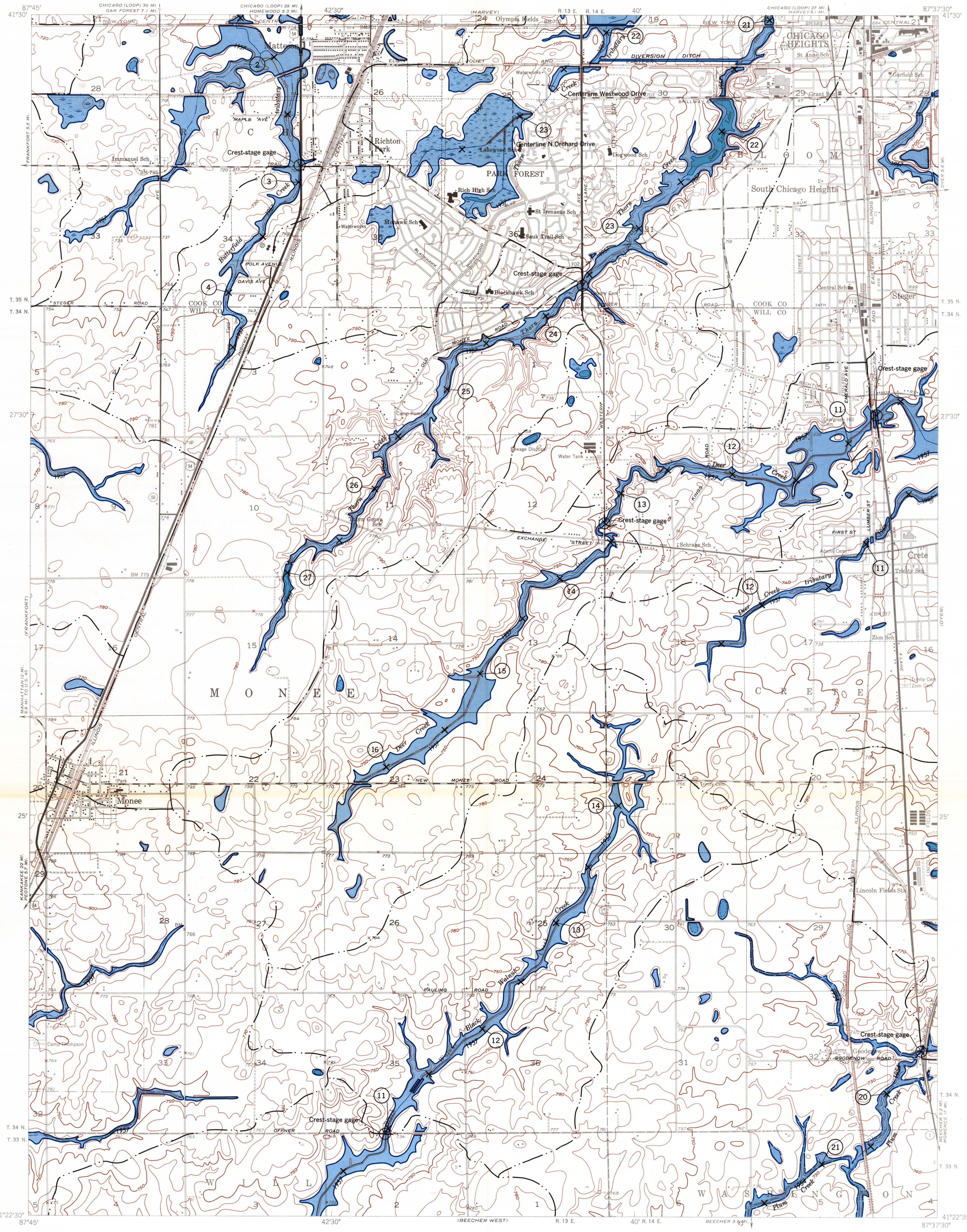
PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION



Base from U.S. Geological Survey, 1953

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

EXPLANATION

Area flooded

Boundary of 1957 flood

Boundary of 1954 flood

Drainage divide

River mile measured along stream channel

FLOODS IN STEGER 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 in the Steger quadrangle, northeastern Illinois. It is intended to be a tool for individuals, governmental agencies, and others delegated with the responsibilities of solving existing flood problems and of formulating effective flood-plain regulations that will minimize the creation of new flood problems.

