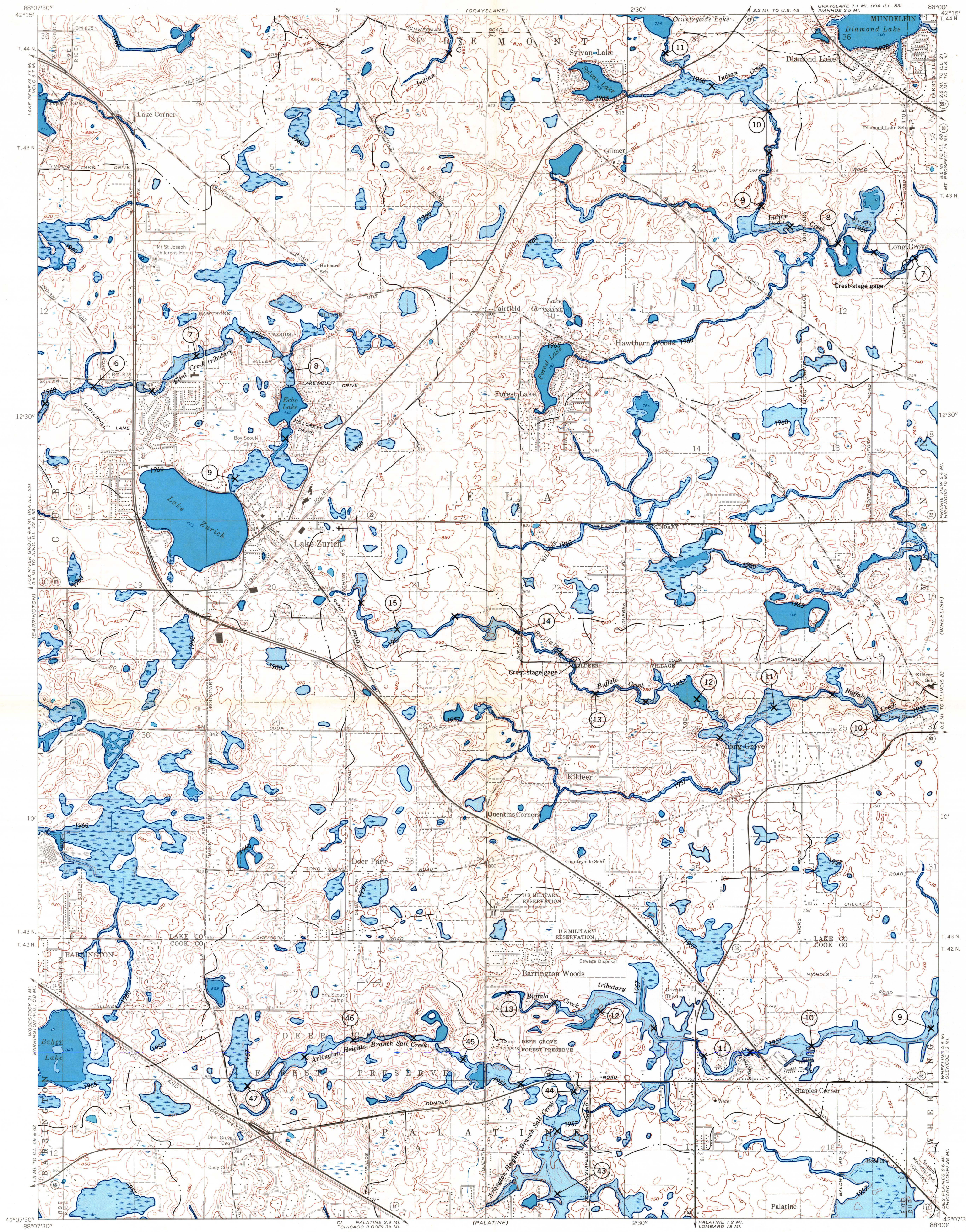
PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION



Base from U.S. Geological Survey, 1960

SCALE 1:24 000

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

QUADRANGLE LOCATION

EXPLANATION

Area flooded
Boundary of 1938 flood
Boundary of 1957 flood
Boundary of 1960 flood
Boundary of 1965 flood
Drainage divide
River mile measured along stream channel

FLOODS IN LAKE ZURICH QUADRANGLE NORTHEASTERN ILLINOIS

This report presents hydrologic data concerning the extent, depth, and frequency of flooding that are useful in planning for economic development of flood plains in the Lake Zurich quadrangle, northeastern Illinois. It will be a valuable tool for counties, municipalities, and other agencies responsible for solving existing flood problems, and in formulating regulations for land use and development that will reduce future flood damage.

