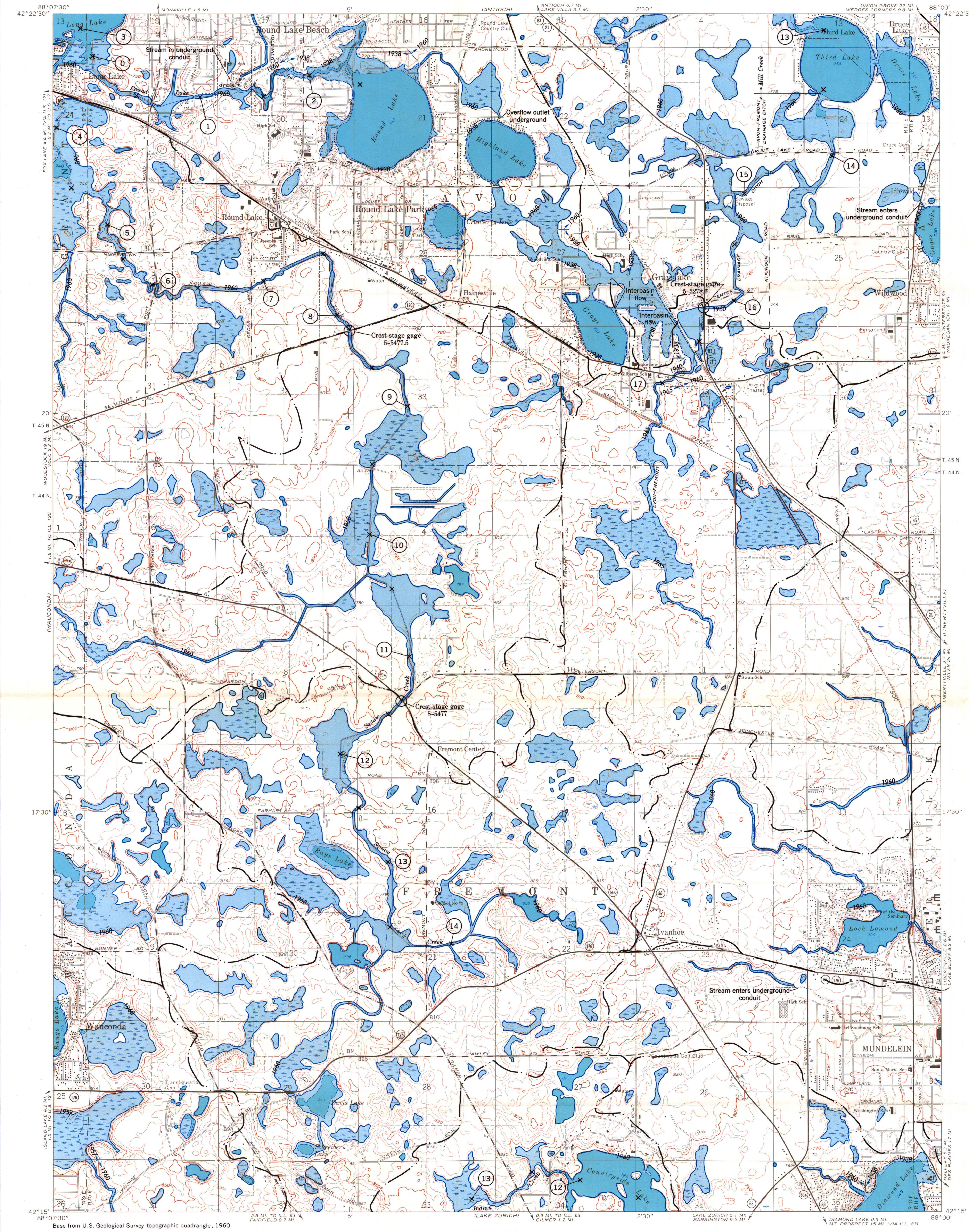
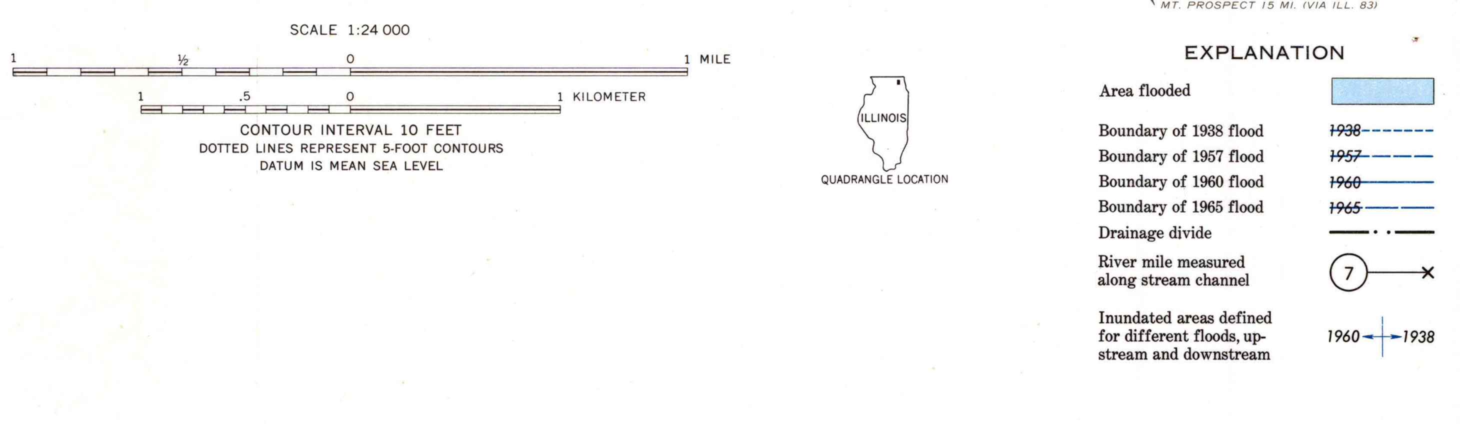
PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION






