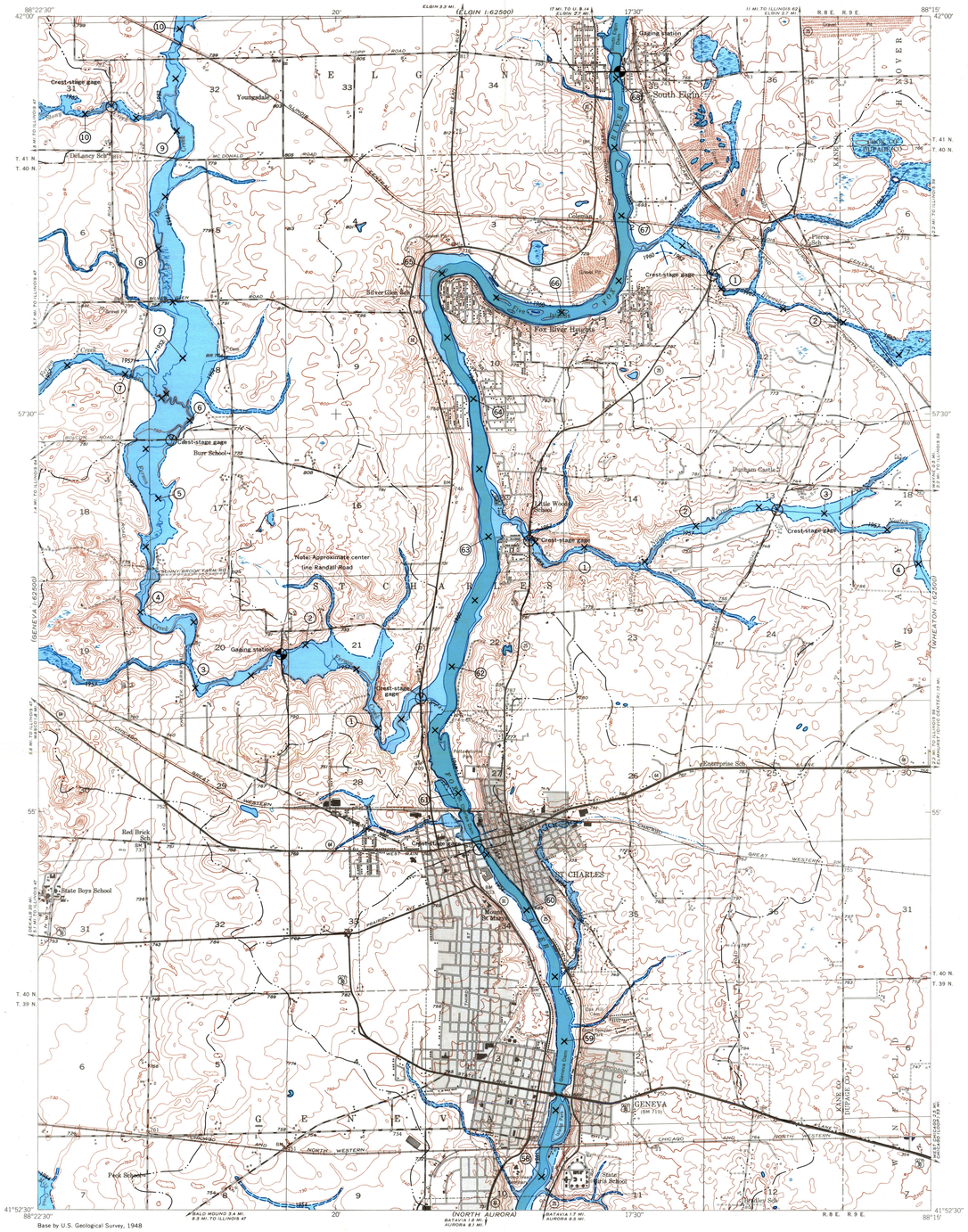
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-142



Base by U.S. Geological Survey, 1948

APPROXIMATE MEAN DECLINATION, 1965

ILLINOIS
QUADRANGLE LOCATION

SCALE 1:24 000
1 0 ½ 0 1 MILE
1 .5 0 1 KILOMETER
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

Area flooded, 1902, 1954, 1957, 1960, 1962	
Boundary of 1952 flood	1952
Boundary of 1954 flood	1954
Boundary of 1957 flood	1957
Boundary of 1960 flood	1960
Boundary of 1962 floods	1962
Drainage divide	
River mile measured along stream channel	③
Inundated areas defined for different floods, upstream and downstream	1960 / 1962

FLOODS IN GENEVA QUADRANGLE, ILLINOIS

Hydrologic data for evaluating the depth and frequency of flooding that affect the economic development of flood plains are presented in this report. 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 Geneva 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1.

