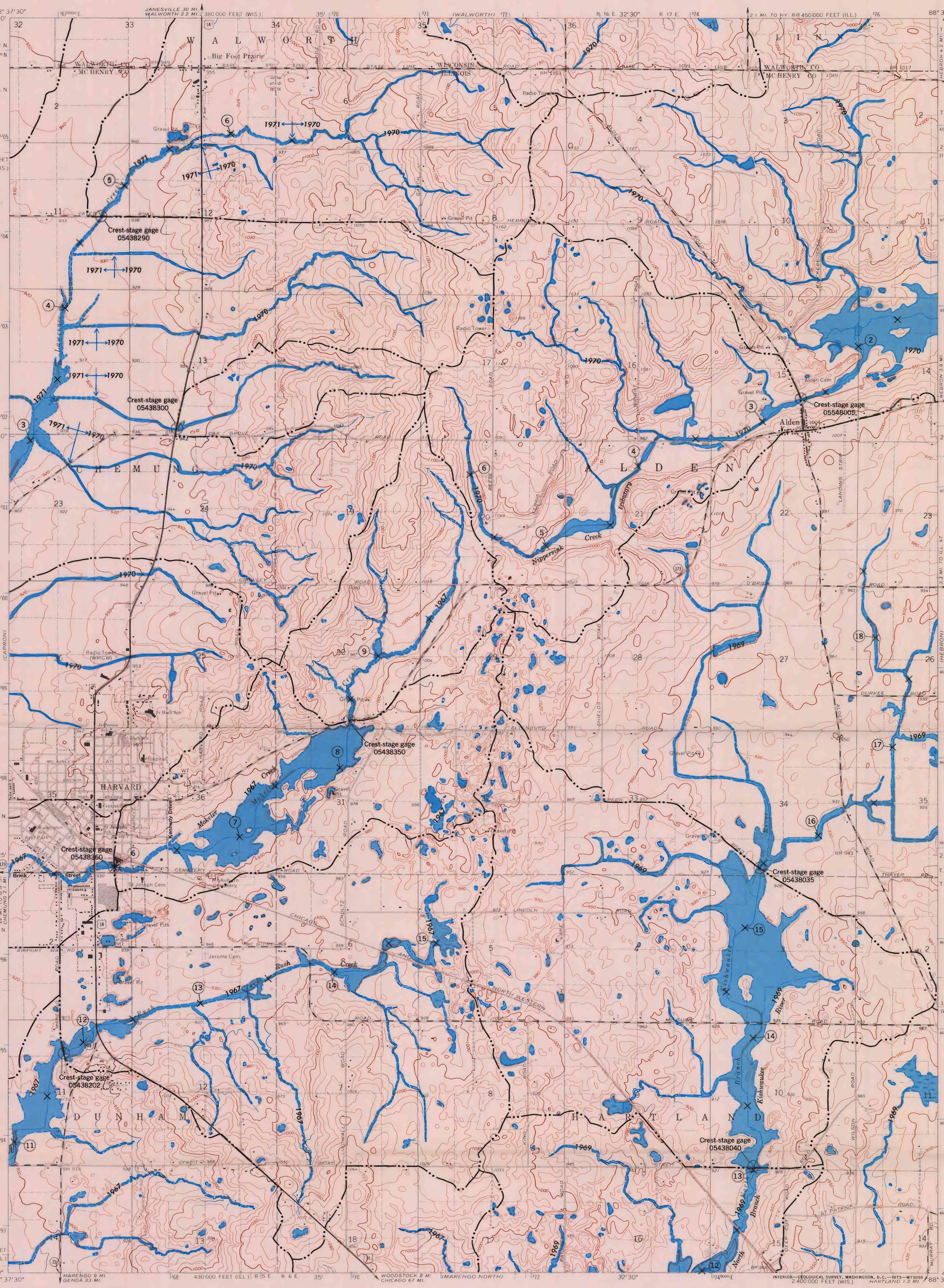
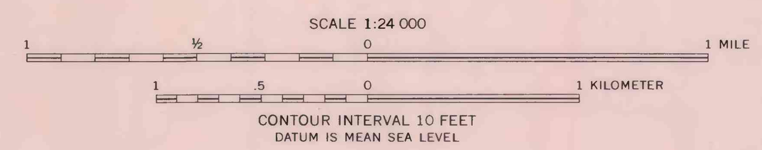


