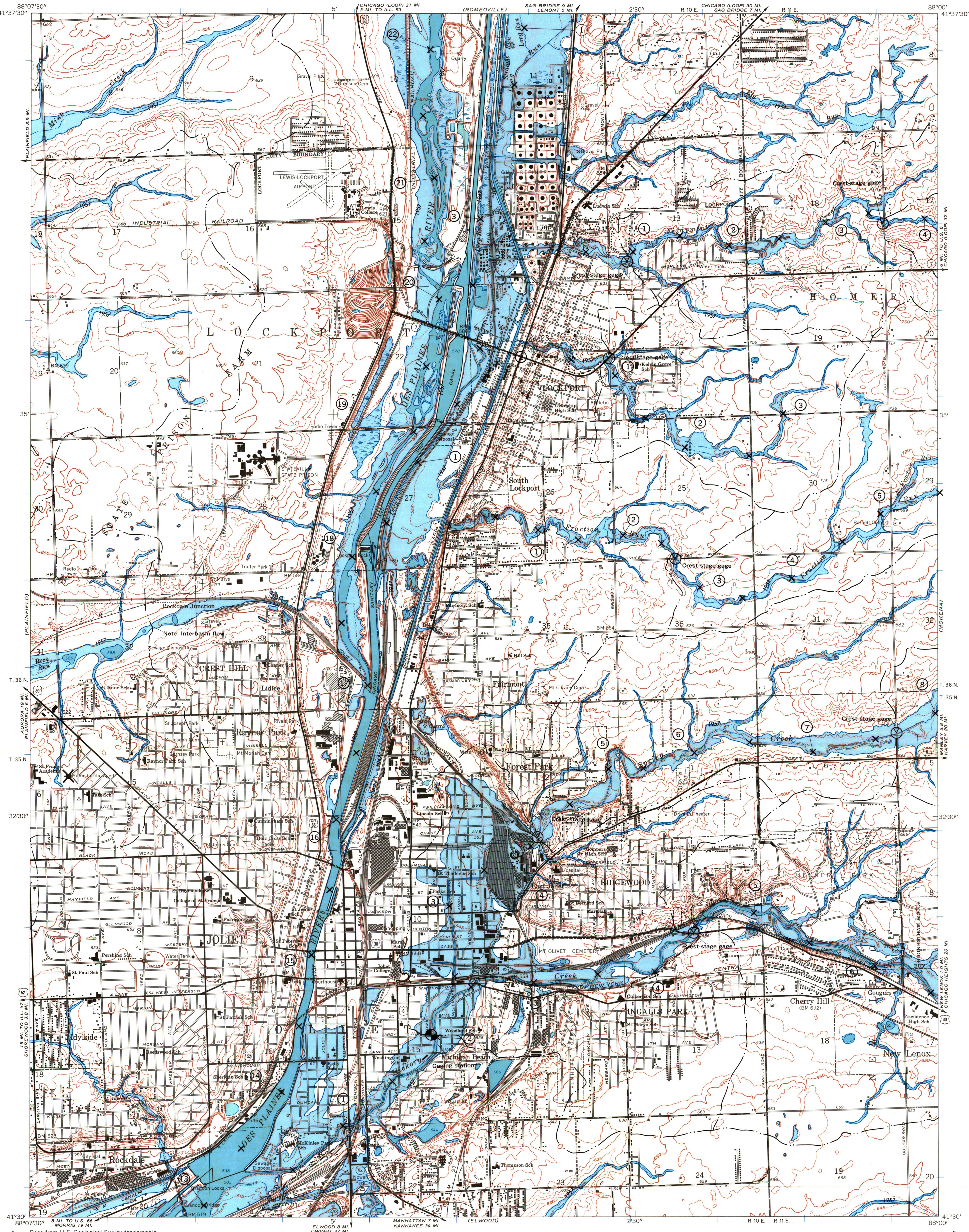
PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION



Base from U.S. Geological Survey topographic quadrangles, SE 4 Joliet, 15', 1953-54

EXPLANATION

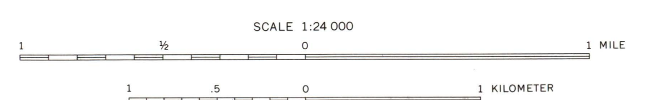
Area flooded 1947, 1957

Boundary of 1947 flood

Boundary of 1957 flood

Drainage divide

River mile measured along stream channel



CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1964

QUADRANGLE LOCATION

FLOODS IN JOLIET QUADRANGLE, ILLINOIS

This report presents hydrologic data that can be used to evaluate the depth and frequency of flooding that affect the economic development of flood plains. These data also provide a technical basis for making sound decisions concerning the use of flood-plain lands. No recommendations or suggestions for land-use regulations are made and no solutions of existing flood problems are proposed.

