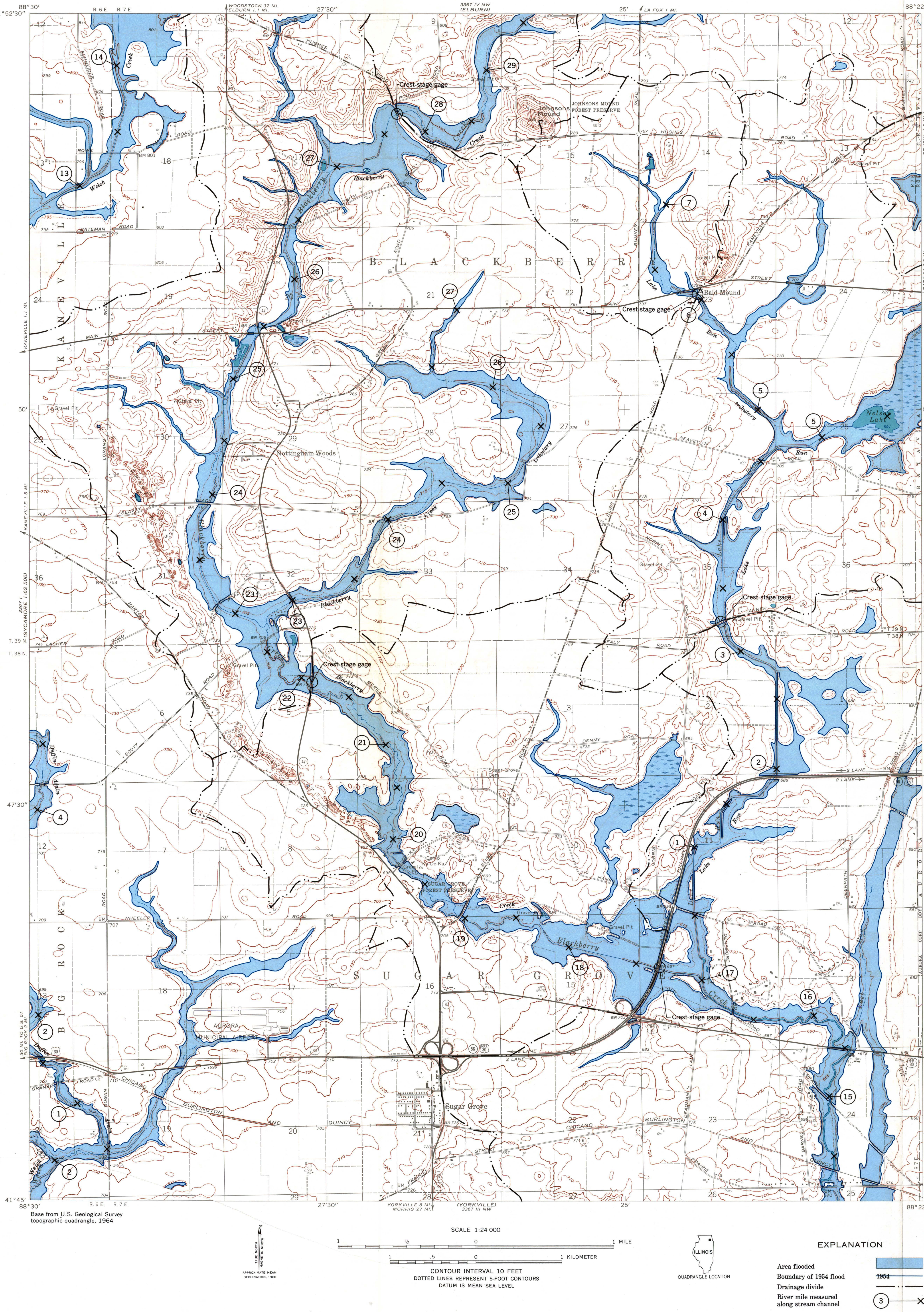
PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION



EXPLANATION

Area flooded
Boundary of 1954 flood
Drainage divide
River mile measured along stream channel

FLOODS IN SUGAR GROVE QUADRANGLE NORTHEASTERN ILLINOIS

This report presents hydrologic data that can be used to evaluate the extent, depth, and frequency of flooding that affect the economic development of flood plains in the Sugar Grove quadrangle, northeastern Illinois. It is intended to aid individuals, governmental agencies, and others responsible for solving existing flood problems and for formulating effective flood-plain regulations that would minimize the creation of new flood problems. The report will also be useful for preparing building and zoning regulations, locating waste disposal facilities, developing recreational areas, and managing surface water in relation to ground-water resources.