Base from U.S. Geological Survey, 1970
10,000-foot grid based on Illinois coordinate system, east zone and Wisconsin coordinate system, south zone
1000-meter Universal Transverse Mercator Grid ticks, zone 16, shown in blue



EXPLANATION

Area flooded
Boundary of 1967 flood — 1967
Boundary of 1969 flood — 1969
Boundary of 1970 flood — 1970
Boundary of 1971 flood — 1971
Drainage divide
River mile measured along stream channel
Inundated areas defined for different floods, upstream and downstream — 1971 / 1970

FLOODS IN HARVARD QUADRANGLE, NORTHEASTERN ILLINOIS

By
Howard E. Allen and Allen W. Noehre
1973

FLOODS IN HARVARD 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 Harvard quadrangle, northeastern Illinois. It will aid individuals, government agencies, and others responsible for solving 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 areas inundated by floods along streams in the Harvard quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. The stream names and the dates of the floods as shown on the map are tabulated in the following table:

Date of flood	Area flooded
June 1967	Mokeler Creek and Rush Creek.
June 1969	North Branch Kishwaukee River.
September 1970	Nippersink Creek tributary and several unnamed streams.
February 1971	Lawrence Creek.

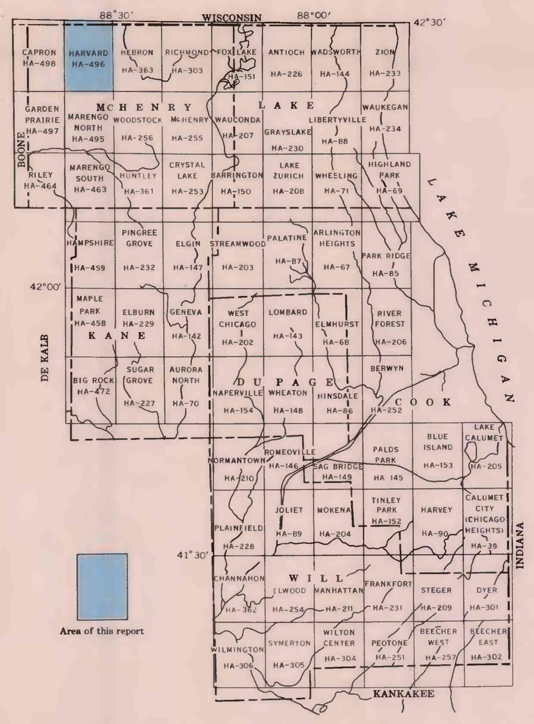


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in flood-hazard mapping program.*

A local resident reported that the flood of June 1969 was the highest observed in the last 15 years on North Branch Kishwaukee River. The June 1969 flood at crest-stage gage 05438300, Lawrence Creek tributary near Harvard, Ill., was the highest flood during the period of record 1961–71.

Greater floods than those 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 floods occurred. Changes in channel conditions, in waterway openings at highways and railroads, or changes in runoff characteristics of the streams caused by increased urbanization that may take place subsequent to the floods represented on the map could affect the height reached by a future flood of comparable discharge. 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 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, 10 feet.

There are several depressions and lowland areas in the Harvard 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 Transportation, Division of Water Resources Management, 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 cooperate by providing financial aid to the mapping program.

The total program includes part of Cook County, nearly all of Kane and Will Counties, and all of Du Page, Lake and McHenry Counties. Financial support for the preparation of this report was provided by McHenry 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 Davis W. Ellis, district chief, and under the immediate supervision of Allen W. Noehre, hydrologist-in-charge of the project.