The approximate areas inundated by floods along streams in the Steger 7½-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown along Plum Creek for the flood of October 1954; along Thorn Creek, Thorn Creek tributary, Deer Creek, Deer Creek tributary, Butterfield Creek tributary, Black Walnut Creek, and several other unnamed streams for the flood of July 1957. The flood of July 1957 on Black Walnut Creek was reported to have been the highest observed in the past 50 years. The stage of the 1957 flood recorded at the gaging stations on Thorn Creek at Glenwood and Deer Creek near Chicago Heights exceeded the estimated 50-year flood stage for the respective sites.

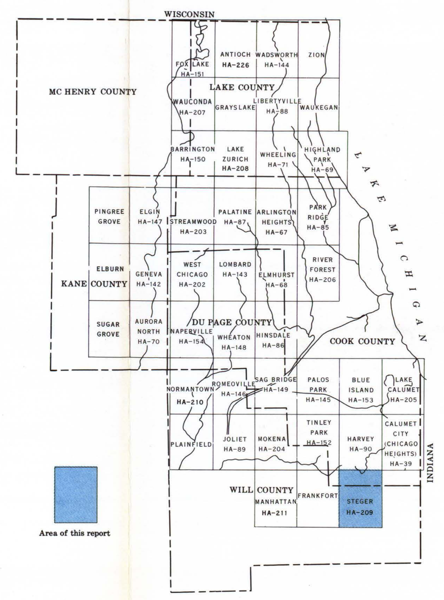


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles in the flood-hazard mapping program.*

Greater floods than those shown on the map are possible. The flood boundaries shown provide a record of historic fact that reflect channel conditions existing when the floods occurred. Changes in channel conditions, waterway openings at highway and railroads, or changes in runoff characteristics of the streams caused by increased urbanization that may have taken place subsequent to the floods shown on the map could affect the flood height reached by future floods of comparable discharges. Protective works built after the floods shown 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.

The general procedure used in defining flood boundaries was to construct flood profiles from elevations of floodmarks identified in the field and from existing data available from other agencies. The extent of flooding 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 portrayal of flood boundaries is consistent with the scale of the map (1 inch = 2,000 feet; contour interval, 10 feet).

There are numerous depressions or lowland areas in the Steger quadrangle where surface water accumulates because of inadequate drainage into 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 boundaries are shown for all such areas that were detected in this investigation.

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 7½-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 Cook and Will Counties, the Metropolitan Sanitary District of Greater Chicago, and the Forest Preserve District of Cook 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 Department of Highways, Cook County.

Additional data were obtained from officials of municipalities located in the area and from field investigations.

Flood heights.— The height of a flood at a gaging station usually is stated in terms of gage height or of stage, which is the water surface above a selected datum plane. Elevations shown on the map are in feet above mean sea level. Gage heights for crest-stage gages in the Steger 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 drainage area for each station also is shown in the table. The subbasin divides from which the areas were determined are shown on the flood map.

Crest-stage gage	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Plum Creek at Goodenow (State Highway Alt. 1)	704.80[1]	9.15
Thorn Creek at Park Forest (Western Avenue)	683.57	6.21
Deer Creek:		
Near Crete (Western Avenue)	731.80	5.11
At Steger (State Highway Alt. 1)	685.99	7.07
Butterfield Creek tributary at Richton Park (Sauk Trail)	702.62	1.41
Black Walnut Creek near Monee (Offner Road)	721.61	6.04

[1] Revised

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 626.4-foot elevation at the gaging station, Deer Creek near Chicago Heights, Ill., during the period 1948-64 are shown in figure 2. The gaging station is at Joe Orr Road, 2¼ miles northeast of the Steger quadrangle, and 2.84 miles upstream from the mouth of Deer Creek.

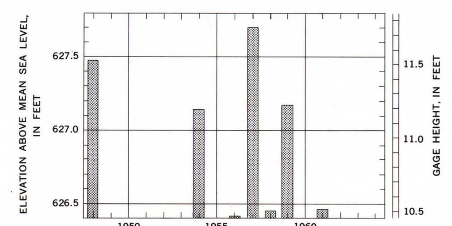


FIGURE 2.—*Annual floods above 626.4-foot elevation, 1948-64, Deer Creek near Chicago Heights, Ill. (Joe Orr Road).*

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 time of the peak may not coincide with that of 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 Thorn Creek at Glenwood and Deer Creek near Chicago Heights were derived from streamflow records for these stations combined with records for other nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The Glenwood gaging station is at the Baltimore and Ohio Chicago Terminal Railroad, 2 miles north of Steger quadrangle, and 9.25 miles upstream from the mouth of Thorn Creek.

