PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

FLOODS IN WHEATON QUADRANGLE, NORTHEASTERN 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. 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 Wheaton 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1.

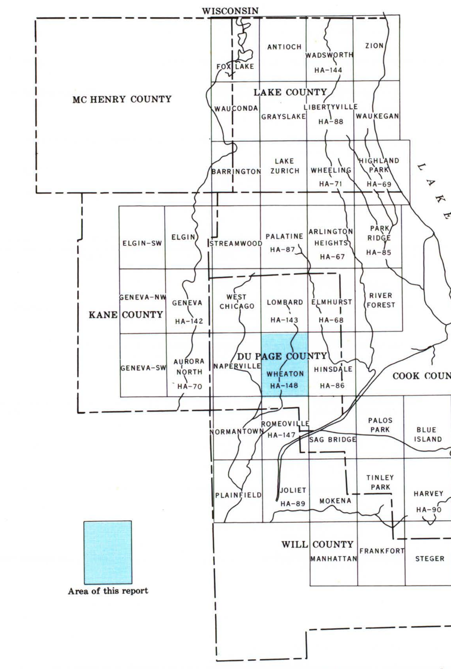

FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles in the flood-hazard mapping program.*

Inundated areas are shown along East Branch Du Page River and Spring Brook for the flood of October 1954; along Winfield Creek for the flood of May 1954; along St. Joseph Creek and its tributaries for the flood of July 1957; along Rott Creek and Lacey Creek for the flood of September 1961; along Prentiss Creek for the flood of July 1963; and along several unnamed tributaries to the East Branch Du Page River for the floods of 1954, 1957, or 1961.

The general procedure used in defining flood limits was to develop flood profiles on the basis of all available data. The extent of flooding delineated on the topographic map was derived 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 only approximate because the map scale is small (1 inch = 2,000 feet) and the contour interval is relatively large (10 feet, with supplemental 5-foot contours in some flood plains) 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 possible changes in channel conditions, waterway openings at highways and railroads, or possible changes in runoff characteristics of the streams caused by increased urbanization that may have taken place after the floods occurred. Protective works built after the floods shown 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 Wheaton 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 largely upon the rates of evaporation and seepage into the ground. Flood limits are shown for many of these areas, but there may have been others that were not detected during this investigation.

Flood limits are not defined for areas that are 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 Du Page 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.

Acknowledgment is made to the following agencies that supplied some of the data on which this report is based: the State of Illinois, Department of Public Works and Buildings, Division of Waterways; and the Corps of Engineers, U.S. Army.

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 Wheaton 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 area for each station and the type of gage are also listed in the table. The subbasin divides from which the areas were determined are shown on the flood map.

Gaging station	Type of gage[1]	Datum of gage above mean sea level (feet)	Drainage area (square miles)
East Branch Du Page River:			
Near Downers Grove (Butterfield Road - State Highway 55)	C	672.21	27.1
At Lisle (Maple Avenue)[2]	R	650.22	58.6
St. Joseph Creek:			
At Belmont (Belmont Avenue)	C	687.04	8.77
At Lisle (State Highway 53)	C	663.92	11.8
Rott Creek at Lisle (Yackley Avenue)	C	674.90	4.90
Prentiss Creek near Lisle (State Highway 53)	C	660.29	6.49
Spring Brook at Wheaton (Warrenville Road)	C	724.13	1.97

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

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 571-foot elevation at the gaging station, Du Page River at Troy, during the period 1941-63, are shown in figure 2. The gaging station at Troy is located at U.S. Highway 52 about 17 miles south of the Wheaton quadrangle and 10.6 miles upstream from the mouth of the Du Page River. The irregular occurrence of floods is evident.

