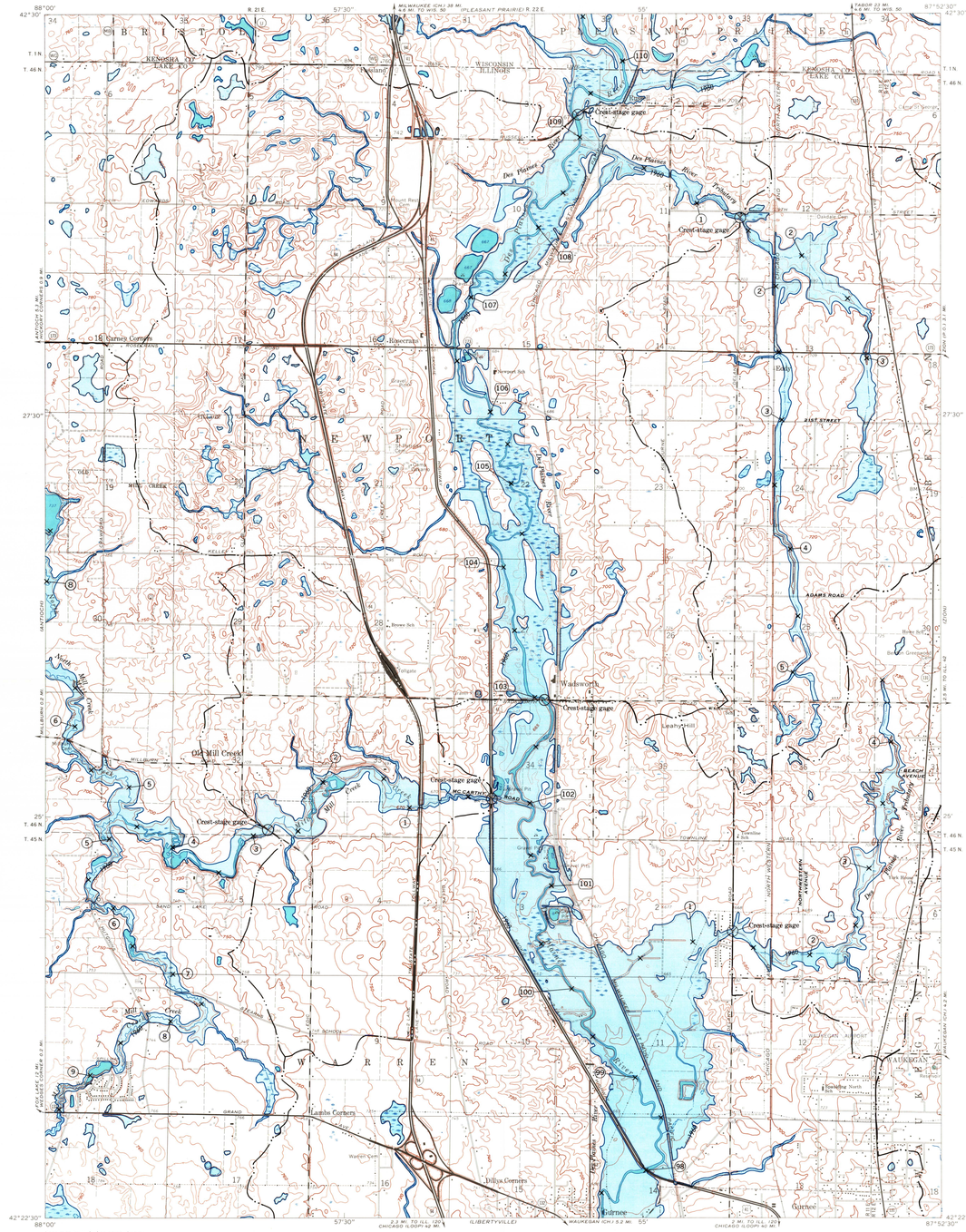
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION

HYDROLOGIC INVESTIGATIONS
ATLAS HA-144



Base map by U.S. Geological Survey

EXPLANATION

Area flooded 1960

Boundary of 1960 flood — 1960

Drainage divide

River mile measured along stream channel (98)

SCALE 1:24 000

1 MILE

1 KILOMETER

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

APPROXIMATE MEAN DECLINATION, 1964

QUADRANGLE LOCATION

FLOODS IN WADSWORTH QUADRANGLE ILLINOIS-WISCONSIN

This report presents data about the depth and frequency of flooding that affect 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.

The approximate areas inundated by floods along streams in the Wadsworth 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1.

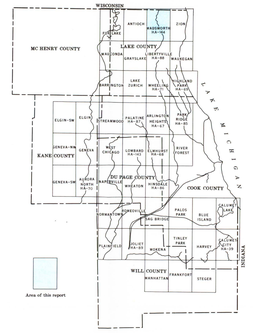


FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles included in the flood-hazard mapping program.*

Inundated areas are shown for the floods of March-April 1960 along Des Plaines River, Mill Creek, North Mill Creek, and unnamed tributaries of Des Plaines River.

The general procedure followed in defining flood limits was to develop flood profiles from elevations of floodmarks identified in the field. The horizontal extent of flooding delineated on the topographic map was derived from the profiles by interpolation between contours (lines of equal elevation) and by plotting overflow limits established by field investigations and surveys. The location of flood limits shown on the map are only approximate because the map scale is small (1 inch = 2,000 feet) and the contour interval is relatively large (5 feet and 10 feet).

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 provide a record of historic facts that reflect channel conditions existing when the floods occurred. No attempt is made to appraise the effect of 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 after the floods occurred. Protective works built after the flood of 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 Wadsworth 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.

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 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 whereby flood maps will be prepared for the 7 1/2-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. Financial support for the preparation of this report was provided by Lake 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 report was 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.