The approximate areas inundated by floods along streams and lakes in the Lake Zurich 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown along Buffalo Creek, Buffalo Creek tributary, and Arlington Heights Branch Salt Creek for the flood of July 1957; along Indian Creek, Flint Creek tributary, and Lake Zurich for the flood of March-April 1960; along Sylvan Lake, Forest Lake, and Baker Lake for the flood of April 1965; and along Diamond Lake for the flood of July 1938.

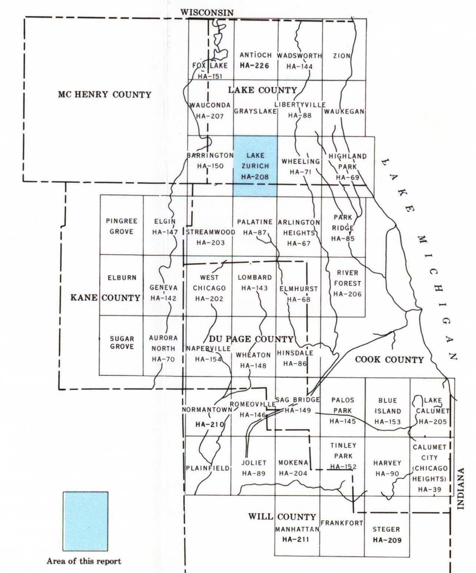


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles in flood-hazard mapping program.*

The stage of the 1957 flood at the gaging station on Buffalo Creek at Buffalo Grove Road was the maximum for the period of record, 1953-64, and corresponds to the estimated 10-year flood at that site. A flood in the spring of 1951 was reported to be the highest in recent years along Indian Creek. Although sufficient data were not available to define its profile, the 1951 flood stage in Countryside Lake was about a quarter of a foot higher than the stage of the 1960 flood. The stage of the 1938 flood on Diamond Lake, 743.65 feet, exceeded the observed stage in April 1965 by about 3 feet and was reported to have been the highest in at least 32 years.

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 existing 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 numerous depressions or lowland areas in the Lake Zurich 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 Lake and Cook 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 Department of Highways, Cook County, for supplying some of the data on which this report is based.

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 elevation of 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 Lake Zurich 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)
Indian Creek at Diamond Lake (Diamond Lake Road)	705.97	10.6
Buffalo Creek near Lake Zurich (Cuba Road)	762.85	1.01

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) above 663-foot elevation at the gaging station, Buffalo Creek near Wheeling, Ill. (Buffalo Grove Road), during the period 1953-64 are shown in figure 2. The gaging station is 2 1/4 miles east of the Lake Zurich quadrangle and at mile 4.98.

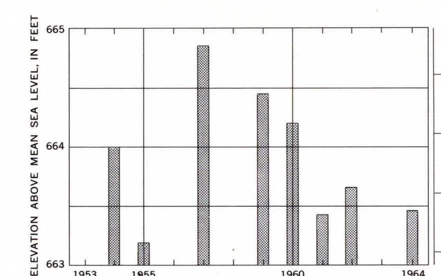


FIGURE 2.—*Annual floods above 663-foot elevation 1953-64, Buffalo Creek near Wheeling, Illinois (Buffalo Grove Road).*

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 station on Buffalo Creek near Wheeling 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 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 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.

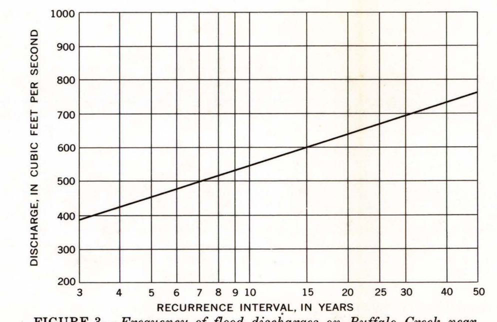


FIGURE 3.— *Frequency of flood discharges on Buffalo Creek near Wheeling, Illinois (Buffalo Grove Road).*