The general relation between discharge and frequency is shown in figures 3 and 4, and the general relation between stage and frequency is shown in figures 5 and 6. The relation between stage and frequency is dependent on the relation of stage to discharge which is affected by changes in the physical conditions of stream channels and constrictions. The frequency curves shown in figures 5 and 6 are based on channel conditions existing in 1965. 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.

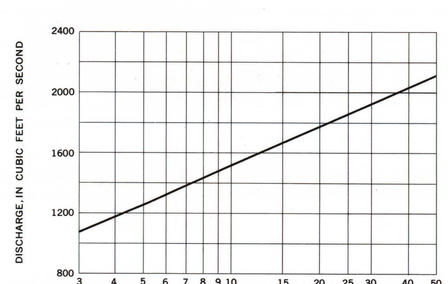


FIGURE 3.—*Frequency of flood discharges on Thorn Creek at Glenwood, Ill. (Baltimore and Ohio Chicago Terminal Railroad).*

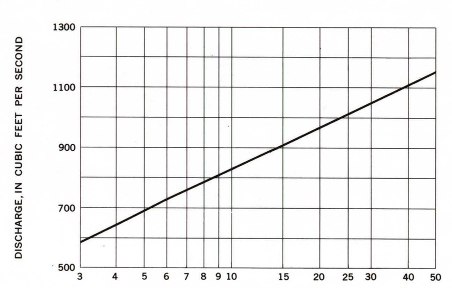


FIGURE 4.—*Frequency of flood discharges on Deer Creek near Chicago Heights, Ill. (Joe Orr Road).*

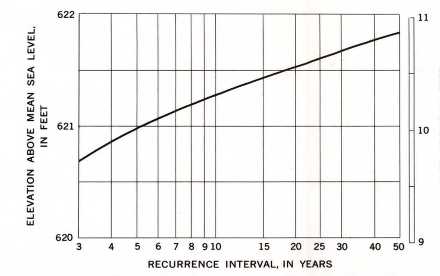


FIGURE 5.—*Frequency of flood stages on Thorn Creek at Glenwood, Ill. (Baltimore and Ohio Chicago Terminal Railroad).*

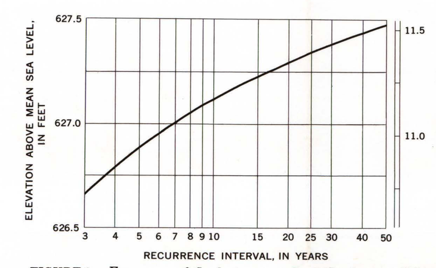


FIGURE 6.—*Frequency of flood stages on Deer Creek near Chicago Heights, Ill. (Joe Orr Road).*

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 at the gaging stations on Thorn Creek at Glenwood (fig. 5) and Deer Creek near Chicago Heights (fig. 6) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	Thorn Creek at Glenwood	Deer Creek near Chicago Heights
50	621.8	627.5
30	621.7	627.4
20	621.5	627.3
10	621.3	627.1
5	621.0	626.9
3	620.7	626.7

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 following year or even in the next week.

Flood profiles.— Profiles of the water surface, based primarily on elevations of marks left by floods of October 1954, July 1957, September 1961, and April 1965, are shown in figures 7-13. 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 on elevations of stream-beds 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 at the same point, indicated by the profiles in figures 7-13. The approximate ground elevation can be determined from contours on the map, although more nearly accurate elevations can be obtained by leveling from nearby bench marks.

Additional data.— Other information pertaining to floods in the Steger 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, 1955, Survey report for flood control, Thorn Creek, Cook-Will Counties, 18 p.

Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. of 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.

