administration, 1994b). Other rivers, including the Wabash, White, East Fork White, Tippecanoe, Eel, Maumee, and St. Mary Rivers, exceeded their banks along nearly their entire lengths for a 1- to 2-week period. These were the highest floodwaters in many of these rivers since 1991. A man died in floodwaters, apparently when his truck was washed into a ditch by high, fast-moving water east of Medora, Indiana (National Oceanic and Atmospheric Administration, 1994b).

Torrential rains caused the worst flooding since 1959 across many southern Indiana locations during April 1996. Between 5 and 9 inches of rain fell April 28–29 (National Oceanic and Atmospheric Administration, 1996a). The most notable flooding occurred along the Blue River. The Blue River crested at 27.15 feet at Fredericksburg (streamgage 03302800, table 15) and 28.9 feet at Milltown (National Oceanic and Atmospheric Administration, 1996b). Major flooding occurred along the Whitewater River in east-central and southeastern Indiana. The river level below Brookville Lake reached its highest stage since 1968. The excessive rainfall also resulted in the lake level rising to nearly 4 feet above the previous record pool elevation (National Oceanic and Atmospheric Administration, 1996a).

Widespread rainfall amounts of about 10 inches in the middle Ohio River Valley, from around Louisville, Kentucky, to Cincinnati, Ohio, occurred during a 1- to 3-day period during the last week in April 1996 (National Oceanic and Atmospheric Administration, 1996a). The Ohio River rose rapidly and reached a crest of 60.7 feet on May 6 at Markland Dam, which is just across the river in Kentucky. This resulted in a massive flood crest that took a few weeks to travel down the Ohio River. The resultant flood was the worst in about 30 years, and one of the five worst on record.

More than 7 inches of rain fell in a 12-hour period on July 18, 1996, near the city of Huntington, Indiana (National Oceanic and Atmospheric Administration, 1996a), causing flash flooding. Damage to the city alone was estimated at $1.5 million (National Oceanic and Atmospheric Administration, 1996b). The flooding in this area was the worst since 1959.

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National Oceanic and Atmospheric Administration (NOAA), 1994b–96b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

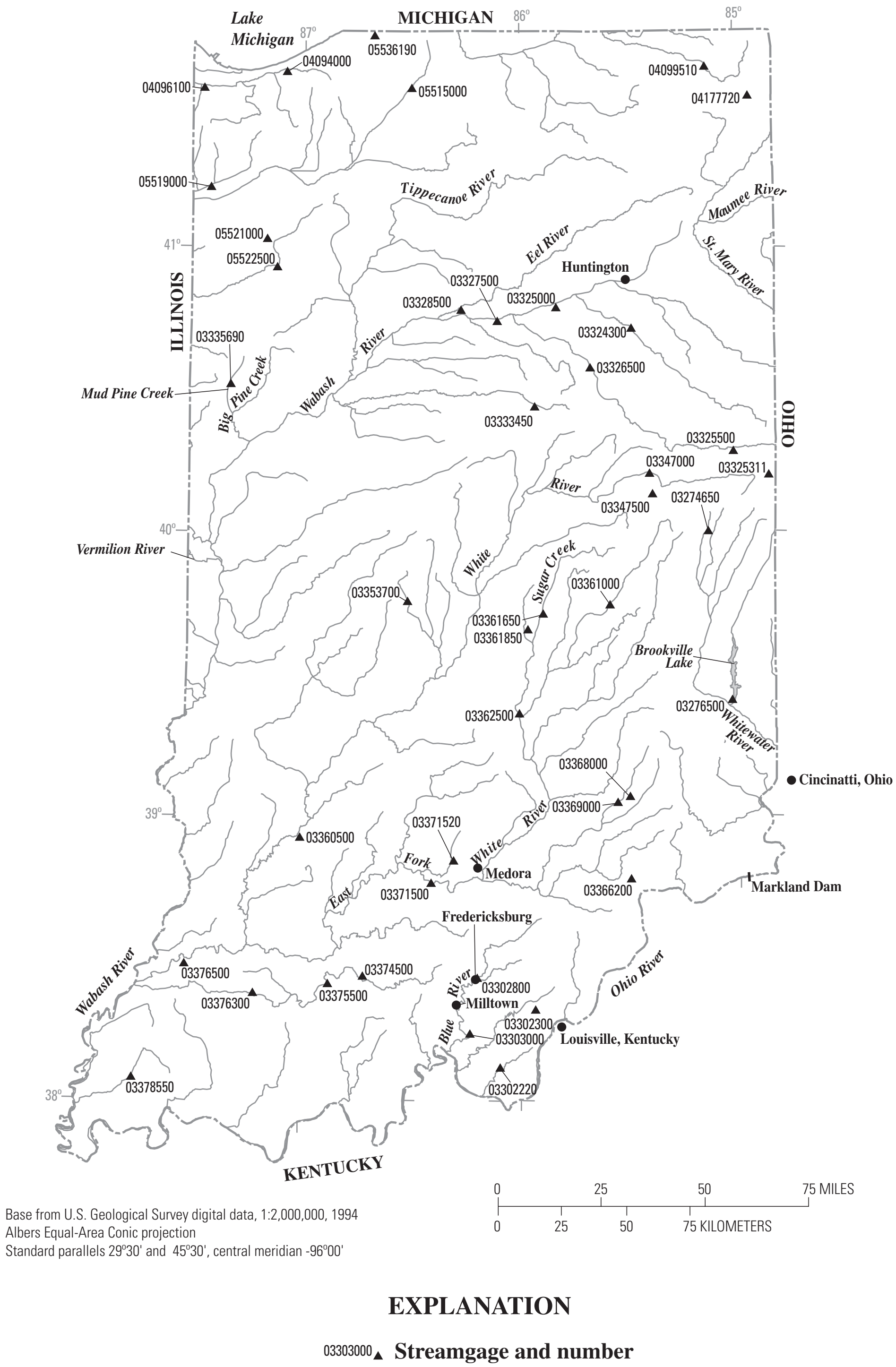

Figure 26. Location of streamgages with significant floods during 1994–98 water years for Indiana.

Table 15. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Indiana.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 26)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03274650	Whitewater River near Economy, IN	10.4	1971–99	1994	8.91	1,120	11/14/93	8.91	1,120	N	10–25
03276500	Whitewater River at Brookville, IN	1,224	1913, 1916–20, 1924–99	1959 1913	27.78 39.00	81,800 --	4/29/96	21.86	49,200	Y	25–50
03302220	Buck Creek near New Middletown, IN	65.2	1970–99	1997	17.26	20,500	3/2/97	17.26	20,500	N	50–100
03302300	Little Indian Creek near Galena, IN	16.1	1969–99	1997	9.79	6,110	3/1/97	9.79	6,110	N	25–50
03302800	Blue River at Fredericksburg, IN	283	1969–99	1996	27.15	39,000	4/29/96	27.15	39,000	N	>100
03303000	Blue River near White Cloud, IN	476	1910–13, 1915–16, 1932–99	1996	23.30	29,400	4/30/96	23.30	29,400	N	50
03324300	Salamonie River near Warren, IN	425	1958–99	1998 1959	16.82 17.05	13,500 13,200	8/5/98	16.82	13,500	N	25–50
03325000	Wabash River at Wabash, IN	1,768	1913, 1924–99	1943 1913	24.22 28.70	49,600 90,000	7/19/96 7/22/98	18.47 18.98	18,800 20,000	Y Y	10–25 10–25
03325311	Little Mississinewa River at Union City, IN	9.67	1983–97	1994 1987	8.23 8.67	625 315	11/14/93	8.23	625	N	10–25
03325500	Mississinewa River near Ridgeville, IN	133	1947–99	1958	16.25	13,900	11/14/93	15.35	10,000	N	25–50
03326500	Mississinewa River at Marion, IN	682	1913, 1924–99	1927 1913	17.40 19.20	25,000 --	8/5/98	16.00	21,500	Y	10–25
03327500	Wabash River at Peru, IN	2,686	1913, 1943–99	1943 1913	24.46 28.10	68,000 115,000	7/22/98	--	21,100	Y	10–25
03328500	Eel River near Logansport, IN	789	1943–99	1985 1943	12.68 13.20	17,700 17,000	7/23/98	11.77	14,800	N	10–25
03333450	Wildcat Creek near Jerome, IN	146	1913, 1962–99	1992 1913	13.31 18.00	7,120 --	6/12/98	13.43	6,940	N	10–25

Table 15. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Indiana.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 26)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03335690	Mud Pine Creek near Oxford, IN	39.4	1971–99	1994	16.98	12,100	4/12/94	16.98	12,100	N	>100
03347000	White River at Muncie, IN	241	1904, 1913, 1924–29, 1931–89, 1991–99	1964 1913	11.98 19.60	14,300 --	11/15/93	13.00	10,500	Y	10–25
03347500	Buck Creek near Muncie, IN	35.5	1955–99	1964	13.96	1,780	11/15/93	13.69	1,730	N	50
03353700	West Fork White Lick Creek at Danville, IN	28.8	1957–99	1957	16.00	6,660	2/27/97	12.08	5,120	N	25–50
03360500	White River at Newberry, IN	4,688	1897, 1908–99	1913	27.50	130,000	11/18/93	25.87	105,000	Y	100
03361000	Big Blue River at Carthage, IN	184	1949, 1951–99	1963	14.62	12,900	11/14/93	12.91	8,410	N	25–50
03361650	Sugar Creek at New Palestine, IN	93.9	1968–99	1994 1991	10.08 10.31	2,340 2,220	11/14/93	10.08	2,340	N	25–50
03361850	Buck Creek at Acton, IN	78.8	1968–99	1969	14.99	7,140	11/14/93	14.44	6,310	N	50–100
03362500	Sugar Creek near Edinburgh, IN	474	1943–99	1956	18.38	27,600	11/15/93	17.05	20,500	N	25
03366200	Harberts Creek near Madison, IN	9.31	1969–99	1990	8.96	2,150	4/29/96	7.67	1,970	N	25–50
03368000	Brush Creek near Nebraska, IN	11.4	1956–99	1981	12.99	9,360	4/16/98	12.20	5,200	N	50
03369000	Vernon Fork Muscatatuck River near Butlerville, IN	85.9	1942–99	1959	25.41	26,200	4/16/98	21.54	18,500	Y	50–100
03371500	East Fork White River near Bedford, IN	3,861	1913, 1940–99	1996	36.32	80,500	5/1/96	36.32	80,500	N	25
03371520	Back Creek at Leesville, IN	24.1	1913, 1971–99	1973 1913	14.00 18.10	15,300 --	4/16/98	11.18	8,590	N	10–25

Table 15. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Indiana.—Continued

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Streamgage number (fig. 26)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03374500	Patoka River near Cuzco, IN	170	1913, 1962–99	1964	20.02	14,700	6/1/96	--	2,830	Y	--
03375500	Patoka River at Jasper, IN	262	1913, 1937, 1948–99	1964 1961	15.17 20.62	14,100 13,700	4/30/96	17.21	6,370	Y	--
03376300	Patoka River at Winslow, IN	603	1937, 1961, 1964–74, 1987–99	1964 1937	28.84 28.90	15,500 --	5/2/96	27.37	11,600	Y	--
03376500	Patoka River near Princeton, IN	822	1935–99	1937 1996	-- 24.35	18,700 13,900	5/4/96	24.35	13,900	Y	--
03378550	Big Creek near Wadesville, IN	104	1966–99	1996	20.35	10,400	4/29/96	20.35	10,400	N	50–100
04094000	Little Calumet River at Porter, IN	66.2	1945–99	1991 1955	10.93 11.66	3,880 3,110	5/10/96	10.63	3,400	N	25–50
04096100	Galena River near Laporte, IN	17.2	1970–99	1991 1993	-- 7.04	900 617	5/10/96	7.00	874	N	25–50
04099510	Pigeon Creek near Angola, IN	106	1946–99	1996 1950	10.92 14.95	1,000 744	5/21/96	10.92	1,000	N	100
04177720	Fish Creek at Hamilton, IN	37.5	1970–99	1996	14.49	1,510	5/17/96	14.49	1,510	N	>100
05515000	Kankakee River near North Liberty, IN	174	1951–99	1982 1968	9.01 9.04	908 629	7/19/96	8.84	891	N	50
05519000	Singleton Ditch at Schneider, IN	123	1949–88 1990–99	1976 1991	11.24 12.54	3,550 2,460	6/16/97	12.05	2,270	N	10–25
05521000	Iroquois River at Rosebud, IN	35.6	1949–99	1991 1959	7.93 8.86	656 383	10/17/93	7.28	569	N	25–50
05522500	Iroquois River at Rensselaer, IN	203	1910, 1949–99	1958	16.54	2,550	10/18/93	15.52	2,520	N	50–100
05536190	Hart Ditch at Munster, IN	70.7	1943–99	1991	8.72	3,010	7/18/96 2/21/97	8.03 8.00	2,710 2,700	N N	10–25 10–25

[1]Regulated during flood: N, no; Y, yes.

Iowa

Rainfall of 4 to 7 inches was common in central Iowa near Boone (fig. 27) June 16 and 17, 1996 (National Oceanic and Atmospheric Administration, 1996a). Doppler radar precipitation estimates were as high as 8.5 inches in the area. The South Skunk River crested at an all time high discharge. Crop damage was extensive as well with many fields becoming flooded. Total damage in Ames and surrounding areas was believed to be several million dollars (National Oceanic and Atmospheric Administration, 1996b). Intense thunderstorms returned within a week, and additional flooding occurred throughout Iowa. Precipitation totals for some areas were more than 15 inches in 2 days. The flash flooding was considered the worst since the summer of 1993.

Significant ice jams formed along the downstream reaches of the Raccoon River on February 19, 1997. A woman was driving across a flood-plain road south of Des Moines when one of the ice jams suddenly broke. The water rose quickly and swept her vehicle off the road with her in it, and she drowned (National Oceanic and Atmospheric Administration, 1997b).

In June 1998, a strong upper level system, combined with a warm front located to the south of Iowa, set the stage for a major flood. Iowa soils were already saturated before the flood began. Extremely intense rain fell over southwestern and central Iowa from this storm. Southwestern Iowa was the hardest hit as more than 13.18 inches of rain fell at Atlantic on June 14 (National Oceanic and Atmospheric Administration, 1998a). This amount of rain set a State record for the greatest 24-hour rainfall total from an official site. Damage was more than a $1 million (National Oceanic and Atmospheric Administration, 1998b). The East Nishnabotna River near Atlantic crested at 22.36 feet on June 15 (streamgage 06809210, table 16), missing the all-time record by about 0.5 foot set in September 1972 (Fischer, 1999). Very intense rains of 2 to 4 inches also fell over the Raccoon and South Skunk River Basins, resulting in widespread flooding. Both the North and South Raccoon Rivers flooded. The flood waves from both rivers merged on the main stem to create the second highest crest on record for the Racoon River. Only the great flood of 1993 created higher crests. Following a brief break from the rain on June 16, rainfall resumed June 17–18. Excessive rain fell over just about the entire State on both days, with amounts of 1 to 3 inches of rain on the first night in the Nishnabotna, upper Des Moines, and the downstream parts of the South Skunk River Basins (National Oceanic and Atmospheric Administration, 1998a). These rains fell on already saturated soils and resulted in considerable runoff. On the 18th, the Des Moines metropolitan area was blitzed with massive flooding. Local rains of 1 to 4 inches fell in the city, much of it falling in 1 to 2 hours (National Oceanic and Atmospheric Administration, 1998a). Much of this water was quickly added to the flows on the already high Raccoon River. Cleanup and repair of the damage from this flood alone were estimated at $12 million (National Oceanic and Atmospheric Administration, 1998b). Numerous rivers south of Des Moines flooded as well. On June 21–23, flooding occurred in the southwestern part of the State. The main rivers affected by the June flood episodes were the East Nishnabotna, Nishnabotna, and Raccoon Rivers, the Des Moines River in the vicinity of Des Moines, and the South Skunk River and Squaw Creek in the vicinity of Ames. The crop-damage estimate from these June 1998 floods totaled more than $100 million (National Oceanic and Atmospheric Administration, 1998b).

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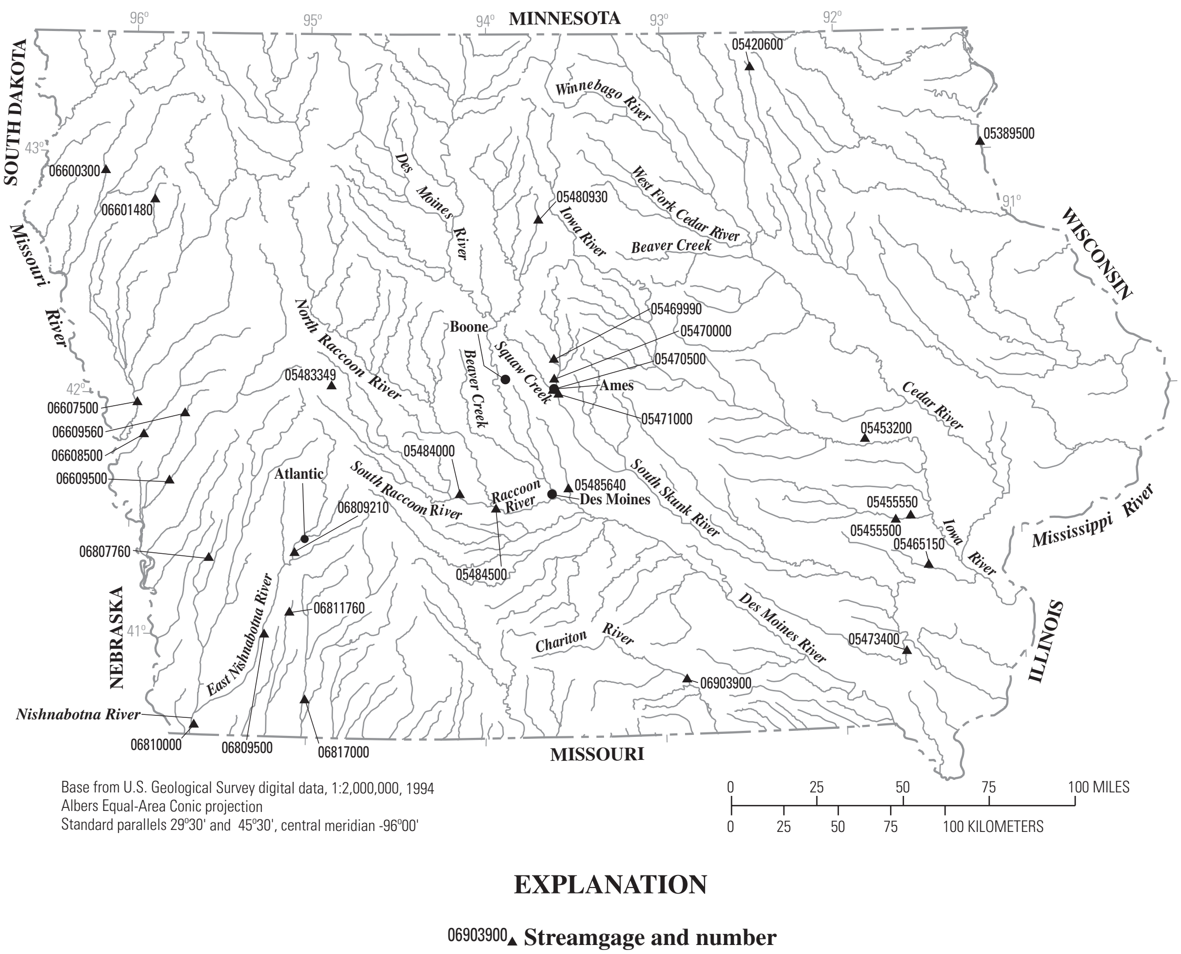

Figure 27. Location of streamgages with significant floods during 1994–98 water years for Iowa.

Table 16. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Iowa.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 27)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05389500	Mississippi River at McGregor, IA	67,500	1880, 1937–98	1965	25.38	276,000	4/15/97	21.38	201,000	Y	25
05420600	Little Wapsipinicon River tributary near Riceville, IA	1.10	1953–98	1997	5.91	3,300	3/11/97	5.91	3,300	N	--
05453200	Price Creek at Amana, IA	29.1	1966–86, 1989–98	1997	87.16	3,770	2/19/97	87.16	3,770	N	--
05455500	English River at Kalona, IA	573	1930, 1940–98	1993	22.55	36,100	5/11/96	21.06	25,100	N	35–40
05455550	Bulgers Run near Riverside, IA	6.31	1965–87, 1989, 1992–98	1965	89.04	3,080	5/10/96	88.10	2,780	N	--
05465150	North Fork Long Creek at Ainsworth, IA	30.2	1965–98	1997	90.44	5,000	2/19/97	90.44	5,000	N	--
05469990	Keigley Branch near Story City, IA	31.0	1966–98	1996	92.26	3,440	6/17/96	92.26	3,440	N	40–60
05470000	South Skunk River near Ames, IA	315	1921–27, 1930, 1933–98	1996	15.89	14,000	7/17/96	15.89	14,000	N	>500
05470500	Squaw Creek at Ames, IA	204	1918, 1920–27, 1965–98	1993	18.54	24,300	6/17/96	15.29	12,700	N	60–80
05471000	South Skunk River below Squaw Creek near Ames, IA	556	1944, 1953–79, 1990, 1992–98	1993 1975	25.53 25.57	26,500 14,700	6/17/96	25.13	24,400	N	>500

Table 16. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Iowa.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 27)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05473400	Cedar Creek near Oakland Mills, IA	530	1979–98	1996 1993	21.03 21.27	12,300 8,920	5/28/96	21.03	12,300	N	50–75
05480930	White Fox Creek at Clarion, IA	13.3	1966–98	1995 1993	92.91 93.59	1,700 1,400	6/29/95	92.91	1,700	N	--
05483349	Middle Raccoon River tributary at Carroll, IA	6.58	1966–98	1996	25.88	4,600	7/17/96	25.88	4,600	N	75–100
05484000	South Raccoon River at Redfield, IA	994	1940–98	1993 1958	26.98 29.04	44,000 35,000	6/15/98	24.67	35,100	N	50–70
05484500	Raccoon River at Van Meter, IA	3,441	1915–98	1993	26.34	70,100	6/15/98	23.29	47,400	N	40–50
05485640	Fourmile Creek at Des Moines, IA	92.7	1972–79, 1981–98	1998	15.00	5,600	6/18/98	15.00	5,600	N	10–20
06600300	West Branch Floyd River near Struble, IA	180	1956–94, 1996–98	1994 1983	15.86 15.86	8,920 7,590	3/4/94	15.86	8,920	N	15–20
06601480	Big Whiskey Slough near Remsen, IA	12.9	1967, 1969–71, 1973, 1975, 1978–86, 1988–90, 1993–98	1996 1979	93.56 94.87	1,210 --	6/21/96	93.56	1,210	N	--
06607500	Little Sioux River near Turin, IA	3,526	1940–98	1996 1971	26.99 27.44	32,000 30,000	6/22/96	26.99	32,000	N	10–15
06608500	Soldier River at Pisgah, IA	407	1940–98	1996	28.87	34,700	7/17/96	28.87	34,700	N	70–90
06609500	Boyer River at Logan, IA	871	1881, 1918–25, 1938–98	1990 1965	22.54 25.22	30,800 --	7/17/96	23.87	28,700	N	30–35

Table 16. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Iowa.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 27)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06609560	Willow Creek near Soldier, IA	29.1	1966–77, 1979–98	1993	84.66	6,840	7/17/96	83.02	5,660	N	20–30
06807760	Middle Silver Creek near Oakland, IA	25.7	1953–98	1998	15.63	2,540	7/14/98	15.63	2,540	N	60–80
06809210	East Nishnabotna River near Atlantic, IA	436	1958, 1961–98	1998 1972	22.36 22.81	41,400 26,700	6/15/98	22.36	41,400	N	200–300
06809500	East Nishnabotna River at Red Oak, IA	894	1917–25, 1936–98	1998	29.39	60,500	6/15/98	29.39	60,500	N	>500
06810000	Nishnabotna River above Hamburg, IA	2,806	1917, 1922–23, 1929–98	1998	33.18	65,100	6/17/98	33.18	65,100	N	>500
06811760	Tarkio River near Elliott, IA	10.7	1952–87, 1989–91, 1993, 1996–98	1998	14.68	5,000	6/14/98	14.68	5,000	N	--
06817000	Nodaway River at Clarinda, IA	762	1918–25, 1936–98	1947	25.30	31,100	6/15/98	23.89	30,200	N	20
06903900	Chariton River near Rathbun, IA	549	1957–98	1960	25.30	21,800	12/14/93	14.94	2,780	Y	--

[1]Regulated during flood: N, no; Y, yes.

Kansas

Approximately 10 inches of rain fell April 9–11, 1994, over much of southeastern Kansas (National Oceanic and Atmospheric Administration, 1994a). At Farlington (fig. 28), rainfall measured 11.25 inches. Many streams and rivers exceeded flood stage throughout the area. The Fall, Marmaton, Neosho, and Verdigris Rivers all exceeded flood stage (National Oceanic and Atmospheric Administration, 1994b). In Fort Scott, the Marmaton River crested almost 10 feet above flood stage. The Neosho River was out of its banks from Iola to the Oklahoma border. Excessive rains returned at the end of April with many of the same streams going out of their banks for the second time (table 17).

Minor to moderate flooding occurred across extreme northeastern and east-central Kansas during May 1995. The floods were caused by above-normal rainfall through the month. The Kansas City area experienced its wettest May in 106 years of record, with a 12.75-inch deluge (National Oceanic and Atmospheric Administration, 1995a). This was 7.71 inches above normal and easily eclipsed the previous record rainfall of 11.00 inches set in 1915. Most rivers only went a few feet above their respective flood stage, but at Osawatomie on the Marais des Cygnes River (National Oceanic and Atmospheric Administration, 1995b), the level topped out 10.6 feet above flood stage. The Missouri River remained above flood stage at Atchison and Leavenworth into June.

Intense rain of 5 to 12 inches fell over parts of extreme southeastern Kansas during September 13–15, 1998 (National Oceanic and Atmospheric Administration, 1998a). Unofficial reports of rainfall as high as 14 inches were reported west of Fort Scott in the Marmaton River Basin. The stage of the Marmaton River at Fort Scott reached 50.05 feet on September 14, which is the second highest stage ever recorded.

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

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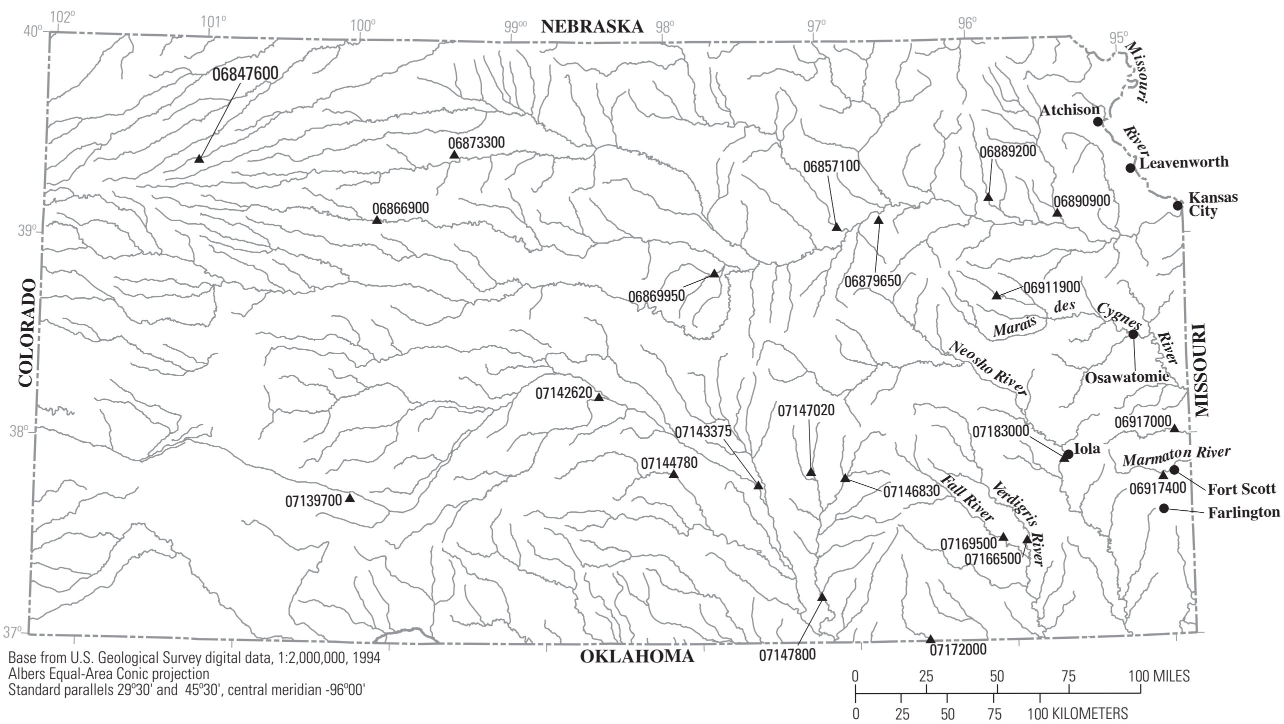

EXPLANATION

07144780▲ Streamgage and number

Figure 28. Location of streamgages with significant floods during 1994–98 water years for Kansas.

Table 17. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Kansas.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 28)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06847600	Prairie Dog Creek tributary at Colby, KS	7.53	1957–97	1975	27.44	4,300	6/15/96	16.60	1,400	N	25
06857100	Republican River below Milford Dam, KS	24,890	1964–98	1993 1964	21.52 22.10	33,700 17,200	12/11/97	16.03	18,700	Y	--
06866900	Saline River near Wakeeney, KS	696	1950, 1956–66, 1982–98	1957 1950	19.40 27.00	13,000 --	9/18/95	16.20	7,040	Y	5
06869950	Mulberry Creek near Salina, KS	261	1961–89, 1991–98	1995	27.14	8,440	5/28/95	27.14	8,440	N	10–25
06873300	Ash Creek tributary near Stockton, KS	.89	1957–93, 1995–98	1996 1993	14.79 15.54	1,380 530	8/3/96	14.79	1,380	N	50–100
06879650	Kings Creek near Manhattan, KS	4.09	1980–98	1995	13.98	10,200	5/13/95	13.98	10,200	N	25
06889200	Soldier Creek near Delia, KS	157	1951, 1959–98	1982 1951	23.95 24.00	29,400 --	5/13/95	23.09	19,900	N	100
06890900	Delaware River below Perry Dam, KS	1,117	1970–98	1995 1970	-- --	14,000 9,920	5/31/95	--	14,000	Y	--
06911900	Dragoon Creek near Burlingame, KS	114	1946, 1961–98	1977 1946	22.05 23.40	24,800 --	5/17/95	22.80	20,200	N	50
06917000	Little Osage River at Fulton, KS	295	1949–98	1987	35.21	62,800	4/28/94	32.61	38,000	N	50–100
06917400	Marmaton River tributary near Fort Scott, KS	2.80	1957–98	1998	17.23	2,160	9/14/98	17.23	2,160	N	25
07139700	Arkansas River tributary near Dodge City, KS	8.66	1957–89, 1992–98	1997	16.32	1,730	9/12/97	16.32	1,730	N	>100
07142620	Rattlesnake Creek near Raymond, KS	1,167	1961–98	1973	8.74	2,140	5/28/95	8.37	1,530	Y	--

Table 17. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Kansas.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 28)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07143375	Arkansas River near Maize, KS	39,110	1987–98	1993	16.84	44,900	5/28/95	15.03	26,700	Y	--
07144780	North Fork Ninnescah River above Cheney Reservoir, KS	787	1966–98	1980	11.65	87,000	5/27/95	10.93	47,900	N	25–50
07146830	Walnut River at Highway 54 east of El Dorado, KS	350	1982–98	1995	16.90	13,000	6/9/95	16.90	13,000	Y	--
07147020	Whitewater River tributary near Towanda, KS	.17	1963–98	1995	16.59	540	6/9/95	16.59	540	N	100
07147800	Walnut River at Winfield, KS	1,880	1898, 1904, 1915, 1922–98	1944 1929	38.30 41.00	105,000 94,400	6/10/95	37.30	85,800	Y	25–50
07166500	Verdigris River near Altoona, KS	1,138	1939–98	1951	31.09	71,000	4/28/94	27.19	31,000	Y	5
07169500	Fall River at Fredonia, KS	827	1904, 1923, 1927–28, 1939–98	1945	36.17	49,000	4/28/94	31.94	31,000	Y	5
07172000	Caney River near Elgin, KS	445	1939–98	1987	42.35	104,000	7/3/95	29.64	43,200	N	10
07183000	Neosho River near Iola, KS	3,818	1885, 1895–1904, 1918–98	1951	43.00	436,000	4/28/94	27.95	37,100	Y	2–5

[1]Regulated during flood: N, no; Y, yes.

Kentucky

During May 1995, the Mississippi River was well above flood stage, and the Ohio River was also flooding. Near the confluence of these rivers at Wickliffe, Kentucky (fig. 29), the worst flooding occurred since 1973. The bridge over the Ohio River between Cairo, Illinois, and Wickliffe, Kentucky, was closed for the first time since 1973. A state of emergency was declared in four Kentucky counties along the Mississippi River.

Excessive rainfall of 7 to 9 inches of rain fell during a 6-hour period in central Kentucky on July 19, 1996 (National Oceanic and Atmospheric Administration, 1996a), which created flash floods that caused more than $2 million in property damage (National Oceanic and Atmospheric Administration, 1996b). On July 31, excessive rains just south of Cincinnati, Ohio, created flood conditions on creeks and small rivers in north-central Kentucky. Damage totaled nearly $7 million (National Oceanic and Atmospheric Administration, 1996b).

On March 1, 1997, a severe weather situation with tornadoes and very intense rainfall occurred along a nearly stationary front from Texas to West Virginia. Excessive rains totaling more than 12 inches occurred at many locations in Kentucky (National Oceanic and Atmospheric Administration, 1997a). Flooding killed 21 persons, 101 counties were declared Federal disaster areas, and estimated damage in Kentucky was $250 to 500 million (National Oceanic and Atmospheric Administration, 1997b). The Ohio River crested on March 7 (70.5 feet) at Louisville (streamgage 03294500, table 18) at about 16 feet above flood stage. The town of Falmouth (population 2,700) was almost totally destroyed (National Oceanic and Atmospheric Administration, 1997b). Record flooding occurred all along the Licking River Basin as 24-hour rainfall amounts beginning early March 1, 1997, totaled from 6 to 10 inches (National Oceanic and Atmospheric Administration, 1997a). The South Fork Licking River at Cynthiana (streamgage 03252500, table 18) crested 8 feet above flood stage at a record 28.03 feet on March 2. The Licking River at Blue Licks Spring crested 22.6 feet above flood stage at a record 47.6 feet on March 2 (National Oceanic and Atmospheric Administration, 1997b).

The record rainfall lead to major flooding along the Salt River Basin including the Rolling Fork. The Salt River at Shepherdsville (streamgage 03298500, table 18) crested at 40.9 feet on March 2. This was the worst flooding here since March 1964. The Rolling Fork near Boston (streamgage 03301500, table 18) crested at a record level of 53.2 feet on March 2. The Green River at Rochester crested at 30.7 feet on March 7 (National Oceanic and Atmospheric Administration, 1997b). This is the second highest stage on record. The record rainfall caused the highest stage on the Kentucky River at Frankfort (streamgage 03287500, table 18) since 1978 when the river crested at 45.22 feet on March 3.

The excessive rains in March 1997 caused the worst flooding on the Ohio River since 1964 and in some spots since 1937. On March 8 the river crested at a record 52.4 feet at Cannelton Dam at Cannelton, Indiana (streamgage 03303280, table 18) and at 50.4 feet at Tell City, Indiana (National Oceanic and Atmospheric Administration, 1997b). The crest at Paducah, nearly 52 feet (National Oceanic and Atmospheric Administration, 1997b), was the highest since 1950, and one of the worst floods on record.

Excessive rainfall from thunderstorms caused flash floods on April 17 and 18 and general flooding on April 19 and 20 in southeastern Kentucky. Flooding was especially severe along the Right and Left Forks of Beaver Creek (National Oceanic and Atmospheric Administration, 1997b).

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National Oceanic and Atmospheric Administration (NOAA), 1996b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

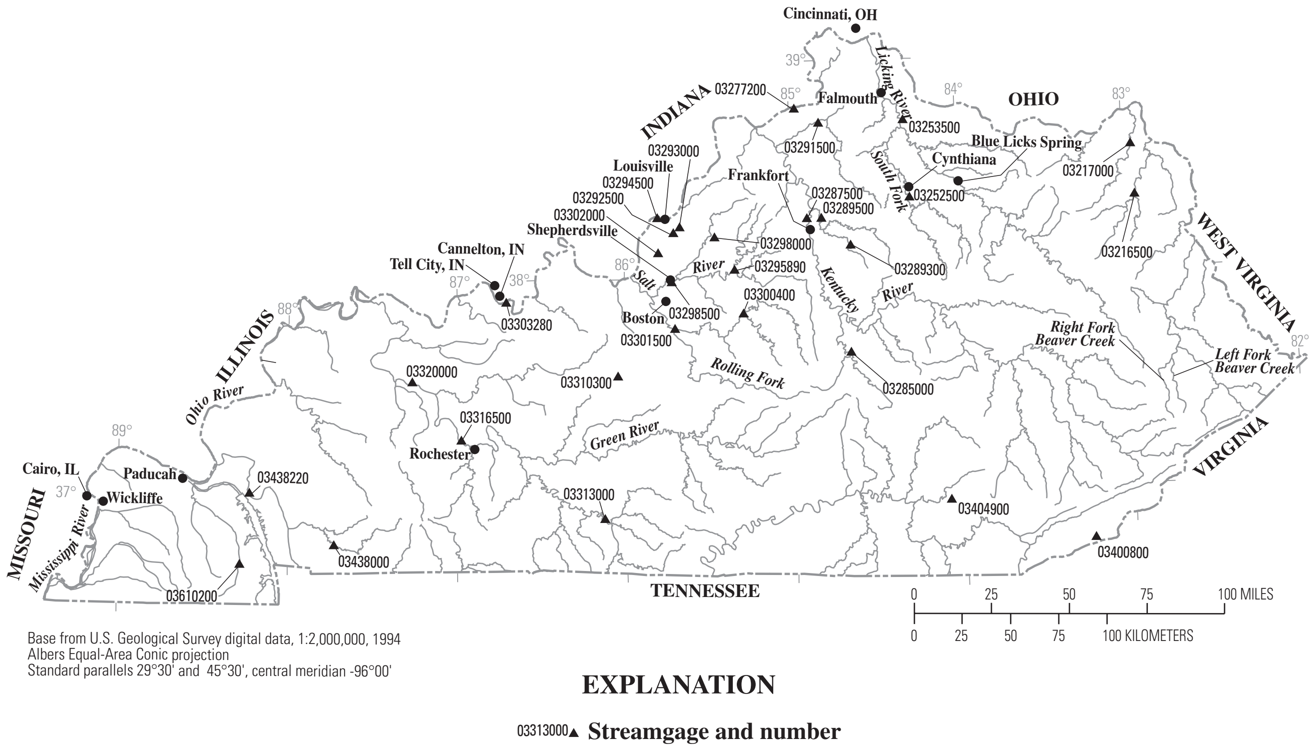

Figure 29. Location of streamgages with significant floods during 1994–98 water years for Kentucky.

Table 18. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Kentucky.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 29)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03216500	Little Sandy River at Grayson, KY	400	1937, 1939–98	1950 1997	27.53 30.57	24,500 16,300	3/2/97	30.57	16,300	Y	5–10
03217000	Tygarts Creek near Greenup, KY	242	1934, 1937, 1941–98	1997	23.65	34,400	3/2/97	23.65	34,400	N	>100
03252500	South Fork Licking River at Cynthiana, KY	621	1918–94, 1997	1997	28.03	39,000	3/2/97	28.03	39,000	N	--
03253500	Licking River at Catawba, KY	3,300	1854, 1888–1998	1997	57.57	110,000	3/3/97	57.57	110,000	Y	--
03277200	Ohio River at Markland Dam near Warsaw, KY	83,170	1971–98	1997	60.72	579,000	3/6/97	60.72	579,000	Y	--
03285000	Dix River near Danville, KY	318	1943–98	1996 1979	18.93 21.81	52,400 44,400	7/20/96	18.93	52,400	N	>100
03289300	South Elkhorn Creek near Midway, KY	105	1983–98	1997	26.37	12,300	3/2/97	26.37	12,300	N	--
03287500	Kentucky River at Frankfort, KY	5,411	1895–1998	1978	48.47	118,000	3/2/97	45.22	93,500	Y	--
03289500	Elkhorn Creek near Frankfort, KY	473	1916–20, 1932, 1937, 1940–13, 1989–98	1997	17.96	35,900	3/4/97	17.96	35,900	N	>100
03291500	Eagle Creek at Glencoe, KY	437	1913, 1915–20, 1928–31, 1937, 1939–87, 1989–98	1997	29.08	58,300	3/2/97	29.08	58,300	N	>100

Table 18. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Kentucky.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 29)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03292500	South Fork Beargrass Creek at Louisville, KY	17.2	1940–83, 1988–98	1997	17.81	5,290	3/2/97	17.81	5,290	N	50–100
03293000	Middle Fork Beargrass Creek at Louisville, KY	18.9	1943, 1945–83, 1985–98	1997 1970	8.70 9.60	5,900 5,200	3/2/97	8.70	5,900	N	>100
03294500	Ohio River at Louisville, KY	91,170	1832, 1848, 1858–59, 1866–69, 1872–1998	1937 1997	85.44 70.47	1,110,000 716,000	3/6/97	70.47	716,000	Y	--
03295890	Brashears Creek at Taylorsville, KY	259	1982–98	1997	31.54	44,800	3/2/97	31.54	44,800	Y	--
03298000	Floyds Fork at Fisherville, KY	138	1937, 1943, 1945–98	1997	17.39	42,100	3/2/97	17.39	42,100	N	>100
03298500	Salt River at Shepherdsville, KY	1,197	1937–98	1964 1937	41.50 47.30	78,200 71,300	3/2/97	40.92	71,300	Y	--
03300400	Beech Fork at Maud, KY	436	1964, 1973–98	1997	27.60	41,500	3/2/97	27.60	41,500	N	50–100
03301500	Rolling Fork near Boston, KY	1,299	1937, 1939–98	1997 1937	53.22 55.20	69,800 --	3/3/97	53.22	69,800	N	>100
03302000	Pond Creek near Louisville, KY	64.0	1937, 1945–98	1964 1997	22.69 25.66	8,020 7,800	3/2/97	25.66	7,800	N	>100
03303280	Ohio River at Cannelton Dam at Cannelton, IN	97,000	1979–98	1997	52.42	735,000	3/8/97	52.42	735,000	Y	--
03310300	Nolin River at White Mills, KY	357	1960–98	1997	36.46	24,500	3/2/97	36.46	24,500	N	50–100

Table 18. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Kentucky.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 29)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03313000	Barren River near Finney, KY	942	1942–50, 1961–94	1962 1943 1994	-- 99.50 90.66	78,000 23,500 7,470	4/11/94	90.66	7,470	Y	--
03316500	Green River at Paradise, KY	6,183	1940–50, 1961–81, 1992–98	1962 1997	40.46 37.63	107,000 86,300	3/7/97	37.63	83,300	Y	--
03320000	Green River at Lock 2 at Calhoun, KY	7,566	1913, 1931–98	1937 1997	43.70 33.23	208,000 86,000	3/7/97	33.23	86,000	Y	--
03400800	Martins Fork near Smith, KY	55.8	1968–98	1977 1998	24.24 14.05	9,000 1,520	4/19/98	14.05	1,520	Y	<2
03404900	Lynn Camp Creek at Corbin, KY	53.8	1957–98	1998 1957	14.33 22.50	6,820 9,000	4/17/98	14.33	6,820	N	25–50
03438000	Little River near Cadiz, KY	244	1940–98	1997	26.44	37,600	3/1/97	26.44	37,600	N	>100
03438220	Cumberland River near Grand Rivers, KY	17,598	1900, 1965–97	1997	45.72	209,000	3/5/97	45.72	209,000	Y	--
03610200	Clarks River at Almo, KY	134	1983–98	1997 1991	18.35 18.84	23,300 16,600	3/2/97	18.35	23,300	N	--

[1]Regulated during flood: N, no; Y, yes.

Louisiana

A nearly stationary area of rain and embedded thunderstorms produced excessive rain across much of central and southern Louisiana on January 26–27, 1994. Storm totals of 6 to 8 inches were common in a large swath from southwestern and west-central Louisiana into east-central Louisiana (National Oceanic and Atmospheric Administration, 1994a). Within this area, rainfall totals of 8 to 12 inches occurred west of Alexandria (fig. 30), overwhelming drainage capacity and resulting in flash flooding.

Torrential rain of 8 to 12 inches fell across parts of southwestern, west-central, and east-central Louisiana during the night and morning hours of April 11, 1995 (National Oceanic and Atmospheric Administration, 1995a). The Calcasieu River crested at Oakdale on April 12 at 15.7 feet (National Oceanic and Atmospheric Administration, 1995b). In east-central Louisiana, floods occurred on the Amite, Comite, Tickfaw, Tangipahoa, and Tchefuncte Rivers. During May 8–10, 1995, extreme weather conditions, which produced as much as 27.5 inches of rain during a 55-hour period (National Oceanic and Atmospheric Administration, 1995a), caused the most severe flooding in recent history along coastal areas of the Gulf of Mexico in Mississippi and southeastern Louisiana. At least six people died, and thousands more were left homeless as a result of the intense flooding. At least $3 billion in property damage was reported in New Orleans, Louisiana (National Oceanic and Atmospheric Administration, 1995b).

Recurrent thunderstorms during April 1997 caused many streams in Louisiana to flood. The most significant flood was at the Wax Lake outlet at Calumet (streamgage 07381590, table 19). This streamgage recorded the largest discharge since records began in 1942.

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–95a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–95b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

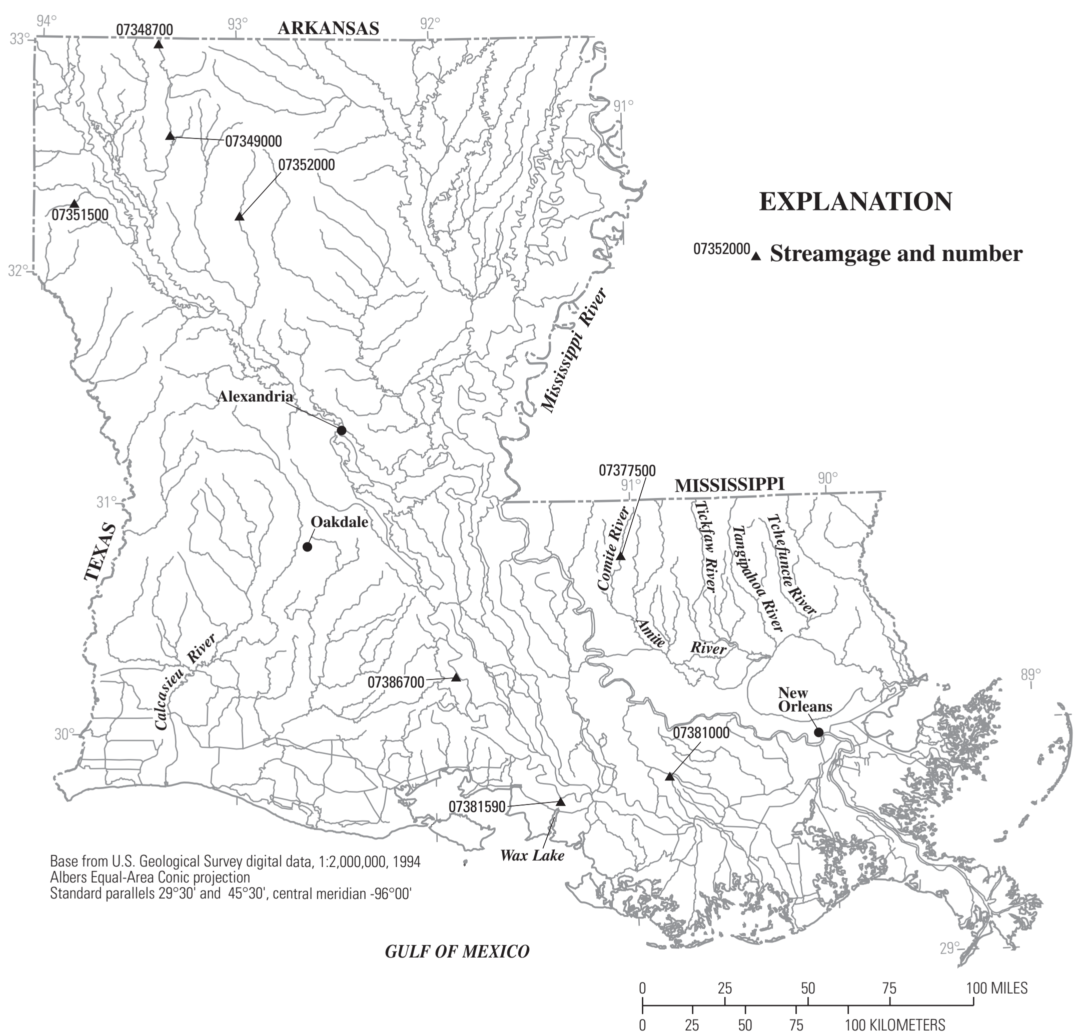

Figure 30. Location of streamgages with significant floods during 1994–98 water years for Louisiana.

Table 19. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Louisiana.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 30)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07348700	Bayou Dorcheat near Springhill, LA	605	1958–98	1997 1958	21.97 22.79	36,700 36,400	4/6/97	21.97	36,700	N	--
07349000	Bayou Dorcheat near Minden, LA	1,097	1929–31, 1933, 1936–92, 1994–98	1958 1997	24.90 25.12	44,800 38,200	4/8/97	25.12	38,200	N	--
07351500	Cypress Bayou near Keithville, LA	66.0	1939–98	1997 1955	13.31 13.62	26,100 23,700	4/23/95 4/5/97	12.29 13.31	15,700 26,100	N N	-- --
07352000	Saline Bayou near Lucky, LA	154	1941–98	1945	12.90	13,500	4/23/95	11.45	10,800	N	--
07377500	Comite River near Olive Branch, LA	145	1943–98	1977 1961	22.88 23.37	22,400 19,900	4/12/95 4/28/97	18.23 17.81	21,400 22,200	N N	-- --
07381000	Bayou Lafourche at Thibodaux, LA	--	1966–88, 1993–97	1995 1973	-- 7.64	1,450 --	5/9/95	--	1,450	Y	--
07381590	Wax Lake outlet at Calumet, LA	--	1942–85, 1988, 1990–98	1997 1973	-- 11.16	258,000 --	4/5/97 5/18/98	-- --	258,000 197,000	Y Y	-- --
07386700	Ruth Canal near Ruth, LA	--	1940, 1947–85, 1997–98	1997 1940	-- 18.40	802 --	4/21/97	--	802	Y	--

[1]Regulated during flood: N, no; Y, yes.

Maine

The town of Fort Fairfield (fig. 31) received its worst flooding in history when ice jams and excessive rains caused the Aroostook River to overflow its banks on April 16, 1994. Floodwaters several feet deep, carrying ice chunks 3 feet thick, caused approximately $9 million in damage to businesses and residences (National Oceanic and Atmospheric Administration, 1994b).

Flooding throughout Maine occurred during January 27–30, 1996, when the last and most intense storm in a series of three low-pressure centers moved northeast from the Great Lakes. South to southeast winds brought warm temperatures and excessive rainfall to the area. Rainfall from the storm exceeded 4 inches in the western Maine mountains, with 2 to 3 inches common over much of central Maine (National Oceanic and Atmospheric Administration, 1996a). High runoff and ice jams caused flooding on many rivers and streams from the western mountains to the northeastern corner of the State.

Low pressure moving through western New England caused flooding in the southwestern part of Maine, April 16–18, 1996. Storm damage to non-Federal public property was estimated at $2.5 million from the storm, including river and coastal flood damage and land-slump damage to public property (National Oceanic and Atmospheric Administration, 1996b). A Federal disaster was declared for five counties in southwestern Maine.

A coastal storm, fed with tropical moisture by the circulation around Hurricane Lily, produced between 8 and 19 inches of rain throughout southwestern Maine during a 30-hour period from October 20–23, 1996 (National Oceanic and Atmospheric Administration, 1996a). Damage was more than $26 million (National Oceanic and Atmospheric Administration, 1996b). Streamgages on Branch Brook, the Little Ossipee River, and the Presumpscot River experienced their peak of record during this flood (table 20).

Rapidly melting snow, caused by record-breaking warmth, combined with rainfall caused flooding on the Kennebec and Androscoggin Rivers and their tributaries on March 30–31, 1998.

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

Figure 31. Location of streamgages with significant floods during 1994–98 water years for Maine.

Table 20. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Maine.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 31)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01014000	Saint John River below Fish River, at Fort Kent, ME	5,665	1927–98	1979	27.31	151,000	4/17/94	26.60	144,000	N	40
01021200	Dennys River at Dennysville, ME	92.9	1956–98	1973	9.35	3,930	3/10/98	8.70	3,440	Y	40
01022294	East Branch Bear Brook near Beddington, ME	.04	1989–98	1998	6.91	18.6	3/9/98	6.91	18.6	N	40
01022295	West Branch Bear Brook near Beddington, ME	.04	1989–98	1998	6.75	16.4	3/9/98	6.75	16.4	N	40
01054200	Wild River at Gilead, ME	69.6	1960, 1965–98	1960	15.60	28,300	10/22/95	14.84	24,500	N	80
01064000	Presumpscot River at outlet of Sebago Lake, ME	441	1887–1998	1902	--	7,000	6/17/98	--	3,760	Y	25
01064118	Presumpscot River at Westbrook, ME	577	1976–95, 1997	1997	34.10	23,300	10/22/96	34.10	23,300	Y	250
01066000	Saco River at Cornish, ME	1,293	1917–98	1936	21.90	46,600	6/18/98	15.11	27,500	N	30
01066500	Little Ossipee River near South Limington, ME	168	1936, 1941–82, 1997	1997 1997	7.02 7.04	5,800 5,760	10/22/96	7.02	5,800	N	30
01069500	Mousam River near West Kennebunk, ME	99.0	1940–84, 1997	1983 1977	5.64 5.82	4,020 3,540	10/22/96	5.36	3,600	Y	50
01069700	Branch Brook near Kennebunk, ME	101.7	1965–74, 1997	1997	8.08	1,020	10/22/96	8.08	1,020	N	40

[1]Regulated during flood: N, no; Y, yes.

Maryland

Unseasonably warm air was drawn northward around the circulation of a deepening storm west of the Appalachian Mountains (fig. 32) on January 18–19, 1996, causing melting of nearly all of a 1- to 2-foot deep snowpack. The melting snow and excessive rains associated with the storm caused widespread, and in some cases, catastrophic flooding and flash flooding on January 19. Flash flooding began at around the same time as the onset of excessive pre-frontal rains. Some areas received between 2 and 4 inches of rain during this period (National Oceanic and Atmospheric Administration, 1996a). Damage throughout Maryland was over $30 million (National Oceanic and Atmospheric Administration, 1996b). Record floods occurred on Cattail Creek, Monacacy River, Morgan Run, Savage River, Wills Creek, and Youghiogheny River (table 21). The Potomac River was the highest since the Hurricane Agnes flood of 1972.

Torrential convective rainfall moved across north-central Maryland during the early morning hours of June 19, 1996, producing widespread and in some cases catastrophic flooding across the area. Damage estimates were $7 million (National Oceanic and Atmospheric Administration, 1996b). Rainfall of more than 5.5 inches fell in Emmitsburg, with as much as 13 inches in nearby Gettysburg, Pennsylvania, during the late-night hours. The Monocacy River at Bridgeport (streamgage 01639000, table 21) had the largest flow since 1933 and the largest flood of record. The worst damage was in Emmitsburg, where numerous residences, businesses, and farms were flooded. There was one fatality approximately 3 miles southwest of Emmitsburg, where a woman left her van along Little Owens Creek and was swept away by the floodwaters.

The track of Tropical Storm Fran from south-central through western Virginia on September 6, 1996, allowed gusty southeast winds at and just above the surface to channel water up the Chesapeake Bay and its main tributaries. This became a small-scale storm surge, containing 6-foot waves and tides that ran in some places nearly 6 feet above normal. Torrential rains associated with Tropical Storm Fran caused the rapid onset of river flooding along the headwaters of the Potomac River late on September 6, spreading gradually southeast throughout the entire basin by early September 10. Damage was estimated to be more than $14 million in the State of Maryland (National Oceanic and Atmospheric Administration, 1996b).

References

National Oceanic and Atmospheric Administration (NOAA), 1996a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1996b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

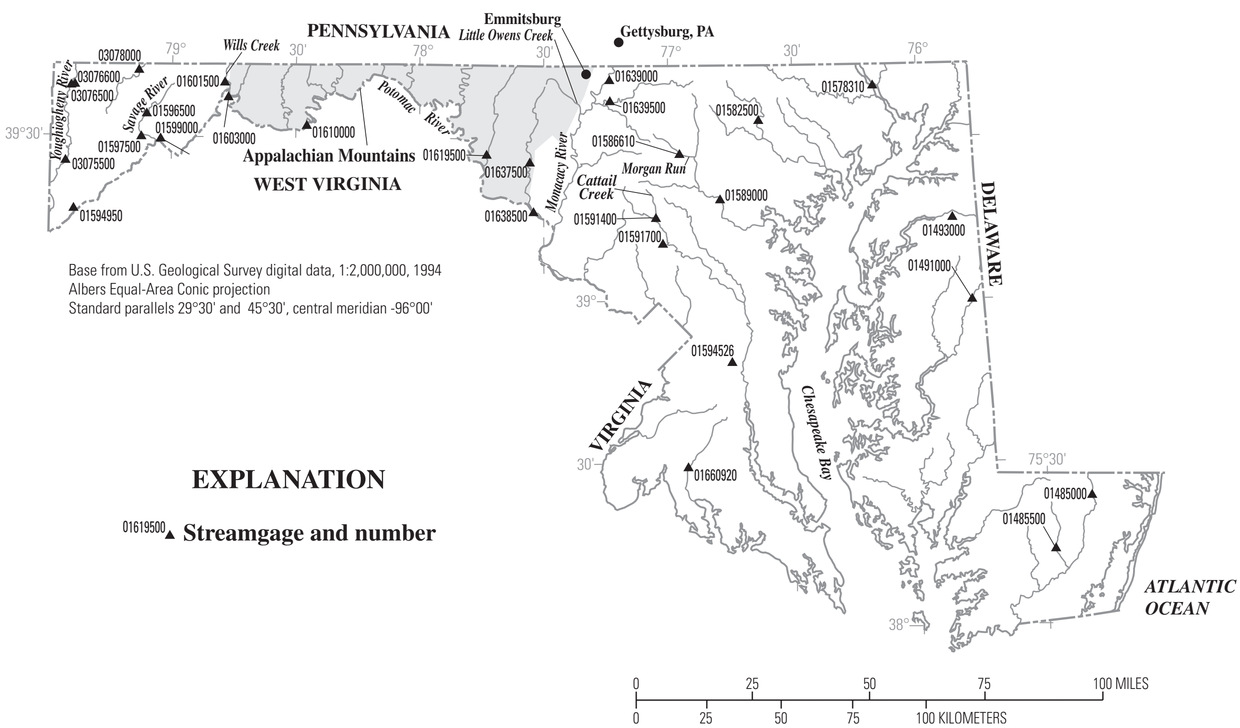

Figure 32. Location of streamgages with significant floods during 1994–98 water years for Maryland.

Table 21. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Maryland.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 32)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01485000	Pocomoke River near Willards, MD	60.5	1950–98	1989	15.41	2,820	1/29/98	13.90	1,970	N	30–35
01485500	Nassawango Creek near Snow Hill, MD	44.9	1950–98	1998 1989	8.13 9.07	2,300 3,930	1/29/98	8.13	2,300	N	75
01491000	Choptank River near Greensboro, MD	113	1948–98	1967	14.47	6,970	12/14/96	12.52	5,120	N	15–20
01493000	Unicorn Branch near Millington, MD	19.7	1948–98	1997 1960	6.09 7.17	1,160 1,060	6/19/96 12/14/96	5.98 6.09	1,090 1,160	N N	15–20 15–20
01578310	Susquehanna River at Conowingo, MD	27,100	1968–98	1972	36.83	1,130,000	1/20/96	34.18	909,000	Y	--
01582500	Gunpowder Falls at Glencoe, MD	160	1984–98	1994	13.72	5,180	3/4/94	13.72	5,180	Y	--
01586610	Morgan Run near Louisville, MD	28.0	1983–98	1996	8.45	3,550	1/19/96	8.45	3,550	N	10–20
01589000	Patapsco River at Hollofield, MD	285	1933, 1945–91, 1994	1972	31.30	80,600	4/14/94	3.99	15,700	Y	--
01591400	Cattail Creek near Glenwood, MD	22.9	1979–98	1996 1979	8.96 11.69	5,210 4,000	1/19/96	8.96	5,210	N	10–25
01591700	Hawlings River near Sandy Spring, MD	27.0	1979–98	1996	9.24	5,180	1/19/96	9.24	5,180	N	15–25
01594526	Western Branch at Upper Marlboro, MD	89.7	1986–89, 1993–98	1996	13.20	3,630	1/19/96	13.20	3,630	N	5–10
01594950	McMillan Fork near Fort Pendleton, MD	2.30	1987–98	1994	7.23	340	2/9/94	7.23	340	N	10–20
01596500	Savage River near Barton, MD	49.1	1949–98	1955	8.45	7,510	9/6/96	7.97	6,620	N	100
01597500	Savage River below Savage River dam near Bloomington, MD	106	1949–98	1996 1986	7.81 7.81	9,190 8,550	9/7/96	7.81	9,190	Y	--
01599000	Georges Creek at Franklin, MD	72.4	1924, 1931–98	1936 1996	9.60 12.77	8,500 6,500	9/6/96	12.77	6,500	N	45–50

Table 21. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Maryland.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 32)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01601500	Wills Creek near Cumberland, MD	247	1924, 1930–98	1996	23.11	45,900	1/19/96	23.11	45,900	N	200
01603000	North Branch Potomac River near Cumberland, MD	877	1889, 1924, 1930–98	1936 1889	29.10 29.20	88,200 89,000	1/19/96	25.56	59,200	Y	--
01610000	Potomac River at Paw Paw, WV	3,129	1877, 1889, 1924, 1928, 1936, 1939–98	1936	54.00	240,000	9/7/96	43.45	140,000	N	30–35
01619500	Antietam Creek near Sharpsburg, MD	281	1928–98	1956	16.73	12,600	1/19/96	13.71	8,960	N	25–30
01637500	Catoctin Creek near Middletown, MD	66.9	1948–98	1977	14.13	12,000	1/19/96	11.72	8,560	N	20–25
01638500	Potomac River at Point of Rocks, MD	9,651	1889, 1895–1998	1936	41.03	480,000	1/21/96	36.34	310,000	N	40
01639000	Monocacy River at Bridgeport, MD	173	1933, 1942–98	1996	25.42	24,400	6/19/96	25.42	24,400	N	95–100
01639500	Big Pipe Creek at Bruceville, MD	102	1948–98	1975	18.98	28,000	1/19/96	13.65	10,100	N	20–25
01660920	Zekiah Swamp Run near Newtown, MD	79.9	1984–98	1994 1986	5.26 5.74	3,380 982	3/29/94	5.26	3,380	N	10–25
03075500	Youghiogheny River near Oakland, MD	134	1936, 1942–98	1996 1936	13.06 15.30	14,100	1/19/96	13.06	14,100	N	50–100
03076500	Youghiogheny River at Friendsville, MD	295	1899–1905, 1923–31, 1940–98	1996 1924	9.54 14.20	16,100 15,600	2/9/94 1/19/96	8.25 9.54	12,000 16,100	Y Y	15–20 --
03076600	Bear Creek at Friendsville, MD	48.9	1965–98	1971	9.60	4,650	1/19/96	8.82	4,310	N	50
03078000	Casselman River at Grantsville, MD	62.5	1948–98	1955	10.70	8,400	1/19/96	9.15	6,410	N	50–100

[1]Regulated during flood: N, no; Y, yes.

Massachusetts

On June 13, 1996, thunderstorms with torrential downpours produced a flash flood that resulted in the worst flooding on the Sawmill River in 100 years of records (fig. 33). The Massachusetts Emergency Management Agency estimated damage from this flood at close to $2 million (National Oceanic and Atmospheric Administration, 1996b). Local residents who had lived in the area for many years said this was the worst flooding they had witnessed since the Great New England Hurricane of 1938.

An extensive, slow-moving surface low-pressure system became positioned along the mid-Atlantic Coast during the evening of October 19, 1996. Record-breaking rainfall occurred in northeastern Massachusetts where intense rain bands remained stationary for many hours. Rainfall totals of 8 inches were widespread with this storm (National Oceanic and Atmospheric Administration, 1996a) and resulted in widespread small stream and tributary flooding. A maximum storm total of 13.03 inches was recorded at Newburyport, exceeding the 100-year, 2-day precipitation (National Oceanic and Atmospheric Administration, 1996a). There was widespread severe urban flooding, especially in downtown Boston and from the Greater Boston Metropolitan Area northward as rainfall of historic proportions occurred there. Damage from the excessive rain was in the tens of millions of dollars (National Oceanic and Atmospheric Administration, 1996b). The Shawsheen and Parker Rivers set new flood-of-record discharges (table 22).

On June 12–14, 1998, a very slow-moving storm system moved through southeastern New England. The combination of its slow movement and the presence of tropical moisture across the region caused the storm to produce rainfall of 6 to 12 inches (National Oceanic and Atmospheric Administration, 1998a) over much of eastern Massachusetts, resulting in widespread urban, small stream, and river flooding. Damage was estimated at $13 million (National Oceanic and Atmospheric Administration, 1998b). Record floods occurred on the Threemile River at North Dighton (streamgage 01109060, table 22).

References

National Oceanic and Atmospheric Administration (NOAA), 1996a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1996b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

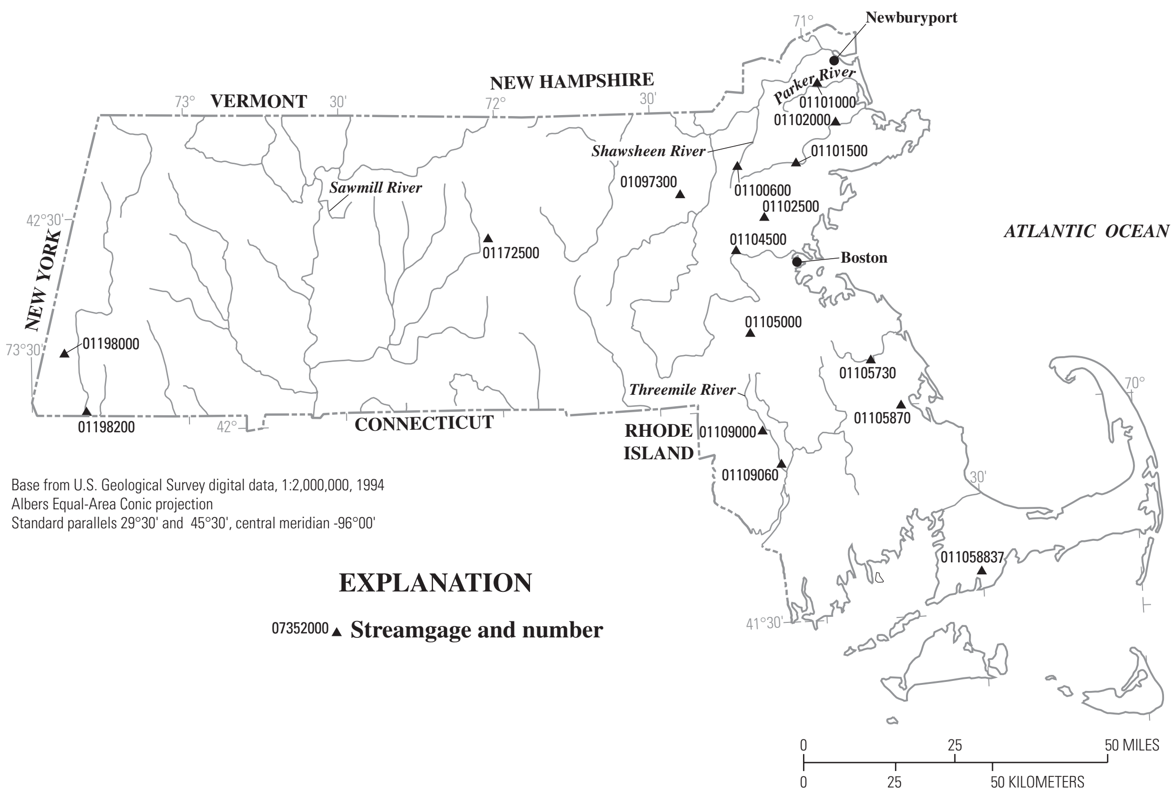

Figure 33. Location of streamgages with significant floods during 1994–98 water years for Massachusetts.

Table 22. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Massachusetts.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 33)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01097300	Nashoba Brook near Acton, MA	12.8	1964–98	1979	5.57	679	10/21/96	5.55	665	N	30
				1998	6.89	293					
01100600	Shawsheen River near Wilmington, MA	36.5	1964–98	1997	10.49	1,850	10/22/96	10.49	1,850	N	70
01101000	Parker River at Byfield, MA	21.3	1946–98	1997	7.82	883	10/22/96	7.82	883	N	150
01101500	Ipswich River at South Middleton, MA	44.5	1938–98	1987	7.51	1,010	10/21/96	7.88	896	N	30
				1997	7.88	896					
01102000	Ipswich River near Ipswich, MA	125	1931–98	1987	9.43	3,550	10/23/96	8.98	3,120	N	60
01102500	Aberjona River at Winchester, MA	24.7	1940–98	1979	15.46	1,330	10/21/96	16.78	1,150	N	50
				1997	16.78	1,150	6/14/98	15.22	1,070	N	50
01104500	Charles River at Waltham, MA	251	1932–98	1976	6.54	4,150	10/21/96	6.05	2,990	Y	20
01105000	Neponset River at Norwood, MA	34.7	1938, 1940–98	1955	14.65	1,490	6/14/98	10.89	1,100	Y	50
01105730	Indian Head River at Hanover, MA	30.3	1967–98	1968	7.13	1,390	10/21/96	6.76	1,290	N	50
01105870	Jones River at Kingston, MA	19.8	1967–98	1968	4.60	575	10/21/96	5.18	343	Y	10
				1997	5.18	343					
011058837	Quashnet River at Waquoit Village, MA	2.58	1989–98	1998	3.09	42	7/1/98	3.09	42	Y	10
01109000	Wading River near Norton, MA	43.3	1926–98	1968	11.47	1,460	6/14/98	11.47	1,220	N	50
01109060	Threemile River at North Dighton, MA	84.3	1967–98	1998	8.89	2,870	6/16/98	8.89	2,870	N	50
01172500	Ware River near Barre, MA	55.1	1947–94, 1996–98	1956	6.31	1,890	1/30/96	5.34	1,350	Y	15–20
01198000	Green River near Great Barrington, MA	51.0	1952–71, 1994–96	1996	9.84	6,740	7/13/96	9.84	6,740	N	>200
01198200	Konkapot River at Ashley Falls, MA	61.1	1963–71, 1994–96	1996	6.29	1,280	1/28/96	6.29	1,280	N	20

[1]Regulated during flood: N, no; Y, yes.

