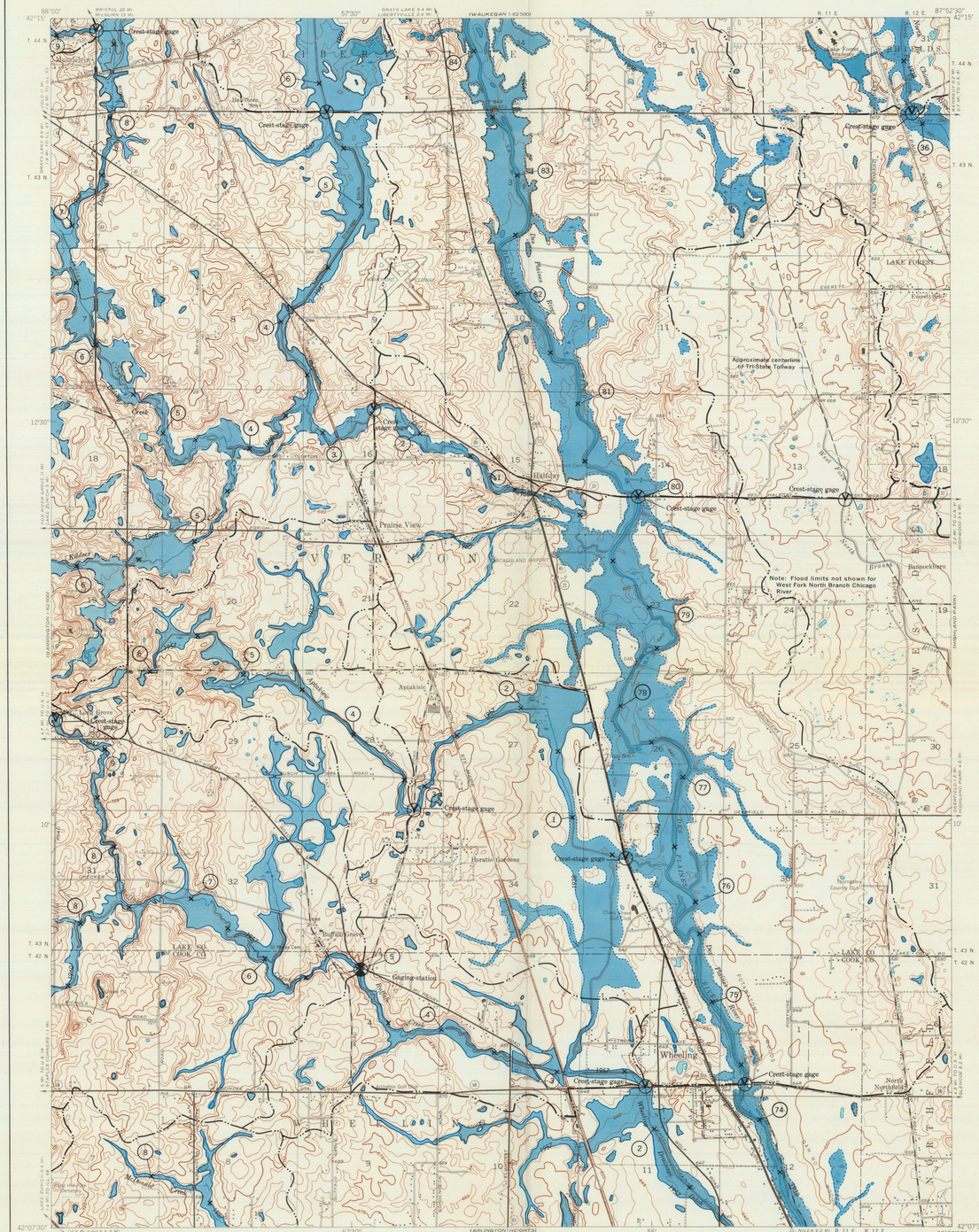
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-71