The approximate areas inundated by floods along streams in the Joliet 7 1/2-minute quadrangle are delineated on the map. The quadrangle location is shown in figure 1. Inundated areas are shown for the flood of July 1957 along Des Plaines River, Big Run, Fiddyment Creek, Milne Creek, Fraction Run, Hickory Creek, Spring Creek, Sugar Run, Rock Run, and Mink Creek; and for the flood of April 1947 along the Illinois and Michigan Canal, Long Run, Straight Run, and Deep Run. The July 1957 flood on Hickory Creek at Joliet was the highest since at least 1867.

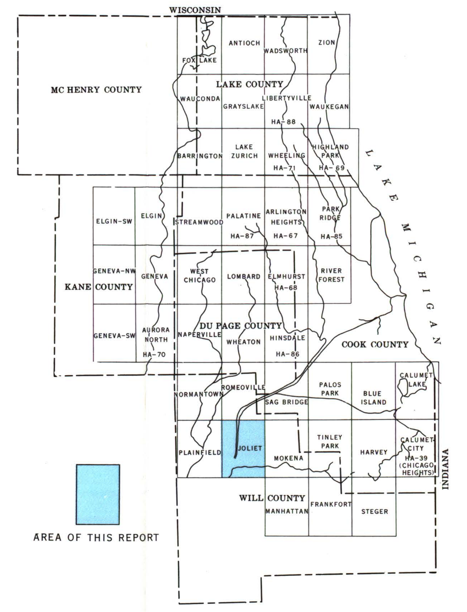


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping program.*

The general procedure followed in defining flood limits was, first, to develop flood profiles from elevations of floodmarks identified in the field. The horizontal extent of flooding delineated on the topographic map was derived from the profile by interpolation between contours (lines of equal elevation) and by plotting overflow limits identified during field investigations and surveys. The locations of flood limits shown on the map are only approximate because the map scale is small (1 inch equals 2,000 feet) and the contour interval is relatively large (10 feet).

The flood limits shown on the map are not necessarily those for the highest floods expected. Greater floods are possible but definition of their probable overflow limits is not within the scope of this report. The flood limits provide a record of historic facts that reflect channel conditions existing when the floods occurred. No attempt was made to appraise the effect of changes in channel conditions, waterway openings at highways and railroads, or changes in runoff characteristics of the stream caused by increased urbanization that may have taken place after the floods occurred. Protective works built after the floods of 1947 and 1957 may reduce the frequency of flooding in the area but will not necessarily eliminate all future flooding. The inundation pattern of future floods may be affected by new highways and bridges, relocation and improvement of stream channels, and other cultural changes.

There are numerous depressions or lowland areas in the Joliet quadrangle where surface water accumulates. Flood limits are shown for many such areas but there may be others that were not detected in this investigation.

Flood limits are not defined for areas inundated as a result of backup in storm drains.

Cooperation and acknowledgment.— The preparation of this report is part of an extensive flood-mapping program financed through a cooperative agreement between The Northeastern Illinois Metropolitan Area Planning Commission and the U.S. Geological Survey whereby flood maps will be prepared for the 7 1/2-minute quadrangles shown in figure 1. Areal limits of the program include parts of Cook, Kane, McHenry, and Will Counties, and all of Du Page and Lake Counties. The six counties cooperate financially in the program through separate agreements with the Planning Commission. Financial support for the preparation of this report was provided by Will County in which the Joliet quadrangle is located.

The cooperative program is administered on behalf of the Planning Commission by Paul Oppermann, Executive Director, and is directly coordinated by John R. Sheaffer, Chief Planner.

The flood maps are prepared by the U.S. Geological Survey under the administrative direction of William D. Mitchell, district engineer, and under the immediate supervision of Davis W. Ellis, engineer-in-charge of the project.