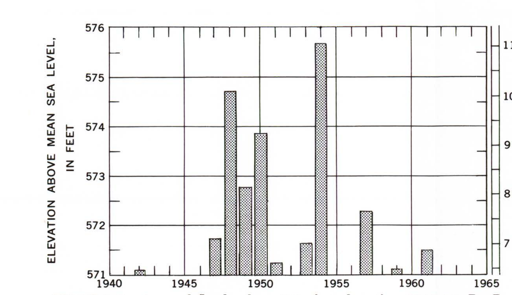

FIGURE 2.—*Annual floods above 571-foot elevation, 1941-63, Du Page River at Troy, Illinois.*

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. Discharge rates usually are expressed in units of 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 varible 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 Illinois Division of Waterways gaging station on East Branch Du Page River at Lisle was derived from streamflow records for this station combined with records for 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 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.

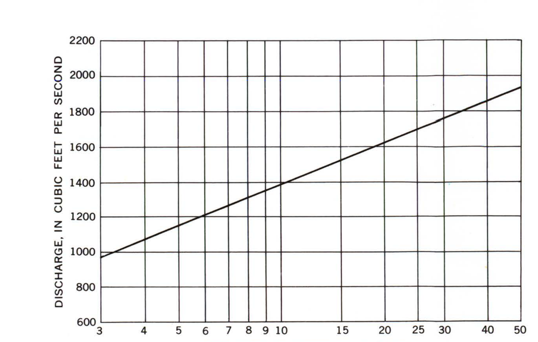

FIGURE 3.—*Frequency of flood discharges on East Branch Du Page River at Lisle (Maple Avenue).*

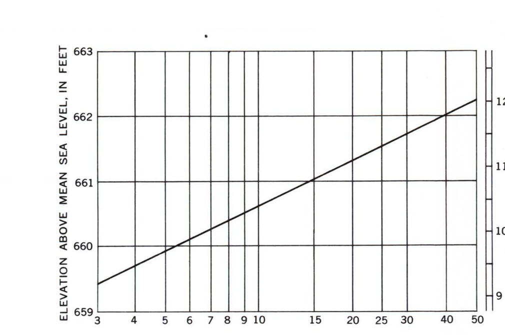

FIGURE 4.—*Frequency of flood stages on East Branch Du Page River at Lisle (Maple Avenue).*

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 with recurrence intervals greater than 10 years). 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 for East Branch Du Page River at Lisle (fig. 4) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	662.2
40	662.0
30	661.7
20	661.3
10	660.6
5	659.9
3	659.4

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 April 1950, October and May 1954, July 1957, September 1961, and July 1963 are shown in figures 5-10. Where floodmarks could not be obtained, 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.

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 that produce 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 5-10. 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 Wheaton 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 flood control, Du Page River, 200 p.