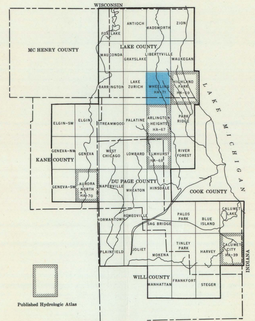


FIGURE 1.—*Outline map of northeastern Illinois showing location of Wheeling Quadrangle*

FLOODS IN WHEELING QUADRANGLE, ILLINOIS

This report presents hydrologic data, about the depth and frequency of flooding, that can be used in planning for the economic development of flood plains. No recommendations or suggestions for land-use regulations are made and no solutions of existing flood problems are proposed. This is the sixth of many such reports planned for northeastern Illinois.

The approximate areas inundated by floods along streams in the Wheeling 7 1/2-minute quadrangle are delineated on the map. The quadrangle location is shown in figure 1. Inundated areas are shown along the Des Plaines River and North Branch Chicago River for the flood of July 1938[1] along Diamond Lake Drain, Hawthorn Drainage Ditch, Aptakisic Creek, Buffalo Creek, Wheeling Drainage Ditch, and McDonald Creek for the flood of July 1957; and along Indian Creek, Kildeer Creek, and Buffalo Creek tributary for the flood of March 1960.

The flood limits shown on the map are not necessarily those for the highest floods expected. Greater floods are possible, but definition of their probable overflow limits is not within the scope of this report. The flood limits reflect channel conditions that existed when the floods occurred and no attempt was made to appraise the effect of channel changes that may have been made later. Protective works built after the floods of 1938, 1957, and 1960 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.

There are numerous depressions or lowland areas in the Wheeling quadrangle where surface water accumulates. Flood limits are shown for many such areas but there may be others that were not detected in this investigation.

During construction of the Tri-State Tollway in 1957-58, the West Fork of North Branch Chicago River was relocated in a new channel, which has contained all floods since that time. No data are available on floods before the relocation. Consequently, flood limits are not shown for West Fork of North Branch Chicago River.

Flood limits are not defined for areas inundated as a result of backup in storm drains.

Cooperation and acknowledgment— The preparation of this report is 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 whereby flood maps will be prepared for the 71/2-minute quadrangles shown in figure 1. Areal limits of the program include parts of Cook, Kane, McHenry, and Will Counties, and all of Du Page and Lake Counties. The six counties cooperate financially in the program through separate agreements with the Planning Commission. The Wheeling quadrangle is in Lake and Cook Counties. 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 Paul Oppermann, Executive Director, and is directly coordinated by John R. Sheaffer, Chief Planner.

The flood maps are prepared by the 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. The Wheeling flood map was prepared by Howard E. Allen and Allen W. Noehre with assistance from other staff members of the Oak Park subdistrict office.

Acknowledgment is made to the following agencies who supplied some of the flood data on which this report is based: the State of Illinois, Department of Public Works and Buildings, Division of Waterways; Lake County Regional Planning Commission; Lake County Highway Department; the Forest Preserve District of Cook County; and the Department of Highways of Cook County. The Division of Waterways also furnished 2-foot interval contour maps along the Des Plaines River.

Additional data were obtained from personal interviews with local officials and private citizens 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 on the map are in feet above mean sea level. Gage heights for gaging stations in the Wheeling 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 drainage area and type of gage at each station also are given in the table. Drainage divides are shown on the map.

Gaging Station	Type of gage[1]	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Des Plaines River:			
at Halfday (Halfday Road)	C	640.45	271
at Wheeling (Dundee Road)	C	635.01	323
Diamond Lake Drain:			
at Mundelein (Mundelein Road)	C	727.57	2.59
Hawthorn Drainage Ditch:			
near Mundelein (Town Line Road)	C	678.92	6.01
Indian Creek:			
at Prairie View (Prairie Road)	C	663.01	35.9
Aptakisic Creek:			
at Aptakisic (Buffalo Grove Road)	C	668.63	2.81
near Wheeling (Milwaukee Avenue)	C	637.08	6.49
Buffalo Creek:			
at Long Grove (Schaefer Road)	C	719.89	7.85
near Wheeling (Buffalo Grove Road)	R	658.60	19.6
Wheeling Drainage Ditch:			
near Wheeling (Dundee Road)	C	639.41	22
North Branch Chicago River:			
at Lake Forest (Town Line Road)	C	662.13	11.6
West Fork of North Branch Chicago River:			
at Bannockburn (Halfday Road)	C	662.09	2.58