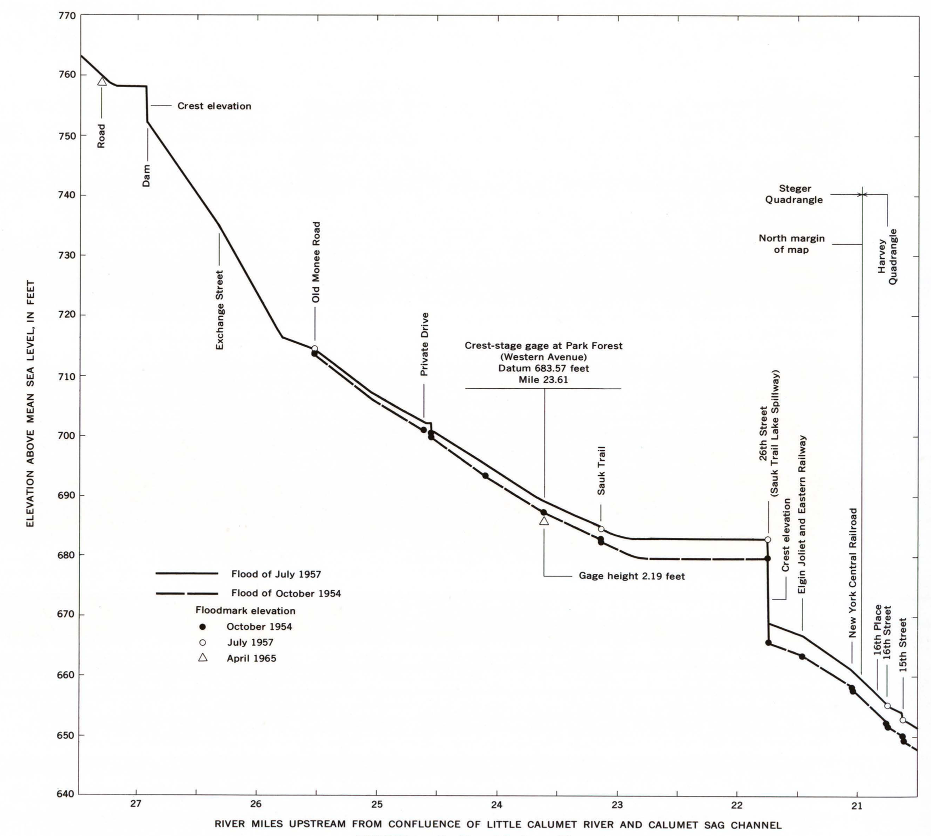


FIGURE 8.—*Profiles of floods on Thorn Creek.*

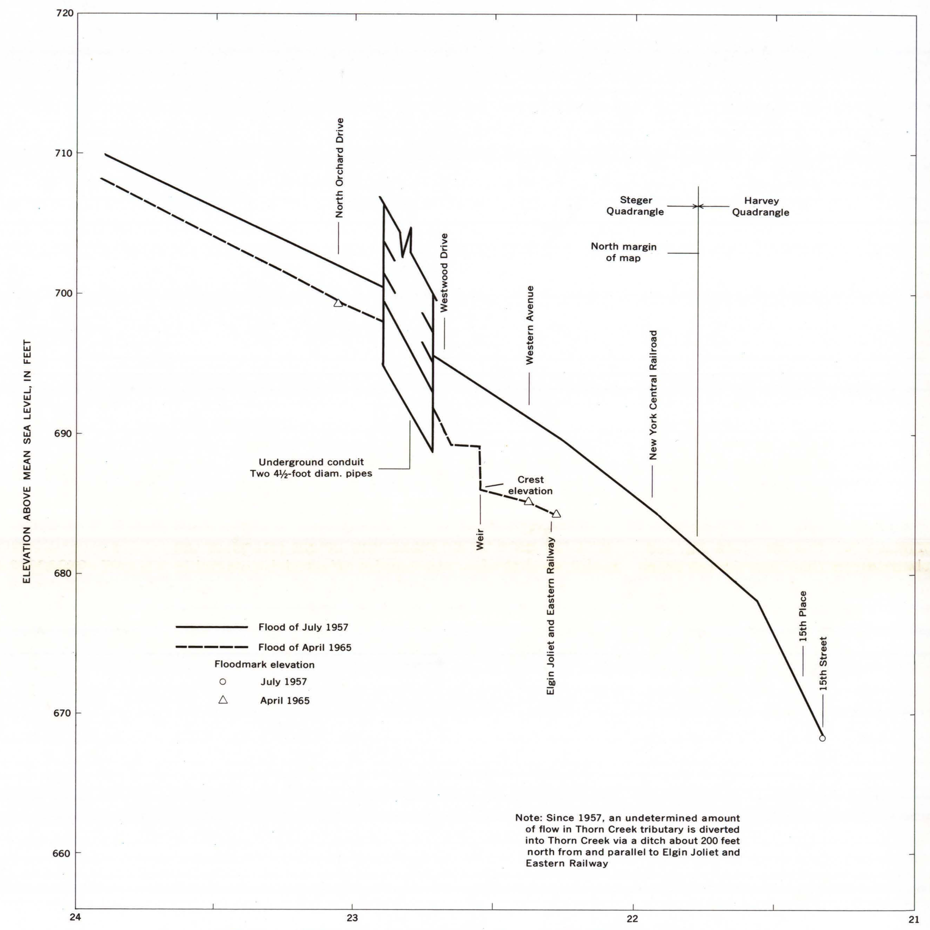


FIGURE 9.—*Profiles of floods on Thorn Creek tributary.*