Michigan

Repeated, highly localized, excessive rainfall near Juniata, Michigan (fig. 34), on July 8, 1994, resulted in flooding along the Cass River. Damage to roads, bridges, buildings, and so forth was estimated to be approximately $1.5 million (National Oceanic and Atmospheric Administration, 1994b).

Melting of a deep snowpack during April 19–26, 1996, triggered flooding on the Escanaba and Ford Rivers and their tributaries in the central part of the Upper Peninsula. Damage was estimated at nearly $1.6 million (National Oceanic and Atmospheric Administration, 1996b).

On May 10, 1996, 24-hour rainfall totals of 8 to 9 inches southeast of Benton Harbor, Michigan (National Oceanic and Atmospheric Administration, 1996a), caused over $5 million in damage from flooding (National Oceanic and Atmospheric Administration, 1996b). One week later on May 18, excessive rains on Isle Royale caused the greatest discharge in 33 years of record on Washington Creek at Windigo (streamgage 04001000, table 23).

Severe thunderstorms developed along a warm front across central lower Michigan during the evenings of June 20 and 21, 1997. The storms moved southeast across the Saginaw River Basin and the Thumb Region and produced excessive rainfall. As a result of this weather, flash flooding caused $19 million in property damage (National Oceanic and Atmospheric Administration, 1997b). Flash flooding was widespread throughout the Saginaw River Basin and most of eastern Michigan.

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

Figure 34. Location of streamgages with significant floods during 1994–98 water years for Michigan.

Table 23. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Michigan.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 34)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04001000	Washington Creek at Windigo, MI	13.2	1965–98	1996	8.17	657	5/18/96	8.17	657	N	25–50
04057510	Sturgeon River near Nahma Junction, MI	183	1967–98	1985	11.50	2,120	4/26/96	11.11	1,900	N	25–50
04059500	Ford River near Hyde, MI	450	1955–98	1960	8.27	7,590	4/26/96	7.45	5,630	N	25
04061500	Paint River at Crystal Falls, MI	597	1945–98	1960	9.82	10,900	4/26/96	7.89	7,300	N	25
04102500	Paw Paw River at Riverside, MI	390	1952–98	1987	10.90	3,580	2/24/97	10.66	3,110	N	25–50
04102700	South Branch Black River near Bangor, MI	83.6	1967–98	1997	14.90	2,390	2/21/97	14.90	2,390	N	25–50
04106320	West Fork Portage Creek near Oshtemo, MI	13.0	1973–98	1993	2.47	36	10/28/94	2.42	36	N	25–50
04106400	West Fork Portage Creek at Kalamazoo, MI	18.7	1960–98	1997	3.33	46	6/21/97	3.33	46	N	10–25
04108600	Rabbit River near Hopkins, MI	71.4	1966–98	1997	11.11	3,740	6/21/97	11.11	3,740	N	50–100
04108645	Rabbit River at Hamilton, MI	274	1979–98	1997	21.60	12,000	6/21/97	21.60	12,000	N	50–100
04108800	Macatawa River near Zeeland, MI	65.8	1961–98	1997	16.72	8,810	6/21/97	16.72	8,810	N	50–100
04115000	Maple River at Maple Rapids, MI	434	1945–98	1986	12.33	8,770	7/8/94	10.27	5,610	N	25
04115265	Fish Creek near Crystal, MI	39.7	1988–98	1990	5.53	558	2/21/97	4.99	320	N	10–20
04119055	Plaster Creek at Grand Rapids, MI	46.6	1974–98	1997	13.43	2,300	2/22/97	13.43	2,300	N	25–50
04130500	Black River near Tower, MI	311	1943–98	1960	7.13	2,340	4/1/98	6.41	1,860	N	25
04135500	Au Sable River at Grayling, MI	110	1943–94	1994	3.25	322	7/6/94	3.25	322	N	>100
04135700	South Branch Au Sable River near Luzerne, MI	401	1967–89, 1991–98	1976	7.30	1,120	4/7/97	6.87	940	N	10–20
04136500	Au Sable River at Mio, MI	1,361	1953–98	1998	6.37	4,380	4/1/98	6.37	4,380	Y	25–50

Table 23. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Michigan.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 34)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04147500	Flint River near Otisville, MI	530	1953–89, 1991–98	1996	15.73	7,470	6/24/96	15.73	7,470	N	25–50
04160350	Pine River near Rattle Run, MI	135	1974–98	1996	24.24	5,730	6/22/96	24.24	5,730	N	25–50
04161540	Paint Creek at Rochester, MI	70.9	1960–98	1968	5.22	918	6/19/96	--	890	N	10–25
				1965	5.95	880					
04163400	Plum Brook at Utica, MI	16.5	1966–98	1996	10.62	1,290	6/18/96	10.62	1,290	N	25–50
04166000	River Rouge at Birmingham, MI	33.3	1951–98	1968	8.70	1,390	6/18/96	7.36	1,070	N	25
04166200	Evans Ditch at Southfield, MI	9.49	1959–98	1982	15.03	1,200	8/6/98	12.83	962	N	15–25
04176605	Otter Creek at La Salle, MI	51.0	1988–98	1997	11.60	3,010	6/2/97	11.60	3,010	N	25–50

[1]Regulated during flood: N, no; Y, yes.

Minnesota

Excessive rainfall of between 5 and 15 inches in the region north of Montevideo, Minnesota (fig. 35), resulted in major property and crop damage on July 3, 1995 (National Oceanic and Atmospheric Administration, 1995a). The Chippewa River near Milan (streamgage 05304500, table 24) rose 9 feet on July 3 and 4, and crested at 13.48 feet on July 6. This was the second highest crest ever for the Chippewa River near Milan.

Moderate to severe flooding occurred on the Red River of the North and many of its tributaries in Minnesota during April 1996. Above-normal precipitation was observed over the basin for the 6 months prior to the flood. In addition, deep snow cover, with drifts as much as 12 feet high, lingered into early April (National Oceanic and Atmospheric Administration, 1996b). This combined with a rapid snowmelt to produce a significant spring flood despite below-average precipitation from mid-March through April. Ice jams contributed to the flooding. The flooding was, for many areas, the worst since 1979 and the most devastating on record. Three streamgages had peaks of record (table 24). Eleven counties were declared Federal disaster areas.

The 1997 spring flooding along the upstream reaches of the Minnesota River and Red River of the North broke many existing flood records in Minnesota. The winter of 1996–97 had extraordinary snowfall with most areas having more than 6 feet of snow, which is two to three times greater than normal. Fargo, North Dakota, had 117 inches of snow compared to an average of 39 inches. Several other cities had in excess of 100 inches (National Oceanic and Atmospheric Administration, 1997a). The western Minnesota towns of Crookston and Madison had 3.08 and 3.14 inches of rain, respectively, on this snowpack on April 5–6 and coupled with warm air temperatures resulted in rapid snowmelt in western Minnesota and eastern North Dakota. Temperatures were approximately 10 degrees above normal in the first week of April. However, during the second and third weeks, temperatures were 20 degrees below normal. Flood workers had to struggle in the middle of a blizzard at times to save property. Twenty-three streamgages in Minnesota experienced their peak of record during the flood of 1997 (table 24).

The Federal Emergency Management Agency's (FEMA's) estimate of public infrastructure damage in Minnesota from the 1997 flood was approximately $300 million (Federal Emergency Management Agency, 1997). Before the water receded, 58 of Minnesota's 87 counties were declared Federal disaster areas. The American Red Cross reported that the massive floods affected 23,263 families. Total flood damage and associated economic impacts were estimated to be as high as $2 billion (Minnesota Department of Natural Resources, 1997).

Excessive rainfall of as much as 9.5 inches on June 17, 1997, resulted in scattered mud slides and widespread street and basement flooding in the Mankato area. Total damage to the area around Mankato exceeded $20 million (National Oceanic and Atmospheric Administration, 1997b).

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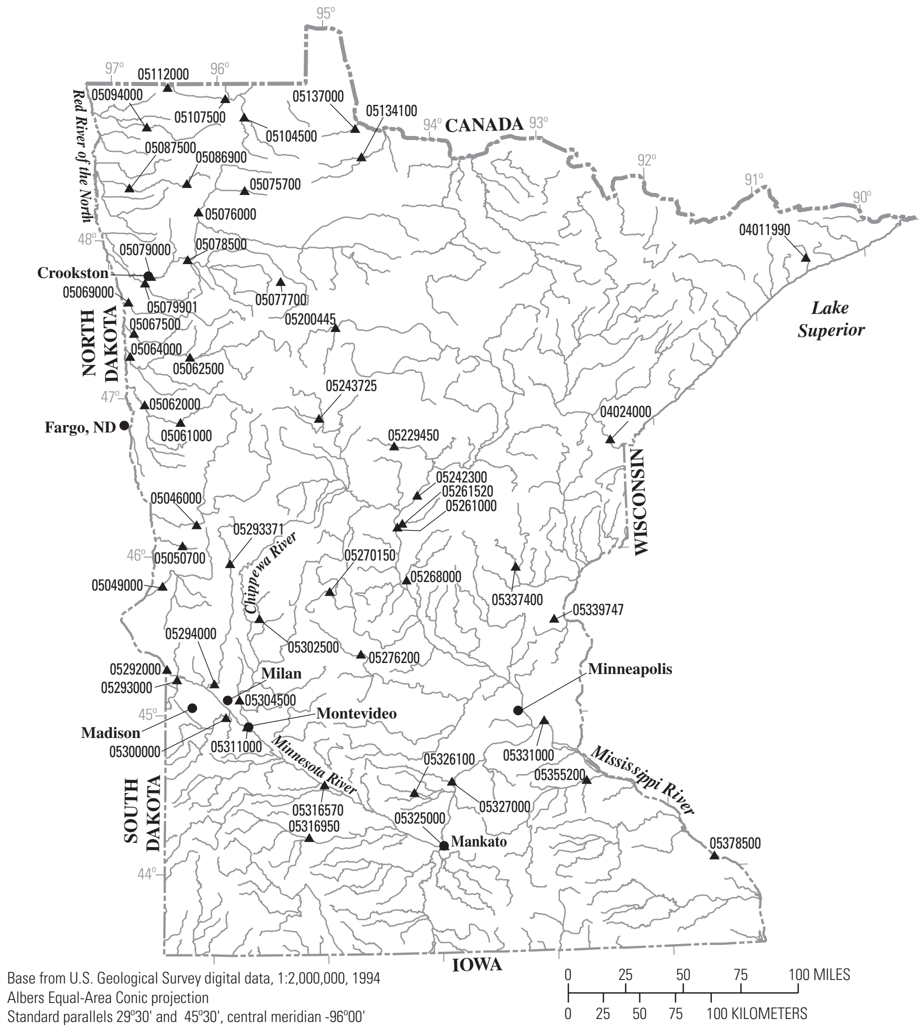

EXPLANATION

05325000▲ **Streamgage and number**

Figure 35. Location of streamgages with significant floods during 1994–98 water years for Minnesota.

Table 24. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Minnesota.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 35)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04011990	Cascade River at Forest Road 45 near Grand Marais, MN	--	1985–98	1996	12.95	1,350	5/19/96	12.95	1,350	N	>10
04024000	St. Louis River at Scanlon, MN	3,430	1908–98	1950 1979	-- 13.93	37,900 34,200	4/21/96	--	27,600	Y	>10
05046000	Otter Tail River below Orwell Dam near Fergus Falls, MN	1,740	1931–98	1953	5.60	1,710	5/22/97	4.63	1,500	Y	>10
05049000	Mustinka River above Wheaton, MN	834	1916–17, 1919–24, 1931–58, 1985–98	1997	23.63	8,800	4/7/97	23.63	8,800	N	>25
05050700	Rabbit River near Nashua, MN	56.1	1979–98	1997	15.76	1,640	4/5/97	15.76	1,640	N	>10
05061000	Buffalo River near Hawley, MN	325	1921, 1945–98	1997 1921	10.77 11.30	2,360 3,000	4/6/97	10.77	2,360	N	>25
05062000	Buffalo River near Dilworth, MN	975	1931–98	1975	27.10	13,600	4/6/97	27.02	8,370	N	>25
05062500	Wild Rice River at Twin Valley, MN	934	1909–17, 1931–98	1997	15.91	10,000	4/6/97	15.91	10,000	N	>100
05064000	Wild Rice River at Hendrum, MN	1,560	1944–98	1997	33.85	10,600	4/18/97	33.85	10,600	Y	>50
05067500	Marsh River near Shelly, MN	220	1944–98	1979 1997	23.36 25.45	4,880 4,300	4/18/97	25.45	4,300	Y	>10
05069000	Sand Hill River at Climax, MN	420	1943–98	1965 1997	17.81 39.40	4,560 4,360	4/19/96 4/20/97	25.17 39.40	4,290 4,360	N N	>10 >10
05075700	Mud River near Grygla, MN	170	1979–98	1996 1997	18.57 19.00	1,950 1,400	4/19/96	18.57	1,950	N	>25
05076000	Thief River near Thief River Falls, MN	985	1909–17, 1919–26, 1929–98	1950	17.38	5,610	4/22/97	15.20	4,120	Y	>10
05077700	Ruffy Brook near Gonvick, MN	45.2	1961–80, 1982–98	1996 1962	5.78 6.70	455 364	4/19/96	5.78	455	N	>10
05078500	Clearwater River at Red Lake Falls, MN	1,380	1910–17, 1919, 1935–98	1979 1995	12.38 13.25	10,300 3,110	4/19/96	12.24	9,400	N	>10

Table 24. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Minnesota.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 35)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
05079000	Red Lake River at Crookston, MN	5,270	1897, 1902, 1904–20, 1922–98	1969	27.33	28,400	4/20/96 4/18/97	24.84 28.40	21,700 28,000	N N	>10 >50
05079901	Burnham Creek near Crookston, MN	--	1986–98	1997	22.63	3,000	4/15/97	22.63	3,000	N	>10
05086900	Middle River near Newfolden, MN	91.1	1979–98	1996 1997	18.31 18.71	2,300 2,000	5/18/96	18.31	2,300	N	>25
05087500	Middle River at Argyle, MN	255	1945, 1950–98	1996	18.27	5,020	5/19/96 4/19/97	18.27 17.96	5,020 4,330	N N	>50 >25
05094000	South Branch Two Rivers at Lake Bronson, MN	422	1929–37, 1941–47, 1954–98	1966	18.23	5,410	4/22/96 4/20/97	14.45 14.58	4,290 4,260	N N	>10 >10
05104500	Roseau River below South Fork near Malung, MN	430	1929–38, 1940–98	1996 1966	-- 23.37	7,310 5,050	5/19/96	--	7,310	N	>50
05107500	Roseau River at Ross, MN	1,090	1896, 1919, 1927, 1929–91, 1995–98	1950 1896	18.25 19.00	6,560 8,200	4/26/97	17.30	4,670	N	>10
05112000	Roseau River below State Ditch 51 near Caribou, MN	1,420	1917, 1920–98	1950	11.81	4,080	5/18/96 5/8/97	10.78 2.00	3,350 3,320	N N	>25 >25
05134100	North Branch Rapid River near Baudette, MN	180	1986–98	1996	13.27	1,550	5/18/96	13.27	1,550	N	>10
05137000	Winter Road River near Baudette, MN	145	1986–98	1996	15.35	2,420	5/18/96	15.35	2,420	N	>25
05200445	Mississippi River at Bemidji, MN	400	1973–98	1997	13.17	1,820	4/18/97	13.17	1,820	Y	>25
05229450	Pine River near Pine River, MN	--	1986–98	1997 1990	5.19 5.25	1,410 1,100	4/6/97	5.19	1,410	N	>10

Table 24. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Minnesota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 35)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05242300	Mississippi River at Brainerd, MN	7,320	1988–98	1997	16.03	15,400	4/10/97	16.03	15,400	Y	>10
05243725	Straight River near Park Rapids, MN	53.2	1987–98	1997	2.33	149	4/6/97	2.33	149	N	>50
05261000	Mississippi River near Fort Ripley, MN	11,010	1972–98	1997	14.15	32,200	4/8/97	14.15	32,200	Y	>25
05261520	Nokasippi River below Fort Ripley, MN	178	1986–98	1997	14.93	1,030	4/9/97	14.93	1,030	N	>10
05268000	Platte River at Royalton, MN	432	1930–36, 1972–98	1972 1997	7.84 14.72	6,850 3,800	4/5/97	14.72	3,800	N	>10
05270150	Ashley Creek near Sauk Centre, MN	113	1986–98	1997	17.12	740	4/6/97	17.12	740	N	>10
05276200	North Fork Crow River at Paynesville, MN	243	1973–98	1997 1984	8.85 10.59	2,460 2,300	4/3/97	8.85	2,460	N	>10
05292000	Minnesota River at Ortonville, MN	1,160	1938–98	1997 1952	12.85 12.92	5,070 3,060	4/10/97	12.85	5,070	Y	>50
05293000	Yellow Bank River near Odessa, MN	459	1940–98	1969	19.07	6,970	4/2/97	17.94	6,770	N	45
05293371	Pomme de Terre (site 210) near Elbow Lake, MN	--	1986–98	1997 1993	6.72 7.08	550 420	4/7/97	6.72	550	N	>25
05294000	Pomme de Terre River at Appleton, MN	905	1931–98	1997	18.13	8,890	4/7/97	18.13	8,890	Y	>500
05300000	Lac Qui Parle River near Lac Qui Parle, MN	960	1911–14, 1931–98	1969 1965	18.94 19.37	17,100 8,370	4/7/97	17.68	13,100	N	>50
05302500	Little Chippewa River near Starbuck, MN	94.1	1979–98	1997	15.45	850	4/6/97	15.45	850	N	>100
05304500	Chippewa River near Milan, MN	1,880	1937–98	1997	18.03	14,400	7/6/95 4/6/97	13.48 18.03	8,440 14,400	N N	>10 >100

Table 24. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Minnesota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 35)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05311000	Minnesota River at Montevideo, MN	6,180	1910–98	1997	23.90	47,500	4/6/97	23.90	47,500	Y	>50
05316570	Beaver Creek near Beaver Falls, MN	194	1972–80, 1982–98	1997	14.73	3,300	4/2/97	14.73	3,300	N	>100
05316950	Cottonwood River near Springfield, MN	777	1973–98	1997	28.77	7,860	3/29/97	28.77	7,860	N	>5
05325000	Minnesota River at Mankato, MN	14,900	1881, 1903–98	1965 1993	29.09 30.11	94,100 75,600	4/10/97	27.61	79,800	Y	>50
05326100	Middle Branch Rush River near Gaylord, MN	67.3	1979–98	1997 1979	19.22 21.00	3,200 715	3/28/97	19.22	3,200	N	>100
05327000	High Island Creek near Henderson, MN	237	1974–98	1997 1993	9.31 9.72	2,830 2,750	7/25/97	9.31	2,830	N	>10
05331000	Mississippi River at St. Paul, MN	36,800	1867–70, 1872–1998	1965	26.01	171,000	4/13/97	22.37	134,000	Y	>50
05337400	Knife River near Mora, MN	102	1975–98	1997	6.48	1,870	4/6/97	6.48	1,870	N	>5
05339747	Goose Creek at Harris, MN	--	1986–98	1996	7.50	295	4/19/96	7.50	295	N	>5
05355200	Cannon River at Welch, MN	1,340	1888, 1911–13, 1931–87, 1992–98	1965 1998	14.01 15.05	36,100 23,500	6/27/98	15.05	23,500	Y	50
05378500	Mississippi River at Winona, MN	59,200	1879–1922, 1924–98	1965	20.77	268,000	4/11/97	18.27	194,000	Y	>25

[1]Regulated during flood: N, no; Y, yes.

Mississippi

During May 8–10, 1995, extreme weather conditions, which produced as much as 27.5 inches of rain during a 55-hour period (National Oceanic and Atmospheric Administration, 1995a), caused the most severe flooding in recent history along coastal areas of the Gulf of Mexico in Mississippi and southeastern Louisiana. At least six people died, and thousands more were left homeless as a result of the intense flooding. At least $3 billion in property damage was reported in New Orleans, Louisiana, alone, and millions more in damage was reported in the Gulf Coast counties of Mississippi and parishes in southeastern Louisiana as a result of the storm (National Oceanic and Atmospheric Administration, 1995b). In Mississippi, flooding was most severe in the Biloxi and Wolf River Basins (fig. 36, table 25). The response of these rivers to the storm was both rapid and devastating as rivers in the affected basins reached record or near-record stages and returned to below flood stage within 48 hours after the end of the rainfall.

The Mississippi River went above flood stage around March 9, 1997, and crested between March 21 and 26. Considerable damage occurred on the Mississippi side of the river downstream from the confluence of the Mississippi and the Arkansas Rivers (National Oceanic and Atmospheric Administration, 1997b).

Flash flooding occurred due to excessive rainfall totaling 6.40 inches near Lexington, Mississippi, during June 9–10, 1997 (National Oceanic and Atmospheric Administration, 1997a). Mississippi Emergency Management Agency estimated damage at $3.5 million dollars (National Oceanic and Atmospheric Administration, 1997b). Approximately 1,000 people were evacuated. The town's eastern commercial area was inundated by floodwaters.

On September 28, 1998, Hurricane Georges made landfall just east of Biloxi, Mississippi, with maximum sustained winds of about 105 miles per hour. At landfall, Georges was a strong category 2 hurricane. From September 28–30, 1998, Georges brought torrents of rain to the central Gulf Coast from Gulfport, Mississippi, to the eastern parts of the Florida Panhandle. Rainfall amounts ranging from 15 to more than 25 inches were reported in many areas of southern Alabama, the Florida Panhandle, and the Mississippi Gulf Coast (National Oceanic and Atmospheric Administration, 1998a). Severe flooding occurred in southern Mississippi.

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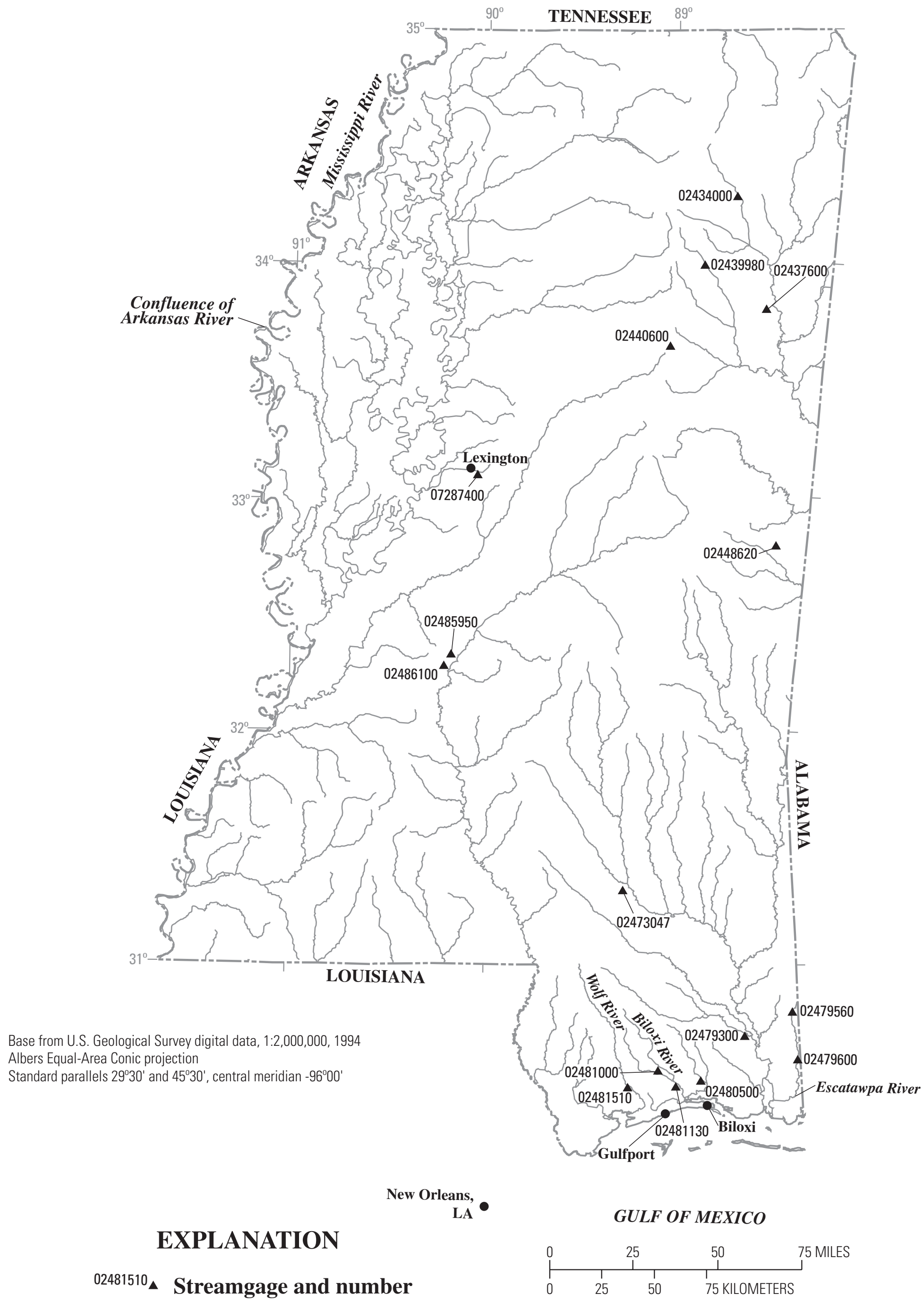


Figure 36. Location of streamgages with significant floods during 1994–98 water years for Mississippi.

Table 25. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Mississippi.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 36)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02434000	Town Creek at Tupelo, MS	111	1939–46, 1949–98	1955	27.72	23,000	3/2/97	26.61	20,000	N	50–100
02437600	James Creek at Aberdeen, MS	28.4	1963–98	1985 1997	15.21 25.10	6,970 6,770	5/27/97	25.10	6,770	N	20
02439980	Chuquatonchee Creek near Okalona, MS	68.5	1951, 1953, 1964–73, 1975–81, 1985–87, 1989–95, 1998	1973	16.93	15,000	3/6/98	14.56	7,060	Y	--
02440600	Line Creek near Maben, MS	4.76	1952–80, 1982–98	1984	28.33	7,540	6/26/94	28.30	7,480	N	--
02448620	Flat Scooba Creek tributary near Scooba, MS	.44	1967–98	1979	8.87	427	1/7/98	5.74	263	N	--
02473047	Gordon Creek at Hattiesburg, MS	8.83	1969–98	1983	61.89	6,920	1/7/98	13.84	4,920	N	15
02479300	Red Creek near Vestry, MS	441	1959–98	1987	21.48	28,000	9/29/98	20.89	24,300	N	20
02479560	Escatawpa River near Agricola, MS	562	1974–98	1998	22.81	27,800	9/30/98	22.81	27,800	N	20
02479600	Escatawpa River near Hurley, MS	646	1958–70, 1998	1998	19.30	27,500	9/30/98	19.30	27,500	N	20
02480500	Tuxachanie Creek near Biloxi, MS	92.4	1906, 1948, 1953–98	1998	26.06	20,300	9/29/98 5/10/95	26.06 24.92	20,300 16,900	N	100 50
02481000	Biloxi River at Wortham, MS	96.2	1948, 1953–98	1995	28.94	13,500	5/9/95	28.94	13,500	N	100
02481130	Biloxi River near Lyman, MS	251	1957, 1964–85, 1987–98	1995	23.95	36,800	5/10/95	23.95	36,800	N	50
02481510	Wolf River near Landon, MS	308	1971–98	1995	28.85	24,500	5/10/95	28.85	24,500	N	50

Table 25. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Mississippi.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 36)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02485950	Town Creek at Jackson, MS	11.4	1885, 1914, 1921, 1953–98	1921	19.00	6,000	6/10/97	12.12	4,110	N	20
02486100	Lynch Creek at Jackson, MS	12.0	1953–95	1995 1953	16.30 18.90	7,180 7,500	4/20/95	16.30	7,180	N	50
07287400	Black Creek at Lexington, MS	88.1	1987–98	1997	27.89	18,600	6/10/97	27.89	18,600	N	25

[1]Regulated during flood: N, no; Y, yes.

Missouri

Parts of eastern, southern, and southeastern Missouri received 6 to 10 inches of rain the evening of November 13 and 14, 1993 (National Oceanic and Atmospheric Administration, 1993a). Numerous tributaries of the Missouri and Mississippi Rivers quickly rose above flood stage including the Gasconade, Osage, Meramec, Bourbeuse, Big, Current, and James Rivers (fig. 37). Eight streamgages had the peak of record during this flood (table 26). Estimates of flood damage neared $50 million, but there were no reported deaths (National Oceanic and Atmospheric Administration, 1993b).

The rains returned to the same areas in Missouri during the second week of April 1994 as 7 to 9 inches of rain fell during a 3-day period (National Oceanic and Atmospheric Administration, 1994a), bringing a quick return to river flooding. Most of the more intense rains were south of the Missouri River. The most serious flooding occurred along the Mississippi, Missouri, Meramec, Bourbeuse, and Big Rivers in eastern Missouri. Damage was over $10 million, and three deaths occurred (National Oceanic and Atmospheric Administration 1994b). Rainfall in April averaged from 4 inches above normal at Kansas City to near 8 inches above normal at Columbia. This April was the wettest on record at Columbia, the second wettest at Springfield and St. Louis, and the fourth wettest at Kansas City (National Oceanic and Atmospheric Administration, 1994a).

Serious flooding returned to the Missouri and Mississippi River Valleys in Missouri, during May 1995, 2 short years after the record flood of 1993. While the flood did cause a great deal of hardship and disruption to the economy and daily lives, it was estimated that people, homes, and business affected by the flood in 1995 were 50 percent less than in 1993 (National Oceanic and Atmospheric Administration, 1995b). This was due primarily to the Federally sponsored buyout programs that moved many people out of the flood plains. The flood of May 1995 was triggered by abnormally excessive rain. May rainfall averages across Missouri ranged from 3 inches above normal at Springfield to 9 inches above normal at St. Louis. May 1995 was the wettest May on record for St. Louis where 12.92 inches of rain fell. The spring (March, April, May) of 1995 was the fifth wettest in St. Louis history with a total of 19.44 inches. The majority of serious flooding was on the main stems of the Missouri and Mississippi Rivers, as well as backwater points on tributaries. Nearly $30 million in damage resulted (National Oceanic and Atmospheric Administration, 1995b). The Mississippi and Missouri Rivers were closed to barge traffic, bringing that industry to a standstill.

A series of thunderstorm complexes produced widespread flooding over central and south-central Missouri on July 26, 1998. Cooperative weather stations reported more than 8 inches of rain at Versailles, Rolla, and Salem (National Oceanic and Atmospheric Administration, 1998a). Flooding caused widespread damage to roads and low-water crossings and bridges.

References

National Oceanic and Atmospheric Administration (NOAA), 1993a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1993b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

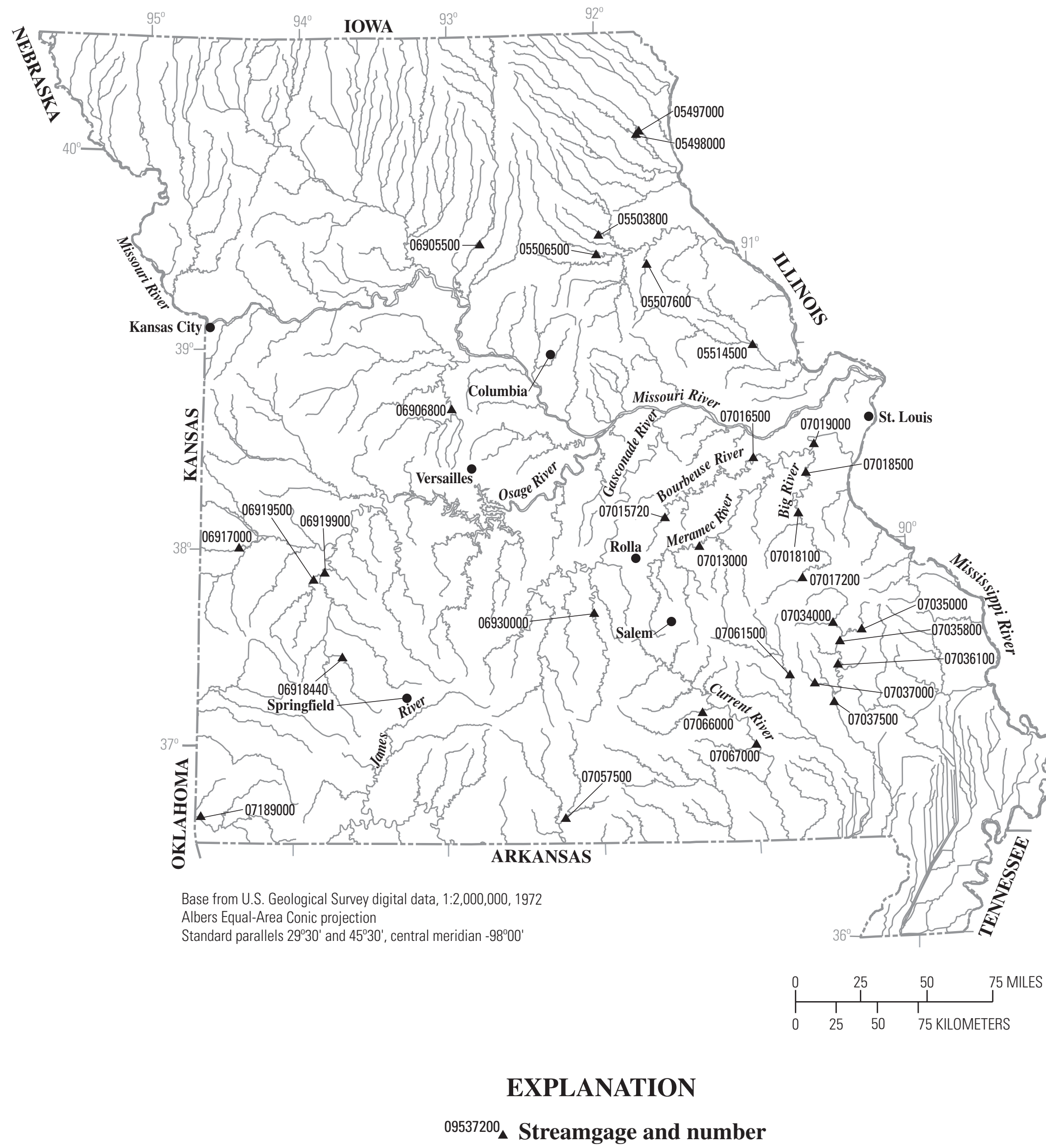


Figure 37. Location of streamgages with significant floods during 1994–98 water years for Missouri.

Table 26. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Missouri.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 37)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05497000	North Fabius River at Monticello, MO	452	1922–98	1973	33.03	20,700	5/28/96	29.63	17,200	N	10
05498000	Middle Fabius River near Monticello, MO	393	1946–98	1973	27.14	17,700	5/29/96	24.87	13,800	N	5
05503800	Crooked Creek near Paris, MO	80.0	1980–98	1996	13.62	9,460	5/7/96	13.62	9,460	N	50–100
05506500	Middle Fork Salt River at Paris, MO	356	1940–98	1973	25.21	45,000	5/8/96	21.84	15,800	N	10–25
05507600	Lick Creek at Perry, MO	104	1980–98	1996	22.25	11,800	5/7/96	22.25	11,800	N	25–50
05514500	Cuivre River near Troy, MO	903	1922–72, 1974–81, 1983–98	1942	33.40	120,000	4/12/94	32.47	107,000	N	>500
06905500	Chariton River near Prairie Hill, MO	1,870	1929–98	1996	22.33	33,600	5/24/95 5/27/96	21.96 22.33	31,600 33,600	N N	5 --
06906800	Lamine River near Otterville, MO	543	1988–98	1995	29.43	84,900	5/18/95	29.43	84,900	N	>500
06917000	Little Osage River at Fulton, KS	295	1949–98	1987	35.21	62,800	4/28/94	32.61	38,000	N	--
06918440	Sac River near Dadeville, MO	257	1966–98	1993	27.56	36,100	4/11/94	20.88	13,700	N	5
06919500	Cedar Creek near Pleasant View, MO	420	1909, 1923–26, 1943, 1949–98	1958 1909	27.35 27.70	37,000 --	4/12/94	27.36	36,300	N	50
06919900	Sac River near Caplinger Mills, MO	1,810	1975–98	1994	30.95	61,500	4/12/94	30.95	61,500	Y	--
06930000	Big Piney River near Big Piney, MO	560	1922–70, 1972–82, 1989–96	1943	20.70	32,700	11/15/93	19.81	30,800	N	10

Table 26. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Missouri.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 37)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07013000	Meramec River near Steelville, MO	781	1915, 1917–98	1998	27.22	55,800	7/27/98	27.22	55,800	N	10–25
07015720	Bourbeuse River near High Gate, MO	135	1965–98	1983	23.65	49,300	7/26/98	23.57	34,500	N	100–500
07016500	Bourbeuse River at Union, MO	808	1897, 1915–98	1983	33.80	73,300	4/13/94	27.77	42,000	N	25–50
07017200	Big River at Irondale, MO	175	1965–96, 1998	1994	28.95	49,100	11/14/93	28.95	49,100	N	100–500
07018100	Big River near Richwoods, MO	735	1984–98	1997 1993	28.25 30.33	61,500 59,800	12/10/96	28.25	61,500	N	50–100
07018500	Big River at Byrnesville, MO	917	1915, 1923–88, 1990, 1992–98	1993 1915	29.37 30.20	63,600 80,000	11/16/93	27.61	50,200	N	25
07019000	Meramec River near Eureka, MO	3,788	1904–05, 1915–16, 1922–97	1915 1983	40.20 42.89	175,000 145,000	4/14/94	40.90	123,000	N	10–25
07034000	Saint Francis River near Roselle, MO	234	1987–97	1994	26.50	45,700	11/14/93	26.50	45,700	N	100–500
07035000	Little Saint Francis River at Fredericktown, MO	90.5	1984–97	1994	26.50	25,100	11/14/93	26.50	25,100	N	100–500
07035800	Saint Francis River near Mill Creek, MO	505	1987–92, 1994–97	1994	33.10	130,000	11/14/93	33.10	130,000	N	>500
07036100	Saint Francis River near Saco, MO	664	1984–97	1994	36.10	161,000	11/14/93	36.10	161,000	N	>500
07037000	Big Creek at Des Arc, MO	99.6	1987–97	1994	16.85	25,700	11/14/93	16.85	25,700	N	100–500

Table 26. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Missouri.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 37)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07037500	Saint Francis River near Patterson, MO	956	1915, 1921–75, 1977–97	1983	35.77	155,000	11/15/93	34.30	133,000	N	100–500
07057500	North Fork River near Tecumseh, MO	561	1945–98	1986	28.10	133,000	11/14/93	24.59	71,200	N	100
07061500	Black River near Annapolis, MO	484	1939–98	1994	27.38	109,000	11/14/93	27.38	109,000	N	>500
07066000	Jacks Fork at Eminence, MO	398	1895, 1904, 1922–98	1994 1904 1895	17.82 27.00 27.00	58,500 -- --	11/15/93	17.82	58,500	N	100–500
07067000	Current River at Van Buren, MO	1,667	1904, 1913–91, 1993–98	1915 1904	25.90 29.00	125,000 --	11/15/93	27.39	92,900	N	10–25
07189000	Elk River near Tiff City, MO	872	1940–98	1941	28.40	137,000	6/11/95	24.45	69,900	N	25

[1]Regulated during flood: N, no; Y, yes.

Montana

As much as 11 inches of rain fell during a 24-hour period in southern Canada and northwestern Montana along the Continental Divide, June 6, 1995 (National Oceanic and Atmospheric Administration, 1995a). As a result, flooding occurred on both sides of the divide. Significant floods occurred on the North Fork Flathead River (fig. 38) as well as many of the smaller rivers and streams of northwestern Montana (table 27).

Warmer temperatures during February 7–11, 1996, after an extended cold and snowy period, caused numerous flooding problems across central Montana during the second week of February. Snowmelt over frozen ground caused streams and rivers to go out of their banks, washing out roads and bridges. Flooding problems ranged from minor inundation of fields to parts of towns being underwater. Ice jams also caused flooding problems as snowmelt ran into frozen streams and rivers. Some of the worst flooding occurred in East Helena where three creeks went out of their banks. Ice jams on the Missouri River caused flooding in Fort Benton. Much of the town was under 1 to 2 feet of water at one point. Seven counties were declared Federal disaster areas. A rapid warming of temperatures, after an extended cold, snowy period, caused ice jams and flooding problems across north-central Montana on March 3–5, 1996. Many small streams went out of their banks, washing out numerous roads. The estimated damage across the region totaled about $1.5 million, mostly from washed out roads and bridges (National Oceanic and Atmospheric Administration, 1996b).

Snowmelt flooding caused numerous road closings and road washouts throughout western Montana in May and June 1996. Flooding on the Bitterroot River caused the bridge near Victor to move 6 inches downstream and drop 23 inches. Estimated repair to fix the bridge was $1 million, and total damage from the flooding was more than $2 million (National Oceanic and Atmospheric Administration, 1996b).

The spring snowmelt for 1997 caused flooding once again in the mountains of Montana. Damage exceeded $2.5 million (National Oceanic and Atmospheric Administration, 1997b).

Rain falling at the rate of more than 5 inches per hour inundated the town of Culbertson in eastern Montana on July 4, 1998 (National Oceanic and Atmospheric Administration, 1997a). Forty-three homes sustained damage with 20 basements completely filled with water and sewage that backed up during the storm. Two homes were moved completely off of their foundations. Highway 2 was flooded and closed from Poplar to the North Dakota line until the next morning. Damage was more than $2 million (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1995a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1995b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

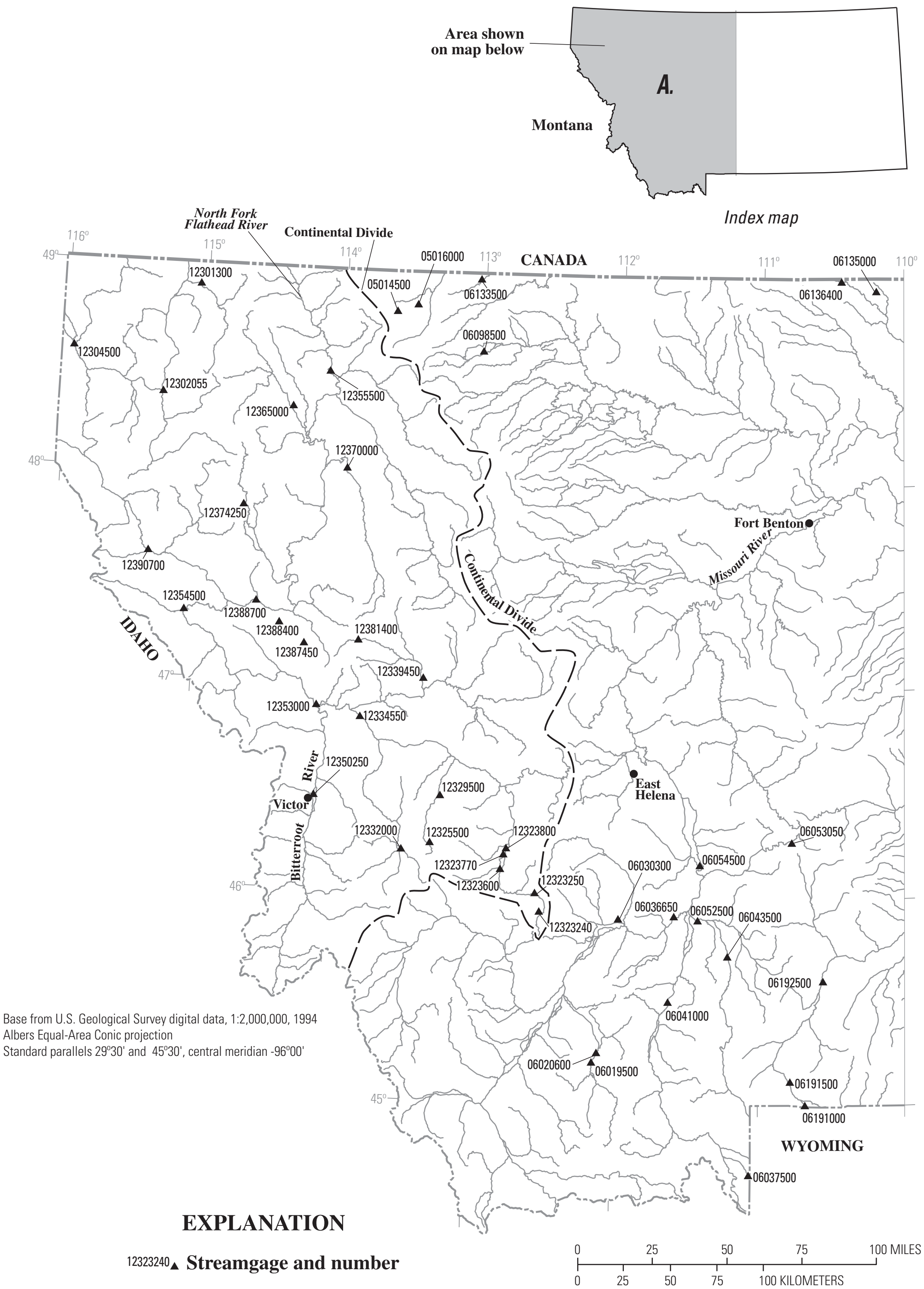
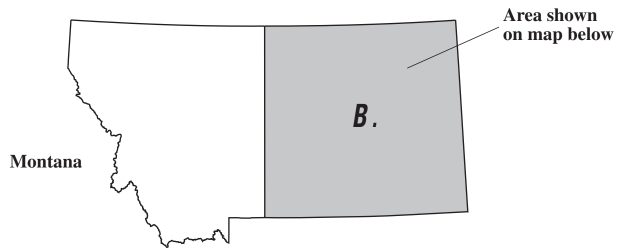
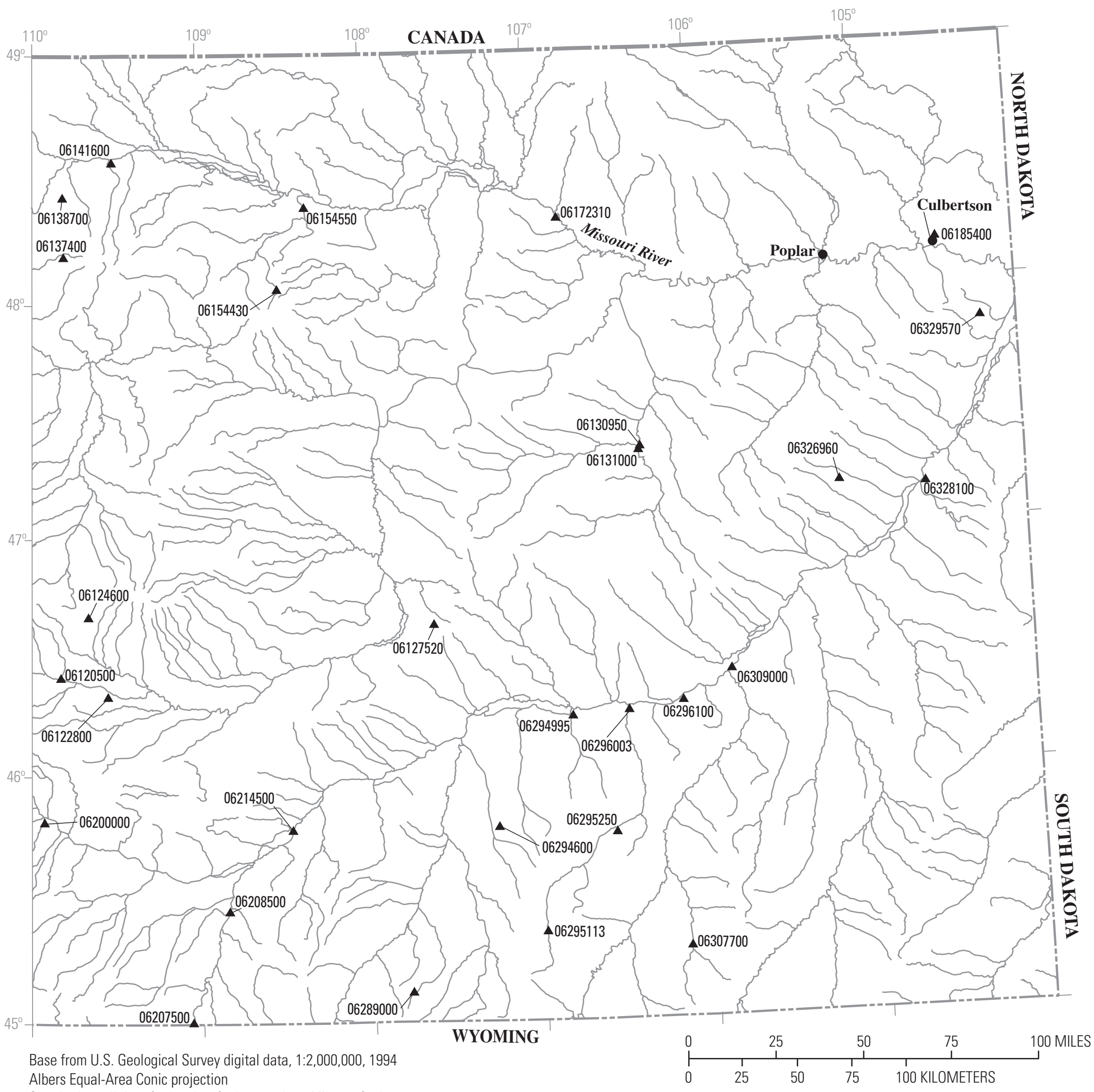


Figure 38. *(A)* Location of streamgages with significant floods during 1994–98 water years for Montana.



Index map



Base from U.S. Geological Survey digital data, 1:2,000,000, 1994
Albers Equal-Area Conic projection
Standard parallels 29°30' and 45°30', central meridian -96°00'

EXPLANATION

06207500▲ **Streamgage and number**

Figure 38. *(B)* Location of streamgages with significant floods during 1994–98 water years for Montana.—Continued

Table 27. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Montana.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 38)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05014500	Swiftcurrent Creek at Many Glacier, MT	30.9	1913–98	1964	10.00	6,700	6/7/95	7.72	3,150	N	45–50
05016000	Swiftcurrent Creek at Lake Sherberne, MT	64.6	1913–98	1995	8.63	2,510	6/7/95	8.63	2,510	N	--
06019500	Ruby River above reservoir near Alder, MT	538	1939–98	1984	6.24	3,810	6/6/95	5.14	2,060	N	30–35
06020600	Ruby River below reservoir near Alder, MT	596	1963–98	1984	8.52	3,010	6/7/95	6.85	1,820	Y	--
06030300	Jefferson River tributary number 2 near Whitehall, MT	4.50	1958–98	1994	8.30	425	7/6/94	8.30	425	N	>100
06036650	Jefferson River near Three Forks, MT	9,532	1979–98	1995 1997	9.00 9.20	17,000 16,700	6/9/95	9.00	17,000	N	10–25
06037500	Madison River near West Yellowstone, MT	420	1914–17, 1919–73, 1984–86, 1989–98	1996	3.78	2,820	5/18/96 5/18/97	3.78 3.58	2,820 2,630	N N	>100 75
06041000	Madison River below Ennis Lake near McAllister, MT	2,186	1943–98	1970	8.01	9,550	6/10/96	7.60	7,980	Y	--
06043500	Gallatin River near Gallatin Gateway, MT	825	1890–94, 1931–81, 1985–98	1971 1974	6.49 7.38	9,270 9,100	6/2/97	6.71	9,160	N	25–30
06052500	Gallatin River at Logan, MT	1,795	1895–1900, 1902–05, 1929–33, 1935–98	1899 1997	-- 9.80	9,840 9,400	6/8/97	9.80	9,400	N	30–35

Table 27. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Montana.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 38)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06053050	Lost Creek near Ringling, MT	9.59	1974–98	1996 1986	3.62 3.98	300 80	2/8/96	3.62	300	N	25
06054500	Missouri River at Toston, MT	14,669	1890, 1910–16, 1941–98	1997	12.22	34,000	6/12/97	12.22	34,000	N	45–50
06098500	Cut Bank Creek near Browning, MT	123	1918, 1920–24, 1991–98	1995	5.59	5,480	6/7/95	5.59	5,480	N	25–50
06120500	Musselshell River at Harlowton, MT	1,125	1909–98	1975	10.01	7,270	6/12/97	8.25	3,720	N	20
06122800	Musselshell River near Shawmut, MT	1,479	1986–97	1997 1991	-- 6.65	5,000 3,020	6/12/97	--	5,000	N	--
06124600	East Fork Roberts Creek tributary near Judith Gap, MT	.74	1974–98	1997 1974	3.87 3.89	83 82	7/20/97	3.87	83	N	10–20
06127520	Home Creek near Sumatra, MT	1.98	1973–98	1994	5.11	278	3/2/94	5.11	278	N	25–30
06130950	Little Dry Creek near Van Norman, MT	1,224	1958–75, 1986, 1995	1995	9.20	10,000	--/--/95	9.20	10,000	N	>100
06131000	Big Dry Creek near Van Norman, MT	2,554	1940–48, 1950–98	1947	13.39	24,600	3/3/94	10.90	15,600	N	15–20

Table 27. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Montana.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 38)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06133500	North Fork Milk River above Saint Mary Canal near Browning, MT	59.0	1911–12, 1924, 1926–27, 1937, 1941–42, 1944–45, 1948, 1950–51, 1953–98	1967	7.95	3,090	3/19/97	10.50	2,860	N	35–40
06135000	Milk River at eastern crossing of international boundary, MT	2,506	1910–11, 1913–15, 1917, 1919–98	1996	15.03	12,000	3/13/96 3/22/97	15.03 11.36	12,000 10,000	N N	25–50 10–25
06136400	Spring Coulee tributary near Simpson, MT	2.49	1972, 1974–98	1997	4.29	56	2/17/97	4.29	56	N	--
06137400	Big Sandy Creek at reservation boundary near Rocky Boy, MT	24.7	1982–98	1998	6.07	510	6/27/98	6.07	510	N	25
06138700	South Fork Spring Coulee near Havre, MT	6.47	1960–98	1966 1982	4.42 4.70	190 145	3/10/96	4.24	170	N	10–25
06141600	Little Box Elder Creek at mouth near Havre, MT	95.9	1986–92, 1994–96	1996	10.30	960	3/11/96	10.30	960	N	10–25
06154430	Lodge Pole Creek at Lodge Pole, MT	19.5	1987–98	1997	6.02	306	5/26/97	6.02	306	N	25–50
06154550	Peoples Creek below Kuhr Coulee near Dodson, MT	675	1989–98	1996	13.03	1,800	3/13/96	13.03	1,800	N	5–10
06172310	Milk River at Tampico, MT	21,078	1974–77, 1988–98	1997 1991	-- 25.40	11,000 7,240	3/27/97	--	11,000	N	5–10

Table 27. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Montana.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 38)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06185400	Missouri River tributary number 5 at Culbertson, MT	3.67	1963–98	1998	12.87	3,790	7/4/98	12.87	3,790	N	>100
06191000	Gardner River near Mammoth Yellowstone National Park, MT	202	1939–72, 1984–98	1956 1997	4.46 5.03	2,080 2,050	6/2/97	5.03	2,050	N	25
06191500	Yellowstone River at Corwin Springs, MT	2,623	1890–93, 1911–98	1996 1918	10.92 11.50	32,200 32,000	6/10/96 6/6/97	10.92 10.91	32,200 32,200	N N	100 100
06192500	Yellowstone River near Livingston, MT	3,551	1897–1905, 1929–32, 1938–98	1997	10.72	38,000	6/10/96 6/6/97	9.97 10.72	37,100 38,000	N N	75–100 75–100
06200000	Boulder River at Big Timber, MT	523	1947–53, 1955–98	1997	9.00	9,940	6/5/97	9.00	9,940	N	50
06207500	Clarks ForkYellowstone River near Belfry, MT	1,154	1922–98	1981	9.97	14,800	6/11/96 6/11/97	8.98 8.68	11,400 10,900	N N	25 10–25
06208500	Clarks Fork Yellowstone River at Edgar, MT	2,032	1922–32, 1934–69, 1987–98	1997	9.30	11,100	6/15/96 6/12/97	9.19 9.30	11,000 11,100	N N	10–25 25
06214500	Yellowstone River at Billings, MT	11,795	1904–05, 1918, 1929–98	1997	15.00	82,000	6/12/97	15.00	82,000	N	>100
06289000	Little Bighorn River at State line near Wyola, MT	193	1939–98	1944	4.87	2,730	6/6/97	4.35	2,100	N	10–25
06294600	East Cabin Creek tributary near Hardin, MT	8.63	1973–98	1998	5.70	277	6/8/98	5.70	277	N	25–50
06294995	Armells Creek near Forsyth, MT	370	1975–84, 1988–95	1994	10.25	3,990	3/3/94	10.25	3,990	N	25

Table 27. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Montana.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 38)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
06295113	Rosebud Creek at reservation boundary near Kirby, MT	123	1980–98	1996 1986	6.30 6.50	219 --	3/17/96	6.30	219	N	25–50
06295250	Rosebud Creek near Colstrip, MT	799	1975–98	1994 1978	8.42 9.03	754 605	3/2/94	8.42	754	N	25–50
06296003	Rosebud Creek at mouth near Rosebud, MT	1,302	1975–98	1994	7.70	3,700	3/4/94	7.70	3,700	N	50–100
06296100	Snell Creek near Hathaway, MT	10.5	1963–77, 1979, 1982–98	1994	3.70	767	3/2/94	3.70	767	N	10–25
06307700	Cow Creek near Fort Howes Ranger Station near Otter, MT	8.37	1972–98	1995	9.21	296	7/15/95	9.21	296	N	25–50
06309000	Yellowstone River at Miles City, MT	48,253	1923, 1929–98	1978 1979	16.50 16.62	102,000 53,900	6/15/97	14.53	83,300	N	10–25
06326960	Timber Fork Upper Sevenmile Creek tributary near Lindsay, MT	1.13	1974–98	1997	10.42	250	7/1/97	10.42	250	N	25–50
06328100	Yellowstone River tributary number 6 near Glendive, MT	2.93	1974–98	1994	5.88	576	6/7/94	5.88	576	N	25–50
06329570	First Hay Creek near Sidney, MT	29.1	1963–98	1997	6.42	3,530	7/1/97	6.42	3,530	N	50–100
12301300	Tobacco River near Eureka, MT	440	1948, 1959–98	1991	7.16	3,180	4/28/97	6.82	2,830	N	25
12302055	Fisher River near Libby, MT	838	1948, 1969–98	1996	10.35	12,000	2/9/96	10.35	12,000	N	100
12304500	Yaak River near Troy, MT	766	1948, 1954, 1956–98	1954	11.40	13,400	5/17/97	9.58	12,600	N	50–100
12323240	Blacktail Creek at Butte, MT	95.4	1989–98	1995	5.28	303	2/19/95	5.28	303	N	10–25

Table 27. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Montana.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 38)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
12323250	Silver Bow Creek below Blacktail Creek at Butte, MT	103	1984–98	1998	8.11	447	7/30/98	8.11	447	N	50
12323600	Silver Bow Creek at Opportunity, MT	284	1989–98	1996	6.91	1,300	2/11/96	6.91	1,300	N	25–50
12323770	Warm Springs Creek at Warm Springs, MT	163	1984–98	1997 1984	4.55 4.61	494 462	6/5/97	4.55	494	N	10–25
12323800	Clark Fork near Galen, MT	572	1989–98	1997	5.07	1,240	6/7/97	5.07	1,240	N	--
12325500	Flint Creek near Southern Cross, MT	52.6	1941–98	1942 1962	1.86 4.56	174 35	6/6/95	2.53	172	N	--
12329500	Flint Creek at Maxville, MT	208	1942–98	1943 1974	6.79 7.49	1,680 680	2/9/96	6.68	1,040	N	10–25
12332000	Middle Fork Rock Creek near Philipsburg, MT	123	1938–98	1974	5.58	1,680	6/9/96	5.41	1,540	N	10–25
12334550	Clark Fork at Turah Bridge near Bonner, MT	3,641	1986–98	1996	9.05	12,400	2/9/96	9.05	12,400	N	10–25
12339450	Clearwater River near Clearwater, MT	345	1975–92, 1997	1997	8.52	3,800	5/28/97	8.52	3,800	N	50–100
12350250	Bitterroot River at Bell Crossing near Victor, MT	1,963	1987–98	1996	10.07	18,700	6/9/96	10.07	18,700	N	25
12353000	Clark Fork below Missoula, MT	9,003	1930–98	1997	12.18	55,100	5/18/97	12.18	55,100	N	25–50
12354500	Clark Fork at Saint Regis, MT	10,709	1911–23, 1929–98	1997	20.27	68,900	5/18/97	20.27	68,900	N	25–50
12355500	North Fork Flathead River near Columbia Falls, MT	1,548	1911–17, 1929–98	1964	18.60	69,100	6/7/95	17.07	59,200	N	>100

Table 27. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Montana.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 38)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
12365000	Stillwater River near Whitefish, MT	524	1931–50, 1964, 1973–98	1997 1948	20.20 20.90	4,570 4,330	5/18/97	20.20	4,570	N	50–100
12370000	Qan River near Bigfork, MT	671	1922–98	1974	7.34	8,890	5/18/97	7.27	8,520	N	50
12374250	Mill Creek above Bassoo Creek near Niarada, MT	19.6	1983–98	1997 1991	2.60 6.83	173 113	4/28/97	2.60	173	N	25
12381400	South Fork Jocko River near Arlee, MT	56.0	1983–98	1997	4.31	1,220	5/17/97	4.31	1,220	N	50–100
12387450	Valley Creek near Arlee, MT	15.3	1983–98	1997	3.04	116	5/16/97	3.04	116	N	25–50
12388400	Revais Creek below West Fork near Dixon, MT	23.4	1983–98	1997	4.36	382	6/1/97	4.36	382	N	50
12388700	Flathead River at Perma, MT	8,795	1984–98	1997	21.65	54,700	6/7/97	21.65	54,700	Y	--
12390700	Prospect Creek at Thompson Falls, MT	182	1956–98	1974	9.86	5,490	2/9/96	9.54	5,160	N	>100

[1]Regulated during flood: N, no; Y, yes.

Nebraska

More than 3 inches of rain fell in an hour on July 15, 1994 (National Oceanic and Atmospheric Administration, 1994a), near Scottsbluff (fig. 39), overfilling an irrigation canal. Backups occurred in a sewer system as a result of the runoff, damaging 19 homes. Nearly 200 other homes were flooded due to the storm's runoff, with more than $1.1 million in damage (National Oceanic and Atmospheric Administration, 1994b).

Excessive rains of 2 to 4 inches fell across north-central and northeastern Nebraska on May 27–28, 1995, with rapid rises of 2 to 3 feet on area streams and creeks. Flooding occurred on the Elkhorn and Niobrara Rivers and their many tributaries. Damage was more than $2 million (National Oceanic and Atmospheric Administration, 1995b).

Thunderstorms developed August 22, 1995, over north-central Nebraska and moved eastward. Continuous redevelopment of thunderstorms resulted in 5- to 8-inch rainfalls in the Niobrara River Basin. Several roads were washed out and numerous bridges suffered structural damage resulting in more than $1 million in damage (National Oceanic and Atmospheric Administration, 1995b).

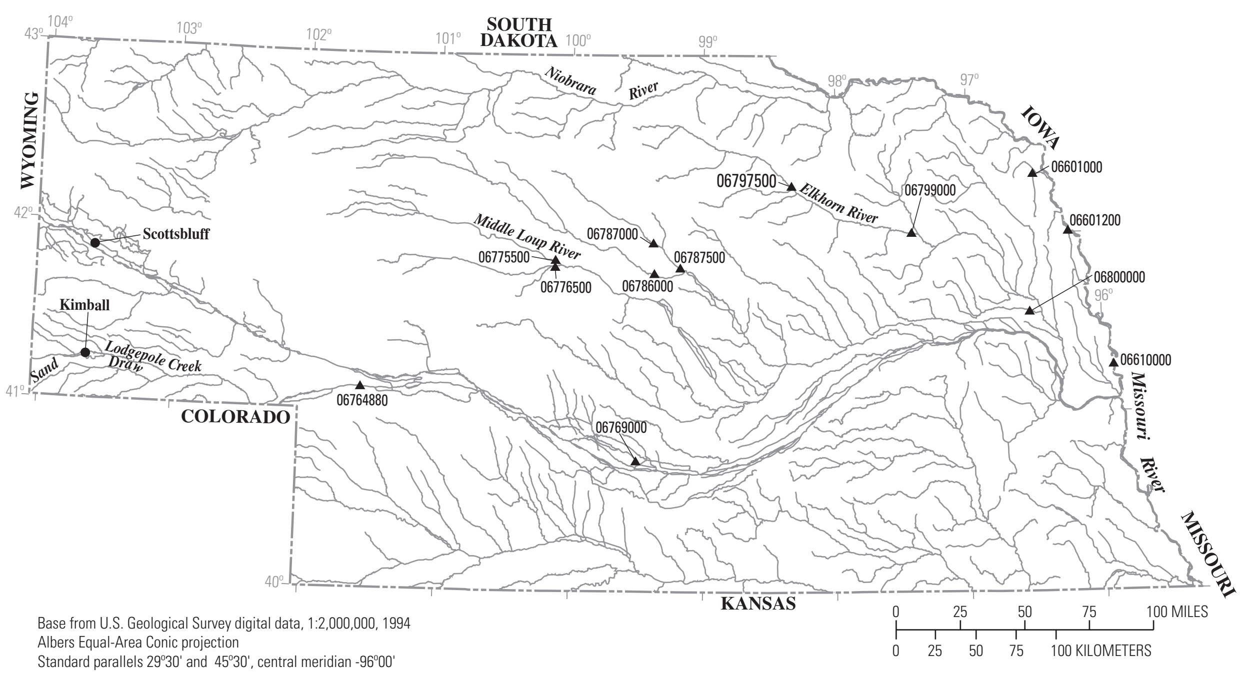
An ice-jam release in March 1996 created a large flood on the Middle Loup River at Dunning (streamgage 06775500, table 28). Isolated intense thunderstorms through the spring and summer of 1996 caused some flash flooding across the State. Buffalo Creek near Overton (streamgage 06769000), Middle Loup River at Dunning (streamgage 06755000), and Maple Creek near Nickerson (streamgage 06800000) had their peaks of record during this period. More than $9 million in damage to property and almost $22 million damage to crops were reported (National Oceanic and Atmospheric Administration, 1996b).

A series of thunderstorms produced in excess of 7.5 inches of rain west of Kimball during a 5-hour period on May 24, 1997 (National Oceanic and Atmospheric Administration, 1997a). Widespread flooding occurred along Lodgepole Creek and in Sand Draw. More than $2 million in damage occurred (National Oceanic and Atmospheric Administration 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

06769000▲ **Streamgage and number**

Figure 39. Location of streamgages with significant floods during 1994–98 water years for Nebraska.

Table 28. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nebraska.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 39)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06601000	Omaha Creek at Homer, NE	174	1940, 1945–98	1940	32.50	51,000	7/17/96	22.30	21,500	N	75–100
06601200	Missouri River at Decatur, NE	316,200	1987–98	1997 1996	31.99 32.31	100,000 83,400	4/15/97	31.99	100,000	Y	10–25
06610000	Missouri River at Omaha, NE	322,800	1928–98	1952 1993	30.20 30.26	396,000 115,000	6/23/96	29.50	118,000	Y	20
06764880	South Platte River at Roscoe, NE	23,900	1982–98	1995	11.29	20,100	6/6/95	11.29	20,100	Y	15–35
06769000	Buffalo Creek near Overton, NE	175	1949–58, 1996–98	1996 1958	9.70 10.47	387 383	8/4/96	9.70	387	N	5–15
06775500	Middle Loup River at Dunning, NE	1,830	1946–98	1996 1949	6.15 7.02	2,480 --	3/25/96	6.15	2,480	N	60–85
06776500	Dismal River at Dunning, NE	2,040	1932, 1945–95	1983 1947	2.40 5.21	1,290 --	5/27/95	2.37	1,060	N	50–60
06786000	North Loup River at Taylor, NE	2,350	1936–98	1995 1957	5.59 9.50	3,480 --	5/28/95	5.59	3,480	N	50–60
06787000	Calamus River near Harrop, NE	693	1964, 1978–97	1995 1987	4.68 5.34	1,380 --	5/28/95	4.68	1,380	N	25–45
06787500	Calamus River near Burwell, NE	994	1940–95	1964 1967	4.35 8.90	1,790 --	5/29/95	5.43	1,380	Y	15–35
06797500	Elkhorn River at Ewing, NE	1,400	1947–98	1995 1947	11.09 11.32	9,050 6,600	5/29/95	11.09	9,050	N	25–30
06799000	Elkhorn River at Norfolk, NE	2,790	1896–1903, 1940–98	1995 1949	13.05 15.63	19,200 --	5/31/95	13.05	19,200	N	30–35
06800000	Maple Creek near Nickerson, NE	369	1944, 1952–98	1996 1984	17.33 17.65	13,700 6,430	8/6/96	17.33	13,700	N	30–35

[1]Regulated during flood: N, no; Y, yes.

Nevada

The floods of January l997 were caused by several factors. First, the Sierra Nevada Mountains and western Nevada had experienced two above-normal precipitation years (1995, 1996). Second, a major winter storm December 21 and 22, 1996, deposited heavy snow in the Sierra Nevada Mountains and western Nevada. Four to 6 feet of snow were common below 7,000 feet in the Sierra Nevada Mountains with as much as 8 feet at the higher elevations. One to 3 feet of snow were found across the valleys of western Nevada (National Oceanic and Atmospheric Administration, 1997a). The following week into New Years' Day showed a dramatic change in the weather pattern. Copious amounts of moisture and warm air were transported from the subtropics into the Sierra Nevada Mountains and western Nevada. The most excessive rainfall occurred January 1 and 2, and snow occurred at elevations as high as 11,700 feet on January 1. An incredible amount of rainfall and snowmelt runoff poured out of the Sierra Nevada from December 30, 1996, to January 6, 1997. For example, an estimated 25 inches of rain and snowmelt runoff occurred during the period in the upper Truckee River Basin in California. These conditions were typical throughout the region and resulted in record flooding on the Truckee, Carson, and Walker Rivers (fig. 40). This flooding caused tremendous amounts of public and private damage throughout the eastern Sierra Nevada Mountains and extreme western Nevada. Total damage was more than $640 million, but there were only two reported deaths (National Oceanic and Atmospheric Administration, 1997b). Nineteen streamgages experienced their peak discharge of record during the first week in January 1997 (table 29).