[1] C, Crest-stage gage; R, Water-stage recorder

Gage height and year of occurrence of each annual flood (highest peak discharge in each calendar year) above 630-foot elevation at the gaging station on Des Plaines River near Des Plaines for the period 1938-62 are shown in figure 2. The gaging station near Des Plaines is at Dam No. 2, about 3 miles south of the Wheeling quadrangle, and at mile 69.3. The irregular occurrence of floods is evident.

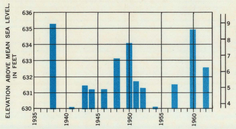


FIGURE 2.—*Annual floods above 630-ft elevation, 1938-62, Des Plaines River near Des Plaines*

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. Usually discharge rates are expressed in units of cubic feet per second (cfs). Peak discharge is the maximum value of the discharge attained by a flood. The peak discharge during a flood generally occurs at the time of the maximum height of the flood, but if the stream is affected by variable back-water, the peak discharge may not coincide with maximum stage.

Flood frequency— Frequency of floods at the Geological Survey gaging stations on Des Plaines River at Wheeling and Buffalo Creek near Wheeling was derived from streamflow records at the stations combined with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The general relation between frequency and discharge is shown in figures 3 and 4, and the general relation between frequency

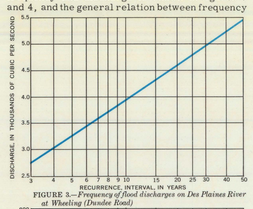


FIGURE 3.—*Frequency of flood discharges on Des Plaines River at Wheeling (Dundee Road)*

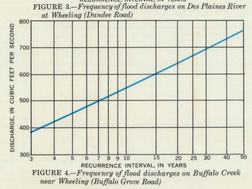


FIGURE 4.—*Frequency of flood discharges on Buffalo Creek near Wheeling (Buffalo Grove Road)*

and stage is shown in figures 5 and 6. The relation between flood stage and frequency is dependent on the relation of flood stage to discharge, which is affected by changes in physical conditions of channels and constrictions. The frequency curves shown in figures 5 and 6 are based on channel conditions existing in 1962. 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 because of the possibility of large errors.

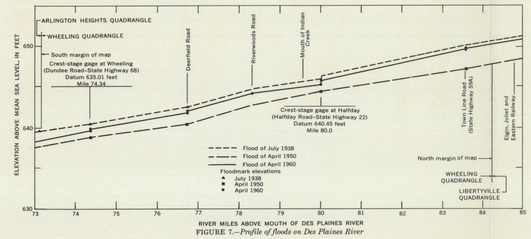


FIGURE 7.—*Profile of floods on Des Plaines River*

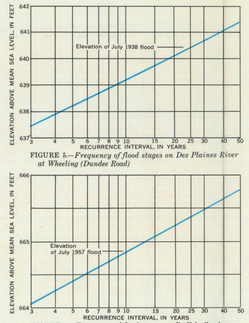


FIGURE 5.—*Frequency of flood stages on Des Plaines River at Wheeling (Dundee Road)*

FIGURE 6.—*Frequency of flood stages on Buffalo Creek near Wheeling (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 may be stated in terms of their probabilities of occurrence (reciprocals of their recurrence intervals). 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 gaging stations on Des Plaines River at Wheeling (fig. 5) and Buffalo Creek near Wheeling (fig. 6) are tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)	
	Des Plaines River at Wheeling	Buffalo Creek near Wheeling
50	641.4	665.8
40	641.1	665.6
30	640.7	665.5
20	640.2	665.2
10	639.2	664.8
5	638.3	664.4
3	637.5	664.1

It is emphasized that recurrence intervals are average figures--the average number of years that will elapse 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 in the next week.

