

FLOODS IN SAG BRIDGE QUADRANGLE
NORTHEASTERN ILLINOIS

This report presents data about the depth and frequency of flooding that affect the economic development of flood plains. The report is intended to be used as a planning tool and the data contained herein provide a technical basis for making sound decisions concerning the use of flood-plain lands. No recommendations or suggestions for land-use regulations are made and no solution of existing flood problems are proposed.

The approximate areas inundated by floods along streams in the Sag Bridge 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle is located as shown in figure 1. Inundated areas are shown along Long Run, Convent Creek, School Gully, Chicago Sanitary and Ship Canal, Illinois and Michigan Canal, and Calumet Sag Channel for the flood of October 1954; along Des Plaines River for the flood of July 1957; and along Flag Creek, Sawmill Creek and Wards Creek for the flood of September 1961.

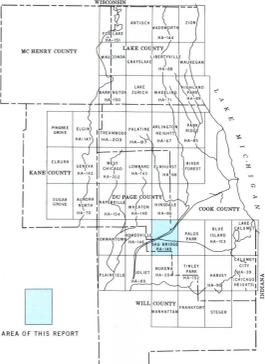


FIGURE 1.—Index map of northeastern Illinois showing location of quadrangles included in the flood-hazard mapping program.

The general procedure used in defining flood limits was first to define flood limits on the basis of elevations of floodmarks identified in the field. Then the extent of flooding was delineated on the topographic map on basis of the profiles by interpolation between contours (lines of equal ground elevation) and by plotting overflow limits established by field investigations and surveys. The flood limits shown on the map are approximate because the map scale is small (1 inch = 2,000 feet) and the contour interval is relatively large (5 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 reflect channel conditions existing when the floods occurred. No appraisals are made of the effect of changes in channel conditions, or waterway openings at highways and railroads, or possible changes in runoff characteristics of the streams caused by increased urbanization after the floods occurred. Protective works built after the floods of 1954, 1957, and 1961 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 Sag Bridge quadrangle where surface water accumulates. 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 to some extent upon the rates of precipitation and seepage into the ground. Flood limits are shown for many such areas but there may have been other flooded areas that were not detected in this investigation.

Flood limits are not defined for areas that were 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. The program includes parts of Cook, Kane, McHenry, and Will Counties, and all of De Wago 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 the County of Cook, 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 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 data on which this report is based: the State of Illinois, Department of Public Works and Buildings, Division of Waterways; the Department of Highways of Cook County; and the Metropolitan Sanitary District of Greater Chicago.

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 gaging stations and crest-stage gages in the Sag Bridge 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 at each station also is shown in the table and the subbasin drainage divides from which the areas were determined are shown on the flood map.

Gaging station	Type of gage	Datum of gage (feet above mean sea level)	Drainage area (square miles)
Flag Creek near Willow Springs (German Church Road)	K	650.00	16.2
Wards Creek near Woodridge (U.S. Highway 66)	C	695.30	3.15
Sawmill Creek tributary near Thornville (U.S. Highway 66)	C	676.54	2.34
Sawmill Creek near Lemont (Rocky Glen Road)	C	641.22	13.3
Long Run			
Near Highland Park (Will-Cook Road)	R	681.62	3.34
Near Sag Bridge (Parker Road)	C	665.05	2.42
Near Lemont (State Street)	R	637.10	20.8

K, Water-stage recorder; C, Crest-stage gage; R, At datum gage; ft after June 30, 1964.

Gage height and year of occurrence of each annual flood (highest peak discharge in each calendar year) above 644-foot elevation at the gaging station on Long Run near Lemont during the period 1952-64 are shown in figure 2 which provides the history of floods recorded at the Lemont gaging station and demonstrates the irregular occurrence of flood events. A histogram of floods on other nearby streams would be similar to that for Long Run although the relative magnitudes of particular floods may be different.

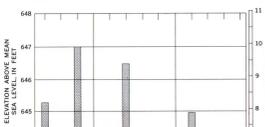


FIGURE 2.—Annual floods above 644-foot elevation, 1952-64, Long Run near Lemont (State Street).

