UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FLOOD OF AUGUST 2, 1972, IN THE LITTLE MAQUOKETA RIVER BASIN, DUBUQUE COUNTY, IOWA

By

Albert J. Heinitz, Hydrologist
United States Geological Survey

Prepared in cooperation with the

IOWA STATE HIGHWAY COMMISSION

Open-file Report
73-d

Iowa City, Iowa
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ABSTRACT

Flood peaks with magnitudes from 2 to 3 times the 50-year flood occurred on streams in the Little Maquoketa River basin for the flood of August 2, 1972. Up to nine inches of rain fell in the headwater of the Middle Fork tributary with six to seven inches occurring over most of the Little Maquoketa River basin. The flood peak elevation at the gaging station near Durango exceeded the 1925 flood of record by 1.7 feet. Flood damages were extensive to crops, roads, and bridges. Many of the homes in Durango, Daytonville, and Sageville were inundated to some extent and were evacuated. Flood damages were estimated to be over one million dollars. No loss of life or personal injuries were sustained.

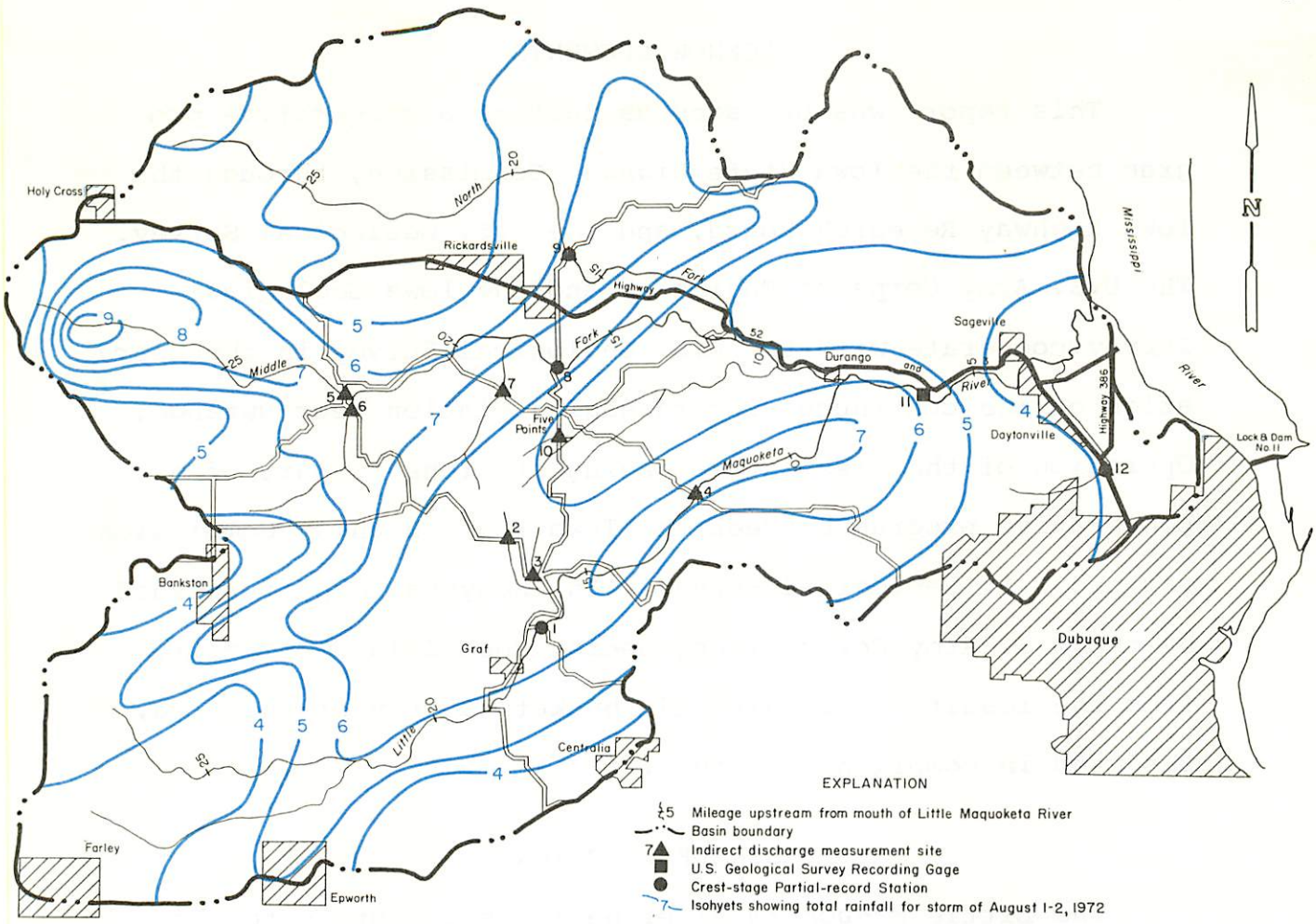
Flood-peak discharges at 12 sites, basin rainfall, a description of the 1972 flood, brief accounts of other major floods in the basin, maximum flood peaks in northeastern Iowa, selected flood-frequency data, and annual floods of record at 5 sites are given.