In addition to strong winds and large hail, redeveloping severe thunderstorms produced intense downpours that resulted in severe flash flooding in the southeastern Las Vegas Valley on August 10, 1997. In Henderson, raging floodwaters turned roads into 3- to 4-foot deep rivers. Water and mudslides closed many roads, including U.S. Highway 95, for several hours. One man was drowned when a strong current swept him under his vehicle as he tried to move it off his neighborhood street. Boulder City and Lake Mead National Recreation Area also were hit hard by thunderstorms producing excessive rain. Damage was estimated at more than $1 million for the Lake Mead National Recreation Area and about $3.4 million for Boulder City (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1997a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1997b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

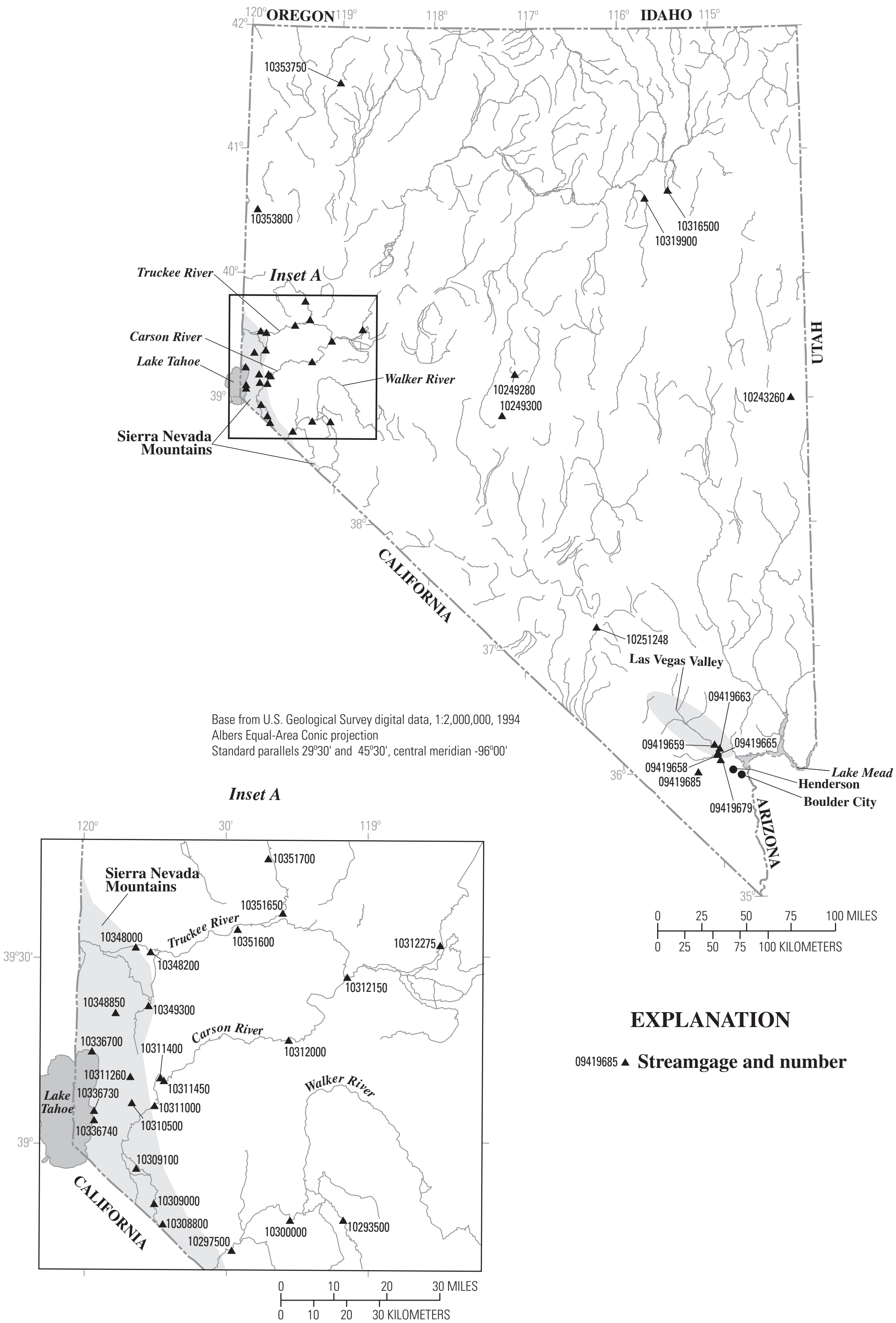


Figure 40. Location of streamgages with significant floods during 1994–98 water years for Nevada.

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09419658	Las Vegas Wash near Sahara Avenue near Las Vegas, NV	1,146	1975, 1988–98	1998 1990	12.50 16.27	4,400 1,960	9/11/98	12.50	4,400	Y	--
09419659	Sloan Channel tributary at Las Vegas Boulevard near North Las Vegas, NV	17.5	1989–98	1998	15.34	920	9/11/98	15.34	920	Y	--
09419663	Las Vegas Wash tributary south of Nellis Air Force Base, NV	1.20	1963–81, 1983–98	1998	21.00	600	9/11/98	21.00	600	Y	--
09419665	Sloan Channel at Charleston Boulevard near Las Vegas, NV	144	1989–98	1998 1997	11.41 11.72	1,230 700	9/11/98	11.41	1,230	Y	--
09419679	Las Vegas Wasteway near East Las Vegas, NV	--	1980–83, 1985–98	1983 1990	6.56 6.99	630	11/21/96	6.81	523 453	N	--
09419685	Bird Springs Wash near Arden, NV	--	1987–98	1998	44.05	35	7/20/98	44.05	35	N	--
10243260	Lehman Creek near Baker, NV	11.0	1948–55, 1993–97	1995	5.01	80	6/29/95	5.01	80	N	--
10249280	Kingston Creek below Cougar Canyon near Austin, NV	23.4	1967–98	1983 1995	3.19 3.86	385 234	6/3/95	3.86	234	Y	--
10249300	South Twin River near Round Mountain, NV	20.0	1965–98	1983	4.39	510	6/3/98	3.20	148	N	--
10251248	Unnamed tributary-Stockade Wash near Rattlesnake Ridge, Nevada Test Site, NV	3.90	1984–88, 1991–95	1995	5.49	90	3/11/95	5.49	90	N	--
10293500	East Walker River above Strosnider Ditch near Mason, NV	1,100	1947–92, 1995–98	1986 1997	7.49 9.61	2,820 2,610	1/4/97	9.61	2,610	Y	>25

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10297500	West Walker River at Hoye Bridge near Wellington, NV	497	1921–22, 1924–32, 1958–98	1997	13.68	11,500	1/3/97	13.68	11,500	Y	>100
10300000	West Walker River near Hudson, NV	964	1915–18, 1920–24, 1947–92, 1995–98	1997	12.18	11,400	1/3/97	12.18	11,400	Y	>100
10308800	Bryant Creek near Gardnerville, NV	31.5	1961–73, 1978–80, 1995–98	1997	8.70	1,360	1/2/97	8.70	1,300	N	<25
10309000	East Fork Carson River near Gardnerville, NV	356	1890–93, 1901–05, 1908–10, 1917, 1925–28, 1936–38, 1940–98	1997	13.00	20,300	1/3/97	13.00	20,300	N	100
10309100	East Fork Carson River at Minden, NV	392	1975–84, 1994–98	1997 1980	10.41 11.40	10,900 8,000	1/2/97	10.41	10,900	Y	--
10310500	Clear Creek near Carson City, NV	15.5	1948–78, 1989–98	1997	3.94	266	1/2/97	3.94	266	N	50
10311000	Carson River near Carson City, NV	886	1939–98	1997	18.43	30,500	1/3/97	18.43	30,500	N	>75
10311260	Vicee Canyon Creek near Sagebrush Ranch near Carson City, NV	1.83	1979–80, 1982, 1984, 1986, 1991–97	1997	9.66	4,000	1/2/97	9.66	4,000	N	>100

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
10311400	Carson River at Deer Run Road near Carson City, NV	958	1980–85, 1991–98	1997	24.23	24,000	1/3/97	24.23	24,000	N	<100
10311450	Brunswick Canyon near New Empire, NV	12.7	1966–78, 1980–98	1995	5.02	245	3/11/95	5.02	245	N	<10
10312000	Carson River near Fort Churchill, NV	1,450	1911–98	1997	15.27	22,300	1/3/97	15.27	22,300	N	>100
10312150	Carson River below Lahontan Reservoir near Fallon, NV	1,801	1980–98	1983	8.34	3,160	5/17/96	7.78	2,430	Y	--
10312275	Carson River at Tarzyn Road near Fallon, NV	--	1986–98	1996 1997	6.11 8.73	942 821	5/27/96	6.11 8.73	942 821	Y	--
10316500	Lamoille Creek near Lamoille, NV	24.9	1915–16, 1918–20, 1922, 1944–98	1997 1982	5.29 6.23	838 829	6/4/97	5.29	838	N	--
10319900	South Fork Humboldt River above Tenmile Creek near Elko, NV	898	1989–98	1995	5.82	2,710	6/3/95	5.82	2,710	N	--
10336700	Incline Creek near Crystal Bay, NV	6.69	1970–73, 1975, 1988–98	1997	3.87	179	1/2/97	3.87	179	N	<50
10336730	Glenbrook Creek at Glenbrook, NV	3.75	1972–75, 1988–98	1997	6.46	144	1/2/97	6.46	144	N	50
10336740	Logan House Creek near Glenbrook, NV	2.08	1984–98	1997	4.75	11	1/2/97	4.75	11	N	<25
10348000	Truckee River at Reno, NV	1,067	1907–21, 1925–26, 1931–34, 1947–98	1956 1997	13.63 14.94	20,800 18,200	1/2/97	14.94	18,200	Y	<50

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10348200	Truckee River near Sparks, NV	1,070	1978–98	1997 1986	-- 15.22	18,000 14,900	1/2/97	--	18,000	Y	--
10348850	Galena Creek at Galena Creek State Park, NV	7.69	1985–98	1997	5.54	2,610	1/2/97	5.54	2,610	N	<50
10349300	Steamboat Creek at Steamboat, NV	123	1962–98	1986	6.79	3,600	1/1/97	6.03	2,090	Y	>25
10351600	Truckee River below Derby Dam near Wadsworth, NV	1,676	1909–10, 1916, 1918–98	1997	14.56	19,900	1/3/97	14.56	19,900	Y	<50
10351650	Truckee River at Wadsworth, NV	1,728	1966–86, 1994–98	1997	19.62	19,100	1/3/97	19.62	19,100	Y	<50
10351700	Truckee River near Nixon, NV	1,827	1956, 1958–98	1997	15.28	21,200	1/3/97	15.28	21,200	Y	50
10353750	Mahogany Creek near Summit Lake, NV	13.3	1988–98	1995 1998	5.34 5.56	50 40	6/5/95	5.34	50	N	--
10353800	Smoke Creek below reservoir near Smoke Creek, NV	50.1	1986, 1989–98	1995 1986	8.43 9.00	4,320 2,270	3/9/95	8.43	4,320	Y	--

[1]Regulated during flood: N, no; Y, yes.

New Hampshire

A coastal storm, which was fed tropical moisture by the circulation around Hurricane Lily, produced 8 to 13 inches of rain throughout parts of central and southern New Hampshire during October 20–23, 1996 (National Oceanic and Atmospheric Administration, 1996a). Many homes and businesses were flooded, roads and bridges were washed out, and several dams were damaged. Total damage was more than $10.8 million (National Oceanic and Atmospheric Administration, 1996b). Oyster River near Durham (streamgage 01073000) had a peak of record during this flood (table 30).

Three to 8 inches of rain during June 13–15, 1998 (National Oceanic and Atmospheric Administration, 1998a), caused small rivers and streams to rise in central and southern New Hampshire. Many roads were flooded and (or) washed out. Campgrounds and some lakeside homes had to be evacuated. More than $1 million in damage resulted (National Oceanic and Atmospheric Administration, 1998b). Excessive rains returned on June 27, 1998. From 3 to possibly as much as 6 inches of rain fell in 12 hours (National Oceanic and Atmospheric Administration, 1998a) causing the Baker River (fig. 41) and its tributaries to rise very rapidly. Bridges were destroyed, vehicles were washed away, and some towns were completely isolated. Damage was near $1.5 million (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1996a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1996b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

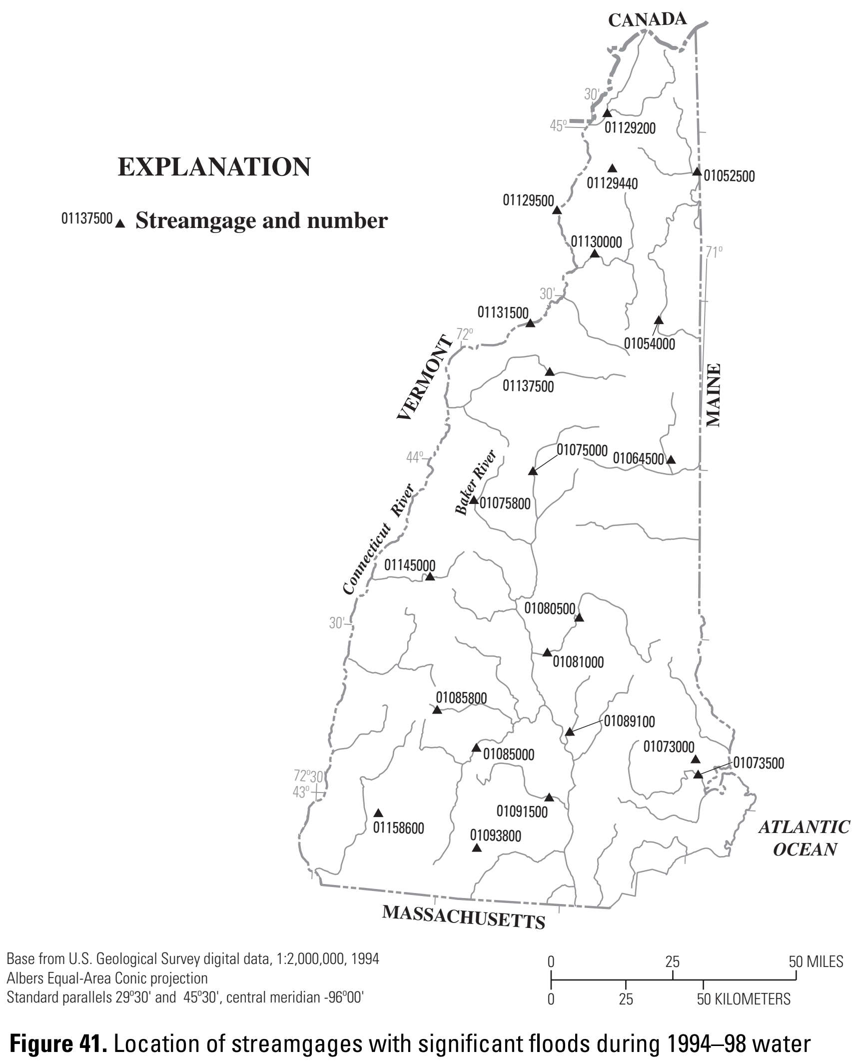


Figure 41. Location of streamgages with significant floods during 1994–98 water years for New Hampshire.

Table 30. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Hampshire.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 41)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01052500	Diamond River near Wentworth Location, NH	152	1942–98	1998 1981	12.11 12.23	12,800 3,620	3/31/98	12.11	12,800	N	>100
01054000	Androscoggin River near Gorham, NH	1,361	1914–98	1923 1998	-- 10.15	21,900 20,400	4/1/98	10.15	20,400	Y	50
01064500	Saco River near Conway, NH	385	1903–09, 1910–12, 1929–98	1998	14.67	36,500	6/14/98	14.67	36,500	--	10–25
01073000	Oyster River near Durham, NH	12.1	1935–98	1997 1936	6.67 7.45	1,160 548	10/21/96	6.67	1,160	N	>100
01073500	Lamprey River near Newmarket, NH	183	1935–98	1987	15.14	7,570	10/22/96	14.59	7,080	Y	50–75
01075000	Pemigewasset River at Woodstock, NH	193	1940–80, 1985–98	1960	16.13	47,000	10/22/95	14.09	33,500	N	25–50
01075800	Stevens Brook near Wentworth, NH	12.9	1964–98	1996	4.51	650	11/12/95	4.51	650	--	10–25
01080500	Lake Winnipesaukee outlet at Lakeport, NH	363	1934–83, 1988–98	1936	--	2,890	6/22/98	--	2,620	Y	10–25
01081000	Winnipesaukee River at Tilton, NH	471	1937–98	1984	8.68	4,580	6/28/98	8.04	3,940	Y	25
01085000	Contoocook River near Henniker, NH	368	1938, 1940–77, 1989–98	1938	21.30	22,200	10/22/96	13.18	9,840	Y	25–50
01085800	West Branch Warner River near Bradford, NH	5.75	1963–98	1984 1996	-- 9.14	800 690	11/12/95	9.14	690	N	10–25
01089100	Soucook River at Pembroke Road near Concord, NH	81.9	1989–98	1996	11.59	2,320	4/17/96	11.59	2,320	N	10–25

Table 30. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Hampshire.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 41)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01091500	Piscataquog River near Goffstown, NH	202	1936, 1938 1940–78, 1983–98	1938	17.52	21,900	10/21/96	10.61	6,470	Y	5–10
01093800	Stony Brook tributary near Temple, NH	3.60	1964–98	1997 1977	5.63 7.13	648 336	10/21/96	5.63	648	N	25–50
01129200	Connecticut River below Indian Stream near Pittsburg, NH	254	1957–98	1996	7.97	5,240	4/27/96 3/31/98	7.97 7.87	5,240 5,120	Y Y	50–100 50–100
01129440	Mohawk River near Colebrook NH	36.7	1987–98	1998	10.99	4,880	3/31/98	10.99	4,880	N	10–25
01129500	Connecticut River at North Stratford, NH	799	1931–98	1998 1981	15.63 16.40	32,300 17,000	3/31/98	15.63	32,300	Y	>100
01130000	Upper Ammonoosuc River near Groveton, NH	232	1936, 1941–80, 1983–98	1969	12.01	24,100	3/31/98	8.97	9,130	N	25–50
01131500	Connecticut River near Dalton, NH	1,514	1928–98	1936	25.60	48,300	4/1/98	23.70	42,000	Y	25–50
01137500	Ammonoosuc River at Bethlehem Junction, NH	87.6	1940–98	1996	12.34	11,300	11/12/95	12.34	11,300	N	50
01145000	Mascoma River at West Canaan, NH	80.5	1938, 1940–78, 1985–98	1953 1938	8.94 9.60	3,780 4,310	6/27/98	8.59	3,420	N	25–50
01158600	Otter Brook below Otter Brook Dam near Keene, NH	47.2	1959–98	1987 1994	8.62 8.64	752 720	4/18/94	8.64	720	Y	10–25

[1]Regulated during flood: N, no; Y, yes.

New Jersey

The combination of warm temperatures, snowmelt, frozen ground, and basin average precipitation of 1.5 to 2 inches (National Oceanic and Atmospheric Administration, 1994a) caused urban flooding throughout interior southern New Jersey on January 28, 1994. The sudden increase in temperatures led to the formation of a few ice jams on area streams and rivers adding to the flooding problems. The area around Trenton (fig. 42) was the hardest hit with an estimated $4.5 million in damage (National Oceanic and Atmospheric Administration, 1994b).

Thunderstorms with torrential downpours remained nearly stationary over the eastern Philadelphia suburbs for about 2 hours on July 14, 1994. Rainfall amounts of 3 to more than 7 inches were reported. In Westmont, 3.25 inches of rain fell within 30 minutes, 4.72 inches within 1 hour, and 6.54 inches in 3 hours. The rainfall rate of 4.72 inches per hour represents a greater than 100-year, 1-hour precipitation event for a single location in southern New Jersey (National Oceanic and Atmospheric Administration, 1994a).

Strong southerly winds ushered very mild and moisture-laden air into the State on January 19, 1996. Street flooding and poor drainage became a major problem early on due to the rains, significant snowmelt, and ice jams. The flash flooding of the afternoon and early evening on January 19 led to larger river flooding through January 21. The worst damage occurred along the Delaware River, which crested at its highest stages since the summer of 1955 (table 31). Widespread flooding along the Raritan River was described as the worst in Manville since Tropical Storm Doria in August 1971. Damage was near $14 million, and one life was lost (National Oceanic and Atmospheric Administration, 1996b).

Nearly stationary thunderstorms dropped between 3.5 and 7.6 inches of rain within 4 hours northwest of Trenton during the evening of June 12, 1996 (National Oceanic and Atmospheric Administration, 1996a). This caused widespread flash flooding throughout the area. Nearly every roadway was flooded. The 7.6 inches of rain represent about a daily 100-year storm (National Oceanic and Atmospheric Administration, 1996a). Approximately $8 million in property damage occurred, most of it in Ewing (National Oceanic and Atmospheric Administration, 1996b).

Rain, intense at times, fell across the northern half of New Jersey during the daylight hours of October 19, 1996. Storm precipitation totals ranged from 5 to nearly 7 inches (National Oceanic and Atmospheric Administration, 1996a). Four streamgages experienced their peak of record during this flood (table 31). Damage was near $45 million, but there were no deaths (National Oceanic and Atmospheric Administration, 1996b).

On July 25, 1997, a long period of excessive rain occurred in northern New Jersey as a strong warm front moved slowly north toward the area. In addition, the area was affected by fringe precipitation from Tropical Storm Danny. Excessive rainfall [from 4 to 7 inches with isolated higher amounts (National Oceanic and Atmospheric Administration, 1997a)] caused widespread serious flooding of homes, streets, rivers, streams, and poor drainage areas in and around Newark. Property damage estimates were at least $3 million (National Oceanic and Atmospheric Administration, 1997b).

Torrential rain from thunderstorms fell across southeastern New Jersey on August 20–21, 1997, as a low-pressure system developed south of Delaware Bay and slowly moved northeast across southern New Jersey. Storm totals included 10.12 inches in Millville and 7.2 inches in Vineland. The storm total of 13.52 inches of rainfall at the Atlantic City International Airport represented a greater than 100-year storm for the area. A 100-year storm for this area is 7.25 inches (National Oceanic and Atmospheric Administration, 1997a). Total damage was estimated at $54 million, but no deaths occurred (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

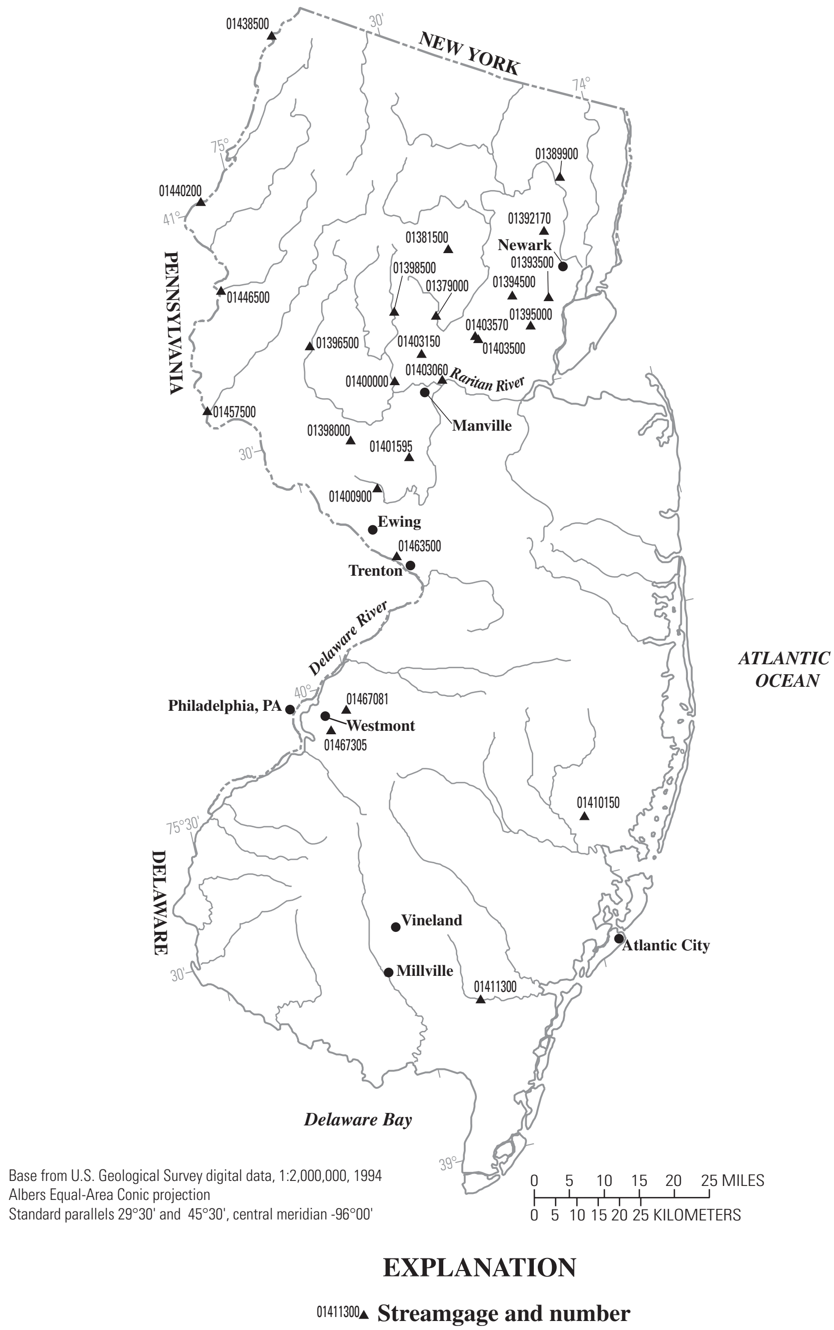


Figure 42. Location of streamgages with significant floods during 1994–98 water years for New Jersey.

Table 31. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Jersey.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 42)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01379000	Passaic River near Millington, NJ	55.4	1904–06, 1922–98	1997	9.89	2,290	10/20/96	9.89	2,290	N	80
01381500	Whippany River at Morristown, NJ	29.4	1922–98	1971	8.60	2,800	10/20/96	7.79	2,300	N	40
01389900	Fleischer Brook at Market Street at Elmwood Park, NJ	1.37	1967–93, 1995–98	1978	6.47	470	7/8/96	2.82	1,600	N	--
01392170	Third River at Bloomfield, NJ	7.71	1989–98	1997	7.34	1,410	10/19/96	7.34	1,410	N	6
01393500	Elizabeth River at Elizabeth, NJ	20.2	1922–98	1971	18.70	4,110	7/25/97	--	3,080	N	9
01394500	Rahway River near Springfield, NJ	25.5	1938–99	1973	9.76	5,430	7/25/97	9.56	5,140	N	50
01395000	Rahway River at Rahway, NJ	40.9	1922–87, 1989–98	1973	7.88	5,420	10/19/96	7.50	4,210	N	30
01396500	South Branch Raritan River near High Bridge, NJ	65.3	1896, 1902, 1904, 1919–24, 1926–98	1979 1994	12.07 14.26	6,910 2,000	10/20/96	11.13	4,730	N	30
01398000	Neshanic River at Reaville, NJ	25.7	1931–98	1971	13.84	15,900	10/19/96	12.63	11,100	N	25
01398500	North Branch Raritan River near Far Hills, NJ	26.2	1919, 1922–98	1971 1919	7.28 7.60	6,390 7,000	10/19/96	6.65	5,090	N	35
01400000	North Branch Raritan River near Raritan, NJ	190	1896, 1924–98	1971	15.47	28,600	10/19/96	15.44	28,500	N	100
01400900	Stony Brook at Glenmoore, NJ	17.0	1957–95	1971	11.02	6,100	1/28/94	9.94	4,950	N	35
01401595	Rock Brook near Blawenburg, NJ	9.03	1967–76, 1978–98	1971	10.00	4,530	10/19/96	8.19	3,130	N	20
01403060	Raritan River below Callo Dam at Bound Brook, NJ	785	1896, 1904–09, 1936–39, 1942, 1945–98	1971	37.47	46,100	10/20/96	35.58	40,100	N	25

Table 31. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Jersey.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 42)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01403150	West Branch Middle Brook near Martinsville, NJ	1.99	1980–98	1997	6.89	700	10/19/96	6.89	700	N	15
01403500	Green Brook at Plainfield, NJ	9.75	1916, 1927, 1936, 1938–98	1938 1970	5.82 6.10	2,890 2,050	10/19/96	5.82	2,120	N	30
01403570	Stony Brook at North Plainfield, NJ	6.88	1938, 1975–81, 1991–98	1997 1938	7.35 10.00	3,130 --	10/19/96	7.35	3,130	N	30
01410150	East Branch Bass River near New Gretna, NJ	8.11	1978–98	1997	7.28	750	8/22/97	7.28	750	N	100
01411300	Tuckahoe River at Head of River, NJ	30.8	1971–96, 1998	1997	9.09	1,340	8/21/97 2/5/98	9.09 6.72	1,340 638	N N	>100 40
01438500	Delaware River at Montague, NJ	3,480	1904, 1936–98	1955 1904	35.15 35.50	250,000 --	1/20/96	26.66	149,000	N	30
01440200	Delaware River near Delaware Water Gap, NJ	3,850	1955, 1965–96	1955	37.40	260,000	1/20/96	24.89	155,000	N	40
01446500	Delaware River at Belvidere, NJ	4,535	1904, 1923–98	1955	30.21	273,000	1/20/96	22.96	158,000	N	40
01457500	Delaware River at Riegelsville, NJ	6,328	1841, 1904, 1907–98	1955	38.85	340,000	1/20/96	28.72	187,000	N	40
01463500	Delaware River at Trenton, NJ	6,780	1902, 1904–98	1955	28.60	329,000	1/20/96	22.20	179,000	N	25
01467081	South Branch Pennsauken Creek at Cherry Hill, NJ	8.98	1968–76, 1978–98	1994	11.63	1,500	7/14/94	11.63	1,500	N	100
01467305	Newton Creek at Collingswood, NJ	1.33	1964–75, 1977–98	1994	6.82	328	7/14/94	6.82	328	N	70

[1]Regulated during flood: N, no; Y, yes.

New Mexico

Intense thunderstorms across New Mexico occurred intermittently during May, June, July, and August 1994, and caused six streamgages to experience their peak of record (table 32). On May 31, 1994, the Rio Grande River below Elephant Butte Dam (streamgage 08361000) had its greatest discharge since the flood of 1942 on May 31, 1994.

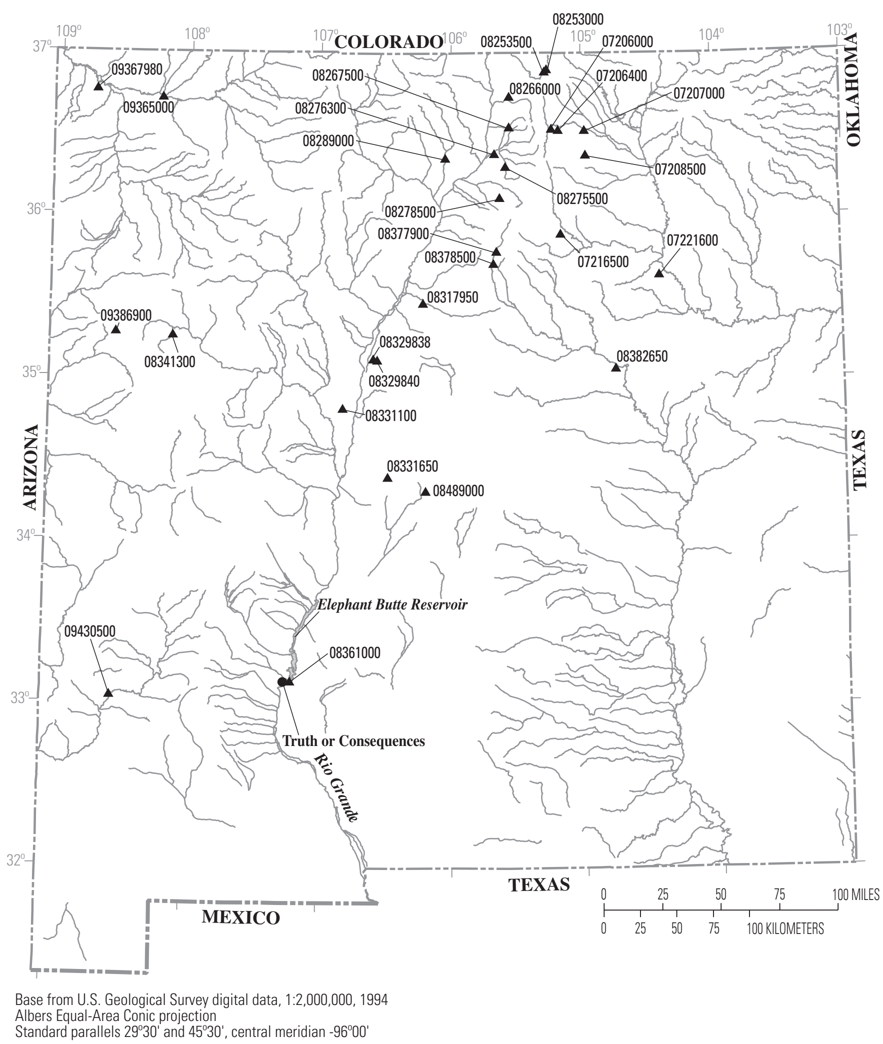
Intense thunderstorms produced excessive rainfall during June 1995, causing flooding in various parts of the State. Peaks of record were set at two streamgages in June (table 32).

An estimated rainfall of as much as 4.50 inches fell in a 3-hour period shortly after midnight on June 29, 1997 (National Oceanic and Atmospheric Administration, 1997a) near Truth or Consequences (fig. 43). Several roads were washed out or damaged, and several cars were washed into Elephant Butte Reservoir. Considerable damage also took place to utilities and a number of homes and businesses, mainly due to the rapid runoff rather than rising water levels in established drainages. Damage was near $1 million (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1997a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1997b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

08361000▲ **Streamgage and number**

Figure 43. Location of streamgages with significant floods during 1994–98 water years for New Mexico.

Table 32. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Mexico.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 43)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07206000	Cimarron River below Eagle Nest Dam, NM	167	1950–98	1994 1955	-- 2.79	303 205	5/23/94	3.63	303	Y	--
07206400	Clear Creek near Ute Park, NM	7.44	1962–77, 1979–84, 1986–96	1965	3.05	151	7/24/94	3.00	150	N	35
07207000	Cimarron River near Cimarron, NM	294	1950–97	1965	12.42	15,500	6/3/95	4.32	892	Y	--
07208500	Rayado Creek at Sauble Ranch near Cimarron, NM	65.0	1914, 1917–20, 1924, 1928–32, 1934–96	1965	11.50	9,000	6/18/95	4.86	666	N	10
07216500	Mora River near Golondrinas, NM	267	1916–20, 1929–86, 1988–98	1952 1969	-- 9.30	14,000 3,180	5/19/94	5.82	6,180	N	60
07221600	Lagarita Creek tributary near Sanchez, NM	1.19	1972, 1982, 1989–96	1994	5.83	1,500	5/11/94	5.83	1,500	N	10
08253000	Casias Creek near Costilla, NM	16.6	1937–97	1994 1971	2.06 2.07	196 181	5/25/94	2.06	196	N	50
08253500	Santistevan Creek near Costilla, NM	2.15	1938–98	1995 1941	1.57 1.73	20 18	6/29/95	1.57	20	N	25
08266000	Cabresto Creek near Questa, NM	36.7	1944–96	1994	5.41	289	5/21/94	5.41	289	Y	--
08267500	Rio Hondo near Valdez, NM	36.2	1935–98	1941 1979	2.73 4.53	541 402	6/20/95	3.98	460	N	20

Table 32. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Mexico.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 43)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08275500	Rio Grande del Rancho near Talpa, NM	83.0	1953–98	1991	4.16	644	5/20/94	3.50	529	N	25
08276300	Rio Pueblo de Taos below Los Cordovas, NM	380	1957–98	1994 1991	8.88 8.93	2,260 1,660	5/20/94	8.88	2,260	Y	25
08278500	Rio Santa Barbara near Penasco, NM	38.0	1954–57, 1992–98	1995	6.21	838	6/18/95	6.21	838	N	--
08289000	Rio Ojo Caliente at La Madera, NM	419	1932–98	1998 1994	6.00 8.27	3,990 3,640	8/14/94 7/8/98	8.27 6.00	3,640 3,990	N N	35 70
08317950	Galisteo Creek below Galisteo Dam, NM	597	1971–97	1997 1981	-- 7.11	3,460 1,590	8/24/97	--	3,460	Y	--
08329838	South Fork Hahn Arroyo in Albuquerque, NM	2.03	1979–83, 1992–98	1994	4.42	574	5/11/94	4.42	574	N	--
08329840	Hahn Arroyo in Albuquerque, NM	4.23	1979–98	1998	2.93	1,150	12/27/97	2.93	1,150	N	--
08331100	Belen Highline Canal tributary near Los Lunas, NM	.16	1955–95	1965 1994	-- 7.30	754 480	8/15/94	7.30	480	N	25
08331650	Canada Montoso near Scholle, NM	35.0	1961–80, 1982–95, 1997	1997	7.47	5,600	7/31/97	7.47	5,600	N	40
08341300	Bluewater Creek above Bluewater Dam, Bluewater, NM	75.0	1953–71, 1973–77, 1989–96, 1998	1953	8.99	3,570	3/6/95	4.45	1,940	N	20
08361000	Rio Grande below Elephant Butte Dam, NM	29,450	1915–98	1942 1998	-- 7.54	8,220 2,810	5/31/94	--	5,270	Y	--

Table 32. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Mexico.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 43)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08377900	Rio Mora near Tererro, NM	53.2	1964–98	1991 1979	4.08 4.15	937 820	6/8/97	3.99	864	N	25
08378500	Pecos River near Pecos, NM	189	1920–22, 1924, 1926, 1928–98	1929	6.20	4,500	6/7/97	4.79	2,060	N	20
08382650	Pecos River above Santa Rosa Lake, NM	2,340	1976–98	1996	19.06	16,000	7/11/96	19.06	16,000	N	20
08489000	Big Draw near Mountainair, NM	4.06	1953–71, 1973–74, 1978–83, 1985–96	1954	8.68	1,710	6/26/96	6.64	1,040	N	20
09365000	San Juan River at Farmington, NM	7,240	1924–97	1927 1935	-- 8.00	68,000 32,800	6/2/97	7.77	13,000	Y	4
09367980	Rattlesnake Arroyo near Shiprock, NM	--	1980–96	1995	6.25	3,800	9/7/95	6.25	3,800	N	20
09386900	Rio Nutria near Ramah, NM	71.4	1970–98	1995	9.34	1,850	3/5/95	9.34	1,850	N	30
09430500	Gila River near Gila, NM	1,864	1928–98	1985 1941	13.00 17.19	35,200 25,400	9/22/97	11.18	18,200	N	20

[1]Regulated during flood: N, no; Y, yes.

New York

The most disastrous flood in more than 20 years struck central New York from January 19–20, 1996. Significant widespread flooding of streams, rivers, homes and businesses, streets and highways, woodlands, and farmland occurred as a result of rapid snowmelt and nearly simultaneous storm runoff. An area of intense low pressure, which was located over the Mid-Atlantic region on Friday morning January 19, produced unseasonably warm temperatures, high dew points, and strong winds. This resulted in rapid melting of 1 to 3 feet of snow. In addition to the rapid snowmelt, 1 to 3 inches of rain fell as the system moved northeast along the coast (National Oceanic and Atmospheric Administration, 1996a). There were 10 known fatalities. Total damage statewide was more than $200 million (National Oceanic and Atmospheric Administration 1996b). Flash floods that began early on January 19 gave rise to main-stem river floods that persisted until the evening of January 21. Near-record river flooding occurred January 19–20 in the Chemung, upper Susquehanna, Hudson, and upper Delaware River Basins (fig. 44). At Waverly, the Susquehanna River crested at 20.35 feet, its third highest level of all time, which was about 1 foot lower than the all time crest of 21.40 feet recorded on March 19, 1946 (National Oceanic and Atmospheric Administration, 1996b). Flooding was so widespread and severe that this event became known as the “Deluge of '96.” Thirty-one streamgages experienced their peak of record in New York during this flood (table 33).

On Friday October 18, 1996, a strong low-pressure system developed along a cold front in New Jersey. With a high-pressure system in place across northern New England, the low slowly intensified and moved slowly off the southern New Jersey Coast during October 19. The increasing difference in pressures caused strong and gusty east winds, which also transported abundant moisture from the Atlantic Ocean across the region. Excessive flood-producing rains along with minor-to-major coastal flooding occurred. More than $17 million in damage resulted from coastal and river flooding (National Oceanic and Atmospheric Administration, 1996b).

During November 8–9, 1996, a slow-moving, low-pressure system tracked from northern Pennsylvania to northern New York. This system produced 4 to 5 inches of rain across most of central New York and the northern Catskill Mountains (National Oceanic and Atmospheric Administration, 1996a). The resulting runoff caused flooding along the Mohawk River to the Hudson River. Nearly $25 million in damage resulted (National Oceanic and Atmospheric Administration, 1996b).

An area of weak low pressure and a moist, unstable air mass over New England and New York resulted in evening and late-night thunderstorms with locally torrential downpours in extreme northern New York during June 25–27, 1998. Approximately $20 million in damage resulted (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1996a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1996b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

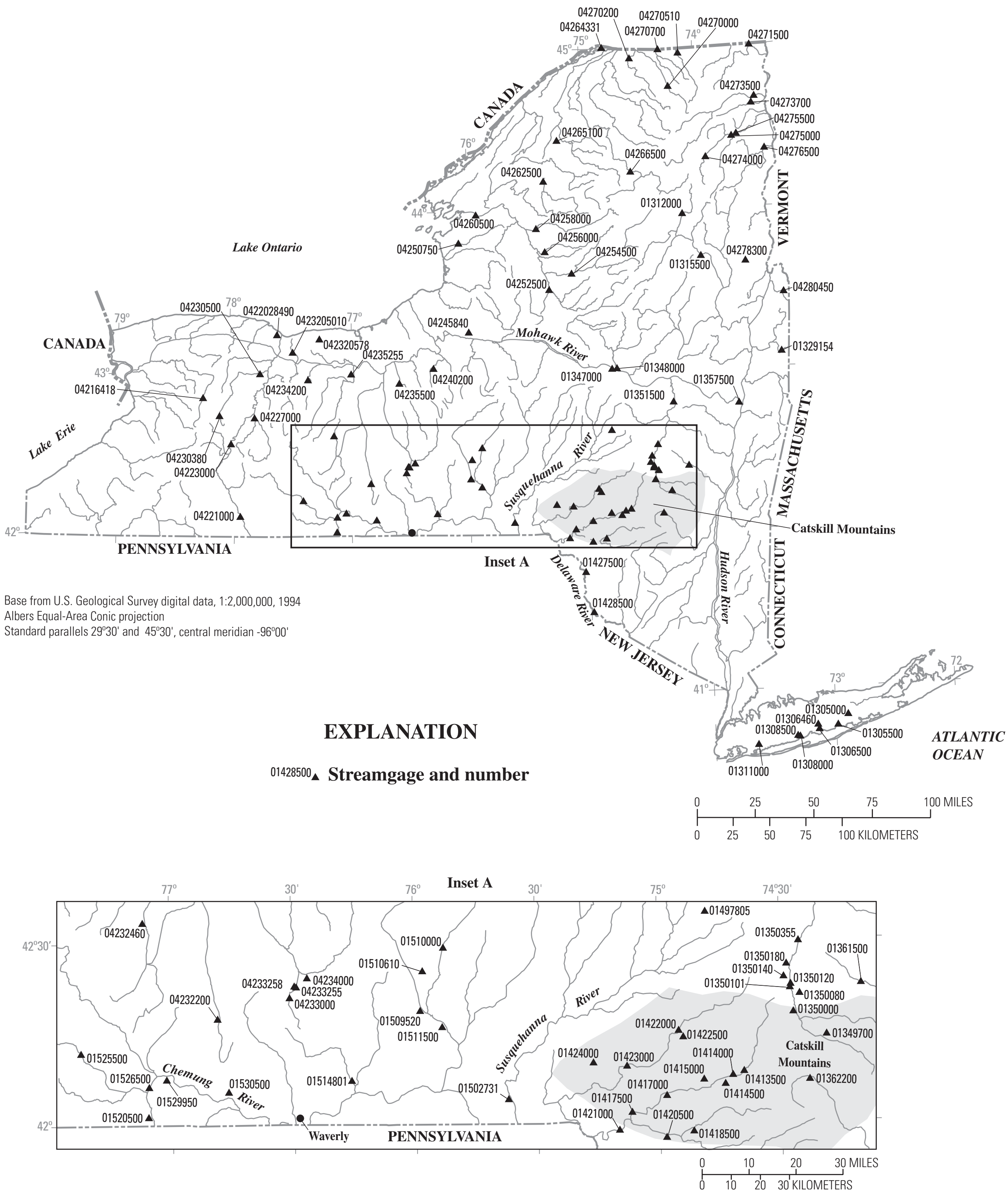


Figure 44. Location of streamgages with significant floods during 1994–98 water years for New York.

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01305000	Carmans River at Yaphank, NY	71.0	1943–98	1989	2.09	143	6/13/98	1.99	122	N	25
01305500	Swan River at East Patchogue, NY	8.60	1947–98	1990	2.71	77	6/13/98	2.39	69	N	75–100
01306460	Connetquot Brook near Central Islip, NY	18.0	1978–98	1998	3.89	155	6/13/98	3.89	155	N	10–25
01306500	Connetquot River near Oakdale, NY	24.0	1944–93, 1997–98	1956	--	263	6/13/98	--	174	N	--
01308000	Sampawams Creek at Babylon, NY	22.7	1945–98	1998	3.73	254	6/13/98	3.73	254	N	>100
01308500	Carlls River at Babylon, NY	35.4	1945–98	1998	2.46	336	6/13/98	2.46	336	N	100
01311000	Pines Brook at Malverne, NY	10.0	1939–98	1994	5.28	866	1/28/94	5.28	866	N	75–100
							10/19/96	4.81	578	N	25
01312000	Hudson River near Newcomb, NY	192	1926–98	1998	12.84	11,500	11/10/96	9.01	5,900	N	10
							1/9/98	12.84	11,500	N	>100
01315500	Hudson River at North Creek, NY	792	1908–98	1949	12.14	28,900	1/9/98	11.54	26,300	Y	50
01329154	Steele Brook at Shushan, NY	2.85	1979–98	1996	6.56	149	1/19/96	6.56	149	N	10–25
01347000	Mohawk River near Little Falls, NY	1,342	1901, 1902, 1904, 1913, 1928–98	1913	--	34,800	1/19/96	18.47	30,700	Y	75–100
01348000	East Canada Creek at East Creek, NY	289	1946–96, 1998	1946	9.00	24,000	1/19/96	8.32	17,000	N	50
							1/09/98	8.46	17,800	N	50–75
01349700	East Kill near Jewett Center, NY	35.6	1951, 1956, 1960, 1967–68, 1972–74, 1987, 1996–98	1996	17.00	13,500	1/19/96	17.00	13,500	N	25
01350000	Schoharie Creek at Prattsville, NY	237	1904, 1908–24, 1926–28, 1930–98	1996	19.39	52,800	1/19/96	19.39	52,800	N	25–50

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01350080	Manor Kill at West Conesville near Gilboa, NY	32.4	1987–98	1996	10.20	5,050	1/19/96	10.20	5,050	N	10–25
01350101	Schoharie Creek at Gilboa, NY	316	1936, 1938, 1956, 1976–98	1996	30.60	70,800	1/19/96	30.60	70,800	Y	75–100
01350120	Platter Kill at Gilboa, NY	10.9	1976–98	1996	6.70	1,370	1/19/96	6.70	1,370	N	25
01350140	Mine Kill near North Blenheim, NY	16.2	1975–98	1996	5.20	2,550	1/19/96	5.20	2,550	N	25–50
01350180	Schoharie Creek at North Blenheim, NY	358	1971–98	1996	17.61	75,600	1/19/96	17.61	75,600	Y	75–100
01350355	Schoharie Creek at Breakabeen, NY	444	1976–98	1996	20.51	80,200	1/19/96	20.51	80,200	Y	75–100
01351500	Schoharie Creek at Burtonsville, NY	886	1940–98	1996	12.88	81,600	1/20/96	12.88	81,600	Y	>100
01357500	Mohawk River at Cohoes, NY	3,450	1915–98	1964	23.15	143,000	1/20/96	22.68	132,000	Y	100
01361500	Catskill Creek at Oak Hill, NY	98.0	1911–77, 1980, 1987–98	1987	16.60	15,400	1/19/96	15.35	13,400	N	25–50
01362200	Esopus Creek at Allaben, NY	63.7	1951, 1964–98	1951	--	20,000	1/19/96	13.58	15,000	N	25–50
01413500	East Branch Delaware River at Margaretville, NY	163	1937–98	1996	14.88	25,800	1/19/96	14.88	25,800	N	75–100
01414000	Platte Kill at Dunraven, NY	34.9	1942–62, 1996–98	1996	11.20	5,690	1/19/96	11.20	5,690	N	>100
01414500	Mill Brook near Dunraven, NY	25.2	1937–98	1996	12.56	5,380	1/19/96	12.56	5,380	N	75–100
							11/9/96	11.09	3,850	N	25

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01415000	Tremper Kill near Andes, NY	33.2	1937–98	1996	7.69	5,000	1/19/96	7.69	5,000	N	75–100
01417000	East Branch Delaware River at Downsville, NY	372	1904, 1942–98	1904	16.00	34,000	12/2/96	9.41	11,000	Y	25
01417500	East Branch Delaware River at Harvard, NY	458	1904, 1935–67, 1978–98	1938	16.93	31,400	1/19/96	12.63	12,200	Y	25–50
				1904	--	42,000	12/2/96	12.79	12,400	Y	25–50
01418500	Beaver Kill at Craigie Clair, NY	81.9	1937–74, 1996	1996	11.83	13,000	1/19/96	11.83	13,000	N	50–75
01420500	Beaver Kill at Cooks Falls, NY	241	1914–98	1996	17.79	42,900	1/19/96	17.79	42,900	N	>100
01421000	East Branch Delaware River at Fishs Eddy, NY	784	1904, 1913–98	1904	23.60	70,000	1/19/96	16.88	53,000	Y	>100
01422000	West Branch Delaware River at Delhi, NY	142	1937–74, 1996	1996	9.80	13,000	1/19/96	9.80	13,000	N	>100
01422500	Little Delaware River near Delhi, NY	49.8	1938–74, 1996–98	1996	8.51	6,100	1/19/96	8.51	6,100	N	>100
							11/9/96	7.67	4,540	N	25–50
01423000	West Branch Delaware River at Walton, NY	332	1951–98	1996	16.36	25,000	1/19/96	16.36	25,000	N	50
01424000	Trout Creek near Rockroyal, NY	20.0	1952–67, 1996	1996	10.06	2,800	1/19/96	10.06	2,800	N	50
01427500	Callicoon Creek at Callicoon, NY	110	1940–82, 1987–98	1947	9.68	16,000	1/19/96	8.42	11,200	N	25–50
01428500	Delaware River above Lackawaxen River near Barryville, NY	2,020	1941–98	1955	26.40	130,000	1/20/96	22.18	98,300	Y	50–75
01497805	Little Elk Creek near Westford, NY	3.73	1978–98	1996	19.92	278	1/19/96	19.92	278	N	25–50

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01502731	Susquehanna River at Windsor, NY	1,820	1988–98	1996	21.22	40,000	1/20/96	21.22	40,000	N	10
01509520	Tioughnioga River at Lisle, NY	453	1988–98	1996 1993	-- 9.31	12,900 12,100	1/20/96	--	12,900	N	10
01510000	Otselic River at Cincinnatus, NY	147	1935, 1939–64, 1970–98	1935 1996	-- 10.89	9,200 8,000	1/19/96	10.89	8,000	N	25
01510610	Merrill Creek tributary near Texas Valley, NY	5.32	1976–81, 1983–98	1996	6.64	1,150	1/19/96	6.64	1,150	N	25–50
01511500	Tioughnioga River at Itaska, NY	730	1930–98	1935	16.61	61,100	1/19/96	10.77	20,800	Y	25–50
01514801	Catatonk Creek northwest of Owego, NY	151	1988–98	1996	14.83	9,740	1/20/96	14.83	9,740	N	25–50
01520500	Tioga River at Lindley, NY	771	1930–98	1972	26.27	128,000	8/18/94	13.38	13,900	Y	10
01525500	Canisteo River at West Cameron, NY	340	1931, 1935–72, 1974–98	1972	23.48	43,000	1/19/96	20.91	29,100	Y	50–75
01526500	Tioga River near Erwins, NY	1,377	1919–98	1972	26.74	190,000	1/19/96	16.98	45,600	Y	75
01529950	Chemung River at Corning, NY	2,005	1972, 1975–98	1972	40.71	228,000	1/19/96	25.93	61,000	Y	25–50
01530500	Newtown Creek at Elmira, NY	77.5	1938–98	1972	19.28	4,000	1/19/96	16.98	3,810	Y	25
04216418	Tonawanda Creek at Attica, NY	76.9	1972, 1978–98	1998	12.71	9,400	7/8/98	12.71	9,400	N	>100
0422028490	Slater Creek (Latta Road) near Greece, NY	1.52	1989–98	1997	4.80	219	10/20/96	4.80	219	N	10–25
04221000	Genesee River at Wellsville, NY	288	1956–58, 1972–98	1972	20.70	38,500	1/19/96	16.13	22,700	N	25–50

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04223000	Genesee River at Portageville, NY	984	1902, 1909–98	1972	32.25	90,000	1/20/96	29.12	56,200	N	25–50
04227000	Canaseraga Creek at Shakers Crossing, NY	335	1916–22, 1959–70, 1972, 1975–98	1972 1916	-- 28.92	11,200 --	1/19/96	13.01	5,510	N	10–25
04230380	Oatka Creek at Warsaw, NY	39.1	1964–98	1998	9.90	4,110	7/8/98	9.90	4,110	N	50–75
04230500	Oatka Creek at Garbutt, NY	200	1946–98	1960	8.64	7,050	1/9/98	8.57	6,160	N	25–50
0423205010	Irondequoit Creek above Blossom Road near Rochester, NY	142	1982–98	1998	9.95	3,300	1/8/98	9.95	3,300	N	75–100
042320578	Bear Creek at Ontario, NY	6.74	1971–73, 1975–98	1998	13.38	238	1/8/98	13.38	238	N	25–50
04232200	Catharine Creek at Montour Falls, NY	41.1	1972, 1975–77, 1987–98	1997	8.48	4,700	11/8/96	8.48	4,700	N	50
04232460	Sugar Creek at Guyanoga, NY	28.9	1966–98	1996	5.88	1,800	1/19/96 1/8/98	5.88 4.98	1,800 1,320	N N	25 10
04233000	Cayuga Inlet near Ithaca, NY	35.2	1935, 1937–98	1935	--	6,500	1/19/96	7.57	4,210	N	25–50
04233255	Cayuga Inlet at Ithaca, NY	86.7	1935, 1971–72, 1975–98	1935	--	14,000	1/19/96	14.67	12,500	N	25–50
04233258	Coy Glen Creek at Ithaca, NY	3.56	1972, 1983–98	1996	22.23	820	1/19/96	22.23	820	N	25
04234000	Fall Creek near Ithaca, NY	126	1926–98	1935	9.52	15,500	1/19/96	7.47	9,450	N	50–75

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

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Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04234200	Mud Creek at East Victor, NY	64.2	1958, 1961–68, 1976–98	1991 1972	7.22 7.85	1,880 1,800	1/19/96	7.09	1,810	N	10–25
04235255	Canandaigua Outlet tributary near Alloway, NY	2.94	1978–98	1996 1998	7.34 7.34	102 102	1/19/96 1/8/98	7.34 7.34	102 102	N N	10 10
04235500	Owasco Outlet near Auburn, NY	206	1914–98	1972	6.28	3,250	1/9/98	4.65	2,150	Y	10–25
04240200	Ninemile Creek at Camillus, NY	84.3	1959–82, 1989–98	1960 1975	8.25 10.83	2,760 2,120	1/19/96	8.92	2,530	Y	10–25
04245840	Scriba Creek near Constantia, NY	38.4	1966–69, 1971–98	1975 1972	7.33 7.42	1,310 1,200	1/8/98	7.32	1,300	N	25–50
04250750	Sandy Creek near Adams, NY	128	1958–98	1996	11.06	7,700	1/19/96	11.06	7,700	N	10–25
04252500	Black River near Boonville, NY	304	1911–98	1985 1982 1913	11.41 11.31 12.50	12,800 12,800 12,400	1/9/98	11.25	12,100	N	25–50
04254500	Moose River at McKeever, NY	363	1869, 1902–70, 1982, 1985, 1987–98	1947	17.45	18,700	1/8/98	14.91	14,600	N	25–50
04256000	Independence River at Donnattsburg, NY	88.7	1943–98	1985	13.34	9,420	1/8/98	9.53	4,340	N	10–25
04258000	Beaver River at Croghan, NY	291	1931–98	1969	6.98	5,100	1/9/98	6.56	4,440	Y	25–50
04260500	Black River at Watertown, NY	1,864	1869, 1897–1913, 1917–98	1998	16.02	55,500	1/10/98	16.02	55,500	Y	>100

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

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Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04262500	West Branch Oswegatchie River near Harrisville, NY	244	1917–98	1998	10.64	8,700	1/9/98	10.64	8,700	N	>100
04264331	Saint Lawrence River at Cornwall Ontario near Massena, NY	298,800	1918–98	1993	--	378,000	3/17/98	--	360,000 (Daily)	Y	--
04265100	Elm Creek near Hermon, NY	32.6	1959–98	1974	9.07	1,270	1/19/96	8.82	1,180	N	25
04266500	Raquette River at Piercefield, NY	721	1900, 1909–98	1993 1972	12.04 12.25	8,630 8,360	4/21/94	11.50	7,660	Y	10–25
04270000	Salmon River at Chasm Falls, NY	132	1926–82, 1985, 1987–98	1985	5.63	3,700	4/1/98	5.43	3,540	N	75–100
04270200	Little Salmon River at Bombay, NY	92.2	1959–98	1998	13.27	3,420	3/31/98	13.27	3,420	N	25–50
04270510	Chateaugay River below Chateaugay, NY	151	1966–95, 1997–98	1998 1966	7.54 10.99	5,440 --	11/9/96 3/31/98	7.51 7.54	5,370 5,440	Y Y	10–25 10–25
04270700	Trout River at Trout River, NY	107	1960–98	1996	9.42	6,980	7/5/96	9.42	6,980	N	50–75
04271500	Great Chazy River at Perry Mills, NY	243	1929–68, 1985, 1987–98	1997	12.24	9,700	11/9/96 3/31/98	12.24 10.89	9,700 7,640	N N	>100 50–75
04273500	Saranac River at Plattsburgh, NY	608	1928, 1944–98	1997	12.11	14,400	11/09/96 4/1/98	12.11 10.73	14,400 11,200	Y Y	>100 25
04273700	Salmon River at South Plattsburgh, NY	63.3	1960–86, 1990–98	1997	7.56	4,200	11/9/96 6/27/98	7.56 7.54	4,200 4,170	N N	50–75 50–75
04274000	West Branch Ausable River near Lake Placid, NY	116	1920–68, 1983–98	1938	12.20	10,800	11/9/96	12.09	10,600	N	>100
04275000	East Branch Ausable River at Au Sable Forks, NY	198	1925–98	1997	15.22	23,900	11/9/96	15.22	23,900	N	>100
04275500	Ausable River near Au Sable Forks, NY	446	1911–68, 1990–98	1997	13.83	37,400	11/9/96	13.83	37,400	N	>100

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

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Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04276500	Bouquet River at Willsboro, NY	270	1924–68, 1980, 1985, 1987–98	1997	10.93	12,300	11/9/96	10.93	12,300	N	50–75
04278300	Northwest Bay Brook near Bolton Landing, NY	22.0	1966–98	1996	6.57	1,950	1/19/96	6.57	1,950	N	25–50
04280450	Mettawee River near Middle Granville, NY	167	1984, 1990–98	1996	10.69	7,600	1/20/96	10.69	7,600	N	10

[1]Regulated during flood: N, no; Y, yes.

North Carolina

Rainfall amounts of 5 to 7 inches (National Oceanic and Atmospheric Administration, 1994a) caused serious flooding in the western mountains of North Carolina on March 27, 1994. Bridges were washed away and roads closed. Mudslides were widespread.

Remnants of Tropical Storm Beryl dropped 3 to 4 inches of rain west of Cape Fear (fig. 45) on August 18, 1994 (National Oceanic and Atmospheric Administration, 1994a). The town of Southport sustained nearly $3 million in damage (National Oceanic and Atmospheric Administration, 1994b).

Hurricane Gordon was a major weather factor along the North Carolina coast during October 17–18, 1994. The storm remained offshore but caused significant flooding and strong winds along the central and northern Carolina coast. The flooding began on Hatteras Island, with about 12 inches of overwash (National Oceanic and Atmospheric Administration, 1994b).

More than 11 inches of rain fell during a 2-day period causing widespread flooding in western North Carolina, January 14–15, 1995. Three Boy Scouts drowned in Pisgah National Forest. They were attempting to cross a footbridge and were swept away in the swollen creek. Two other men drowned. Overall damage was estimated at $2.5 million (National Oceanic and Atmospheric Administration, 1995b).

Flash flooding developed rapidly during the evening of September 4, 1996, as stationary thunderstorms dumped between 10 and 15 inches of rain in a small area of Hickory Nut Gorge (National Oceanic and Atmospheric Administration, 1996a). A wall of water rushed down the valley of the upper Broad River carrying campsites, RVs, mobile homes, trees, and debris downstream.

Hurricane Fran made landfall near Cape Fear, on September 5, 1996, and was the worst natural economic disaster to occur in North Carolina history. In North Carolina, wind and flooding damage exceeded $5 billion (National Oceanic and Atmospheric Administration, 1996b). The copious rainfall produced many severe flash and river floods. The flooding on the Haw River at Haw River (streamgage 02096500, table 34), the Tar River at Louisburg (streamgage 02081747), and at Rocky Mount (streamgage 02082585, table 34) exceeded the highest flood on record. A massive evacuation occurred in Goldsboro where residents of 550 homes had to be moved to public shelters. Excessive rain from Hurricane Fran moved downstream along the Neuse River and, combined with a large amount of debris, led to serious flooding. The Neuse River at Kinston (streamgage 02089500, table 34) crested at 23.3 feet, more than 9 feet above flood stage (National Oceanic and Atmospheric Administration, 1996b).

The remnants of Hurricane Fran produced widespread wind damage and flash flooding in north-central and parts of northwestern North Carolina during the late evening hours of September 5 and morning hours of September 6, 1996. Excessive rainfall forced creeks and streams to leave their banks, flooding roads and damaging crops, roads, and vehicles.

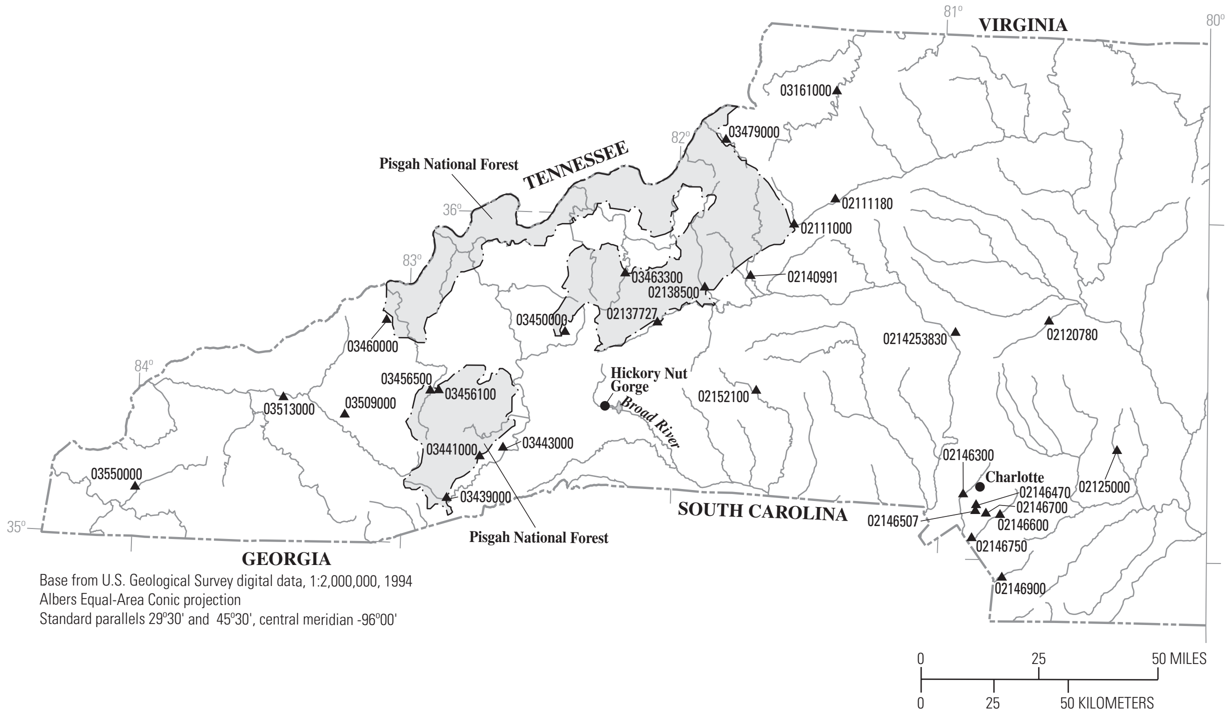
Strong thunderstorms occurred in the early morning of July 23, 1997, between Charlotte and Raleigh. These storms developed ahead of the remnants of Hurricane Danny. Between 5 and 10 inches of rain fell in a few hours (National Oceanic and Atmospheric Administration, 1997a) causing widespread flooding. Two women died after their vehicles became trapped in floodwaters. A young girl perished when she went to play in the water and was swept away. Damage in this area was more than $11 million (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

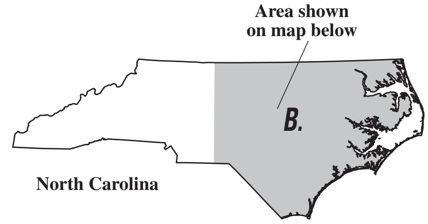
Index map



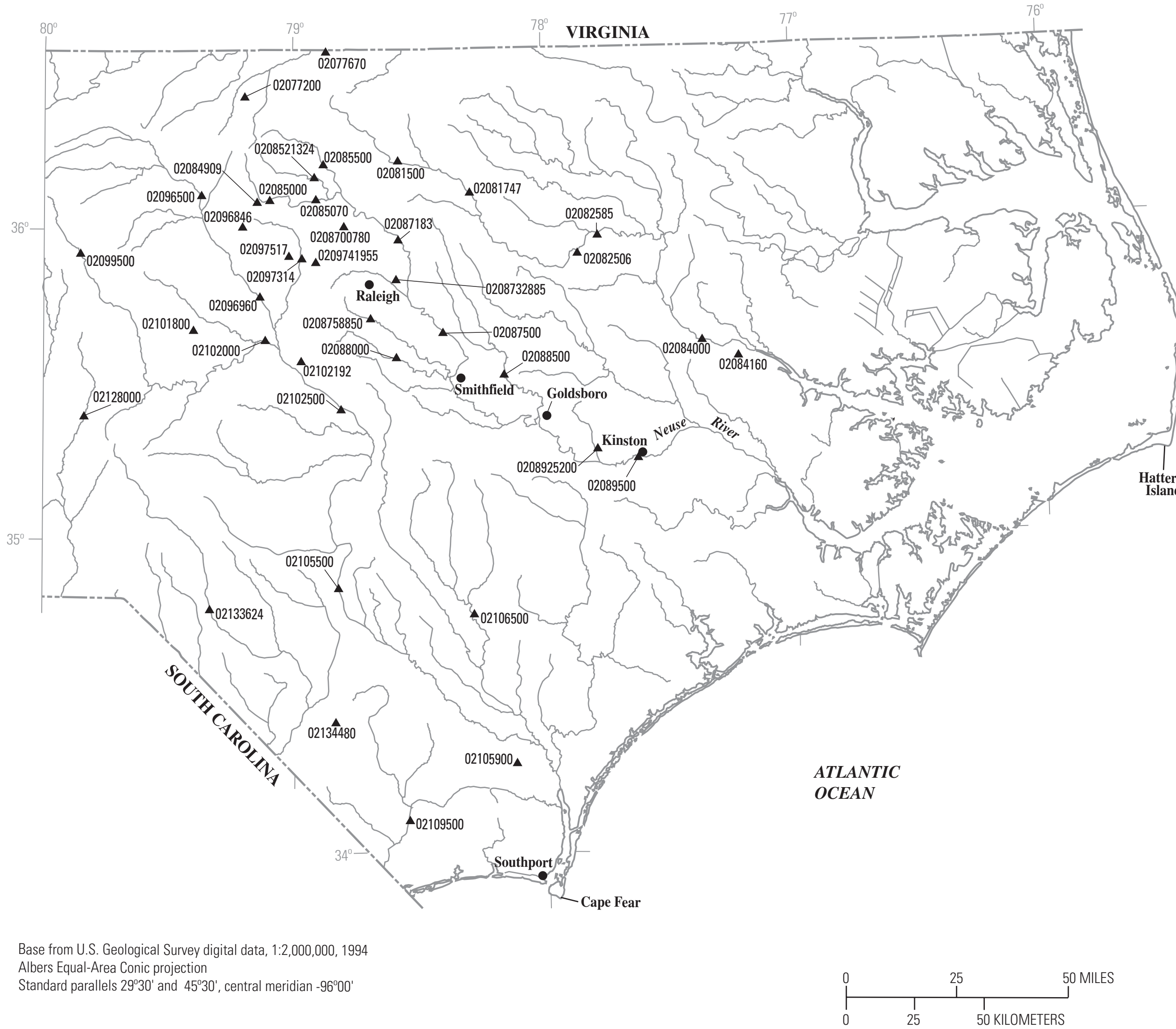
EXPLANATION

03439000▲ Streamgage and number

Figure 45. *(A)* Location of streamgages with significant floods during 1994–98 water years for North Carolina.



