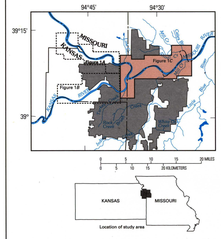
Index map



FLOOD-INUNDATION MAPS FOR KANSAS CITY AND VICINITY, 1993

The areas inundated by the floods of July 10 and July 27, 1993, in the Kansas City metropolitan area are shown in fig. 1A (sheet 1), fig. 1B (sheet 2), and fig. 1C (sheet 3), which are based on 1:24,000-scale topographic maps. Flood-boundary lines shown on the maps have been determined from analyses of floodwater elevation marks and flood profiles in relation to elevations on the topographic maps and from flood boundaries evident on aerial photographs taken at the approximate time of the flood crest on the Missouri and the Kansas Rivers on July 27, 1993, by the U.S. Army Corps of Engineers (USACE). The flood elevations are contoured on the inundation maps to reflect the flow characteristics down the valleys of the Missouri and the Kansas Rivers.

The approximate locations of the FEMA 100-year flood boundaries are shown for reference. As mapped, these boundaries are available from the respective FEMA Flood Insurance Study reports (U.S. Department of Housing and Urban Development, 1975–95) for each city or county in the Kansas City metropolitan area. In areas where the FEMA boundary and the 1993 flood boundaries coincide, only the 1993 lines are shown. Isolated pools of water behind levees or in low areas are not depicted on these maps except in the West Bottoms along the Kansas River where an extensive area was flooded by Turkey Creek on July 10.

Turkey Creek Flood, July 10, 1993

In Kansas City, Kansas and Missouri, Turkey Creek flooded during the morning of July 10, 1993. More than 10 in. of rain (unofficial reports) fell overnight within the southwestern part of the Kansas City metropolitan area and resulted in rapid rises in several streams, which included Turkey Creek. An example of the rapid rise and fall of the smaller streams in the area can be seen in the gage-height record of the USGS streamflow-gaging station on Indian Creek at Overland Park, Kansas (station number 06893300), for July 10 in which the stage rose 10 ft in 9 hours (fig. 11). The runoff lasted about 16 hours, and the stream reached a peak flow of 9,070 ft^3/s. At this location, the Indian Creek Basin is 12 mi^2, about 5 mi^2 larger than the Turkey Creek Basin as measured at the discontinued streamflow-gaging station on Turkey Creek at Kansas City, Kansas (station number 06892940).

The level of Turkey Creek at Kansas City, Kansas, reached an elevation of 788.59 ft above sea level on July 10 as determined from high-water-mark surveys. This elevation corresponded to a flow of about 11,000 ft^3/s and was only 0.5 ft lower than the peak elevation for the flood of September 11, 1977, which had a peak flow of 11,700 ft^3/s (Hauth and Carswell, 1981). Downstream, where the entire flow is diverted to the Kansas River through the Turkey Creek Diversion Tunnel, the water-carrying capacity was reduced by the small difference in elevation (about 6 ft) between the level of the Kansas River and that of water entering the tunnel. As a result, water began to pond along Southwest Boulevard from U.S. 169 to just north of 27th Street, ultimately overtopping a sill just north of the 27th Street overpass over the St. Louis and Santa Fe Railroad tracks. For a few hours, water flowed over the sill and spread out over the West Bottoms northward as far as 12th Street. As in most small urban watershed floods, the flow of Turkey Creek quickly subsided, which allowed the flow through the tunnel to reduce the elevation of the ponded water and resulted in the cessation of flow over the sill into the West Bottoms area.

Missouri and Kansas River Flood, July 27, 1993

The Missouri and the Kansas Rivers reached their highest flows almost simultaneously on July 27, 1993 (figs. 9, 10, sheet 2), as a result of excessive rainfall over southwestern Iowa, northeastern Kansas, northwestern Missouri, and southeastern Nebraska. The excessive rainfall, saturated soil conditions, and high river stages combined to create a flood of historic magnitude on the Missouri River. Had the flood-retarding reservoirs in the Missouri and the Kansas River Basins not been functional, the peak discharge at the gaging station on the Missouri River at Kansas City, Missouri, could have been as high as 713,000 ft^3/s. At this flow rate, the Federal levee system would have been overtopped (Perry, 1994). The observed flows on July 27 were less than 2 ft from the top of the Federal levees. The Missouri River at Kansas City, Missouri (station number 06893000), was above a flood stage of 32 ft from July 6 until August 6 (The Kansas City Star, 1993). High stages of the Missouri River during this time affected the levels of the Kansas River upstream from its mouth by producing backwater. Backwater effects reached more than 20 mi upstream on the Kansas River at peak discharges on July 27.

