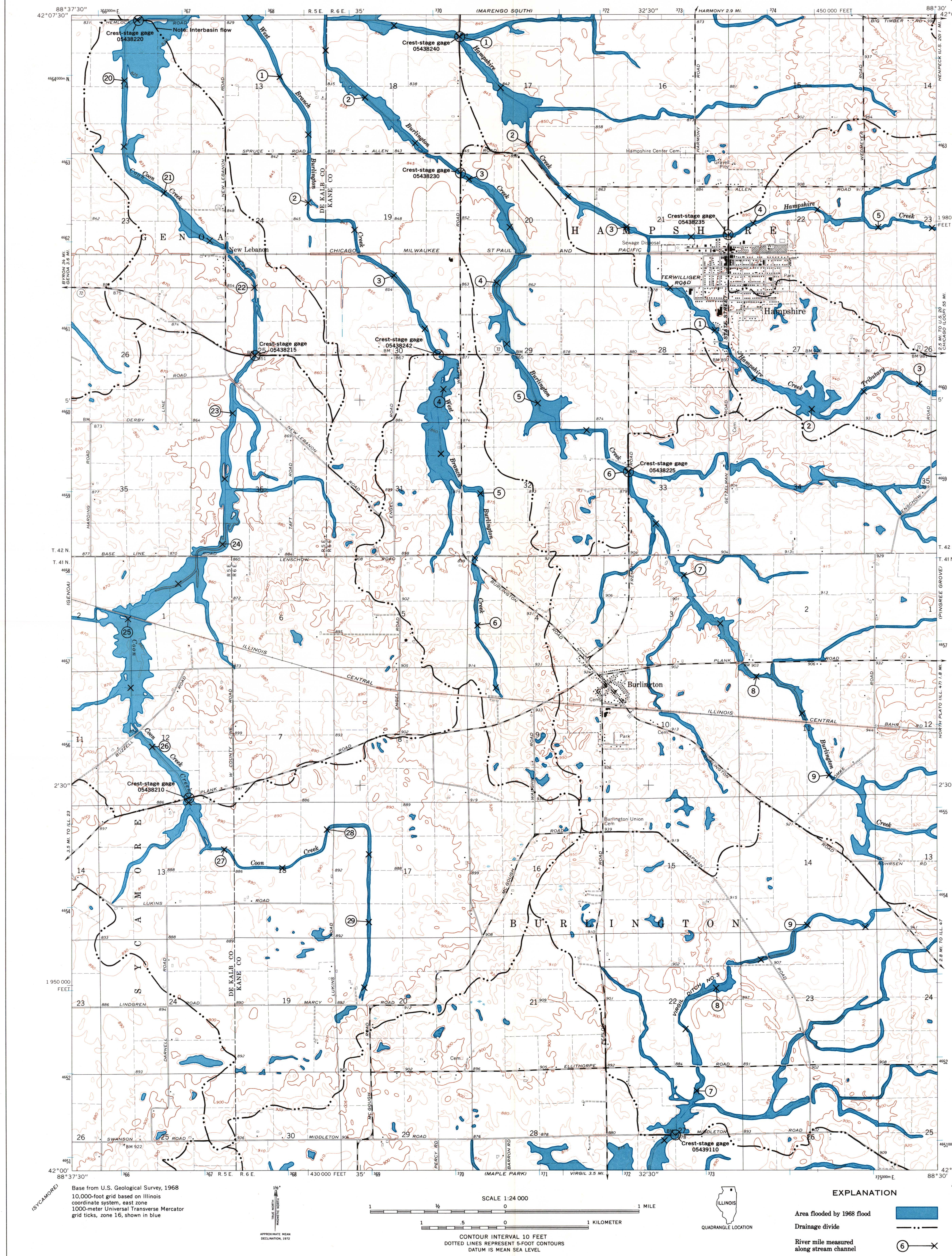

Base from U.S. Geological Survey, 1968
10,000-foot grid based on Illinois coordinate system, east zone
1000-meter Universal Transverse Mercator grid ticks, zone 16, shown in blue

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

EXPLANATION

Area flooded by 1968 flood

Drainage divide

River mile measured along stream channel

FLOODS IN HAMPSHIRE QUADRANGLE NORTHEASTERN ILLINOIS

Introduction.—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 Hampshire quadrangle, northeastern Illinois. It will aid individuals, government agencies, and others responsible for solving the existing flood problems and for formulating effective flood-plain regulations that will 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 the ground-water resources.