# FLOODS IN GRAYSLAKE QUADRANGLE, NORTHEASTERN ILLINOIS

This report presents hydrologic data concerning the extent and depth of flooding that are useful for an appraisal of the hazards involved in occupancy and development of flood plains in the Grayslake quadrangle. It will aid individuals, government agencies, and others responsible for solving existing flood problems and for formulating effective flood-plain regulations that would minimize the creation of new flood problems. The report will be useful for preparing building and zoning regulations, locating waste disposal facilities, purchasing unoccupied land, developing recreational areas, and managing surface water in relation to the ground-water resources.

The areas inundated by specific floods along streams in the Grayslake quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown for the July 1938 flood along Round Lake drain upstream from mile 1.82, around Round Lake, Highland Lake, Diamond Lake, and Grays Lake; for the flood of March-April 1960 along Round Lake drain downstream from mile 1.82, Squaw Creek, Mill Creek, and Avon-Fremont drainage ditch downstream from State Highway 120, and along many other small streams and lakes in the area; for the July 1957 flood around Gages Lake, Bangs Lake, and a large swamp in the southwestern corner of the map; and for the April 1965 flood on the Avon-Fremont drainage ditch upstream from State Highway 120.

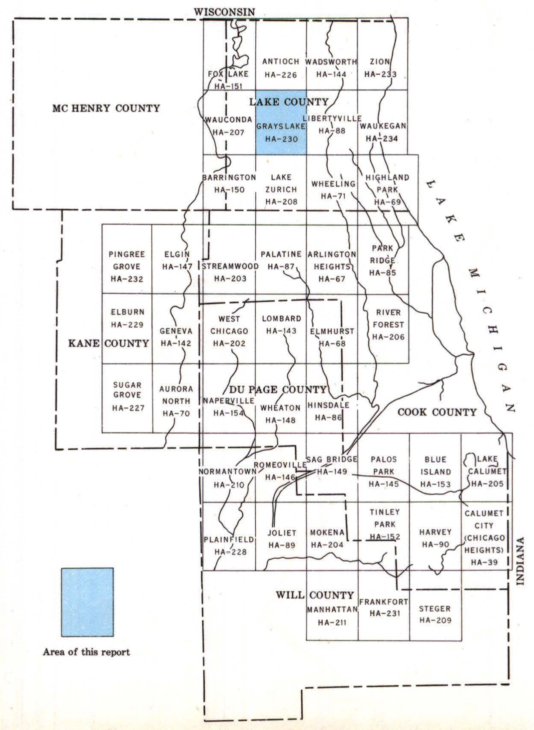



FIGURE 1.—*Index map of northeastern Illinois showing location of quadrangles in the flood-hazard mapping program.*

According to reports of local residents, the July 1938 flood was at least 2 feet deeper than the March-April 1960 flood on Squaw Creek, Round Lake drain, and Avon-Fremont drainage ditch upstream from Druce Lake Road.

Greater floods than those whose boundaries are 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 highways 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 of future floods 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.

In general, the procedure used in defining flood boundaries was to construct flood profiles from elevations of floodmarks identified in the field and from existing data available from other agencies. The flood profiles were used to delineate the extent of flooding on the topographic base map by interpolation between contours (lines of equal ground elevations). Overflow boundaries identified during field investigations and surveys were used to supplement data from the profiles. The portrayal of flood boundaries is consistent with the scale of the map (1 inch = 2,000 feet; contour interval, 10 feet, with supplemental 5-foot contours).

There are depressions and lowland areas in the Grayslake quadrangle where surface water accumulates because of inadequate surface drainage to streams. Depth of flooding in these areas is 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 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 7½-minute quadrangles shown in figure 1. The program includes part 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 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.

This report was prepared by the U.S. Geological Survey under the administrative direction of William D. Mitchell, district chief, and under the immediate supervision of Davis W. Ellis, engineer-in-charge of the project.

Acknowledgment is made to the Lake County Highway Department for supplying some of the data on which this report is based.

Additional data were obtained from public officials 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 at gages in the Grayslake 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 size of drainage basin for each station is also shown in the table. The subbasin divides from which the areas were determined are shown on the flood map.

| Crest-stage gage | Station number | Datum of gage above mean sea level (feet) | Drainage area (square miles) |
|---|---|---|---|
| Avon-Fremont drainage ditch (State Highway 83) ----- | 5-5278.6 | 773.03 | 4.73 |
| Squaw Creek: | | | |
| At Fremont Center (State Highway 59A) -------- | 5-5477 | 781.22 | 9.40 |
| At Round Lake Park (State Highway 120) -------- | 5-5477.5 | 767.34 | 17.8 |

Gage height and year of occurrence of each annual flood (highest peak stage in each calendar year) at the gaging station, Nippersink Lake at Fox Lake, Ill., during the period 1938, 1940-65 are shown in figure 2. The gaging station at Fox Lake is located 300 feet upstream from the Chicago, Milwaukee, St. Paul & Pacific Railroad in the village of Fox Lake, 3½ miles northwest of Grayslake quadrangle. This histogram shows the history of floods recorded at the Nippersink Lake gaging station and also portrays the irregular occurrence of flood events. The maximum and minimum daily mean water levels for each calendar year, 1940-65, at the Nippersink Lake gage are shown in figure 3.