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 Harvard quadrangle can be converted to elevation 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)
North Branch Kishwaukee River:			
Near Alden (Green Road)	05438035	917.78	10.8
Near Hartland (Streit Road)	05438040	905.55	16.7
Rush Creek near Harvard (Marengo Road)	05438202	907.16	5.67
Lawrence Creek near Big Foot (Yates Road)	05438290	929.41	5.13
Lawrence Creek tributary near Harvard (U.S. Highway 14)	05438300	925.50	.742
Mokeler Creek:			
Near Harvard (State Highway 173)	05438350	955.19	1.69
At Harvard (Jefferson Street)	05438360	927.54	4.37
Nippersink Creek tributary at Alden (Alden Road)	05548005	950.16	4.33

The crest-stage gages were installed during October 1969 except for Lawrence Creek tributary near Harvard which was installed July 7, 1960.

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 defined by 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 936.6-foot elevation at the gaging station 05438300 Lawrence Creek tributary near Harvard, during the period 1961–71 are shown in figure 2. The gaging station is at a culvert on U.S. Highway 14, 2½ miles north of Harvard. The graph shows the history of floods at the gage and illustrates the irregular occurrence of floods.

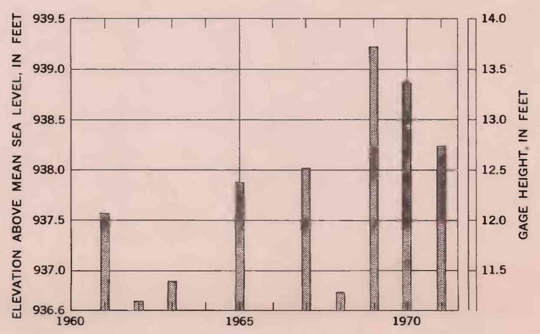


FIGURE 2.—*Annual floods above 936.6-foot elevation, 1961-71, Lawrence Creek tributary near Harvard, Ill. (U.S. Highway 14).*

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 debris jam may cause a high stage during a period of relatively low discharge.

Flood frequency.—Frequency of floods at the U.S. Geological Survey gaging stations on Coon Creek at Riley (05438250), and on Lawrence Creek tributary near Harvard (05438300) was computed by fitting the logarithms of the annual floods at these stations to a Pearson Type III distribution. The Coon Creek gage is located on Harmony Road, 0.7 mile southwest of Riley, 14 miles south of the southern boundary of the Harvard quadrangle, and at river mile 13.40.

The relation between discharge and frequency is shown in figures 3 and 4 and the 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 physical conditions of stream channels and constrictions. The frequency curves shown in figures 5 and 6 are based on channel conditions existing in 1972. 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.

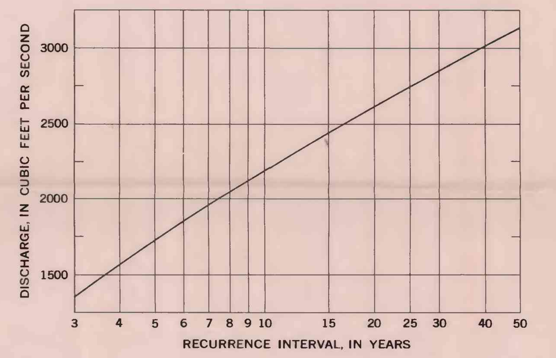


FIGURE 3.—*Frequency of flood discharges on Coon Creek at Riley, Ill.*

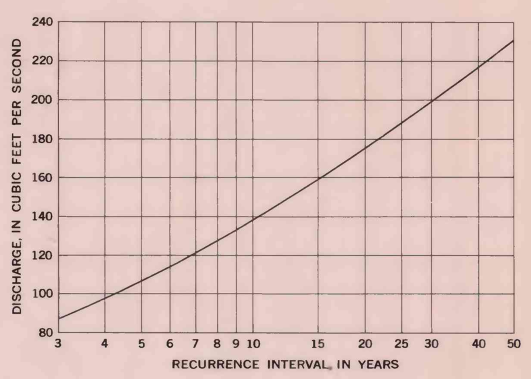


FIGURE 4.—*Frequency of flood discharges on Lawrence Creek tributary near Harvard, Ill. (U.S. Highway 14).*