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

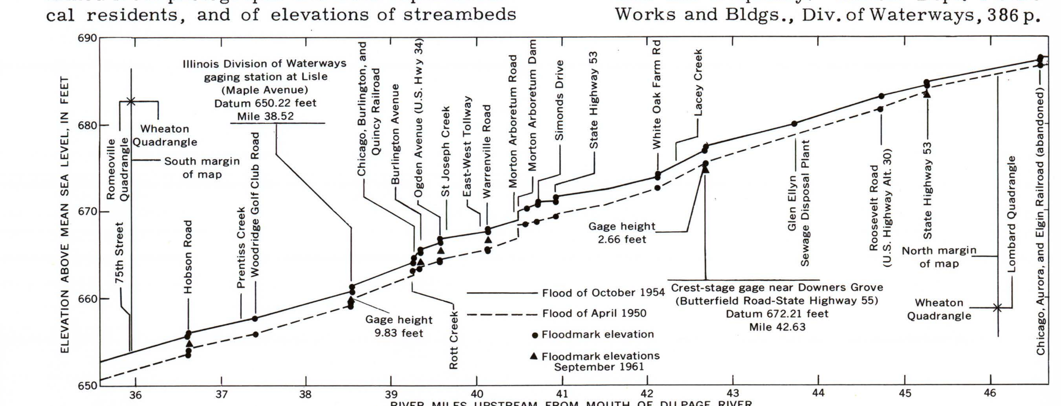

FIGURE 5.—*Profiles of floods on East Branch Du Page River.*

