

FLOODS IN ELGIN QUADRANGLE, ILLINOIS

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

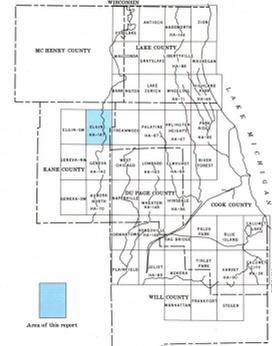


FIGURE 1.—Index map of northeastern Illinois showing location of quadrangles in the flood-hazard mapping program.

Inundated areas are shown along Otter Creek and Fitchie Creek for the flood of June 1962; along Fox River for the flood of April 1960; and along Jekes Creek, Tyler Creek, and Poplar Creek for the flood of March 1960.

The general procedure used in outlining flood limits was to define flood profiles on the basis of all available data. The extent of flooding delineated on the topographic map was determined from the profiles by interpolation between contours (lines of equal ground elevations) and by plotting overflow limits identified during field investigations and surveys. The flood limits shown on the map are approximate because the map scale is small (1 inch = 2,000 feet), and the contour interval is relatively large (10 feet) in relation to the slopes of streams in the area.

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 shown reflect channel conditions existing when the floods occurred. No appraisals are made of the effect of changes in channel conditions, waterway openings at highways and railroads, or possible changes in runoff characteristics of the streams caused by increased urbanization after the floods occurred. Protective works built after the floods of 1960 and 1962 may reduce the frequency of flooding in the area but will not necessarily eliminate 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 Elgin quadrangle where surface water accumulates because of inadequate drainage to the streams. Frequency and depth of flooding in these areas are unrelated to the water-surface elevation along the streams. Some areas are flooded only briefly after periods of heavy rainfall or snowmelt, whereas others remain inundated continuously, depending, to some extent, upon the rates of evaporation and seepage into the ground. Flood limits are shown for many of these areas, but there may have been other areas that were not detected during this investigation.

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

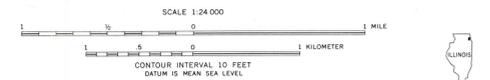
Cooperation and acknowledgment.—The preparation of this report is a part of an extensive flood-mapping program financed through a cooperative agreement between the Northeastern Illinois Metropolitan Area Planning Commission and the U.S. Geological Survey. Under the agreement, flood maps will be prepared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

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

The report was 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.

EXPLANATION

- Area flooded
- Boundary of 1960 flood
- Boundary of 1962 flood
- Drainage divide
- River mile measured along stream channel



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; the Elgin Sanitary District; and the Cook County Highway Department.

Additional data were obtained from officials of municipalities located 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 at gages in the Elgin 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. The size of drainage basin for each station is also shown in the table. The subbasin divides from which the areas were determined are shown on the flood map.

Gaging station	Type	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Fox River at East Dundee (East Dundee foot bridge)	C	712.15	1,414
Jekes Creek at West Dundee (State Highway 31)	C	713.48	6.81
Tyler Creek	C	888.61	38.1
Near Gilberts (Big Timber Road)	C	732.96	39.1
Poplar Creek at Elgin (Village Street)	R	716.00	36.3
Fitchie Creek at Bowers (Bowers Road)	C	726.30	6.79

C, Crest-stage gage; R, Water-stage recorder, Revised.

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 702.5-foot elevation at the Elgin Sewage Disposal Plant on the Fox River during the period 1929-63 are shown in figure 2. This plant is in the Elgin quadrangle at

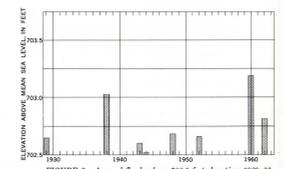


FIGURE 2.—Annual floods above 702.5-foot elevation, 1929-63, Fox River at Elgin, Ill. (Sewage Disposal Plant).

about mile 70 on the Fox River. The irregular occurrence of floods is evident.