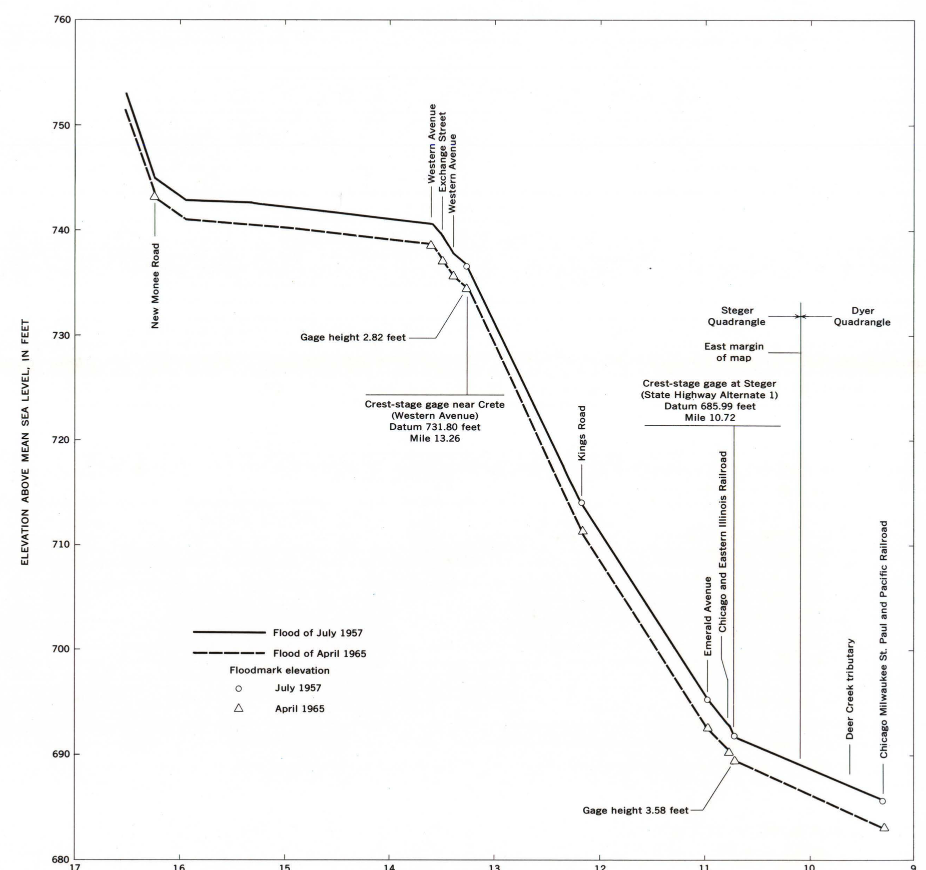


FIGURE 10.—*Profiles of floods on Deer Creek.*

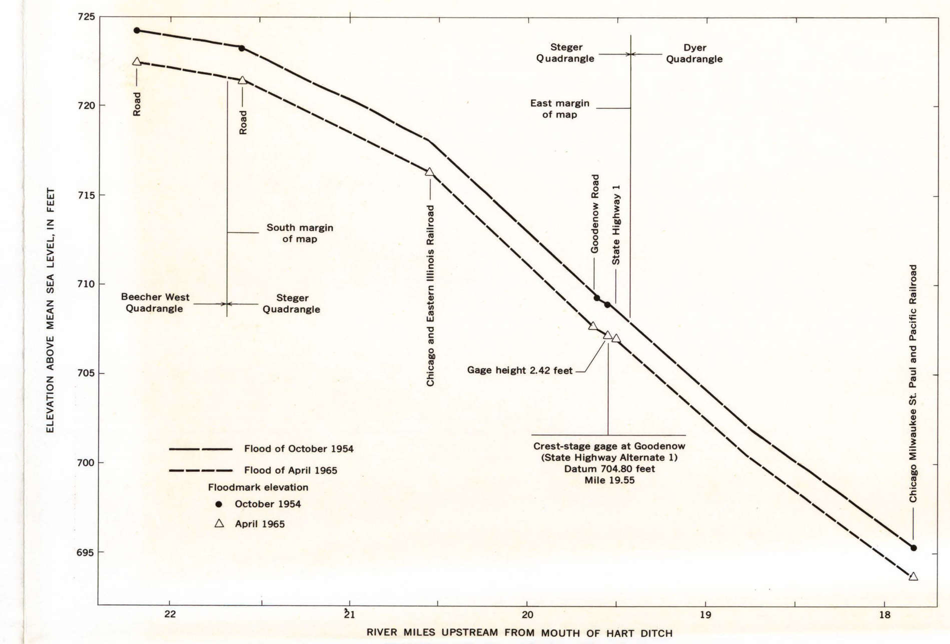


FIGURE 7.—*Profiles of floods on Plum Creek.*

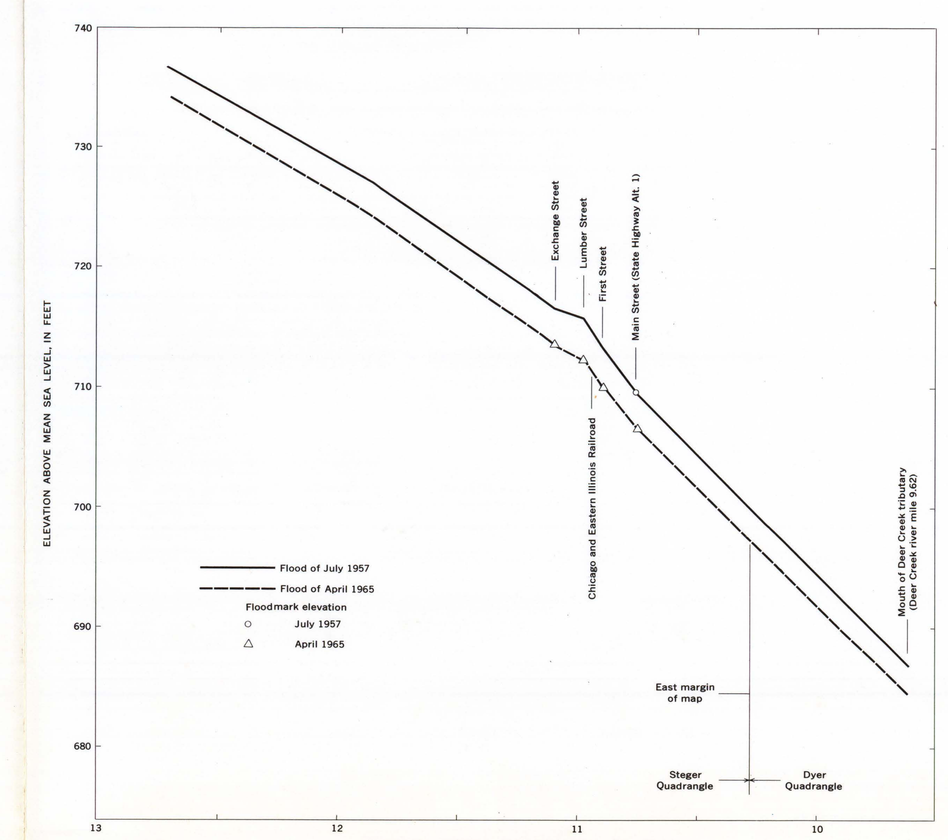