The approximate areas inundated by floods along streams in the Sugar Grove 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown along Blackberry Creek, Blackberry Creek tributary, Lake Run, Lake Run tributary, East Run, Welch Creek, Duffin drain, and several unnamed streams for the flood of October 1954.

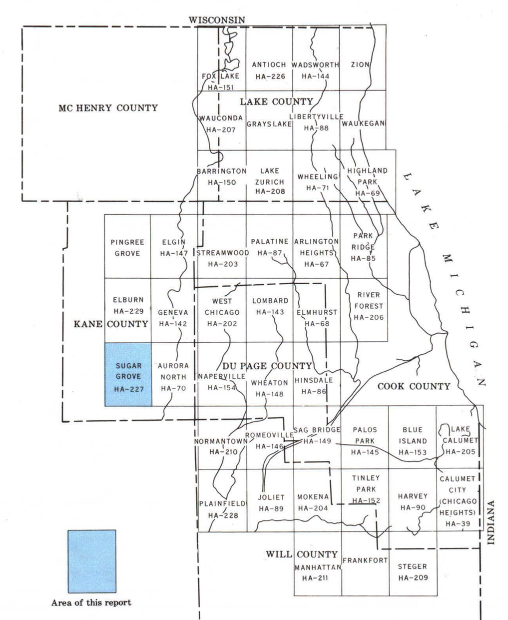


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles in the flood-hazard mapping program.*

According to reports of local residents, some of whom could remember as far back as 60 years, the October 1954 flood was the highest observed on streams throughout the Sugar Grove quadrangle.

Greater floods than the flood whose boundaries are shown on the map are possible. The flood boundaries shown provide a record of historic fact that reflects channel conditions existing when the flood occurred. Changes in channel conditions, in waterway openings at highways and railroads, or in runoff characteristics of the streams caused by increased urbanization that may have taken place subsequent to the flood represented on the map could affect the flood height reached by a future flood of comparable discharge. Protective works built after the flood 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 the flood boundaries was to construct flood profiles from elevations of floodmarks identified in the field and from data available from other agencies. 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 portrayal of flood boundaries is consistent with the scale of the map (1 inch = 2,000 feet; contour interval, 5 feet and 10 feet). There are several depressions or lowland areas in the Sugar Grove 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 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.

Acknowledgment is made to the State of Illinois, Department of Public Works and Buildings, Division of Highways, and to the Kane County Highway Department for furnishing information on floods at several bridges and culverts in the area.

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 in this report are in feet above mean sea level. Gage heights for crest-stage gages in the Sugar Grove 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 the drainage basin 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)
Blackberry Creek:		
Near Elburn (Hughes Road)	743.53	6.15
Near Kaneville (State Highway 47)	698.73	21.9
Near Sugar Grove (State Highway 56)	672.01	29.6
Lake Run tributary near Batavia (Bliss Road)	716.31	2.11
Lake Run near Mooseheart (Tanner Road)	682.00	11.0

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, Ill., during the period 1941-64 are shown in figure 2. The gaging station is just upstream from U.S. Highway 52, about 18 miles southeast of the Sugar Grove quadrangle, and is 10 1/2 miles upstream from the mouth of Du Page River. The graph illustrates the irregular occurrence of floods on the Du Page River and typifies the probable relative magnitude of floods on streams in Sugar Grove quadrangle.

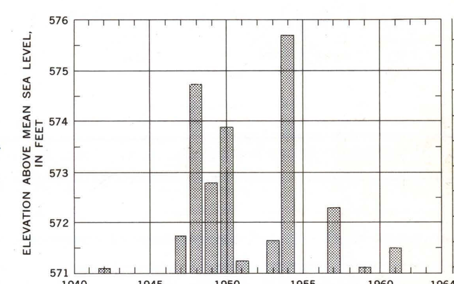


FIGURE 2.—*Annual floods above 571-foot elevation, 1941-64, Du Page River at Troy, Ill.*

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 variable backwater, the time of the peak discharge may not coincide with that of the maximum stage. For example, backwater from an ice or a debris jam may cause a high stage during a period of relatively low discharge.

Flood frequency.— Frequency of floods at the Geological Survey gaging station on Blackberry Creek near Yorkville, Ill., 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 Blackberry Creek gaging station is at Boomer Road, 4 1/4 miles south of the Sugar Grove quadrangle and 3.4 miles upstream from the mouth of Blackberry Creek.