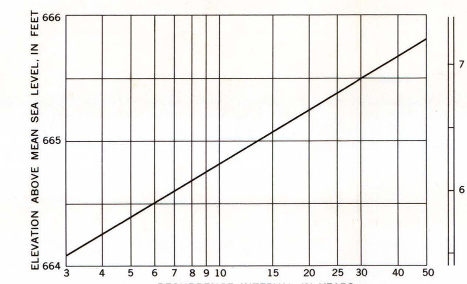


FIGURE 4.— *Frequency of flood stages on Buffalo Creek near Wheeling, Illinois (Buffalo Grove Road).*

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 Buffalo Creek near Wheeling (fig. 4) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	665.8
30	665.5
20	665.2
10	664.8
5	664.4
3	664.1

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 July 1957, March-April 1960, and April 1965, are shown in figures 5-9. Where floodmarks could not be obtained the profiles were constructed on the basis of flood crests determined from reports of 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 nearly accurate elevations can be obtained by leveling from nearby bench marks.

Additional data.— Other information pertaining to floods in the Lake Zurich 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. of Public Works and Bldgs., Div. of Waterways, 386 p.

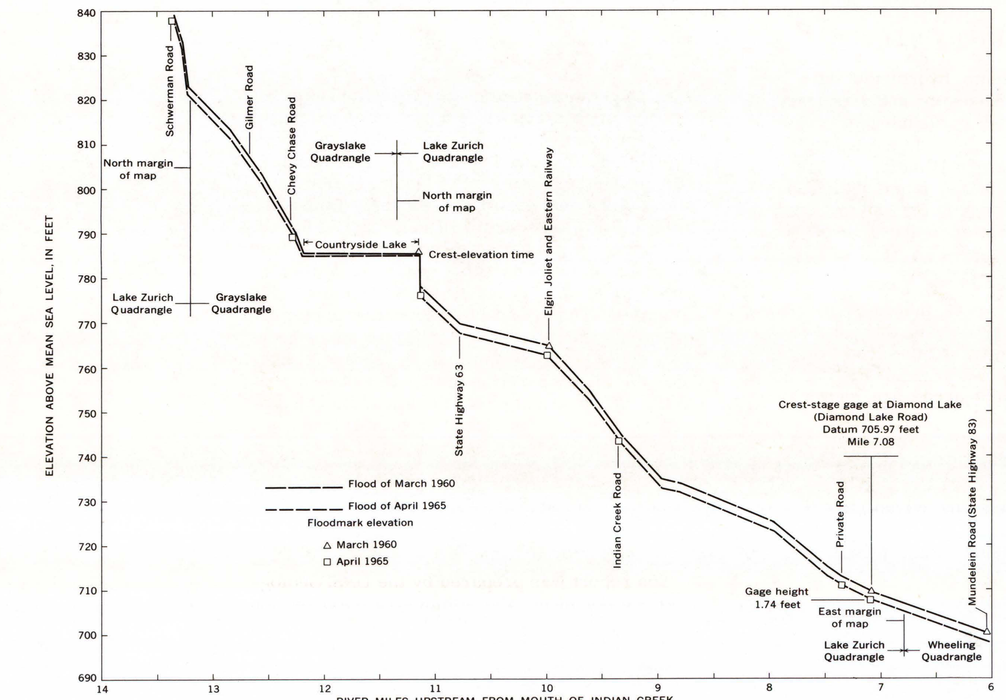


FIGURE 5.—*Profiles of floods on Indian Creek.*

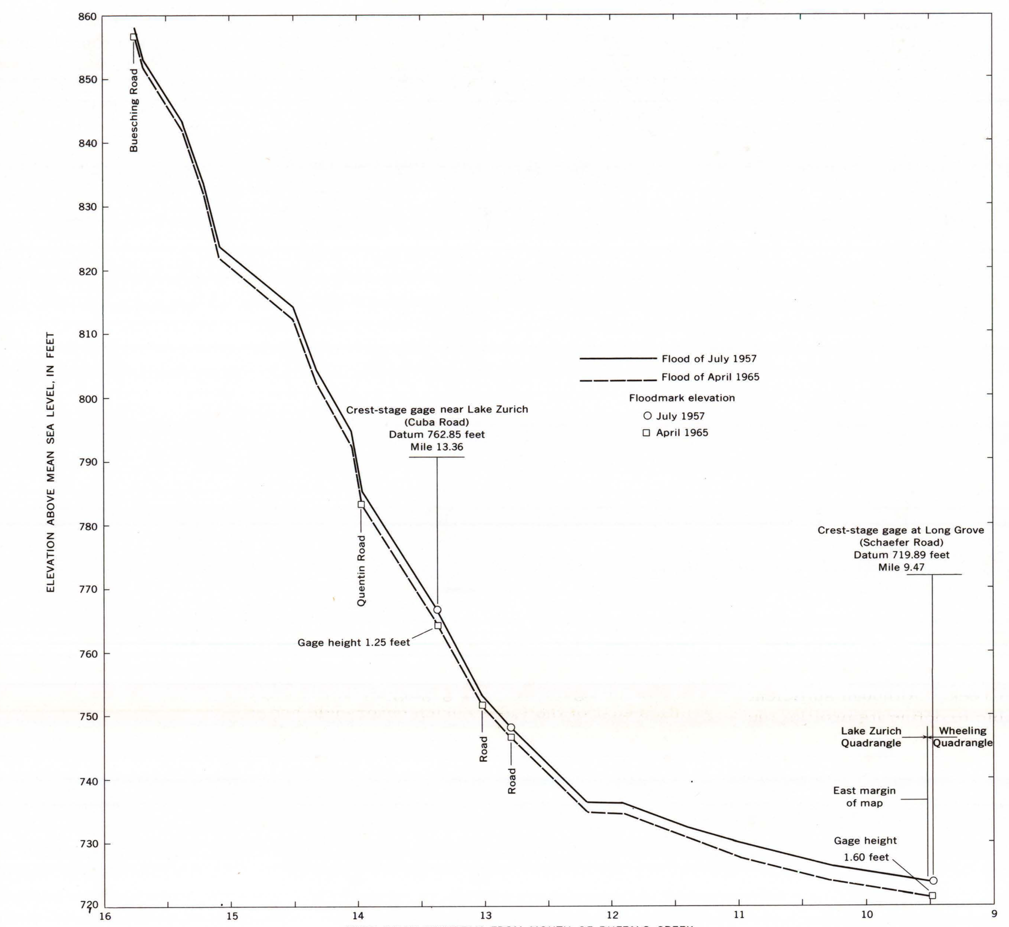


FIGURE 6.—*Profiles of floods on Buffalo Creek.*

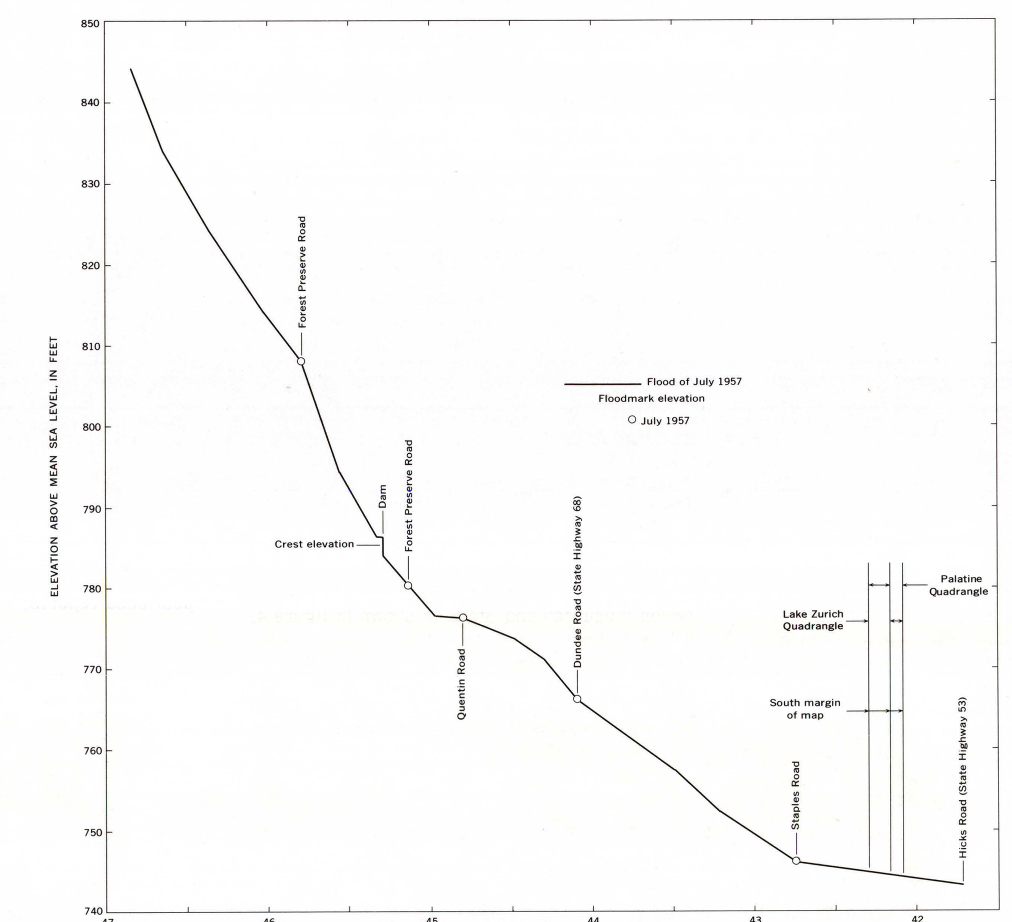


FIGURE 8.—*Profile of flood on Arlington Heights Branch Salt Creek.*