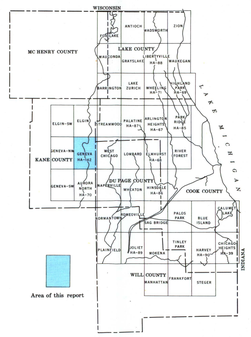


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping program.*

Inundated areas are shown along Fox River for the flood of October 1954 below St. Charles Dam and for the flood of April 1960 above St. Charles Dam; along Norton Creek and Ferson Creek for the flood of July 1957; along Otter Creek for the flood of July 1952; along Brewster Creek for the flood of March 1962; and along Stony Creek for the flood of June 1962.

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 reflect channel conditions that existed when the floods occurred and no attempt was made to appraise the effect of channel changes that may have been made later. Protective works built after the floods of 1952, 1954, 1957, 1960, and 1962 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 Geneva 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 a 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. Kane County provided financial support for the preparation of this report.

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 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: the State of Illinois, Department of Public Works and Buildings, Division of Waterways; and the Department of Highways of Kane County. The Division of Waterways also furnished 2-foot contour-interval maps along Fox River.

Additional data were obtained from officials of municipalities in the area, from personal interviews with private citizens, 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 the Geneva 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 (square miles)
Fox River:			
At South Elgin (State Street)[2]	R	691.73	1525
At St. Charles (Illinois Avenue)	C	680.02	1619
Brewster Creek at Valley View (State Highway 25)	C	710.08	13.9
Norton Creek:			
Near Wayne (Dunham Road)	C	731.54	7.53
Near St. Charles (State Highway 25)	C	692.22	11.6
Stony Creek near South Elgin (Stevens Road)	C	780.26	11.7
Ferson Creek:			
Near Fox River Heights (Bolcum Road)	C	746.20	45.8
Near St. Charles (Randall Road)	R	704.84	51.6
At St. Charles (State Highway 31)	C	688.08	53.6

[1]R, Water-stage recorder; C, Crest-stage gage.
[2]Division of Waterways gage.

Gage height and year of occurrence of each annual flood (highest peak discharge in each calendar year) above 733-foot elevation at the gaging station on Fox River at Algonquin during the period 1916–62 are shown in figure 2. The gaging station at Algonquin is located about 11 1/2 miles north of the Geneva quadrangle, and at mile 82.6. The irregular occurrence of floods is evident.

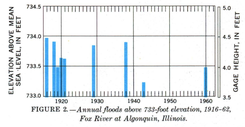


FIGURE 2.—*Annual floods above 733-foot elevation, 1916–62, Fox River at Algonquin, Illinois.*

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. Usually discharge rates are expressed in units of cubic feet per second (cfs). Peak discharge is the maximum 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 the stream is affected by variable backwater, the peak discharge may not coincide with maximum stage.

Flood frequency— Frequency of floods at the Division of Waterways gaging station on Fox River at South Elgin and the Geological Survey gaging station on Ferson Creek near St. Charles was derived from streamflow records at these stations combined with records at 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 figures 3 and 4, and the general relation between frequency and stage is shown in figures 5 and 6.

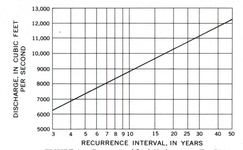


FIGURE 3.—*Frequency of flood discharges on Fox River at South Elgin (State Street).*

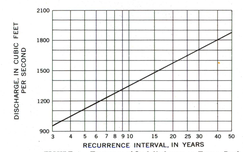


FIGURE 4.—*Frequency of flood discharges on Ferson Creek near St. Charles (Randall Road).*

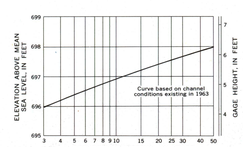


FIGURE 5.—*Frequency of flood stages on Fox River at South Elgin (State Street).*

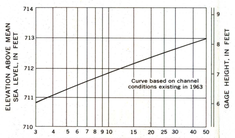


FIGURE 6.—*Frequency of flood stages on Ferson Creek near St. Charles (Randall Road).*

The relation between flood stage and frequency is dependent on the relation of flood stage to discharge which is affected by changes in physical conditions of channels and constrictions. The frequency curves shown in figures 5 and 6 are based on channel conditions existing in 1963. 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.