Acknowledgment is made to the following agencies that supplied some of the flood data on which this report is based: Corps of Engineers, U.S. Army; the State of Illinois, Department of Public Works and Buildings, Division of Waterways; and the Metropolitan Sanitary District of Greater Chicago. The Corps of Engineers also furnished maps of the city of Joliet showing 2-foot-interval contours and the extent of the July 1957 flood on Hickory Creek, Spring Creek, and Sugar Run. The Division of Waterways furnished 2-foot-interval countour strip maps along Hickory Creek and Spring Creek in Joliet and along the Illinois and Michigan Canal and its tributaries upstream from the confluence with the Des Plaines River.

Additional data were obtained from the Texaco Oil Company, Lockport Division; the Elgin, Joliet, and Eastern Railway Company; the Atchison, Topeka, and Santa Fe Railway Company; Commonwealth Edison Company; from officials of municipalities in the area; and from field investigations.

Flood height.— The height of a flood at a gaging station usually is stated in terms of gage height or stage, which is the elevation of the water surface above a selected datum plane. Elevations shown on the map are in feet above mean sea level. Gage heights for gaging stations located in Joliet quadrangle can be converted to elevations above mean sea level by adding the gage height to the appropriate datum of gage listed in the following table. Size of drainage area and type of gage at each station also are shown in the table. Drainage divides are shown on the map.

Gaging station	Type of gage[1]	Datum of gage above mean sea level (feet)	Drainage area (sq mi)
Fiddyment Creek:			
Near Lockport (Gougar Road)	C	679.84	1.92
At Lockport (Oak Street)	C	618.98	4.55
Milne Creek at Lockport (State Highway 7)	C	627.71	1.96
Fraction Run near Lockport (Bruce Road)	C	654.83	5.17
Hickory Creek:			
At Ridgewood (Cass Street-U.S. Highway 30)	C	576.14	83.9
At Joliet (Third Avenue)	R	527.00	107
Spring Creek:			
Near Ridgewood (Gougar Road)	C	630.31	14.5
Near Joliet (Belle Avenue)	C	559.46	18.4

[1]C, Crest-stage gage; R, Water-stage recorder

Gage height and year of occurrence of each annual flood (highest peak discharge in each calendar year) above 534-foot elevation at the gaging station on Hickory Creek at Joliet during the period 1945-62 are shown in figure 2. The irregular occurrence of floods is evident.

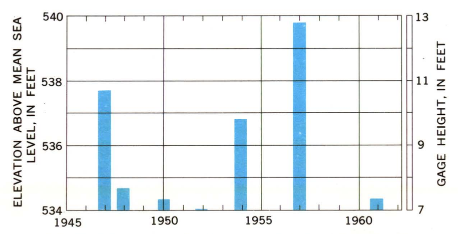


FIGURE 2.—*Annual floods above 534-foot elevation, 1945-62, Hickory Creek at Joliet (Third Avenue).*

Flood discharge.— The rate of discharge of a stream is the volume of flow that passes a particular location in a given period of time. Discharge rates usually are expressed in units of cubic feet per second (cfs). Peak discharge is the maximum value of the discharge attained by a flood. The peak discharge during a flood generally occurs at the time of the maximum height of the flood, but if a stream is affected by variable backwater, the peak discharge may not coincide with the maximum stage.

Flood frequency.— Frequency of floods at the Geological Survey gaging station on Hickory Creek at Joliet was derived from streamflow records for this station combined with records for other nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The general relation between frequency and discharge is shown in figure 3, and the general relation between frequency and stage is shown in figure 4. The relation between stage and frequency is dependent on the relation of stage to discharge which is affected by changes in physical conditions of channels and constrictions. The frequency curve shown in figure 4 is based on channel conditions existing in 1962. Longer records and future changes in channel conditions may define somewhat different flood-frequency curves. Extrapolation of the curves beyond the limits shown is not recommended because of the possibility of large errors.