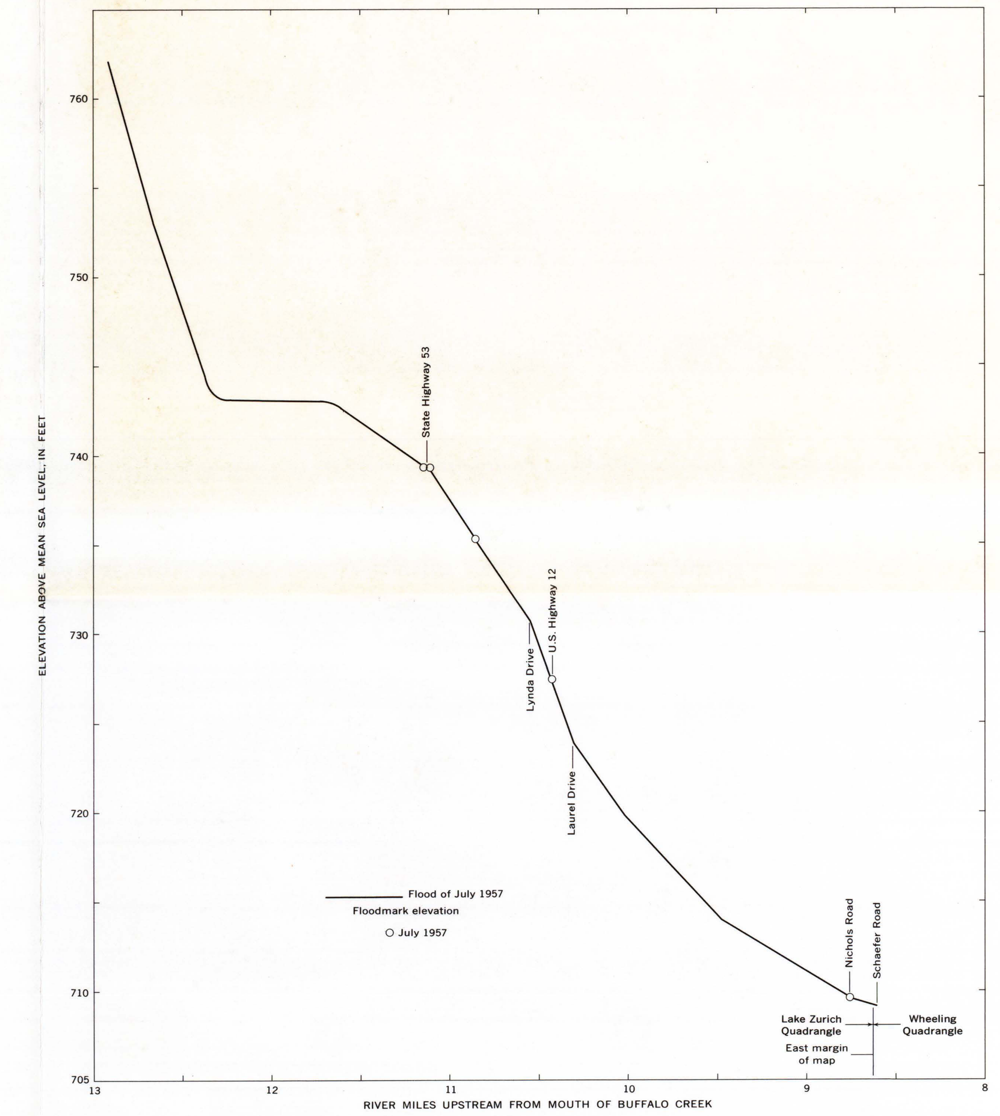


FIGURE 7.—*Profile of flood on Buffalo Creek tributary.*

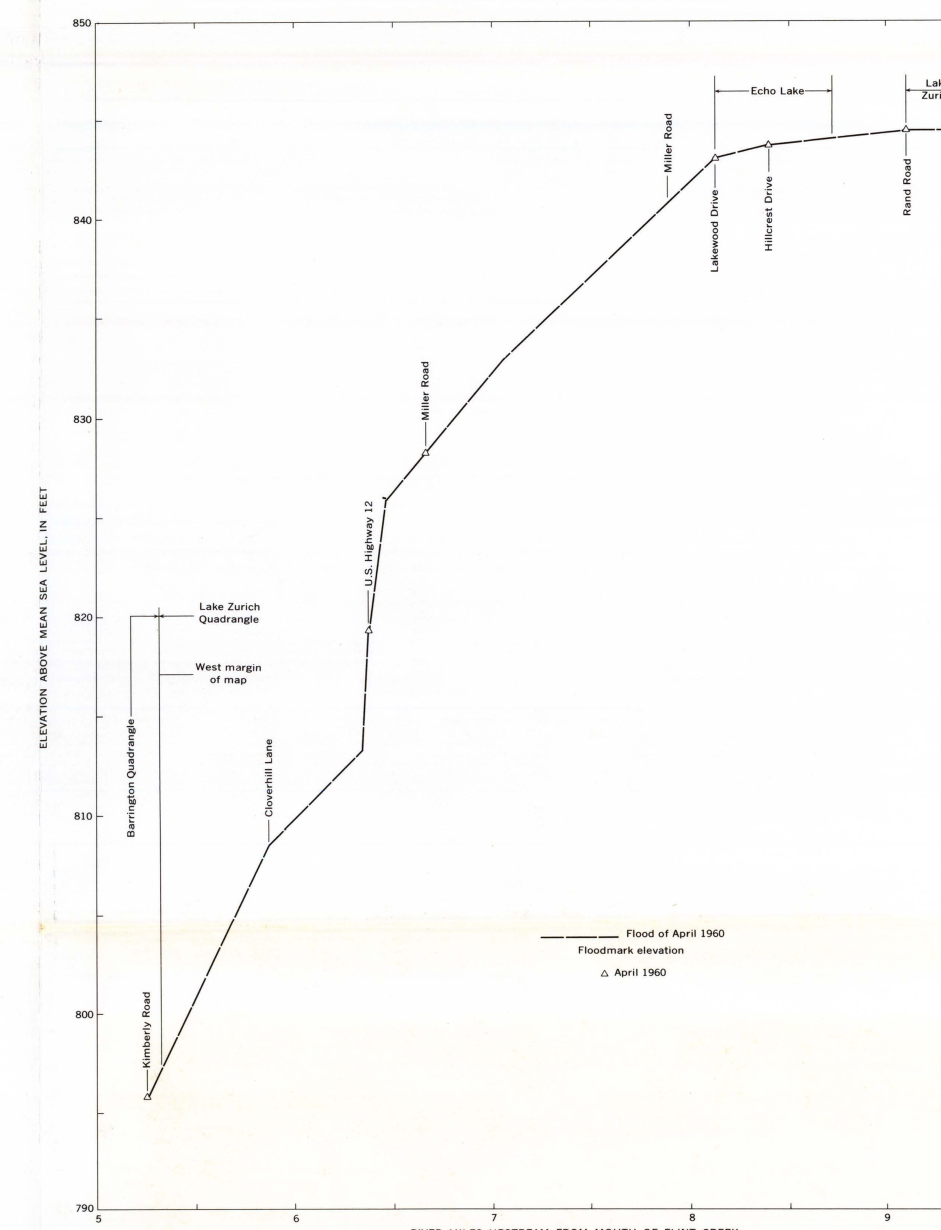


FIGURE 9.—*Profile of flood on Flint Creek tributary.*

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1966—W66173

FLOODS IN LAKE ZURICH QUADRANGLE, NORTHEASTERN ILLINOIS

By
Allen W. Noehre and Roman T. Mycyk

1966