Acknowledgment is made to the following agencies that 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 Highway Department; and the Corps of Engineers, U.S. Army. The Division of Waterways also furnished 2-foot-interval contour maps along Des Plaines River.

Additional data were obtained from officials of municipalities 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 on the map are in feet above mean sea level. Gage heights for crest-stage gages located in the Wadsworth 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 at each station also is shown in the table. Drainage divides are shown on the map.

Crest-stage gage	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Des Plaines River:		
At Russell (Russell Road)	666.29	124
At Wadsworth (Wadsworth Road)	662.16	146
Mill Creek:		
At Old Mill Creek (Edie Road)	676.85	58.1
At Wadsworth (Skokie Highway)	662.06	62.4
Des Plaines River tributary near Russell (Delaney Road)	678.12	7.08
Des Plaines River tributary near Gurnee (Delaney Road)	664.24	3.53

Gage height and year of occurrence of each annual flood (highest peak discharge in each calendar year) above 658-foot elevation at the crest-stage gage on Des Plaines River near Gurnee during the period 1946-62 are shown in figure 2. The Gurnee crest-stage gage is located at Belvidere Road, about 2 miles south of the Wadsworth quadrangle, and at mile 94.2. The irregular occurrence of floods is evident (fig. 2).

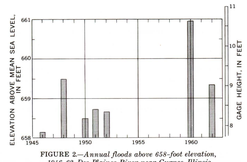


FIGURE 2.—*Annual floods above 658-foot elevation, 1946-62, Des Plaines River near Gurnee, Illinois.*

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 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 a stream is affected by variable backwater, the peak discharge may not coincide with maximum stage.

Flood frequency —Frequency of floods at the Geological Survey crest-stage gage on Des Plaines River at Wadsworth was derived from streamflow records at this station combined with records at 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 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 curve shown in figure 4 is based on channel conditions existing in 1963. 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.

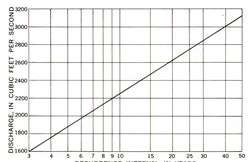


FIGURE 3.—*Frequency of flood discharges on Des Plaines River at Wadsworth (Wadsworth Road).*

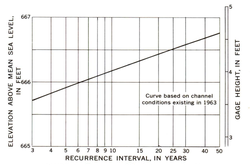


FIGURE 4.—*Frequency of flood stages on Des Plaines River at Wadsworth (Wadsworth Road).*

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 the crest-stage gage on Des Plaines River at Wadsworth (fig. 4) is tabulated below:

Recurrence interval (years)	Elevation above mean sea level (feet)
50	666.8
25	666.5
10	666.2
5	665.9
3	665.7

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 March-April 1960 and March 1962 are shown in figures 5-7. Where floodmarks could not be identified, the profiles were constructed on the basis of elevations of lower floods and streambeds, and on the basis of flood crests 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 that shown on the profiles. An increase in channel capacity through a bridge opening would reduce the flood height on the upstream side; conversely, 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 elevations indicated by the profiles in figures 5-7. The approximate ground elevation can be determined from information indicated by contours on the map, although more accurate elevations may be obtained by leveling to nearby bench marks.

Additional data —Other information pertaining to floods in the Wadsworth 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, p. 107-200.
Illinois Department of Public Works and Buildings, Division of Waterways, 1961, Report on plan for flood control and drainage development, Des Plaines River, 143 p.
Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. Public Works and Bldgs., Div. of Waterways, 386 p.

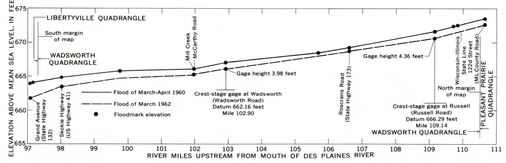


FIGURE 5.—*Profiles of floods on Des Plaines River.*

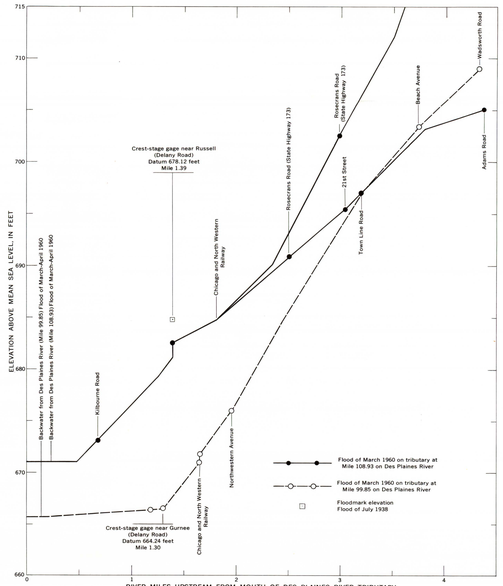


FIGURE 6.—*Profiles of floods on Des Plaines River tributaries.*

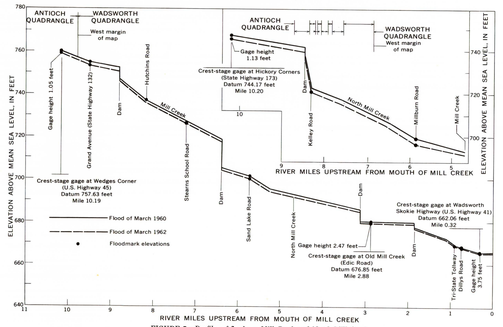


FIGURE 7.—*Profiles of floods on Mill Creek and North Mill Creek.*

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1964—W 64232

FLOODS IN WADSWORTH QUADRANGLE, ILLINOIS-WISCONSIN

By
Allen W. Noehre

1964

HYDROLOGIC INVESTIGATION
ATLAS HA-144