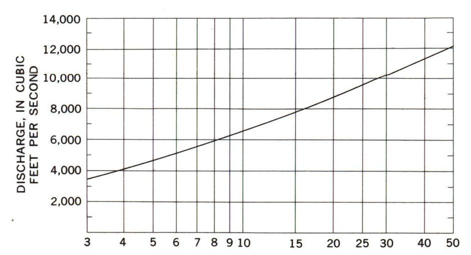


FIGURE 3.—*Frequency of flood discharges on Hickory Creek at Joliet (Third Avenue).*

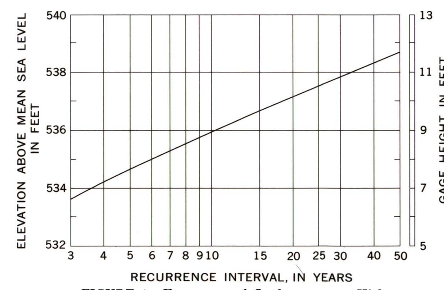


FIGURE 4.—*Frequency of flood stages on Hickory Creek at Joliet (Third Avenue).*

Recurrence intervals.— As applied to flood events, a recurrence interval is the average interval of time within which a given flood will be equaled or exceeded once. Frequencies of floods may be stated in terms of their probabilities of occurrence (reciprocals of their recurrence intervals). For example, a flood with a 25-year recurrence interval would have a 4-percent chance of being equaled or exceeded in any given year, and a flood with a 50-year recurrence interval would have a 2-percent chance of being equaled or exceeded in any given year.

The general relation between recurrence interval and flood height at the gaging station on Hickory Creek at Joliet (fig. 4) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	538.7
40	538.3
30	537.8
20	537.2
10	535.9
5	534.8
3	533.6

It is emphasized that recurrence intervals are average figures--the average number of years that will elapse between occurrences of floods that equal or exceed a given magnitude. The fact that a major flood is experienced in one year does not reduce the probability of that flood being exceeded in the next year or in the next week.

Flood profiles.— Profiles of the water surface, based primarily on elevations of marks left by floods of April 1947, October 1954, July 1957, and April 1960, are shown in figures 5-11. Where floodmarks could not be identified, the profiles were constructed on the basis of elevations of lower floods and streambeds, and the extent of overflows was determined from photographs and reports of local residents. River miles used for the profiles correspond to those marked along the streams on the flood map.

The abrupt changes in the profiles, shown at some road crossings, indicate the difference in water-surface elevations at the upstream and downstream sides of bridges produced by channel constrictions. The drop in water surface through bridge openings during future floods may be different from that shown on the profiles. An increase in channel capacity through a bridge opening would reduce the flood height on the upstream side. An accumulation of debris at a bridge would reduce the channel capacity and tend to increase the upstream flood height. Channel changes through bridge openings may also change the overflow pattern of future floods.

Flood depths.— Depth of flooding at any point can be estimated by subtracting the ground elevation from the water-surface elevation indicated by the profiles in figures 5-11. The approximate ground elevation can be determined from information indicated by contours on the map, although more accurate elevations may be obtained by leveling to nearby bench marks.

Additional data.— Other information pertaining to floods in the Joliet quadrangle may be obtained at the office of the U.S. Geological Survey, Oak Park, Ill., and from the following published reports:

Daniels, W. S., and Hale, M. D., 1958, Floods of October 1954 in the Chicago area, Illinois and Indiana: U.S. Geol. Survey Water-Supply Paper 1370-B, p. 107-200.

Illinois Department of Public Works and Buildings, Division of Waterways, 1950, Survey report for flood control, Hickory Creek at Joliet, 70 p.

______1951, Survey report for flood control, Illinois and Michigan Canal and tributaries, 69 p.

Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. Public Works and Bldgs., Div. of Waterways, 386 p.

Ramey, H. P., 1959, Storm water drainage in the Chicago area: Am. Soc. Civil Engineers Proc., v. 85, no. HY 4, p. 11-37.