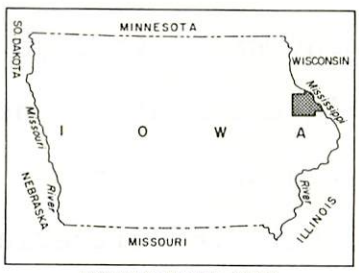
INTRODUCTION

The greatest flood of record in the Little Maquoketa River basin occurred on August 2, 1972, as a result of a storm system that dropped from 4 to 9 inches of rain over the area. The Middle Fork Little Maquoketa River received the greatest amount of rainfall with from 6 to 7 inches over most of the basin and up to 9 inches in the headwater. A map of the basin with isohyetal data is shown in figure 1.

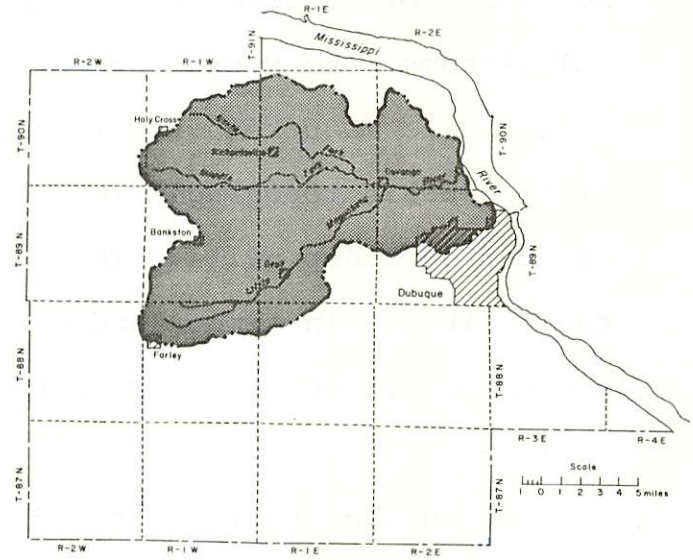
The purpose of this report is to document the August 2, 1972, flood for future hydrologic planning within the state. Peak flood discharges were determined at 12 sites in the basin. A secondary purpose is to include available data on all floods in the basin for comparative purposes and for ready reference. This report presents storm and flood descriptions, description and location of gaging stations, peak stages and discharges, stage and discharge hydrographs for the gaging station near Durango, and flood-frequency curves for selected stations.

The gaging stations listed in this report are numbered and listed in the downstream order used in the Water-Supply Papers of the U.S. Geological Survey. For example, 5-4145 is the permanently assigned number to the gaging station on the Little Maquoketa River near Durango. For identification and cross-reference in this report, all gaging stations and flood determination sites have been assigned a site number. These numbers are also in a downstream order. Station 5-4145 has the site number 11.





LOCATION OF DUBUQUE COUNTY



LOCATION OF LITTLE MAQUOKETA RIVER BASIN IN DUBUQUE COUNTY

Isohyets supplied by Corps of Engineers

Figure 1. Map of Little Maquoketa River basin showing location of flood-measurement sites and isohyetal data.