Index map



EXPLANATION

02109500▲ **Streamgage and number**

Figure 45. *(B)* Location of streamgages with significant floods during 1994–98 water years for North Carolina.—Continued

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/ day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02077200	Hyco Creek near Leasburg, NC	45.9	1965–92, 1994–97	1996 1995	40.47 48.53	9,140 --	9/6/96	40.47	9,140	N	25–50
02077670	Mayo Creek near Bethel Hill, NC	53.5	1978–98	1978	10.83	3,950	9/6/96	10.83	3,040	Y	25
02081500	Tar River near Tar River, NC	167	1940–98	1996	24.06	19,900	9/6/96 3/19/98	24.06 19.36	19,900 13,200	N N	50–100 10–25
02081747	Tar River at Louisburg, NC	427	1964–98	1996	25.34	21,100	9/6/96 3/20/98	25.34 24.62	21,100 18,500	N N	>100 50–100
02082506	Tar River below Tar River Reservoir near Rocky Mount, NC	777	1973–98	1998	23.67	14,700	3/23/98	23.67	14,700	Y	>500
02082585	Tar River at Rocky Mount, NC	925	1977–98	1996	25.88	15,100	9/12/96	25.88	15,100	Y	>500
02084000	Tar River at Greenville, NC	2,620	1888, 1906–76, 1997–98	1919	24.50	46,500	5/7/97 3/28/98	14.05 18.08	13,900 25,500	N N	-- --
02084160	Chicod Creek near Simpson, NC	45.0	1976–87, 1992–98	1998	13.45	3,150	8/27/98	13.45	3,150	N	25
02084909	Sevenmile Creek near Efland, NC	14.1	1988–98	1996	15.47	3,440	9/6/96	15.47	3,440	N	>100
02085000	Eno River at Hillsborough, NC	66.0	1928, 1930–71, 1986–98	1945 1996	20.01 21.13	11,000 10,800	9/6/96	21.13	10,800	N	>100
02085070	Eno River near Durham, NC	141	1964–98	1996	23.58	14,700	9/6/96 3/19/98	23.58 20.76	14,700 10,800	N N	10–25 <10
0208521324	Little River at State Road 1461 near Orange Factory, NC	78.2	1988–98	1996	13.26	11,600	9/6/96	13.26	11,600	N	25
02085500	Flat River at Bahama, NC	149	1926–98	1996	17.26	33,800	9/6/96 3/19/98	17.26 12.05	33,800 16,700	N N	200–500 10–25
0208700780	Little Lick Creek above State Road 1814 near Oak Grove, NC	10.1	1983–95	1995	9.33	1,830	6/29/95	9.33	1,830	N	10–25

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02087183	Neuse River near Falls, NC	771	1945, 1971–98	1975	25.21	13,600	9/16/96	8.05	7,650	Y	25–50
0208732885	Marsh Creek near New Hope, NC	6.84	1984–98	1995 1996	12.84 13.33	4,140 3,900	8/27/95	12.84	4,140	N	25
02087500	Neuse River near Clayton, NC	1,150	1919, 1928–98	1945	22.12	22,900	9/7/96	20.12	19,700	Y	50–100
0208758850	Swift Creek near McCullars Crossroads, NC	35.8	1989–98	1996	14.15	6,790	9/6/96	14.15	6,790	N	25–50
02088000	Middle Creek near Clayton, NC	83.5	1940–98	1996	14.88	11,900	9/6/96	14.88	11,900	N	200–500
02088500	Little River near Princeton, NC	232	1919, 1924, 1928, 1930–98	1965 1924	13.94 14.90	7,150 --	9/9/96 3/11/98	13.32 13.51	5,480 5,150	N N	25 10–25
0208925200	Bear Creek at Mays Store, NC	57.7	1988–98	1997	9.50	1,550	10/9/96	9.50	1,550	N	<5
02089500	Neuse River at Kinston, NC	2,692	1919, 1924, 1928–98	1919	25.00	39,000	9/17/96	23.26	27,100	Y	50–100
02096500	Haw River at Haw River, NC	606	1929–98	1996	32.83	51,400	6/29/95 9/6/96	28.46 32.83	29,500 51,400	N N	10–25 200
02096846	Cane Creek near Orange Grove, NC	7.54	1989–98	1996	7.90	2,060	9/6/96	7.90	2,060	N	25
02096960	Haw River near Bynum, NC	1,275	1974–98	1996	21.76	76,700	9/6/96	21.76	76,700	N	>100
02097314	New Hope Creek near Blands, NC	75.9	1983–98	1996	14.05	12,700	9/6/96	14.05	12,700	N	100–200
0209741955	Northeast Creek at State Road 1100 near Genlee, NC	21.1	1983–93, 1996–98	1996	13.92	5,140	9/6/96	13.92	5,140	N	25–50
02097517	Morgan Creek near Chapel Hill, NC	41.0	1983–98	1996	16.18	4,210	9/6/96	16.18	4,210	N	50
02099500	Deep River near Randleman, NC	125	1929–31, 1934–98	1947	32.20	20,000	9/6/96	28.75	15,600	N	50–100

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02101800	Tick Creek near Mount Vernon Springs, NC	15.5	1959–81, 1994–98	1996	13.41	4,010	9/6/96	13.41	4,010	N	25
02102000	Deep River at Moncure, NC	1,434	1931–98	1945	17.20	80,300	9/6/96	12.94	47,900	N	50
02102192	Buckhorn Creek near Corinth, NC	76.3	1973–98	1973	20.02	6,920	9/6/96	16.79	4,300	Y	25–50
02102500	Cape Fear River at Lillington, NC	3,464	1924–98	1945	33.19	150,000	9/7/96	18.97	51,800	Y	50
02105500	Cape Fear River at Wilm O Huske Lock near Tarheel, NC	4,852	1938–94, 1997–98	1952 1945	29.92 43.44	70,600 --	3/22/98	26.28	47,100	Y	>500
02105900	Hood Creek near Leland, NC	21.6	1953–73, 1994–98	1998	11.53	2,650	8/27/98	11.53	2,650	N	25–50
02106500	Black River near Tomahawk, NC	676	1928, 1945, 1948, 1952–98	1984 1928	22.08 47.00	17,500 11,400	9/10/96	21.31	13,700	N	25–50
02109500	Waccamaw River at Freeland, NC	680	1940–98	1996	17.02	12,400	9/12/96	17.02	12,400	N	50
02111000	Yadkin River at Patterson, NC	28.8	1940–43, 1945–98	1973	12.70	16,200	8/17/94	9.38	5,750	N	10–25
02111180	Elk Creek at Elkville, NC	48.1	1940, 1966–98	1940	22.00	70,000	8/17/94	12.02	18,700	N	25
02120780	Second Creek near Barber, NC	118	1980–98	1995	17.28	8,560	8/28/95	17.28	8,560	N	100–200
02125000	Big Bear Creek near Richfield, NC	55.6	1955–98	1997	16.54	11,400	7/23/97	16.54	11,400	N	25
02128000	Little River near Star, NC	106	1955–93, 1995–98	1997	18.60	15,400	7/23/97 3/19/98	18.60 15.84	15,400 11,300	N N	200–500 50–100
02133624	Lumber River near Maxton, NC	365	1988–92, 1994–98	1998	13.52	3,380	3/22/98	13.52	3,380	N	10–25
02134480	Big Swamp near Tarheel, NC	229	1986–95, 1997–98	1998 1993	13.10 13.34	3,980 2,840	3/11/98	13.10	3,980	N	10–25
02137727	Catawba River near Pleasant Gardens, NC	127	1981–98	1994	15.22	13,700	8/17/94	15.22	13,700	N	10–25

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02138500	Linville River near Nebo, NC	66.7	1916, 1923–98	1940	11.40	39,500	8/17/94	10.52	18,600	N	25
02140991	Johns River at Arneys Store, NC	201	1986–98	1994	25.23	42,300	8/17/94	25.23	42,300	N	25–50
0214253830	Norwood Creek near Troutman, NC	7.18	1984–98	1997	9.20	1,480	4/28/97	9.20	1,480	N	10–25
02146300	Irwin Creek near Charlotte, NC	30.7	1963–98	1997	20.38	11,600	7/23/97	20.38	11,600	N	500
02146470	Little Hope Creek at Seneca Place, Charlotte, NC	2.63	1967–72, 1983–86, 1988–90, 1995–98	1997	8.50	1,700	7/23/97	8.50	1,700	N	50
02146507	Little Sugar Creek at Archdale Drive at Charlotte, NC	42.6	1978–98	1997	15.06	13,600	7/23/97	15.06	13,600	N	500
02146600	McAlpine Creek at Sardis Road near Charlotte, NC	39.6	1962–98	1995	17.79	9,040	8/27/95	17.79	9,040	N	>200
02146700	McMullen Creek at Sharon View Road near Charlotte, NC	6.95	1963–98	1995	11.03	3,470	8/27/95 7/27/98	11.03 10.64	3,470 3,230	N N	50 25–50
02146750	McAlpine Creek below McMullen Creek near Pineville, NC	92.4	1975–98	1995	19.40	12,500	8/27/95	19.40	12,500	N	200
02146900	Twelve Mile Creek near Waxhaw, NC	76.5	1949, 1961–98	1995 1949	21.94 23.60	9,970 --	8/27/95	21.94	9,970	N	50–100
02152100	First Broad River near Casar, NC	60.5	1960–95, 1997–98	1995 1976	15.58 16.70	7,790 7,760	1/14/95	15.58	7,790	N	10–25
03161000	South Fork New River near Jefferson, NC	205	1916, 1925–26, 1929–41, 1943–98	1940	22.50	52,800	1/15/95	13.73	21,000	N	50
03439000	French Broad River at Rosman, NC	67.9	1908–09, 1916, 1928, 1936–89, 1991–98	1965	14.95	13,500	8/17/94	14.12	11,500	N	50

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

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Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03441000	Davidson River near Brevard, NC	40.4	1876, 1916, 1919, 1921–90, 1924–98	1928 1994	11.80 12.08	8,400 7,620	8/17/94	12.08	7,620	N	25–50
03443000	French Broad River at Blantyre, NC	296	1875–76, 1880, 1893, 1899, 1901–02, 1905–06, 1910, 1916, 1919, 1921–98	1965 1916	25.50 27.10	30,000 --	8/18/94 1/8/98	23.81 22.61	21,200 19,400	N N	50 25–50
03450000	Beetree Creek near Swannanoa, NC	5.46	1927–75, 1978, 1980–81, 1986, 1988–98	1940	6.20	1,370	8/17/94	5.75	1,040	N	50–100
03456100	West Fork Pigeon River at Bethel, NC	58.4	1981–98	1994	12.63	11,700	8/17/94	12.63	11,700	Y	25–50
03456500	East Fork Pigeon River near Canton, NC	51.5	1955–98	1973	11.19	12,000	8/17/94	10.70	11,100	N	10–25
03460000	Cataloochee Creek near Cataloochee, NC	49.2	1935–52, 1963–98	1963	8.08	5,080	3/27/94	7.55	4,280	N	10–25
03463300	South Toe River near Celo, NC	43.3	1958–98	1978	17.41	32,900	8/17/94	10.49	15,600	N	10–25
03479000	Watauga River near Sugar Grove, NC	92.1	1916, 1940–98	1940	29.60	50,800	1/14/95	20.46	20,500	N	25
03509000	Scott Creek above Sylva, NC	51.0	1940, 1942–75, 1993–95	1994 1973	6.77 8.78	4,440 2,800	3/27/94	6.77	4,440	N	200
03513000	Tuckasegee River at Bryson City, NC	655	1898–1982, 1984–95, 1997–98	1940	15.96	61,600	3/28/94	14.25	33,300	Y	10–25

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

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Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03550000	Valley River at Tomotla, NC	104	1898, 1905–09, 1915–17, 1919–98	1907	20.50	18,000	3/27/94	17.10	11,900	N	25–50
				1898	21.20	20,000	2/16/95	17.15	12,100	N	50

[1]Regulated during flood: N, no; Y, yes.

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09419658	Las Vegas Wash near Sahara Avenue near Las Vegas, NV	1,146	1975, 1988–98	1998 1990	12.50 16.27	4,400 1,960	9/11/98	12.50	4,400	Y	--
09419659	Sloan Channel tributary at Las Vegas Boulevard near North Las Vegas, NV	17.5	1989–98	1998	15.34	920	9/11/98	15.34	920	Y	--
09419663	Las Vegas Wash tributary south of Nellis Air Force Base, NV	1.20	1963–81, 1983–98	1998	21.00	600	9/11/98	21.00	600	Y	--
09419665	Sloan Channel at Charleston Boulevard near Las Vegas, NV	144	1989–98	1998 1997	11.41 11.72	1,230 700	9/11/98	11.41	1,230	Y	--
09419679	Las Vegas Wasteway near East Las Vegas, NV	--	1980–83, 1985–98	1983 1990	6.56 6.99	630	11/21/96	6.81	523 453	N	--
09419685	Bird Springs Wash near Arden, NV	--	1987–98	1998	44.05	35	7/20/98	44.05	35	N	--
10243260	Lehman Creek near Baker, NV	11.0	1948–55, 1993–97	1995	5.01	80	6/29/95	5.01	80	N	--
10249280	Kingston Creek below Cougar Canyon near Austin, NV	23.4	1967–98	1983 1995	3.19 3.86	385 234	6/3/95	3.86	234	Y	--
10249300	South Twin River near Round Mountain, NV	20.0	1965–98	1983	4.39	510	6/3/98	3.20	148	N	--
10251248	Unnamed tributary-Stockade Wash near Rattlesnake Ridge, Nevada Test Site, NV	3.90	1984–88, 1991–95	1995	5.49	90	3/11/95	5.49	90	N	--
10293500	East Walker River above Strosnider Ditch near Mason, NV	1,100	1947–92, 1995–98	1986 1997	7.49 9.61	2,820 2,610	1/4/97	9.61	2,610	Y	>25

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10297500	West Walker River at Hoye Bridge near Wellington, NV	497	1921–22, 1924–32, 1958–98	1997	13.68	11,500	1/3/97	13.68	11,500	Y	>100
10300000	West Walker River near Hudson, NV	964	1915–18, 1920–24, 1947–92, 1995–98	1997	12.18	11,400	1/3/97	12.18	11,400	Y	>100
10308800	Bryant Creek near Gardnerville, NV	31.5	1961–73, 1978–80, 1995–98	1997	8.70	1,360	1/2/97	8.70	1,300	N	<25
10309000	East Fork Carson River near Gardnerville, NV	356	1890–93, 1901–05, 1908–10, 1917, 1925–28, 1936–38, 1940–98	1997	13.00	20,300	1/3/97	13.00	20,300	N	100
10309100	East Fork Carson River at Minden, NV	392	1975–84, 1994–98	1997 1980	10.41 11.40	10,900 8,000	1/2/97	10.41	10,900	Y	--
10310500	Clear Creek near Carson City, NV	15.5	1948–78, 1989–98	1997	3.94	266	1/2/97	3.94	266	N	50
10311000	Carson River near Carson City, NV	886	1939–98	1997	18.43	30,500	1/3/97	18.43	30,500	N	>75
10311260	Vicee Canyon Creek near Sagebrush Ranch near Carson City, NV	1.83	1979–80, 1982, 1984, 1986, 1991–97	1997	9.66	4,000	1/2/97	9.66	4,000	N	>100

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10311400	Carson River at Deer Run Road near Carson City, NV	958	1980–85, 1991–98	1997	24.23	24,000	1/3/97	24.23	24,000	N	<100
10311450	Brunswick Canyon near New Empire, NV	12.7	1966–78, 1980–98	1995	5.02	245	3/11/95	5.02	245	N	<10
10312000	Carson River near Fort Churchill, NV	1,450	1911–98	1997	15.27	22,300	1/3/97	15.27	22,300	N	>100
10312150	Carson River below Lahontan Reservoir near Fallon, NV	1,801	1980–98	1983	8.34	3,160	5/17/96	7.78	2,430	Y	--
10312275	Carson River at Tarzyn Road near Fallon, NV	--	1986–98	1996 1997	6.11 8.73	942 821	5/27/96	6.11 8.73	942 821	Y	--
10316500	Lamoille Creek near Lamoille, NV	24.9	1915–16, 1918–20, 1922, 1944–98	1997 1982	5.29 6.23	838 829	6/4/97	5.29	838	N	--
10319900	South Fork Humboldt River above Tenmile Creek near Elko, NV	898	1989–98	1995	5.82	2,710	6/3/95	5.82	2,710	N	--
10336700	Incline Creek near Crystal Bay, NV	6.69	1970–73, 1975, 1988–98	1997	3.87	179	1/2/97	3.87	179	N	<50
10336730	Glenbrook Creek at Glenbrook, NV	3.75	1972–75, 1988–98	1997	6.46	144	1/2/97	6.46	144	N	50
10336740	Logan House Creek near Glenbrook, NV	2.08	1984–98	1997	4.75	11	1/2/97	4.75	11	N	<25
10348000	Truckee River at Reno, NV	1,067	1907–21, 1925–26, 1931–34, 1947–98	1956 1997	13.63 14.94	20,800 18,200	1/2/97	14.94	18,200	Y	<50

Table 29. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Nevada.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 40)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10348200	Truckee River near Sparks, NV	1,070	1978–98	1997 1986	-- 15.22	18,000 14,900	1/2/97	--	18,000	Y	--
10348850	Galena Creek at Galena Creek State Park, NV	7.69	1985–98	1997	5.54	2,610	1/2/97	5.54	2,610	N	<50
10349300	Steamboat Creek at Steamboat, NV	123	1962–98	1986	6.79	3,600	1/1/97	6.03	2,090	Y	>25
10351600	Truckee River below Derby Dam near Wadsworth, NV	1,676	1909–10, 1916, 1918–98	1997	14.56	19,900	1/3/97	14.56	19,900	Y	<50
10351650	Truckee River at Wadsworth, NV	1,728	1966–86, 1994–98	1997	19.62	19,100	1/3/97	19.62	19,100	Y	<50
10351700	Truckee River near Nixon, NV	1,827	1956, 1958–98	1997	15.28	21,200	1/3/97	15.28	21,200	Y	50
10353750	Mahogany Creek near Summit Lake, NV	13.3	1988–98	1995 1998	5.34 5.56	50 40	6/5/95	5.34	50	N	--
10353800	Smoke Creek below reservoir near Smoke Creek, NV	50.1	1986, 1989–98	1995 1986	8.43 9.00	4,320 2,270	3/9/95	8.43	4,320	Y	--

[1]Regulated during flood: N, no; Y, yes.

New Hampshire

A coastal storm, which was fed tropical moisture by the circulation around Hurricane Lily, produced 8 to 13 inches of rain throughout parts of central and southern New Hampshire during October 20–23, 1996 (National Oceanic and Atmospheric Administration, 1996a). Many homes and businesses were flooded, roads and bridges were washed out, and several dams were damaged. Total damage was more than $10.8 million (National Oceanic and Atmospheric Administration, 1996b). Oyster River near Durham (streamgage 01073000) had a peak of record during this flood (table 30).

Three to 8 inches of rain during June 13–15, 1998 (National Oceanic and Atmospheric Administration, 1998a), caused small rivers and streams to rise in central and southern New Hampshire. Many roads were flooded and (or) washed out. Campgrounds and some lakeside homes had to be evacuated. More than $1 million in damage resulted (National Oceanic and Atmospheric Administration, 1998b). Excessive rains returned on June 27, 1998. From 3 to possibly as much as 6 inches of rain fell in 12 hours (National Oceanic and Atmospheric Administration, 1998a) causing the Baker River (fig. 41) and its tributaries to rise very rapidly. Bridges were destroyed, vehicles were washed away, and some towns were completely isolated. Damage was near $1.5 million (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1996a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1996b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

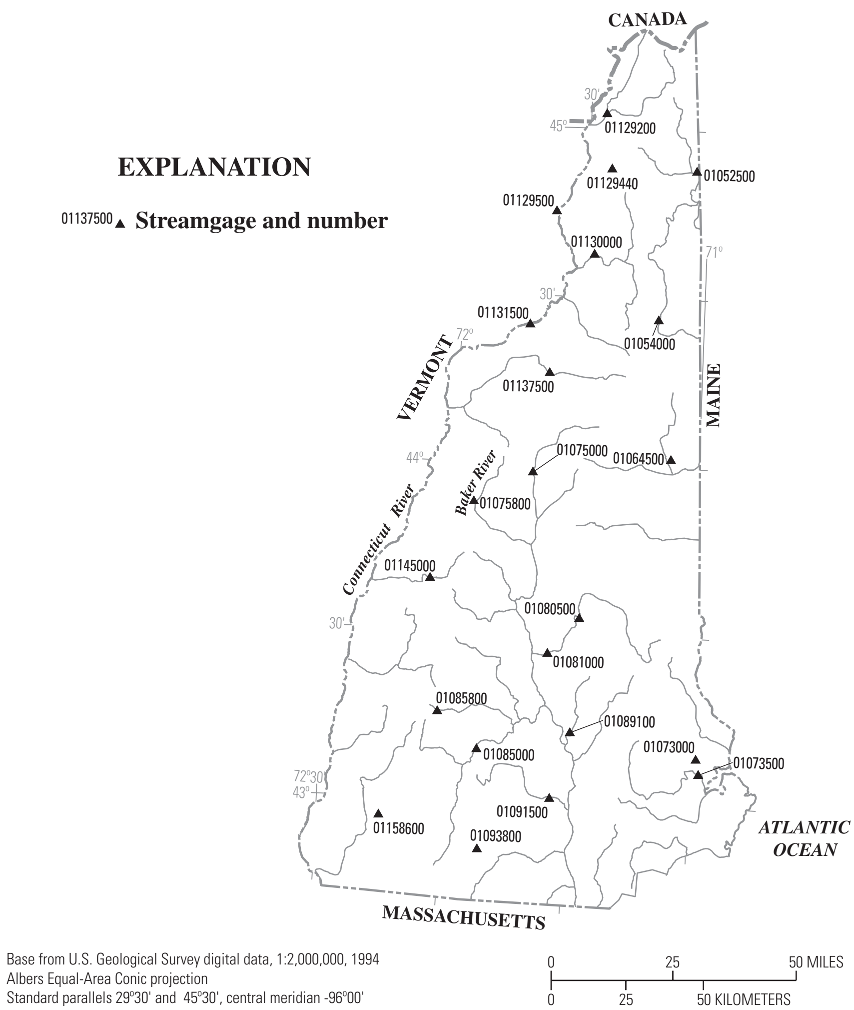


Figure 41. Location of streamgages with significant floods during 1994–98 water years for New Hampshire.

Table 30. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Hampshire.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 41)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01052500	Diamond River near Wentworth Location, NH	152	1942–98	1998 1981	12.11 12.23	12,800 3,620	3/31/98	12.11	12,800	N	>100
01054000	Androscoggin River near Gorham, NH	1,361	1914–98	1923 1998	-- 10.15	21,900 20,400	4/1/98	10.15	20,400	Y	50
01064500	Saco River near Conway, NH	385	1903–09, 1910–12, 1929–98	1998	14.67	36,500	6/14/98	14.67	36,500	--	10–25
01073000	Oyster River near Durham, NH	12.1	1935–98	1997 1936	6.67 7.45	1,160 548	10/21/96	6.67	1,160	N	>100
01073500	Lamprey River near Newmarket, NH	183	1935–98	1987	15.14	7,570	10/22/96	14.59	7,080	Y	50–75
01075000	Pemigewasset River at Woodstock, NH	193	1940–80, 1985–98	1960	16.13	47,000	10/22/95	14.09	33,500	N	25–50
01075800	Stevens Brook near Wentworth, NH	12.9	1964–98	1996	4.51	650	11/12/95	4.51	650	--	10–25
01080500	Lake Winnipesaukee outlet at Lakeport, NH	363	1934–83, 1988–98	1936	--	2,890	6/22/98	--	2,620	Y	10–25
01081000	Winnipesaukee River at Tilton, NH	471	1937–98	1984	8.68	4,580	6/28/98	8.04	3,940	Y	25
01085000	Contoocook River near Henniker, NH	368	1938, 1940–77, 1989–98	1938	21.30	22,200	10/22/96	13.18	9,840	Y	25–50
01085800	West Branch Warner River near Bradford, NH	5.75	1963–98	1984 1996	-- 9.14	800 690	11/12/95	9.14	690	N	10–25
01089100	Soucook River at Pembroke Road near Concord, NH	81.9	1989–98	1996	11.59	2,320	4/17/96	11.59	2,320	N	10–25

Table 30. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Hampshire.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 41)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01091500	Piscataquog River near Goffstown, NH	202	1936, 1938 1940–78, 1983–98	1938	17.52	21,900	10/21/96	10.61	6,470	Y	5–10
01093800	Stony Brook tributary near Temple, NH	3.60	1964–98	1997 1977	5.63 7.13	648 336	10/21/96	5.63	648	N	25–50
01129200	Connecticut River below Indian Stream near Pittsburg, NH	254	1957–98	1996	7.97	5,240	4/27/96 3/31/98	7.97 7.87	5,240 5,120	Y Y	50–100 50–100
01129440	Mohawk River near Colebrook NH	36.7	1987–98	1998	10.99	4,880	3/31/98	10.99	4,880	N	10–25
01129500	Connecticut River at North Stratford, NH	799	1931–98	1998 1981	15.63 16.40	32,300 17,000	3/31/98	15.63	32,300	Y	>100
01130000	Upper Ammonoosuc River near Groveton, NH	232	1936, 1941–80, 1983–98	1969	12.01	24,100	3/31/98	8.97	9,130	N	25–50
01131500	Connecticut River near Dalton, NH	1,514	1928–98	1936	25.60	48,300	4/1/98	23.70	42,000	Y	25–50
01137500	Ammonoosuc River at Bethlehem Junction, NH	87.6	1940–98	1996	12.34	11,300	11/12/95	12.34	11,300	N	50
01145000	Mascoma River at West Canaan, NH	80.5	1938, 1940–78, 1985–98	1953 1938	8.94 9.60	3,780 4,310	6/27/98	8.59	3,420	N	25–50
01158600	Otter Brook below Otter Brook Dam near Keene, NH	47.2	1959–98	1987 1994	8.62 8.64	752 720	4/18/94	8.64	720	Y	10–25

[1]Regulated during flood: N, no; Y, yes.

New Jersey

The combination of warm temperatures, snowmelt, frozen ground, and basin average precipitation of 1.5 to 2 inches (National Oceanic and Atmospheric Administration, 1994a) caused urban flooding throughout interior southern New Jersey on January 28, 1994. The sudden increase in temperatures led to the formation of a few ice jams on area streams and rivers adding to the flooding problems. The area around Trenton (fig. 42) was the hardest hit with an estimated $4.5 million in damage (National Oceanic and Atmospheric Administration, 1994b).

Thunderstorms with torrential downpours remained nearly stationary over the eastern Philadelphia suburbs for about 2 hours on July 14, 1994. Rainfall amounts of 3 to more than 7 inches were reported. In Westmont, 3.25 inches of rain fell within 30 minutes, 4.72 inches within 1 hour, and 6.54 inches in 3 hours. The rainfall rate of 4.72 inches per hour represents a greater than 100-year, 1-hour precipitation event for a single location in southern New Jersey (National Oceanic and Atmospheric Administration, 1994a).

Strong southerly winds ushered very mild and moisture-laden air into the State on January 19, 1996. Street flooding and poor drainage became a major problem early on due to the rains, significant snowmelt, and ice jams. The flash flooding of the afternoon and early evening on January 19 led to larger river flooding through January 21. The worst damage occurred along the Delaware River, which crested at its highest stages since the summer of 1955 (table 31). Widespread flooding along the Raritan River was described as the worst in Manville since Tropical Storm Doria in August 1971. Damage was near $14 million, and one life was lost (National Oceanic and Atmospheric Administration, 1996b).

Nearly stationary thunderstorms dropped between 3.5 and 7.6 inches of rain within 4 hours northwest of Trenton during the evening of June 12, 1996 (National Oceanic and Atmospheric Administration, 1996a). This caused widespread flash flooding throughout the area. Nearly every roadway was flooded. The 7.6 inches of rain represent about a daily 100-year storm (National Oceanic and Atmospheric Administration, 1996a). Approximately $8 million in property damage occurred, most of it in Ewing (National Oceanic and Atmospheric Administration, 1996b).

Rain, intense at times, fell across the northern half of New Jersey during the daylight hours of October 19, 1996. Storm precipitation totals ranged from 5 to nearly 7 inches (National Oceanic and Atmospheric Administration, 1996a). Four streamgages experienced their peak of record during this flood (table 31). Damage was near $45 million, but there were no deaths (National Oceanic and Atmospheric Administration, 1996b).

On July 25, 1997, a long period of excessive rain occurred in northern New Jersey as a strong warm front moved slowly north toward the area. In addition, the area was affected by fringe precipitation from Tropical Storm Danny. Excessive rainfall [from 4 to 7 inches with isolated higher amounts (National Oceanic and Atmospheric Administration, 1997a)] caused widespread serious flooding of homes, streets, rivers, streams, and poor drainage areas in and around Newark. Property damage estimates were at least $3 million (National Oceanic and Atmospheric Administration, 1997b).

Torrential rain from thunderstorms fell across southeastern New Jersey on August 20–21, 1997, as a low-pressure system developed south of Delaware Bay and slowly moved northeast across southern New Jersey. Storm totals included 10.12 inches in Millville and 7.2 inches in Vineland. The storm total of 13.52 inches of rainfall at the Atlantic City International Airport represented a greater than 100-year storm for the area. A 100-year storm for this area is 7.25 inches (National Oceanic and Atmospheric Administration, 1997a). Total damage was estimated at $54 million, but no deaths occurred (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

Figure 42. Location of streamgages with significant floods during 1994–98 water years for New Jersey.

Table 31. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Jersey.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 42)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01379000	Passaic River near Millington, NJ	55.4	1904–06, 1922–98	1997	9.89	2,290	10/20/96	9.89	2,290	N	80
01381500	Whippany River at Morristown, NJ	29.4	1922–98	1971	8.60	2,800	10/20/96	7.79	2,300	N	40
01389900	Fleischer Brook at Market Street at Elmwood Park, NJ	1.37	1967–93, 1995–98	1978	6.47	470	7/8/96	2.82	1,600	N	--
01392170	Third River at Bloomfield, NJ	7.71	1989–98	1997	7.34	1,410	10/19/96	7.34	1,410	N	6
01393500	Elizabeth River at Elizabeth, NJ	20.2	1922–98	1971	18.70	4,110	7/25/97	--	3,080	N	9
01394500	Rahway River near Springfield, NJ	25.5	1938–99	1973	9.76	5,430	7/25/97	9.56	5,140	N	50
01395000	Rahway River at Rahway, NJ	40.9	1922–87, 1989–98	1973	7.88	5,420	10/19/96	7.50	4,210	N	30
01396500	South Branch Raritan River near High Bridge, NJ	65.3	1896, 1902, 1904, 1919–24, 1926–98	1979 1994	12.07 14.26	6,910 2,000	10/20/96	11.13	4,730	N	30
01398000	Neshanic River at Reaville, NJ	25.7	1931–98	1971	13.84	15,900	10/19/96	12.63	11,100	N	25
01398500	North Branch Raritan River near Far Hills, NJ	26.2	1919, 1922–98	1971 1919	7.28 7.60	6,390 7,000	10/19/96	6.65	5,090	N	35
01400000	North Branch Raritan River near Raritan, NJ	190	1896, 1924–98	1971	15.47	28,600	10/19/96	15.44	28,500	N	100
01400900	Stony Brook at Glenmoore, NJ	17.0	1957–95	1971	11.02	6,100	1/28/94	9.94	4,950	N	35
01401595	Rock Brook near Blawenburg, NJ	9.03	1967–76, 1978–98	1971	10.00	4,530	10/19/96	8.19	3,130	N	20
01403060	Raritan River below Callo Dam at Bound Brook, NJ	785	1896, 1904–09, 1936–39, 1942, 1945–98	1971	37.47	46,100	10/20/96	35.58	40,100	N	25

Table 31. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Jersey.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 42)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01403150	West Branch Middle Brook near Martinsville, NJ	1.99	1980–98	1997	6.89	700	10/19/96	6.89	700	N	15
01403500	Green Brook at Plainfield, NJ	9.75	1916, 1927, 1936, 1938–98	1938 1970	5.82 6.10	2,890 2,050	10/19/96	5.82	2,120	N	30
01403570	Stony Brook at North Plainfield, NJ	6.88	1938, 1975–81, 1991–98	1997 1938	7.35 10.00	3,130 --	10/19/96	7.35	3,130	N	30
01410150	East Branch Bass River near New Gretna, NJ	8.11	1978–98	1997	7.28	750	8/22/97	7.28	750	N	100
01411300	Tuckahoe River at Head of River, NJ	30.8	1971–96, 1998	1997	9.09	1,340	8/21/97 2/5/98	9.09 6.72	1,340 638	N N	>100 40
01438500	Delaware River at Montague, NJ	3,480	1904, 1936–98	1955 1904	35.15 35.50	250,000 --	1/20/96	26.66	149,000	N	30
01440200	Delaware River near Delaware Water Gap, NJ	3,850	1955, 1965–96	1955	37.40	260,000	1/20/96	24.89	155,000	N	40
01446500	Delaware River at Belvidere, NJ	4,535	1904, 1923–98	1955	30.21	273,000	1/20/96	22.96	158,000	N	40
01457500	Delaware River at Riegelsville, NJ	6,328	1841, 1904, 1907–98	1955	38.85	340,000	1/20/96	28.72	187,000	N	40
01463500	Delaware River at Trenton, NJ	6,780	1902, 1904–98	1955	28.60	329,000	1/20/96	22.20	179,000	N	25
01467081	South Branch Pennsauken Creek at Cherry Hill, NJ	8.98	1968–76, 1978–98	1994	11.63	1,500	7/14/94	11.63	1,500	N	100
01467305	Newton Creek at Collingswood, NJ	1.33	1964–75, 1977–98	1994	6.82	328	7/14/94	6.82	328	N	70

[1]Regulated during flood: N, no; Y, yes.

New Mexico

Intense thunderstorms across New Mexico occurred intermittently during May, June, July, and August 1994, and caused six streamgages to experience their peak of record (table 32). On May 31, 1994, the Rio Grande River below Elephant Butte Dam (streamgage 08361000) had its greatest discharge since the flood of 1942 on May 31, 1994.

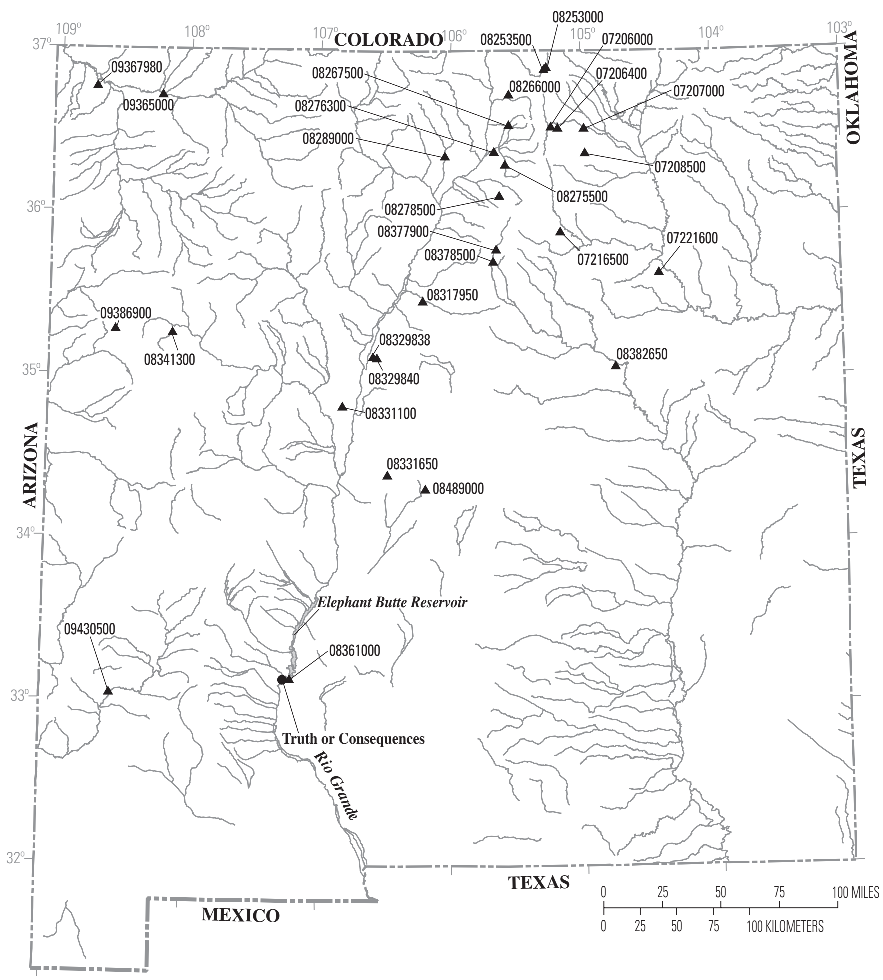
Intense thunderstorms produced excessive rainfall during June 1995, causing flooding in various parts of the State. Peaks of record were set at two streamgages in June (table 32).

An estimated rainfall of as much as 4.50 inches fell in a 3-hour period shortly after midnight on June 29, 1997 (National Oceanic and Atmospheric Administration, 1997a) near Truth or Consequences (fig. 43). Several roads were washed out or damaged, and several cars were washed into Elephant Butte Reservoir. Considerable damage also took place to utilities and a number of homes and businesses, mainly due to the rapid run-off rather than rising water levels in established drainages. Damage was near $1 million (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1997a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1997b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



Base from U.S. Geological Survey digital data, 1:2,000,000, 1994
Albers Equal-Area Conic projection
Standard parallels 29°30' and 45°30', central meridian -96°00'

EXPLANATION

08361000▲ **Streamgage and number**

Figure 43. Location of streamgages with significant floods during 1994–98 water years for New Mexico.

Table 32. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Mexico.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 43)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07206000	Cimarron River below Eagle Nest Dam, NM	167	1950–98	1994 1955	-- 2.79	303 205	5/23/94	3.63	303	Y	--
07206400	Clear Creek near Ute Park, NM	7.44	1962–77, 1979–84, 1986–96	1965	3.05	151	7/24/94	3.00	150	N	35
07207000	Cimarron River near Cimarron, NM	294	1950–97	1965	12.42	15,500	6/3/95	4.32	892	Y	--
07208500	Rayado Creek at Sauble Ranch near Cimarron, NM	65.0	1914, 1917–20, 1924, 1928–32, 1934–96	1965	11.50	9,000	6/18/95	4.86	666	N	10
07216500	Mora River near Golondrinas, NM	267	1916–20, 1929–86, 1988–98	1952 1969	-- 9.30	14,000 3,180	5/19/94	5.82	6,180	N	60
07221600	Lagarita Creek tributary near Sanchez, NM	1.19	1972, 1982, 1989–96	1994	5.83	1,500	5/11/94	5.83	1,500	N	10
08253000	Casias Creek near Costilla, NM	16.6	1937–97	1994 1971	2.06 2.07	196 181	5/25/94	2.06	196	N	50
08253500	Santistevan Creek near Costilla, NM	2.15	1938–98	1995 1941	1.57 1.73	20 18	6/29/95	1.57	20	N	25
08266000	Cabresto Creek near Questa, NM	36.7	1944–96	1994	5.41	289	5/21/94	5.41	289	Y	--
08267500	Rio Hondo near Valdez, NM	36.2	1935–98	1941 1979	2.73 4.53	541 402	6/20/95	3.98	460	N	20

Table 32. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Mexico.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 43)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08275500	Rio Grande del Rancho near Talpa, NM	83.0	1953–98	1991	4.16	644	5/20/94	3.50	529	N	25
08276300	Rio Pueblo de Taos below Los Cordovas, NM	380	1957–98	1994 1991	8.88 8.93	2,260 1,660	5/20/94	8.88	2,260	Y	25
08278500	Rio Santa Barbara near Penasco, NM	38.0	1954–57, 1992–98	1995	6.21	838	6/18/95	6.21	838	N	--
08289000	Rio Ojo Caliente at La Madera, NM	419	1932–98	1998 1994	6.00 8.27	3,990 3,640	8/14/94 7/8/98	8.27 6.00	3,640 3,990	N N	35 70
08317950	Galisteo Creek below Galisteo Dam, NM	597	1971–97	1997 1981	-- 7.11	3,460 1,590	8/24/97	--	3,460	Y	--
08329838	South Fork Hahn Arroyo in Albuquerque, NM	2.03	1979–83, 1992–98	1994	4.42	574	5/11/94	4.42	574	N	--
08329840	Hahn Arroyo in Albuquerque, NM	4.23	1979–98	1998	2.93	1,150	12/27/97	2.93	1,150	N	--
08331100	Belen Highline Canal tributary near Los Lunas, NM	.16	1955–95	1965 1994	-- 7.30	754 480	8/15/94	7.30	480	N	25
08331650	Canada Montoso near Scholle, NM	35.0	1961–80, 1982–95, 1997	1997	7.47	5,600	7/31/97	7.47	5,600	N	40
08341300	Bluewater Creek above Bluewater Dam, Bluewater, NM	75.0	1953–71, 1973–77, 1989–96, 1998	1953	8.99	3,570	3/6/95	4.45	1,940	N	20
08361000	Rio Grande below Elephant Butte Dam, NM	29,450	1915–98	1942 1998	-- 7.54	8,220 2,810	5/31/94	--	5,270	Y	--

Table 32. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New Mexico.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 43)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08377900	Rio Mora near Tererro, NM	53.2	1964–98	1991 1979	4.08 4.15	937 820	6/8/97	3.99	864	N	25
08378500	Pecos River near Pecos, NM	189	1920–22, 1924, 1926, 1928–98	1929	6.20	4,500	6/7/97	4.79	2,060	N	20
08382650	Pecos River above Santa Rosa Lake, NM	2,340	1976–98	1996	19.06	16,000	7/11/96	19.06	16,000	N	20
08489000	Big Draw near Mountainair, NM	4.06	1953–71, 1973–74, 1978–83, 1985–96	1954	8.68	1,710	6/26/96	6.64	1,040	N	20
09365000	San Juan River at Farmington, NM	7,240	1924–97	1927 1935	-- 8.00	68,000 32,800	6/2/97	7.77	13,000	Y	4
09367980	Rattlesnake Arroyo near Shiprock, NM	--	1980–96	1995	6.25	3,800	9/7/95	6.25	3,800	N	20
09386900	Rio Nutria near Ramah, NM	71.4	1970–98	1995	9.34	1,850	3/5/95	9.34	1,850	N	30
09430500	Gila River near Gila, NM	1,864	1928–98	1985 1941	13.00 17.19	35,200 25,400	9/22/97	11.18	18,200	N	20

[1]Regulated during flood: N, no; Y, yes.

New York

The most disastrous flood in more than 20 years struck central New York from January 19–20, 1996. Significant widespread flooding of streams, rivers, homes and businesses, streets and highways, woodlands, and farmland occurred as a result of rapid snowmelt and nearly simultaneous storm runoff. An area of intense low pressure, which was located over the Mid-Atlantic region on Friday morning January 19, produced unseasonably warm temperatures, high dew points, and strong winds. This resulted in rapid melting of 1 to 3 feet of snow. In addition to the rapid snowmelt, 1 to 3 inches of rain fell as the system moved northeast along the coast (National Oceanic and Atmospheric Administration, 1996a). There were 10 known fatalities. Total damage statewide was more than $200 million (National Oceanic and Atmospheric Administration 1996b). Flash floods that began early on January 19 gave rise to main-stem river floods that persisted until the evening of January 21. Near-record river flooding occurred January 19–20 in the Chemung, upper Susquehanna, Hudson, and upper Delaware River Basins (fig. 44). At Waverly, the Susquehanna River crested at 20.35 feet, its third highest level of all time, which was about 1 foot lower than the all time crest of 21.40 feet recorded on March 19, 1946 (National Oceanic and Atmospheric Administration, 1996b). Flooding was so widespread and severe that this event became known as the "Deluge of '96." Thirty-one streamgages experienced their peak of record in New York during this flood (table 33).

On Friday October 18, 1996, a strong low-pressure system developed along a cold front in New Jersey. With a high-pressure system in place across northern New England, the low slowly intensified and moved slowly off the southern New Jersey Coast during October 19. The increasing difference in pressures caused strong and gusty east winds, which also transported abundant moisture from the Atlantic Ocean across the region. Excessive flood-producing rains along with minor-to-major coastal flooding occurred. More than $17 million in damage resulted from coastal and river flooding (National Oceanic and Atmospheric Administration, 1996b).

During November 8–9, 1996, a slow-moving, low-pressure system tracked from northern Pennsylvania to northern New York. This system produced 4 to 5 inches of rain across most of central New York and the northern Catskill Mountains (National Oceanic and Atmospheric Administration, 1996a). The resulting runoff caused flooding along the Mohawk River to the Hudson River. Nearly $25 million in damage resulted (National Oceanic and Atmospheric Administration, 1996b).

An area of weak low pressure and a moist, unstable air mass over New England and New York resulted in evening and late-night thunderstorms with locally torrential downpours in extreme northern New York during June 25–27, 1998. Approximately $20 million in damage resulted (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1996a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1996b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

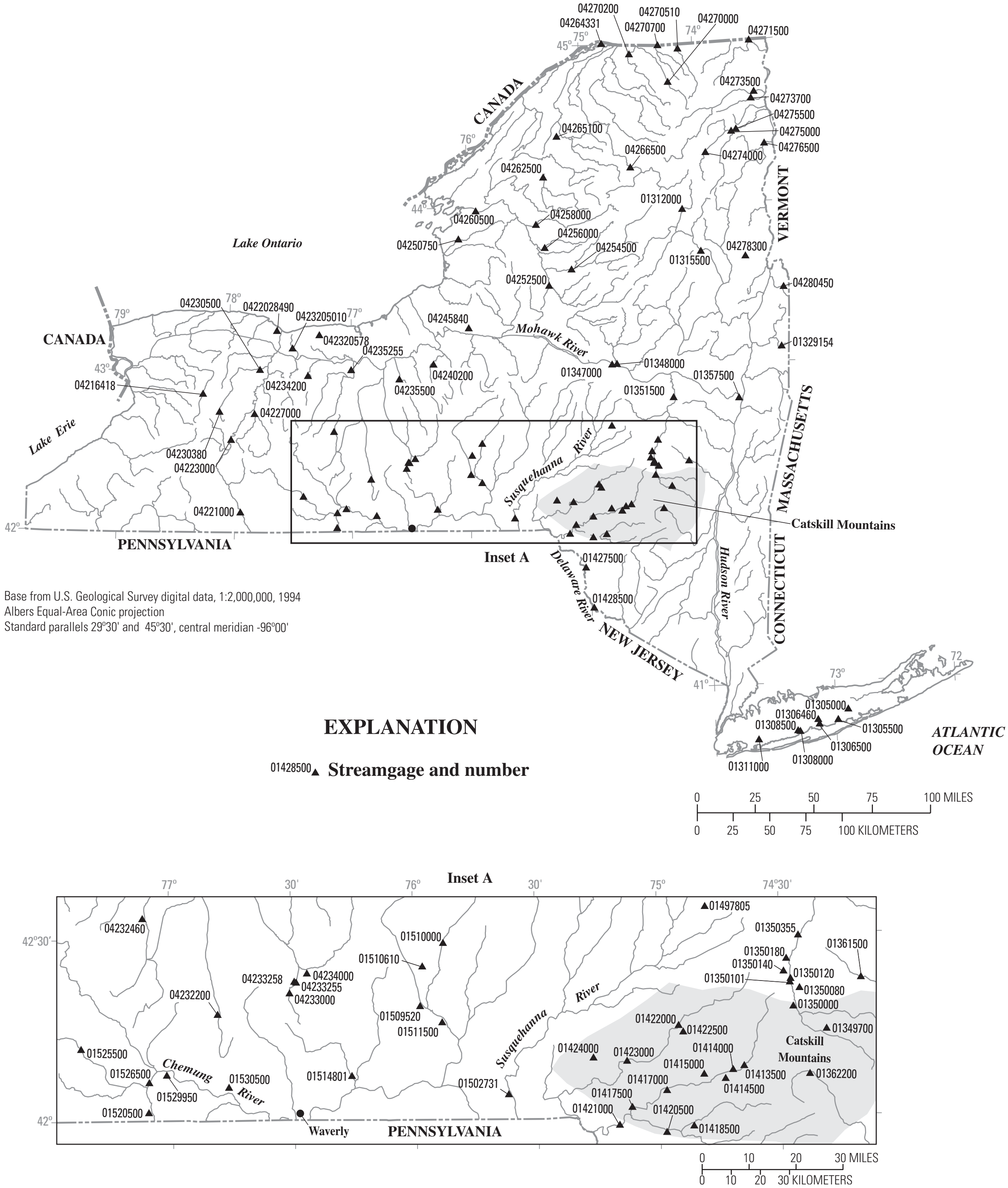


Figure 44. Location of streamgages with significant floods during 1994–98 water years for New York.

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01305000	Carmans River at Yaphank, NY	71.0	1943–98	1989	2.09	143	6/13/98	1.99	122	N	25
01305500	Swan River at East Patchogue, NY	8.60	1947–98	1990	2.71	77	6/13/98	2.39	69	N	75–100
01306460	Connetquot Brook near Central Islip, NY	18.0	1978–98	1998	3.89	155	6/13/98	3.89	155	N	10–25
01306500	Connetquot River near Oakdale, NY	24.0	1944–93, 1997–98	1956	--	263	6/13/98	--	174	N	--
01308000	Sampawams Creek at Babylon, NY	22.7	1945–98	1998	3.73	254	6/13/98	3.73	254	N	>100
01308500	Carlls River at Babylon, NY	35.4	1945–98	1998	2.46	336	6/13/98	2.46	336	N	100
01311000	Pines Brook at Malverne, NY	10.0	1939–98	1994	5.28	866	1/28/94	5.28	866	N	75–100
							10/19/96	4.81	578	N	25
01312000	Hudson River near Newcomb, NY	192	1926–98	1998	12.84	11,500	11/10/96	9.01	5,900	N	10
							1/9/98	12.84	11,500	N	>100
01315500	Hudson River at North Creek, NY	792	1908–98	1949	12.14	28,900	1/9/98	11.54	26,300	Y	50
01329154	Steele Brook at Shushan, NY	2.85	1979–98	1996	6.56	149	1/19/96	6.56	149	N	10–25
01347000	Mohawk River near Little Falls, NY	1,342	1901, 1902, 1904, 1913, 1928–98	1913	--	34,800	1/19/96	18.47	30,700	Y	75–100
01348000	East Canada Creek at East Creek, NY	289	1946–96, 1998	1946	9.00	24,000	1/19/96	8.32	17,000	N	50
							1/09/98	8.46	17,800	N	50–75
01349700	East Kill near Jewett Center, NY	35.6	1951, 1956, 1960, 1967–68, 1972–74, 1987, 1996–98	1996	17.00	13,500	1/19/96	17.00	13,500	N	25
01350000	Schoharie Creek at Prattsville, NY	237	1904, 1908–24, 1926–28, 1930–98	1996	19.39	52,800	1/19/96	19.39	52,800	N	25–50

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01350080	Manor Kill at West Conesville near Gilboa, NY	32.4	1987–98	1996	10.20	5,050	1/19/96	10.20	5,050	N	10–25
01350101	Schoharie Creek at Gilboa, NY	316	1936, 1938, 1956, 1976–98	1996	30.60	70,800	1/19/96	30.60	70,800	Y	75–100
01350120	Platter Kill at Gilboa, NY	10.9	1976–98	1996	6.70	1,370	1/19/96	6.70	1,370	N	25
01350140	Mine Kill near North Blenheim, NY	16.2	1975–98	1996	5.20	2,550	1/19/96	5.20	2,550	N	25–50
01350180	Schoharie Creek at North Blenheim, NY	358	1971–98	1996	17.61	75,600	1/19/96	17.61	75,600	Y	75–100
01350355	Schoharie Creek at Breakabeen, NY	444	1976–98	1996	20.51	80,200	1/19/96	20.51	80,200	Y	75–100
01351500	Schoharie Creek at Burtonsville, NY	886	1940–98	1996	12.88	81,600	1/20/96	12.88	81,600	Y	>100
01357500	Mohawk River at Cohoes, NY	3,450	1915–98	1964	23.15	143,000	1/20/96	22.68	132,000	Y	100
01361500	Catskill Creek at Oak Hill, NY	98.0	1911–77, 1980, 1987–98	1987	16.60	15,400	1/19/96	15.35	13,400	N	25–50
01362200	Esopus Creek at Allaben, NY	63.7	1951, 1964–98	1951	--	20,000	1/19/96	13.58	15,000	N	25–50
01413500	East Branch Delaware River at Margaretville, NY	163	1937–98	1996	14.88	25,800	1/19/96	14.88	25,800	N	75–100
01414000	Platte Kill at Dunraven, NY	34.9	1942–62, 1996–98	1996	11.20	5,690	1/19/96	11.20	5,690	N	>100
01414500	Mill Brook near Dunraven, NY	25.2	1937–98	1996	12.56	5,380	1/19/96	12.56	5,380	N	75–100
							11/9/96	11.09	3,850	N	25

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01415000	Tremper Kill near Andes, NY	33.2	1937–98	1996	7.69	5,000	1/19/96	7.69	5,000	N	75–100
01417000	East Branch Delaware River at Downsville, NY	372	1904, 1942–98	1904	16.00	34,000	12/2/96	9.41	11,000	Y	25
01417500	East Branch Delaware River at Harvard, NY	458	1904, 1935–67, 1978–98	1938	16.93	31,400	1/19/96	12.63	12,200	Y	25–50
				1904	--	42,000	12/2/96	12.79	12,400	Y	25–50
01418500	Beaver Kill at Craigie Clair, NY	81.9	1937–74, 1996	1996	11.83	13,000	1/19/96	11.83	13,000	N	50–75
01420500	Beaver Kill at Cooks Falls, NY	241	1914–98	1996	17.79	42,900	1/19/96	17.79	42,900	N	>100
01421000	East Branch Delaware River at Fishs Eddy, NY	784	1904, 1913–98	1904	23.60	70,000	1/19/96	16.88	53,000	Y	>100
01422000	West Branch Delaware River at Delhi, NY	142	1937–74, 1996	1996	9.80	13,000	1/19/96	9.80	13,000	N	>100
01422500	Little Delaware River near Delhi, NY	49.8	1938–74, 1996–98	1996	8.51	6,100	1/19/96	8.51	6,100	N	>100
							11/9/96	7.67	4,540	N	25–50
01423000	West Branch Delaware River at Walton, NY	332	1951–98	1996	16.36	25,000	1/19/96	16.36	25,000	N	50
01424000	Trout Creek near Rockroyal, NY	20.0	1952–67, 1996	1996	10.06	2,800	1/19/96	10.06	2,800	N	50
01427500	Callicoon Creek at Callicoon, NY	110	1940–82, 1987–98	1947	9.68	16,000	1/19/96	8.42	11,200	N	25–50
01428500	Delaware River above Lackawaxen River near Barryville, NY	2,020	1941–98	1955	26.40	130,000	1/20/96	22.18	98,300	Y	50–75
01497805	Little Elk Creek near Westford, NY	3.73	1978–98	1996	19.92	278	1/19/96	19.92	278	N	25–50

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01502731	Susquehanna River at Windsor, NY	1,820	1988–98	1996	21.22	40,000	1/20/96	21.22	40,000	N	10
01509520	Tioughnioga River at Lisle, NY	453	1988–98	1996 1993	-- 9.31	12,900 12,100	1/20/96	--	12,900	N	10
01510000	Otselic River at Cincinnatus, NY	147	1935, 1939–64, 1970–98	1935 1996	-- 10.89	9,200 8,000	1/19/96	10.89	8,000	N	25
01510610	Merrill Creek tributary near Texas Valley, NY	5.32	1976–81, 1983–98	1996	6.64	1,150	1/19/96	6.64	1,150	N	25–50
01511500	Tioughnioga River at Itaska, NY	730	1930–98	1935	16.61	61,100	1/19/96	10.77	20,800	Y	25–50
01514801	Catatonk Creek northwest of Owego, NY	151	1988–98	1996	14.83	9,740	1/20/96	14.83	9,740	N	25–50
01520500	Tioga River at Lindley, NY	771	1930–98	1972	26.27	128,000	8/18/94	13.38	13,900	Y	10
01525500	Canisteo River at West Cameron, NY	340	1931, 1935–72, 1974–98	1972	23.48	43,000	1/19/96	20.91	29,100	Y	50–75
01526500	Tioga River near Erwins, NY	1,377	1919–98	1972	26.74	190,000	1/19/96	16.98	45,600	Y	75
01529950	Chemung River at Corning, NY	2,005	1972, 1975–98	1972	40.71	228,000	1/19/96	25.93	61,000	Y	25–50
01530500	Newtown Creek at Elmira, NY	77.5	1938–98	1972	19.28	4,000	1/19/96	16.98	3,810	Y	25
04216418	Tonawanda Creek at Attica, NY	76.9	1972, 1978–98	1998	12.71	9,400	7/8/98	12.71	9,400	N	>100
0422028490	Slater Creek (Latta Road) near Greece, NY	1.52	1989–98	1997	4.80	219	10/20/96	4.80	219	N	10–25
04221000	Genesee River at Wellsville, NY	288	1956–58, 1972–98	1972	20.70	38,500	1/19/96	16.13	22,700	N	25–50

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04223000	Genesee River at Portageville, NY	984	1902, 1909–98	1972	32.25	90,000	1/20/96	29.12	56,200	N	25–50
04227000	Canaseraga Creek at Shakers Crossing, NY	335	1916–22, 1959–70, 1972, 1975–98	1972 1916	-- 28.92	11,200 --	1/19/96	13.01	5,510	N	10–25
04230380	Oatka Creek at Warsaw, NY	39.1	1964–98	1998	9.90	4,110	7/8/98	9.90	4,110	N	50–75
04230500	Oatka Creek at Garbutt, NY	200	1946–98	1960	8.64	7,050	1/9/98	8.57	6,160	N	25–50
0423205010	Irondequoit Creek above Blossom Road near Rochester, NY	142	1982–98	1998	9.95	3,300	1/8/98	9.95	3,300	N	75–100
042320578	Bear Creek at Ontario, NY	6.74	1971–73, 1975–98	1998	13.38	238	1/8/98	13.38	238	N	25–50
04232200	Catharine Creek at Montour Falls, NY	41.1	1972, 1975–77, 1987–98	1997	8.48	4,700	11/8/96	8.48	4,700	N	50
04232460	Sugar Creek at Guyanoga, NY	28.9	1966–98	1996	5.88	1,800	1/19/96 1/8/98	5.88 4.98	1,800 1,320	N N	25 10
04233000	Cayuga Inlet near Ithaca, NY	35.2	1935, 1937–98	1935	--	6,500	1/19/96	7.57	4,210	N	25–50
04233255	Cayuga Inlet at Ithaca, NY	86.7	1935, 1971–72, 1975–98	1935	--	14,000	1/19/96	14.67	12,500	N	25–50
04233258	Coy Glen Creek at Ithaca, NY	3.56	1972, 1983–98	1996	22.23	820	1/19/96	22.23	820	N	25
04234000	Fall Creek near Ithaca, NY	126	1926–98	1935	9.52	15,500	1/19/96	7.47	9,450	N	50–75

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
04234200	Mud Creek at East Victor, NY	64.2	1958, 1961–68, 1976–98	1991 1972	7.22 7.85	1,880 1,800	1/19/96	7.09	1,810	N	10–25
04235255	Canandaigua Outlet tributary near Alloway, NY	2.94	1978–98	1996 1998	7.34 7.34	102 102	1/19/96 1/8/98	7.34 7.34	102 102	N N	10 10
04235500	Owasco Outlet near Auburn, NY	206	1914–98	1972	6.28	3,250	1/9/98	4.65	2,150	Y	10–25
04240200	Ninemile Creek at Camillus, NY	84.3	1959–82, 1989–98	1960 1975	8.25 10.83	2,760 2,120	1/19/96	8.92	2,530	Y	10–25
04245840	Scriba Creek near Constantia, NY	38.4	1966–69, 1971–98	1975 1972	7.33 7.42	1,310 1,200	1/8/98	7.32	1,300	N	25–50
04250750	Sandy Creek near Adams, NY	128	1958–98	1996	11.06	7,700	1/19/96	11.06	7,700	N	10–25
04252500	Black River near Boonville, NY	304	1911–98	1985 1982 1913	11.41 11.31 12.50	12,800 12,800 12,400	1/9/98	11.25	12,100	N	25–50
04254500	Moose River at McKeever, NY	363	1869, 1902–70, 1982, 1985, 1987–98	1947	17.45	18,700	1/8/98	14.91	14,600	N	25–50
04256000	Independence River at Donnattsburg, NY	88.7	1943–98	1985	13.34	9,420	1/8/98	9.53	4,340	N	10–25
04258000	Beaver River at Croghan, NY	291	1931–98	1969	6.98	5,100	1/9/98	6.56	4,440	Y	25–50
04260500	Black River at Watertown, NY	1,864	1869, 1897–1913, 1917–98	1998	16.02	55,500	1/10/98	16.02	55,500	Y	>100

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04262500	West Branch Oswegatchie River near Harrisville, NY	244	1917–98	1998	10.64	8,700	1/9/98	10.64	8,700	N	>100
04264331	Saint Lawrence River at Cornwall Ontario near Massena, NY	298,800	1918–98	1993	--	378,000	3/17/98	--	360,000 (Daily)	Y	--
04265100	Elm Creek near Hermon, NY	32.6	1959–98	1974	9.07	1,270	1/19/96	8.82	1,180	N	25
04266500	Raquette River at Piercefield, NY	721	1900, 1909–98	1993 1972	12.04 12.25	8,630 8,360	4/21/94	11.50	7,660	Y	10–25
04270000	Salmon River at Chasm Falls, NY	132	1926–82, 1985, 1987–98	1985	5.63	3,700	4/1/98	5.43	3,540	N	75–100
04270200	Little Salmon River at Bombay, NY	92.2	1959–98	1998	13.27	3,420	3/31/98	13.27	3,420	N	25–50
04270510	Chateaugay River below Chateaugay, NY	151	1966–95, 1997–98	1998 1966	7.54 10.99	5,440 --	11/9/96 3/31/98	7.51 7.54	5,370 5,440	Y Y	10–25 10–25
04270700	Trout River at Trout River, NY	107	1960–98	1996	9.42	6,980	7/5/96	9.42	6,980	N	50–75
04271500	Great Chazy River at Perry Mills, NY	243	1929–68, 1985, 1987–98	1997	12.24	9,700	11/9/96 3/31/98	12.24 10.89	9,700 7,640	N N	>100 50–75
04273500	Saranac River at Plattsburgh, NY	608	1928, 1944–98	1997	12.11	14,400	11/09/96 4/1/98	12.11 10.73	14,400 11,200	Y Y	>100 25
04273700	Salmon River at South Plattsburgh, NY	63.3	1960–86, 1990–98	1997	7.56	4,200	11/9/96 6/27/98	7.56 7.54	4,200 4,170	N N	50–75 50–75
04274000	West Branch Ausable River near Lake Placid, NY	116	1920–68, 1983–98	1938	12.20	10,800	11/9/96	12.09	10,600	N	>100
04275000	East Branch Ausable River at Au Sable Forks, NY	198	1925–98	1997	15.22	23,900	11/9/96	15.22	23,900	N	>100
04275500	Ausable River near Au Sable Forks, NY	446	1911–68, 1990–98	1997	13.83	37,400	11/9/96	13.83	37,400	N	>100

Table 33. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in New York.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 44)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04276500	Bouquet River at Willsboro, NY	270	1924–68, 1980, 1985, 1987–98	1997	10.93	12,300	11/9/96	10.93	12,300	N	50–75
04278300	Northwest Bay Brook near Bolton Landing, NY	22.0	1966–98	1996	6.57	1,950	1/19/96	6.57	1,950	N	25–50
04280450	Mettawee River near Middle Granville, NY	167	1984, 1990–98	1996	10.69	7,600	1/20/96	10.69	7,600	N	10

[1]Regulated during flood: N, no; Y, yes.

North Carolina

Rainfall amounts of 5 to 7 inches (National Oceanic and Atmospheric Administration, 1994a) caused serious flooding in the western mountains of North Carolina on March 27, 1994. Bridges were washed away and roads closed. Mudslides were widespread.

Remnants of Tropical Storm Beryl dropped 3 to 4 inches of rain west of Cape Fear (fig. 45) on August 18, 1994 (National Oceanic and Atmospheric Administration, 1994a). The town of Southport sustained nearly $3 million in damage (National Oceanic and Atmospheric Administration, 1994b).

Hurricane Gordon was a major weather factor along the North Carolina coast during October 17–18, 1994. The storm remained offshore but caused significant flooding and strong winds along the central and northern Carolina coast. The flooding began on Hatteras Island, with about 12 inches of overwash (National Oceanic and Atmospheric Administration, 1994b).

More than 11 inches of rain fell during a 2-day period causing widespread flooding in western North Carolina, January 14–15, 1995. Three Boy Scouts drowned in Pisgah National Forest. They were attempting to cross a footbridge and were swept away in the swollen creek. Two other men drowned. Overall damage was estimated at $2.5 million (National Oceanic and Atmospheric Administration, 1995b).

Flash flooding developed rapidly during the evening of September 4, 1996, as stationary thunderstorms dumped between 10 and 15 inches of rain in a small area of Hickory Nut Gorge (National Oceanic and Atmospheric Administration, 1996a). A wall of water rushed down the valley of the upper Broad River carrying campsites, RVs, mobile homes, trees, and debris downstream.

Hurricane Fran made landfall near Cape Fear, on September 5, 1996, and was the worst natural economic disaster to occur in North Carolina history. In North Carolina, wind and flooding damage exceeded $5 billion (National Oceanic and Atmospheric Administration, 1996b). The copious rainfall produced many severe flash and river floods. The flooding on the Haw River at Haw River (streamgage 02096500, table 34), the Tar River at Louisburg (streamgage 02081747), and at Rocky Mount (streamgage 02082585, table 34) exceeded the highest flood on record. A massive evacuation occurred in Goldsboro where residents of 550 homes had to be moved to public shelters. Excessive rain from Hurricane Fran moved downstream along the Neuse River and, combined with a large amount of debris, led to serious flooding. The Neuse River at Kinston (streamgage 02089500, table 34) crested at 23.3 feet, more than 9 feet above flood stage (National Oceanic and Atmospheric Administration, 1996b).

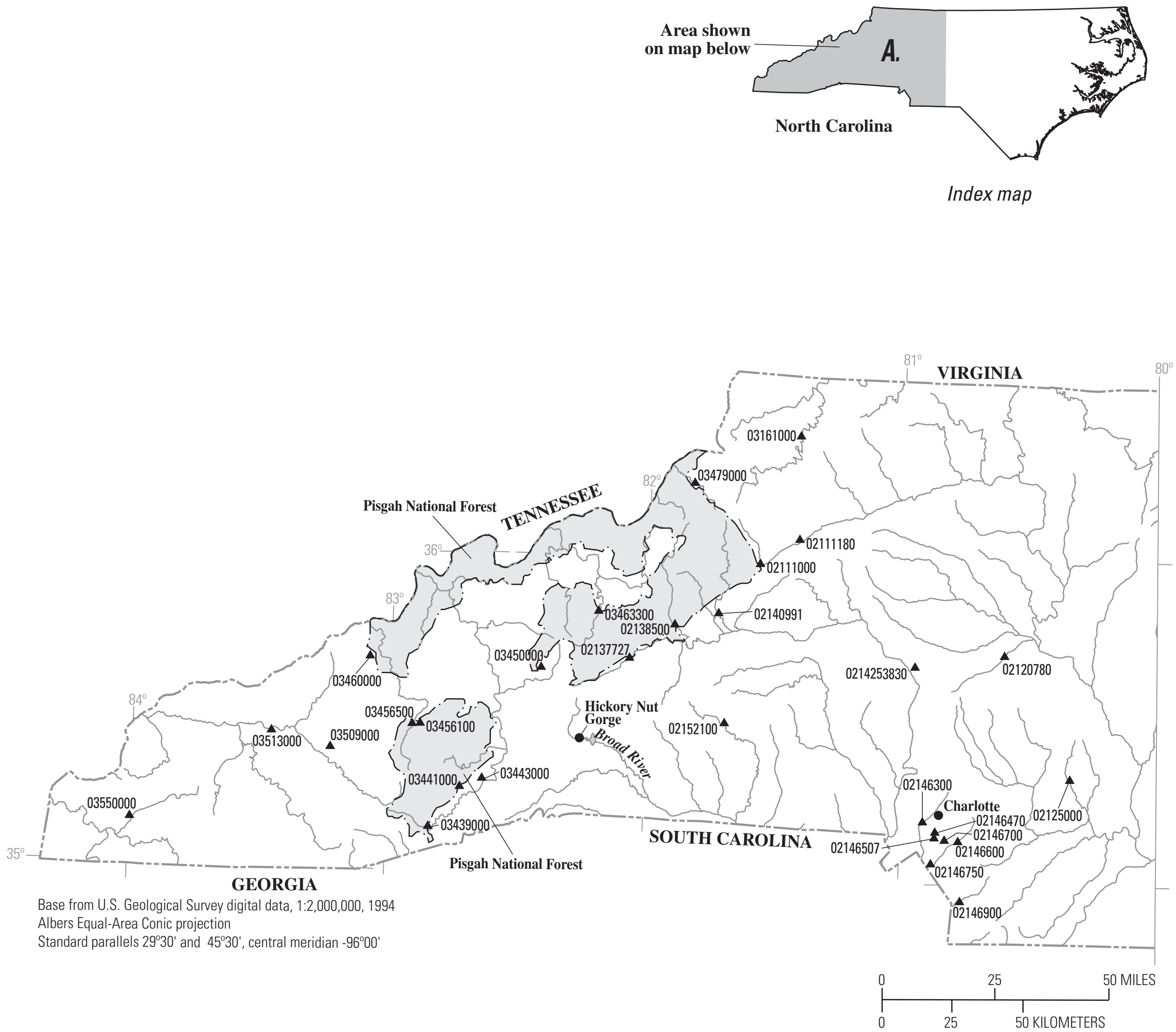
The remnants of Hurricane Fran produced widespread wind damage and flash flooding in north-central and parts of northwestern North Carolina during the late evening hours of September 5 and morning hours of September 6, 1996. Excessive rainfall forced creeks and streams to leave their banks, flooding roads and damaging crops, roads, and vehicles.