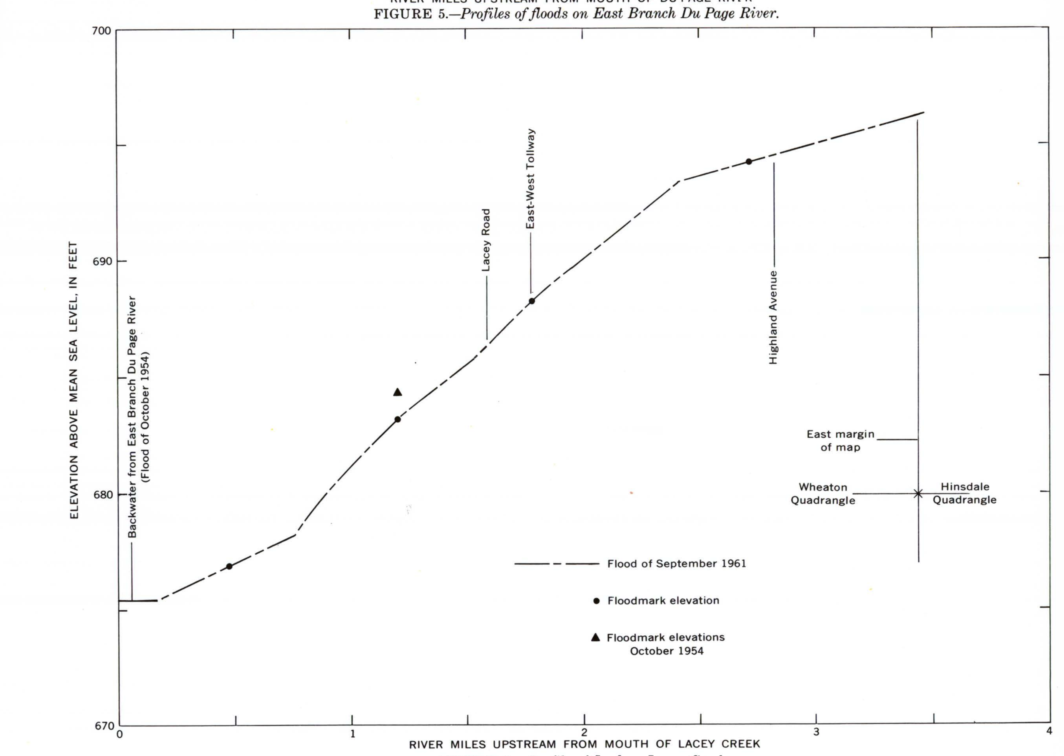

FIGURE 6.—*Profile of flood on Lacey Creek.*

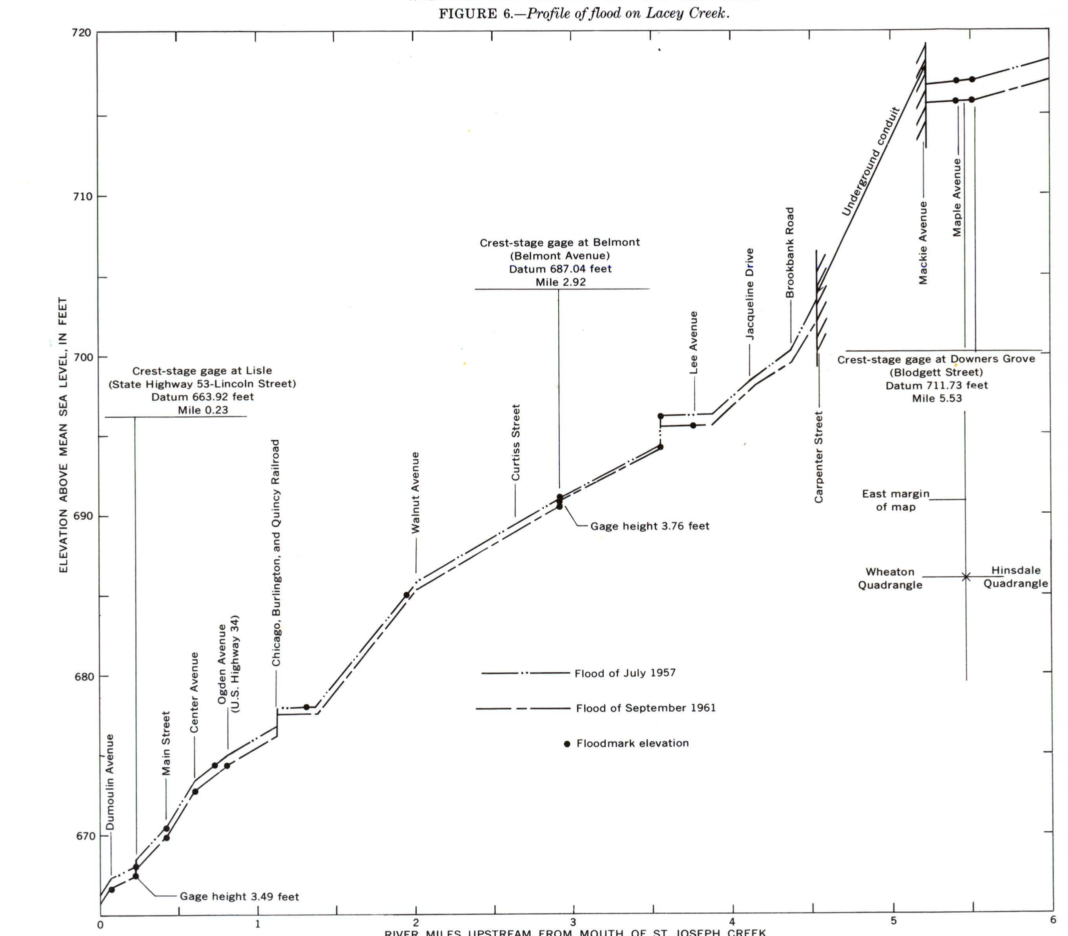

FIGURE 7.—*Profiles of floods on St. Joseph Creek.*