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 cubic feet per second (cfs). Peak discharge, the maximum discharge attained by a flood, generally occurs at the time of the maximum height (stage) of the flood, but if a stream is affected by variable backwater, the peak discharge may not coincide with the maximum stage. For example, backwater from an ice jam may cause a high stage during a period of relatively low discharge.

Flood frequency.—Frequency of floods at the Geological Survey gaging stations on Fox River at Algonquin and Poplar Creek at Elgin, and at the Division of Waterways gaging station on Fox River at South Elgin was computed from streamflow records of these stations combined with records of nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The gaging station at Algonquin is at State Highway 62 in the Crystal Lake quadrangle, about three miles north of the Elgin quadrangle, and at mile 82.62 on the Fox River. The gaging station, Fox River at South Elgin, is at State Street in the Geneva quadrangle about half a mile south of the Elgin quadrangle, and at mile 68.07. The relations between frequency and discharge for the three stations are shown in figures 3 and 4, and the relations between frequency and stage are shown in figures 5-7. The relation between

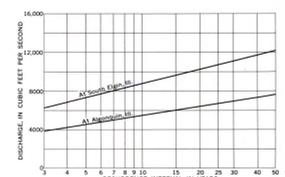


FIGURE 3.—Frequency of flood discharges on Fox River.

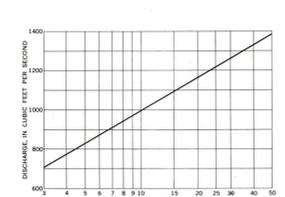


FIGURE 4.—Frequency of flood discharges on Poplar Creek at Elgin, Ill. (Village Street).

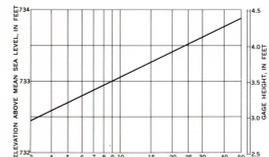


FIGURE 5.—Frequency of flood stages on Fox River at Algonquin, Ill.

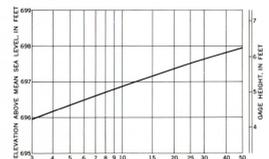


FIGURE 6.—Frequency of flood stages on Fox River at South Elgin, Ill.



FIGURE 7.—Frequency of flood stages on Poplar Creek at Elgin, Ill. (Village Street).

stage and frequency is dependent upon the relation of stage to discharge which is affected by changes in physical conditions of channels and constrictions. The frequency curves shown in figures 5-7 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.

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 can be stated in terms of their probabilities of occurrence (virtually, reciprocals of

their recurrence intervals for floods larger than the 10-year flood). 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 relations between recurrence interval and flood height for Fox River at Algonquin (fig. 5), Fox River at South Elgin (fig. 6), and Poplar Creek at Elgin (fig. 7) are tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
100	723.6
50	721.4
25	719.2
10	716.0
5	713.8
2	712.5

It is emphasized that recurrence intervals are average figures—the average number of years 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 even in the next week.

Flood profiles.—Profiles of the water surface, based primarily on elevations of marks left by floods of March and April 1960 and March and June 1962 are shown in figures 8-11. Where floodmarks could not be identified, the profiles were constructed on the basis of flood crests determined from photographs and from reports of local residents, and of elevations of streambeds and lower flood stages. River miles used for the profiles correspond to those marked along the streams on the flood map.

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 8-11. The approximate ground elevation can be determined from contours on the map, although more nearly accurate elevations can be obtained by leveling to nearby bench marks.

Additional data.—Other information pertaining to floods in the Elgin quadrangle can 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, 204 p.

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

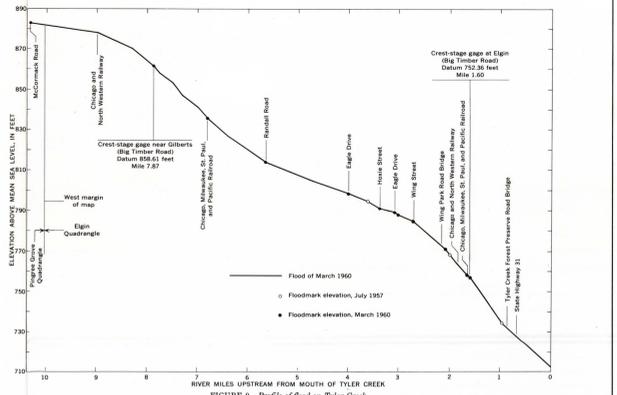


FIGURE 8.—Profile of flood on Tyler Creek.