Strong thunderstorms occurred in the early morning of July 23, 1997, between Charlotte and Raleigh. These storms developed ahead of the remnants of Hurricane Danny. Between 5 and 10 inches of rain fell in a few hours (National Oceanic and Atmospheric Administration, 1997a) causing widespread flooding. Two women died after their vehicles became trapped in floodwaters. A young girl perished when she went to play in the water and was swept away. Damage in this area was more than $11 million (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

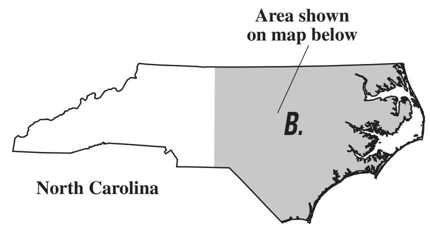
National Oceanic and Atmospheric Administration (NOAA), 1994b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



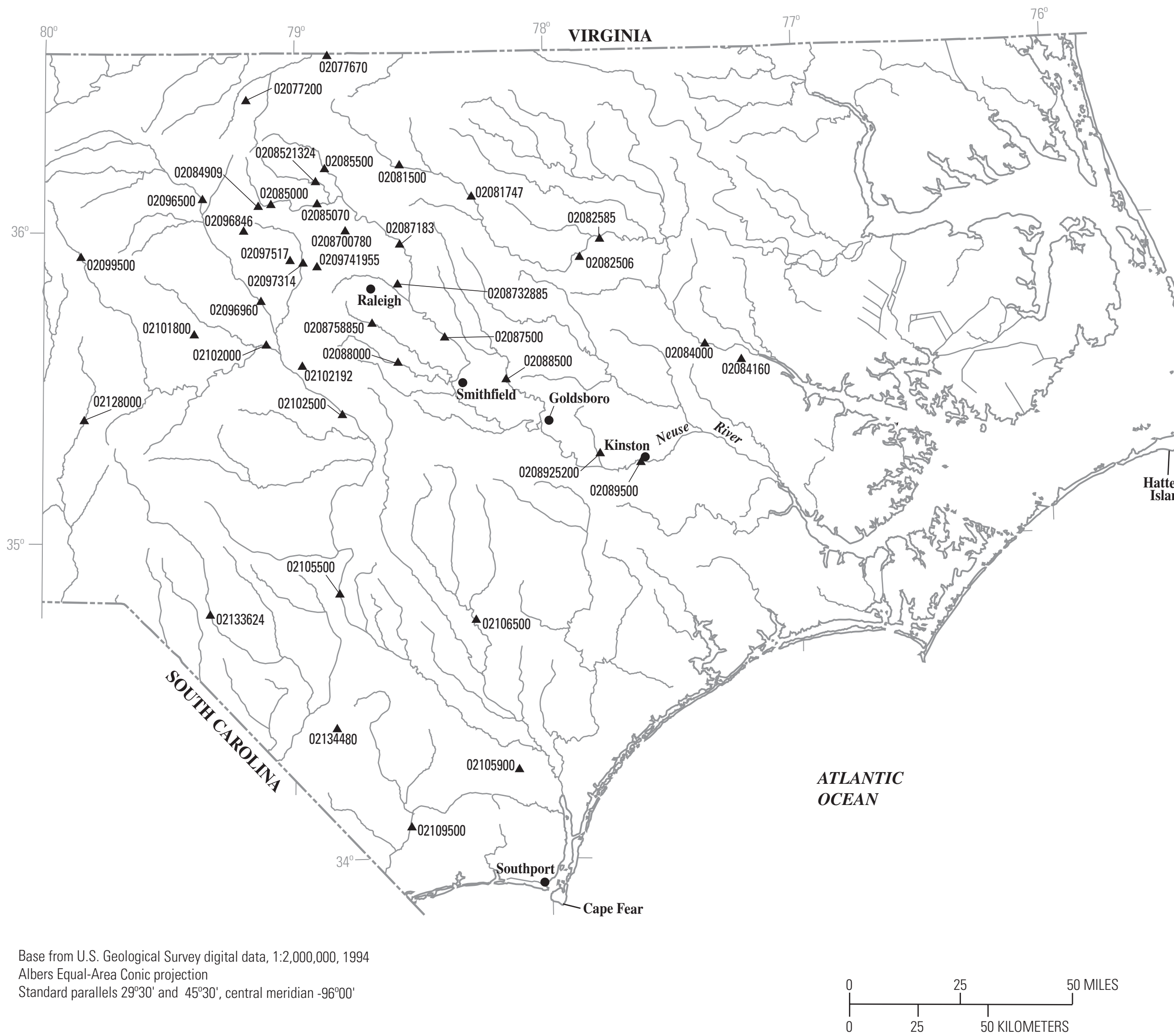
EXPLANATION

03439000▲ **Streamgage and number**

Figure 45. *(A)* Location of streamgages with significant floods during 1994–98 water years for North Carolina.



Index map



EXPLANATION

02109500▲ **Streamgage and number**

Figure 45. *(B)* Location of streamgages with significant floods during 1994–98 water years for North Carolina.—Continued

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02077200	Hyco Creek near Leasburg, NC	45.9	1965–92, 1994–97	1996 1995	40.47 48.53	9,140 --	9/6/96	40.47	9,140	N	25–50
02077670	Mayo Creek near Bethel Hill, NC	53.5	1978–98	1978	10.83	3,950	9/6/96	10.83	3,040	Y	25
02081500	Tar River near Tar River, NC	167	1940–98	1996	24.06	19,900	9/6/96 3/19/98	24.06 19.36	19,900 13,200	N N	50–100 10–25
02081747	Tar River at Louisburg, NC	427	1964–98	1996	25.34	21,100	9/6/96 3/20/98	25.34 24.62	21,100 18,500	N N	>100 50–100
02082506	Tar River below Tar River Reservoir near Rocky Mount, NC	777	1973–98	1998	23.67	14,700	3/23/98	23.67	14,700	Y	>500
02082585	Tar River at Rocky Mount, NC	925	1977–98	1996	25.88	15,100	9/12/96	25.88	15,100	Y	>500
02084000	Tar River at Greenville, NC	2,620	1888, 1906–76, 1997–98	1919	24.50	46,500	5/7/97 3/28/98	14.05 18.08	13,900 25,500	N N	-- --
02084160	Chicod Creek near Simpson, NC	45.0	1976–87, 1992–98	1998	13.45	3,150	8/27/98	13.45	3,150	N	25
02084909	Sevenmile Creek near Efland, NC	14.1	1988–98	1996	15.47	3,440	9/6/96	15.47	3,440	N	>100
02085000	Eno River at Hillsborough, NC	66.0	1928, 1930–71, 1986–98	1945 1996	20.01 21.13	11,000 10,800	9/6/96	21.13	10,800	N	>100
02085070	Eno River near Durham, NC	141	1964–98	1996	23.58	14,700	9/6/96 3/19/98	23.58 20.76	14,700 10,800	N N	10–25 <10
0208521324	Little River at State Road 1461 near Orange Factory, NC	78.2	1988–98	1996	13.26	11,600	9/6/96	13.26	11,600	N	25
02085500	Flat River at Bahama, NC	149	1926–98	1996	17.26	33,800	9/6/96 3/19/98	17.26 12.05	33,800 16,700	N N	200–500 10–25
0208700780	Little Lick Creek above State Road 1814 near Oak Grove, NC	10.1	1983–95	1995	9.33	1,830	6/29/95	9.33	1,830	N	10–25

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

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Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02087183	Neuse River near Falls, NC	771	1945, 1971–98	1975	25.21	13,600	9/16/96	8.05	7,650	Y	25–50
0208732885	Marsh Creek near New Hope, NC	6.84	1984–98	1995 1996	12.84 13.33	4,140 3,900	8/27/95	12.84	4,140	N	25
02087500	Neuse River near Clayton, NC	1,150	1919, 1928–98	1945	22.12	22,900	9/7/96	20.12	19,700	Y	50–100
0208758850	Swift Creek near McCullars Crossroads, NC	35.8	1989–98	1996	14.15	6,790	9/6/96	14.15	6,790	N	25–50
02088000	Middle Creek near Clayton, NC	83.5	1940–98	1996	14.88	11,900	9/6/96	14.88	11,900	N	200–500
02088500	Little River near Princeton, NC	232	1919, 1924, 1928, 1930–98	1965 1924	13.94 14.90	7,150 --	9/9/96 3/11/98	13.32 13.51	5,480 5,150	N N	25 10–25
0208925200	Bear Creek at Mays Store, NC	57.7	1988–98	1997	9.50	1,550	10/9/96	9.50	1,550	N	<5
02089500	Neuse River at Kinston, NC	2,692	1919, 1924, 1928–98	1919	25.00	39,000	9/17/96	23.26	27,100	Y	50–100
02096500	Haw River at Haw River, NC	606	1929–98	1996	32.83	51,400	6/29/95 9/6/96	28.46 32.83	29,500 51,400	N N	10–25 200
02096846	Cane Creek near Orange Grove, NC	7.54	1989–98	1996	7.90	2,060	9/6/96	7.90	2,060	N	25
02096960	Haw River near Bynum, NC	1,275	1974–98	1996	21.76	76,700	9/6/96	21.76	76,700	N	>100
02097314	New Hope Creek near Blands, NC	75.9	1983–98	1996	14.05	12,700	9/6/96	14.05	12,700	N	100–200
0209741955	Northeast Creek at State Road 1100 near Genlee, NC	21.1	1983–93, 1996–98	1996	13.92	5,140	9/6/96	13.92	5,140	N	25–50
02097517	Morgan Creek near Chapel Hill, NC	41.0	1983–98	1996	16.18	4,210	9/6/96	16.18	4,210	N	50
02099500	Deep River near Randleman, NC	125	1929–31, 1934–98	1947	32.20	20,000	9/6/96	28.75	15,600	N	50–100

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

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Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02101800	Tick Creek near Mount Vernon Springs, NC	15.5	1959–81, 1994–98	1996	13.41	4,010	9/6/96	13.41	4,010	N	25
02102000	Deep River at Moncure, NC	1,434	1931–98	1945	17.20	80,300	9/6/96	12.94	47,900	N	50
02102192	Buckhorn Creek near Corinth, NC	76.3	1973–98	1973	20.02	6,920	9/6/96	16.79	4,300	Y	25–50
02102500	Cape Fear River at Lillington, NC	3,464	1924–98	1945	33.19	150,000	9/7/96	18.97	51,800	Y	50
02105500	Cape Fear River at Wilm O Huske Lock near Tarheel, NC	4,852	1938–94, 1997–98	1952 1945	29.92 43.44	70,600 --	3/22/98	26.28	47,100	Y	>500
02105900	Hood Creek near Leland, NC	21.6	1953–73, 1994–98	1998	11.53	2,650	8/27/98	11.53	2,650	N	25–50
02106500	Black River near Tomahawk, NC	676	1928, 1945, 1948, 1952–98	1984 1928	22.08 47.00	17,500 11,400	9/10/96	21.31	13,700	N	25–50
02109500	Waccamaw River at Freeland, NC	680	1940–98	1996	17.02	12,400	9/12/96	17.02	12,400	N	50
02111000	Yadkin River at Patterson, NC	28.8	1940–43, 1945–98	1973	12.70	16,200	8/17/94	9.38	5,750	N	10–25
02111180	Elk Creek at Elkville, NC	48.1	1940, 1966–98	1940	22.00	70,000	8/17/94	12.02	18,700	N	25
02120780	Second Creek near Barber, NC	118	1980–98	1995	17.28	8,560	8/28/95	17.28	8,560	N	100–200
02125000	Big Bear Creek near Richfield, NC	55.6	1955–98	1997	16.54	11,400	7/23/97	16.54	11,400	N	25
02128000	Little River near Star, NC	106	1955–93, 1995–98	1997	18.60	15,400	7/23/97 3/19/98	18.60 15.84	15,400 11,300	N N	200–500 50–100
02133624	Lumber River near Maxton, NC	365	1988–92, 1994–98	1998	13.52	3,380	3/22/98	13.52	3,380	N	10–25
02134480	Big Swamp near Tarheel, NC	229	1986–95, 1997–98	1998 1993	13.10 13.34	3,980 2,840	3/11/98	13.10	3,980	N	10–25
02137727	Catawba River near Pleasant Gardens, NC	127	1981–98	1994	15.22	13,700	8/17/94	15.22	13,700	N	10–25

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

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Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02138500	Linville River near Nebo, NC	66.7	1916, 1923–98	1940	11.40	39,500	8/17/94	10.52	18,600	N	25
02140991	Johns River at Arneys Store, NC	201	1986–98	1994	25.23	42,300	8/17/94	25.23	42,300	N	25–50
0214253830	Norwood Creek near Troutman, NC	7.18	1984–98	1997	9.20	1,480	4/28/97	9.20	1,480	N	10–25
02146300	Irwin Creek near Charlotte, NC	30.7	1963–98	1997	20.38	11,600	7/23/97	20.38	11,600	N	500
02146470	Little Hope Creek at Seneca Place, Charlotte, NC	2.63	1967–72, 1983–86, 1988–90, 1995–98	1997	8.50	1,700	7/23/97	8.50	1,700	N	50
02146507	Little Sugar Creek at Archdale Drive at Charlotte, NC	42.6	1978–98	1997	15.06	13,600	7/23/97	15.06	13,600	N	500
02146600	McAlpine Creek at Sardis Road near Charlotte, NC	39.6	1962–98	1995	17.79	9,040	8/27/95	17.79	9,040	N	>200
02146700	McMullen Creek at Sharon View Road near Charlotte, NC	6.95	1963–98	1995	11.03	3,470	8/27/95 7/27/98	11.03 10.64	3,470 3,230	N N	50 25–50
02146750	McAlpine Creek below McMullen Creek near Pineville, NC	92.4	1975–98	1995	19.40	12,500	8/27/95	19.40	12,500	N	200
02146900	Twelve Mile Creek near Waxhaw, NC	76.5	1949, 1961–98	1995 1949	21.94 23.60	9,970 --	8/27/95	21.94	9,970	N	50–100
02152100	First Broad River near Casar, NC	60.5	1960–95, 1997–98	1995 1976	15.58 16.70	7,790 7,760	1/14/95	15.58	7,790	N	10–25
03161000	South Fork New River near Jefferson, NC	205	1916, 1925–26, 1929–41, 1943–98	1940	22.50	52,800	1/15/95	13.73	21,000	N	50
03439000	French Broad River at Rosman, NC	67.9	1908–09, 1916, 1928, 1936–89, 1991–98	1965	14.95	13,500	8/17/94	14.12	11,500	N	50

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

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Streamgage number (fig. 45)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03441000	Davidson River near Brevard, NC	40.4	1876, 1916, 1919, 1921–90, 1924–98	1928 1994	11.80 12.08	8,400 7,620	8/17/94	12.08	7,620	N	25–50
03443000	French Broad River at Blantyre, NC	296	1875–76, 1880, 1893, 1899, 1901–02, 1905–06, 1910, 1916, 1919, 1921–98	1965 1916	25.50 27.10	30,000 --	8/18/94 1/8/98	23.81 22.61	21,200 19,400	N N	50 25–50
03450000	Beetree Creek near Swannanoa, NC	5.46	1927–75, 1978, 1980–81, 1986, 1988–98	1940	6.20	1,370	8/17/94	5.75	1,040	N	50–100
03456100	West Fork Pigeon River at Bethel, NC	58.4	1981–98	1994	12.63	11,700	8/17/94	12.63	11,700	Y	25–50
03456500	East Fork Pigeon River near Canton, NC	51.5	1955–98	1973	11.19	12,000	8/17/94	10.70	11,100	N	10–25
03460000	Cataloochee Creek near Cataloochee, NC	49.2	1935–52, 1963–98	1963	8.08	5,080	3/27/94	7.55	4,280	N	10–25
03463300	South Toe River near Celo, NC	43.3	1958–98	1978	17.41	32,900	8/17/94	10.49	15,600	N	10–25
03479000	Watauga River near Sugar Grove, NC	92.1	1916, 1940–98	1940	29.60	50,800	1/14/95	20.46	20,500	N	25
03509000	Scott Creek above Sylva, NC	51.0	1940, 1942–75, 1993–95	1994 1973	6.77 8.78	4,440 2,800	3/27/94	6.77	4,440	N	200
03513000	Tuckasegee River at Bryson City, NC	655	1898–1982, 1984–95, 1997–98	1940	15.96	61,600	3/28/94	14.25	33,300	Y	10–25

Table 34. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Carolina.—Continued

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			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03550000	Valley River at Tomotla, NC	104	1898, 1905–09, 1915–17, 1919–98	1907	20.50	18,000	3/27/94	17.10	11,900	N	25–50
				1898	21.20	20,000	2/16/95	17.15	12,100	N	50

[1]Regulated during flood: N, no; Y, yes.

North Dakota

During the winter of 1993–94, above-average precipitation in Montana resulted in deeper than normal snowpacks in river basins that drain east into North Dakota. In January 1994, record snowfalls occurred in much of the western part of North Dakota. During February and March, additional snowfalls of several inches added to the ever-increasing snowpack. By early March, a rapid warm-up caused snowmelt and ice jams to occur on several rivers and streams in eastern Montana and western North Dakota. Flooding occurred along the Yellowstone River (fig. 46). High water flowed eastward into the Missouri River and caused record stages along the way. A maximum daily gage height of 26.60 feet for the period of record occurred on March 8, 1994, on the Missouri River near Williston (streamgage 06330000, table 35). About 10,000 acres of prime farmland were flooded in the northwestern part of the State. Property and crop damage in eastern Montana and western North Dakota were estimated to be about $5 million (National Oceanic and Atmospheric Administration, 1994b).

During the spring of 1996, alternating warm and cold periods resulted in multiple snowmelt discharges in February, March, and April over all of the State except the northeastern one-third. By having the snowmelt runoff in three separate months rather than one, few record discharges resulted.

Excessive runoff in the upper Sheyenne River Basin primarily occurred during April 1996. Because of the sudden increase of runoff into Lake Ashtabula, high release rates were required to avoid an uncontrolled flow through the emergency spillway. A peak stage of 36.46 feet occurred on April 20, 1996, at the Sheyenne River below Baldhill Dam (streamgage 05058000, table 35), which is 0.20 foot higher than the previous record set in 1979. A peak stage of 19.20 feet occurred on April 13, 1996, on the Sheyenne River at Lisbon (streamgage 05058700, table 35), which is 0.16 foot higher than the previous record set in 1975.

The harsh winter of 1996–97, combined with the 1997 spring floods, caused the worst natural disaster in recent history for North Dakota, eastern South Dakota, and western Minnesota. Above-normal snowfall in central and eastern North Dakota during the winter of 1996–97 and a blizzard on April 5–6, 1997, caused the worst flooding in the Red River of the North and Missouri River Basins in more than 100 years.

The heaviest snowfalls occurred along the main stems of the Red River of the North and the Missouri River and were about 300 percent greater than normal. About 117 inches of

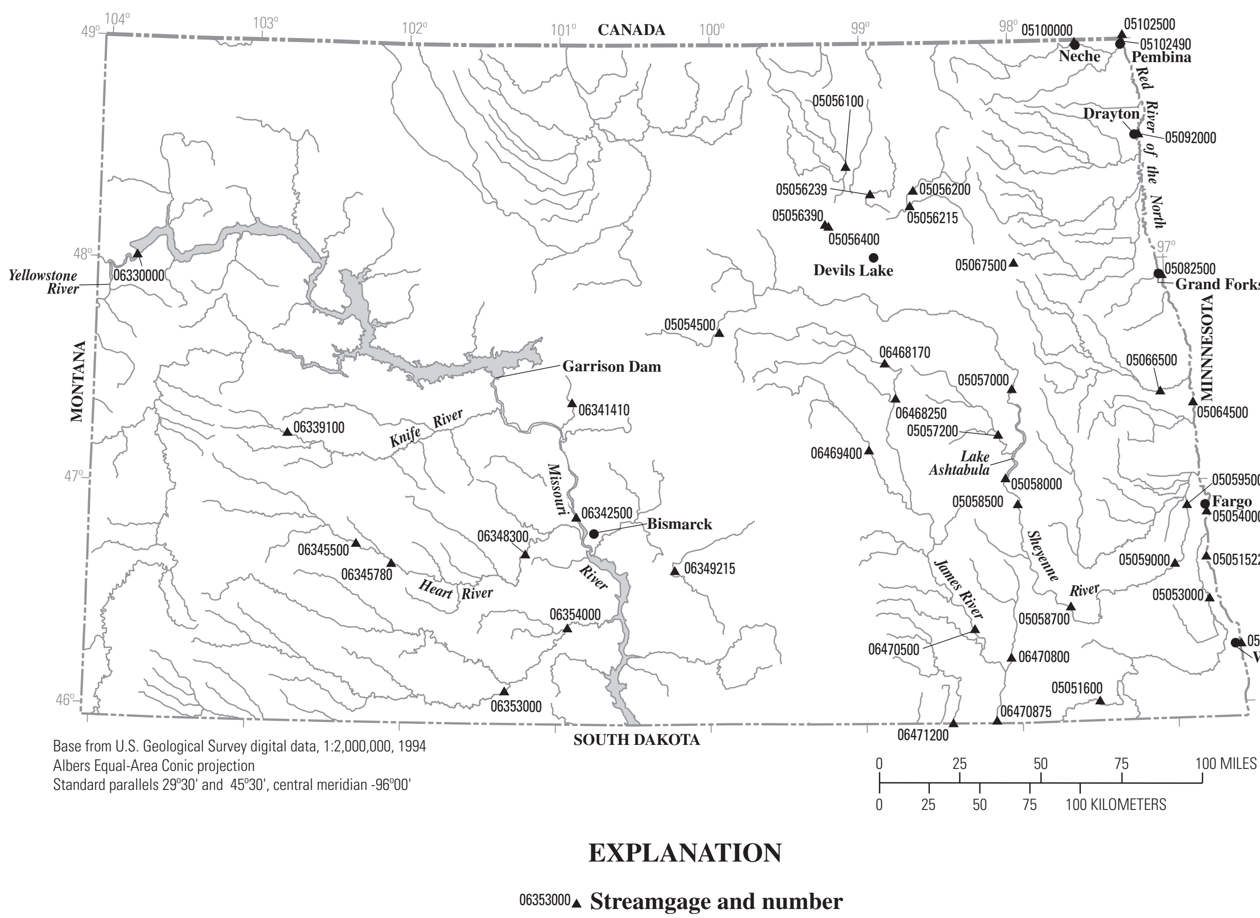

Figure 46. Location of streamgages with significant floods during 1994–98 water years for North Dakota.

snow were recorded in Fargo, 96 inches in Grand Forks, and 101 inches in Bismarck (National Oceanic and Atmospheric Administration, 1996a). Elsewhere in the region, snowfalls were well above seasonal averages. Melting of the snowpack and thawing of ice began in late March on rivers and streams in the southern and western parts of the State. Flows were inhibited by a blizzard that occurred on April 5–6, 1997. The blizzard brought a severe drop in temperatures, winds up to 70 miles per hour, and up to 2 feet of snow with drifts many feet higher in several areas. In southeastern North Dakota, the blizzard was preceded by wind-driven rain and sleet. The wind and ice toppled trees and power lines, leaving thousands of people without power for days. Thousands of people were forced to flee their homes, some permanently, as floodwaters and severe weather caused over $5 billion in damage to the region (National Oceanic and Atmospheric Administration, 1997b).

The Red River of the North is one of the few rivers in the United States to flow directly north into Canada. The basin flood plain lies in a glacial lakebed and is relatively flat (less than 0.5-foot drop in elevation per mile in the reach downstream from Grand Forks, North Dakota). Because of the flat basin, the shallow river channel, and the northerly flow, the timing of spring thaw and snowmelt can greatly aggravate flooding in the basin. Snow and ice in the headwaters of the Red River of the North begin to melt first, when areas downstream remain largely frozen. The melt pattern can cause ice jams to form, and substantial backwater can occur as flow moves northward toward a still-frozen river channel.

Two peak stages occurred in Wahpeton, which is located in the southern part of the Red River of the North Basin. On April 6, 1997, the stage of the Red River of the North at Wahpeton (streamgage 05051500, table 35) was 19.42 feet, which is 1.47 feet higher than the record set in 1989. Because of the additional moisture from the April 5–6, 1997, blizzard, a record flow of 12,800 cubic feet per second and corresponding stage of 19.25 feet was recorded 9 days later. On April 17, 1997, the peak stage of the Red River of the North at Fargo (streamgage 05054000, table 35), about 96 river miles north of Wahpeton, was 39.57 feet, and the peak flow was 28,000 cubic feet per second. On April 18, 1997, the peak stage at Fargo was 39.72 feet, which exceeded the record set 100 years earlier, and the peak flow was 27,700 cubic feet per second.

High flows continued to move downstream in the Red River of the North. On April 18, 1997, the peak stage of the Red River of the North at Grand Forks (streamgage 05082500, table 35) was 52.04 feet, which is 1.84 feet higher than the record set in 1897, and the peak flow was 137,000 cubic feet per second. The peak flow was unusual because it resulted from the convergence of flows from the Red Lake River in Minnesota, flows from the main channel, and breakout flows from the Red River of the North that were conveyed by old Red River of the North oxbows. Breakout flows occurred upstream from Grand Forks when plugs in the upstream end of the oxbows either were overtopped or washed away, which caused a flow of about 25,000 cubic feet per second to arrive at the confluence of the Red Lake River and the Red River of the North at Grand Forks. The flow of 25,000 cubic feet per second coincided with the peak flow of the two rivers. To compound problems in Grand Forks, a fire on April 19, 1997, demolished several buildings in the flooded city. The flooding made it extremely difficult for firefighters to reach the fires and put them out. Except for emergency personnel, Grand Forks and its sister city, East Grand Forks, Minnesota, were completely evacuated at this time.

On April 24, 1997, the peak stage at the Red River of the North at Drayton (streamgage 05092000, table 35) was 45.55 feet, which is 1.89 feet higher than the record set in 1979, and the peak flow was 124,000 cubic feet per second. At the Pembina River at Neche (streamgage 05100000, table 35), the peak stage was 24.51 feet, which is 0.87 foot higher than the record set in 1979, and the flow was 12,800 cubic feet per second. Six days later, the peak flow was 15,100 cubic feet per second, and the stage was 24.20 feet. On April 27, 1997, USGS personnel measured 141,000 cubic feet per second in the Red River of the North at Pembina (streamgage 05102490, table 35), which is located about 2 miles upstream from the international boundary with Canada. The previous maximum discharge of this century at the Canadian streamgage, Red River at Emerson, Manitoba (streamgage 05102500), located about 1 mile downstream from the border was 95,500 cubic feet per second on May 13, 1950.

Devils Lake Basin is a 3,810-square-mile closed subbasin within the Red River of the North Basin. Devils Lake discharges no water until the lake level reaches 1,459 feet above NAVD 88, the lowest natural outlet elevation. Since 1993, the lake level has risen rapidly in response to above-normal precipitation and runoff. The rising water has inundated homes, businesses, and agricultural lands and has caused roads to be closed or raised in elevation. On April 16, 1997, Devils Lake reached 1,438.4 feet above NAVD 88, equaling the previous record set in 1867. Because of the excessive runoff during the spring of 1997, the lake level continued rising to a maximum daily elevation of 1,442.97 feet above NAVD 88 on July 26, 1997, the highest level in at least 130 years (Wiche, 1998). In 1997, record peak stages or flows occurred at several streamgages within the Devils Lake Basin (table 35).

Flooding also occurred in the Missouri River Basin during 1997. Heavy snowpacks in North Dakota, Montana, and South Dakota caused high flows throughout the basin. Flow in the Missouri River main stem is controlled by six dams. Garrison Dam, located in central North Dakota about 75 river miles north of Bismarck, was completed in 1953. On July 13, 1997, the peak stage of the Missouri River at Bismarck, North Dakota (streamgage 06342500, table 35), was 14.00 feet, which is 0.58 foot less than the post-Garrison Dam record set on December 18, 1979. The peak flow of 59,500 cubic feet per second on July 25, 1997, was maintained for several weeks by U.S. Army Corps of Engineer personnel to accommodate the high water moving through the system. Although high flow on the Missouri River main stem caused little damage in North Dakota, the high flows on tributaries to the Missouri River, such as the Knife, Heart, and James Rivers, caused flooding in several communities in North Dakota. New records for peak stage and peak flow occurred at several streamgages in the upper Missouri River Basin during the spring of 1997 (table 35).

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Wiche, G.J., 1998, Lake levels, streamflow, and surface-water quality in the Devils Lake area, North Dakota, through 1997: U.S. Geological Survey Fact Sheet 033–98, 4 p.

Table 35. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Dakota.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 46)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05051500	Red River of the North at Wahpeton, ND	4,010	1897, 1942–98	1997 1997	19.25 19.42	12,800 --	4/15/97	19.25	12,800	Y	100
05051522	Red River of the North at Hickson, ND	4,300	1976–98	1997 1997	36.85 37.60	13,300 --	4/14/97	36.85	13,300	Y	50–150
05051600	Wild Rice River near Rutland, ND	546	1960–98	1997	10.11	2,700	4/3/97 6/29/98	10.11 8.40	2,700 1,590	N N	100 25
05053000	Wild Rice River near Abercrombie, ND	2,080	1897, 1933–98	1969 1897	24.58 27.50	9,540 --	4/16/97	25.40	9,470	Y	25
05054000	Red River of the North at Fargo, ND	6,800	1882, 1897, 1902–98	1997 1997	39.57 39.72	28,000 27,700	4/17/97 4/18/97	39.57 39.72	28,000 27,700	Y Y	50–100 50–100
05054500	Sheyenne River above Harvey, ND	424	1956–98	1979 1996	9.45 10.30	1,000 570	4/12/96	10.30	570	N	10–25
05056100	Mauvais Coulee near Cando, ND	387	1954, 1956–90, 1992–98	1997	11.68	3,000	4/21/97	11.68	3,000	N	10–50
05056200	Edmore Coulee near Edmore, ND	382	1956–98	1997	87.95	1,830	4/24/97	87.95	1,830	N	10–50
05056215	Edmore Coulee tributary near Webster, ND	148	1988–89, 1991–98	1997 1993	74.41 75.06	1,390 1,330	4/25/97 8/2/93	74.41 75.06	1,390 1,330	N N	-- --
05056239	Starkweather Coulee near Webster, ND	310	1980–98	1997 1987	7.75 8.50	782 570	4/27/97	7.75	782	N	25–100
05056390	Little Coulee near Brinsmade, ND	350	1976–89, 1992–97	1997	11.47	439	4/26/97	11.47	439	N	--
05056400	Big Coulee near Churchs Ferry, ND	2,510	1950–89, 1992–97	1997	9.26	2,280	4/23/95 5/4/97	7.62 9.26	1,450 2,280	Y Y	-- 25–100
05057000	Sheyenne River near Cooperstown, ND	6,470	1945–98	1950 1996	18.69 19.13	7,830 6,760	4/18/96	19.13	6,760	N	25
05057200	Baldhill Creek near Dazey, ND	691	1950, 1956–98	1979	17.78	9,000	4/3/97	11.56	2,780	N	10–25

Table 35. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 46)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05058000	Sheyenne River below Baldhill Dam, ND	7,470	1948, 1950–98	1996	36.46	5,460	4/20/96	36.46	5,460	Y	10–25
05058500	Sheyenne River at Valley City, ND	7,810	1882, 1897, 1919, 1938–75, 1980–98	1996 1882	18.78 20.00	5,250 --	4/21/96 4/19/97	18.78 18.01	5,250 4,810	Y Y	25 10–25
05058700	Sheyenne River at Lisbon, ND	8,190	1950, 1957–98	1997 1975	19.29	5,670	4/23/97 4/13/96	19.29 19.20	5,670 5,060	Y Y	10–25 10–25
05059000	Sheyenne River near Kindred, ND	8,800	1947, 1950–98	1997 1997	21.38 22.33	5,970 3,600	4/30/96 4/27/97	20.65 21.38	5,100 5,970	Y Y	10–25 25–50
05059500	Sheyenne River at West Fargo, ND	8,870	1903–06, 1919, 1930–94, 1996–98	1997 1997	22.68 22.90	4,810 --	5/2/96 4/19/97	-- 22.68	4,240 4,810	Y Y	-- --
05064500	Red River of the North at Halstad, MN	21,800	1936–37, 1942–98	1997	40.74	71,500	4/19/97	40.74	71,500	Y	100–200
05066500	Goose River at Hillsboro, ND	1,203	1882, 1897, 1904, 1916, 1931–98	1979	16.76	14,800	4/6/97	15.62	8,520	N	10–25
05067500	Marsh River near Shelly, MN	151	1944–98	1979 1997	23.36 25.45	4,880 4,300	4/18/97	25.45	4,300	N	10–25
05082500	Red River of the North at Grand Forks, ND	30,100	1882–1998	1997 1997	52.04 54.35	137,000 114,000	4/21/96 4/18/97 4/22/97	45.93 52.04 54.35	58,400 137,000 114,000	Y Y Y	10–25 100–200
05092000	Red River of the North at Drayton, ND	34,800	1897, 1936–37, 1941–98	1997	45.55	124,000	4/24/97	45.55	124,000	Y	100–200
05100000	Pembina River at Neche, ND	3,410	1904–08, 1910–15, 1919–98	1997 1997	24.20 24.51	15,100 12,800	4/23/95 4/27/97	23.30 24.20	8,500 15,100	N N	10–25 50–100

Table 35. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 46)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05102490	Red River of the North at Pembina, ND	36,400	1985–98	1997	794.39	141,000	4/26/97 4/26/96	794.39 790.95	141,000 66,400	Y Y	100–200 10–25
05102500	Red River of the North at Emerson, Manitoba	40,200	1913–98	1997	92.41	133,000	4/26/97 4/26/96	92.41 89.10	133,000 66,700	Y Y	100–200 10–25
06339100	Knife River at Manning, ND	205	1968–98	1997	17.05	3,600	3/21/97	17.05	3,600	N	10–25
06341410	Turtle Creek above Washburn, ND	350	1987–98	1996	7.28	954	3/12/96	7.28	954	N	--
06342500	Missouri River at Bismarck, ND	186,400	1929–98	1952	27.90	500,000	7/13/97 7/25/97	14.00 13.98	59,100 59,500	Y Y	50–100 50–100
06345500	Heart River near Richardton, ND	1,240	1905–21, 1938, 1943–98	1950 1912	28.05 38.50	23,400 4,500	3/23/97	--	13,000	Y	25–50
06345780	Heart River above Lake Tschida near Glen Ullin, ND	1,530	1988–98	1997 1997	-- 26.74	11,500 4,540	3/22/97	--	11,500	Y	--
06348300	Heart River at Stark Bridge near Judson, ND	2,930	1989–98	1997	21.90	18,000	3/23/97	21.90	18,000	Y	--
06349215	Long Lake Creek above Long Lake near Moffit, ND	280	1989–98	1997	12.99	3,200	3/29/97	12.99	3,200	N	--
06353000	Cedar Creek near Raleigh, ND	1,750	1939, 1962–98	1997	17.05	14,600	3/24/97	17.05	14,600	N	50–100
06354000	Cannonball River at Breien, ND	4,100	1906–08, 1912–18, 1922, 1924, 1928–98	1950	22.30	94,800	3/25/97	20.82	31,100	N	10–25
06468170	James River near Grace City, ND	1,060	1969–98	1997	14.77	4,000	4/3/97	14.77	4,000	N	10–20
06468250	James River above Arrowwood Lake near Kensal, ND	1,200	1986–98	1997	13.00	4,700	4/5/97	13.00	4,700	N	--
06469400	Pipestem Creek near Pingree, ND	700	1974–98	1997 1995	11.37 11.70	3,400 3,180	4/19/97	11.37	3,400	N	10–25
06470500	James River at Lamoure, ND	4,390	1950–98	1969	16.17	6,800	4/1/97	16.09	6,500	Y	15–45

Table 35. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in North Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 46)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06470800	Bear Creek near Oakes, ND	365	1977–98	1998	11.75	1,730	6/28/98	11.75	1,730	N	10–25
06470875	James River at Dakota Lake Dam near Ludden, ND	5,480	1982–98	1997	17.86	7,500	4/6/97	17.86	7,500	Y	25–100
06471200	Maple River at North Dakota-South Dakota State line, ND	716	1957–98	1969	15.22	5,930	3/29/97	16.19	5,300	N	20–45
				1997	16.19	5,300					

[1]Regulated during flood: N, no; Y, yes.

Ohio

Two to 3 inches of rain (National Oceanic and Atmospheric Administration, 1994a) on top of saturated ground produced widespread flooding of streams, streets, basements, and poor drainage areas in northeastern Ohio during the middle of April 1994. Damage was near $25 million, and one death occurred (National Oceanic and Atmospheric Administration, 1994b).

Nearly stationary thunderstorms in central and northern Ohio resulted in rainfall totals of 4 to 11 inches during August 7–9, 1995 (National Oceanic and Atmospheric Administration, 1995a). Damage from the August flooding was more than $13 million (National Oceanic and Atmospheric Administration, 1995b).

As a result of rain and melted snow in Ohio, Pennsylvania, and West Virginia, the Ohio River (fig. 47) crested 3 to 6 feet above flood stage from Marietta to Ironton during January 19–30, 1996. Damage from this flood was more than $10 million, but no lives were lost (National Oceanic and Atmospheric Administration, 1996a). The Ohio River at Cincinnati (National Oceanic and Atmospheric Administration, 1996b) eventually crested 5.3 feet above flood stage at a stage of 57.3 feet during the evening of January 24. This was the highest crest in Cincinnati since March 1979.

Showers and thunderstorms dumped 4 to 12 inches of rain across southern Ohio during March 1–3, 1997 (National Oceanic and Atmospheric Administration 1997a). Five people were killed by the flooding in Ohio from this storm, and there was more than $200 million in damage (National Oceanic and Atmospheric Administration, 1997b). Sixteen counties were declared Federal disaster areas. The Ohio River rose rapidly reaching a crest stage of 59.8 feet (9.8 feet above flood stage) at Portsmouth (National Oceanic and Atmospheric Administration, 1997b) on March 4. Farther downstream at Meldahl Dam (National Oceanic and Atmospheric Administration, 1997b), the river crested at 61.3 feet (10.3 feet above flood stage) on March 6. In Cincinnati, the Ohio River crested at 64.7 feet on March 5 (National Oceanic and Atmospheric Administration, 1997b). Many towns were flooded from Portsmouth to Cincinnati, and thousands of people were evacuated from their homes for several days.

Severe thunderstorms bringing damaging winds and torrential rains affected much of east-central Ohio, western Pennsylvania, and northern West Virginia during June 26–30, 1998. These storms caused eight deaths and several injuries, along with more than $98 million in damage across Ohio. Damage to crops was an additional $70 million (National Oceanic and Atmospheric Administration, 1998b). Travel across this area was nearly impossible, as many roads were underwater. Four streamgages recorded the highest discharge of record during this June flood, and two more peaks of record occurred during local floods from intense thunderstorms in August 1998 (table 36). The August 1998 floods caused more than $3 million in damage (National Oceanic and Atmospheric Administration, 1998b).

References

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National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

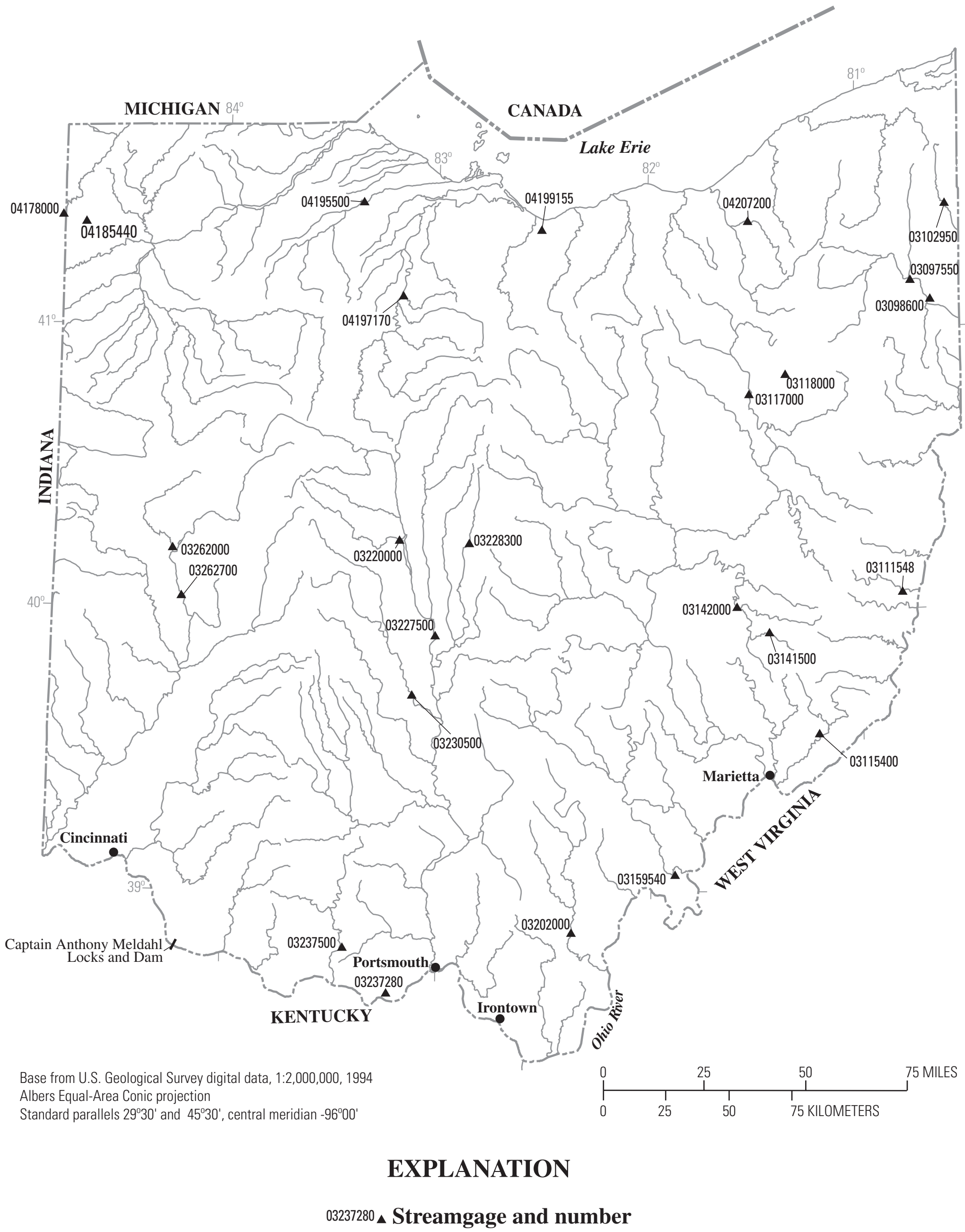


Figure 47. Location of streamgages with significant floods during 1994–98 water years for Ohio.

Table 36. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Ohio.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 47)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03097550	Mahoning River at Ohio Edison Power Plant at Niles, OH	854	1988–98	1994	13.35	9,760	4/13/94	13.35	9,760	Y	--
03098600	Mahoning River below West Avenue at Youngstown, OH	978	1988–98	1994	15.44	11,900	4/13/94	15.44	11,900	Y	--
03102950	Pymatuning Creek at Kinsman, OH	96.7	1966–96	1986	12.40	2,740	1/19/96	12.28	2,560	N	10–25
03111548	Wheeling Creek below Blaine, OH	97.7	1983–87, 1989–98	1998	8.21	5,470	6/28/98	8.21	5,470	N	10
03115400	Little Muskingum River at Bloomfield, OH	210	1959–81, 1996–98	1998	30.78	32,300	6/28/98	30.78	32,300	N	>100
03117000	Tuscarawas River at Massillon, OH	518	1939–98	1969	16.43	10,700	4/13/94	12.77	6,490	Y	--
03118000	Main Branch Nimishillen Creek at Canton, OH	43.1	1942–98	1959 1994	6.50 6.62	2,470 1,810	4/13/94	6.62	1,810	N	25–50
03141500	Seneca Fork below Senecaville Dam near Senecaville, OH	118	1939–91, 1995–96, 1998	1998 1949	9.51 10.35	977 718	6/28/98	9.51	977	Y	--
03142000	Wills Creek at Cambridge, OH	406	1927–28, 1938–98	1998	26.91	11,400	6/29/98	26.91	11,400	Y	50–100
03159540	Shade River near Ter, OH	156	1966–98	1997	31.44	15,600	3/2/97	31.44	15,600	N	>100
03202000	Raccoon Creek at Adamsville, OH	585	1916–35, 1937, 1939–85, 1992–98	1968 1997	28.69 29.11	20,000 16,500	3/3/97	29.11	16,500	N	25–50
03220000	Mill Creek near Bellepoint, OH	178	1913, 1943–98	1997 1913	14.45 18.00	21,800 --	6/2/97	14.45	21,800	N	>100

Table 36. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Ohio.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 47)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03227500	Scioto River at Columbus, OH	1,629	1913, 1921–98	1959	27.22	68,200	6/2/97	24.78	43,800	Y	--
03228300	Big Walnut Creek at Sunbury, OH	101	1989–98	1997 1991	11.20 11.86	6,700 5,690	6/1/97	11.20	6,700	N	--
03230500	Big Darby Creek at Darbyville, OH	534	1922–36, 1938–98	1959	17.94	49,000	6/3/97	15.62	23,700	N	25–50
03237280	Upper Twin Creek at McGaw, OH	12.2	1960, 1964–98	1960	11.62	7,320	3/2/97	10.01	4,430	N	50–100
03237500	Ohio Brush Creek near West Union, OH	387	1927–35, 1941–98	1997	31.15	77,700	3/2/97	31.15	77,700	N	>100
03262000	Loramie Creek at Lockington, OH	257	1913, 1916–98	1913	91.60	25,600	8/8/95	84.59	6,130	Y	--
03262700	Great Miami River at Troy, OH	926	1958, 1963–88, 1991–98	1995 1958	16.02 16.40	21,700 21,000	8/8/95	16.02	21,700	Y	--
04178000	Saint Joseph River near Newville, IN	610	1947–96, 1998	1996	17.74	10,400	5/18/96	17.74	10,400	N	--
04185440	Unnamed tributary to Lost Creek near Farmers, OH	4.23	1986–98	1998	7.59	1,770	8/25/98	7.59	1,770	N	--
04195500	Portage River at Woodville, OH	428	1913, 1929–35, 1940–98	1913	17.00	17,000	8/27/98	13.98	11,500	N	25
04197170	Rock Creek at Tiffin, OH	34.6	1983–86, 1988–98	1998	8.96	2,640	8/26/98	8.96	2,640	N	--
04199155	Old Womans Creek at Berlin Road near Huron, OH	22.1	1988–94, 1996–98	1997	11.81	1,940	2/27/97	11.81	1,940	N	--
04207200	Tinkers Creek at Bedford, OH	83.9	1963–98	1969	10.10	7,220	8/13/94	9.81	6,750	N	>100

[1]Regulated during flood: N, no; Y, yes.

Oklahoma

High water along the Neosho River in northeastern Oklahoma forced the evacuation of about 50 homes in Miami (fig. 48). Most areas of Oklahoma received locally intense rain and large hail from thunderstorms on April 1995 (National Oceanic and Atmospheric Administration, 1995a). Severe thunderstorms with a 3-day rainfall of about 8 inches in many areas moved across Oklahoma intermittently during both May and June 1995 (National Oceanic and Atmospheric Administration, 1995a). Runoff from the intense rains caused flash floods on small streams and larger regional floods in the larger basins. Flood-prone areas of Guthrie, Kingfisher, and Miami were inundated. On June 7, 1995, the Red River near Terral (streamgage 07315500, table 37) reached its highest discharge since records began in 1935. Sixteen of the 23 significant floods for Oklahoma during the 1994 through 1998 water years occurred during May and June 1995. Damage was more than $5 million (National Oceanic and Atmospheric Administration, 1995b).

Widespread excessive rainfall caused flooding in September 1996 due to two storm systems—the remnants of the Pacific Tropical Storm Fausto during the middle of the month and a frontal system that produced localized flash flooding and caused five deaths at the end of the month. Flooding associated with Fausto was most notable in west-central Oklahoma in the Clinton area with more than 6 inches of rain (National Oceanic and Atmospheric Administration, 1996a). Severe flash flooding occurred in northeastern Oklahoma on September 25–26, 1996, with more than 8 inches of rain in many areas (National Oceanic and Atmospheric Administration, 1996a). One person drowned in Pryor; a mother and three children died near Tahlequah when their car was swept off a road (National Oceanic and Atmospheric Administration, 1996b).

Slow-moving thunderstorms moved repeatedly over parts of northern and western Oklahoma causing extensive flash flooding during September 22–23, 1997. Rainfall amounts were about 9 inches at some locations (National Oceanic and Atmospheric Administration, 1997a), causing severe localized flooding in Cherokee, Tipton, Hobart, and west of Clinton. Flooding also occurred along the Salt Fork of the Arkansas River near Tonkawa and the Chikaskia River near Blackwell (National Oceanic and Atmospheric Administration, 1997b).

References

National Oceanic and Atmospheric Administration (NOAA), 1995a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1995b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

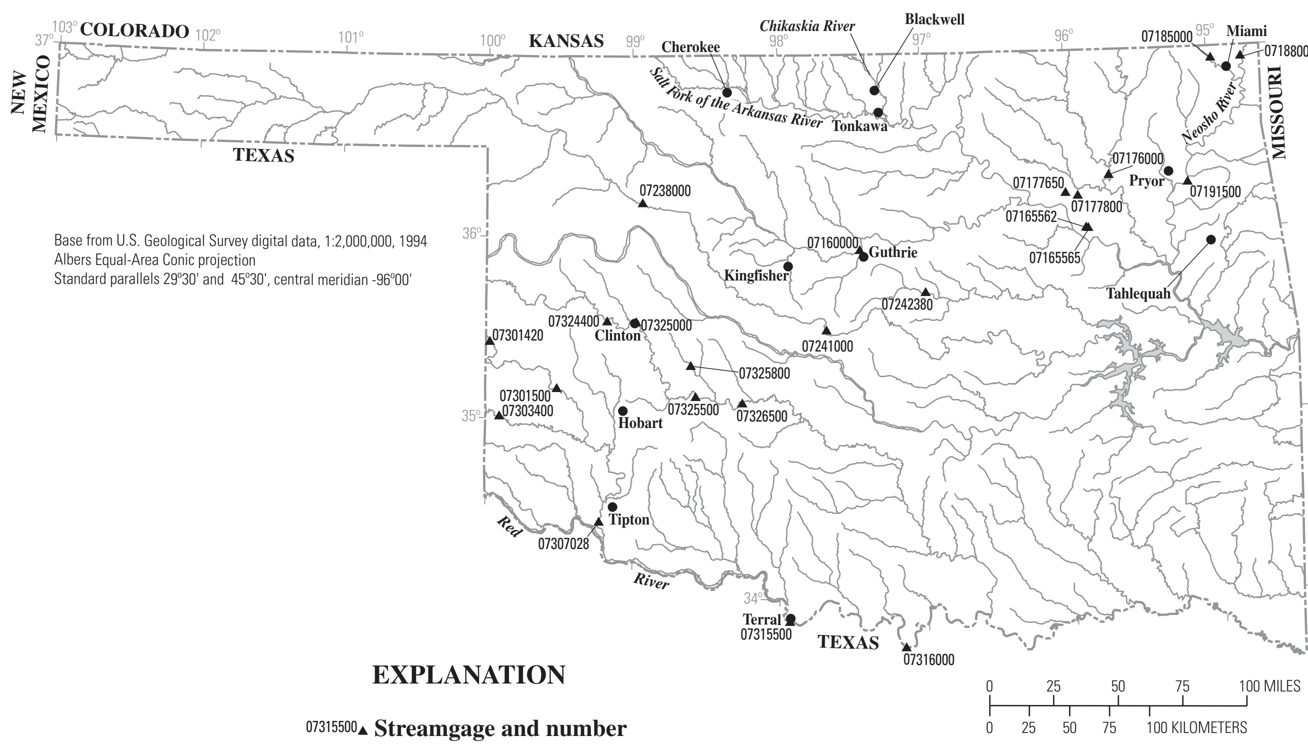


Figure 48. Location of streamgages with significant floods during 1994–98 water years for Oklahoma.

Table 37. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oklahoma.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 48)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07160000	Cimarron River near Guthrie, OK	16,892	1935, 1937–76, 1983–98	1957 1987	18.58 20.71	158,000 116,000	6/10/95	17.18	93,300	N	15–20
07165562	Haikey Creek at 101st Street South at Tulsa, OK	17.8	1988–98	1995	17.42	6,470	4/10/95	17.42	6,470	N	10
07165565	Little Haikey Creek at 101st Street South at Tulsa, OK	5.45	1987–98	1995	16.82	1,930	6/29/95	16.82	1,930	N	10
07176000	Verdigris River near Claremore, OK	6,534	1935–98	1943	55.05	182,000	7/7/95	29.76	40,800	Y	10
07177650	Flat Rock Creek at Cincinnati Avenue at Tulsa, OK	8.20	1987–98	1995	12.82	4,220	6/9/95	12.82	4,220	N	10–25
07177800	Coal Creek at Tulsa, OK	7.53	1989–98	1995	14.18	5,190	6/23/95	14.18	5,190	N	10–25
07185000	Neosho River near Commerce, OK	5,876	1904, 1927, 1935, 1938, 1939–98	1951	34.03	267,000	4/13/94	25.67	106,000	Y	50
07188000	Spring River near Quapaw, OK	2,510	1935, 1939–98	1993	46.60	230,000	4/13/94	34.38	107,000	N	15–20
07191500	Neosho River near Chouteau, OK	11,534	1927, 1937–58, 1961, 1963–98	1943	45.00	400,000	6/11/95	36.29	164,000	Y	30–35
07238000	North Canadian River near Seiling, OK	12,261	1924, 1946–98	1951 1924	15.61 16.40	33,000 --	9/23/97	14.86	7,200	Y	25–35

Table 37. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oklahoma.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 48)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07241000	North Canadian River below Lake Overholser near Oklahoma City, OK	13,222	1921, 1923–24, 1952–68, 1969–72, 1973–87, 1988–98	1924	40.90	135,000	6/11/95	25.05	19,500	Y	15–20
07242380	Deep Fork near Warwick, OK	532	1983–98	1983 1995	22.05 21.28	28,700 34,600	6/9/95	21.28	34,600	Y	25
07301420	Sweetwater Creek near Sweetwater, OK	424	1986–98	1995	15.89	1,940	6/3/95	15.89	1,940	N	10–25
07301500	North Fork Red River near Carter, OK	2,337	1904–07, 1928, 1930–32, 1935, 1938–98	1959 1995	13.42 15.08	53,400 34,800	6/4/95	15.08	34,800	N	30-35
07303400	Elm Fork of North Fork Red River near Carl, OK	416	1959–79, 1995–98	1995	18.80	62,300	6/3/95	18.80	62,300	N	>100
07307028	North Fork Red River near Tipton, OK	4,691	1985–98	1993	19.18	51,200	6/6/95	18.41	40,700	Y	25–50
07315500	Red River near Terral, OK	28,723	1935, 1938–80, 1981–83, 1986–91, 1993–98	1995 1987	30.56 32.65	236,000 225,000	6/7/95	30.56	236,000	Y	>100
07316000	Red River near Gainesville, TX	30,782	1935–98	1987	40.08	265,000	6/13/95	36.63	169,000	Y	10–15
07324400	Washita River near Foss, OK	1,551	1956–58, 1961–87, 1989–98	1958 1959	16.90 23.40	3,660 --	9/15/96	21.24	2,990	Y	75–85
07325000	Washita River near Clinton, OK	1,977	1934–98	1934	33.90	90,000	9/15/96	26.24	10,800	Y	30–35

Table 37. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oklahoma.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 48)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
07325500	Washita River at Carnegie, OK	3,129	1913, 1921, 1923–24, 1934–36, 1937–98	1949 1995	26.21 31.50	50,000 40,200	6/5/95	31.50	40,200	Y	40–45
07325800	Cobb Creek near Eakly, OK	132	1968–98	1995 1986	22.05 24.38	12,000 10,000	6/4/95	22.05	12,000	N	25
07326500	Washita River at Anadarko, OK	3,656	1902–08, 1924–25, 1935–37, 1993–98	1995	25.37	52,800	6/6/95	25.37	52,800	Y	50–55

[1]Regulated during flood: N, no; Y, yes.

Oregon

A subtropical, moisture-laden Pacific front stalled over northwestern Oregon on November 10, 1995. Storm total rainfall ranged from about 3 inches in the Willamette River Valley to 4 inches in the Cascade Range and 5 inches in the Coast Range. The most serious damages occurred in the Portland area and along the Zig Zag River in the foothills of Mt. Hood (fig. 49) (National Oceanic and Atmospheric Administration, 1995b).

Runoff from excessive rains and melting mountain snow caused major floods on many northern and eastern Oregon rivers beginning on February 6, 1996. The first rivers reached flood stage on the morning of February 6 when the most intense rain was still falling. Streamflow measured at 27 streamgages set all-time high river discharges, and 4 more set stage records during February 1996 (table 38). Many smaller ungaged streams also left their banks during this period. Statewide damage was estimated at over $400 million, with an estimated 5,000 homes destroyed, and seven people lost their lives as a direct result of flooding (National Oceanic and Atmospheric Administration, 1996b). Most rivers had receded to below flood stage by February 14; however, the lower Willamette River fluctuated around flood stage, and the downstream reaches of the Columbia River remained above flood stage until the end of February.

Moist southwest flow aloft produced moderate to excessive rain and strong winds over southwestern and northern Oregon during November 17–21, 1996. Storm total rainfall ranged from 8 to 12 inches on the coast with local amounts near 20 inches, while 3 to 7 inches of rain fell inland (National Oceanic and Atmospheric Administration, 1996a). Flooding was extensive in southwestern Oregon. The rainfall amount and rate produced numerous mudslides into homes and across highways. Many highways were closed due to slides, and the northbound lane of I–5 near Roseburg collapsed. Major rivers, such as the downstream reaches of the Willamette River, remained above flood stage until November 23. Damage estimates were nearly $45 million, and there were five deaths from drowning (National Oceanic and Atmospheric Administration, 1996b).

A series of storm systems dumped excessive amounts of rain over southern Oregon during December 7–10, 1996. A 24-hour rainfall total of 4 to 8 inches fell along the coast and 2 to 6 inches inland (National Oceanic and Atmospheric Administration, 1996a). Most major rivers and many of the small streams in southwest Oregon flooded. Mudslides and flooding closed many roads and highways. Damage was over $8 million (National Oceanic and Atmospheric Administration, 1996b).

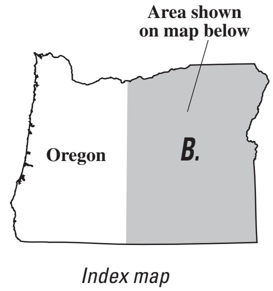
A warm southwest flow pushed temperatures above 60 ^{o}F on New Years Eve Day, 1997, with the freezing level lifting to elevations above 10,000 feet. Melting snow and copious rain drove rivers and streams well above flood stage across southern Oregon from New Years Day to January 5, with widespread flooding through January 3. The total basin rainfall for the New Years Day storm averaged 2 to 4 inches, with rainfall amounts in excess of 8 inches (National Oceanic and Atmospheric Administration, 1997a). Six streamgages recorded their peak of record during this flood (table 38). Damage was nearly $89 million (National Oceanic and Atmospheric Administration, 1997b).

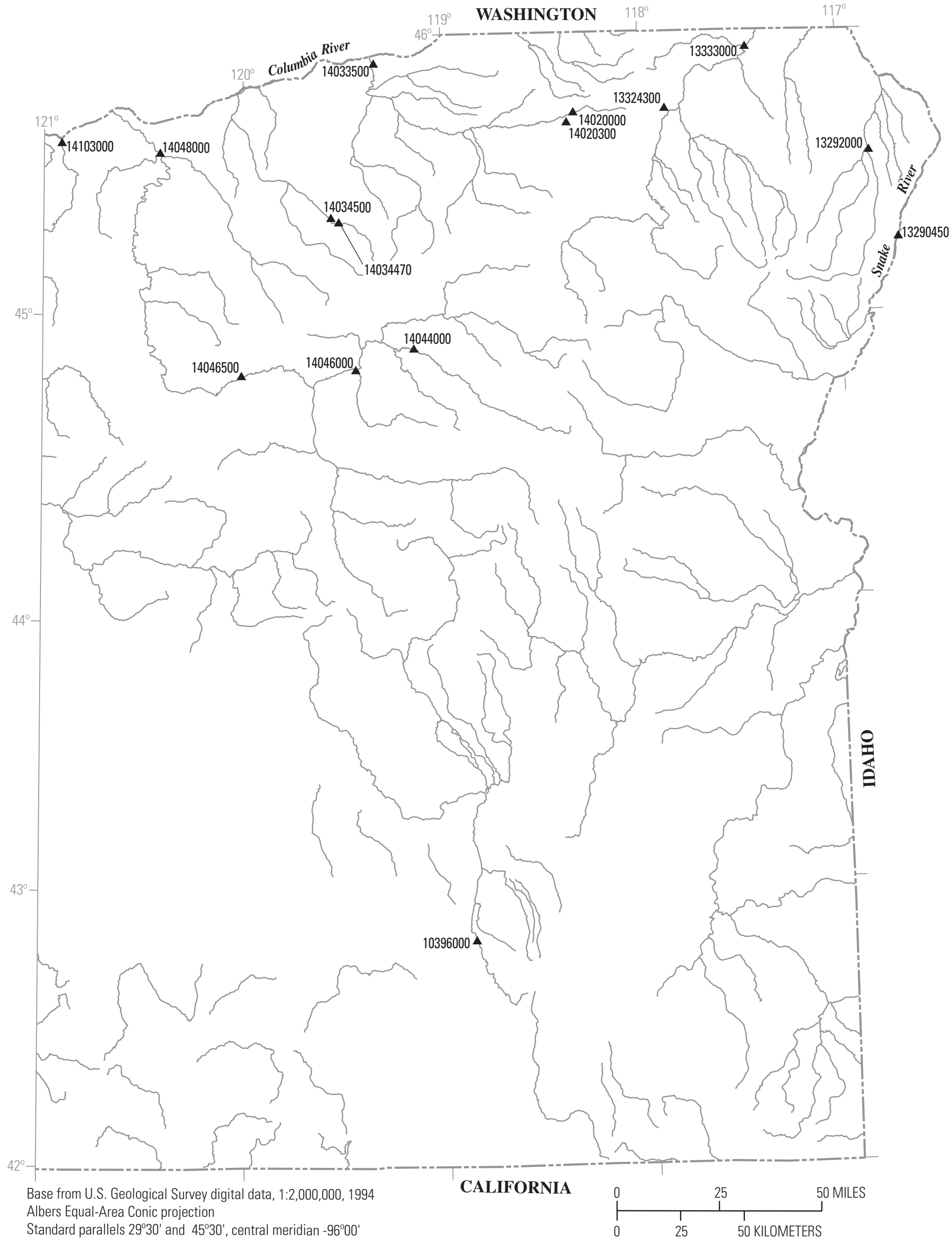
References

National Oceanic and Atmospheric Administration (NOAA), 1995a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1995b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

Figure 49. *(A)* Location of streamgages with significant floods during 1994–98 water years for Oregon.