FIGURE 11.—*Profiles of floods on Deer Creek tributary.*

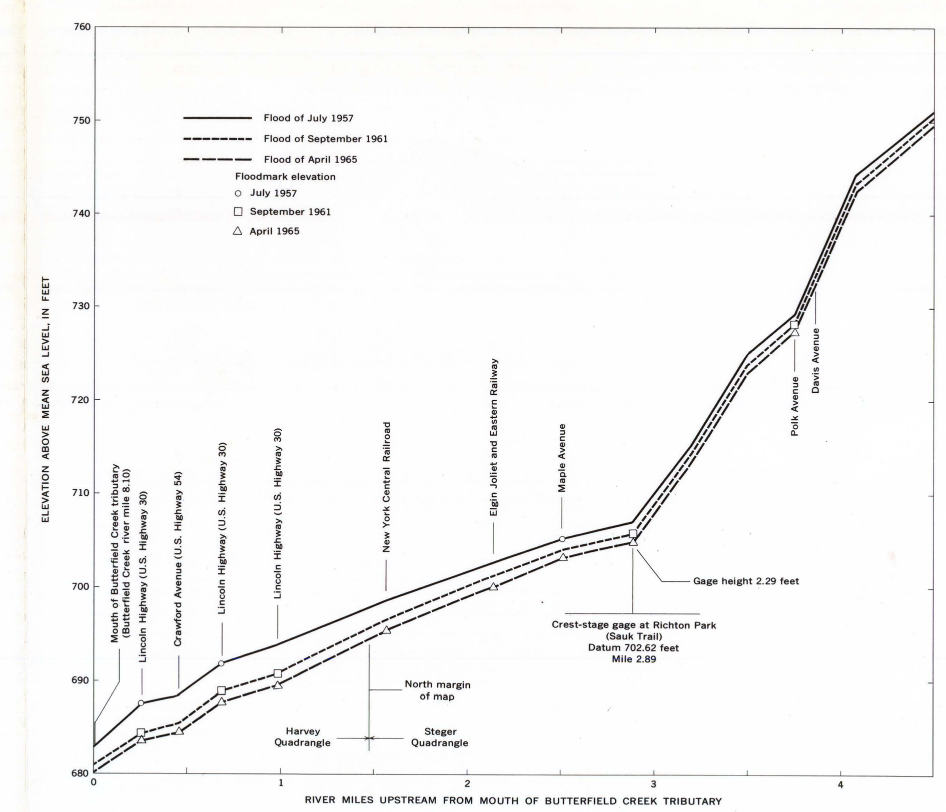


FIGURE 12.—*Profiles of floods on Butterfield Creek tributary.*