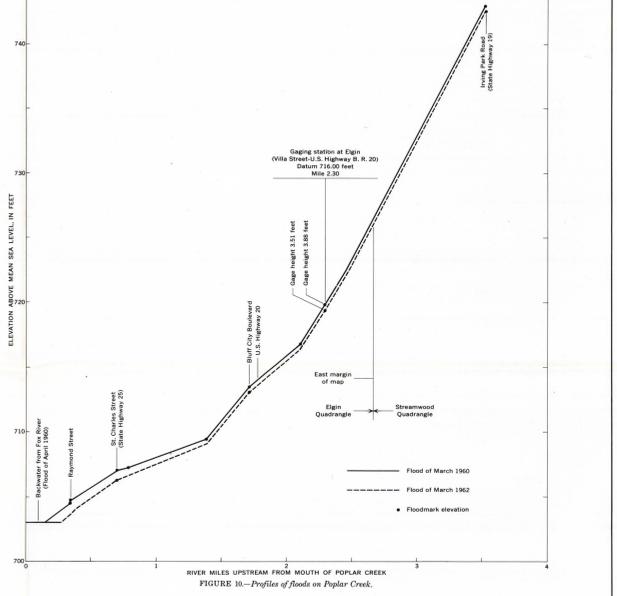


FIGURE 9.—Profile of floods on Poplar Creek.

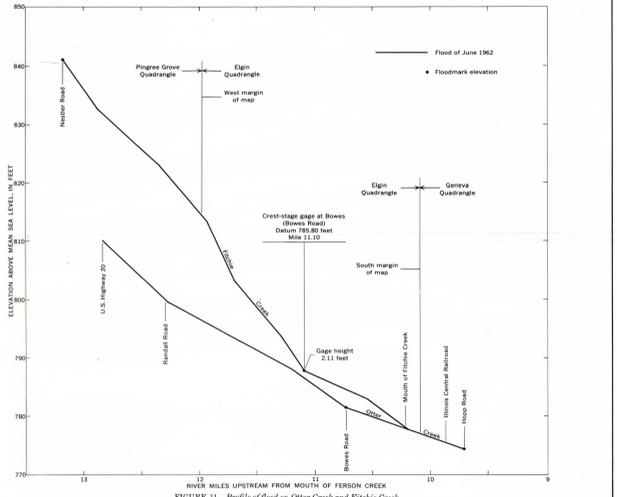


FIGURE 10.—Profile of flood on Otter Creek and Fitchie Creek.

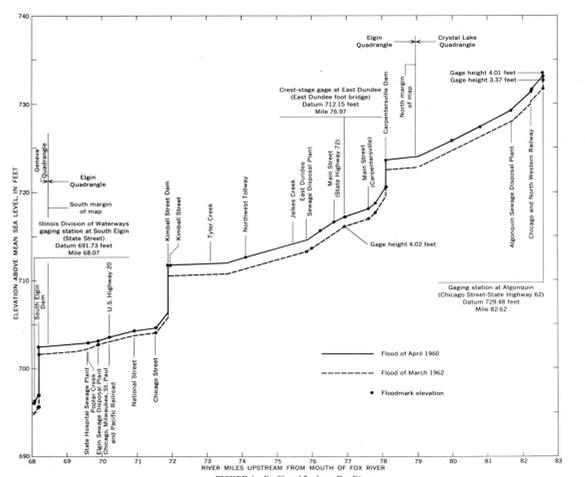


FIGURE 11.—Profile of floods on Fox River.

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