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

Flood of 1993—Mississippi River near the Jefferson National Expansion Memorial (Arch), St. Louis, Missouri

The Mississippi River at St. Louis, Missouri, was within 100 feet of the Jefferson National Expansion Memorial at a record stage of 49.58 feet (photograph courtesy of the Missouri Highway and Transportation Department).

Introduction

River-flow data have been collected on the Mississippi River at St. Louis near the Jefferson National Expansion Memorial (Arch) since 1861. Water at this location is excess river flow from 13 States and part of Canada (drainage area of about 697,000 square miles). Many disaster conditions, including floods and droughts, have affected this area; however, the flood of 1993 will be remembered not only for its intensity and duration, but as the largest flood in 150 years in the area.

Flood of 1993

Extreme weather conditions produced large amounts of rainfall throughout the upper Midwest during the spring and summer of 1993. Precipitation at St. Louis from January through September 1993 was more than 41 inches, whereas the average precipitation for an entire year is 37.5 inches. As a result of the intense rainfall, extensive flooding was common throughout the upper Midwest.

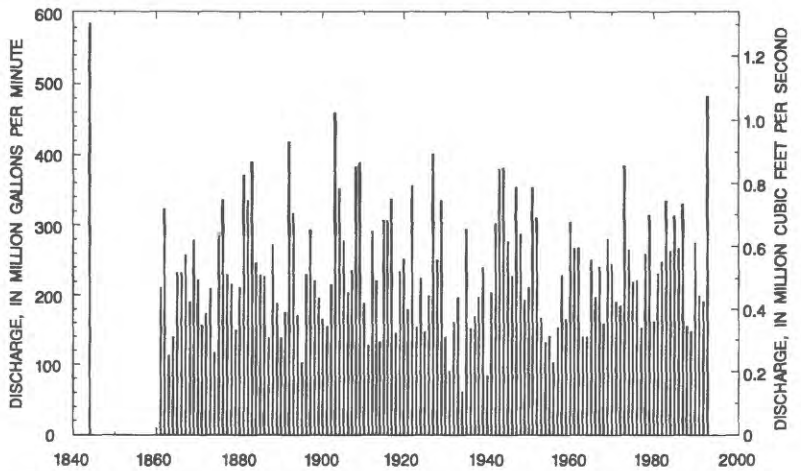
Levees were broken; farmland, towns, and transportation routes were flooded and destroyed; thousands of people were forced to abandon their homes; and 47 people died as a direct result of the flood.

On August 1, 1993, the largest peak discharge since 1844 was measured in St. Louis on the Mississippi River by the U.S. Geological Survey. (The peak discharge of 1844 was estimated because the streamflow-gaging station for the Mississippi River at St. Louis on the Eads Bridge was not installed until 1861.) The peak discharge in August 1993 was measured at 485 million gallons per minute or 1,080,000 cubic feet per second—a rate sufficient to fill Busch Stadium about every 65 seconds. The maximum depth of the river was estimated to be 87 feet and

The Eads Bridge at St. Louis, Missouri, over the Mississippi River, on July 18, 1993; river stage is about 3 feet less than the peak stage of 49.58 feet on August 1, 1993 (photograph courtesy of Greg Sawyer).

the maximum velocity measured was 7.6 miles per hour (11.1 feet per second) during the peak discharge. In comparison, during low-flow periods, maximum depths are less than 30 feet and maximum velocities are less than 3 miles per hour (4.4 feet per second). The daily average discharge for the Mississippi River at St. Louis from 1861 through 1993 was 83.5 million gallons per minute or 186,000 cubic feet per second.

The record setting August 1, 1993, peak river stage of the Mississippi River at St. Louis was 49.58 feet, just 2.5 feet below the floodwall. (The top of the floodwall on the west bank is at a river stage of 52.0 feet.) This stage was more than 6 feet higher than the previous peak stage of 43.23 feet in April 1973 (when the peak discharge was 382 million gallons per minute or 851,000 cubic feet per second). The flood stage (stage at which the river overtops its banks) for the Mississippi River at St. Louis is 30.0 feet. Because of development and construction on the Mississippi River flood plain, river stages are now higher for equivalent discharges than in the previous century, and the river stage for the 1993 flood cannot be compared to the stage for the 1844 flood.



Hydrograph of peak discharges for floods on the Mississippi River at St. Louis.

The duration of the flood of 1993 also was record setting. The Mississippi River was above flood stage at St. Louis for a total of 144 days during April 1 to September 30, 1993. The duration of the flood of 1973 was 77 days.

The large peak discharge, the high river stage, and the long duration of the flood of 1993 were unusual according to the historical records. The flood of 1993 was slightly greater than a 100-year flood event. A 100-year flood event will be exceeded on the average once in 100 years. There is a 1 percent chance that such a flood will occur in any year.

—R.E. Southard and B.J. Smith

References

Parrett, Charles, Melcher, N.B., and James, Jr., R.W., 1993, Flood discharges in the Upper Mississippi River Basin, 1993: U.S. Geological Survey Circular 1120–A, 14 p.

Southard, R.E., 1995, Flood volumes in the Upper Mississippi River Basin, April 1 through September 30, 1993: U.S. Geological Survey Circular 1120–H, 32 p.

For More Information

Further information on the flood of 1993 can be obtained from:

District Chief
U.S. Geological Survey
1400 Independence Rd., MS 200
Rolla, Missouri 65401

or
by accessing the U.S. Geological Survey "Home Page" on the World Wide Web at:

"http://wwwdmorll.er.usgs.gov"