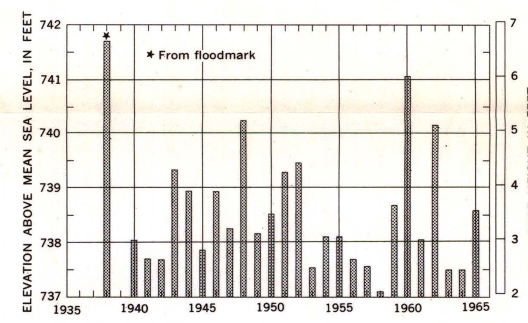



FIGURE 2.—*Annual peaks, 1938, 1940-65, Nippersink Lake at Fox Lake.*

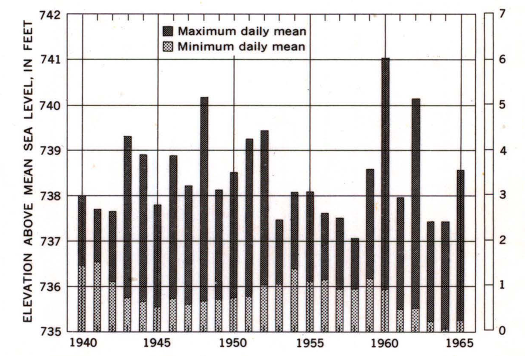



FIGURE 3.—*Maximum and minimum daily mean water levels of Nippersink Lake at Fox Lake, for each calendar year, 1940-65.*

*Lake elevations.*—There are many natural lakes throughout the Grayslake quadrangle. Although outlets for controlling the water level have been constructed on some of these lakes, the observed ranges in stage are generally less than 4 feet. During this investigation the water-surface elevation was determined for most of the larger lakes and a previous higher stage was determined for those lakes where sufficient information could be obtained. Listed in the following table are the elevations that were determined:

| Lake | Elevation of water surface in feet above mean sea level | | | |
|---|---|---|---|---|
| | Observed stage | | Previous stage | |
| | Date (1965) | Elevation | Date | Elevation |
| Bangs Lake | Apr. 28 | 774.2 | July 1938<br>July 1957 | 775.9<br>775.1 |
| Countryside Lake | Apr. 23 | 784.9 | Mar. 1960 | 785.4 |
| Cranberry Lake | Sept. 15 | 792.7 | - - | - - |
| Diamond Lake | Apr. 21 | 740.8 | July 1938 | 743.6 |
| Druce Lake | Sept. 15 | 765.0 | Apr. 1960 | 768.3 |
| Gages Lake | Sept. 15 | 779.1 | July 1957<br>Apr. 1960 | 780.8<br>780.4 |
| Grays Lake | Nov. 15 | 787.8 | July 1938<br>Apr. 1960 | 789.0<br>788.7 |
| Highland Lake | Sept. 15 | 779.2 | July 1938 | 781.6 |
| Loch Lomond | Nov. 4 | 739.5 | - - | - - |
| Long Lake | Sept. 16 | 739.0 | Apr. 1960 | 741.7 |
| Round Lake | Nov. 5 | 762.6 | July 1938 | 766.2 |
| Third Lake | July 26 | 763.5 | July 1938 | 767.3 |

*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 debris or an ice jam may cause a high stage during a period of relatively low discharge.

*Flood profiles.*—Profiles of the water surface, based primarily on elevations of marks left by the floods of July 1938, March-April 1960, March 1962, April 1965, and July 1965 are shown in figures 4-6. Where floodmarks could not be obtained, the profiles were constructed on the basis of flood crests determined from photographs and from reports of local residents, and on the basis of elevations of streambeds and lower flood stages. 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 the downstream sides of bridges that produce channel constrictions. 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. 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 4-6. The approximate ground elevation can be determined from contours on the map; however, more nearly accurate elevations can be obtained by leveling from nearby bench marks.