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 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 time of the maximum discharge may not coincide with that of the maximum stage.

Flood frequency—Frequency of floods at the Geological Survey gaging stations on Long Run near Lemont and on Flag Creek near Willow Springs was derived from streamflow records of these stations combined with records of nearby stations and with the regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The general relations between frequency and discharge are shown in figures 3 and 4 and the general relations between frequency and stage are 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 stage-frequency curve for Long Run (fig. 5) is based on channel conditions existing in 1964. The stage-frequency curve for Flag Creek (fig. 6) is based on channel conditions existing prior to April 1963 at which time new bridge construction and other improvements were initiated. After the channel work is completed and additional records of streamflow are obtained, a different stage-frequency curve probably will be defined. Extrapolation of the curves beyond the limits shown is not recommended.

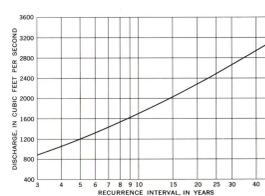


FIGURE 3.—Frequency of flood discharges on Long Run near Lemont (State Street).

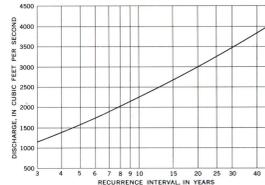


FIGURE 4.—Frequency of flood discharges on Flag Creek near Willow Springs (German Church Road).

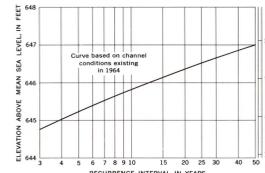


FIGURE 5.—Frequency of flood stages on Long Run near Lemont (State Street).

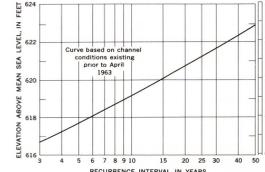


FIGURE 6.—Frequency of flood stages on Flag Creek near Willow Springs (German Church Road).

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 (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 stations on Long Run near Lemont (fig. 5) and Flag Creek near Willow Springs (fig. 6) is tabulated below:

Recurrence interval (years)	Long Run near Lemont (State Street)	Flag Creek near Willow Springs (German Church Road)
50	647.0	622.9
100	646.9	622.4
200	646.7	621.7
300	646.4	620.7
400	645.8	619.1
500	645.3	617.7
600	644.8	616.7

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 October 1954, July 1957, April 1960, and September 1961 are shown in figures 7-10. Where floodmarks could not be identified, the profiles were constructed on the basis of elevations of lower floods and streambeds, and of 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 elevation at the same point indicated by the profiles in figures 7-10. The approximate ground elevation can be determined from contours on the map, although more nearly accurate elevations may be obtained by leveling to nearby bench marks.

Additional data—Other information pertaining to floods in the Sag Bridge 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, 1951, Survey Report for flood control, Illinois and Michigan Canal and tributaries, 68 p.
- Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. Public Works and Bldgs., Div. of Waterways, 386 p.

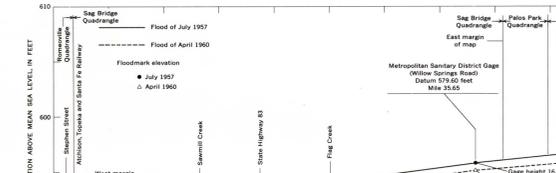


FIGURE 7.—Profiles of floods on Des Plaines River.

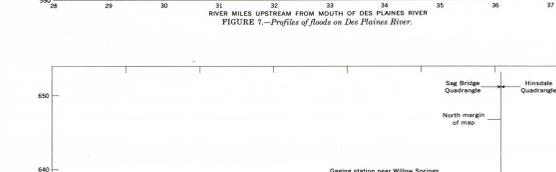


FIGURE 8.—Profiles of floods on Flag Creek.



FIGURE 9.—Profiles of floods on Sawmill Creek.