The general relation between discharge and frequency is shown in figure 3 and the general relation between stage and frequency 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 the physical conditions of stream channels and constrictions. The frequency curve in figure 4 is 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.

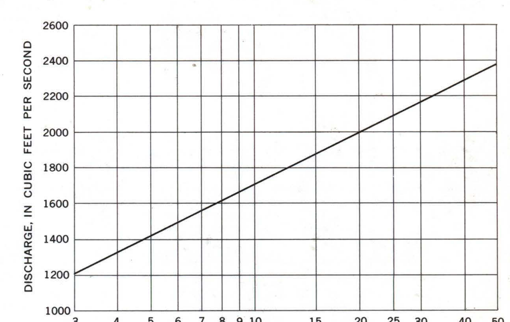


FIGURE 3.—*Frequency of flood discharges on Blackberry Creek near Yorkville, Ill. (Boomer Road).*

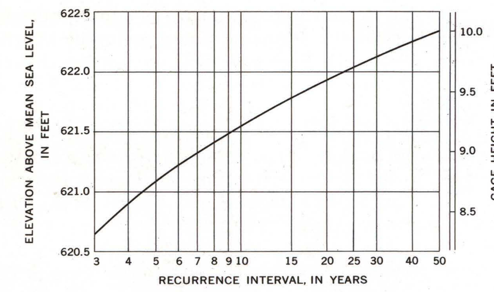


FIGURE 4.—*Frequency of flood stages on Blackberry Creek near Yorkville, Ill. (Boomer Road).*

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 station on Blackberry Creek near Yorkville (fig. 4) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	622.3
30	622.1
20	621.9
10	621.6
5	621.1
3	620.6

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 October 1954 and February 1965 are shown in figures 5-9. Where floodmarks could not be identified, the profiles were constructed on the basis of flood crests determined from photographs and from reports by local residents, and on 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 at the same point, indicated by the profiles in figures 5-9. The approximate ground elevation can be determined from contours on the map, although more accurate elevations can be obtained by leveling from nearby bench marks.

Additional data.— Other information pertaining to floods in the Sugar Grove 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.
Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. Public Works and Bldgs., Div. of Waterways, 386 p.