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

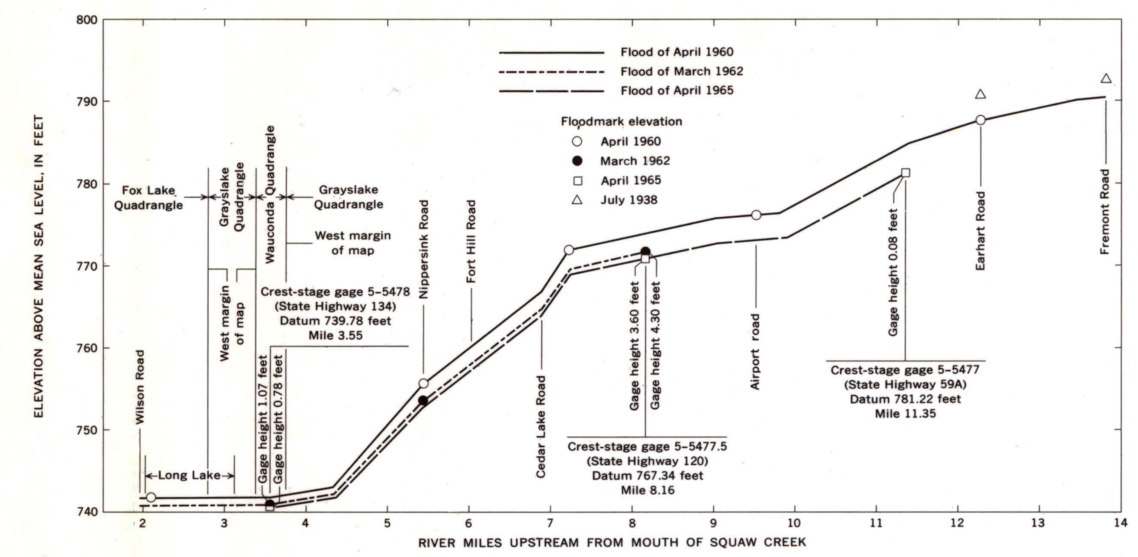



FIGURE 4.—*Profiles of floods on Squaw Creek.*

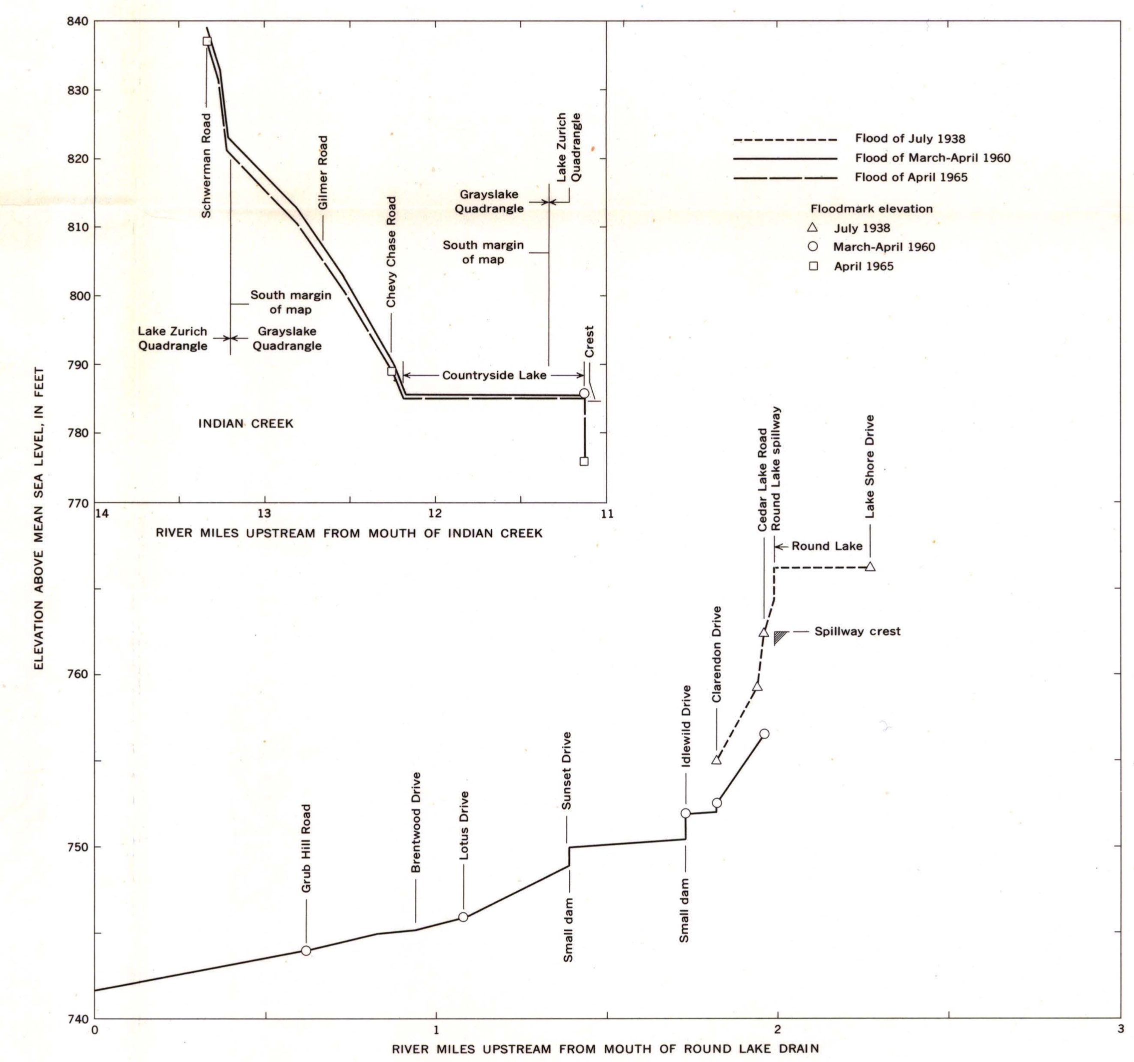