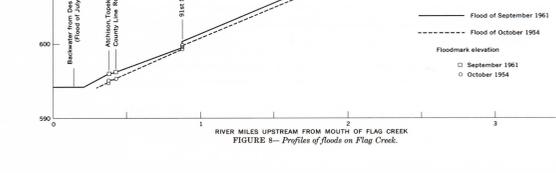
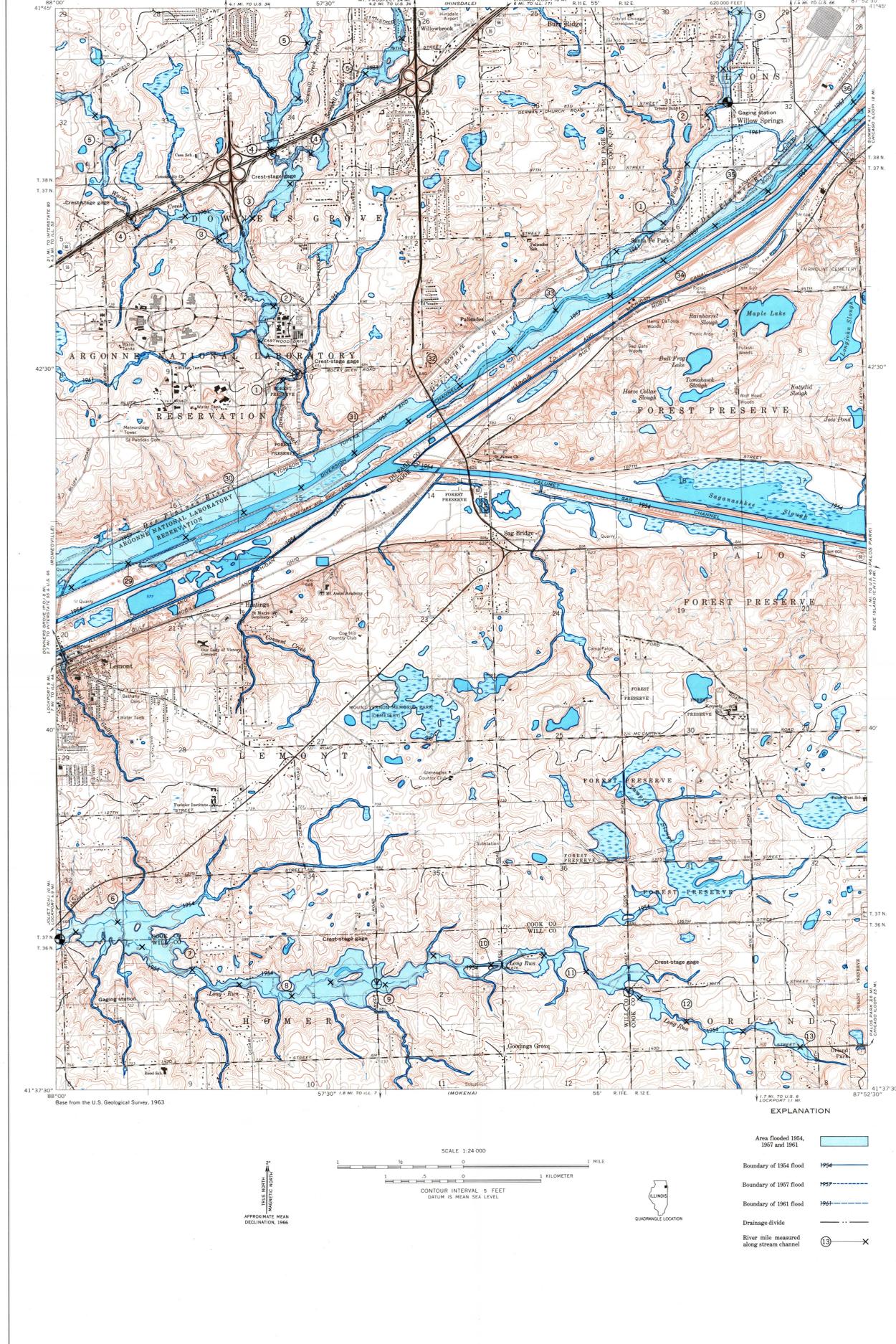


FIGURE 10.—Profiles of flood on Long Run.



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