Recurrence intervals— As applied to flood events, 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, or 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 gaging stations on Fox River at South Elgin (fig. 5) and Ferson Creek near St. Charles (fig. 6) is tabulated below:

Recurrence interval (years)	ELEVATION ABOVE MEAN SEA LEVEL, IN FEET	
	Fox River at South Elgin (State Street)	Ferson Creek near St. Charles (Randall Road)
50	697.9	713.0
40	697.8	712.8
30	697.7	712.6
20	697.4	712.4
10	696.9	711.8
5	696.4	711.3
3	696.0	710.8

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 the floods of July 1952, October 1954, July 1957, April 1960, March and June 1962, and April 1963, are shown in figures 7–10. 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, produced by channel constrictions at some road crossings, indicate the difference in water-surface elevations at the upstream and downstream sides of bridges. 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 7–10. The approximate ground elevation can be determined from information indicated by contours on the map, although more accurate elevations can be obtained by leveling to nearby bench marks.

Additional data— Other information pertaining to floods in the Geneva 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, 1962, Survey report for development of Fox River for recreational navigation, 114 p.

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

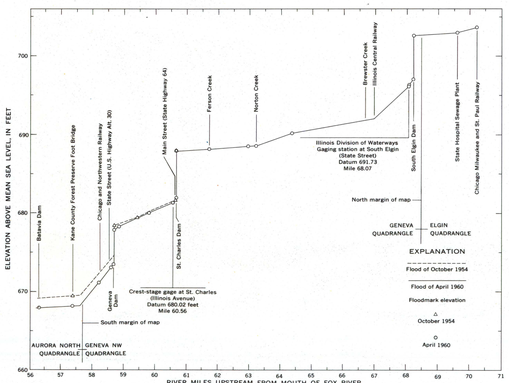


FIGURE 7.—*Profiles of floods on Fox River.*

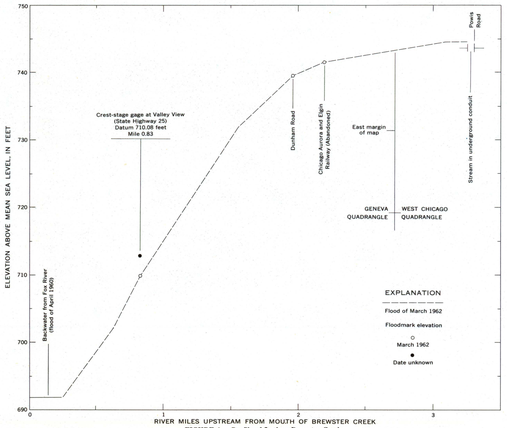


FIGURE 8.—*Profile of flood on Brewster Creek.*

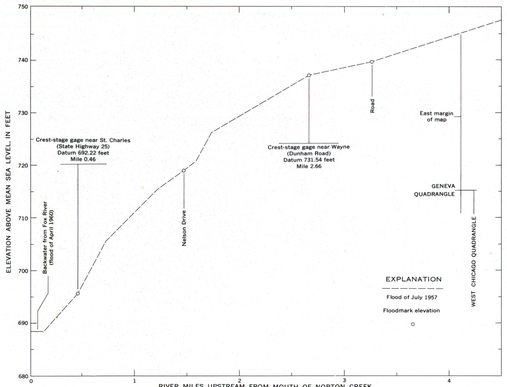


FIGURE 9.—*Profile of flood on Norton Creek.*

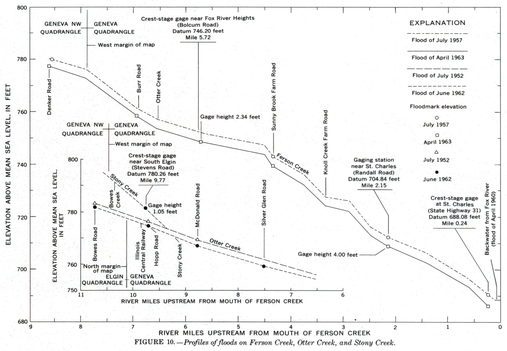


FIGURE 10.—*Profiles of floods on Ferson Creek, Otter Creek, and Stony Creek.*

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By
Allen W. Noehre and Gerald L. Walter

1965

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