Flood profiles— Profiles of the water surface, based primarily on elevations of marks left by floods of July 1938, April 1950, July 1957, March and April 1960, and March 1962, are shown in figures 7-11. Where floodmarks could not be identified, the profiles were constructed on basis of elevations of lower floods and streambeds, and the extent of overflows determined from photographs and reports of local residents. 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. The drop in water surface through bridge openings during future floods may be different from those 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 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 to nearby bench marks.

Additional data— Other information pertaining to floods in the Wheeling quadrangle may 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.

Illinois Division of Waterways, Department Public Works and Buildings, 1961, Report on plan for flood control and drainage development, Des Plaines River.

Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Div. Waterways, Dept. Public Works and Buildings.

Ramey, H. P., 1959, Storm water drainage in the Chicago area: Am. Soc. Civil Engineers Proc., v. 85, no. HY 4, p. 11-37.

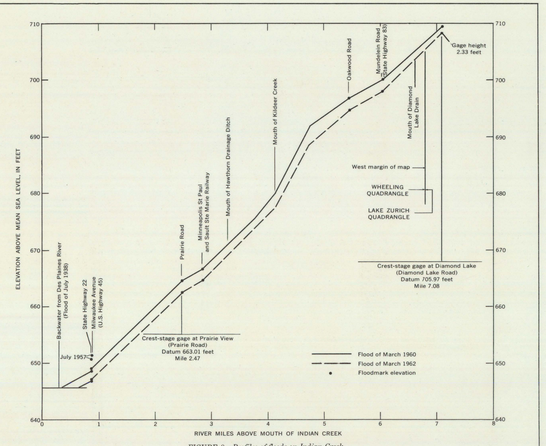


FIGURE 8.—*Profiles of floods on Indian Creek*

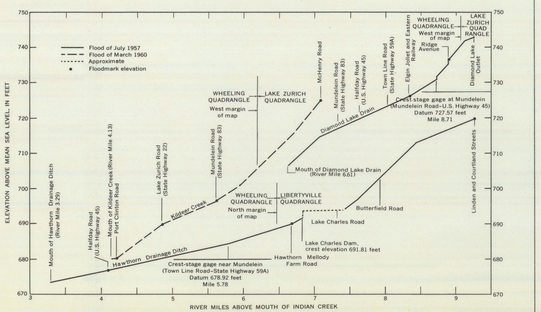


FIGURE 9.—*Profiles of floods on Hawthorn Drainage Ditch, Kildeer Creek, and Diamond Lake Drain*

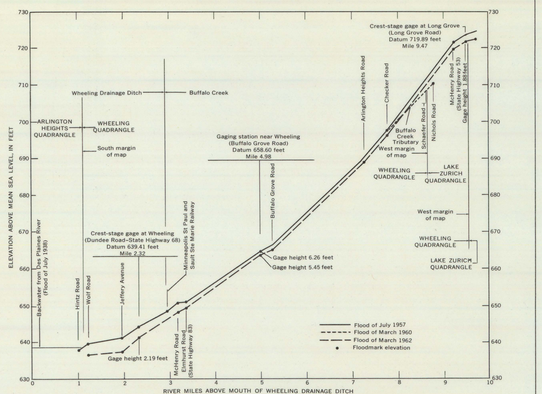


FIGURE 10.—*Profiles of floods on Wheeling Drainage Ditch, Buffalo Creek, and Buffalo Creek tributary*

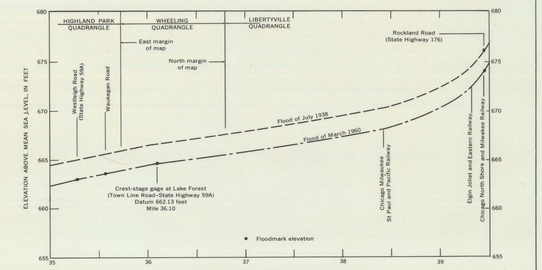


FIGURE 11.—*Profiles of floods on North Branch Chicago River*

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