The approximate areas inundated by floods along streams in the Hampshire quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1.

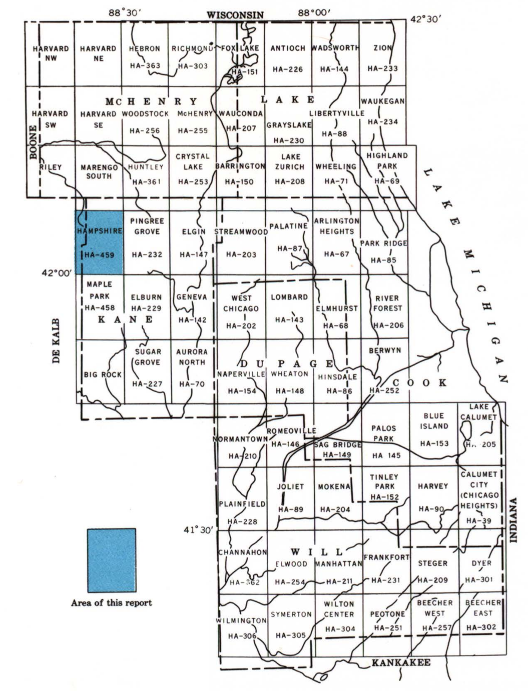

FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping program.*

Inundated areas for the flood of August 1968 are shown along Coon Creek, Burlington Creek, West Branch Burlington Creek, Hampshire Creek, Hampshire Creek tributary, Virgil ditch No. 3, and several unnamed streams.

The floods of February 1938 on Hampshire Creek and Coon Creek were reported by local residents to be the highest observed in the past 46 years.

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 reflect channel conditions existing when the floods occurred. Changes in channel conditions, waterway openings at highways and railroads, or changes in runoff characteristics of the streams caused by increased urbanization that may have taken place subsequent to the flood shown on the map could affect the flood height of future floods 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 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, 10 feet with some supplemental 5-foot intervals).

There are depressions and lowland areas in the Hampshire 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 rate 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 cooperative agreements between the Northeastern Illinois Planning Commission and the U.S. Geological Survey. Under previous agreements with the Northeastern Illinois Planning Commission and the Illinois Department of Public Works and Buildings, Division of Waterways, flood maps have been prepared for the 7½-minute quadrangles as shown in figure 1. The counties of Cook, Du Page, Kane, Lake, and McHenry cooperated in the program financially through separate agreements with the Planning Commission.

The total program includes parts of Cook, and McHenry Counties, nearly all of Kane and Will Counties, and all of Du Page and Lake Counties. Financial support for the preparation of this report was provided by Kane County through the Northeastern Illinois Planning Commission.

The cooperative program for this report is administered on behalf of the Planning Commission by Matthew L. Rockwell, Executive Director.

This report was prepared by the U.S. Geological Survey under the administrative direction of William D. Mitchell, district chief, and under the immediate supervision of Allen W. Noehre, hydrologist-in-charge of the project.

Acknowledgment is made to the Kane County Highway Department for furnishing some of the data on which this report is based.

Additional data were obtained from public officials 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 in this report are in feet above mean sea level. Gage heights for crest-stage gages in the Hampshire 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.

Crest-stage gage	Station number	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Coon Creek:			
Near Charter Grove (Plank Road)	05438210	871.23	6.87
At New Lebanon (State Highway 72)	05438215	841.26	16.5
Near New Lebanon (Hemlock Road)	05438220	820.14	19.0
Burlington Creek:			
Near Burlington (French Road)	05438225	870.88	11.8
Near Hampshire (Walker Road)	05438230	837.60	15.2
Hamsphire Creek:			
At Hampshire (State Street)	05438235	877.76	3.04
Near Harmony (Walker Road)	05438240	831.85	12.1
West Branch Burlington Creek near New Lebanon (State Highway 72)	05438242	855.80	2.90
Virgil ditch No. 3 near Burlington (Middleton Road)	05439110	873.70	8.33

Size of the drainage basin for each station also is given in the table. The subbasin divides from which the areas were determined are shown on the flood map. The divides were described in the traditional manner of following the ridge line or highest ground elevation between adjacent streams.