DAMAGES

Damages in the Kansas City metropolitan area from the 1993 flooding were widespread and ranged from flooded basements to erosion and closure of parts of the interstate highway system. Many homes, farmsteads, and businesses were inundated by the muddy floodwaters and were seriously damaged. In addition to the physical damages to structures and contents, agricultural losses were extensive in the flood plains as crops were a total loss, farm equipment was damaged or lost, and productive land was covered by sand. Other economic losses included unemployment as a result of closed businesses.

Damages along the Kansas River were mainly to agricultural lands in the vicinity of the Kansas Highway 7 Bridge (Kansas River mile 20.5), but as the water-profile elevations exceeded the FEMA 100-year estimates farther downstream, more homes and businesses were damaged. The greatest damage along the Kansas River was inflicted near Kansas River mile 9.0, where several large mobile home parks were destroyed. Downstream from the beginning of the Federal levee system at Kansas River mile 8.0, the Kansas River caused only slight damage. However, localized floods from interior drainage behind the levee system on July 10 resulted in widespread damage in the West Bottoms area of Kansas City, Missouri and Kansas. This flooding was created by high flows on Turkey Creek, which occurred simultaneously with high levels of the Kansas River. The flood elevations were lower in the West Bottoms area on July 10 than within the Kansas River on July 27 but nonetheless caused extensive damage in the West Bottoms area and along Southwest Boulevard.

Flood damage along the Missouri River was extensive throughout the Kansas City metropolitan area. Upstream of the I–435 Bridge (Missouri River mile 383.5), all farmsteads and agricultural lands were inundated. The majority of homes and businesses in the communities of Wolcott and Waldron were damaged. Agricultural levees were breached and eroded. The cities of Parkville and Riverside experienced extensive damage to homes and businesses. Railroad embankments on both sides of the Missouri River channel were damaged by erosion of road grades in many locations. Interstate Highway I–635 was extensively damaged as floodwaters flowed over and through the embankments. The Federal levee system contained the Missouri River, and flooding was limited to areas on the river side of the levees. Flood damage was substantial beyond the eastern end of the Federal levee system at Missouri River mile 354, where water flooded farms, businesses, and homes before and after flowing over the Missouri Highway 291 embankments.

ADDITIONAL INFORMATION

Several other publications describe the floods of 1993 in the Midwest. The USGS Circular 1120, "Floods in the Upper Mississippi River Basin, 1993," consists of individually published chapters that document the effects of the 1993 flooding. The series includes data and findings on the magnitude and frequency of peak discharges; precipitation; water-quality characteristics, which include nutrients and manmade contaminants; analysis of flood waves; transport of sediment; assessment of sediment deposited on flood plains; effects of inundation on ground-water quality; flood-discharge volumes; effects of reservoir storage on flood peaks; stream-channel scour at selected bridges; and documentation of geomorphologic changes.

This report is one chapter in a series of Hydrologic Investigations Atlases (HA–735) that depicts the extent of flood-plain inundation in and around Iowa City, Des Moines, and Davenport, Iowa, Kansas City, Kansas, and Jefferson City, St. Louis, and Kansas City, Missouri. The National Oceanic and Atmospheric Administration (1994) provides hydrometeorologic, hydraulic, and river-forecasting information, as well as a disaster survey team contact list. Additional information can be obtained from the USACE, Kansas City District, and local engineering departments of the cities and counties in the area. Flood-damage estimates and Flood Insurance Studies are available from the U.S. Department of Housing and Urban Development, FEMA, in Kansas City, Missouri.

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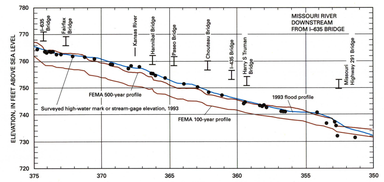


Figure 6. Water-surface profiles for the Federal Emergency Management Agency (FEMA) 100- and 500-year discharges and for the July 27, 1993, peak discharge along the Missouri River downstream from the I–635 Bridge, Kansas City, Missouri.

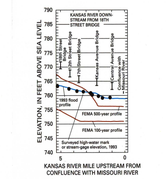


Figure 8. Water-surface profiles for the Federal Emergency Management Agency (FEMA) 100- and 500-year discharges and for the July 27, 1993, peak discharge along the Kansas River downstream from the 18th Street Bridge, Kansas City, Kansas.