FIGURE 5.—*Profiles of floods on Round Lake drain and Indian Creek.*

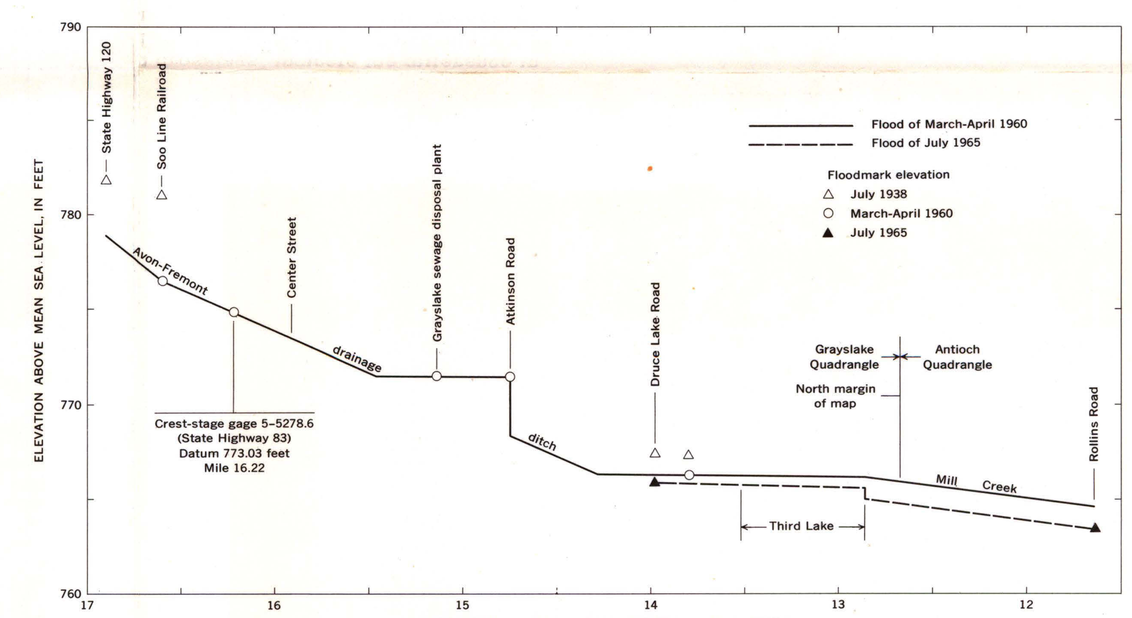



FIGURE 6.—*Profiles of floods on Mill Creek and Avon-Fremont drainage ditch.*

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