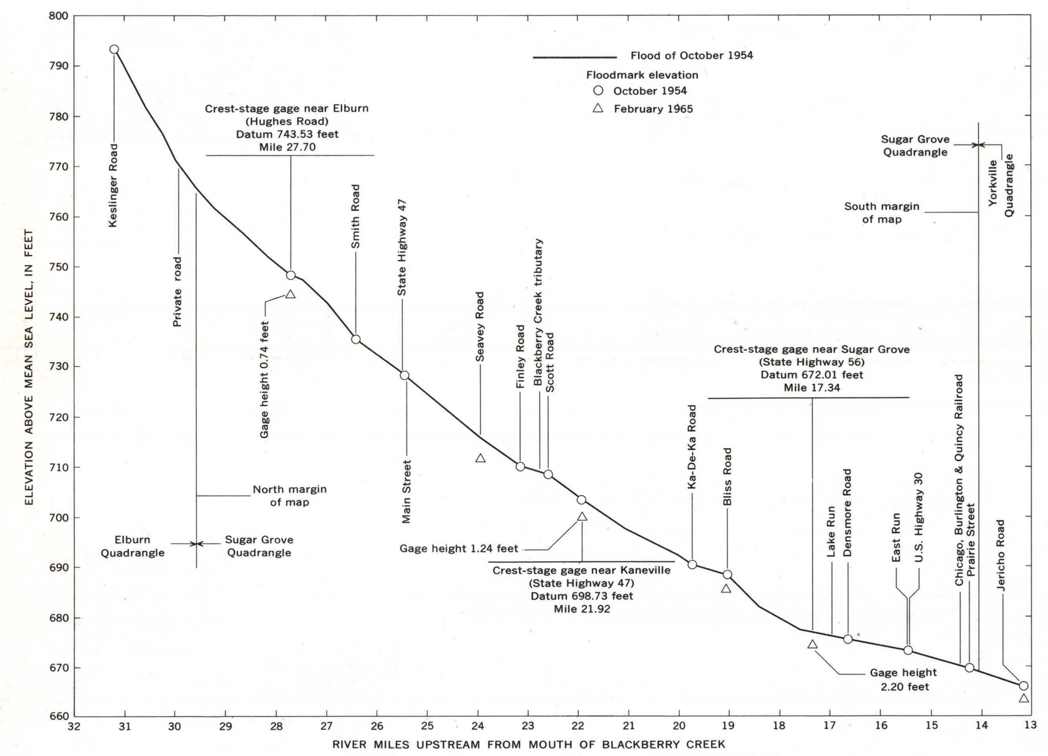


FIGURE 5.—*Profile of flood on Blackberry Creek.*

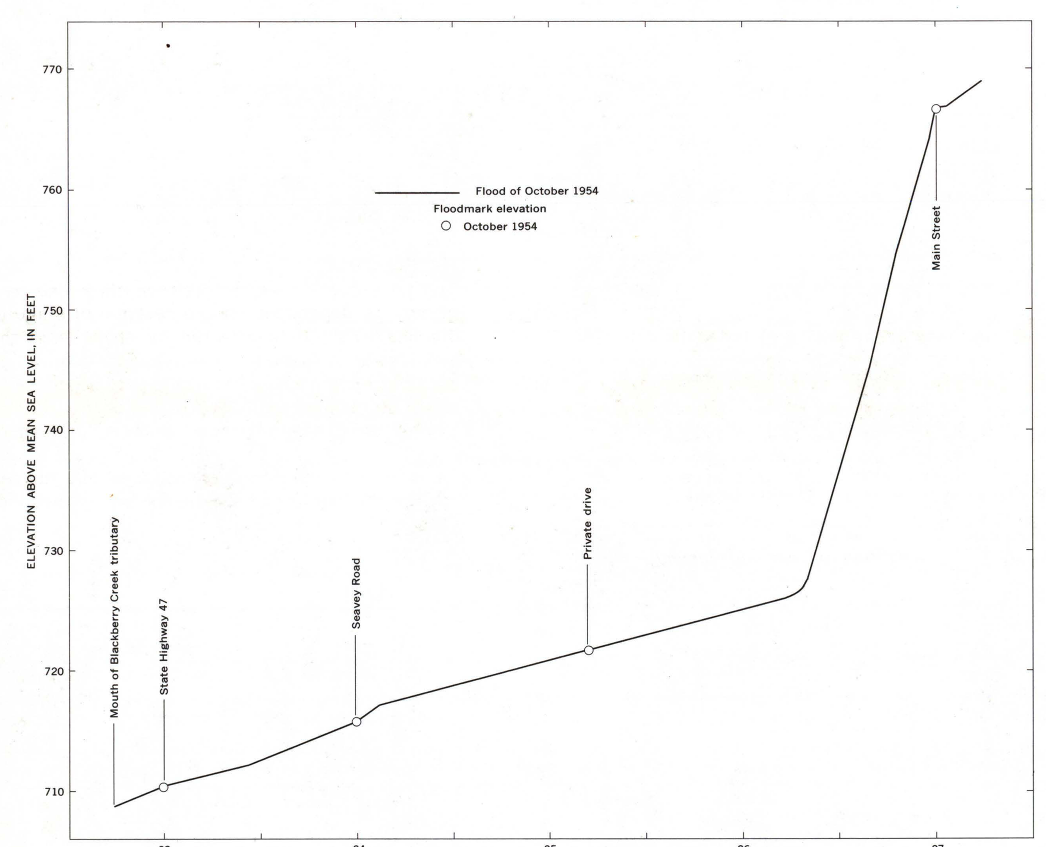


FIGURE 6.—*Profile of flood on Blackberry Creek tributary.*