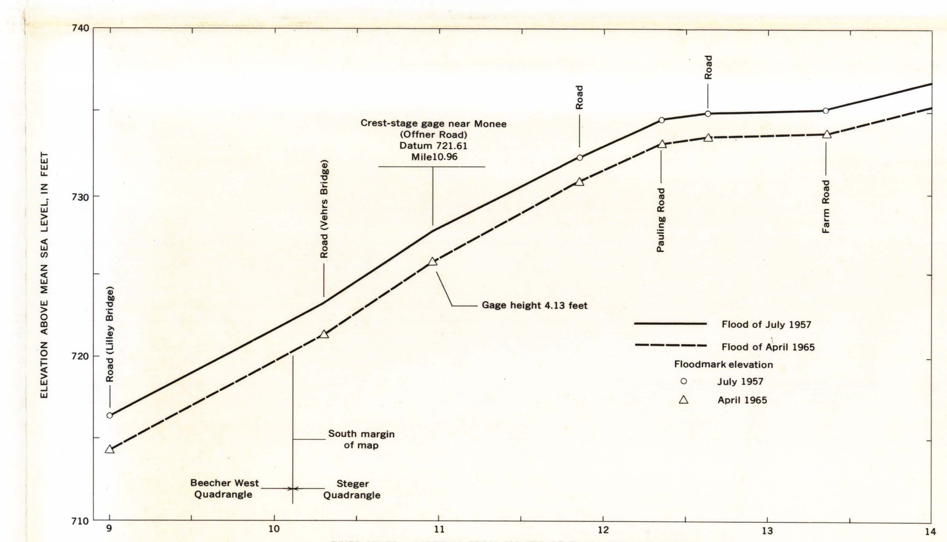


FIGURE 13.—*Profiles of floods on Black Walnut Creek.*

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By
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1966