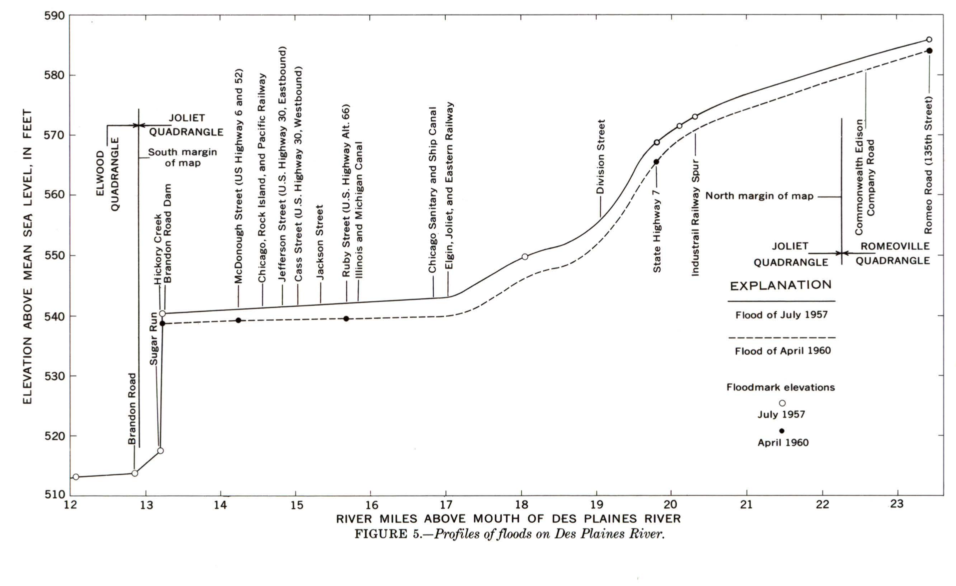


FIGURE 5.—*Profiles of floods on Des Plaines River.*

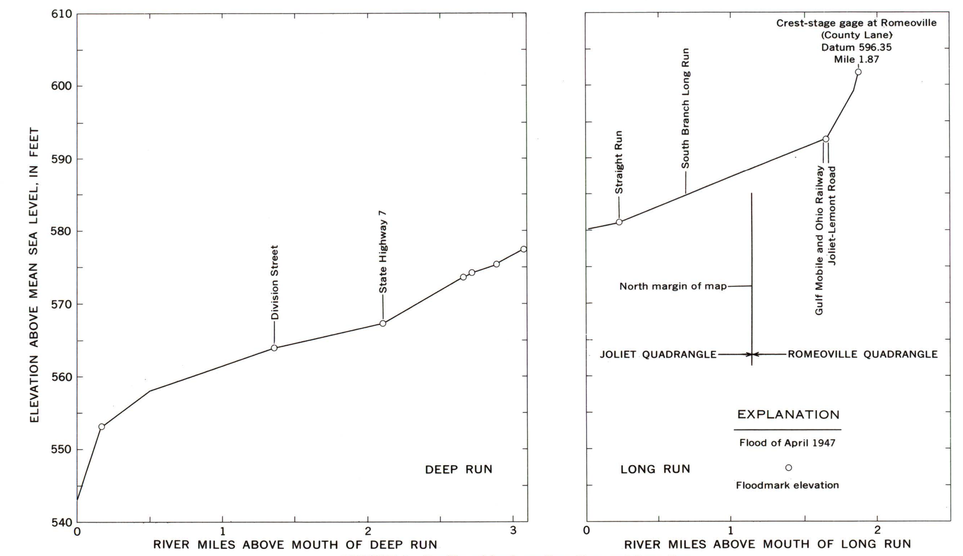


FIGURE 6.—*Profiles of floods on Deep Run and Long Run.*