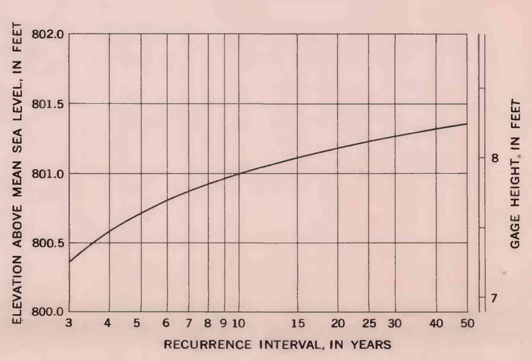


FIGURE 5.—*Frequency of flood stages on Coon Creek at Riley, Ill.*

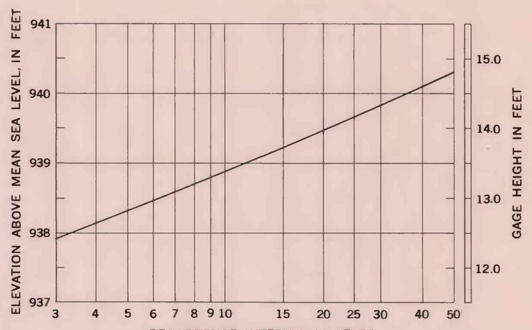


FIGURE 6.—*Frequency of flood stages on Lawrence Creek tributary near Harvard, Ill. (U.S. Highway 14).*

Recurrence intervals.—As applied to flood events, recurrence interval is the average interval of time within which a given flood will be exceeded once. Frequencies of floods can also 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 exceeded in any given year, or a flood with a 50-year recurrence interval would have a 2-percent chance of being exceeded in any given year.

The general relation between recurrence interval and flood height at the gaging stations on Coon Creek at Riley (fig. 5) and Lawrence Creek tributary near Harvard (fig. 6) is tabulated in the following table:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	Coon Creek at Riley	Lawrence Creek tributary near Harvard
50	801.4	940.3
30	801.3	939.8
20	801.2	939.5
10	801.0	938.9
5	800.7	938.3
3	800.4	937.9

It is emphasized that recurrence intervals are average figures—the average number of years between occurrences of floods that 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, based primarily on elevations of the marks left by floods of June 1967, June 1969, September 1970 and February 1971 are shown in figures 7–11.

Where floodmarks could not be identified, the profiles were constructed on the basis of flood crests determined 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 7–11. 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.