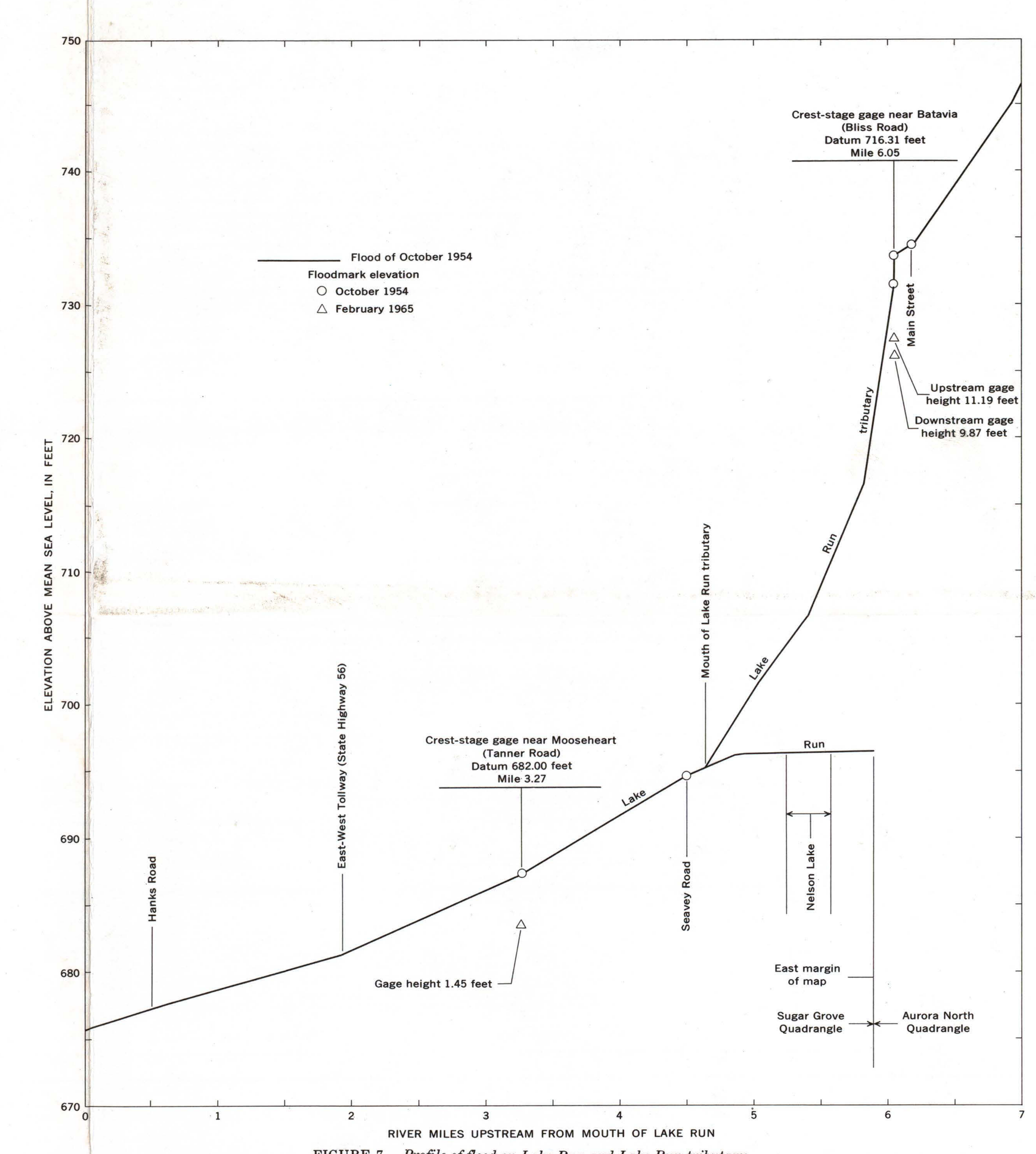


FIGURE 7.—*Profile of flood on Lake Run and Lake Run tributary.*

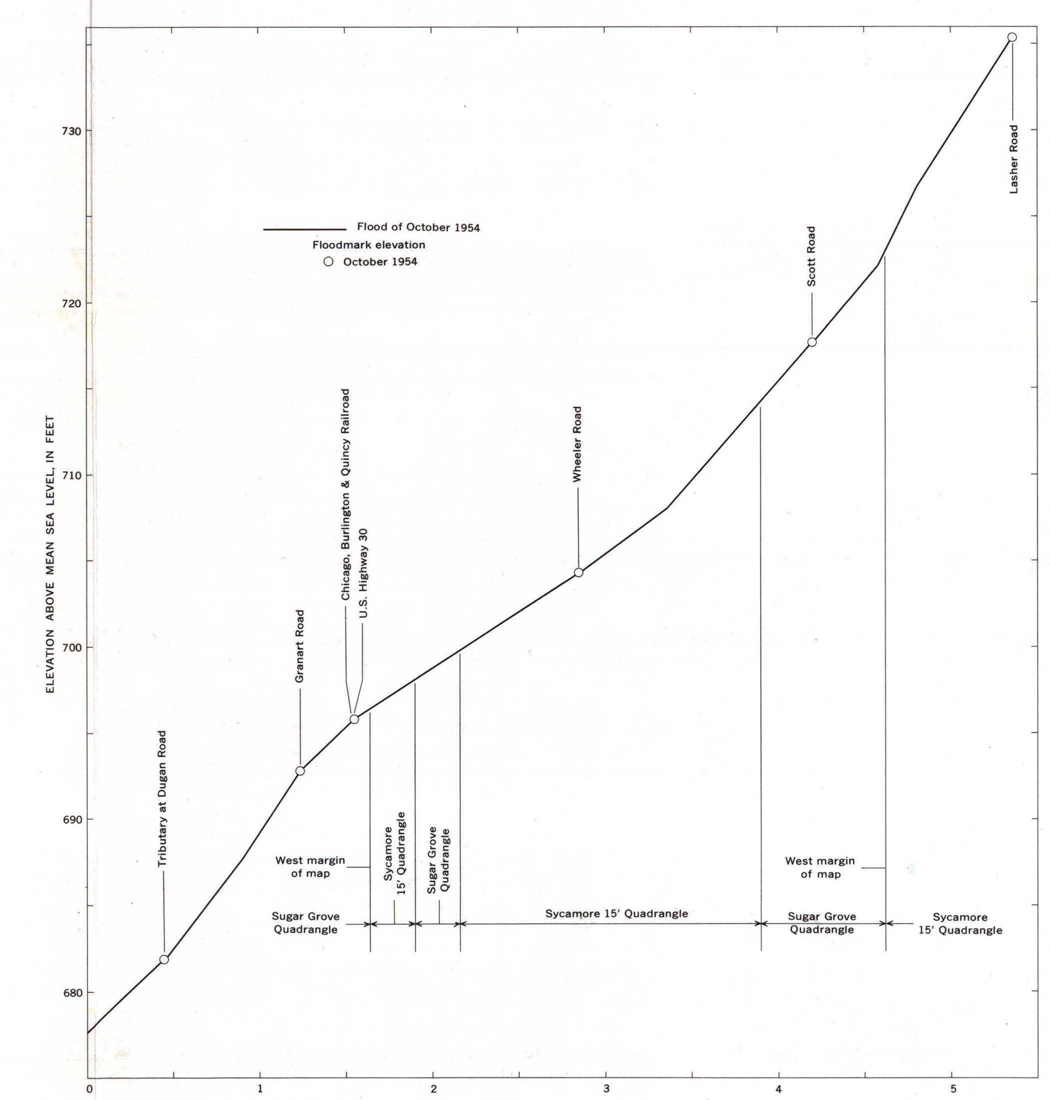


FIGURE 8.—*Profile of flood on Duffin Drain.*

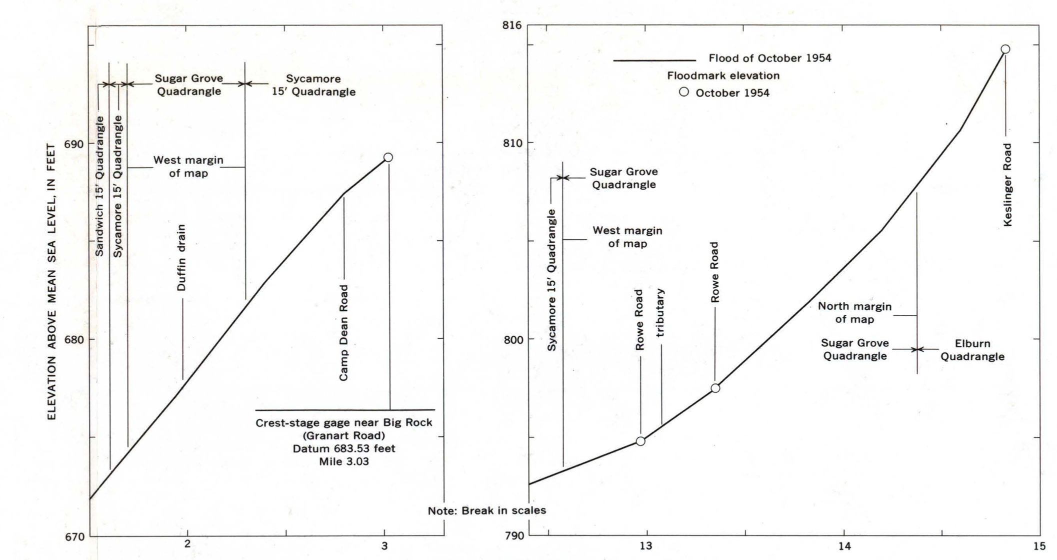


FIGURE 9.—*Profile of flood on Welch Creek.*

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By
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1966

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