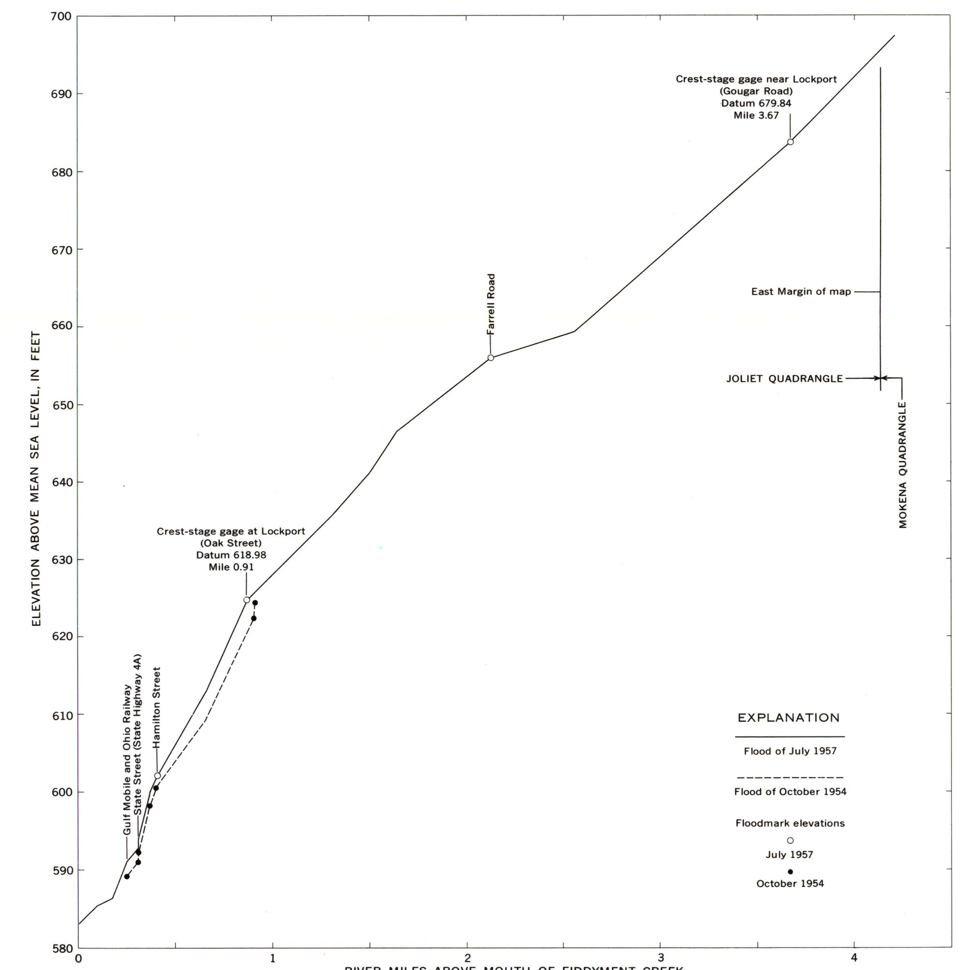


FIGURE 7.—*Profiles of floods on Fiddyment Creek.*

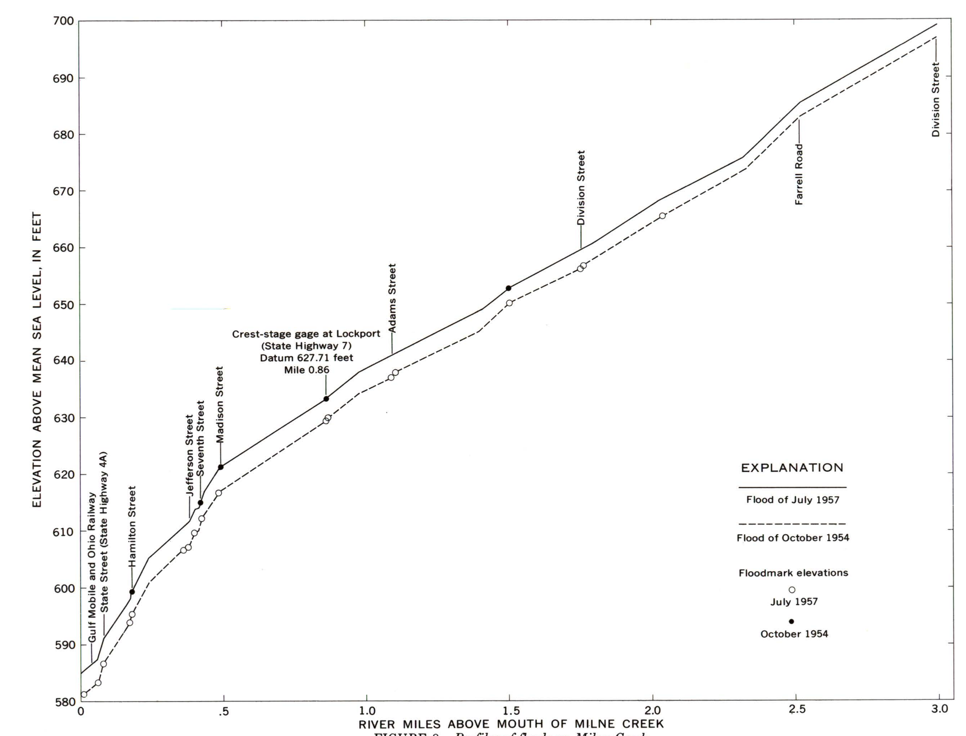


FIGURE 8.—*Profiles of floods on Milne Creek.*

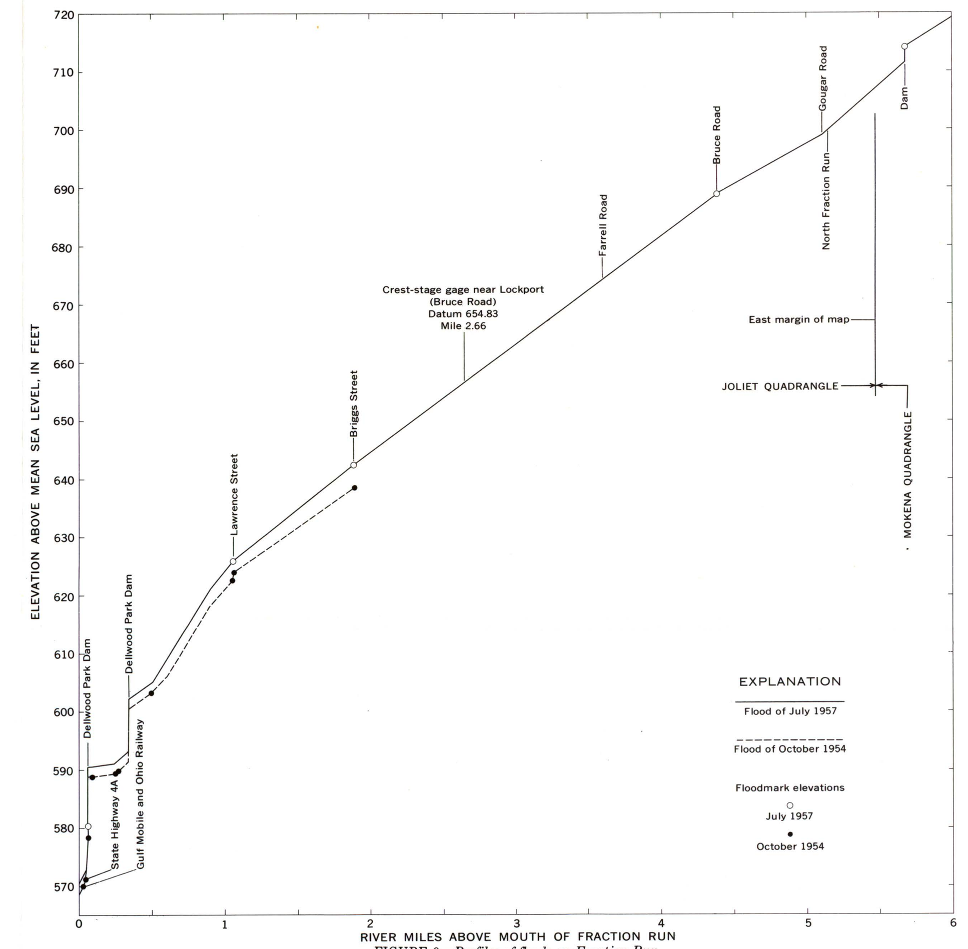