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 748-foot elevation at the gaging station Kishwaukee River at Belvidere, during the period 1938–69 are shown in figure 2. This gaging station is at the sewage-treatment plant in Belvidere, about 15 miles northwest of the Hampshire quadrangle, and 20.8 miles upstream from mouth of Kishwaukee River.

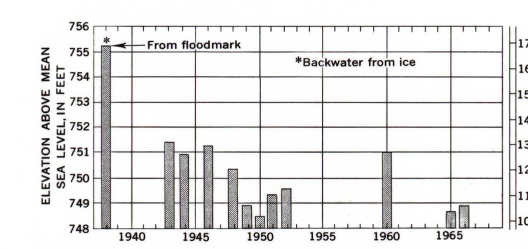

FIGURE 2—*Annual floods above 748-foot elevation, 1938, 1940–69 Kishwaukee River at Belvidere.*

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 debris or 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 station Coon Creek at Riley, about 4½ miles downstream from crest-stage gage 05438220, was derived from streamflow records of this station for the period August 1961 through September 1969 using log-Pearson Type III method. The relation between frequency and discharge is shown in figure 3, and the 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 stream channels and constrictions. The frequency curve shown in figure 4 is based on channel conditions existing in 1969. Longer records and future changes in channel conditions may define somewhat different flood-frequency curves at this site. Extrapolation of the curves beyond the limits shown is not recommended. These curves are not directly applicable to gaging station sites in Hampshire quadrangle.

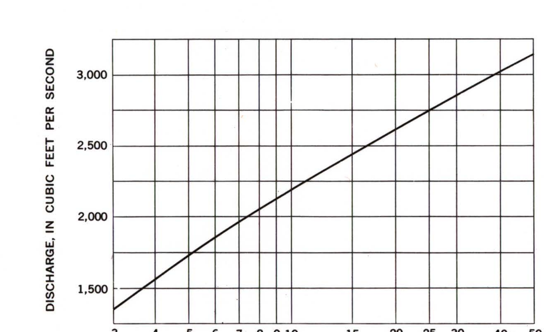

FIGURE 3.—*Frequency of flood discharges on Coon Creek at Riley.*

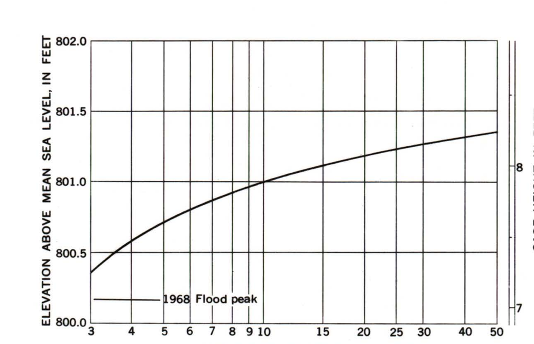

FIGURE 4.—*Frequency of flood discharges on Coon Creek at Riley.*

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 Coon Creek at Riley (fig. 4) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	801.4
30	801.3
20	801.2
10	801.0
5	800.7
3	800.4

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 during the next year or even during the next week.

Flood profiles.—Profiles of the water surface for the floods of June 1967 and August 1968 are shown in figures 5–10.