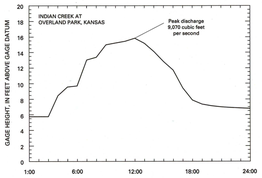
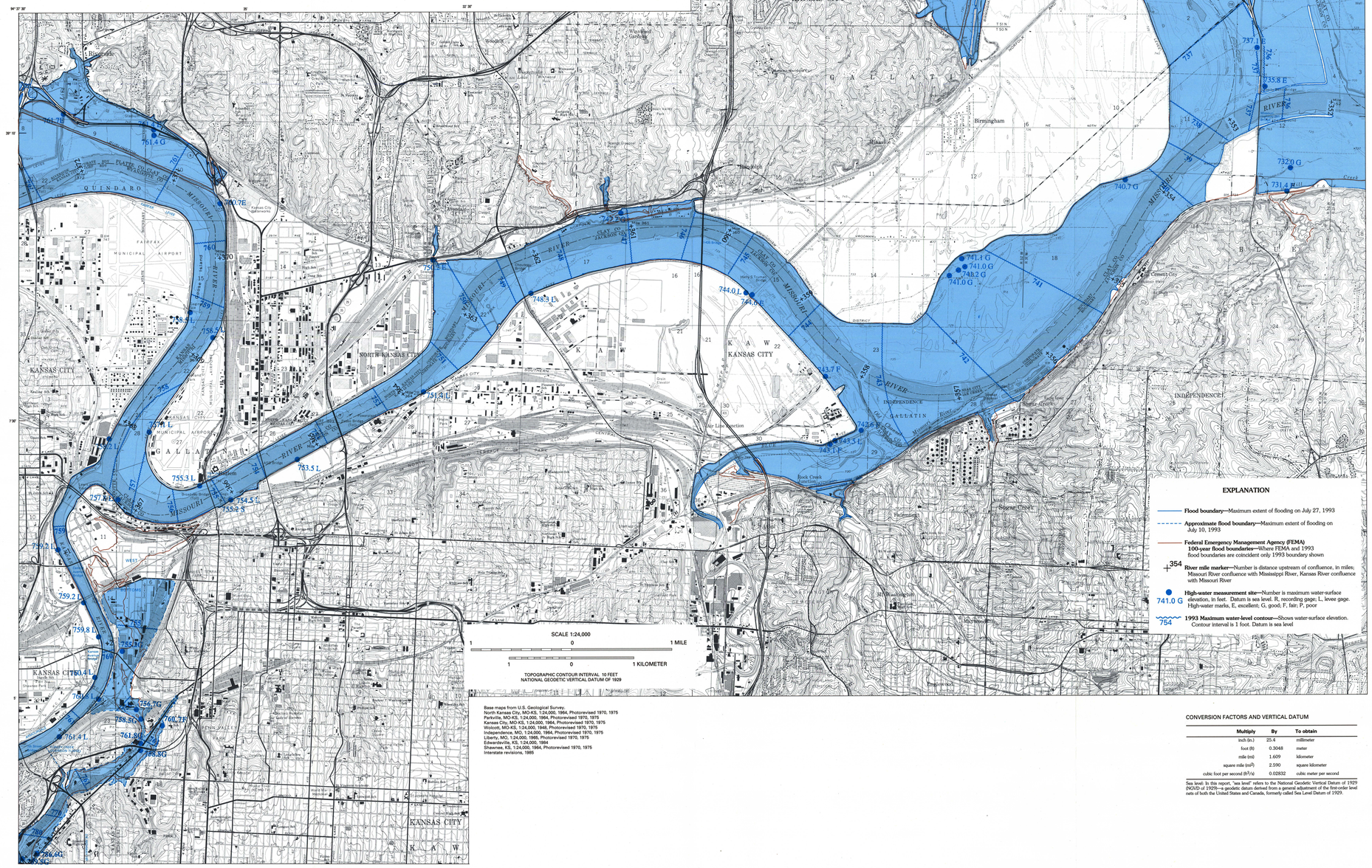


Figure 11. Gage height for Indian Creek at Overland Park, Kansas, for July 10,1993.



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EXPLANATION

- **Flood boundary**—Maximum extent of flooding on July 27, 1993
- **Approximate flood boundary**—Maximum extent of flooding on July 10, 1993
- **Federal Emergency Management Agency (FEMA) 100-year flood boundaries**—Where FEMA and 1993 flood boundaries are coincident only 1993 boundary shown
- **River mile marker**—Number is distance upstream of confluence, in miles; Missouri River confluence with Mississippi River, Kansas River confluence with Missouri River
- **High-water measurement site**—Number is maximum water-surface elevation, in feet. Datum is sea level. R, recording gage; L, levee gage. High-water marks, E, excellent; G, good; F, fair; P, poor
- **1993 Maximum water-level contour**—Shows water-surface elevation. Contour interval is 1 foot. Datum is sea level

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Figure 1C. Flood boundaries, water-elevation measurements, and water-level contours for 1993 and Federal Emergency Management Agency 100-year-flood boundaries for the Kansas City metropolitan area from about Missouri River miles 372 to 352.

DELINEATION OF FLOODING WITHIN THE UPPER MISSISSIPPI RIVER BASIN—FLOODS OF JULY 10 AND 27, 1993, IN KANSAS CITY, MISSOURI, AND KANSAS CITY, KANSAS, AND VICINITY

By
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1997