ACKNOWLEDGMENTS

This report was prepared as part of a cooperative program between the Iowa State Highway Commission, through the Iowa Highway Research Board, and the U.S. Geological Survey. The U.S. Army Corps of Engineers and the Iowa Geological Survey cooperate with the U.S. Geological Survey in the operation of the continuous-record gaging station near Durango. Operation of the crest-stage gaging stations is part of a cooperative program between the Iowa State Highway Commission and the U.S. Geological Survey. An isohyetal map, furnished by the U.S. Army Corps of Engineers, Rock Island District, from the results of a rainfall "bucket" survey of the area, was used in compiling figure 1.

BASIN DESCRIPTION

The Little Maquoketa River basin is tributary to the Mississippi River in northeastern Iowa and lies just to the northwest of Dubuque, Iowa. The basin contains three principal streams, the North Fork Little Maquoketa River, the Middle Fork Little Maquoketa River, and the main stem Little Maquoketa River. Basin topography is rugged, with many small valleys bounded by steep hills. The lowlands are in cultivation and the hills are in timber and pasture. The region is very scenic and is sometimes referred to as the "Little Switzerland" of Iowa.

Towns that suffered flood damages include Durango, Dayton-ville, and Sageville, all in the lower reaches of the main stem.

FLOOD HISTORY

Floods on the Little Maquoketa River have been well documented since the establishment of a gaging station near Durango in 1934. The only other flood data recorded in the Little Maquoketa River basin prior to 1934 was the outstanding flood of 1925 which was documented by the U.S. Army Corps of Engineers.

Climatological data reports of the U.S. Weather Bureau mention three great storms that occurred in the Dubuque area, in 1876, 1918, and 1919. Very brief descriptions of these storms and subsequent storms in 1925, 1937, and 1947 follow.

Storm of 1876: One of the largest storms recorded in the area occurred on July 4, 1876, when 40 persons were drowned at Rockdale on the outskirts of Dubuque. Rainfall of 4.55 inches in two hours and five minutes was recorded at Dubuque.

Storm of 1918: On August 16-17, 1918, rainfall of 5.22 inches in 24 hours was recorded. Of this, 2.48 inches fell in one hour and 18 minutes. A flood peak discharge of 28,000 cubic feet per second (cfs) was computed for Catfish Creek, about 2 miles south of Dubuque, by the U.S. Geological Survey. This flood peak is shown in figure 2.

Storm of 1919: A storm on July 9, 1919, caused the deaths of seven people. This was the result of 3.81 inches of rain in 4 hours. Great damage was done to streets in all portions of the city lying below the bluffs. The U.S. Geological Survey made a computation of discharge on the Little Maquoketa River tributary at Dubuque. This is the same stream on which crest-