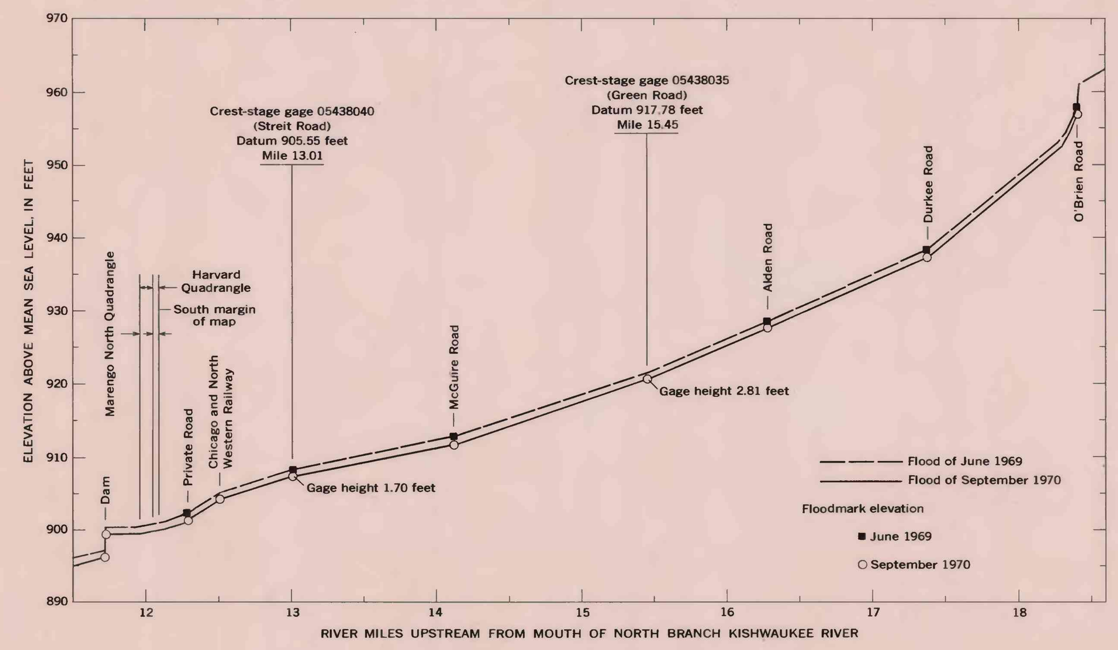


FIGURE 8.—*Profiles of floods on North Branch Kishwaukee River.*

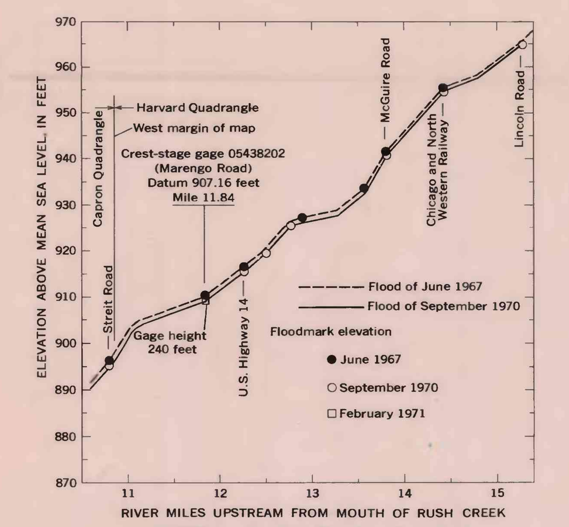


FIGURE 9.—*Profiles of floods on Rush Creek.*

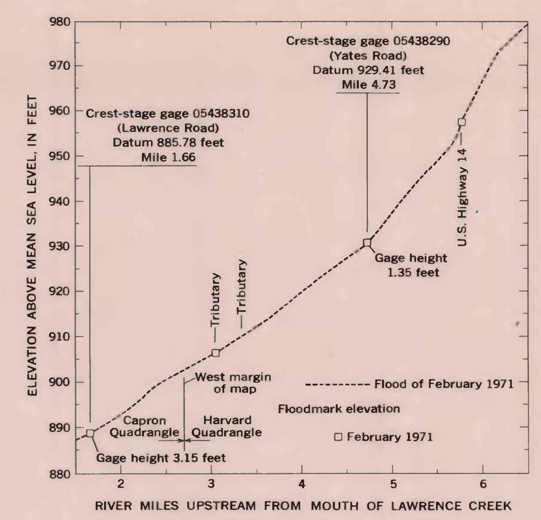


FIGURE 10.—*Profile of flood on Lawrence Creek.*

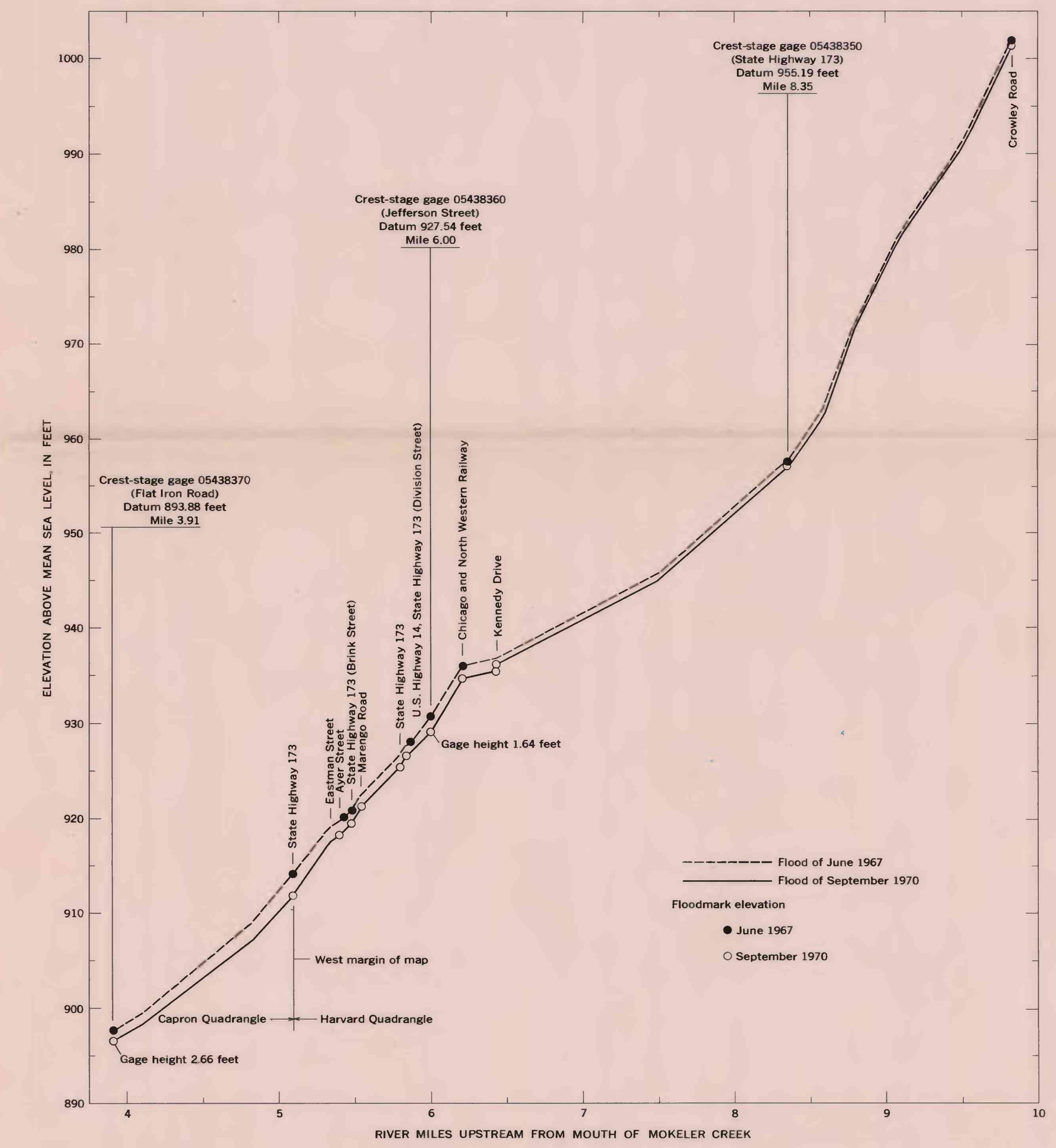


FIGURE 11.—*Profiles of floods on Mokeler Creek.*

Additional data.—Other information pertaining to floods in the Harvard quadrangle can be obtained at the