EXPLANATION

10396000▲ **Streamgage and number**

Figure 49. *(B)* Location of streamgages with significant floods during 1994–98 water years for Oregon.—Continued

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 49)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
10396000	Donner Und Blitzen River near Frenchglen, OR	200	1911–16, 1918–21, 1930, 1938–98	1978	7.15	4,270	5/14/98	6.32	3,110	N	15
11501000	Sprague River near Chiloquin, OR	1,580	1921–98	1965	10.37	14,900	1/5/97	9.05	10,800	N	40–50
11502500	Williamson River below Sprague River near Chiloquin, OR	3,000	1917–98	1997 1965	10.27 10.56	17,100 16,100	1/5/97	10.27	17,100	N	75–100
11509500	Klamath River at Keno, OR	3,920	1905–13, 1930–98	1986 1907	12.82 14.40	10,300 5,220	2/22/96 1/3/97	12.41 12.60	9,520 9,870	Y Y	-- --
11510700	Klamath River below John C. Boyle Power Plant near Keno, OR	4,080	1959–98	1996	9.50	11,600	2/21/96 1/3/97	9.50 9.44	11,600 11,400	Y Y	-- --
13290450	Snake River at Hells Canyon Dam, Idaho-Oregon State line, OR	73,300	1966–98	1997	86.17	103,000	1/2/97	86.17	103,000	Y	--
13292000	Imnaha River at Imnaha, OR	622	1929–98	1997	11.44	20,200	1/1/97	11.44	20,200	N	>100
13324300	Lookingglass Creek near Looking Glass, OR	78.3	1983–98	1996	7.41	2,120	2/9/96	7.41	2,120	N	>25
13333000	Grande Ronde River at Troy, OR	3,275	1945–98	1996	13.76	51,800	2/9/96 1/1/97	13.76 12.65	51,800 36,700	N N	>100 25
14020000	Umatilla River above Meacham Creek near Gibbon, OR	131	1933–98	1996 1965	9.40 9.50	6,220 4,910	11/28/95 1/1/97	9.40 8.76	6,220 5,230	N N	50 25
14020300	Meacham Creek at Gibbon, OR	176	1976–98	1996	7.67	5,930	11/28/95	7.67	5,930	N	20
14033500	Umatilla River near Umatilla, OR	2,290	1904–98	1965 1906	10.75 11.00	19,800 19,600	2/10/96	8.49	16,300	Y	30
14034470	Willow Creek above Willow Creek Lake near Heppner, OR	67.6	1983–98	1997	9.60	544	2/1/97	9.60	544	N	10–25

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 49)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
14034500	Willow Creek at Heppner, OR	96.8	1949, 1952–90, 1992–98	1949 1957	-- 6.15	1,700 812	5/11/95	5.22	333	Y	--
14044000	Middle Fork John Day River at Ritter, OR	515	1930–98	1965	8.39	4,730	1/1/97	8.24	4,540	N	50
14046000	North Fork John Day River at Monument, OR	2,520	1925–98	1965	18.45	33,400	2/9/96 1/1/97	14.63 17.56	21,700 30,400	N N	15 50
14046500	John Day River at Service Creek, OR	5,090	1926, 1930–98	1965	17.85	40,200	1/1/97	16.49	35,200	N	35
14048000	John Day River at McDonald Ferry, OR	7,580	1905–08, 1910–96, 1998	1965	13.59	42,800	2/10/96	13.16	31,300	N	25
14076500	Deschutes River near Culver, OR	2,705	1953–98	1965	10.00	6,680	1/31/97	7.89	3,910	Y	25
14087400	Crooked River below Opal Springs near Culver, OR	4,300	1962–98	1965	9.36	6,660	1/2/97	9.08	6,350	Y	--
14090350	Jefferson Creek near Camp Sherman, OR	27.8	1984–98	1996	3.94	730	2/7/96	3.94	730	N	25–50
14090400	Whitewater River near Camp Sherman, OR	22.8	1983–98	1996 1998	-- 7.37	2,320 683	2/7/96	--	2,320	N	50–100
14091500	Metolius River near Grandview, OR	316	1913, 1922–98	1996	7.38	8,430	2/7/96	7.38	8,430	N	>100
14092500	Deschutes River near Madras, OR	7,820	1924–98	1983	7.70	22,500	2/8/96	7.08	19,100	Y	--
14092750	Shitike Creek at Peters Pasture near Warm Springs, OR	22.9	1983–98	1996	6.66	2,430	2/7/96	6.66	2,430	N	25–50
14092885	Shitike Creek below Wolford Canyon near Warm Springs, OR	75.8	1975–96	1996	7.93	3,600	2/7/96	7.93	3,600	N	50
14095500	Warm Springs River near Simnasho, OR	107	1984–98	1996	6.98	4,670	2/7/96	6.98	4,670	N	50–100

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 49)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
14096300	Mill Creek near Badger Butte near Warm Springs, OR	26.8	1984–98	1996	8.42	1,300	2/7/96	8.42	1,300	N	25–50
14096850	Beaver Creek below Quartz Creek near Simnasho, OR	145	1984–98	1996	10.57	5,760	2/7/96	10.57	5,760	N	20–30
14097100	Warm Springs River near Kah-neeta Hot Springs, OR	526	1973–98	1996	14.32	22,600	2/7/96	14.32	22,600	N	50–100
14103000	Deschutes River at Moody near Biggs, OR	10,500	1898, 1907–98	1996	12.08	70,300	2/8/96	12.08	70,300	Y	>100
14120000	Hood River at Tucker Bridge near Hood River, OR	279	1898–99, 1914, 1916–17, 1965–75, 1977–98	1965	20.60	33,200	2/7/96	17.11	23,300	N	<25
14137000	Sandy River near Marmot, OR	263	1912–98	1965	17.05	61,400	2/7/96	20.40	48,100	N	75–100
14138800	Blazed Alder Creek near Rhododendron, OR	8.17	1964–98	1965	8.25	2,610	2/7/96	7.05	2,020	N	25
14138850	Bull Run River near Multnomah Falls, OR	47.9	1967–98	1996	13.60	9,140	2/6/96	13.60	9,140	N	30–40
14139700	Cedar Creek near Brightwood, OR	7.93	1965–98	1965	7.20	1,990	2/7/96	5.40	1,720	N	15
14139800	South Fork Bull Run River near Bull Run, OR	15.4	1975–98	1996	9.54	3,630	2/7/96	9.54	3,630	N	50
14140000	Bull Run River near Bull Run, OR	107	1908–98	1965 1996	-- 16.00	25,100 20,200	2/7/96	16.00	20,200	Y	35
14142500	Sandy River below Bull Run River near Bull Run, OR	436	1911–14, 1930–66, 1985–98	1965 1996	22.30 22.59	84,400 68,600	2/7/96	22.59	68,600	Y	50
14145500	Middle Fork Willamette River above Salt Creek near Oakridge, OR	392	1914, 1936–98	1946 1956	12.06 12.71	34,000 33,300	1/2/97	8.38	8,610	Y	--

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 49)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
14148000	Middle Fork Willamette River below North Fork near Oakridge, OR	924	1912, 1924–98	1946	18.80	81,800	11/19/96	10.34	40,800	Y	--
14150300	Fall Creek near Lowell, OR	118	1964–98	1997	12.48	12,700	11/19/96	12.48	12,700	N	15
14151000	Fall Creek below Winberry Creek near Fall Creek, OR	186	1936–98	1957	18.80	24,700	12/27/96	8.01	4,640	Y	--
14153500	Coast Fork Willamette River below Cottage Grove Dam, OR	104	1939–98	1965	11.83	5,910	12/12/96	9.16	3,420	Y	--
14154500	Row River above Pitcher Creek near Dorena, OR	211	1936–98	1965	18.19	33,100	11/18/96	17.25	30,100	N	100
14157500	Coast Fork Willamette River near Goshen, OR	642	1906–12, 1951–98	1910	19.50	58,500	11/19/96	17.17	33,400	Y	--
14158500	McKenzie River at outlet of Clear Lake, OR	92.4	1913–15, 1948–98	1965 1913	8.15 10.69	3,300 1,130	2/7/96	7.01	2,600	Y	15–20
14158790	Smith River above Smith River Reservoir near Belknap Springs, OR	16.2	1961–98	1965	11.90	5,160	2/7/96	9.48	2,960	N	30
14159500	South Fork McKenzie River near Rainbow, OR	208	1948–98	1957 1946	8.66 9.30	17,600 24,500	2/13/96 1/6/97	5.42 5.39	6,650 6,570	Y Y	-- --
14161500	Lookout Creek near Blue River, OR	24.1	1950–55, 1964–98	1996	10.03	8,000	2/7/96	10.03	8,000	N	>100
14162500	McKenzie River near Vida, OR	930	1925–98	1946	17.70	64,400	2/7/96	10.05	30,900	Y	--
14165000	Mohawk River near Springfield, OR	177	1936–52, 1956, 1964–97	1996	23.11	13,500	2/7/96	23.11	13,500	N	30
14166500	Long Tom River near Noti, OR	89.3	1936–98	1956	20.17	6,990	2/7/96	19.98	6,780	N	25
14178000	North Santiam River below Boulder Creek near Detroit, OR	216	1907–09, 1929–98	1965	13.76	26,700	2/7/96	11.78	24,000	N	60–80

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.—Continued

[mi2, square miles; ft, feet above an arbitrary datum; ft3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 49)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
14182500	Little North Santiam River near Mehama, OR	112	1932–98	1965	16.73	36,000	2/7/96	15.29	33,900	N	60–80
14183000	North Santiam River at Mehama, OR	655	1906–07, 1911–14, 1922–98	1946 1922 1923	15.37 17.50 17.50	76,600 62,900 62,900	2/7/96	13.40	53,800	Y	--
14185000	South Santiam River below Cascadia, OR	174	1936–98	1996 1965	18.11 19.68	31,700 27,600	2/7/96	18.11	31,700	N	50–70
14185900	Quartzville Creek near Cascadia, OR	99.2	1964–98	1965 1996	-- 20.54	36,500 23,700	2/7/96	20.54	23,700	N	25
14187200	South Santiam River near Foster, OR	557	1974–98	1996	18.74	28,700	2/7/96	18.74	28,700	Y	--
14187500	South Santiam River at Waterloo, OR	640	1906, 1924–98	1965	24.50	95,200	2/7/96	13.09	29,200	Y	--
14189000	Santiam River at Jefferson, OR	1,790	1908–16, 1922, 1940–98	1922 1965	22.50 24.22	202,000 197,000	2/7/96	23.25	168,000	Y	--
14190500	Luckiamute River near Suver, OR	240	1906–11, 1941–98	1965	34.52	32,900	2/8/96	33.00	24,800	N	25
14196001	Haskins Creek below reservoir near McMinnville, OR	6.90	1952–98	1996	6.01	1,050	2/8/96	6.01	1,050	Y	>50
14202000	Pudding River at Aurora, OR	479	1929–65, 1994–97	1996	30.72	43,700	2/8/96	30.72	43,700	N	50–100
14202980	Scoggins Creek below Henry Hagg Lake near Gaston, OR	38.8	1975–98	1996 1991	16.88 18.01	2,210 2,050	4/23/96	16.88	2,210	Y	--
14203500	Tualatin River near Dilley, OR	125	1940–98	1965	19.34	17,100	2/8/96	19.06	10,100	Y	--
14206900	Fanno Creek at 56th Avenue at Portland, OR	2.37	1974–78, 1991–98	1996	13.20	733	2/8/96	13.20	733	N	25–50
14207500	Tualatin River at West Linn, OR	706	1929–98	1996	18.32	26,400	2/10/96	18.32	26,400	Y	--

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 49)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
14209000	Oak Grove Fork above powerplant intake, OR	124	1910–98	1923 1997	5.45 8.52	5,000 2,620	2/7/96	6.18	4,530	Y	--
14209500	Clackamas River above Three Lynx Creek, OR	479	1910–13, 1922–98	1965	21.70	68,200	2/7/96	18.09	46,600	Y	40–50
14210000	Clackamas River at Estacada, OR	671	1909–98	1965 1996	18.36 27.57	86,900 68,900	2/7/96	27.57	68,900	Y	40–50
14211500	Johnson Creek at Sycamore, OR	26.5	1941–98	1965 1997	14.68 15.30	2,620 2,550	2/7/96 11/19/96	14.28 15.30	2,350 2,550	N N	15 25
14301000	Nehalem River near Foss, OR	667	1940–98	1996	29.56	70,300	2/8/96	29.56	70,300	N	>100
14301500	Wilson River near Tillamook, OR	161	1915, 1932–98	1972 1965	16.91 20.26	36,000 32,100	2/8/96	19.51	35,000	N	50
14303200	Tucca Creek near Blaine, OR	3.09	1984–98	1996 1997	4.30 5.09	680 400	2/6/96	4.30	680	N	>50
14305500	Siletz River at Siletz, OR	202	1906–12, 1925–98	1996 1965	24.49 27.32	34,700 32,200	2/7/96	24.49	34,700	N	50
14306340	East Fork Lobster Creek near Alsea, OR	5.70	1984–98	1996	5.37	1,360	2/7/96	5.37	1,360	N	25–50
14308000	South Umpqua River at Tiller, OR	449	1911, 1940–98	1965	25.72	60,200	11/18/96	22.17	46,000	N	25
14308500	Elk Creek near Drew, OR	54.4	1955–82, 1987–98	1995	11.09	9,120	1/9/95	11.09	9,120	N	20–25
14308990	Cow Creek above Galesville Reservoir near Azalea, OR	64.7	1986–98	1995	12.04	6,980	1/9/95	12.04	6,980	N	10–25
14309000	Cow Creek near Azalea, OR	78.0	1928–31, 1933–98	1974	16.40	10,600	1/2/97	9.69	2,490	Y	--
14310000	Cow Creek near Riddle, OR	456	1951, 1955–98	1951	28.50	41,100	1/9/95	26.22	34,400	Y	10

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.—Continued

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Streamgage number (fig. 49)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
14314500	Clearwater River above Trap Creek near Toketee Falls, OR	41.6	1928–98	1965 1997	-- 6.92	1,020 768	1/1/97	6.92	768	Y	--
14316000	Fish Creek at Big Camas Ranger Station near Toketee Falls, OR	68.8	1948–98	1965 1956	-- 12.82	12,100 9,880	11/18/96	10.66	6,240	Y	15
14316700	Steamboat Creek near Glide, OR	227	1956–98	1965	25.60	51,000	11/18/96	19.54	31,400	N	20–25
14319850	Gassy Creek near Nonpareil, OR	9.19	1989–98	1997	6.59	1,940	11/18/96	6.59	1,940	N	10–25
14320700	Calapooya Creek near Oakland, OR	210	1956–73, 1987–98	1997	21.62	27,100	11/18/96	21.62	27,100	N	25
14321400	Elk Creek near Elkhead, OR	28.7	1987–98	1997	10.82	6,670	11/18/96	10.82	6,670	N	25–50
14325000	South Fork Coquille River at Powers, OR	169	1917–26, 1929–98	1965	26.51	48,900	11/18/96	21.93	38,500	N	50
14328000	Rogue River above Prospect, OR	312	1909, 1911, 1924–98	1965	11.55	22,400	1/1/97	8.38	12,000	N	20
14330000	Rogue River below Prospect, OR	379	1914–30, 1969–98	1997	8.15	12,200	1/1/97	8.15	12,200	N	25
14332000	South Fork Rogue River near Prospect, OR	83.8	1925–31, 1950–98	1965 1956	-- 8.30	7,010 3,180	12/30/95	7.13	4,030	N	25
14337500	Big Butte Creek near McLeod, OR	245	1946–57, 1968–98	1956 1972	12.75 13.21	8,950 8,170	1/1/97	12.61	7,390	N	15–20
14337600	Rogue River near McLeod, OR	938	1965–98	1965	20.35	74,300	1/7/97	9.01	17,400	Y	--
14338000	Elk Creek near Trail, OR	129	1946–98	1965	18.84	19,200	1/1/97	12.00	11,300	N	15
14357500	Bear Creek at Medford, OR	289	1916–98	1997	14.69	17,600	1/1/97	14.69	17,600	Y	50–100
14359000	Rogue River at Raygold near Central Point, OR	2,053	1906–98	1965 1927	23.43 24.80	131,000 110,000	1/1/97	17.17	70,500	Y	--
14361500	Rogue River at Grants Pass, OR	2,459	1939–98	1965	34.15	152,000	1/1/97	26.49	90,800	Y	--

Table 38. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Oregon.—Continued

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Streamgage number (fig. 49)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
14362000	Applegate River near Copper, OR	225	1939–98	1974 1965	25.38 26.00	29,800 29,000	1/1/97	16.23	18,800	Y	--
14362250	Star Gulch near Ruch, OR	16.0	1984–98	1997	5.43	1,050	1/1/97	5.43	1,050	N	>50
14366000	Applegate River near Applegate, OR	483	1939–98	1974	20.41	37,200	1/1/97	17.90	29,700	Y	--
14369500	Applegate River near Wilderville, OR	698	1939–55, 1979–98	1956	20.30	66,500	1/2/97	19.38	44,000	Y	--
14372300	Rogue River near Agness, OR	3,939	1961–98	1965	68.03	290,000	1/2/97	39.60	241,000	Y	--
14400000	Chetco River near Brookings, OR	271	1970–98	1997	28.56	76,100	11/19/96	28.56	76,100	N	50

[1]Regulated during flood: N, no; Y, yes.

Pennsylvania

Slow-moving thunderstorms with excessive rainfall occurred several times during the summer months of 1994 including the remnants of Tropical Storm Beryl in August. These excessive rains caused small-stream flash flooding across the State. Although no records were set for gage heights or stream discharges, extensive damage occurred from the floods. Total damage was estimated to be nearly $19 million (National Oceanic and Atmospheric Administration, 1994b). There were no deaths caused by the flooding during this period.

Severe flooding occurred near York (fig. 50) on July 4, 1995, as about 4.5 inches of rain fell within 3 hours (National Oceanic and Atmospheric Administration, 1995a). Total damage was estimated at $8 million (National Oceanic and Atmospheric Administration, 1995b). This was the worst flood damage in York since the remnants of Hurricane Eloise in September 1975.

The most disastrous flood in more than 20 years struck Pennsylvania during the early morning of January 19 through the evening of January 21, 1996. Nearly all of Pennsylvania experienced flooding of unusual magnitude beginning in the early morning of January 19 with rapid flooding of headwater basins of western Pennsylvania and ending as major flooding along the rivers of the State on January 20–21. Two major snowstorms set the stage for the great flood. The snowstorm of January 7–8 had been termed the Blizzard of '96 and was followed by a second major storm on January 12–13. Overnight on January 18 and 19, excessive rain fell atop snow that had begun to melt rapidly due to high winds and warm temperatures. Many locations had in excess of 2 inches of rain, with the hardest hit areas receiving 3 inches in less than 12 hours (National Oceanic and Atmospheric Administration, 1996a). Snowpack from the severe January snowstorms held water equivalents of 2 to 4 inches across much of the region, and much of the water was released during the period of excessive rain. Major rivers and streams responded quite rapidly, and ice jams caused significant problems in many areas. The flooding was as bad as that from Hurricane Eloise in 1975 and in a few areas was even worse than the record floods of Hurricane Agnes in 1972. Record discharges were measured at 29 streamgages throughout the State (table 39). In the hardest hit areas of central Pennsylvania, 18 deaths were attributed to the flooding. Many of the deaths occurred when people drove into flooded areas and became stranded. Because of strong winds, temperatures in the teens, and ice-cold water, there was little time to rescue people caught in the flood. Estimates of damage from the flooding and the prior week's blizzard totaled $700 million for the State (National Oceanic and Atmospheric Administration, 1996b). An estimated $760 million also was lost to commerce during the 2 weeks. The Pennsylvania Department of Transportation further estimated damage to roads and bridges at $500 million (National Oceanic and Atmospheric Administration, 1996b).

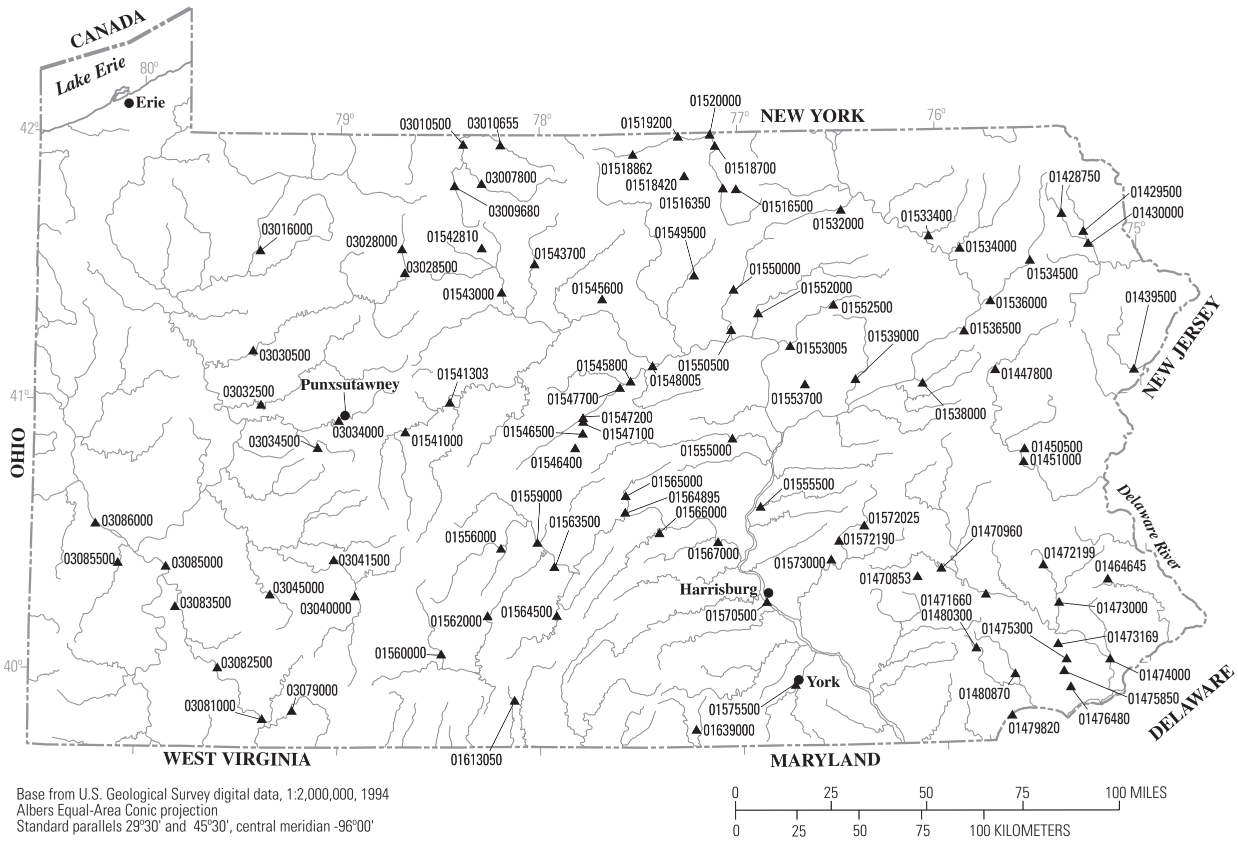
Intense thunderstorms over southern Pennsylvania produced as much as 12 inches of rainfall during the evening of June 18, 1996. Major flash floods caused more than $26 million in damage, and three persons lost their lives. Slow-moving thunderstorms caused flash flooding during the early morning of July 19, with 4 to 6 inches of rainfall over northwestern Pennsylvania (National Oceanic and Atmospheric Administration, 1996a). The greatest damage occurred near and west of Punxsutawney. More than $225 million in damage to homes, businesses, roads, and bridges occurred from this storm, and there were two deaths (National Oceanic and Atmospheric Administration, 1996b).

Tropical moisture left behind by the remnants of Hurricane Fran was a major contributor to the torrential downpours from thunderstorms in south-central Pennsylvania, southwest of Harrisburg, on September 8, 1996. As much as 10 inches of rainfall within a 3-hour period caused widespread flash flooding and resulted in the deaths of two persons and about $20 million dollars in property damage (National Oceanic and Atmospheric Administration, 1996b). A little more than a week later 7 inches of rainfall caused flash flooding near Erie (National Oceanic and Atmospheric Administration, 1996a), where $5 million in damage occurred (National Oceanic and Atmospheric Administration, 1996b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–96a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–96b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

01613050▲ **Streamgage and number**

Figure 50. Location of streamgages with significant floods during 1994–98 water years for Pennsylvania.

Table 39. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Pennsylvania.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 50)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01428750	West Branch Lackawaxen River near Aldenville, PA	40.6	1975–98	1996	8.00	4,340	1/19/96	8.00	4,340	N	25–50
01429500	Dyberry Creek near Honesdale, PA	64.6	1944–98	1952	14.60	15,500	1/20/96	7.32	2,600	Y	<10
01430000	Lackawaxen River near Honesdale, PA	164	1942, 1949–69, 1974–82, 1984–94, 1996–98	1942	24.50	34,000	1/19/96	8.49	7,180	Y	<10
01439500	Bush Kill at Shoemakers, PA	117	1909–98	1955	13.95	23,400	1/27/96	7.01	4,990	N	>10
01447800	Lehigh River below Frances E. Walter Reservoir near White Haven, PA	290	1955, 1958–98	1955 1958	-- 9.85	54,200 13,800	1/29/96	8.79	11,500	Y	<10
01450500	Aquashicola Creek at Palmerton, PA	76.7	1940–98	1945	13.63	11,700	1/19/96	12.64	9,760	N	50–100
01451000	Lehigh River at Walnutport, PA	889	1942, 1947–98	1955 1942	17.68 20.60	77,800 --	1/19/96	12.32	40,100	Y	25
01464645	North Branch Neshaminy Creek below Lake Galena near New Britain, PA	16.2	1986–98	1997	4.77	2,060	10/19/96	4.77	2,060	Y	10–25
01470853	Furnace Creek at Robesonia, PA	4.18	1983–98	1994 1984	3.79 4.70	537 227	11/28/93	3.79	537	N	10–25
01470960	Tulpehocken Creek at Blue Marsh damsite near Readin, PA	175	1965–98	1972	18.70	16,100	12/6/93	7.73	4,060	Y	<10
01471660	Schuylkill River at Birdsboro, PA	976	1984–94, 1996	1996	157.59	27,900	1/20/96	157.59	27,900	N	<10
01472199	West Branch Perkiomen Creek at Hillegass, PA	23.0	1982–98	1996 1989	6.34 9.55	4,610 1,190	1/19/96	6.34	4,610	N	25–50
01473000	Perkiomen Creek at Graterford, PA	279	1915–98	1935	18.26	39,900	1/19/96	16.45	32,500	N	25–50

Table 39. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Pennsylvania.—Continued

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Streamgage number (fig. 50)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01473169	Valley Creek at Pennsylvania Turnpike Bridge near Valley Forge, PA	20.8	1983–98	1997	10.54	2,200	10/19/96	10.54	2,200	N	<10
01474000	Wissahickon Creek at mouth, Philadelphia, PA	64.0	1966–98	1973	7.92	6,870	1/19/96	7.60	6,240	N	<10
01475300	Darby Creek at Waterloo Mills near Devon, PA	5.15	1972–97	1997	6.87	1,920	10/19/96	6.87	1,920	N	25
01475850	Crum Creek near Newtown Square, PA	15.8	1977–98	1997	9.62	2,380	10/19/96	9.62	2,380	N	10–25
01476480	Ridley Creek at Media, PA	30.5	1987–95, 1997–98	1994	9.93	3,700	1/28/94	9.93	3,700	N	10–25
01479820	Red Clay Creek near Kennett Square, PA	28.3	1988–98	1996	9.22	3,760	1/19/96	9.22	3,760	N	10–25
01480300	West Branch Brandywine Creek near Honey Brook, PA	18.7	1960–98	1996	11.62	8,920	1/19/96	11.62	8,920	N	>25
01480870	East Branch Brandywine Creek below Downingtown, PA	89.9	1972–98	1997	12.60	6,700	10/19/96	12.60	6,700	Y	10–25
01516350	Tioga River near Mansfield, PA	153	1972, 1975, 1977–98	1996 1975	18.87 20.13	38,900 18,000	1/19/96	18.87	38,900	N	<50
01516500	Corey Creek near Mainesburg, PA	12.2	1955–98	1972	10.44	5,580	8/18/94	10.15	4,970	N	50–100
01518420	Crooked Creek below Catlin Hollow at Middlebury Center, PA	74.3	1985–98	1997	51.93	15,300	11/08/96	51.93	15,300	N	<25
01518700	Tioga River at Tioga Junction, PA	446	1976–98	1976	22.12	48,000	8/18/94	15.42	11,200	Y	10
01518862	Cowanesque River at Westfield, PA	90.6	1984–98	1996	11.10	13,000	1/19/96	11.10	13,000	N	10–25
01519200	Cowanesque River at Elkland, PA	235	1980–98	1996	30.20	28,000	1/19/96	30.20	28,000	N	25–50

Table 39. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Pennsylvania.—Continued

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Streamgage number (fig. 50)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01520000	Cowanesque River near Lawrenceville, PA	298	1952–98	1975	18.13	43,700	1/23/96	12.41	6,580	Y	<10
01532000	Towanda Creek near Monroeton, PA	215	1914–98	1972 1996	16.90 20.86	74,000 67,900	1/19/96	20.86	67,900	N	>100
01533400	Susquehanna River at Meshoppen, PA	8,720	1977–98	1996	36.34	226,000	1/20/96	36.34	226,000	N	>25
01534000	Tunkhannock Creek near Tunkhannock, PA	383	1914–98	1996	19.97	30,300	1/19/96	19.97	30,300	N	>25
01534500	Lackawanna River at Archbald, PA	108	1940–98	1942	10.58	9,510	1/19/96	9.32	7,190	Y	<50
01536000	Lackawanna River at Old Forge, PA	332	1939–98	1955	20.05	31,000	1/19/96	15.58	22,300	Y	50
01536500	Susquehanna River at Wilkes Barre, PA	9,960	1787, 1807, 1809, 1833, 1865, 1891-1998	1972	40.91	345,000	1/20/96	34.45	221,000	N	10–25
01538000	Wapwallopen Creek near Wapwallopen, PA	43.8	1920–98	1972	11.04	5,410	1/19/96	10.35	4,650	N	<100
01539000	Fishing Creek near Bloomsburg, PA	274	1936, 1939–98	1972	15.18	30,900	1/19/96	12.86	21,300	N	<25
01541000	West Branch Susquehanna River at Bower, PA	315	1889, 1914–98	1936	19.74	31,500	7/19/96	17.24	22,000	N	50–100
01541303	West Branch Susquehanna River at Hyde, PA	474	1964, 1979–98	1964	18.10	19,400	1/19/96	11.16	7,630	Y	<10
01542810	Waldy Run near Emporium, PA	5.24	1964–98	1967	6.32	828	1/19/96	6.24	698	N	50
01543000	Driftwood Branch Sinnemahoning Creek at Sterling Run, PA	272	1914–98	1942	14.70	47,800	1/19/96	11.17	26,700	N	>25
01543700	First Fork Sinnemahoning Creek at Wharton, PA	182	1984–98	1996	15.37	15,400	1/19/96	15.37	15,400	N	50
01545600	Young Womans Creek near Renovo, PA	46.2	1965–98	1972	7.98	5,370	8/18/94	6.92	3,890	N	>25

Table 39. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Pennsylvania.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 50)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01545800	West Branch Susquehanna River at Lock Haven, PA	3,345	1975–98	1996	25.76	93,900	1/20/96	25.76	93,900	N	25–50
01546400	Spring Creek at Houserville, PA	58.5	1985–98	1996	10.05	2,370	1/19/96	10.05	2,370	N	>50
01546500	Spring Creek near Axemann, PA	87.2	1936, 1941–98	1936	8.60	8,400	1/19/96	6.42	3,490	N	>25
01547100	Spring Creek at Milesburg, PA	142	1967–98	1972	13.20	8,170	1/19/96	10.78	4,780	N	<25
01547200	Bald Eagle Creek below Spring Creek at Milesburg, PA	265	1956–98	1972	11.67	21,300	1/19/96	10.47	16,800	N	25–50
01547700	Marsh Creek at Blanchard, PA	44.1	1956–98	1984	7.85	6,900	1/19/96	7.43	5,890	N	<50
01548005	Bald Eagle Creek near Beech Creek Station, PA	562	1985–98	1996	15.62	12,600	1/19/96	15.62	12,600	Y	10–25
01549500	Blockhouse Creek near English Center, PA	37.7	1936, 1941–98	1972	9.34	6,260	1/19/96	8.84	5,540	N	>25
01550000	Lycoming Creek near Trout Run, PA	173	1914–98	1996	22.68	32,000	1/19/96	22.68	32,000	N	>100
01550500	Lycoming Creek near Williamsport, PA	268	1909–12, 1988–90, 1995–98	1996	18.69	45,000	1/19/96	18.69	45,000	N	--
01552000	Loyalsock Creek at Loyalsockville, PA	443	1926–98	1996	17.93	55,800	1/19/96	17.93	55,800	N	>100
01552500	Muncy Creek near Sonestown, PA	23.8	1936, 1941–98	1972 1936	8.94 9.30	8,260 --	1/19/96	8.70	7,560	N	<50
01553005	Muncy Creek near Muncy, PA	209	1989–98	1996	20.57	43,000	1/19/96	20.57	43,000	N	--
01553700	Chillisquaque Creek at Washingtonville, PA	51.3	1980–98	1996	11.27	3,770	1/19/96	11.27	3,770	N	<25
01555000	Penns Creek at Penns Creek, PA	301	1930–98	1972	14.85	34,600	1/19/96	13.74	25,300	N	>50
01555500	East Mahantango Creek near Dalmatia, PA	162	1930–93, 1995–98	1972	26.62	69,900	1/19/96	17.47	21,200	N	<50

Table 39. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Pennsylvania.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 50)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01556000	Frankstown Branch Juniata River at Williamsburg, PA	291	1889, 1917–98	1936 1996	18.58 19.35	30,000 17,800	1/19/96	19.35	17,800	N	>25
01559000	Juniata River at Huntingdon, PA	816	1896–98, 1900–22, 1924–29, 1931–38, 1942–98	1936	21.87	81,000	1/19/96	15.95	36,500	N	<25
01560000	Dunning Creek at Belden, PA	172	1936, 1940–98	1977 1936	14.15 17.81	19,400 16,900	1/19/96	13.46	15,700	N	50
01562000	Raystown Branch Juniata River at Saxton, PA	756	1889, 1912–98	1936	24.54	80,500	1/20/96	19.63	45,800	N	50–100
01563500	Juniata River at Mapleton Depot, PA	2,030	1936, 1938–98	1936	38.20	165,000	1/20/96	22.47	57,600	Y	10–25
01564500	Aughwick Creek near Three Springs, PA	205	1889, 1939–98	1996	20.85	32,600	1/19/96	20.85	32,600	N	>100
01564895	Juniata River at Lewistown, PA	2,519	1989–98	1996	31.64	74,400	1/20/96	31.64	74,400	Y	--
01565000	Kishacoquillas Creek at Reedsville, PA	164	1936, 1940–70, 1972, 1984–85, 1989–98	1972	16.17	16,400	1/19/96	14.20	12,400	N	50
01566000	Tuscarora Creek near Port Royal, PA	214	1889, 1912–58, 1972, 1988–90, 1996–98	1996 1972	21.27 25.10	25,000 --	9/7/96	21.27	25,000	N	>100
01567000	Juniata River at Newport, PA	3,354	1889, 1899–1998	1889	35.90	209,000	1/20/96	24.69	103,000	Y	10–25

Table 39. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Pennsylvania.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 50)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01570500	Susquehanna River at Harrisburg, PA	24,100	1787, 1846, 1865, 1868, 1886, 1889, 1891–1998	1972	32.57	1,020,000	1/21/96	24.66	568,000	N	>25
01572025	Swatara Creek near Pine Grove, PA	116	1989–98	1994	14.17	5,880	11/28/93	14.17	5,880	N	--
01572190	Swatara Creek near Inwood, PA	167	1989–98	1994	16.20	9,510	11/28/93	16.20	9,510	N	--
01573000	Swatara Creek at Harper Tavern, PA	337	1919–98	1972	23.72	66,700	1/20/96	15.67	19,800	N	10–25
01575500	Codorus Creek near York, PA	222	1933, 1940–98	1972	26.36	30,000	1/19/96	14.91	9,890	Y	<10
01613050	Tonoloway Creek near Needmore, PA	10.7	1963–93, 1995–96, 1998	1972 1996	9.17 9.48	1,300 1,250	1/19/96	9.48	1,250	N	25
01639000	Plum Run at Round Top, PA	1.65	1933, 1942–98	1996	25.42	24,400	6/19/96	25.42	24,400	N	--
03007800	Allegheny River at Port Allegany, PA	248	1975–98	1996	15.37	12,600	1/19/96	15.37	12,600	N	50–100
03009680	Potato Creek at Smethport, PA	160	1975–97	1996	13.19	8,160	1/19/96	13.19	8,160	N	<25
03010500	Allegheny River at Eldred, PA	550	1916–98	1972	29.05	65,400	1/20/96	21.88	20,600	N	10–25
03010655	Oswayo Creek at Shinglehouse, PA	98.7	1972, 1975–98	1996	12.74	4,660	1/19/96	12.74	4,660	N	50
03016000	Allegheny River at West Hickory, PA	3,660	1942–84, 1986–95, 1997–98	1956	17.20	101,000	1/8/98	11.19	43,100	Y	10
03028000	West Branch Clarion River at Wilcox, PA	63.0	1954–98	1996	10.23	5,590	1/19/96	10.23	5,590	N	>25
03028500	Clarion River at Johnsonburg, PA	204	1942, 1946–94, 1996–98	1996 1942	10.14 16.70	12,800 --	1/19/96	10.14	12,800	Y	>100

Table 39. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Pennsylvania.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 50)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03030500	Clarion River near Piney, PA	951	1936, 1948–98	1972	28.24	74,500	7/19/96	25.22	62,400	N	50–100
03032500	Redbank Creek at Saint Charles, PA	528	1910–93, 1995–98	1996	23.90	66,300	7/19/96	23.90	66,300	N	>100
03034000	Mahoning Creek at Punxsutawney, PA	158	1936, 1939–98	1996	18.38	20,400	7/19/96	18.38	20,400	N	>100
03034500	Little Mahoning Creek at McCormick, PA	87.4	1940–98	1996	14.46	10,600	7/19/96	14.46	10,600	N	>100
03040000	Stonycreek River at Ferndale, PA	451	1914–36, 1939–98	1936 1977	-- 23.21	59,000 48,000	1/19/96	17.64	41,600	N	50–100
03041500	Conemaugh River at Seward, PA	715	1936, 1939–98	1977	27.06	115,000	1/19/96	20.68	59,900	N	>25
03045000	Loyalhanna Creek at Kingston, PA	172	1940–98	1955	15.80	29,700	1/19/96	13.37	18,200	N	25–50
03079000	Casselman River at Markleton, PA	382	1915–98	1955 1936	14.06 16.40	50,000 35,800	1/19/96	13.26	45,000	N	>100
03081000	Youghiogheny River below Confluence, PA	1,029	1936, 1941–98	1936	21.60	85,000	1/19/96	17.74	48,500	Y	<100
03082500	Youghiogheny River at Connellsville, PA	1,326	1860, 1888, 1891–99, 1901–98	1955	21.96	103,000	1/19/96	18.65	65,300	Y	25–50
03083500	Youghiogheny River at Sutersville, PA	1,715	1921–98	1955	32.50	108,000	1/19/96	28.19	84,100	Y	<50
03085000	Monongahela River at Braddock, PA	7,337	1936, 1939–98	1996 1972	29.07 31.39	210,000 180,000	1/20/96	29.07	210,000	Y	<50
03085500	Chartiers Creek at Carnegie, PA	257	1916–33, 1936, 1941–98	1956	17.37	13,500	1/28/94	11.94	11,800	N	<25
03086000	Ohio River at Sewickley, PA	19,500	1934–98	1936	34.75	574,000	1/20/96	33.34	372,000	Y	<25

[1]Regulated during flood: N, no; Y, yes.

Puerto Rico

Thunderstorms developed over the north-central interior slopes of Puerto Rico on November 9, 1995, dumping 6.70 inches of rain at Corozal (fig. 51). One nonofficial rain gage recorded 13.50 inches of rain (National Oceanic and Atmospheric Administration, 1995a). Civil defense agencies reported numerous mudslides in and around Corozal. Río Cibuco below Corozal (streamgage 50038320, table 40) reached its highest discharge since records began in 1970.

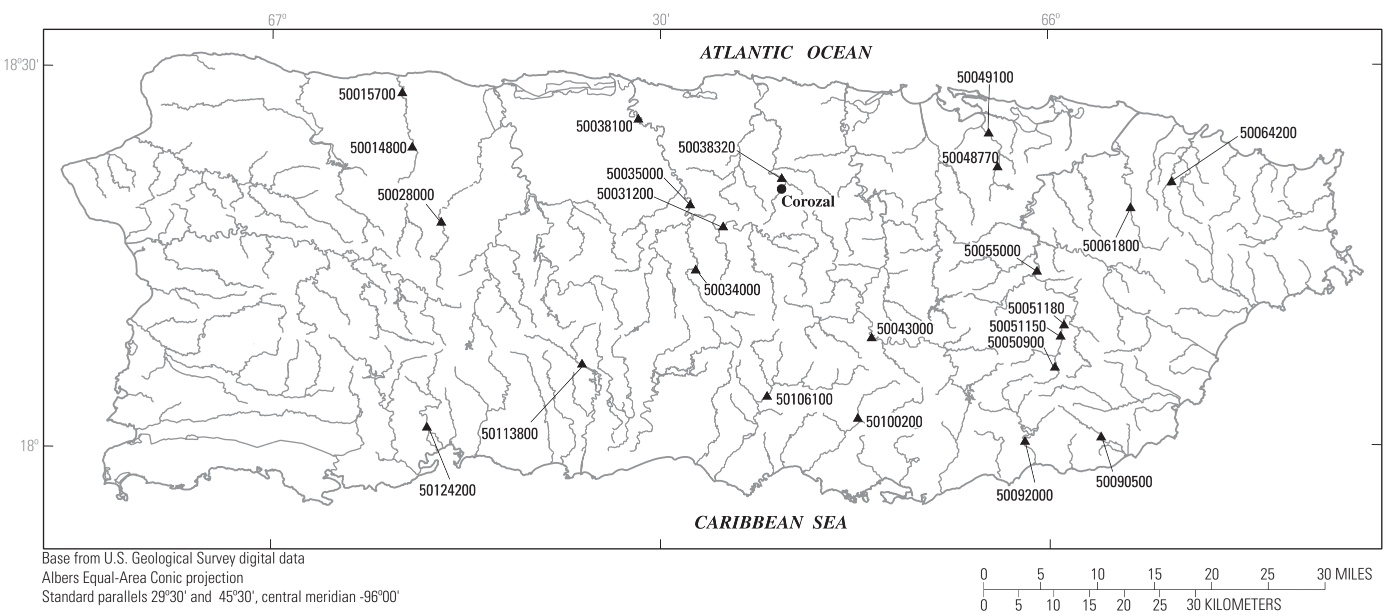
Rainfall amounts associated with the eastern circulation of Hurricane Hortense produced widespread flooding and caused 21 deaths across the interior sections of Puerto Rico on September 9–10, 1996. The eastern interior municipalities received as much as 22 inches of rain (National Oceanic and Atmospheric Administration, 1996a). Creeks and streams island-wide reached very high stages and produced very serious flooding. Seven streamgages measured their peak of record during this flood (table 40). Río Grande de Loíza at Caguas (streamgage 50055000, table 40) had its largest discharge since 1945.

During September 20–22, 1998, Hurricane Georges passed directly over Puerto Rico with wind gusts as high as 150 miles per hour and rainfall amounts up to 27 inches (National Oceanic and Atmospheric Administration, 1998a). Total damage was over $2 billion from the wind and rain, but no lives were lost (National Oceanic and Atmospheric Administration, 1998b). Ten streamgages recorded their largest discharges (table 40).

References

National Oceanic and Atmospheric Administration (NOAA), 1995a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1995b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

50124200▲ **Streamgage and number**

Figure 51. Location of streamgages with significant floods during 1994–98 water years for Puerto Rico.

Table 40. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Puerto Rico.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 51)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
50014800	Rio Camuy near Bayaney, PR	--	1984–98	1998	21.69	11,600	9/22/98	21.69	11,600	N	>50
50015700	Rio Camuy near Hatillo, PR	--	1984–96	1996	25.18	11,400	9/10/96	25.18	11,400	N	10–25
50028000	Rio Tanama near Utuado, PR	18.4	1960–98	1998	21.24	23,500	9/22/98	21.24	23,500	N	>100
50031200	Rio Grande de Manati near Morovis, PR	55.2	1965–98	1985 1971	17.89 20.30	48,000 35,000	9/10/96	18.83	47,700	N	40–50
50034000	Rio Bauta near Orocovis, PR	16.7	1970–82, 1989–98	1998	25.93	28,200	9/22/98	25.93	28,200	N	50–100
50035000	Rio Grande de Manati at Ciales, PR	128	1899, 1928, 1932, 1949–53, 1956, 1958–98	1996 1899	25.20 50.00	128,000 --	9/10/96 9/21/98	25.20 22.38	128,000 78,900	N N	50–100 20
50038100	Rio Grande de Manati at Highway 2 near Manati, PR	197	1928, 1932, 1945, 1959–63, 1965–66, 1968–98	1998 1996	34.90 36.39	136,000 --	9/22/98	34.90	136,000	N	40–50
50038320	Rio Cibuco below Corozal, PR	15.1	1970–98	1996	22.35	20,400	11/9/95	22.35	20,400	N	50–100
50043000	Rio de La Plata at Proyecto La Plata, PR	54.8	1960–92, 1996	1992	36.39	73,600	9/10/96	34.10	66,000	N	30–40 --
50048770	Rio Piedras at El Senorial, PR	7.49	1988–98	1996 1988	15.46 16.08	5,390 4,680	9/10/96	15.46	5,390	N	10–25

Table 40. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Puerto Rico.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 51)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
50049100	Rio Piedras at Hato Rey, PR	15.2	1970, 1972–74, 1976–82, 1988–98	1996	22.11	10,500	9/10/96	22.11	10,500	N	10–25
50050900	Rio Grande de Loiza at Quebrada Arenas, PR	6.00	1978–98	1998	26.37	45,000	9/21/98	26.37	45,000	N	50–100
50051150	Quebrada Blanca at Jagual, PR	3.25	1985–98	1996	14.64	7,610	9/10/96	14.64	7,610	N	10–25
50051180	Quebrada Salvatierra near San Lorenzo, PR	3.74	1984–98	1996	20.86	15,000	9/10/96	20.86	15,000	N	25–50
50055000	Rio Grande de Loiza at Caguas, PR	89.8	1945, 1960–98	1945	33.20	85,000	9/10/96	32.32	83,000	N	50–100
50061800	Rio Canovanas near Campo Rico, PR	9.84	1968–98	1998	15.90	17,300	9/21/98	15.90	17,300	N	50–100
50064200	Rio Grande near El Verde, PR	7.31	1968–75, 1977–82, 1991–98	1998	19.30	22,000	9/21/98	19.30	22,000	N	50–100
50090500	Rio Maunabo at Lizas, PR	5.38	1971–85, 1991–98	1994	17.46	9,950	9/20/94	17.46	9,950	N	10–25
50092000	Rio Grande de Patillas near Patillas, PR	18.3	1966–98	1992	--	30,900	9/10/96	22.55	22,400	N	30–40
				1998	24.36	--	9/21/98	24.36	--	N	--
50100200	Rio Lapa near Rabo del Buey, PR	10.0	1971, 1989–98	1996	18.65	18,100	9/10/96	18.65	18,100	N	10–25
50106100	Rio Coamo at Coamo, PR	43.5	1987–98	1998	25.94	52,700	9/21/98	25.94	52,700	N	>50
50113800	Rio Cerrillos above Lago Cerrillos near Ponce, PR	11.9	1989–98	1998	12.42	16,200	9/21/98	12.42	16,200	N	10–25
50124200	Rio Guayanilla near Guayanilla, PR	18.9	1981–98	1998	21.88	18,700	9/22/98	21.88	18,700	N	25–50

[1]Regulated during flood: N, no; Y, yes.

Rhode Island

A strong low-pressure system that moved to the northeast along the Mid-Atlantic Coast on February 18, 1998, brought excessive rainfall, isolated flash floods, and thunderstorms to central and southern Rhode Island. Rainfall totals for this storm ranged from 2.0 to 3.5 inches during a 12-hour period (National Oceanic and Atmospheric Administration, 1998). In Middletown (fig. 52), the Maidford River rose out of its banks and flooded part of a neighborhood.

During June 12–14, 1998, a very slow-moving, complex storm system moved through southeastern New England. The combination of its slow movement and the presence of tropical moisture across the region produced rainfall of 6 to 8 inches over much of Rhode Island. The most excessive rainfall amounts of 7 to 8 inches occurred in the northeast corner of the State (National Oceanic and Atmospheric Administration, 1998). Numerous small streams flooded over their banks. The streamgage on Ten Mile River at Pawtucket Avenue at East Providence (streamgage 01109403, table 41) recorded its peak of record on June 15.

A slow-moving warm front with an abundance of tropical moisture produced several hours of torrential rain with amounts totaling 3 to 6 inches during the morning and early afternoon of June 30, 1998 (National Oceanic and Atmospheric Administration, 1998). During the evening, more thunderstorm activity produced flooding and the highest discharge since 1936 on the Woonasquatucket River at Centerdale (streamgage 01114500, table 41).

Reference

National Oceanic and Atmospheric Administration (NOAA), 1998, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

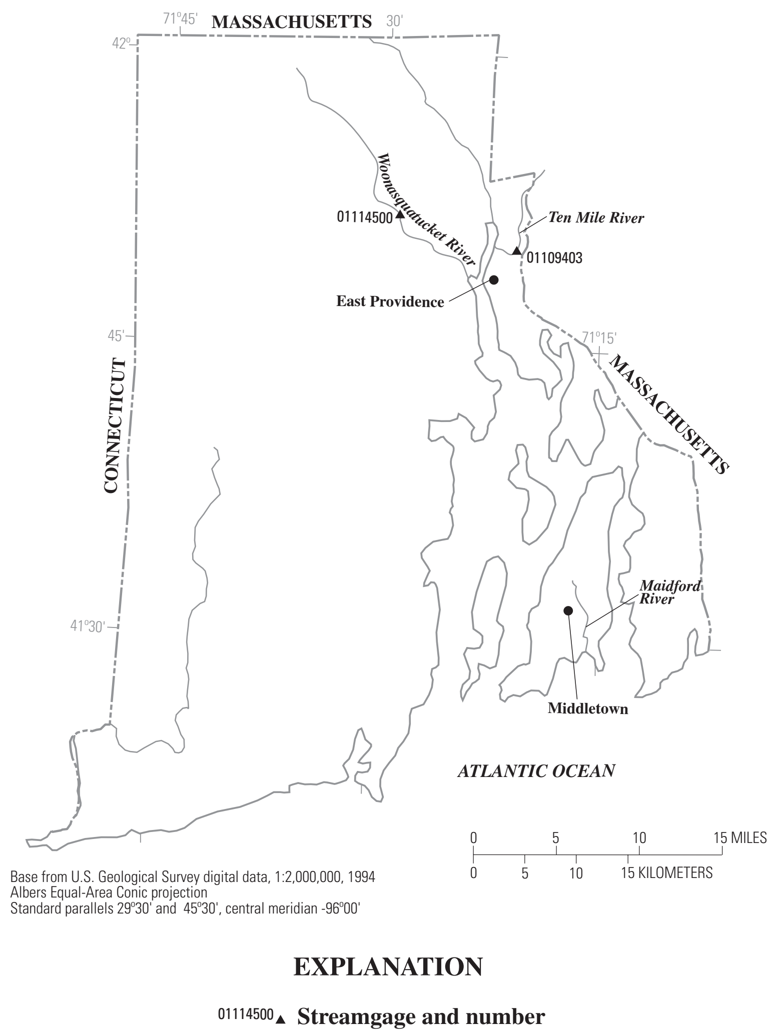


Figure 52. Location of streamgages with significant floods during 1994–98 water years for Rhode Island.

Table 41. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Rhode Island.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 52)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01109403	Ten Mile River at Pawtucket Avenue at East Providence, RI	53.1	1987–98	1998	8.50	1,450	6/15/98	8.50	1,450	Y	25
01114500	Woonasquatucket River at Centerdale, RI	38.3	1936, 1942–98	1998 1968	7.26 7.75	1,520 1,440	6/30/98	7.26	1,520	Y	50

[1]Regulated during flood: N, no; Y, yes.

South Carolina

Excessive rains of more than 6 inches within 24 hours caused flash flooding early the morning of June 27, 1994 (National Oceanic and Atmospheric Administration, 1994a). The flash flooding affected several creeks in and near Lexington (fig. 53) and caused $5.0 million in property damage (National Oceanic and Atmospheric Administration, 1994b).

Rainfall associated with Tropical Storm Beryl totalled 4 or 5 inches in the Piedmont area and 12 inches in the mountains on August 17, 1994 (National Oceanic and Atmospheric Administration, 1994a). This rainfall caused severe flooding near Greenville and Spartanburg. Damage was more than $1.5 million to property and more than $10 million to crops. No deaths were reported (National Oceanic and Atmospheric Administration, 1994b).

Several episodes of intense rainfall during the fall of 1994 caused flash floods and coastal flooding in South Carolina. Record-breaking rains of more than 13 inches in 24 hours fell near Beaufort on October 3, 1994. A 24-hour total of 11.5 inches on northern Hilton Head Island broke the official all-time rainfall records at that location (National Oceanic and Atmospheric Administration, 1994a). Scattered areas of flash flooding were followed by coastal flooding. Excessive rainfall occurred again on October 13 in and around Charleston with 4 to 8 inches falling (National Oceanic and Atmospheric Administration, 1994a). More than $27 million in damage resulted from the flooding (National Oceanic and Atmospheric Administration, 1994b).

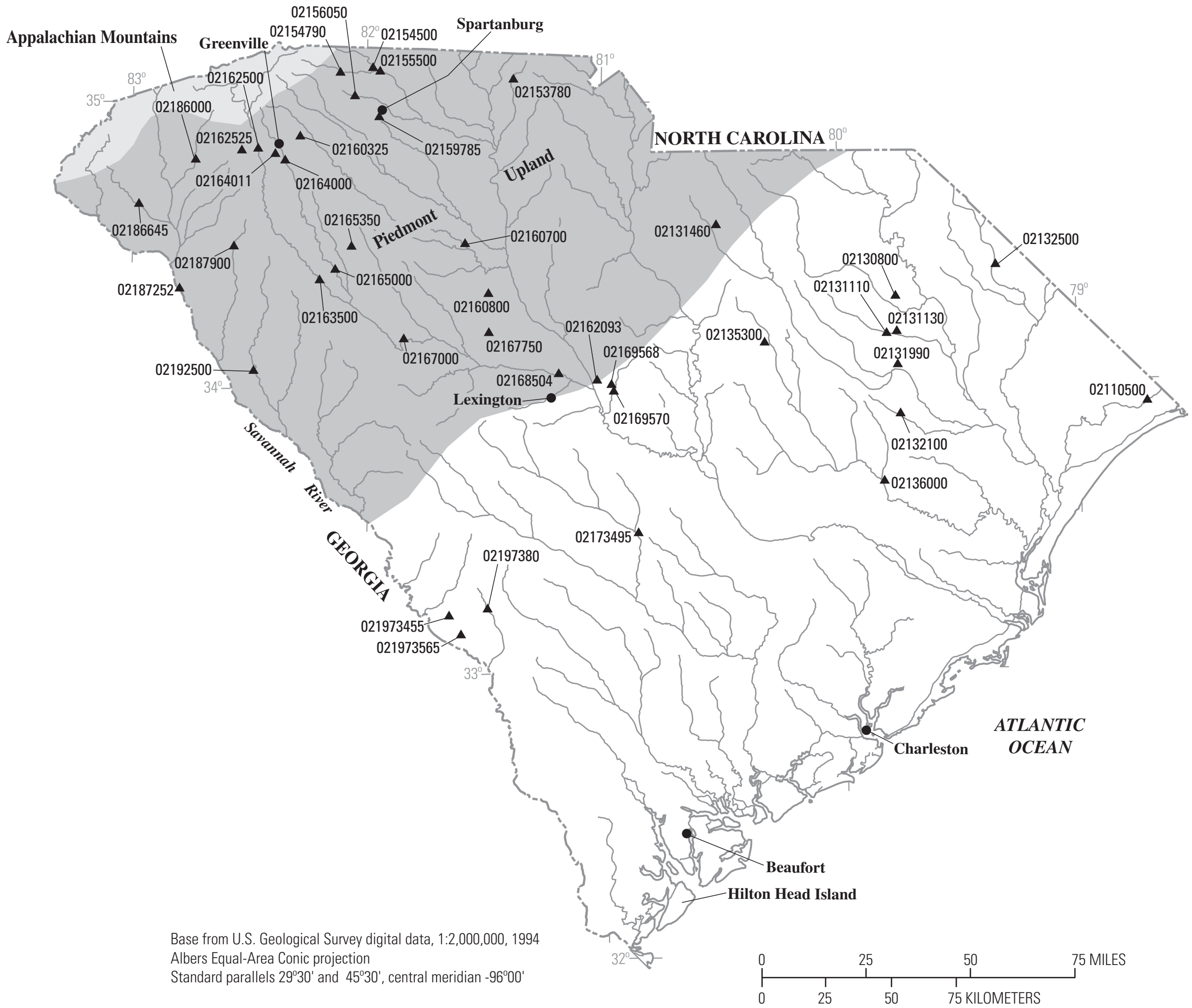
The remnants of Tropical Storm Jerry moved slowly eastward across the State during August 24–28, 1995, and produced unusually excessive rains statewide with amounts mostly varying from 8 to more than 12 inches in some locations (National Oceanic and Atmospheric Administration, 1995a). The excessive rain produced flash flooding in flood-prone areas, general flooding on many rivers, broken dams, flooded streets, homes, and low-lying farmland. Damage was more than $20 million (National Oceanic and Atmospheric Administration, 1995b). Statewide damage to roads and bridges was estimated by the South Carolina Department of Transportation to be $4.5 million. Eleven streamgages recorded their highest discharge ever during this flood (table 42).

A flash flood occurred late in the evening on August 14, 1998, following 4 to 5 inches of rainfall in a short period (National Oceanic and Atmospheric Administration, 1998a). The flash flood affected several creeks near Spartanburg. There were nearly $2.5 million in damage (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

02197345▲ Streamgage and number

Figure 53. Location of streamgages with significant floods during 1994–98 water years for South Carolina.

Table 42. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Carolina.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 53)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02110500	Waccamaw River near Longs, SC	1,110	1951–98	1981 1996	14.87 14.95	16,200 15,800	9/15/96	14.95	15,800	N	10–25
02130800	Backswamp near Darlington, SC	6.22	1976–98	1995	12.21	800	12/24/94	12.21	800	N	50–100
02131110	Jeffries Creek above Florence, SC	46.6	1968–98	1995	10.72	3,220	12/24/94	10.72	3,220	N	50–100
02131130	Gully Branch at Cherokee Road at Florence, SC	1.92	1985–98	1996	6.37	765	9/11/96	6.37	765	N	10–25
02131460	Neds Creek near Kershaw, SC	3.98	1977–78, 1980–82, 1984–86, 1989, 1991–96	1996	6.98	238	6/10/95	6.98	238	N	--
02131990	Carter Creek at Effingham, SC	8.28	1969–84, 1987–98	1995	9.61	1,440	12/24/94	9.61	1,440	N	--
02132100	Two Mile Branch near Lake City, SC	19.0	1976–98	1995	10.19	2,400	12/24/94	10.19	2,400	N	>100
02132500	Little Pee Dee River near Dillon, SC	524	1940–98	1945	14.64	9,810	2/24/95	12.73	6,760	N	25
02135300	Scape Ore Swamp near Bishopville, SC	96.0	1969–98	1991	11.80	4,500	12/24/94	9.86	2,580	N	25–50
02136000	Black River at Kingstree, SC	1,252	1893–1998	1973	19.77	58,000	12/28/94	15.35	22,100	N	10–25
02153780	Clarks Fork Creek near Smyrna, SC	24.1	1981–98	1995	13.77	2,100	8/27/95	13.77	2,100	N	--
02154500	North Pacolet River at Fingerville, SC	116	1931–98	1940	27.13	12,500	8/28/95	21.37	8,160	N	10–25
02154790	South Pacolet River near Campobello, SC	55.4	1989–98	1995	11.33	5,170	8/27/95	11.33	5,170	N	25–50
02155500	Pacolet River near Fingerville, SC	212	1903, 1931–98	1940 1903	22.43 46.00	22,800 --	8/27/95	15.58	13,700	Y	--

Table 42. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Carolina.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 53)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02156050	Lawsons Fork Creek at Dewey Plant near Inman, SC	6.46	1980–98	1994 1980	7.33 7.86	563 213	8/17/94	7.33	563	N	--
02159785	Tributary to Fairforest Creek at Spartanburg, SC	.52	1987–98	1994	5.19	243	6/28/94	5.19	243	N	50–100
02160325	Brushy Creek near Greenville, SC	9.05	1986–98	1995	14.10	--	8/27/95	14.10	--	N	--
02160700	Enoree River at Whitmire, SC	444	1974–98	1995	37.32	31,200	8/28/95	37.32	31,200	N	>100
02160800	Second Creek near Pomaria, SC	1.87	1977–89, 1991, 1993–98	1995	8.43	1,090	8/26/95	8.43	1,090	N	--
02162093	Smith Branch at North Main Street at Columbia, SC	5.67	1977–98	1995	11.69	2,120	6/11/95	11.69	2,120	N	10–25
02162500	Saluda River near Greenville, SC	295	1942–78, 1981–82, 1984–98	1950	19.38	11,000	8/27/95	15.59	8,550	N	10–25
02162525	Hamilton Creek (Road 135) near Easley, SC	1.60	1983, 1988–90, 1993–98	1995	8.11	835	8/27/95	8.11	835	N	--
02163500	Saluda River near Ware Shoals, SC	580	1939–98	1995	22.95	20,900	8/27/95	22.95	20,900	N	25–50
02164000	Reedy River near Greenville, SC	48.6	1942–75, 1977, 1987–98	1995	11.88	5,400	8/27/95	11.88	5,400	N	50–100
02164011	Brushy Creek at Grove Road at Greenville, SC	2.82	1985–98	1993	9.18	1,740	1/8/98	7.57	1,250	N	2–5
02165000	Reedy River near Ware Shoals, SC	236	1940–59, 1961–98	1973 1995	15.40 18.71	11,000 9,980	8/28/95	18.71	9,980	N	10–25

Table 42. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Carolina.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 53)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02165350	Dirty Creek tributary near Laurens, SC	1.21	1978, 1980, 1984–91, 1993–98	1994 1995	7.27 8.76	252 --	8/27/95	8.76	--	N	--
02167000	Saluda River at Chappells, SC	1,360	1888, 1906–98	1930 1908	31.50 34.70	63,700 --	8/28/95	27.22	38,000	Y	--
02167750	Camping Creek tributary near Prosperity, SC	.52	1974–87, 1989–98	1995 1991	6.64 7.22	135 --	8/27/95	6.64	135	N	50
02168504	Saluda River below Lake Murray Dam near Columbia, SC	2,420	1989–98	1996	15.85	22,000	3/9/96	15.85	22,000	Y	--
02169568	Pen Branch at Columbia, SC	2.26	1986–98	1997	9.10	2,350	7/24/97	9.10	2,350	N	>100
02169570	Gills Creek at Columbia, SC	59.6	1967–98	1979 1997	8.66 9.43	2,880 2,480	7/24/97	9.43	2,480	Y	--
02173495	Sunnyside Canal at Orangeburg, SC	1.07	1986–98	1995	7.38	2,980	1/7/95	7.38	2,980	N	>100
02186000	Twelvemile Creek near Liberty, SC	106	1955–64, 1990–98	1998	13.46	6,730	1/8/98	13.46	6,730	N	25
02186645	Coneross Creek near Seneca, SC	65.4	1989–98	1994	15.26	3,590	8/17/94	15.26	3,590	N	5–10
02187252	Savannah River below Hartwell Lake near Hartwell, GA	2,090	1985–98	1997 1994	12.80 17.18	39,00 --	3/27/97	12.80	39,000	Y	--
02187900	Broadway Creek near Anderson, SC	26.4	1977–79, 1981–82, 1984–98	1995	15.81	2,720	8/27/95	15.81	2,720	N	25–50
02192500	Little River near Mount Carmel, SC	217	1940–79, 1981–82, 1984–85, 1987–98	1940	29.60	20,800	8/27/95	26.46	14,800	N	50–100
021973455	Indian Grave Branch at Savannah River site, SC	2.06	1987–96	1996 1991	3.99 5.90	52 --	6/14/96	3.99	52	Y	--
021973565	Steel Creek at Road A at Savannah River site, SC	--	1985–86, 1988–98	1998 1991	4.32 4.32	602 --	3/9/98	4.32	602	Y	--
02197380	Lower Three Runs below Par Pond at Savannah River site, SC	36.7	1980–82, 1987–98	1998	6.43	603	3/5/98	6.43	603	Y	--

[1]Regulated during flood: N, no; Y, yes.

South Dakota

Flooding occurred along the James River Basin in South Dakota (fig. 54) through the month of April 1995. Above-normal precipitation in March and April and rapid snowmelt from two significant winter storms in April kept the James River above flood stage throughout the month. Water levels were 3 to 6 feet above flood stage at the beginning of the month and 2 to 9 feet above flood stage at the end of the month. A significant amount of farmland and several roads were flooded throughout the month. Flooding along the James River continued from the end of April through all of May. An all-time record stage was recorded at Huron (streamgage 06476000, table 43) on May 19, and the river farther south reached levels not far below the all-time record. The most excessive and most widespread rain occurred on May 8–9 when 1 to 5 inches fell (National Oceanic and Atmospheric Administration, 1995a). Record streamflow occurred at 20 streamgages throughout South Dakota with many occurring in the Black Hills Region (table 43). More than $3.5 million in damage occurred (National Oceanic and Atmospheric Administration, 1995b).

Late March 1997 flooding from snowmelt of near-record to record snowpack occurred across parts of central and north-central South Dakota and most of northeastern South Dakota through the month of April. Much of the snowpack across northeastern South Dakota melted in the first week of April. The massive amount of water flooded many stretches of county and township roads as well as many State and Federal highways. The inundated sections of roads either were broken up or washed out. Hundreds of culverts were blown out or damaged, and many bridges either were damaged or washed out by ice flows and the high water. Many long-term residents said this was the worst flooding they had seen in their lifetimes. Little precipitation through mid- to late April allowed for a significant reduction in the flooding, although much of the area remained flooded into May. The total damage estimate for the March and April flooding, which included road, home, and sewer- and water-system damage, was $35 million (National Oceanic and Atmospheric Administration, 1997b). The record discharges on the James River in 1995 were nearly doubled during the flood of 1997. The record flooding on the James River in March and April continued a slow recession through the month of May. Thousands of acres of farmland and pastureland remained flooded by the James River through May. As a result, large economic losses were incurred from the inability to plant the flooded acres.

Excessive rain of 2 to 4 inches, with some amounts nearing 5 inches, fell across a large part northeastern South Dakota mainly on the evening of May 11, 1998 (National Oceanic and Atmospheric Administration, 1998a). This round of excessive rain only exacerbated the already extensive flooding occurring from many years of above-normal precipitation. Some residents of Blue Dog Lake said they had never seen the lake so high in more than 35 years of living there. Damage was almost $4 million (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1995a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1995b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

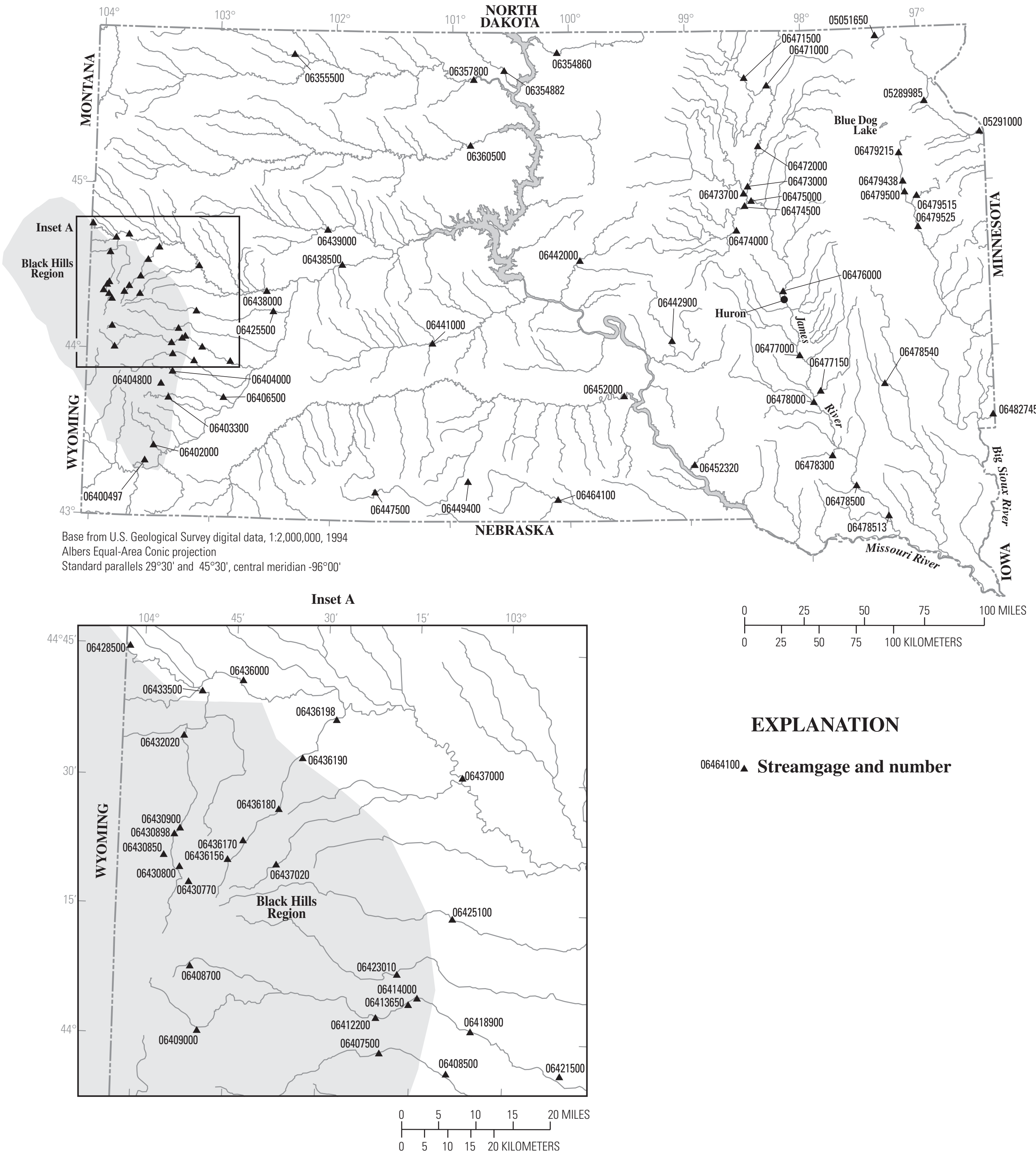


Figure 54. Location of streamgages with significant floods during 1994–98 water years for South Dakota.

Table 43. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Dakota.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 54)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05051650	La Belle Creek near Veblen, SD	8.74	1988–98	1996	7.34	664	5/18/96	7.34	664	N	5–20
				1997	10.60	100	4/4/97	10.60	100	N	--
05289985	Big Coulee Creek near Peever, SD	12.1	1988–98	1998	7.42	614	5/12/98	7.42	614	N	5–15
				1995	9.08	300	3/11/95	9.08	300	N	--
05291000	Whetstone River near Big Stone City, SD	39	1910–12, 1919, 1931–98	1919	26.00	29,000	4/6/97	14.21	7,930	N	15–25
06354860	Spring Creek near Herreid, SD	440	1963–87, 1989–97	1987	13.38	4,540	3/31/97	12.64	2,680	N	10–20
06354882	Oak Creek near Wakpala, SD	356	1985–98	1997	19.62	7,500	3/27/97	19.62	7,500	N	20–60
06355500	North Fork Grand River near White Butte, SD	1,190	1946–98	1950	20.00	30,900	3/21/97	11.00	4,000	Y	15–20
06357800	Grand River at Little Eagle, SD	5,370	1959–98	1987	19.16	31,000	3/27/97	16.96	20,900	Y	20–35
				1972	21.01	15,000					
06360500	Moreau River near Whitehorse, SD	4,880	1953, 1955–98	1997	26.93	29,700	3/23/97	26.93	29,700	N	25–40
06400497	Cascade Springs near Hot Springs, SD	.47	1977–96	1996	10.82	247	8/9/96	10.82	247	N	>100
06402000	Fall River at Hot Springs, SD	137	1938–98	1947	11.12	8,300	7/19/97	4.36	1,170	Y	20–35
06403300	French Creek above Fairburn, SD	105	1982–98	1995	4.08	1,060	5/8/95	4.08	1,060	N	20–45
06404000	Battle Creek near Keystone, SD	66.0	1946–47, 1962–98	1972	14.50	26,200	5/8/95	7.17	1,690	N	5–10
06404800	Grace Coolidge Creek near Hayward, SD	7.48	1989–98	1995	7.57	337	5/8/95	7.57	337	N	10–20
06406500	Battle Creek below Hermosa, SD	285	1989–98	1995	9.30	1,360	5/9/95	9.30	1,360	N	2–10

Table 43. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 54)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06407500	Spring Creek near Keystone, SD	163	1987–98	1995	7.96	913	5/9/95	7.96	913	N	10–20
06408500	Spring Creek near Hermosa, SD	199	1950–98	1972 1996	-- 12.24	13,400 6,910	5/30/96	12.24	6,910	N	35–60
06408700	Rhoads Fork near Rochford, SD	7.95	1982–98	1997	4.00	10	7/24/97	4.00	10	N	2–10
06409000	Castle Creek near Hill City, SD	79.2	1949–98	1952 1984	5.81 6.31	1,120 122	4/9/96	3.69	271	N	15–20
06412200	Rapid Creek above Victoria Creek near Rapid City, SD	355	1989–98	1997	8.38	1,180	6/2/97	8.38	1,180	Y	10–30
06413650	Lime Creek at mouth at Rapid City, SD	10.0	1981–83, 1988–98	1997	4.97	365	6/2/97	4.97	365	N	10–20
06414000	Rapid Creek at Rapid City, SD	410	1905–06, 1943–98	1972	19.66	50,000	6/2/97	11.18	3,190	Y	10–20
06418900	Rapid Creek below sewage treatment plant near Rapid City, SD	452	1982–98	1997	10.05	2,260	6/3/97	10.05	2,260	Y	25–50
06421500	Rapid Creek near Farmingdale, SD	602	1947–58, 1960–98	1972	11.85	7,320	5/27/96	10.77	3,830	Y	30–45
06423010	Boxelder Creek near Rapid City, SD	128	1981–98	1995 1996	33.09 33.46	1,080 1,060	5/10/95 5/31/96	33.09 33.46	1,080 1,060	N N	10–20 10–20
06425100	Elk Creek near Rapid City, SD	190	1979–93, 1995–98	1996	12.77	3,120	5/27/96	12.77	3,120	N	5–15
06425500	Elk Creek near Elm Springs, SD	540	1950–98	1952 1997	-- 16.22	8,540 3,000	5/28/96	14.85	7,660	N	10–15
06428500	Belle Fourche River at Wyoming-South Dakota State line	3,280	1947–98	1995	16.33	6,320	5/10/95 3/14/96	16.33 15.58	6,320 5,050	Y Y	40–80 20–35

Table 43. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 54)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06430770	Spearfish Creek near Lead, SD	63.5	1989–98	1998	8.39	181	8/20/98	8.39	181	Y	10–20
06430800	Annie Creek near Lead, SD	3.55	1989–98	1995	6.12	270	5/8/95	6.12	270	N	25–55
06430850	Little Spearfish Creek near Lead, SD	25.8	1989–98	1995	--	61	5/10/95	--	61	N	10–25
06430898	Squaw Creek near Spearfish, SD	6.95	1989–98	1995	9.47	860	5/8/95	9.47	860	N	25–100
06430900	Spearfish Creek above Spearfish, SD	139	1989–98	1995	7.42	2,890	5/8/95	7.42	2,890	Y	40–120
06432020	Spearfish Creek below Spearfish, SD	204	1989–98	1995	7.37	1,590	5/9/95	7.37	1,590	Y	25–70
06433500	Hay Creek at Belle Fourche, SD	121	1954–96	1995	10.23	1,280	5/9/95	10.23	1,280	N	40–80
06436000	Belle Fourche River near Fruitdale, SD	4,540	1946–98	1982	14.32	12,700	5/10/95	14.09	12,200	Y	15–35
06436156	Whitetail Creek at Lead, SD	6.15	1989–98	1995	6.67	507	5/8/95	6.67	507	N	20–45
06436170	Whitewood Creek at Deadwood, SD	40.6	1982–95	1995	10.63	3,540	5/8/95	10.63	3,540	N	10–20
06436180	Whitewood Creek above Whitewood, SD	56.3	1983–98	1995	9.06	3,800	5/8/95	9.06	3,800	N	30–60
06436190	Whitewood Creek near Whitewood, SD	77.4	1982–98	1995	6.01	3,930	5/8/95	6.01	3,930	N	15–25
06436198	Whitewood Creek above Vale, SD	102	1983–98	1995	5.72	4,250	5/8/95	5.72	4,250	N	10–20
06437000	Belle Fourche River near Sturgis, SD	5,870	1946–98	1982	19.10	36,400	5/10/95	17.10	20,000	Y	15–25
06437020	Bear Butte Creek near Deadwood, SD	16.6	1989–98	1995	8.34	1,590	5/8/95	8.34	1,590	N	15–30

Table 43. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 54)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06438000	Belle Fourche River near Elm Springs, SD	7,210	1927, 1929–98	1964 1927	15.90 21.80	45,100 --	5/27/96	17.28	39,900	Y	15–20
06438500	Cheyenne River near Plainview, SD	21,600	1920, 1927, 1951–81, 1995–98	1996	22.10	69,700	5/28/96	22.10	69,700	Y	30–60
06439000	Cherry Creek near Plainview, SD	1,190	1946–98	1952	22.63	17,500	5/29/96	19.43	9,430	N	15–25
06441000	Bad River near Midland, SD	1,460	1946–98	1967	24.44	29,400	5/29/96	22.99	16,300	N	25–30
06442000	Medicine Knoll Creek near Blunt, SD	317	1917, 1950–97	1991 1917	12.98 15.00	5,000 --	3/28/97	13.15	4,000	N	20–30
06442900	Elm Creek near Gann Valley, SD	381	1988–92, 1994–98	1997	15.58	3,440	3/28/97	15.58	3,440	N	15–40
06447500	Little White River near Martin, SD	310	1932, 1938–40, 1962–98	1997	13.48	1,300	6/4/97	13.48	1,300	N	25–40
06449400	Rosebud Creek at Rosebud, SD	50.8	1975–97	1995	10.53	670	6/23/95	10.53	670	N	15–20
06452000	White River near Oacoma, SD	10,200	1929–98	1952 1994	-- 24.70	51,900 25,000	6/5/97	18.58	33,700	N	15–20
06452320	Platte Creek near Platte, SD	741	1989–98	1995	11.29	2,600	5/11/95	11.29	2,600	N	2–10
06464100	Keya Paha River near Keyapaha, SD	466	1982–98	1997	9.48	1,020	2/20/97	9.48	1,020	N	5–15
06471000	James River at Columbia, SD	5,857	1946–98	1950 1997	16.89 18.63	5,420 4,130	4/30/97	18.63	4,130	Y	25–50
06471500	Elm River at Westport, SD	1,493	1947–98	1969	22.11	12,600	3/30/97	21.56	9,380	N	15–25

Table 43. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 54)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06472000	James River near Stratford, SD	8,865	1950–72, 1977, 1995, 1997	1997 1995	19.48 19.86	8,400 --	4/6/97	19.48	8,400	N	>100
06473000	James River at Ashton, SD	9,742	1946–98	1997	25.03	9,150	4/23/97	25.03	9,150	N	70–125
06473700	Snake Creek near Ashton, SD	2,657	1956–72, 1977–79, 1985–89, 1997	1997	20.74	15,000	4/1/97	20.74	15,000	N	60–150
06474000	Turtle Creek near Tulare, SD	1,124	1954–56, 1966–81, 1985–98	1997	18.80	13,500	3/28/97	18.80	13,500	N	30–60
06474500	Turtle Creek at Redfield, SD	1,481	1946–72, 1997	1997	18.32	13,500	3/29/97	18.32	13,500	N	35–70
06475000	James River near Redfield, SD	13,911	1950–98	1997	29.92	17,000	5/15/95 4/3/97	26.26 29.92	9,800 17,000	N N	45–70 >150
06476000	James River at Huron, SD	15,869	1881, 1922, 1929–32, 1944–98	1997	21.28	23,400	5/19/95 4/6/97	16.86 21.28	10,000 23,400	N N	25–40 >250
06477000	James River near Forestburg, SD	17,590	1920, 1922, 1950–98	1997	20.61	25,600	5/18/95 4/6/97	17.08 20.61	13,000 25,600	N N	25–40 >125
06477150	Rock Creek near Fulton, SD	240	1967–79, 1989–98	1997 1993	13.74 14.34	3,120 1,880	3/29/97	13.74	3,120	N	10–20
06478000	James River near Mitchell, SD	19,064	1954–58, 1966–72, 1995, 1997	1997	23.14	28,000	4/7/97	23.14	28,000	N	>100

Table 43. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in South Dakota.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 54)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06478300	Dry Creek near Parkston, SD	97.2	1956–80, 1989–97	1960	12.70	4,210	5/27/95	9.89	2,900	N	15–25
06478500	James River near Scotland, SD	20,653	1929–98	1984	20.45	29,400	5/29/95 4/9/97	19.39 19.87	18,100 28,000	N N	25–35 60–100
06478513	James River near Yankton, SD	20,942	1982–98	1997 1984	22.94 24.34	28,800 26,400	4/9/97	22.94	28,800	N	60–100
06478540	Little Vermillion River near Salem, SD	78.6	1967–98	1993	11.95	3,300	3/28/97	10.01	1,560	N	20–40
06479215	Big Sioux River near Florence, SD	638	1984–98	1997	9.32	2,000	4/4/97	9.32	2,000	N	15–30
06479438	Big Sioux River near Watertown, SD	1,007	1973–98	1997	12.09	7,820	4/5/97	12.09	7,820	N	45–100
06479500	Big Sioux River at Watertown, SD	1,129	1946–72, 1997	1997	12.49	5,800	4/6/97	12.49	5,800	N	>250
06479515	Willow Creek near Watertown, SD	110	1972–86, 1997	1997	10.93	3,650	4/5/97	10.93	3,650	N	20–60
06479525	Big Sioux River near Castlewood, SD	1,997	1977–98	1997	12.87	4,300	4/11/97	12.87	4,300	N	>150
06482745	Beaver Creek at Valley Springs, SD	104	1986–96	1994	24.89	2,280	6/13/94	24.89	2,280	N	5–15

[1]Regulated during flood: N, no; Y, yes.