FIGURE 9.—*Profiles of floods on Fraction Run.*

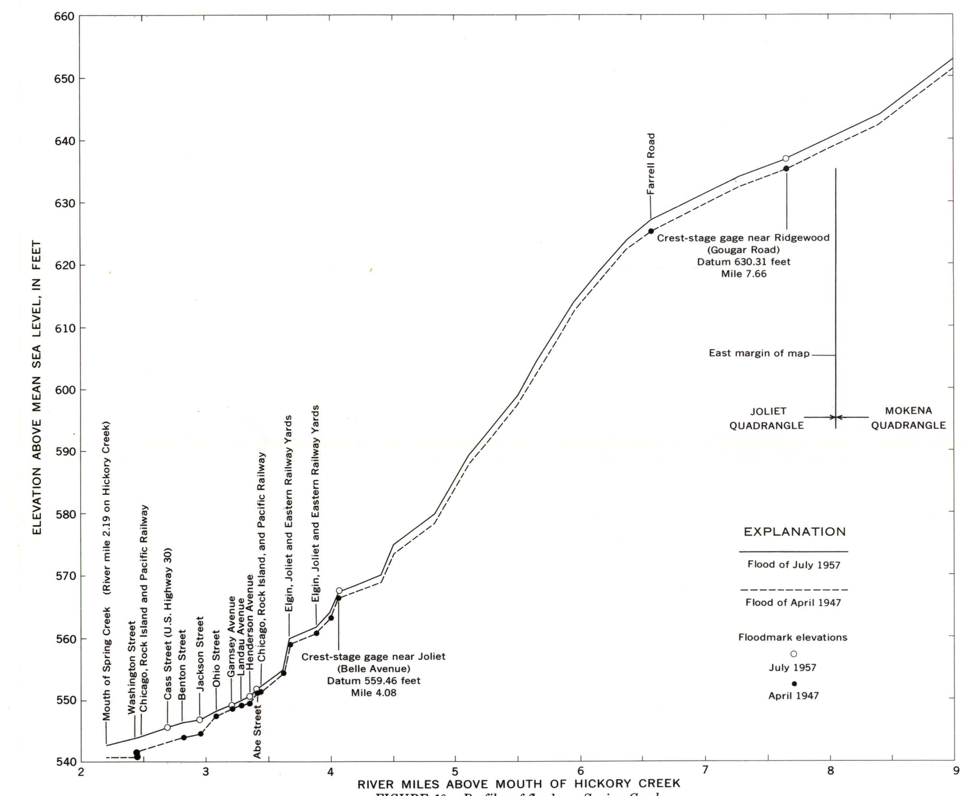


FIGURE 10.—*Profiles of floods on Spring Creek.*

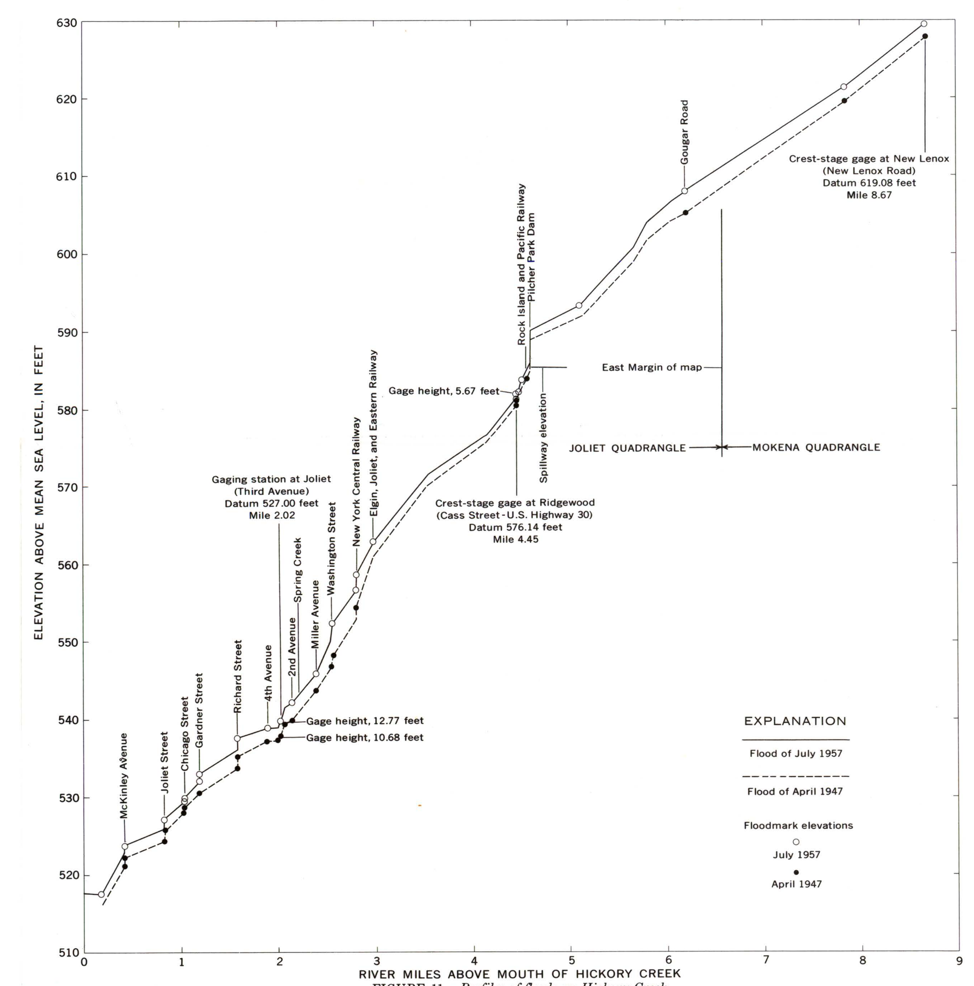


FIGURE 11.—*Profiles of floods on Hickory Creek.*

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.

FLOODS IN JOLIET QUADRANGLE, ILLINOIS

By
Howard E. Allen and Theodore A. Wyerman

1964

For sale by U.S. Geological Survey, price 75 cents