office of the U.S. Geological Survey, Oak Park, Ill., and from the following reports:

Ellis, D.W., 1968, Floodflows from small drainage areas in Illinois—Preliminary flood-frequency relations: U.S. Geol. Survey open-file report, 10 p.
(U.S.) Water Resources Council, 1967, A uniform technique for determining flood-flow frequencies: 1025 Vermont Ave., N.W. Wash., D.C. 20005, Bull. 15, 15 p.

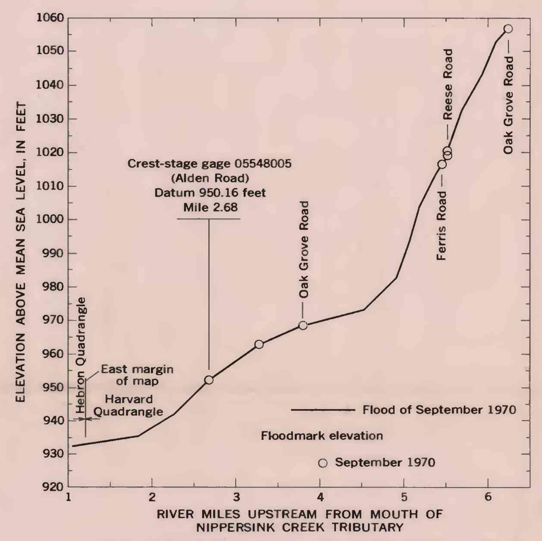


FIGURE 7.—*Profile of flood on Nippersink Creek tributary.*