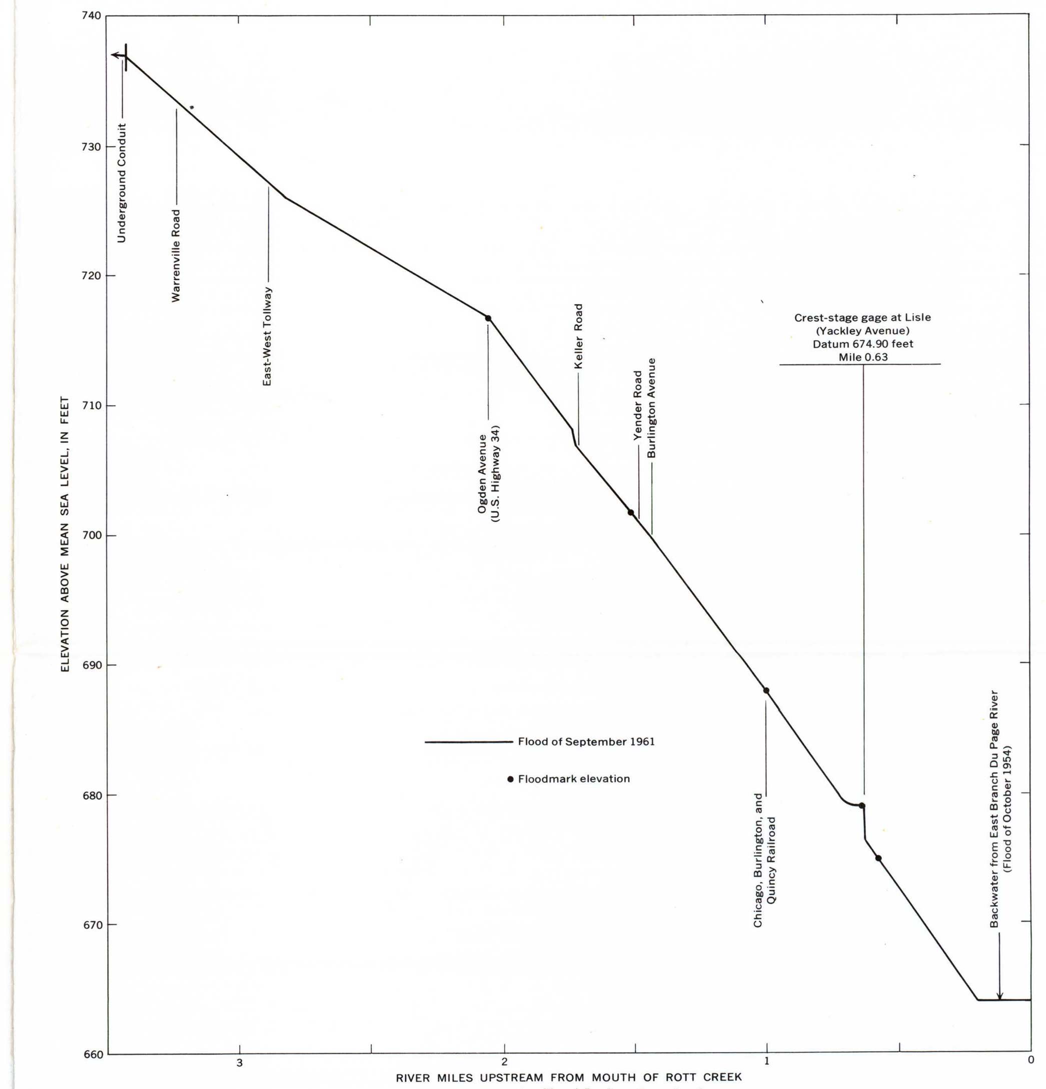

FIGURE 8.—*Profile of flood on Rott Creek.*

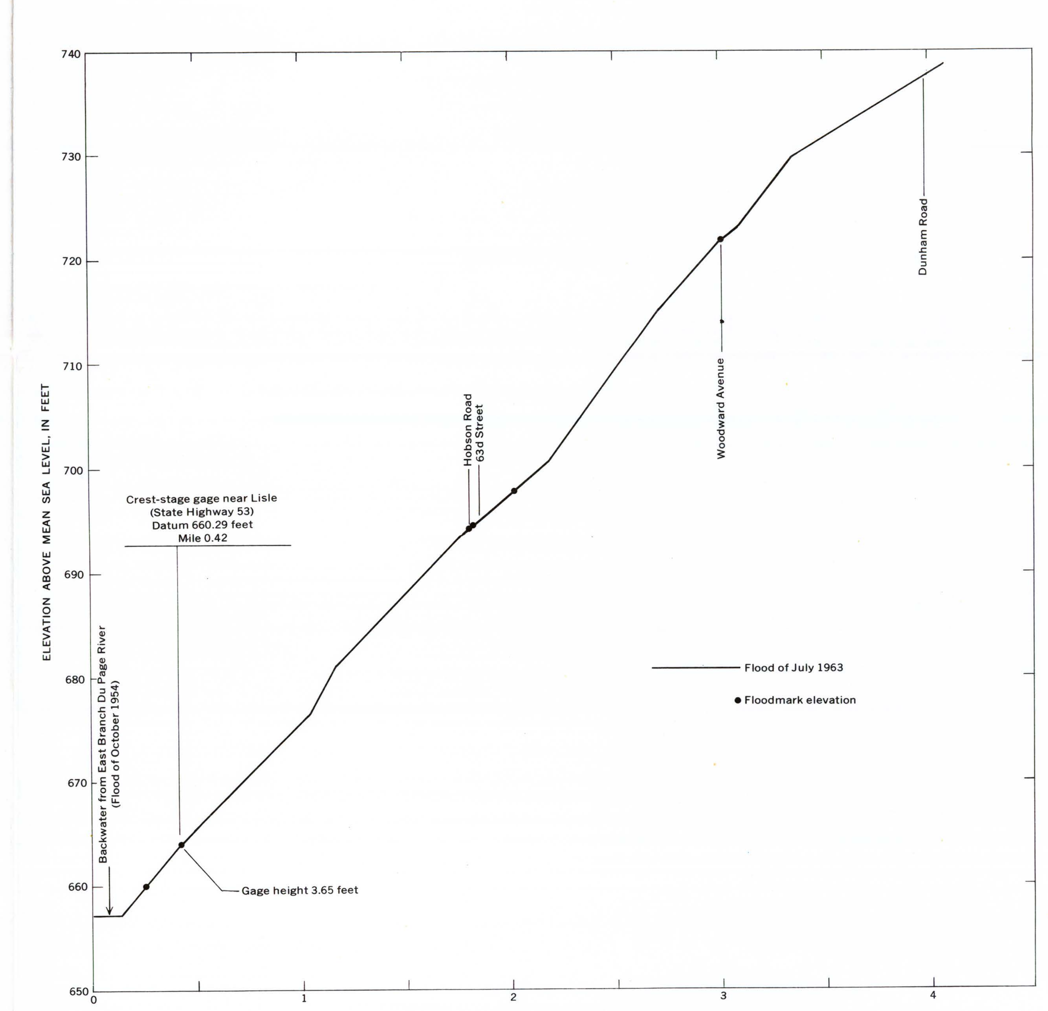

FIGURE 9.—*Profile of flood on Prentiss Creek.*