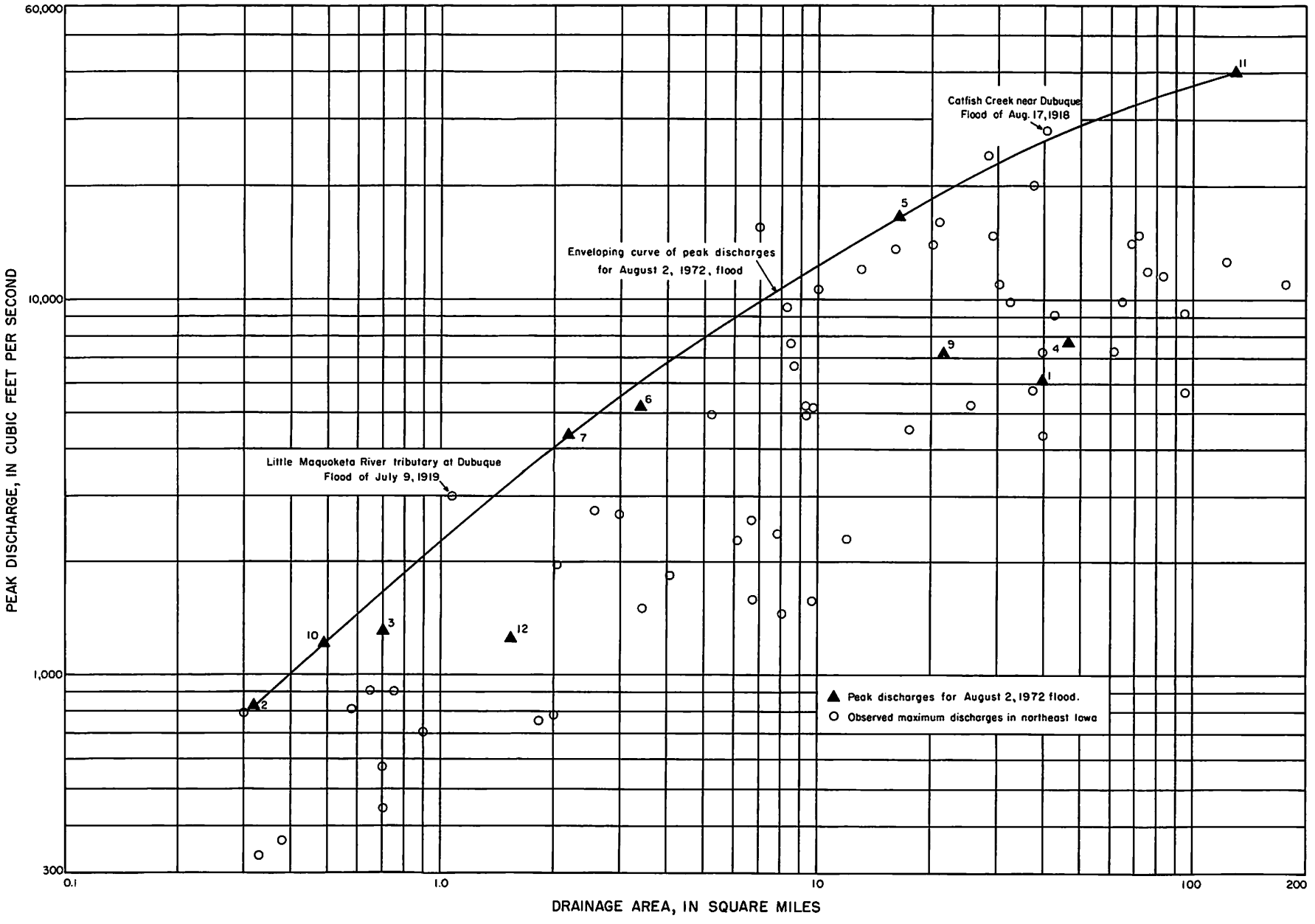


Figure 2. Maximum flood peaks in northeast Iowa.

stage gage 5-4146 is located; however, the discharge computation of 3,000 cfs was made for a site 1/4 mile upstream from the gage with a drainage area of 1.07 square miles. The flood peak is shown in figure 2.

Storm of 1925: Rainfall for the month of June at Dubuque was 10.80 inches with most of this resulting from four heavy rainstorms between June 11 to 24. The greatest of these storms occurred on the night of June 14-15 when 3.15 inches of rain fell between 10 pm and 4 am. A discharge of 29,000 cfs for the Little Maquoketa River near Durango was computed by the U.S. Army Corps of Engineers by an indirect measurement. On the Sageville road, this flood was reported to be 0.4 foot higher than the previous record made in July 1919.

Storm of 1937: Rainfall totaling 2.32 inches at Dubuque and 3.32 inches at Lock and Dam No. 11 on the Mississippi River was recorded on June 20. This had been preceded by over two inches of rain during the previous week. The flood on the Little Maquoketa River near Durango produced by this storm was the fifth greatest recorded.

Storm of 1947: The outstanding features of the rains that produced the great floods of June 1947 were their wide areal extent, long duration, and large accumulated monthly totals over the entire state. Rainfall for the month averaged 10.39 inches for the state. This was the greatest total in the history of the state and exceeded the previous high by over two inches. The rains came in heavy downpours on the 1st, 4th-5th, and 12th-13th. Rainfall at Dubuque on the 12th-13th was 3.89

inches in a 24-hour period. This produced the fourth largest flood recorded on the Little Maquoketa River. Total rainfall at Dubuque for the month was 10.45 inches.