Tennessee

Torrential rainfall of more than 7 inches in some areas occurred across the eastern one-third of Tennessee on March 27, 1994 (National Oceanic and Atmospheric Administration, 1994a) resulting in widespread flash flooding across that part of the State. Record discharges were measured at five streamgages (table 44). Three people were killed due to flash flooding. A 19-year-old man was killed near Sevierville (fig. 55) when he tried to cross a swollen creek. A woman was killed in Seymour when the car she was in washed off the road. In all, nearly 200 people were evacuated, more than 1,000 homes were affected by the floods, numerous roads and bridges were damaged or destroyed, and several mudslides and rockslides occurred. Damage totaled $155 million (National Oceanic and Atmospheric Administration, 1994b).

The Mississippi River went above flood stage on April 12, 1994, at Caruthersville, Missouri, producing flooding in northwest Tennessee. Several roads were closed for a few days due to the flooding. Overnight thunderstorms produced localized flash flooding in western Tennessee on April 28, 1994 (National Oceanic and Atmospheric Administration, 1994a).

Excessive rains across the Midwest forced the Mississippi River and some of its tributaries above flood stage in western Tennessee during the end of May 1995. About 35 miles of roads were underwater, and more than 145,000 acres of crops were flooded (National Oceanic and Atmospheric Administration, 1995b).

Excessive rain fell on ground already saturated from previous rains on August 11, 1996. Seventy-seven homes, 20 businesses, 4 public buildings, and 3 churches were extensively damaged in Chattanooga. Approximately $2 million in damage resulted (National Oceanic and Atmospheric Administration, 1996b).

Excessive rainfall during the first few days of March 1997 along with rivers that were already high caused prolonged flooding along the Mississippi and Tennessee Rivers and their tributaries. The Mississippi River reached levels that had not been seen since 1937. Numerous roads were closed for days. Near Jackson, two persons were killed when their car was swept off a flooded road. One person was killed near Memphis while attempting to cross a flooded bridge. One man also was killed near Union City when he fell out of a boat helping people out of their homes. Total damage was more than $22 million (National Oceanic and Atmospheric Administration, 1997b).

An estimated 8 inches of rain fell at Lawrenceburg on July 13–14, 1998, with 4 inches of rain falling in about 1 hour on July 13 (National Oceanic and Atmospheric Administration, 1998a). Two people were killed, and 20 were injured from the resulting flood. Damage was more than $4 million with 122 homes damaged or destroyed; 13 mobile homes and several small bridges were swept away. The water and sewage plant for Lawrenceburg was left inoperable (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

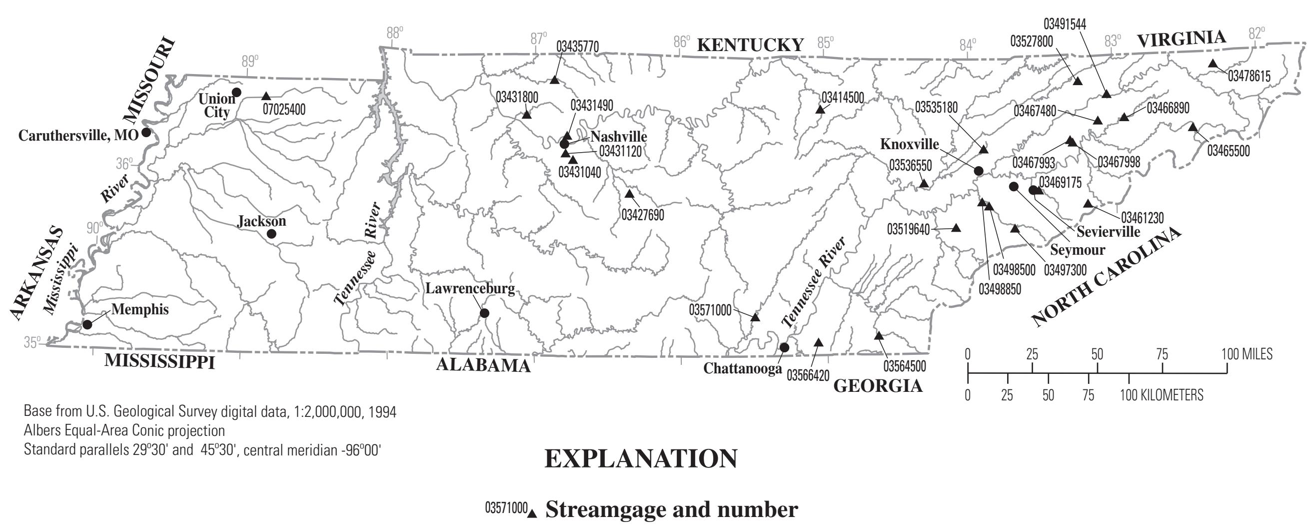


Figure 55. Location of streamgages with significant floods during 1994–98 water years for Tennessee.

Table 44. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Tennessee.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 55)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03414500	East Fork Obey River near Jamestown, TN	202	1929, 1943–98	1973 1929	30.46 30.70	44,800 --	11/30/96	29.11	39,800	N	25
03427690	Bushman Creek at Pitts Lane Ford near Compton, TN	9.67	1989–98	1996	7.24	2,020	7/21/96	7.24	2,020	N	25
03431040	Sevenmile Creek at Blackman Road near Nashville, TN	12.2	1965–98	1998	10.57	10,500	6/4/98	10.57	10,500	N	>100
03431120	West Fork Browns Creek at Gen Bates Drive at Nashville, TN	3.30	1965–98	1975	7.00	2,110	11/27/94	6.67	1,840	N	10
03431490	Pages Branch at Avondale, TN	2.01	1977–98	1995 1998	6.03 6.32	2,800 1,430	11/27/94	6.03	2,800	N	25
03431800	Sycamore Creek near Ashland City, TN	97.2	1962–87, 1989–98	1989	13.50	18,500	3/3/97	13.45	18,200	N	15–20
03435770	Sulphur Fork Red River above Springfield, TN	65.6	1976–97	1997	14.52	12,100	3/3/97	14.52	12,100	N	10–15
03461230	Caney Creek near Cosby, TN	1.62	1967–98	1996	6.45	275	1/26/96	6.45	275	N	30–35
03465500	Nolichucky River at Embreeville, TN	805	1901, 1921–98	1901	24.00	120,000	1/15/95	15.53	64,000	N	25
03466890	Lick Creek near Albany, TN	172	1985–98	1994	17.41	10,800	3/27/94	17.41	10,800	N	100
03467480	Bent Creek at Taylor Gap, TN	2.18	1986–98	1994	15.56	2,550	3/27/94	15.56	2,550	N	10
03467993	Cedar Creek near Valley Home, TN	2.01	1986–98	1997	13.38	210	4/29/97	13.38	210	N	20–25
03467998	Sinking Fork at White Pine, TN	6.38	1986–98	1998	7.25	1,600	4/17/98	7.25	1,600	N	15–20
03469175	Little Pigeon River above Sevierville, TN	184	1989–98	1994	17.50	19,700	3/28/94	17.50	19,700	N	25–50
03478615	Evans Creek near Blountville, TN	2.50	1984–98	1996	12.68	98	5/25/96	12.68	98	N	5–10

Table 44. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Tennessee.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 55)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03491544	Crockett Creek below Rogersville, TN	4.67	1989–98	1998	5.39	996	4/17/98	5.39	996	N	10–25
03497300	Little River above Townsend, TN	106	1964–98	1994	15.75	27,100	3/27/94	15.75	27,100	N	>100
03498500	Little River near Maryville, TN	269	1875, 1896, 1920, 1951–98	1875 1896	31.00 31.00	50,000 36,000	3/28/94	27.95	42,100	N	100
03498850	Little River near Alcoa, TN	300	1986–98	1994	25.63	28,000	3/28/94 4/19/98	25.63 19.58	28,000 13,000	N N	25–50 --
03519640	Baker Creek near Greenback, TN	16.0	1966–98	1998	10.61	4,100	4/17/98	10.61	4,100	N	50
03527800	Big War Creek at Luther, TN	22.3	1986–98	1998	10.61	4,100	4/17/98	10.61	4,100	N	25–50
03535180	Willow Fork near Halls Crossroads, TN	3.23	1967–98	1998	8.40	990	4/17/98	8.40	990	N	25–30
03536550	Whiteoak Creek below Melton Valley Drive near Oak Ridge, TN	3.28	1985–96	1996	6.55	728	5/26/96	6.55	728	N	10–25
03564500	Ocoee River at Parksville, TN	595	1907, 1912–16, 1922–94	1990 1907	24.76 --	61,800 65,000	3/27/94	22.36	42,000	Y	75–100
03566420	Wolftever Creek near Ooltewah, TN	18.8	1965–98	1973	9.75	7,300	3/28/94	9.08	5,110	N	40–45
03571000	Sequatchie River near Whitwell, TN	402	1867, 1921–94	1991 1867	18.02 19.00	35,400 --	2/11/94	16.68	25,100	N	20–25
07025400	North Fork Obion River near Martin, TN	372	1939–67, 1997–98	1958	23.05	30,300	3/2/97	22.98	27,000	N	25–50

[1]Regulated during flood: N, no; Y, yes.

Texas

Excessive rains began falling late October 17, 1994, in southeastern Texas from Austin to Livingston (fig. 56). Rainfall amounts overnight ranged from 10 to 18 inches in 16 counties (National Oceanic and Atmospheric Administration, 1994a), and most of these areas experienced flash flooding during the night. During the night, five lives were lost in the flash floods in three separate instances. During the day, September 18, an additional seven people drowned in the flood, bringing the 2-day total to 12 people. On October 19, the storms moved farther south and began affecting the counties along the coast of the Gulf of Mexico. Over the next 2 days, an additional five people died as a result of the floods. Total rainfall for the entire storm generally ranged from 10 to 20 inches, with Liberty recording 30.50 inches of rain during the storm (National Oceanic and Atmospheric Administration, 1994a). Before the flash-flood-producing rains had ended, flooding of rivers, creeks, and bayous had begun and would continue, in some areas, to the end of October.

The Trinity River experienced extensive flooding from just upstream from Lake Livingston to the mouth of the Trinity River at Trinity Bay. A record-high elevation on Lake Livingston was recorded on October 17, which resulted in a record release from the dam of more than 110,000 cubic feet per second. This record release, in combination with an additional inflow of 45,000 cubic feet per second downstream from the dam, led to a record flood along the Trinity River downstream from Lake Livingston. The Trinity River at Liberty (streamgage 08067000, table 45) set a new record crest on October 18, and when a levee system failed, much of the city of Liberty was flooded.

The San Jacinto River and 24 other streamgages in southeast Texas were also at record heights during the flood (table 45). Lake Conroe reached a record elevation on the afternoon of October 17, which resulted in record releases from the lake and also resulted in record flood stages along the San Jacinto River all the way to Lake Houston. The excessive inflow resulted in a record elevation at Lake Houston of 52.76 feet, which is 3 feet higher than the previous record. The uncontrolled spillway at Lake Houston released an estimated 354,000 cubic feet per second into the lower San Jacinto River that flows into the Houston Ship Channel. The tremendous flows caused four fuel pipelines to rupture resulting in a fuel spill in the river and subsequent fires. The floods on the Brazos River lasted until October 27, 1994.

In summary, 17 people lost their lives during the flood, more than 13,000 people had to be evacuated, and more than 22,000 homes received flood damage. Total damage to homes and businesses was approximately $800 million, while another $100 million in damage occurred to roads and bridges throughout southeast Texas (National Oceanic and Atmospheric Administration, 1994b). During the height of the flood, several major highways leading into and out of Houston were impassable due to high water.

On May 5, 1995, more than 3 inches of rain in 30 minutes and as much as 5 inches in 1 hour caused massive flash flooding across the city of Dallas (National Oceanic and Atmospheric Administration, 1995a). Seventeen people drowned, most were in cars trying to cross flooded intersections, low-lying areas, or flooded creeks. The flooding destroyed four single-family homes and damaged 93, destroyed 166 multi-family housing units, and damaged 54 businesses. Excessive rainfall continued into June 1995, especially along the Red River Valley. The peak of 48 years of record occurred on the Red River near Burkburnett (streamgage 07308500, table 45) on June 6, 1995.

Tropical Storm Josephine caused coastal flooding along the upper Texas coast on October 28, 1996. Tides ranged from 2 to 5 feet above predicted levels and caused substantial beach erosion and damaged beach houses and low-lying coastal roads. Seven homes were destroyed, and 75 to 80 homes were damaged. Rainfall of as much as 13 inches in the headwaters of the Nueces River on October 27–28 (National Oceanic and Atmospheric Administration, 1996a) caused the river to rise rapidly. The Nueces River crested at 24.88 feet (13.88 feet above flood stage) just south of Uvalde (streamgage 08192000, table 45). This was the highest reading since 1962. Flooding also occurred along the Frio River due to the excessive rainfall. Total damage was more than $18 million (National Oceanic and Atmospheric Administration, 1996b).

An upper level, low-pressure system was stationary over south-central Texas during June 21–23, 1997. Spiral rain bands around the low repeatedly moved over the same areas, bringing continuous flooding rains. Several river flood warnings were issued along the Llano and Colorado Rivers. The Llano River at Llano (streamgage 08151500, table 45) crested at 38.86 feet. This crest was the highest since 1935. Damage was more than $47 million, and there were three deaths (National Oceanic and Atmospheric Administration, 1997b).

During August 21–26, 1998, Tropical Storm Charley spread excessive rainfall over much of south-central Texas. Thunderstorms produced rainfall rates approaching 5 inches per hour (National Oceanic and Atmospheric Administration, 1998a). Flooding occurred on the Frio, Nueces, and Rio Grande Rivers. Del Rio received nearly all of its average annual precipitation (18 inches) during a 2-day period (National Oceanic and Atmospheric Administration, 1998a). Flooding occurred downstream from Del Rio on the Rio Grande. More than $43 million in damage and 13 deaths resulted from Tropical Storm Charley (National Oceanic and Atmospheric Administration, 1998b).

Tropical Storm Frances came onshore near the same location as Tropical Storm Charley on September 10, 1998. However, Frances tracked to the north over Dallas, dropping from 4 to 12 inches of rainfall in central Texas (National Oceanic and Atmospheric Administration, 1998a). Some significant floods occurred near Houston, and damage primarily was due to high winds and coastal flooding with some inland flooding.

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

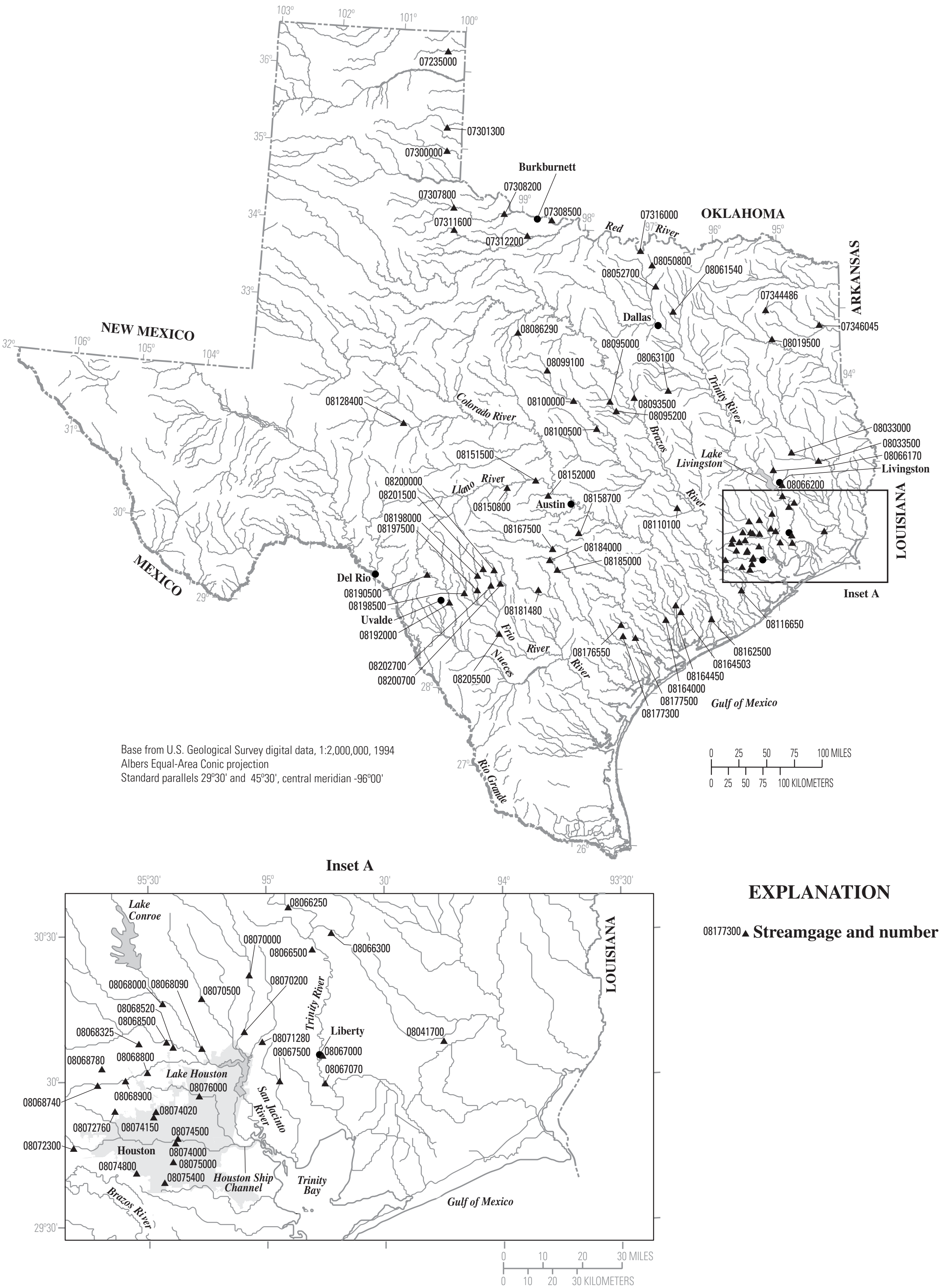


Figure 56. Location of streamgages with significant floods during 1994–98 water years for Texas.

Table 45. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Texas.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 56)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood	Recurrence interval (years)
07235000	Wolf Creek at Lipscomb, TX	697	1938–42, 1962–98	1942 1996	11.57 12.44	20,000 10,300	9/19/96	12.44	10,300	Y	10
07300000	Salt Fork Red River near Wellington, TX	1,222	1953–98	1957	19.00	146,000	4/3/97	17.10	81,100	Y	15
07301300	North Fork Red River near Shamrock, TX	1,082	1964–97	1995	8.49	25,600	6/3/95	8.49	25,600	N	>100
07307800	Pease River near Childress, TX	2,754	1960–62, 1968–98	1995	17.12	28,500	6/5/95	17.12	28,500	N	>100
07308200	Pease River near Vernon, TX	3,488	1960–89, 1991, 1993–98	1984	20.15	40,500	8/2/95	19.23	32,800	N	20
07308500	Red River near Burkburnett, TX	20,570	1960–98	1995 1984	16.61 16.90	174,000 166,000	6/6/95	16.61	174,000	N	>100
07311600	North Wichita River near Paducah, TX	540	1962–82, 1995–98	1995	19.76	18,100	6/5/95	19.76	18,100	N	>100
07312200	Beaver Creek near Electra, TX	652	1961–98	1995 1987	34.87 34.94	11,700 11,600	8/3/95	34.87	11,700	Y	75
07316000	Red River near Gainesville, TX	30,782	1936–98	1987	40.08	265,000	6/13/95	36.63	169,000	Y	--
07344486	Brushy Creek at Scroggins, TX	23.4	1979–98	1995	14.96	10,700	11/5/94	14.96	10,700	N	>100
07346045	Black Cypress Bayou at Jefferson, TX	365	1969–98	1988	19.34	11,600	4/29/97	18.88	10,100	N	20
08019500	Big Sandy Creek near Big Sandy, TX	231	1939–98	1945	24.10	24,000	11/7/94	17.89	6,040	Y	5
08033000	Neches River near Diboll, TX	2,724	1884, 1900, 1924–25, 1940–98	1884	21.00	110,000	10/17/94	18.16	44,900	Y	15
08033500	Neches River near Rockland, TX	3,636	1884, 1904–11, 1914–98	1884	34.90	62,000	10/20/94	33.29	42,300	Y	15

Table 45. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Texas.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 56)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08041700	Pine Island Bayou near Sour Lake, TX	336	1968–98	1995	37.50	48,800	10/20/94	37.50	48,800	N	>100
08050800	Timber Creek near Collinsville, TX	38.8	1986–98	1994	14.94	13,300	7/10/94	14.94	13,300	N	20
08052700	Little Elm Creek near Aubrey, TX	75.5	1957–76, 1980–98	1994	18.27	36,200	7/11/94	18.27	36,200	Y	>100
08061540	Rowlett Creek near Sachse, TX	120	1969–98	1998	28.07	32,200	1/5/98	28.07	32,200	N	20
08063100	Richland Creek near Dawson, TX	333	1961–93, 1995–98	1962 1998	21.64 22.61	15,800 3,790	1/6/98	22.61	3,790	Y	--
08066170	Kickapoo Creek near Onalaska, TX	57.0	1966–98	1995	41.85	84,600	10/17/94	41.85	84,600	N	>100
08066200	Long King Creek at Livingston, TX	141	1963–98	1995	30.49	50,900	10/17/94	30.49	50,900	N	>100
08066250	Trinity River near Goodrich, TX	16,844	1966–98	1995	48.97	125,000	10/18/94	48.97	125,000	Y	--
08066300	Menard Creek near Rye, TX	152	1966–98	1995	31.12	13,700	10/17/94	31.12	13,700	N	40
08066500	Trinity River at Romayor, TX	17,186	1924–98	1995	42.70	122,000	10/19/94	42.70	122,000	Y	75
08067000	Trinity River at Liberty, TX	17,468	1940–70, 1973–98	1995	31.00	135,000	10/18/94	31.00	135,000	Y	75
08067070	Coastal Water Authority Canal near Dayton, TX	--	1982–98	1998	3.07	1,220	6/2/98	3.07	1,220	Y	--
08067500	Cedar Bayou near Crosby, TX	64.9	1972–98	1995	28.33	7,800	10/18/94	28.33	7,800	N	>100
08068000	West Fork San Jacinto River near Conroe, TX	828	1913, 1924–27, 1940–98	1995	32.30	115,000	10/18/94	32.30	115,000	Y	50
08068090	West Fork San Jacinto River above Lake Houston near Porter, TX	962	1985–98	1995	40.10	130,000	10/18/94	40.10	130,000	Y	--

Table 45. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Texas.—Continued

[mi2, square miles; ft, feet above an arbitrary datum; ft3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 56)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08068325	Willow Creek near Tomball, TX	41.0	1984, 1986–87, 1989–98	1998 1995	29.36 31.81	1,920 --	1/7/98	29.36	1,920	N	--
08068500	Spring Creek near Spring, TX	409	1929, 1939–98	1995	44.05	78,800	10/18/94	44.05	78,800	N	>100
08068520	Spring Creek at Spring, TX	419	1929, 1939–95	1995	44.05	78,800	10/18/94	44.05	78,800	N	>100
08068740	Cypress Creek at House-Hahl Road near Cypress, TX	131	1975–98	1995	47.61	5,200	10/19/94	47.61	5,200	N	>100
08068780	Little Cypress Creek near Cypress, TX	41.0	1983–98	1995	81.41	4,520	10/18/94	81.41	4,520	N	25
08068800	Cypress Creek at Grant Road near Cypress, TX	214	1983–98	1995	47.38	10,500	10/18/94	47.38	10,500	N	>100
08068900	Cypress Creek at Stuebner-Airline Road near Westfield, TX	248	1984–85, 1988–98	1995	39.61	11,300	10/19/94	39.61	11,300	N	--
08070000	East Fork San Jacinto River near Cleveland, TX	325	1935, 1940–98	1995	24.57	63,000	10/18/94	24.57	63,000	N	100
08070200	East Fork San Jacinto River near New Caney, TX	388	1985–98	1995	33.00	74,100	10/19/94	33.00	74,100	N	>100
08070500	Caney Creek near Splendora, TX	105	1944–98	1995	26.40	36,000	10/17/94	26.40	36,000	N	>100
08071280	Luce Bayou above Lake Houston near Huffman, TX	218	1985–98	1995	35.08	25,900	10/18/94	35.08	25,900	N	25
08072300	Buffalo Bayou near Katy, TX	63.3	1978–98	1994	38.85	3,780	2/21/94	38.85	3,780	N	50
08072760	Langham Creek at West Little York Road near Addicks, TX	24.6	1981–98	1997 1981	22.62 22.80	1,820 1,000	5/24/97	22.62	1,820	N	10
08074000	Buffalo Bayou at Houston, TX	358	1929, 1936–98	1936	49.00	40,000	9/11/98	36.33	13,400	Y	--
08074020	Whiteoak Bayou at Alabonson Road at Houston, TX	--	1984, 1986–98	1998 1992	48.54 49.58	13,300 8,610	9/11/98	48.54	13,300	N	50

Table 45. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Texas.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 56)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08074150	Cole Creek at Deihl Road, Houston, TX	7.50	1964–86, 1990–98	1998	80.86	2,860	9/11/98	80.86	2,860	N	--
08074500	Whiteoak Bayou at Houston, TX	86.3	1929, 1936–98	1992 1936	50.43 51.50	25,100 14,750	9/11/98	47.06	21,200	N	--
08074800	Keegans Bayou at Roark Road near Houston, TX	12.7	1965–98	1992	75.91	4,880	10/18/94	75.87	4,850	N	--
08075000	Brays Bayou at Houston, TX	94.9	1929, 1936–98	1976	52.13	29,000	10/18/94	51.02	27,000	N	--
08075400	Sims Bayou at Hiram Clarke Street, Houston, TX	20.2	1965–98	1995 1976	54.65 57.12	7,510 4,500	10/18/94	54.65	7,510	N	--
08076000	Greens Bayou near Houston, TX	68.7	1953–98	1989	66.04	16,500	5/24/97	62.77	13,100	N	--
08086290	Big Sandy Creek above Breckenridge, TX	280	1962–98	1982	28.60	80,000	9/15/96	26.53	15,000	N	50
08093500	Aquilla Creek near Aquilla, TX	308	1936, 1939–98	1936	33.00	74,200	12/21/97	28.38	14,200	Y	5
08095000	North Bosque River near Clifton, TX	968	1924–98	1992	38.30	200,000	3/16/98	34.88	137,000	Y	>100
08095200	North Bosque River at Valley Mills, TX	1,146	1960–98	1992	44.60	220,000	3/16/98	39.40	92,000	Y	10
08099100	Leon River near De Leon, TX	479	1961–98	1990	19.00	24,500	6/24/97	16.37	10,500	Y	--
08100000	Leon River near Hamilton, TX	1,891	1925–31, 1962–98	1992	35.02	32,100	2/20/97	33.42	27,200	Y	--
08100500	Leon River at Gatesville, TX	2,342	1908, 1951–98	1992 1908	35.00 35.00	68,000 70,000	2/24/97	31.04	31,000	Y	10
08110100	Davidson Creek near Lyons, TX	195	1963–98	1995	19.33	26,400	10/17/94	19.33	26,400	N	100
08116650	Brazos River near Rosharon, TX	45,339	1967–80, 1984–98	1995 1992	51.82 51.89	84,400 82,700	10/22/94	51.82	84,400	Y	--
08128400	Middle Concho River above Tankersley, TX	2,084	1961–98	1974	24.98	15,500	8/29/96	24.30	14,400	N	25

Table 45. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Texas.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 56)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08150800	Beaver Creek near Mason, TX	215	1964–98	1978	24.00	66,900	10/28/96	19.45	45,900	N	25
08151500	Llano River at Llano, TX	4,197	1935, 1940–98	1935	41.50	380,000	6/23/97	38.86	260,000	N	50
08152000	Sandy Creek near Kingsland, TX	346	1952, 1967–95, 1998	1952	34.20	163,000	5/29/95	31.22	107,000	N	>100
08158700	Onion Creek near Driftwood, TX	124	1941, 1980–94, 1996–98	1997	17.56	10,000	6/9/97	17.56	10,000	N	5
08162500	Colorado River near Bay City, TX	42,240	1940, 1948–98	1960 1940	46.40 46.60	84,100 83,300	10/20/94	38.67	71,100	Y	--
08164000	Lavaca River near Edna, TX	817	1936, 1939–98	1995	35.49	150,000	10/19/94	35.49	150,000	N	>100
08164450	Sandy Creek near Louise, TX	289	1978–98	1995	28.45	24,900	10/19/94	28.45	24,900	N	>100
08164503	West Mustang Creek near Ganado, TX	178	1978–98	1995	28.39	20,000	10/19/94	28.39	20,000	N	>100
08167500	Guadalupe River near Spring Branch, TX	1,315	1923–92, 1994–98	1978	45.25	160,000	6/22/97	45.12	116,000	N	50
08176550	Fifteenmile Creek near Weser, TX	167	1985–98	1997	26.68	19,400	6/21/97	26.68	19,400	N	--
08177300	Perdido Creek at Farm Road 622 near Fannin, TX	28.0	1979–98	1997	17.89	26,510	4/4/97	17.89	26,510	N	25
08177500	Coleto Creek near Victoria, TX	514	1939–54, 1967, 1979–98	1967	42.00	236,000	4/4/97	32.05	50,100	Y	10
08181480	Leon Creek at Interstate Highway 35 at San Antonio, TX	219	1985–98	1997	24.60	27,900	6/22/97	24.60	27,900	N	--
08184000	Cibolo Creek near Bulverde, TX	198	1946–65, 1997	1997 1958	-- 22.50	61,600 21,100	6/22/97	--	61,600	N	>100
08185000	Cibolo Creek at Selma, TX	274	1946–98	1997	29.73	69,600	6/22/97	29.73	69,600	Y	50

Table 45. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Texas.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 56)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
08190500	West Nueces River near Brackettville, TX	694	1935, 1940–50, 1957–98	1935	40.00	550,000	10/28/96	30.74	230,000	N	50
08192000	Nueces River below Uvalde, TX	1,861	1928–98	1935	49.40	616,000	10/28/96	24.88	201,000	N	25
08197500	Frio River below Dry Frio River near Uvalde, TX	631	1952–98	1997	25.09	100,000	6/22/97	25.09	100,000	N	50
08198000	Sabinal River near Sabinal, TX	206	1943–98	1958 1997	24.60 28.50	55,200 52,500	6/22/97	28.50	52,500	N	100
08198500	Sabinal River at Sabinal, TX	241	1932, 1953–98	1997	35.86	93,500	6/22/97	35.86	93,500	N	>100
08200000	Hondo Creek near Tarpley, TX	95.6	1932, 1953–98	1997	29.64	76,900	6/22/97	29.64	76,900	N	100
08200700	Hondo Creek at King Waterhole near Hondo, TX	149	1961–98	1997	18.96	63,600	6/22/97	18.96	63,600	N	100
08201500	Seco Creek at Miller Ranch near Utopia, TX	45.0	1958, 1962–98	1997	17.70	64,900	6/22/97	17.70	64,900	N	>100
08202700	Seco Creek at Rowe Ranch near D'Hanis, TX	168	1932, 1961–98	1997	30.62	51,400	6/22/97	30.62	51,400	N	50
08205500	Frio River near Derby, TX	3,429	1916–98	1932	29.45	230,000	6/24/97	21.77	56,400	N	50

[1]Regulated during flood: N, no; Y, yes.

Utah

A powerful Pacific storm system affected Utah during March 1995. Total storm snowfall in the northern mountains included 25 inches at Alta and 21 inches at Park City (fig. 57). In the southern mountains, Brian Head recorded 38 inches of snow (National Oceanic and Atmospheric Administration, 1995a). In southwestern Utah, the combination of excessive rain, deep snow, and already saturated soils produced significant flooding. Flooding began first on the Santa Clara River after Gunlock Reservoir began to overflow. A record flow of 3,500 cubic feet per second was measured at the Gunlock Reservoir spillway (National Oceanic and Atmospheric Administration, 1995b). Damage estimates to public and private property in Washington County were $1.4 million (National Oceanic and Atmospheric Administration, 1995b). Snowmelt and thunderstorm activity throughout Utah caused 10 streamgages to experience their peak of record (table 46) in 1995.

Intense downpours occurred across southern Utah on September 14, 1996. A flash flood occurred in a portion of White Canyon, about 10 miles northwest of Natural Bridges National Monument. The floodwaters claimed the life of a 16-year-old girl (National Oceanic and Atmospheric Administration, 1996b).

Excessive rains fell in southwest Utah during November 21–22, 1996. Some of the worst flooding in the State's history was reported near Washington. The mountains of southwest Utah received 2 to 4 inches of rainfall, and valley locations had from 1 to 2 inches (National Oceanic and Atmospheric Administration, 1996a). Rainfall rates of as much as 1 inch per hour were measured. Although the damage was more than $5 million, there were only two known injuries. Excessive rains returned in January 1997 to the same part of southwestern Utah, and another $5 million in damage resulted (National Oceanic and Atmospheric Administration, 1997b).

On July 22, 1998, a flash flood moved down Canal Creek Canyon just south of Spring City. Several roads were damaged, and four bridges were washed out. Crops were ruined in the area as well (National Oceanic and Atmospheric Administration, 1998b).

A 10-year-old girl drowned on September 5, 1998, in a flash flood in Ice Cream Canyon, located in the southern part of Glen Canyon National Recreation Area, when 0.87 inch of rain fell in a short period of time in the area (National Oceanic and Atmospheric Administration, 1998b).

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National Oceanic and Atmospheric Administration (NOAA), 1995b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

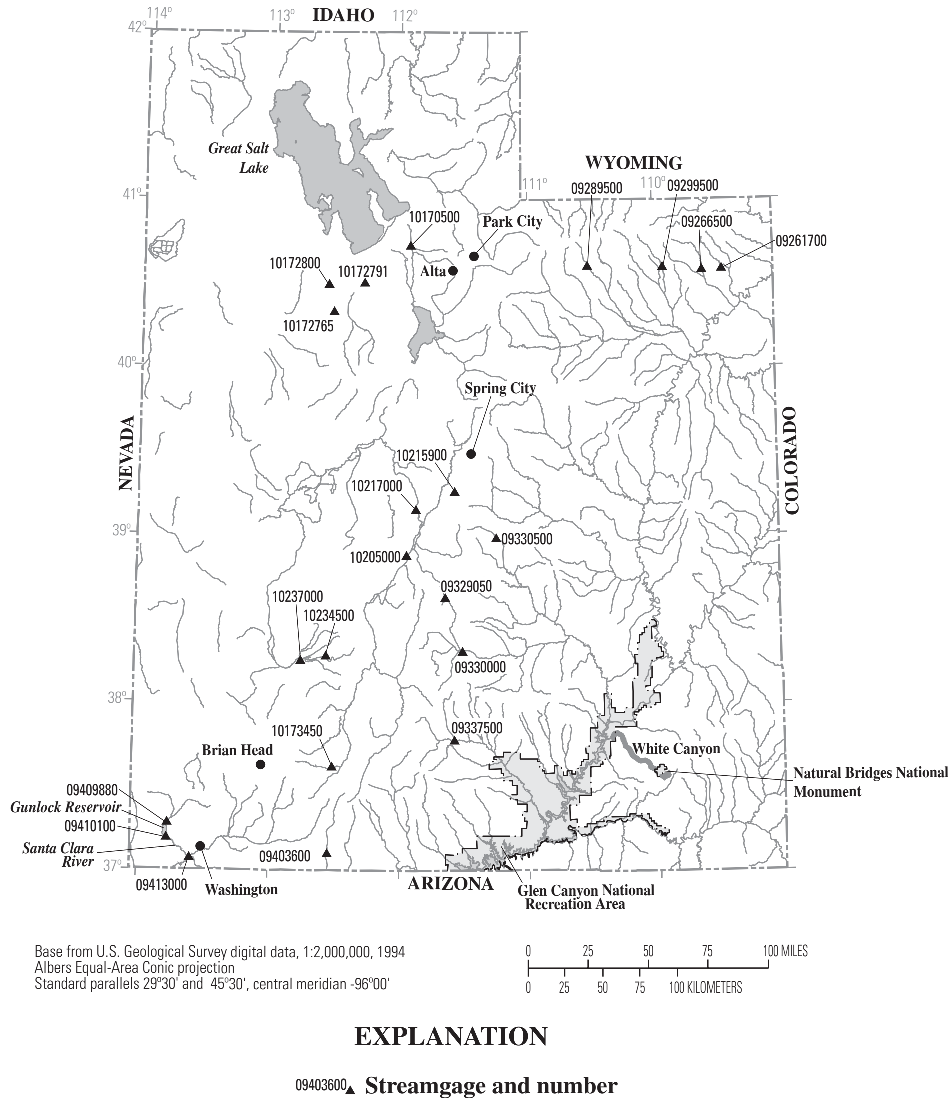

Figure 57. Location of streamgages with significant floods during 1994–98 water years for Utah.

Table 46. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Utah.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 57)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09261700	Big Brush Creek above Red Fleet Reservoir near Vernal, UT	77.2	1980–98	1998 1980	2.09 3.06	384 314	5/22/98	2.09	384	Y	10–25
09266500	Ashley Creek near Vernal, UT	101	1912, 1914–98	1995	5.64	4,100	6/15/95	5.64	4,100	N	~500
09289500	Lake Fork River above Moon Lake near Mountain Home, UT	77.9	1933–34, 1943–55, 1964–98	1995	6.44	2,740	6/27/95	6.44	2,740	N	75–100
09299500	Whiterocks River near Whiterocks, UT	109	1902–03, 1909, 1918–25, 1927, 1930–98	1983	5.28	4,640	6/26/95	6.98	2,820	N	75–90
09329050	Seven Mile Creek near Fish Lake, UT	24	1965–98	1995 1984	3.52 4.03	424 369	6/12/95	3.52	424	N	40–50
09330000	Fremont River near Bicknell, UT	751	1938–43, 1945–58, 1977–97	1997	7.02	1,360	3/21/97	7.02	1,360	Y	50–60
09330500	Muddy Creek near Emery, UT	105	1909, 1911–14, 1949–98	1952	11.14	3,340	8/11/95	10.05	3,140	N	50–60
09337500	Escalante River near Escalante, UT	320	1910–12, 1943–55, 1972–98	1998	11.05	4,550	8/24/98	11.05	4,550	N	35–40
09403600	Kanab Creek near Kanab, UT	198	1979–98	1961	15.70	3,030	1/3/97	7.97	2,300	N	5–10
09409880	Santa Clara River at Gunlock, UT	271	1970–98	1995	8.07	2,830	3/11/95	8.07	2,830	Y	20–30

Table 46. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Utah.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 57)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
09410100	Santa Clara River below Winsor Dam near Santa Clara, UT	378	1972–98	1995	20.17	3,460	3/12/95	20.17	3,460	Y	30–40
09413000	Santa Clara River at St. George, UT	541	1951–56, 1985–98	1995	14.60	6,000	3/12/95	14.60	6,000	Y	10–25
10170500	Surplus Canal at Salt Lake City, UT	--	1943–98	1984	8.91	4,410	6/17/98	16.79	3,500	Y	--
10172765	Clover Creek above Big Hollow near Clover, UT	6.71	1985–98	1995	2.26	47	6/6/95	2.26	47	N	20–30
10172791	Settlement Creek above reservoir near Tooele, UT	16.8	1989–98	1995 1990	4.41 4.59	67 7	6/15/95	4.41	67	N	5–10
10172800	South Willow Creek near Grantsville, UT	4.19	1963–98	1998	2.45	118	7/24/98	2.45	118	N	75–100
10173450	Mammoth Creek above West Hatch Ditch near Hatch, UT	105	1965–98	1983	5.13	838	6/14/95	4.79	654	N	5–10
10205000	Sevier River near Sigurd, UT	3,375	1915–98	1922 1995	6.10 8.33	2,400 1,310	6/15/95	8.33	1,310	Y	25–30
10215900	Manti Creek below Dugway Creek near Manti, UT	26.4	1965–74, 1979–98	1995	5.49	705	6/28/95	5.49	705	N	25–30
10217000	Sevier River below San Pitch River near Gunnison, UT	4,921	1918–98	1984 1995	-- 9.17	5,400 3,290	6/15/95	9.17	3,290	Y	40–50
10234500	Beaver River near Beaver, UT	91.0	1914–98	1936 1937	7.27 7.95	1,080 749	6/15/95	3.16	1,050	N	25–30
10237000	Beaver River at Adamsville, UT	303	1914–98	1995 1980	5.52 7.04	1,870 728	6/6/95	5.52	1,870	Y	75–100

[1]Regulated during flood: N, no; Y, yes.

Vermont

High water occurred at Lake Champlain in northwestern Vermont (fig. 58) starting in April 1994, which resulted in flood damage to homes and roadways, shoreline erosion, and washing of debris into the lake and onto lakeshores. Compared to the record flood in 1993, water levels peaked about 6 inches lower, and there was much less damage. The worst damage occurred on the morning of April 19 when a thick ice pack on the lake broke up as strong south winds pushed masses of ice northward on the lake. The ice caused an estimated $500,000 to $700,000 in damage when it sheared off 11 high-voltage utility poles (National Oceanic and Atmospheric Administration, 1994b).

A cold front moved southeast from Canada during the afternoon of August 4, 1995, and focused the most intense rains across northern Vermont. More than 5.5 inches of rain fell from the remnants of Tropical Storm Dean as a result of tropical moisture moving northeast along the front (National Oceanic and Atmospheric Administration, 1995a). A woman was killed when her car went into a culvert, which had been washed out. Road washouts and closures were reported in many areas across Vermont. Extensive crop damage also was reported. Total damage was more than $5 million (National Oceanic and Atmospheric Administration, 1995b).

A strong storm system moved in from the Great Lakes to Vermont on January 18, 1996. The circulation associated with this storm resulted in above-normal temperatures, strong winds, and flooding due to snowmelt and rainfall. Two deaths were attributed to the flooding. Damage was more than $30 million (National Oceanic and Atmospheric Administration, 1996b).

A very moist and unstable atmosphere remained over Vermont on June 13, 1996. This produced a second straight day of torrential rains from training thunderstorms in the Grafton area, which resulted in disastrous flash flooding. Grafton was completely isolated with all roads becoming impassable. The Saxtons River reached its third highest stage of record. Several bridges were severely damaged, and 14 homes were affected by the flooding with 3 homes sustaining severe damage. Total damage was $1.5 million (National Oceanic and Atmospheric Administration, 1996b).

A cold front stalled across northern Vermont during the morning hours of July 15, 1997, and focused excessive convective rain east of St. Albans during the morning of July 15. This resulted in numerous road and bridge washouts. Extensive flooding of tributary rivers was followed by flooding of larger rivers. Damage in northwestern Vermont was more than $8 million (National Oceanic and Atmospheric Administration, 1997b).

An area of low pressure tracked across New York and New England on June 26–27, 1998. Excessive convective rains fell with 3 to 8 inches across the midsection of Vermont. Extensive flooding occurred, especially along the Mad River, White River, and Ayers Brook (table 47). Damage was $13 million (National Oceanic and Atmospheric Administration, 1998b).

A cold front moved across the region on August 11–12, 1998. With a warm, humid air mass in place, thunderstorms resulted in torrential downpours during the night. Small streams and brooks quickly rose out of their banks. Road flooding was especially severe in St. Albans.

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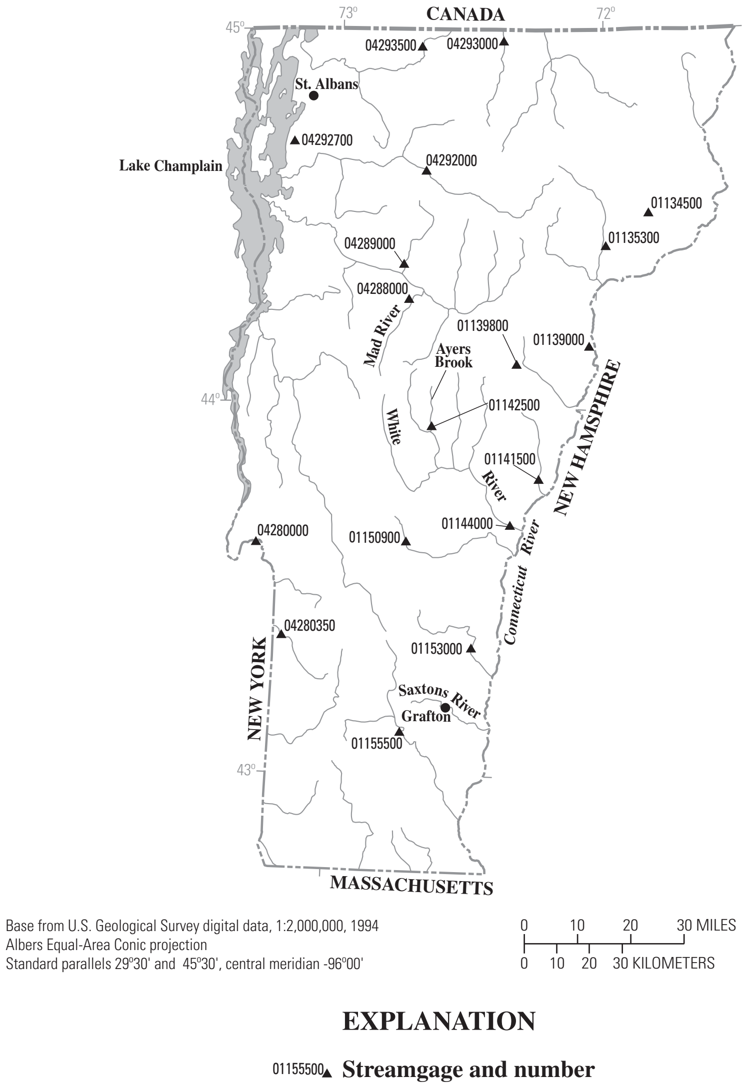


Figure 58. Location of streamgages with significant floods during 1994–98 water years for Vermont.

Table 47. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Vermont.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 58)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01134500	Moose River at Victory, VT	75.2	1947–98	1973	12.04	4,940	8/6/95	11.72	4,540	N	50–75
01135300	Sleepers River near St. Johnsbury, VT	42.9	1990–98	1998	7.11	7,570	8/12/98	7.11	7,570	--	>100
01139000	Wells River at Wells River, VT	98.4	1941–98	1973	9.82	5,970	7/15/97	8.54	4,560	N	25–50
01139800	East Orange Branch at East Orange, VT	8.95	1958–98	1996	5.42	626	1/19/96	5.42	626	--	10-25
01141500	Ompompanoosuc River at Union Village, VT	130	1928, 1941–98	1947 1928	9.65 14.50	4,800 --	4/19/97 4/6/98	10.03 9.97	2,440 2,360	Y Y	<10 <10
01142500	Ayers Brook at Randolph, VT	30.5	1928, 1940–98	1998 1928	11.93 16.00	3,480 --	6/27/98	11.93	3,480	N	>200
01144000	White River at West Hartford, VT	690	1915–98	1998	17.38	34,500	6/27/98	17.38	34,500	--	10–25
01150900	Ottauquechee River near West Bridgewater, VT	23.4	1985–98	1996 1987	7.33 7.78	1,960 1,270	10/22/95	7.33	1,960	N	25
01153000	Black River at North Springfield, VT	158	1930–98	1938	17.68	15,500	4/6/98	7.93	4,150	Y	--
01155500	West River at Jamaica, VT	179	1947–98	1949	14.87	29,500	4/23/96 4/6/98	9.47 9.49	5,840 5,900	Y Y	-- --
04280000	Poultney River below Fair Haven, VT	187	1929–98	1945	24.36	14,800	1/20/96	20.91	10,200	Y	25–50
04280350	Mettawee River near Pawlet, VT	70.2	1985–98	1996	6.31	4,480	1/19/96	6.31	4,480	N	10–25
04288000	Mad River near Moretown, VT	139	1928–98	1928	19.40	23,000	6/27/98	14.13	14,500	N	50
04289000	Little River near Waterbury, VT	111	1936–98	1936	19.38	6,520	8/6/95	14.81	4,410	Y	25–50

Table 47. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Vermont.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than; <, less than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 58)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04292000	Lamoille River at Johnson, VT	310	1912–13, 1929–98	1995	19.88	19,000	8/6/95	19.88	19,000	N	>200
04292700	Stone Bridge Brook near Georgia Plains, VT	8.45	1963–74, 1990–98	1996	8.59	1,030	1/19/96	8.59	1,030	N	50–100
04293000	Missisquoi River near North Troy, VT	131	1932–98	1997	13.84	8,940	7/15/97	13.84	8,940	N	50–100
							3/31/98	12.68	8,890	N	50–100
04293500	Missisquoi River near East Berkshire, VT	479	1912–19, 1921–23, 1928–98	1928	23.10	45,000	3/31/98	17.09	20,400	N	25–50

[1]Regulated during flood: N, no; Y, yes.

Virginia

In February 1994, a developing storm over the southeastern United States brought excessive precipitation to extreme southwestern Virginia after 2 to 3 inches of rain had exacerbated flooding conditions a day earlier. One to three additional inches of rain fell into already swollen creeks, streams, and rivers, creating flash flooding beginning late on February 10 and continuing through February 11 (National Oceanic and Atmospheric Administration, 1994a).

A slow-moving frontal system, with several low-pressure waves riding along it, produced moderate to excessive rainfall during the last week of March 1994. Rainfall totals ranged from 3 to 6 inches across the State, with the largest amounts occurring across the extreme southwestern areas (National Oceanic and Atmospheric Administration, 1994a). The rain, falling on saturated ground, produced widespread flooding across the western one-half of the State, mainly on March 28 and 29. One death occurred northwest of Richmond (fig. 59) when the transportation director for the public schools drowned while checking water depth on area roadways (National Oceanic and Atmospheric Administration, 1994b).

Torrential rainfall caused by thunderstorms in south-central and southwestern Virginia occurred June 22–23, 1995. The storms produced major flash flooding that resulted in two fatalities and three injuries along the Maury, James, Roanoke, and Dan Rivers (fig. 59, inset A). Excessive rainfall continued over the central and northern Shenandoah Valley June 27–28, 1995. The excessive rain, falling on saturated soil, caused catastrophic flooding and flash flooding, resulting in three deaths, at least 20 injured, $50 million in private and public property damage, and nearly $100 million in agricultural damage (National Oceanic and Atmospheric Administration, 1995b). Eight Virginia counties were declared Federal disaster areas. The most severe flooding occurred near Madison, where rainfall at higher elevations exceeded 20 inches in a 12-hour period (National Oceanic and Atmospheric Administration, 1995a). Flooding was most extreme along the Rapidan and Rappahannock River Basins. Flooding along the Rapidan River near Ruckersville (streamgage 01665500, table 48) was deemed to be greater than a 500-year event. Although the streamgage was washed away, a watermark estimate at the Ruckersville site was 31.3 feet, exceeding the previous record set in October 1942 by 10.5 feet. Near Fredericksburg (streamgage 01668000, table 48), the flood stage on the Rappahannock River was exceeded by nearly 7 feet (National Oceanic and Atmospheric Administration, 1995b).

In January 1996, precipitation combined with unseasonably warm, humid air caused nearly all of the snowpack, estimated at between 6 and 15 inches and as much as 2 feet or more at higher elevations, to melt in a 12-hour period (National Oceanic and Atmospheric Administration, 1996a). The unseasonably warm air was drawn northward around the circulation of a deepening storm west of the Appalachian Mountains during January 18–19. The melting snow and additional rainfall produced widespread flooding and flash flooding on January 19. A pre-frontal line of intense showers and embedded thunderstorms moved into the region shortly after dawn on January 19, causing widespread flash flooding. Snowmelt, combined with 1 to 3 inches of rain (some locations received nearly 5 inches) (National Oceanic and Atmospheric Administration, 1996a), caused the worst regional flooding in more than 10 years. Five deaths occurred as a result of the flooding, and damage estimates were more than $67 million (National Oceanic and Atmospheric Administration, 1996b).

On September 5, 1996, Hurricane Fran made landfall on the North Carolina coast near Cape Fear (fig. 45). As a category 3 hurricane, Fran had 115-mile-per-hour sustained winds, a 13-foot storm surge along the Virginia coast, and excessive rains of as much as 16 inches in Virginia and West Virginia. The center of the storm passed from south to north through the center of Virginia. Five deaths occurred from drowning, and property damage estimates from flooding were more than $41 million in Virginia (National Oceanic and Atmospheric Administration, 1996b). Twenty-one streamgages recorded their highest discharge of record during this widespread flood (table 48).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–96a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–96b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

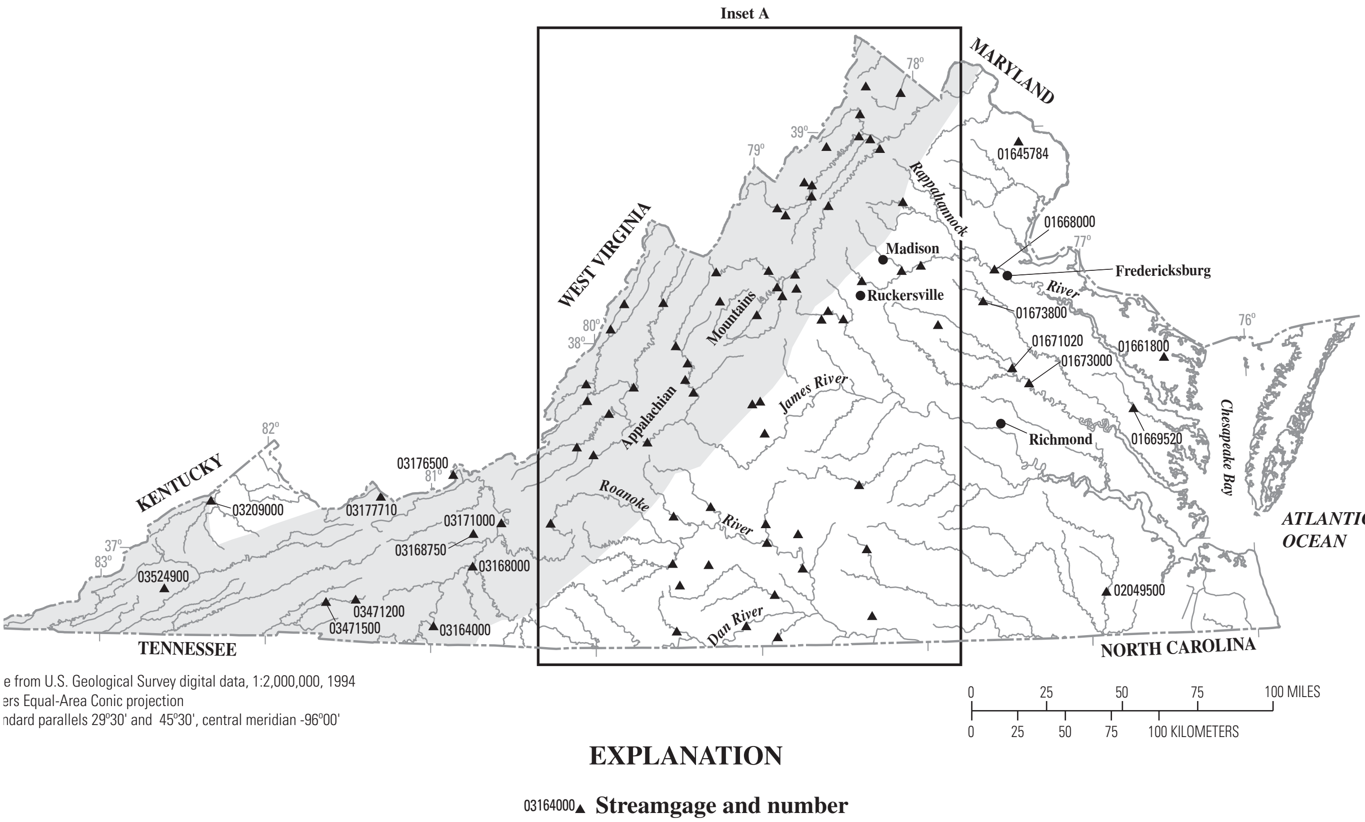


Figure 59. Location of streamgages with significant floods during 1994–98 water years for Virginia.

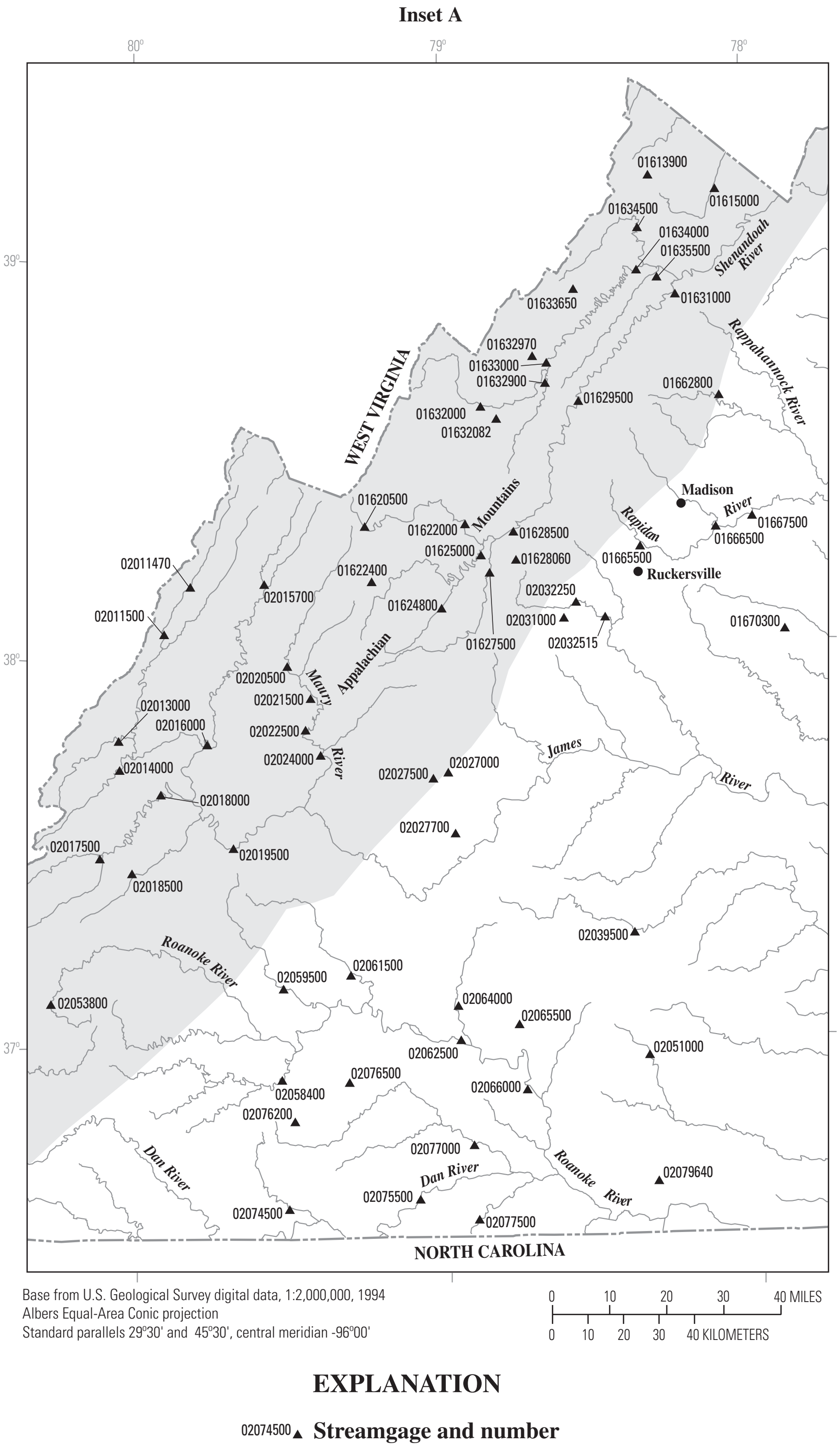


Figure 59. Location of streamgages with significant floods during 1994–98 water years for Virginia.—Continued

Table 48. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Virginia.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 59)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01613900	Hogue Creek near Hayfield, VA	15.0	1961–98	1996	9.71	4,090	9/6/96	9.71	4,090	N	100–200
01615000	Opequon Creek near Berryville, VA	57.4	1943–97	1988 1943	13.49 18.40	12,600 --	1/19/96	13.30	11,900	N	100
01620500	North River near Stokesville, VA	17.2	1947–98	1949 1986	10.90 19.80	9,530 7,600	9/6/96	9.79	3,750	N	25–50
01622000	North River near Burketown, VA	379	1924, 1927–72, 1976–98	1996	36.70	70,400	9/6/96	36.70	70,400	N	200
01622400	Buffalo Branch tributary O 2 near Christians, VA	.49	1967–96	1996	7.68	244	9/6/96	7.68	244	N	50–100
01624800	Christians Creek near Fisherville, VA	70.1	1968–90, 1992–97	1996	16.14	16,200	9/6/96	16.14	16,200	N	>500
01625000	Middle River near Grottoes, VA	375	1924, 1928–98	1996	35.62	44,300	9/7/96	35.62	44,300	N	200
01627500	South River at Harriston, VA	212	1870, 1878, 1924, 1926–51, 1969–98	1996 1870	15.57 18.80	28,900 --	9/6/96	15.57	28,900	N	100
01628060	White Oak Run near Grottoes, VA	1.94	1980–96	1996	6.25	530	9/6/96	6.25	530	N	--
01628500	South Fork Shenandoah River near Lynnwood, VA	1,084	1931–98	1996	30.84	107,000	9/7/96	30.84	107,000	N	100
01629500	South Fork Shenandoah River near Luray, VA	1,377	1897, 1924, 1926–30, 1936, 1939–51, 1979–98	1996	26.95	112,000	9/7/96	26.95	112,000	N	50–100
01631000	South Fork Shenandoah River at Front Royal, VA	1,642	1900–05, 1931–98	1943	34.80	130,000	9/7/96	32.57	121,000	N	50–100

Table 48. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Virginia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 59)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01632000	North Fork Shenandoah River at Cootes Store, VA	210	1878, 1889, 1924, 1926–98	1996	27.86	63,400	9/6/96	27.86	63,400	N	>500
01632082	Linville Creek at Broadway, VA	45.5	1986–98	1996	13.23	17,800	9/6/96	13.23	17,800	N	--
01632900	Smith Creek near New Market, VA	93.2	1960–98	1996	17.62	12,400	9/6/96	17.62	12,400	N	50–100
01632970	Crooked Run near Mount Jackson, VA	6.49	1972–96	1996	11.34	5,700	1/19/96	11.34	5,700	N	>500
01633000	North Fork Shenandoah River at Mount Jackson, VA	506	1943–98	1996	22.17	103,000	9/6/96	22.17	103,000	N	>500
01633650	Pughs Run near Woodstock, VA	3.66	1971–96	1996	13.39	1,100	9/6/96	13.39	1,100	N	100
01634000	North Fork Shenandoah River near Strasburg, VA	768	1926–98	1996	32.27	114,000	9/7/96	32.27	114,000	N	>500
01634500	Cedar Creek near Winchester, VA	103	1936, 1938–98	1943	27.00	22,000	9/6/96	23.40	20,800	N	50–100
01635500	Passage Creek near Buckton, VA	87.8	1933–98	1996	15.89	23,000	9/6/96	15.89	23,000	N	200
01645784	Snakeden Branch at Reston, VA	.79	1972–78, 1985–96	1996	7.62	1,050	9/6/96	7.62	1,050	N	50
01661800	Bush Mill Stream near Heathsville, VA	6.82	1964–96	1979	8.52	714	3/3/94	8.10	625	N	25–50
01662800	Battle Run near Laurel Mills, VA	27.6	1959–95, 1998	1995	14.40	9,120	6/27/95	14.40	9,120	N	100
01665500	Rapidan River near Ruckersville, VA	114	1943–81, 1983–96	1995	31.30	106,000	6/27/95	31.30	106,000	N	>500
01666500	Robinson River near Locust Dale, VA	179	1943–98	1995 1996	22.93 23.92	25,400 22,100	6/27/95	22.93	25,400	N	25–50
01667500	Rapidan River near Culpeper, VA	472	1931–98	1995	30.40	59,300	6/28/95	30.40	59,300	N	100
01668000	Rappahannock River near Fredericksburg, VA	1,596	1908–98	1943	25.90	140,000	9/7/96	17.97	74,100	N	25

Table 48. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Virginia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 59)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01669520	Dragon Swamp at Mascot, VA	108	1982–98	1998	9.39	2,800	2/6/98	9.39	2,800	N	--
01670300	Contrary Creek near Mineral, VA	5.53	1976–96	1994	6.94	7,050	11/28/93	6.94	7,050	N	>500
01671020	North Anna River at Hart Corner near Doswell, VA	463	1980–98	1994	21.80	12,000	3/29/94	21.80	12,000	N	--
01673000	Pamunkey River near Hanover, VA	1,081	1928, 1942–92, 1994–98	1969 1928	31.12 32.60	40,300 --	3/31/94	25.16	21,200	N	25
01673800	Po River near Spotsylvania, VA	77.4	1963–98	1972	19.03	10,900	11/28/93	17.10	8,070	N	50
02011470	Back Creek at Sunrise, VA	76.1	1985–98	1996	11.99	5,690	1/19/96	11.99	5,690	Y	--
02011500	Back Creek near Mountain Grove, VA	134	1913, 1951–98	1996 1913	12.41 17.00	18,400 --	1/19/96	12.41	18,400	Y	--
02013000	Dunlap Creek near Covington, VA	164	1913, 1929–98	1972 1913	15.65 18.00	27,400 --	1/19/96	13.33	17,100	N	50
02014000	Potts Creek near Covington, VA	153	1878, 1913, 1929–56, 1966–81, 1983–98	1986	13.46	15,400	1/19/96	11.32	9,860	N	25
02015700	Bullpasture River at Williamsville, VA	110	1961–98	1986	14.39	22,900	9/6/96	12.50	21,600	N	200
02016000	Cowpasture River near Clifton Forge, VA	461	1913, 1926–98	1913	20.80	45,000	9/7/96	16.91	30,100	N	25–50
02017500	Johns Creek at New Castle, VA	104	1927–98	1935 1972	10.80 12.48	8,000 7,960	1/19/96	11.78	6,760	N	10–25
02018000	Craig Creek at Parr, VA	329	1926–98	1986	24.76	58,500	1/19/96	16.71	21,600	N	25–50
02018500	Catawba Creek near Catawba, VA	34.3	1940, 1944–98	1986	19.19	21,200	6/28/95	11.34	8,640	N	50
02019500	James River at Buchanan, VA	2,075	1878, 1886, 1889, 1893–1998	1986	38.84	179,000	1/20/96	29.24	103,000	Y	--

Table 48. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Virginia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 59)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02020500	Calfpasture River above Mill Creek at Goshen, VA	144	1939–96	1986	20.23	56,300	9/6/96	16.38	35,800	N	100–200
02021500	Maury River at Rockbridge Baths, VA	329	1929–98	1986	19.19	87,700	9/6/96	14.28	42,000	N	50–100
02022500	Kerrs Creek near Lexington, VA	35.0	1927–98	1950 1995	13.80 15.44	23,000 21,700	6/28/95	15.44	21,700	N	200–500
02024000	Maury River near Buena Vista, VA	646	1936, 1939–98	1969	31.23	105,000	6/28/95	19.48	37,500	N	25–50
02027000	Tye River near Lovingston, VA	92.8	1939–98	1969	29.00	80,000	9/6/96	16.05	17,100	N	50
02027500	Piney River at Piney River, VA	47.6	1949–98	1969	13.80	38,000	9/6/96	12.85	27,400	N	200–500
02027700	Buffalo River tributary near Amherst, VA	.46	1966–78, 1980–96	1985 1996	2.96 7.33	720 196	9/6/96	7.33	196	N	10–25
02031000	Mechums River near White Hall, VA	95.4	1943–51, 1959, 1979–98	1943	30.30	20,000	9/6/96	24.79	14,200	N	25
02032250	Moormans River near Free Union, VA	74.6	1972, 1979–97	1995	22.28	19,100	6/28/95	22.28	19,100	N	25
02032515	South Fork Rivanna River near Charlottesville, VA	260	1979–97	1996	24.39	16,100	9/6/96	24.39	16,100	Y	--
02039500	Appomattox River at Farmville, VA	303	1926–98	1972	29.70	33,100	9/7/96	24.02	17,900	N	25–50
02049500	Blackwater River near Franklin, VA	617	1940, 1942–98	1940	22.00	21,000	2/7/98	15.27	7,250	N	10–25
02051000	North Meherrin River near Lunenburg, VA	55.6	1940, 1947–75, 1977–80, 1982–98	1972 1940	28.30 48.00	14,400 --	9/6/96	22.94	6,390	N	10–25
02053800	South Fork Roanoke River near Shawsville, VA	110	1961–98	1972	11.12	14,200	9/6/96	8.88	9,690	N	10–25
02058400	Pigg River near Sandy Level, VA	350	1964–98	1987	31.12	65,600	9/6/96	27.32	33,700	N	25–50

Table 48. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Virginia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 59)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
02059500	Goose Creek near Huddleston, VA	188	1924, 1926–27, 1930–98	1987	37.49	53,200	6/29/95	25.80	20,400	N	10–25
02061500	Big Otter River near Evington, VA	320	1937–98	1995	29.93	45,900	6/23/95 9/6/96	29.93 22.98	45,900 29,200	N N	50–100 25
02062500	Roanoke (Staunton) River at Brookneal, VA	2,415	1878, 1924–76, 1978–98	1940	46.00	130,000	9/7/96	38.78	80,300	Y	--
02064000	Falling River near Naruna, VA	173	1930–34, 1940, 1942–98	1996	36.14	62,800	9/6/96	36.14	62,800	N	>500
02065500	Cub Creek at Phenix, VA	98.0	1940, 1947–98	1996	21.89	15,200	9/6/96	21.89	15,200	N	200–500
02066000	Roanoke (Staunton) River at Randolph, VA	2,977	1878, 1901–13, 1915–98	1940	41.60	150,000	9/7/96	34.94	89,300	Y	--
02074500	Sandy River near Danville, VA	112	1930–98	1940	17.38	23,000	9/6/96	11.06	13,000	N	25
02075500	Dan River at Paces, VA	2,550	1940, 1951–75, 1977–98	1972	33.15	64,800	9/7/96	31.43	56,500	N	25–50
02076200	Bearskin Creek near Chatham, VA	4.06	1967–78, 1980–84, 1986–96	1995	19.90	2,850	6/29/95	19.90	2,850	N	50–100
02076500	Georges Creek near Gretna, VA	9.24	1950–97	1996	10.02	2,260	9/6/96	10.02	2,260	N	50
02077000	Banister River at Halifax, VA	547	1905, 1929–98	1944	40.80	50,000	9/7/96	33.45	23,900	N	25–50
02077500	Hyco River near Denniston, VA	289	1928, 1930–34, 1945, 1951–98	1975 1928	24.27 26.40	10,800 --	9/7/96	23.16	9,430	Y	--
02079640	Allen Creek near Boydton, VA	53.4	1962–96	1996	22.93	6,870	9/6/96	22.93	6,870	N	50

Table 48. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Virginia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 59)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03164000	New River near Galax, VA	1,131	1930–98	1940	25.70	141,000	1/15/95	15.23	68,700	N	50–100
03168000	New River at Allisonia, VA	2,202	1930–98	1940	23.42	185,000	1/15/95	16.56	108,000	N	100
03168750	Thorne Springs Branch near Dublin, VA	4.77	1957–96	1995 1973	7.41 8.01	3,760 2,200	7/7/95	7.41	3,760	N	>500
03171000	New River at Radford, VA	2,748	1878, 1896–1998	1940	35.96	218,000	1/15/95	24.04	108,000	Y	--
03176500	New River at Glen Lyn, VA	3,768	1878, 1915–98	1878	33.10	240,000	1/16/95	19.83	125,000	Y	--
03177710	Bluestone River at Falls Mills, VA	44.2	1981–97	1996	8.66	1,560	1/27/96	8.66	1,560	N	--
03209000	Pound River below Flannagan Dam near Haysi, VA	221	1920, 1927–98	1929 1957	16.50 18.65	30,000 27,300	4/14/94	7.96	4,240	Y	--
03471200	South Fork Holston River at Teas, VA	31.1	1967–80, 1982–95	1994	17.61	7,660	2/11/94	17.61	7,660	N	200–500
03471500	South Fork Holston River at Riverside near Chilhowie, VA	76.1	1908–09, 1921–31, 1942–98	1978	10.20	9,600	1/15/95	8.68	5,820	N	50
03524900	Stony Creek at Ka, VA	30.9	1981–96	1994	7.81	10,800	3/28/94	7.81	10,800	N	--

[1]Regulated during flood: N, no; Y, yes.