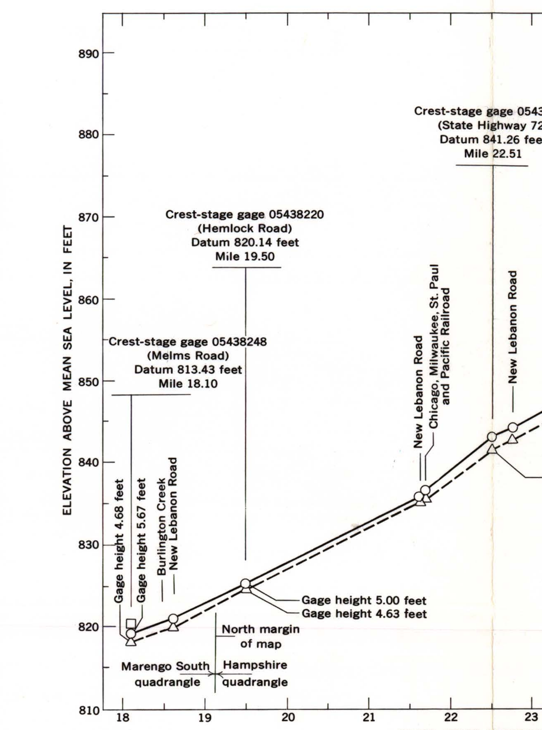

FIGURE 5.—*Profiles of floods on Coon Creek.*

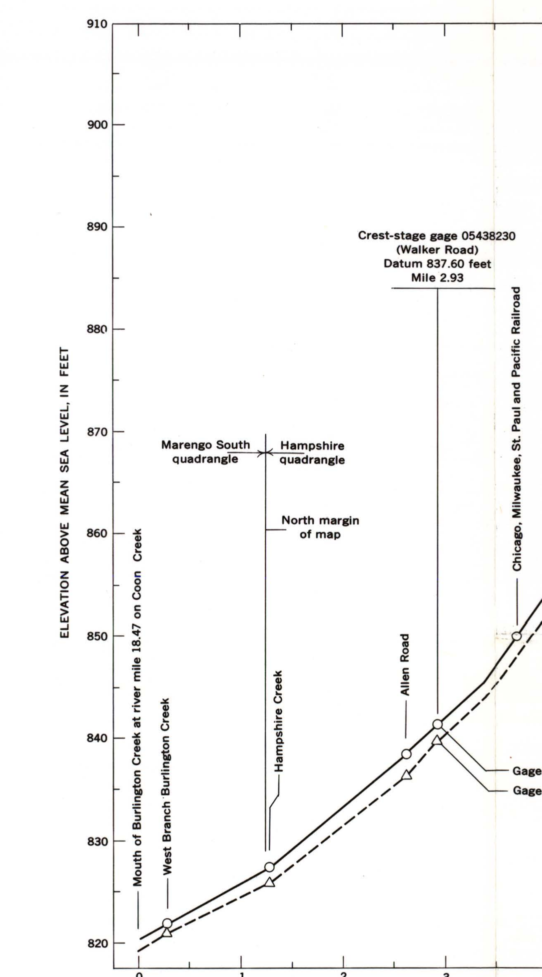

FIGURE 6.—*Profiles of floods on Burlington Creek.*

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.

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 at the same point, indicated by the profiles in figures 5–10. 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 Hampshire quadrangle can be obtained at the office of the U.S. Geological Survey, Oak Park, Ill., and from the following report:

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

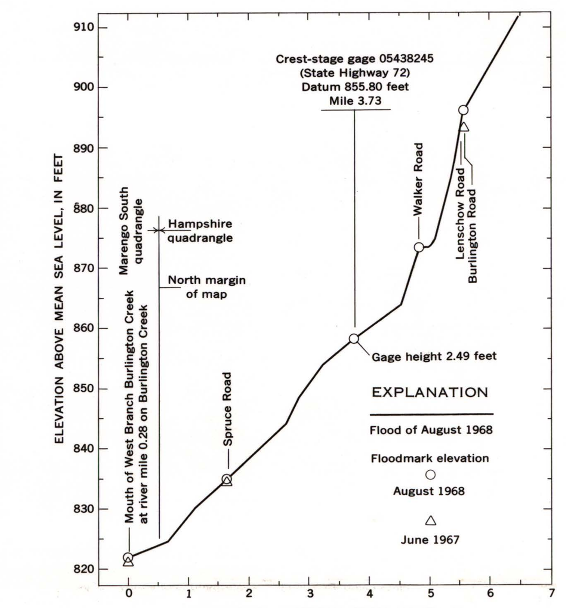

FIGURE 7.—*Profile of flood and west branch Burlington Creek*

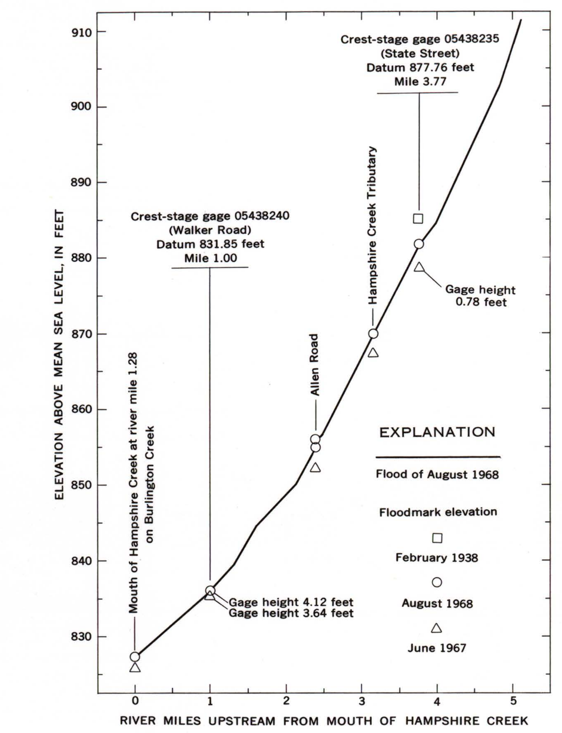

FIGURE 8.—*Profile of flood on Hampshire Creek.*

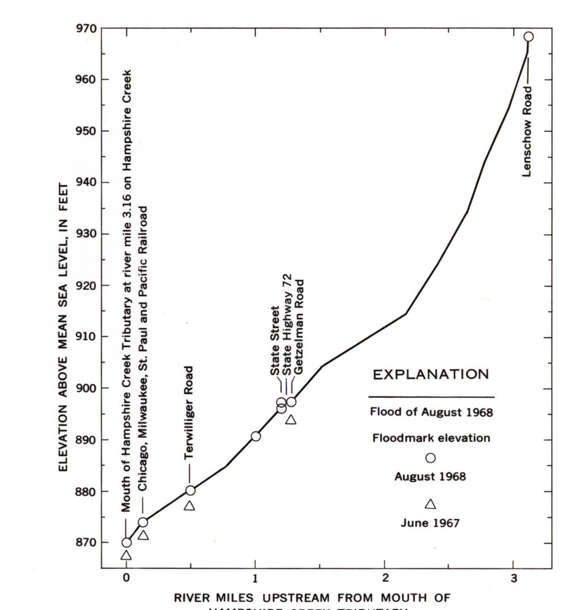

FIGURE 9.—*Profile of flood on Hampshire Creek Tributary.*

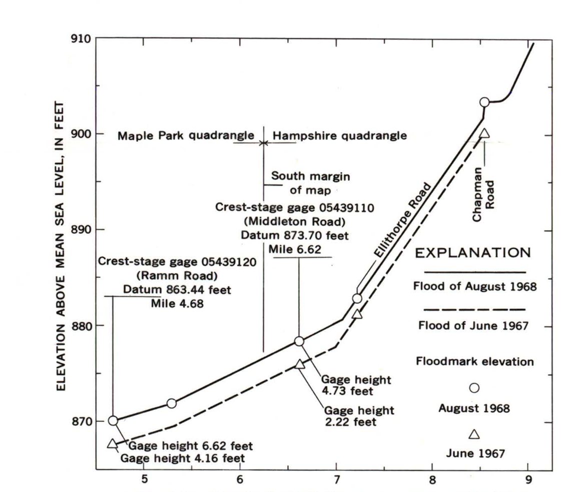

FIGURE 10.—*Profiles of floods on Virgil Ditch No. 3.*

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FLOODS IN HAMPSHIRE QUADRANGLE, NORTHEASTERN ILLINOIS

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1972

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