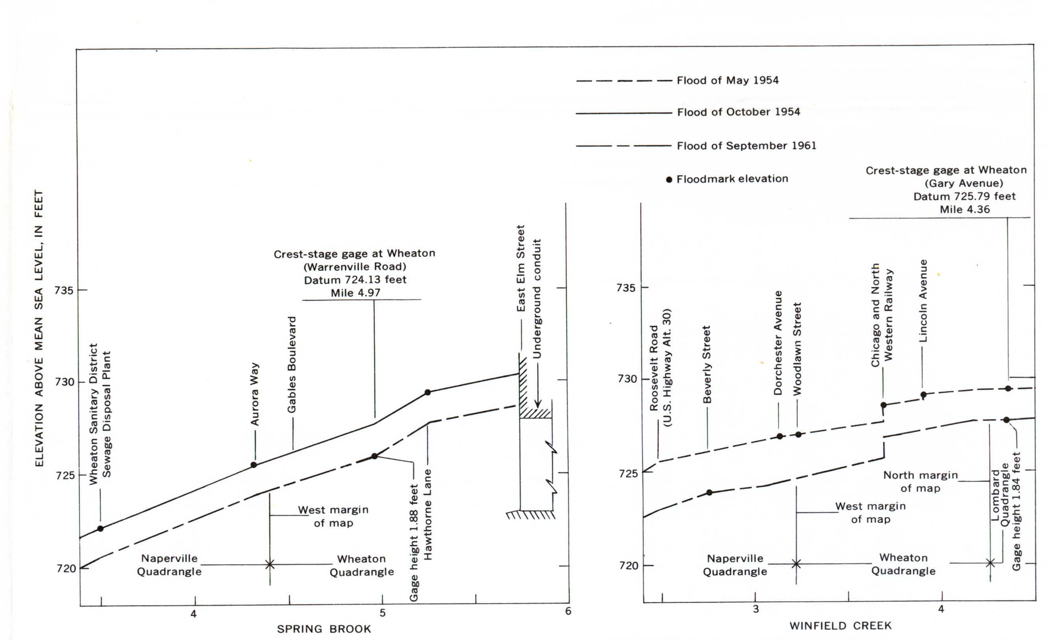

FIGURE 10.—*Profiles of floods on Spring Brook and Winfield Creek.*

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