Washington

Flooding occurred on every major river in western Washington in late November 1995. The Skagit River near Concrete (streamgage 12194000, table 49) had its greatest discharge since 1921. Other major floods were on the Snoqualmie River, which was 7 feet above flood stage, and the Nooksack River, which was 6 feet above flood stage (National Oceanic and Atmospheric Administration, 1995a). Most rivers crested near or at record levels. In the towns of Duvall and Carnation (fig. 60, inset A), 15,000 people were stranded as the flooded rivers covered the few roads in and out of the towns. A state of emergency was declared in 16 counties in the State, and an estimated $3 million was needed for road repairs. Property damage was more than $10 million (National Oceanic and Atmospheric Administration, 1995b). For the month of November, most areas had twice their normal average rainfall, and many areas fell just short of setting records for the wettest November on record (National Oceanic and Atmospheric Administration, 1995a).

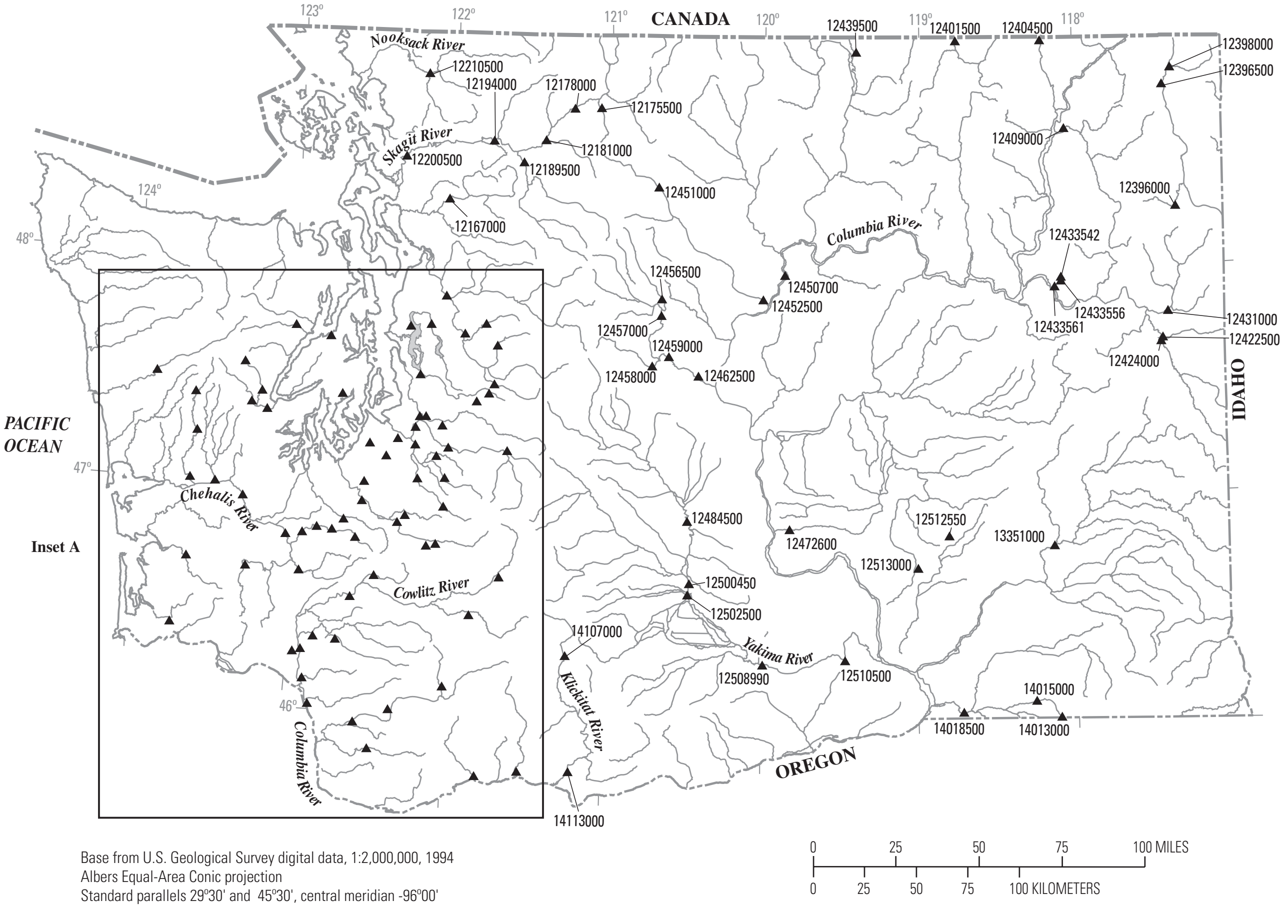
Some of the worst flooding in more than 60 years took place in Washington during February 7–10, 1996. Damage statewide was estimated at $223 million (National Oceanic and Atmospheric Administration, 1996b). The Chehalis, Yakima, Cowlitz, and Klickitat Rivers all had record discharges (table 49). A state of emergency was declared in 13 counties. Overall it was the wettest winter season ever. The normal, winter precipitation at Seattle-Tacoma International Airport (Sea Tac) is 21.11 inches, the previous record was 30.6 inches, and for 1995–96 the total was 32.46 inches (National Oceanic and Atmospheric Administration, 1995a; 1996a). Thirty-eight streamgages had record discharges during February 1996 (table 49).

The 1996–97 winter had excessive precipitation and snowmelt periods that caused flooding throughout the State. In January 1997, the runoff from melting snow and rain caused mudslides and sinkholes in the Seattle area. The cleanup from the mudslides and repairs to roads and bridges was estimated to be $20 million (National Oceanic and Atmospheric Administration, 1997b). Lake Sammamish was about 7 feet above normal, its highest level since 1962, and many lawns and docks were flooded. Flooding occurred in western Washington in February and in eastern Washington during March through May as the deep snowpack melted.

References

National Oceanic and Atmospheric Administration (NOAA), 1995a–97a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1995b–97b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

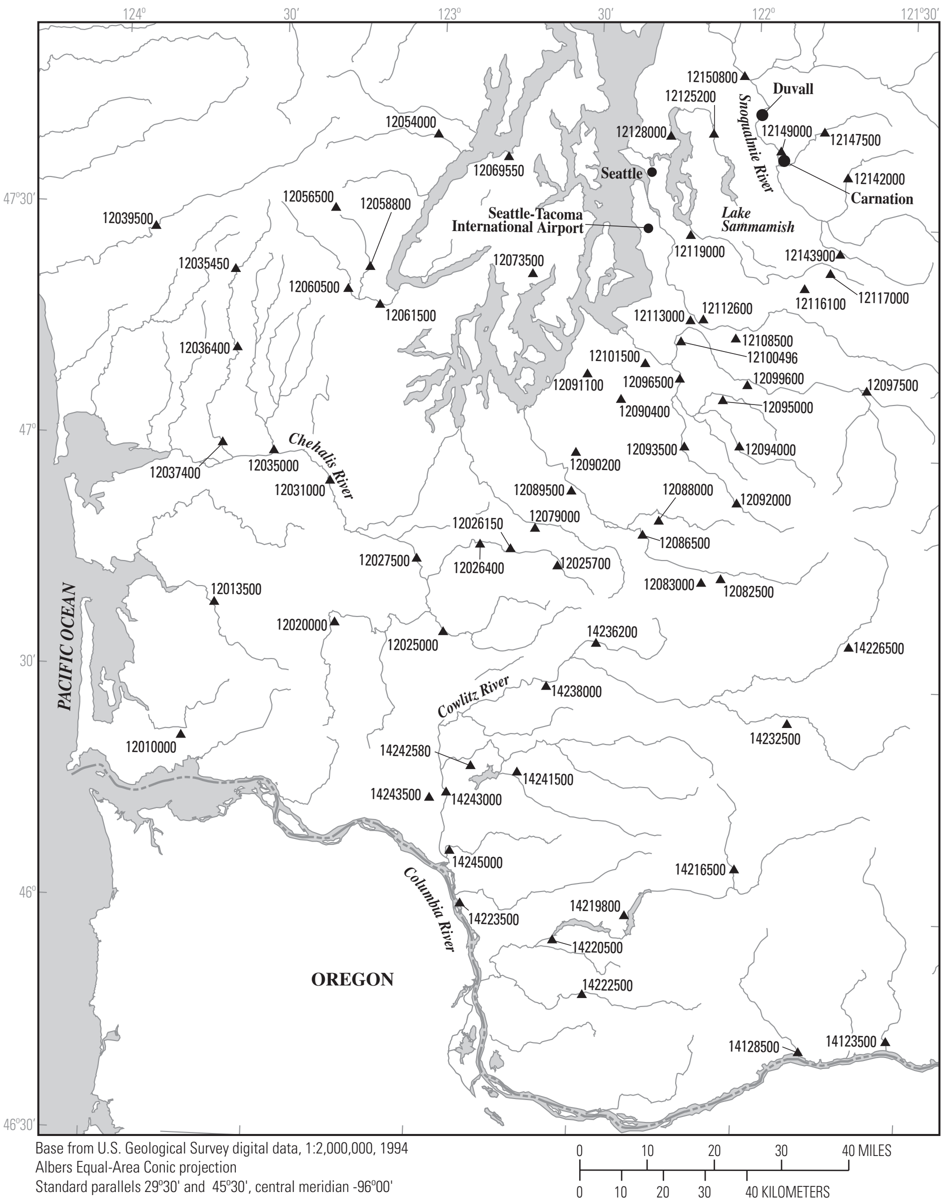


EXPLANATION

12510500▲ **Streamgage and number**

Figure 60. Location of streamgages with significant floods during 1994–98 water years for Washington.

Inset A



EXPLANATION

14222500▲ Streamgage and number

Figure 60. Location of streamgages with significant floods during 1994–98 water years for Washington.—Continued

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

			Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
Streamgage number (fig. 60)	Streamgage name	Total drainage (mi^2)	Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
12010000	Naselle River near Naselle, WA	54.8	1930–98	1997	19.26	12,600	3/18/97	19.26	12,600	N	>100
12013500	Willapa River near Willapa, WA	130	1949–56, 1958–59, 1962–98	1995	27.28	14,800	12/20/94 3/19/97	27.28 24.53	14,800 12,100	N N	50–100 10–25
12020000	Chehalis River near Doty, WA	113	1940–98	1996	20.37	28,900	2/8/96	20.37	28,900	N	50–100
12025000	Newaukum River near Chehalis, WA	155	1929–31, 1943–81, 1983–98	1996 1954	13.54 13.62	13,300 7,880	2/8/96	13.54	13,300	N	>100
12025700	Skookumchuck River near Vail, WA	40.0	1968–98	1996	11.24	8,350	2/8/96	11.24	8,350	N	25–50
12026150	Skookumchuck River below Bloody Run Creek near Centralia, WA	65.9	1930–33, 1940–98	1996 1954	13.41 48.59	9,020 6,710	2/8/96	13.41	9,020	Y	--
12026400	Skookumchuck River near Bucoda, WA	112	1968–98	1996	17.87	11,300	2/8/96	17.87	11,300	Y	--
12027500	Chehalis River near Grand Mound, WA	895	1929–98	1996	19.98	74,800	2/9/96	19.98	74,800	N	>100
12031000	Chehalis River at Porter, WA	1,294	1947–85, 1987–98	1996	25.22	80,700	2/9/96	25.22	80,700	N	>100
12035000	Satsop River near Satsop, WA	299	1930–98	1997 1935	38.87 38.90	63,600 46,600	12/20/94 3/19/97	37.28 38.87	50,600 63,600	N N	50–100 >100
12035450	Big Creek near Grisdale, WA	9.57	1973–97	1997 1987	8.17 9.20	4,000 3,340	3/19/97	8.17	4,000	N	25–50
12036400	Schafer Creek near Grisdale, WA	12.1	1987–97	1997	13.57	4,100	3/19/97	13.57	4,100	N	50–100
12037400	Wynoochee River above Black Creek near Montesano, WA	155	1957–98	1997 1957	20.21 20.54	25,600 24,500	3/19/97	20.21	25,600	Y	10–25
12039500	Quinault River at Quinault Lake, WA	264	1910, 1912–22, 1926–98	1910	22.00	52,600	3/19/97	19.72	46,400	N	25–50

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 60)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
12054000	Duckabush River near Brinnon, WA	66.5	1939–98	1996 1950	8.62 10.06	9,240 8,960	12/12/95	8.62	9,240	N	25–50
12056500	North Fork Skokomish River below Staircase Rapids near Hoodsport, WA	57.2	1925–98	1935	14.40	27,000	12/20/94	10.49	14,800	N	10–25
12058800	North Fork Skokomish River below Lower Cushman Dam near Potlatch, WA	--	1989–98	1996	10.97	3,680	12/19/95	10.97	3,680	Y	--
12060500	South Fork Skokomish River near Union, WA	76.3	1932–84, 1996–98	1997 1935	8.98 11.00	24,400 21,600	3/19/97	8.98	24,400	N	50–100
12061500	Skokomish River near Potlatch, WA	227	1934, 1944–98	1991 1997	16.80 17.75	36,600 --	12/10/94 3/19/97	17.48 17.75	30,000 --	Y Y	-- --
12069550	Big Beef Creek near Seabeck, WA	13.8	1970–81, 1994–98	1997	6.97	1,840	1/1/97	6.97	1,840	N	>100
12073500	Huge Creek near Wauna, WA	6.47	1948–69, 1978–98	1991 1997	5.13 5.76	547 526	3/19/97	5.76	526	N	25–50
12079000	Deschutes River near Rainier, WA	89.8	1950–79, 1981–82, 1988–98	1990	17.01	9,600	2/8/96	15.74	7,850	N	25–50
12082500	Nisqually River near National, WA	133	1943–98	1996	12.18	21,200	2/8/96	12.18	21,200	N	50–100
12083000	Mineral Creek near Mineral, WA	75.2	1943–98	1996 1990	12.89 13.56	14,900 13,800	2/8/96	12.89	14,900	N	>100
12086500	Nisqually River at La Grande, WA	292	1907–08, 1910–11, 1920–31, 1945–98	1996	15.30	39,500	2/8/96	15.30	39,500	Y	--

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 60)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
12088000	Ohop Creek near Eatonville, WA	34.5	1928–32, 1942–74, 1993–98	1996	8.76	2,620	2/8/96	8.76	2,620	N	>100
12089500	Nisqually River at McKenna, WA	517	1948–68, 1978–98	1996	17.13	50,000	2/8/96	17.13	50,000	Y	--
12090200	Muck Creek at Roy, WA	86.8	1957–76, 1996	1996 1972	-- 5.40	1,670 692	2/8/96	--	1,670	N	>100
12090400	North Fork Clover Creek near Parkland, WA	6.25	1960–75, 1995–98	1995 1960	10.05 14.78	371 153	2/19/95	10.05	371	N	>100
12091100	Flett Creek at Tacoma, WA	8.01	1960–98	1996	3.08	203	2/8/96	3.08	203	Y	--
12092000	Puyallup River near Electron, WA	92.8	1912–26, 1945–49, 1958–93, 1995–98	1996 1960	10.94 11.90	16,000 10,800	2/8/96	10.94	16,000	N	>100
12093500	Puyallup River near Orting, WA	172	1932–98	1996	11.37	18,300	2/8/96	11.37	18,300	N	>100
12094000	Carbon River near Fairfax, WA	78.9	1930–78, 1991–98	1991 1996	-- 15.85	13,000 12,000	2/8/96	15.85	12,000	N	25–50
12095000	South Prairie Creek at South Prairie, WA	79.5	1950–79, 1988–98	1996	35.14	8,170	2/8/96	35.14	8,170	N	50–100
12096500	Puyallup River at Alderton, WA	438	1916–27, 1944–57, 1996–97	1996	61.15	41,500	2/9/96	61.15	41,500	N	>100
12097500	Greenwater River at Greenwater, WA	73.5	1912, 1930–78, 1993–98	1978	9.80	10,500	2/8/96	8.94	5,900	N	25–50
12099600	Boise Creek at Buckley, WA	15.4	1978–98	1996 1984	4.26 5.18	1,200 972	2/8/96	4.26	1,200	N	25–50
12100496	White River near Auburn, WA	464	1988–98	1996	83.15	15,000	2/10/96	83.15	15,000	Y	--
12101500	Puyallup River at Puyallup, WA	948	1915–98	1934 1918	21.40 34.15	57,000 40,500	2/9/96	29.77	46,700	Y	40

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 60)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
12108500	Newaukum Creek near Black Diamond, WA	27.4	1945–98	1996	3.95	2,640	2/8/96	3.95	2,640	N	>100
12112600	Big Soos Creek above hatchery near Auburn, WA	66.7	1961–98	1996	8.88	4,200	2/9/96	8.88	4,200	N	>100
12113000	Green River near Auburn, WA	399	1937–98	1960	69.75	28,100	2/8/96	63.62	12,400	Y	--
12116100	Canyon Creek near Cedar Falls, WA	.19	1946–98	1976	2.22	131	12/4/95	2.05	107	N	25–50
12117000	Taylor Creek near Selleck, WA	17.2	1957–98	1996 1965	5.53 5.78	3,130 2,730	2/8/96	5.53	3,130	N	50–100
12119000	Cedar River at Renton, WA	184	1907, 1946–50, 1952–98	1991	17.13	10,600	11/30/95	16.04	7,650	Y	--
12125200	Sammamish River near Woodinville, WA	157	1966–98	1997	26.93	2,870	2/9/96 1/1/97	25.76 26.93	2,470 2,870	N N	10–25 50–100
12128000	Thornton Creek near Seattle, WA	12.1	1946, 1962–68, 1996–98	1997	5.26	423	12/31/96	5.26	423	N	--
12142000	North Fork Snoqualmie River near Snoqualmie Falls, WA	64.0	1930–54, 1956–57, 1959–98	1932	17.50	15,800	11/29/95	12.82	14,500	N	10–25
12143900	Boxley Creek near Edgewick, WA	3.64	1982–98	1996	5.20	256	12/3/95	5.20	256	N	10–25
12147500	North Fork Tolt River near Carnation, WA	39.9	1953–65, 1968–98	1960	13.15	9,560	11/29/95	12.74	8,280	N	10–25
12149000	Snoqualmie River near Carnation, WA	603	1930–98	1991	60.70	65,200	2/9/96	60.34	61,600	N	10–25
12150800	Snohomish River near Monroe, WA	1,537	1964–98	1991	25.30	150,000	11/30/95	24.10	132,000	N	25–50
12167000	North Fork Stillaguamish River near Arlington, WA	262	1929–98	1991	15.20	36,700	2/8/96 3/19/97	14.84 14.81	34,600 34,400	N N	10–25 10–25

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 60)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
12175500	Thunder Creek near Newhalem, WA	105	1920–98	1922 1981	-- 14.50	15,400 14,500	11/29/95	12.76	10,900	N	10–25
12178000	Skagit River at Newhalem, WA	1,175	1815, 1856, 1898, 1909–14, 1921–98	1856 1922	-- 94.80	95,000 60,000	12/2/95	91.14	32,300	Y	--
12181000	Skagit River at Marblemount, WA	1,381	1944, 1947–57, 1976–98	1996	13.73	62,300	11/29/95	13.73	62,300	Y	--
12189500	Sauk River near Sauk, WA	714	1912, 1929–98	1981	18.24	98,600	11/8/95	16.57	79,000	N	25–50
12194000	Skagit River near Concrete, WA	2,737	1815, 1856, 1898, 1910, 1918, 1922, 1925–98	1815	69.30	500,000	11/29/95	41.57	160,000	Y	--
12200500	Skagit River near Mount Vernon, WA	3,093	1907, 1941–98	1991	37.37	152,000	11/30/95	37.34	141,000	Y	--
12210500	Nooksack River at Deming, WA	584	1908, 1910, 1932, 1935–48, 1950–98	1932 1908	16.80 20.00	49,300 --	11/29/95	14.80	48,900	N	50–100
12396000	Calispell Creek near Dalkena, WA	68.3	1951–77, 1979–93, 1995–98	1974	14.38	3,190	4/23/96	9.21	1,190	N	10–25
12396500	Pend Oreille River Bel Box Canyon near Ione, WA	24,900	1948, 1953–98	1972	34.54	136,000	6/7/97	34.44	134,000	Y	--
12398000	Sullivan Creek at Metaline Falls, WA	142	1954–68, 1970, 1994–98	1997 1961	4.38 6.20	4,350 2,020	6/1/97	4.38	4,350	N	>100
12401500	Kettle River near Ferry, WA	2,200	1929–98	1948	21.15	21,200	6/1/97	20.85	19,600	N	50–100

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 60)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
12404500	Kettle River near Laurier, WA	3,800	1894, 1930–98	1948 1894	17.25 22.00	35,000 --	5/17/97	15.87	30,800	N	25–50
12409000	Colville River at Kettle Falls, WA	1,007	1923–98	1974 1956	9.84 10.17	3,440 3,230	4/28/97	9.44	2,860	N	25–50
12422500	Spokane River at Spokane, WA	4,290	1891–1998	1894 1934	-- 29.75	49,000 47,800	5/19/97	29.06	42,600	Y	--
12424000	Hangman Creek at Spokane, WA	689	1948–98	1997	14.31	21,200	1/1/97	14.31	21,200	N	50–100
12431000	Little Spokane River at Dartford, WA	665	1929–32, 1947–98	1997	8.27	4,110	3/21/97	8.27	4,110	N	>100
12433542	Blue Creek above Midnite Mine drainage near Wellpinit, WA	6.00	1985–98	1997	3.22	65	3/22/97	3.22	65	N	50–100
12433556	Midnite Mine drainage near Wellpinit, WA	1.30	1985–94,	1997	1.78	6	3/19/97	1.78	6	Y	25–50
12433561	Blue Ceek River near mouth near Wellpinit, WA	19.1	1985–98	1997	4.87	180	3/19/97	4.87	180	Y	25–50
12439500	Okanogan River at Oroville, WA	3,195	1943–98	1997	14.88	3,770	6/7/97	14.88	3,770	Y	--
12450700	Columbia River below Wells Dam, WA	86,100	1968–98	1972	--	402,000	6/12/97	--	362,000	Y	--
12451000	Stehekin River at Stehekin, WA	321	1911–15, 1927–98	1996	29.58	20,900	11/29/95	29.58	20,900	N	>100
12452500	Chelan River at Chelan, WA	924	1904–93, 1995–98	1982 1968	-- --	18,400 18,400	11/30/95	--	17,000	Y	--
12456500	Chiwawa River near Plain, WA	170	1914, 1937–49, 1955–57, 1991–98	1996	9.36	7,030	11/30/95	9.36	7,030	N	25–50
12457000	Wenatchee River at Plain, WA	591	1911–29, 1932–79, 1990–98	1996	14.97	36,100	11/30/95	14.97	36,100	N	>100

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 60)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
12458000	Icicle Creek above Snow Creek near Leavenworth, WA	193	1912–14, 1937–79, 1994–98	1996	16.04	19,800	11/29/95	16.04	19,800	N	>100
12459000	Wenatchee River at Peshastin, WA	1,000	1929–98	1996	17.89	41,300	11/30/95	17.89	41,300	N	>100
12462500	Wenatchee River at Monitor, WA	1,301	1963–98	1996	30.02	47,500	11/30/95	30.02	47,500	N	>100
12472600	Crab Creek near Beverly, WA	4,840	1960–98	1980	6.46	936	1/4/97	5.10	512	Y	--
12484500	Yakima River at Umtanum, WA	1,594	1907–17, 1919–21, 1923, 1925–27, 1929–98	1934 1907	-- 41.20	32,200 41,000	2/9/96	38.77	27,200	Y	--
12500450	Yakima River above Ahtanum Creek at Union Gap, WA	3,479	1967–98	1996	53.88	53,300	2/9/96	53.88	53,300	Y	--
12502500	Ahtanum Creek at Union Gap, WA	173	1908, 1910, 1912–14, 1952, 1960–98	1974 1996	10.36 13.50	3,100 2,660	2/9/96	13.50	2,660	N	50–100
12508990	Yakima River at Mabton, WA	5,359	1971–98	1996	28.18	49,500	2/10/96	28.18	49,500	Y	--
12510500	Yakima River at Kiona, WA	5,615	1878, 1897–1914, 1934–98	1934	21.57	67,000	2/11/96	20.98	49,400	Y	--
12512550	Providence Coulee near Cunningham, WA	52.1	1978–91, 1993–94, 1996–98	1997	16.18	1,000	1/31/97	16.18	1,000	N	>100
12513000	Esquatzel Coulee at Connell, WA	234	1953–94, 1996–98	1956 1997	12.68 19.86	5,560 2,820	1/31/97	19.86	2,820	N	25
13351000	Palouse River at Hooper, WA	2,500	1898–99, 1901–07, 1909–16, 1948, 1951–98	1963	19.13	33,500	2/9/96	17.95	28,000	N	40

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

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Streamgage number (fig. 60)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
14013000	Mill Creek near Walla Walla, WA	59.6	1914–17, 1940–98	1996	20.43	6,350	2/9/96	20.43	6,350	N	>100
14015000	Mill Creek at Walla Walla, WA	95.7	1942–48, 1950–98	1996	6.89	4,190	2/9/96	6.89	4,190	Y	--
14018500	Walla Walla River near Touchet, WA	1,657	1949, 1952–98	1965 1996	18.90 20.58	33,400 32,500	2/10/96	20.58	32,500	N	>100
14107000	Klickitat River above West Fork near Glenwood, WA	151	1945–78, 1992–98	1996	5.70	5,500	2/8/96	5.70	5,500	N	>100
14113000	Klickitat River near Pitt, WA	1,297	1910–12, 1929–98	1996	17.90	51,000	2/8/96	17.90	51,000	N	>100
14123500	White Salmon River near Underwood, WA	386	1916–30, 1936–98	1996	19.16	45,200	2/8/96	19.16	45,200	N	>100
14128500	Wind River near Carson, WA	225	1935–79, 1996–97	1996	23.04	53,600	2/8/96	23.04	53,600	N	>100
14216500	Muddy River below Clear Creek near Cougar, WA	131	1928–34, 1955–73, 1984–98	1996	33.26	30,600	2/8/96	33.26	30,600	N	>100
14219800	Speelyai Creek near Cougar, WA	12.6	1960–98	1963 1996	-- 8.12	3,600 3,300	2/8/96	8.12	3,300	N	10–25
14220500	Lewis River at Ariel, WA	731	1924–98	1934	35.00	129,000	2/8/96	27.38	86,400	Y	--
14222500	East Fork Lewis River near Heisson, WA	125	1930–98	1996	25.26	28,600	2/8/96	25.26	28,600	N	>100
14223500	Kalama River below Italian Creek near Kalama, WA	198	1947–79, 1996	1996 1972	-- 15.80	24,000 17,900	2/8/96	--	24,000	N	>100
14226500	Cowlitz River at Packwood, WA	287	1912–20, 1930–98	1934 1978	13.00 13.73	36,600 36,200	2/8/96	10.86	32,900	N	25–50
14232500	Cispus River near Randle, WA	321	1911–12, 1930–41, 1943–96	1996 1934	11.50 12.70	31,600 20,000	2/8/96	11.50	31,600	N	>100

Table 49. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Washington.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 60)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
14236200	Tilton River above Bear Canyon Creek near Cinebar, WA	141	1957–98	1996	17.90	27,100	2/8/96	17.90	27,100	N	50–100
14238000	Cowlitz River below Mayfield Dam, WA	1,400	1912, 1935–98	1996	26.19	68,400	11/28/95	26.19	68,400	Y	--
14241500	South Fork Toutle River at Toutle, WA	120	1940–57, 1996–98	1997 1954	27.01 58.91	15,500 14,300	1/1/97	27.01	15,500	N	--
14242580	Toutle River at Tower Road near Silver Lake, WA	496	1982–98	1996 1983	24.91 28.03	61,800 38,000	2/8/96	24.91	61,800	N	--
14243000	Cowlitz River at Castle Rock, WA	2,238	1927–98	1934 1998	31.60 41.30	139,000 30,800	2/8/96	32.11	112,000	Y	>100
14243500	Delameter Creek near Castle Rock, WA	19.6	1950–69, 1996	1996 1963	-- 6.53	3,500 2,420	2/8/96	--	3,500	N	50–100
14245000	Coweman River near Kelso, WA	119	1950–84, 1996	1996 1978	-- 14.67	11,700 9,940	2/8/96	--	11,700	N	50–100

[1]Regulated during flood: N, no; Y, yes.

West Virginia

Excessive rains of 2 to 5 inches fell mainly over central and northern West Virginia during February 8–9, 1994 (National Oceanic and Atmospheric Administration, 1994a). Small-stream flooding was widespread late on the night of February 8–9. Moderate to major river flooding occurred along the Tygart Valley, Buckhannon, Cheat, and West Fork Little Kanawha Rivers (fig. 61). The crest on the Tygart Valley River at Philippi (streamgage 03054500, table 50) reached 27.13 feet on February 9, the second highest stage in the 20th century. Damage was more than $6 million (National Oceanic and Atmospheric Administration, 1994b).

A stationary front, combined with an upper level disturbance, caused excessive rains across southern West Virginia on June 27–28, 1995. Six inches of rain caused severe flooding and flash flooding near Summersville (National Oceanic and Atmospheric Administration, 1995a). Four to 6 inches of rain near Princeton flooded and washed out many roads and bridges, stranded motorists in their vehicles, caused mud slides, damaged and destroyed crops, and damaged buildings. Total damage was more than $8 million (National Oceanic and Atmospheric Administration, 1995b).

On January 19, 1996, a combination of unseasonably warm, humid air over a dense snowpack, estimated between 12 and 18 inches and as much as 2 feet at higher elevations (National Oceanic and Atmospheric Administration, 1996a), caused nearly all of the snow to melt in a 12-hour period. The unseasonably warm air was drawn northward around the circulation of a deepening storm west of the Appalachian Mountains on January 18–19. The melting snow, combined with downpours, produced serious flooding over West Virginia. The most serious flooding was reported in the upstream reaches of the Potomac River. Total damage from this flood was estimated to be more than $61 million (National Oceanic and Atmospheric Administration, 1996b). There was one death. The Cheat River, in the northern mountains of West Virginia and one of the flashiest rivers in the country, was the first river to reach flood stage during this widespread flood. Flooding from the Allegheny and Monongahela Rivers in Pennsylvania, met nearly simultaneously in Pittsburgh, Pennsylvania, and then flowed down the Ohio River. Widespread 1- to 2-inch rains, plus runoff from snowmelt in the West Virginia and Maryland mountains, combined to create major flooding along the Ohio River. Six streamgages recorded their highest discharge for their periods of record in West Virginia (table 50) in January 1996. The flood-control projects held water back from the main-stem Ohio River to help reduce flood damage there.

On May 15–16, 1996, training thunderstorms, producing rainfall totals of 2.5 to 3.5 inches in 6 hours (National Oceanic and Atmospheric Administration, 1996a), moved southeast across southern West Virginia. A 57-year-old woman from Whitman died when she tried to leave her home and wade through the floodwaters. Two other women drowned trying to flee their flooded home in Cassity. The Tygart Valley River had significant floods (table 50). Most of the more than $7 million in damage across southern West Virginia was caused by the floodwaters from small streams and creeks (National Oceanic and Atmospheric Administration, 1996b).

Excessive rainfall associated with the remnants of Hurricane Fran on September 6, 1996, caused considerable and in some cases record flooding along rivers and tributaries in the Potomac River Basin. A thin band of 11 to 14 inches of rain (National Oceanic and Atmospheric Administration, 1996a) falling along higher ridges ran off into the South Branch Potomac River. Damage was excessive, especially along the South Branch Potomac. The $5 million in reported property damage included $3.5 million to 227 residences and $1.5 million to public buildings. Two persons died from the floods (National Oceanic and Atmospheric Administration, 1996b).

Showers and thunderstorms hit the western lowlands three separate times during March 1–2, 1997. Rainfall totals of 5 to 7.5 inches were measured (National Oceanic and Atmospheric Administration, 1997a). The full spectrum of flooding occurred. Sixteen West Virginia counties were declared Federal disaster areas. There was more than $13 million in property damage, and three persons drowned in the flooding (National Oceanic and Atmospheric Administration, 1997b).

A series of thunderstorms produced flash floods across central and north-central West Virginia during June 27–30, 1998. Nearly $30 million in damage and two deaths resulted from the flash floods (National Oceanic and Atmospheric Administration, 1998b).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

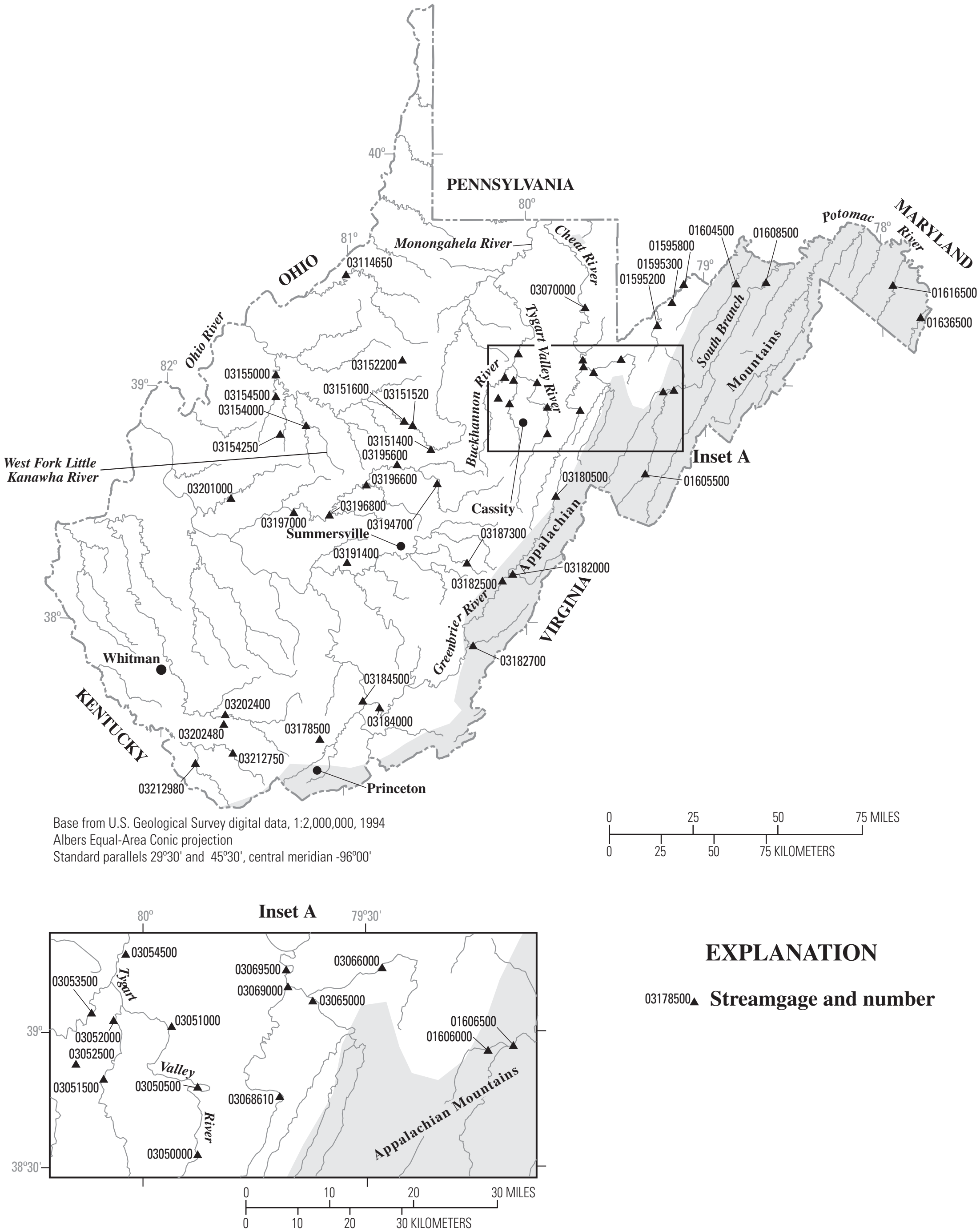

Figure 61. Location of streamgages with significant floods during 1994–98 water years for West Virginia.

Table 50. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in West Virginia.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 61)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
01595200	Stony River near Mount Storm, WV	249	1962–98	1986	16.41	14,000	9/6/96	12.55	7,750	Y	--
01595300	Abram Creek at Oakmont, WV	42.6	1955, 1957–82, 1996	1996 1955	-- 9.82	17,500 3,830	9/6/96	--	17,500	N	>500
01595800	North Branch Potomac River at Barnum, WV	266	1967–95, 1997–99	1978	13.37	27,100	3/30/95	8.92	8,830	Y	--
01604500	Patterson Creek near Headsville, WV	211	1939–98	1955 1943	12.20 13.00	16,000 15,300	1/19/96	11.97	14,400	N	25–50
01605500	South Branch Potomac River at Franklin, WV	179	1936, 1941–69, 1977–98	1986	22.58	44,000	9/6/96	19.16	34,000	N	200
01606000	North Fork South Branch Potomac River at Cabins, WV	335	1936, 1940–80, 1986, 1996	1986 1949	-- 18.00	90,000 50,000	9/6/96	--	8,000	N	2
01606500	South Branch Potomac River near Petersburg, WV	676	1878, 1924, 1929–98	1986 1949	21.80 22.83	130,000 62,000	9/6/96	22.20	113,000	N	200–500
01608500	South Branch Potomac River near Springfield, WV	1,486	1878, 1900–01, 1904–06, 1929–98	1986	44.22	240,000	9/7/96	34.98	147,000	N	50–100
01616500	Opequon Creek near Martinsburg, WV	273	1906, 1936, 1948–98	1996	18.76	23,400	1/20/96	18.76	23,400	N	50
01636500	Shenandoah River at Millville, WV	3,022	1870, 1896–98, 1900–01, 1903–08, 1924, 1929–98	1943	32.40	230,000	9/8/96	26.84	156,000	N	50–100

Table 50. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in West Virginia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 61)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03050000	Tygart Valley River near Dailey, WV	185	1916–76, 1986, 1989–98	1986 1932	16.60 17.20	22,000 13,100	5/17/96 6/19/98	15.65 14.65	19,900 15,900	N N	100–200 50
03050500	Tygart Valley River near Elkins, WV	271	1945–98	1986	22.81	23,500	5/17/96	18.66	14,500	N	25–50
03051000	Tygart Valley River at Belington, WV	406	1888, 1908–98	1986	23.65	29,500	2/9/94 5/17/96	19.64 20.19	20,000 21,200	N N	25–50 50
03051500	Middle Fork River at Midvale, WV	122	1916–42, 1986, 1996	1986 1939	-- 18.50	14,000 11,400	5/17/96	--	14,000	N	50–100
03052000	Middle Fork River at Audra, WV	148	1943–79, 1986, 1989–98	1986	15.80	17,100	5/17/96	15.60	16,700	N	50–100
03052500	Sand Run near Buckhannon, WV	14.3	1947–98	1986	8.34	3,200	2/9/94 5/17/96	7.18 7.98	2,120 2,860	N N	10–25 50
03053500	Buckhannon River at Hall, WV	277	1908, 1916–98	1986	16.88	15,000	2/9/94	15.59	13,300	N	25
03054500	Tygart Valley River at Philippi, WV	914	1912, 1941–98	1986	31.83	61,000	2/9/94 5/17/96	27.13 27.50	47,400 48,400	N N	50 50–100
03065000	Dry Fork at Hendricks, WV	349	1941–98	1986	20.74	100,000	1/19/96	14.17	41,000	N	25–50
03066000	Blackwater River at Davis, WV	85.9	1922–98	1986	17.67	12,500	2/9/94	13.60	7,660	N	25–50
03068610	Taylor Run at Bowden, WV	5.06	1974–82, 1992–98	1996	8.00	600	7/31/96	8.00	600	N	25
03069000	Shavers Fork at Parsons, WV	213	1888, 1907, 1911–26, 1941–98	1986	19.86	43,000	5/17/96	14.02	22,500	N	50
03069500	Cheat River near Parsons, WV	722	1844, 1888, 1914–98	1986	24.30	170,000	1/19/96	19.84	90,100	N	100

Table 50. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in West Virginia.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 61)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
03070000	Cheat River at Rowlesburg, WV	939	1844, 1888, 1921, 1924–96	1986	34.91	190,000	1/19/96	25.88	114,000	N	100
03114650	Buffalo Run near Little, WV	4.19	1969–77, 1994–98	1996 1998	12.53 13.30	2,420 1,900	7/19/96	12.53	2,420	N	50–100
03151400	Little Kanawha River near Wildcat, WV	112	1975–83, 1986–98	1996	18.47	19,600	7/31/96	18.47	19,600	N	200–500
03151520	Little Kanawha River below Burnsville Dam, WV	163	1977–98	1996 1977	8.19 58.81	2,540 2,530	8/6/96	8.19	2,540	Y	--
03151600	Little Kanawha River at Burnsville, WV	248	1975–83, 1994–98	1996	14.82	6,100	7/31/96	14.82	6,100	Y	--
03152200	Buck Run near Leopold, WV	2.91	1970–77, 1994–98	1998	11.45	1,290	6/28/98	11.45	1,290	N	200–500
03154000	West Fork Little Kanawha River at Rocksdale, WV	205	1929–31, 1938–98	1939 1997	30.30 31.55	20,200 15,000	3/2/97	31.55	15,000	N	25
03154250	Tanner Run at Spencer, WV	2.82	1970–77, 1994–98	1995	8.20	1,520	5/14/95	8.20	1,520	N	50–100
03154500	Reedy Creek near Reedy, WV	79.4	1952–78, 1997	1997	15.37	7,260	3/--/97	15.37	7,260	N	10–25
03155000	Little Kanawha River at Palestine, WV	1,516	1897, 1916–22, 1939–98	1939 1967	32.25 39.14	53,000 50,700	3/2/97	--	48,100	Y	10–25
03178500	Camp Creek near Camp Creek, WV	32.0	1947–71, 1994–98	1996	6.77	5,610	1/19/96	6.77	5,610	N	100
03180500	Greenbrier River at Durbin, WV	133	1944–98	1986	15.82	37,100	5/18/96	15.52	35,600	N	>500
03182000	Knapp Creek at Marlinton, WV	108	1946–58, 1986, 1989, 1994–98	1996	19.55	22,000	1/19/96	19.55	22,000	N	200–500
03182500	Greenbrier River at Buckeye, WV	540	1930–98	1986	23.20	82,000	1/19/96	20.93	61,500	N	100–200

Table 50. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in West Virginia.—Continued

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 61)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year: Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Significant floods 1994–98 water years: Date (month/day/year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
03182700	Anthony Creek near Anthony, WV	144	1972–82, 1996	1996	21.35	27,400	1/23/96	21.35	27,400	N	200–500
03184000	Greenbrier River at Hilldale, WV	1,619	1936–98	1996	26.88	93,000	1/20/96	26.88	93,000	N	100–200
03184500	New River at Hinton, WV	6,256	1937–98	1940	18.97	246,000	1/20/96	10.68	91,700	Y	--
03187300	North Fork Cranberry River near Hillsboro, WV	9.78	1969–82, 1994–98	1996	6.20	2,300	1/19/96	6.20	2,300	N	50
03191400	Laurel Creek near Summersville, WV	4.28	1966–77, 1994–98	1995	13.20	1,900	6/27/95	13.20	1,900	N	500
03194700	Elk River below Webster Springs, WV	266	1861, 1896, 1930–83, 1986–98	1986 1861	17.20 26.34	38,000 --	1/19/96	15.14	28,600	N	50
03195600	Granny Creek at Sutton, WV	6.98	1966–77, 1994–98	1994	14.91	1,650	5/7/94	14.91	1,650	N	50
03196600	Elk River near Frametown, WV	751	1959–98	1996	20.39	30,300	7/31/96 3/1/97	20.39 16.65	30,300 22,800	Y Y	-- --
03196800	Elk River at Clay, WV	992	1916–98	1967	22.80	48,000	3/1/97	21.98	45,100	Y	--
03197000	Elk River at Queen Shoals, WV	1,145	1918, 1929–98	1932 1918	29.20 37.20	72,000 --	3/2/97	25.36	47,000	Y	--
03201000	Pocatalico River at Sissonville, WV	238	1909–16, 1931, 1938–78, 1980, 1997–98	1939 1998	34.40 35.70	15,500 14,600	6/29/98	35.70	14,600	N	25–50
03202400	Guyandotte River near Baileysville, WV	306	1969–98	1977	26.89	36,700	5/16/96	22.18	22,500	N	10–25
03202480	Brier Creek at Fanrock, WV	7.34	1970–77, 1994–98	1996 1977	-- 7.29	1,200 980	5/16/96	--	1,200	N	25
03212750	Tug Fork at Welch, WV	174	1986–98	1996	13.23	6,550	5/16/96	13.23	6,550	N	10
03212980	Dry Fork at Beartown, WV	209	1986–98	1998	11.88	9,840	3/21/98	11.88	9,840	N	10–25

[1]Regulated during flood: N, no; Y, yes.

Wisconsin

Excessive rainfall from thunderstorms occurred September 15, 1994, across most of north-central Wisconsin and caused flooding on the Lily, Namekagon, Flambeau, and Spirit Rivers (fig. 62). Six streamgages recorded their highest discharges of record (table 51). Damage was more than $62 million (National Oceanic and Atmospheric Administration, 1994b).

Excessive rainfall of 4 to 8 inches fell across most of central and east-central Wisconsin, and parts of northeastern Wisconsin on June 16–18, 1996. Amounts during the 3-day period ranged from 2 to 7 inches in most areas (National Oceanic and Atmospheric Administration, 1996a). Runoff from the excessive rainfall caused rivers to rise, with several peaking well above flood stage. Property damage was more than $23 million, and crop damage estimates amounted to at least $56 million (National Oceanic and Atmospheric Administration, 1996b). Some of the larger lakes recorded their highest levels ever. Lake Monona and Lake Kegonsa eventually reached new record levels on June 19 (National Oceanic and Atmospheric Administration, 1996a). About 1,275 homes had varying amounts of flood damage as rains of 1 to 2 inches fell on saturated soil (National Oceanic and Atmospheric Administration, 1996a; 1996b), resulting in flash flooding in the Madison area. Emergency managers noted that this was the worst flash flooding seen in the Madison area for 30 years. On June 17, 4.51 inches of rain fell at the Madison airport, making it the wettest June day ever. A total of 13.52 inches of rain fell at Port Washington during June 16–18, with a 1-day record maximum rainfall of 7.68 inches occurring on June 18 (National Oceanic and Atmospheric Administration, 1996a).

In extreme southern Wisconsin, rainfall amounts during a 5-hour period on July 18, 1996, generally totaled 10 to 12 inches. As much as 13.50 inches fell about 6 miles northwest of Monroe (National Oceanic and Atmospheric Administration, 1996a). A bridge west of Browntown was washed away as water depths on the road reached 4 feet. Damage was more than $6 million (National Oceanic and Atmospheric Administration, 1996b).

Severe flash flooding occurred in southeastern Wisconsin including Milwaukee as rainfall amounts of as much as 10 inches fell during a 30-hour period ending on June 21, 1997 (National Oceanic and Atmospheric Administration, 1997a). The flash flooding was greater than the 100-year flood (National Oceanic and Atmospheric Administration, 1997b). No one was injured or killed by the floodwaters, thanks to superb rescue efforts by local law enforcement officials and firefighters. About 9,600 homes in the county had minor damage, 137 had major damage, and 15 were destroyed. Property losses were more than $84 million (National Oceanic and Atmospheric Administration, 1997b). Four streamgages recorded their highest discharge ever during this flood (table 51). Areas along and near the Menomonee River experienced moderate to major flooding to nearby roads, homes, and businesses. In Menomonee Falls, several homes had significant structural damage, and about 50 homes had significant damage.

A series of slow-moving thunderstorms produced a total of 6 to 10 inches of rainfall (National Oceanic and Atmospheric Administration, 1998a) and caused flash flooding as they moved through the Janesville and Milton areas on August 5, 1998. Flash floods also hit the area from Sheboygan Falls to Sheboygan during the early morning hours of August 5. Sheboygan had the worst flooding, with estimated damage of about $6 million to roads and bridges. The city school district suffered damage of $1.2 million (National Oceanic and Atmospheric Administration, 1998b).

Flash floods ravaged parts of Milwaukee and the counties to the west during the afternoon and evening hours of August 6, 1998. For Milwaukee, it was the second year in row for devastating floods. The damage was not as bad as that in June 1997, but for the county to the west it was the worst flooding ever. The flash flood was the result of 5 to 9 inches of rain falling in addition to 1 to 3 inches that fell during the previous 2 days. Maximum storm rainfall was 8.90 inches in Milwaukee (National Oceanic and Atmospheric Administration, 1998a). Damage was more than $82 million (National Oceanic and Atmospheric Administration, 1998b). One 13-year-old boy was injured as he was swept into a culvert and submerged for 15 minutes by floodwaters.

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National Oceanic and Atmospheric Administration (NOAA), 1994a–98a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–98b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

EXPLANATION

05431022▲ Streamgage and number

Figure 62. Location of streamgages with significant floods during 1994–98 water years for Wisconsin.

Table 51. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Wisconsin.

[mi², square miles; ft, feet above an arbitrary datum; ft³/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 62)	Streamgage name	Total drainage (mi²)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft³/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft³/s)	Regulated during flood[1]	Recurrence interval (years)
04063700	Popple River near Fence, WI	139	1964–98	1979 1996	4.52 4.70	1,640 1,490	4/26/96	4.70	1,490	N	30–50
04067760	Peshtigo River near Cavour, WI	150	1970–98	1996	15.78	1,600	4/21/96	15.78	1,600	N	20–30
04069700	North Branch Oconto River near Wabeno, WI	34.1	1970–98	1996	14.21	621	4/20/96	14.21	621	N	100
04071800	Pensaukee River near Pulaski, WI	48.8	1961–93, 1995–98	1996 1973	16.96 17.10	1,810 1,700	6/18/96	16.96	1,810	N	25
04074850	Lily River near Lily, WI	45.6	1970–76, 1978–98	1994 1975	10.55 11.00	173 158	9/15/94	10.55	173	N	10–20
04074950	Wolf River at Langlade, WI	463	1968–79, 1981–98	1996	10.40	2,440	4/26/96	10.40	2,440	N	30–50
04078500	Embarrass River near Embarrass, WI	384	1920–85, 1994–98	1965	12.13	7,080	6/19/96	10.81	4,830	N	10–20
04079700	Spaulding Creek near Big Falls, WI	5.57	1959–98	1960	11.64	101	6/18/96	11.56	93	N	25
04086000	Sheboygan River at Sheboygan, WI	418	1917–23, 1951–98	1998	12.02	7,820	8/6/98	12.02	7,820	N	25–30
04086600	Milwaukee River near Cedarburg, WI	607	1982–98	1996	12.88	5,500	6/18/96	12.88	5,500	N	10–25
04087000	Milwaukee River at Milwaukee, WI	696	1915–98	1997	10.00	16,500	6/21/97	10.00	16,500	N	>100
04087030	Menomonee River at Menomonee Falls, WI	34.7	1975–77, 1980–98	1997	8.31	1,500	6/21/97	8.31	1,500	N	25–50
04087088	Underwood Creek at Wauwatosa, WI	18.2	1979–98	1998	13.10	7,500	8/6/98	13.10	7,500	N	50–100
04087100	Honey Creek at Milwaukee, WI	3.26	1959–98	1997	22.70	1,100	6/21/97	22.70	1,100	N	75–100
04087120	Menomonee River at Wauwatosa, WI	123	1962–98	1997	18.64	13,500	6/21/97	18.64	13,500	N	30–50

Table 51. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Wisconsin.—Continued

[mi2, square miles; ft, feet above an arbitrary datum; ft3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 62)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
04087204	Oak Creek at South Milwaukee, WI	25.0	1964–98	1986	9.88	1,140	6/21/97	9.71	1,110	N	30–50
05332500	Namekagon River near Trego, WI	488	1928–70, 1988–98	1941	--	5,200	9/17/94	--	3,060	Y	25–30
05356500	Chippewa River near Bruce, WI	1,650	1914–98	1994 1941	18.12 20.46	29,000 25,800	9/17/94	18.12	29,000	Y	>100
05357360	Bear River near Powell, WI	120	1970–98	1996	13.06	730	4/26/96	13.06	730	N	10–25
05359600	Price Creek near Phillips, WI	16.9	1958–98	1994	17.43	552	9/15/94	17.43	552	N	>100
05360500	Flambeau River near Bruce, WI	1,860	1952–98	1994	12.44	24,100	9/16/94 4/21/96	12.44 10.56	24,100 17,900	Y Y	60–70 15–20
05361400	Hay Creek near Prentice, WI	22.6	1961–98	1994 1967	15.39 15.41	1,650 975	9/16/94	15.39	1,650	N	>100
05361420	Douglas Creek near Prentice, WI	25.2	1970–98	1994	17.66	1,620	9/15/94	17.66	1,620	N	>100
05370900	Spring Creek near Durand, WI	6.45	1962–98	1975	15.71	860	7/7/94	14.10	450	N	10–20
05382200	French Creek near Ettrick, WI	14.7	1960–71, 1989–98	1998 1967	12.14 13.07	2,450 1,300	6/27/98	12.14	2,450	N	25–50
05393500	Spirit River at Spirit Falls, WI	81.6	1942–98	1942	10.00	4,180	9/15/94	8.66	3,990	N	75–100
05395100	Trappe River tributary near Merrill, WI	1.58	1959–98	1995	17.79	396	8/15/95	17.79	396	N	20–25
05397600	Big Sandy Creek near Wausau, WI	11.5	1959–98	1959	15.18	2,120	8/15/95	14.46	1,600	N	30–40
05406491	Garfoot Creek near Cross Plains, WI	5.39	1985–86, 1990–98	1998 1993	6.78 7.57	212 111	3/31/98	6.78	212	N	50–100
05429500	Yahara River near McFarland, WI	327	1931–71, 1974–98	1959 1996	5.82 6.66	867 778	6/19/96	6.66	778	Y	50–60

Table 51. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Wisconsin.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 62)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
05431022	Delavan Lake outlet at Borg Road near Delavan, WI	42.1	1984–98	1994 1998	8.27 8.35	473 325	2/22/94	8.27	473	N	10–25
05432300	Rock Branch near Mineral Point, WI	4.83	1959–98	1993	22.63	3,100	5/24/94	17.74	1,570	N	25–35
05433500	Yellowstone River near Blanchardville, WI	28.5	1955–73, 1975–98	1990	11.40	8,500	6/17/96	10.74	5,100	N	10–15

[1]Regulated during flood: N, no; Y, yes.

Wyoming

Early on the morning of June 7, 1994, 4 to 5 inches of rain fell southwest of Kaycee (National Oceanic and Atmospheric Administration, 1994a) causing flash flooding on the Middle Fork Powder River (fig. 63). Several ranches sustained damage to irrigation equipment and fences. Only minor structural damage was reported at Kaycee.

On June 14, 1995, prolonged flooding occurred in central Wyoming as warm temperatures in the mountains brought a rapid snowmelt. Streams in the Wind River Basin overflowed their banks and caused considerable flooding. The flooding at Riverton occurred on the far south side of town. There was one fatality due to the flooding (National Oceanic and Atmospheric Administration, 1995b).

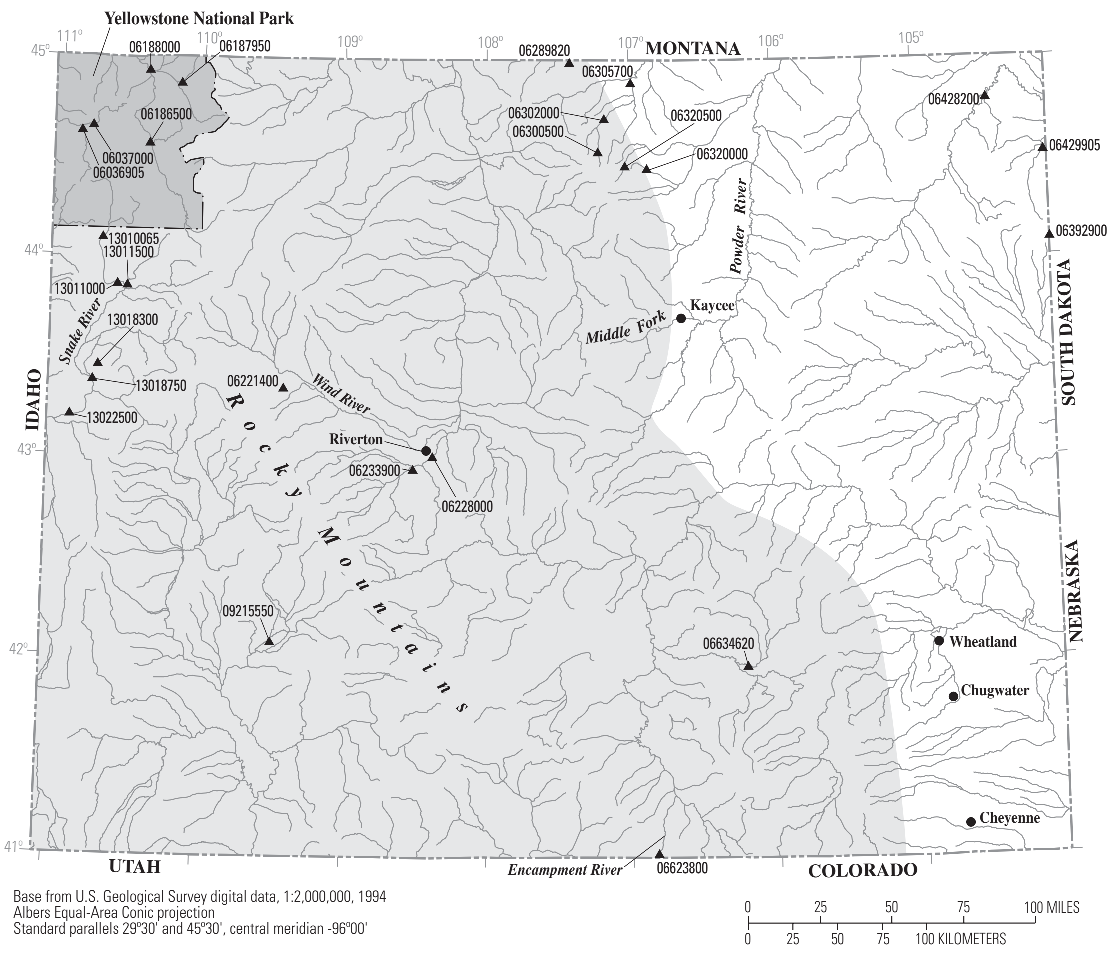
During snowmelt in May 1996 several rivers in Yellowstone National Park had their largest discharge of record (table 52). During July and August of 1996 several episodes of excessive rain caused by thunderstorms resulted in urban flooding in Cheyenne, Wheatland, and Chugwater.

Snowmelt in May and June 1997 caused significant flooding in Wyoming. The Snake River near Alpine, Wyoming (streamgage 13022500, table 52), had its largest discharge since 1937. Floods also occurred on the Wind River at Riverton (streamgage 06228000, table 52) and the Encampment River above Hog Park Creek near Encampment (streamgage 06623800, table 52).

References

National Oceanic and Atmospheric Administration (NOAA), 1994a–96a, Climatological data (by State): Asheville, North Carolina, National Climatic Data Center, various months.

National Oceanic and Atmospheric Administration (NOAA), 1994b–96b, Storm data (by State): Asheville, North Carolina, National Climatic Data Center, various months.



EXPLANATION

06623800▲ **Streamgage and number**

Figure 63. Location of streamgages with significant floods during 1994–98 water years for Wyoming.

Table 52. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Wyoming.

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 63)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06036905	Firehole River near West Yellowstone, MT	282	1984–96	1996	6.10	2,050	5/18/96	6.10	2,050	N	25–50
06037000	Gibbon River near West Yellowstone, MT	118	1984–96	1996	5.30	1,500	5/18/96	5.30	1,500	N	10–25
06186500	Yellowstone River at Yellowstone Lake outlet, Yellowstone National Park, WY	1,006	1923–82, 1984–86, 1989–98	1997	8.90	9,950	6/28/96 6/18/97	8.25 8.90	8,770 9,950	N N	25–50 50–100
06187950	Soda Butte Creek near Lamar Ranger Station, Yellowstone National Park, WY	99.0	1989–98	1996 1998	5.61 5.87	2,450 997	6/8/96	5.61	2,450	N	10–25
06188000	Lamar River near Tower Falls Ranger Station, Yellowstone National Park, WY	660	1923–69, 1985–86, 1989–98	1996	12.15	19,500	6/6/95 6/10/96 6/5/97	9.95 12.15 11.46	14,000 19,500 17,500	N N N	25–50 >100 100
06221400	Dinwoody Creek above lakes near Burris, WY	88.2	1918, 1956, 1958–78, 1989, 1997–98	1995 1963	4.50 4.57	1,510 1,270	7/13/95 6/9/97	4.50 4.35	1,510 1,490	N N	30–50 20–30
06228000	Wind River at Riverton, WY	2,309	1906, 1908, 1911–98	1935 1997	8.15 10.86	13,300 10,100	6/10/97	10.86	10,100	Y	20
06233900	Popo Agie River near Arapahoe, WY	796	1980–95	1995	10.22	4,760	6/17/95	10.22	4,760	Y	10–25
06289820	East Pass Creek near Dayton, WY	21.7	1983–98	1995 1997	4.47 6.45	511 117	5/9/95	4.47	511	Y	>50
06300500	East Fork Big Goose Creek near Big Horn, WY	20.1	1954–83, 1985–98	1963 1995	3.59 6.69	1,230 1,140	6/15/95	6.69	1,140	N	40–50

Table 52. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Wyoming.—Continued

[mi2, square miles; ft, feet above an arbitrary datum; ft3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 63)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/day/year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
06302000	Big Goose Creek near Sheridan, WY	120	1930–98	1963	5.83	3,160	6/17/95	4.65	2,090	Y	30
06305700	Goose Creek near Acme, WY	411	1984–98	1995 1994	7.30 7.51	3,330 1,490	6/17/95	7.30	3,330	Y	75–100
06320000	Rock Creek near Buffalo, WY	60.0	1941–98	1997	8.80	2,080	6/8/97	8.80	2,080	Y	30–35
06320500	South Piney Creek at Willow Park, WY	33.6	1946, 1948–57, 1960–72, 1975–83, 1985–98	1963 1997	4.68 5.27	1,620 1,220	6/8/97	5.27	1,220	Y	35–50
06392900	Beaver Creek at Mallo Camp near Four Corners, WY	10.3	1975–80, 1982–83, 1991–96	1994 1975	2.14 5.40	103 21	4/22/94	2.14	103	N	15–30
06428200	Belle Fourche River near Alva, WY	2,948	1989–98	1995	6.76	2,690	5/8/95	6.76	2,690	Y	--
06429905	Sand Creek near Ranch A near Beulah, WY	267	1977–83, 1991–96	1995 1982	3.80 7.35	1,230 514	5/8/95	3.80	1,230	N	>50
06623800	Encampment River above Hog Park Creek near Encampment, WY	72.7	1965–98	1997 1970	4.94 5.01	1,490 1,180	6/2/97	4.94	1,490	N	10
06634620	Little Medicine Bow River at Boles Spring near Medicine Bow, WY	969	1984–97	1997	7.66	1,900	3/20/97	7.66	1,900	N	5
09215550	Big Sandy River below Farson, WY	1,097	1982–98	1995	7.44	1,400	6/18/95	7.44	1,400	Y	--
13010065	Snake River above Jackson Lake at Flagg Ranch, WY	486	1984–97	1996	10.75	15,000	6/5/96	10.75	15,000	N	10–25
13011000	Snake River near Moran, WY	807	1904–67, 1971–97	1918 1943	-- 11.63	15,100 13,300	6/11/97	10.96	12,100	Y	20

Table 52. Maximum stage and discharge for period of record for streamgages having significant floods during 1994–98 water years in Wyoming.—Continued

[mi^2, square miles; ft, feet above an arbitrary datum; ft^3/s, cubic feet per second; --, not determined or not applicable; >, greater than. Source: Recurrence intervals calculated from U.S. Geological Survey data. Other data from U.S. Geological Survey reports or databases]

Streamgage number (fig. 63)	Streamgage name	Total drainage (mi^2)	Maximum stage and discharge for period of record through 1998 water year				Significant floods 1994–98 water years				
			Period of record (water years)	Water year	Stage (ft)	Discharge (ft^3/s)	Date (month/ day/ year)	Stage (ft)	Discharge (ft^3/s)	Regulated during flood[1]	Recurrence interval (years)
13011500	Pacific Creek at Moran, WY	169	1918, 1945–75, 1978–97	1983 1997	6.33 7.56	5,350 4,890	6/5/97	7.56	4,890	N	40–60
13018300	Cache Creek near Jackson, WY	10.6	1945–98	1971 1996	3.90 4.30	225 166	6/10/96	4.30	166	N	20
13018750	Snake River below Flat Creek near Jackson, WY	2,627	1978–97	1997	11.66	32,000	6/11/97	11.66	32,000	Y	30–70
13022500	Snake River above reservoir near Alpine, WY	3,465	1937–38, 1953–67, 1971–97	1997 1974	-- 11.96	38,300 28,600	6/11/96 6/11/97	-- --	31,600 38,300	Y Y	20–30 100

[1]Regulated during flood: N, no; Y, yes.

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