FLOOD OF AUGUST 2, 1972

Description

The only official rainfall gage in the area is located at Lock and Dam No. 11 on the Mississippi River at Dubuque. The rainfall recorded there was 0.36 inch August 1, and 5.27 inches August 2, 1972. Residents throughout the area recorded rainfall amounts generally in the range of 6 to 7 inches and indicated that much of this occurred during a cloudburst around midnight of August 1. Peak flood discharges occurred in the early morning hours of August 2.

Flood inundation was particularly severe on the Middle Fork Little Maquoketa River and on the Little Maquoketa River downstream from the Middle Fork. Flood peaks with magnitudes from 2 to 3 times the 50-year flood were experienced on these streams. Figure 2 shows that the flood peaks of August 2, 1972, were with very few exceptions the greatest experienced in northeastern Iowa. The magnitude of inundation is clearly illustrated at the gaging station, 1.7 miles east of Durango, where the bridge deck was under 6 feet of water at the crest of the flood and the water virtually extended from valley wall to valley wall.

The peak flood elevation at the gaging station near Durango exceeded the 1925 flood of record by 1.7 feet. One

longtime resident southwest of Rickardsville said the water was the highest in over 40 years that he had lived near the Middle Fork Little Maquoketa River.

Flood damages were estimated to be in excess of one million dollars; damages to farm crops were extensive; streets and roads were washed out; several bridges were destroyed; damages to homes in the lower reaches of the valley were extensive. No loss of life or serious injuries were reported.

Extensive flooding occurred in the three small communities of Daytonville, Sageville, and Durango, all situated on U.S. Highway 52, which follows the Little Maquoketa River northwest from Dubuque.

Peak stages and discharges

Gaging stations in the Little Maquoketa River basin consist of one station (no. 5-4145) where a continuous record of discharge is computed and four crest-stage partial-record stations where flood-peak records are collected on a systematic basis. The gaging station on the Little Maquoketa River near Durango has been in operation since October 1934. Daily discharges are published by the U.S. Geological Survey in annual publications of "Water Resources Data for Iowa." A list of the flood peaks above a selected base is given in the appendix of this report. The four crest-stage gaging stations have been in operation in the basin since 1951. The locations for these gages are shown in figure 1. A complete location description, along with a list of the annual flood peaks, for each gage is given in the appendix.

Flood peak discharges for August 2, 1972, for the gaging station and for two of the crest-stage gages were determined by indirect measurements. Indirect methods of determining peak discharge are based on hydraulic equations which relate the discharge to the water-surface profile and the geometry of the channel. A field survey is made after the flood to determine the location and elevation of highwater marks and the characteristics of the channel. The discharge for the crest-stage gage on the Middle Fork Little Maquoketa River (no. 5-4144) was estimated from an enveloping curve of peak discharge versus drainage area relationship (figure 2). This gage and the bridge at which it was located were destroyed by the August 2 flood. The peak stage was determined from a survey of high-water marks. The peak discharge for the crest-stage gage on the Little Maquoketa River near Graf (no. 5-4143.5) was determined from the stage-discharge rating. Flood peak discharges were determined by indirect measurements for seven other sites in the basin. These sites are also shown in figure 1.

A summary of the flood data for the August 2, 1972, flood is given in table 1.

An enveloping curve of the flood-peak discharges of the 1972 flood in relation to drainage area is shown in figure 2. Selected maximum flood peaks for other streams in northeastern Iowa are shown for a comparison.

Stage and discharge hydrographs for the Little Maquoketa River gaging station (site 11) are shown in figure 3.

Table 1. Summary of flood data for selected sites in the Little Maquoketa River basin

Site No.	Station Number	Stream	Location	Period of flood record	Drainage area (sq. mi.)	Previous Maximum Flood			Flood of August 2, 1972			[a]50-year flood (cfs)
						Date	Gage height (feet)	Discharge (cfs)	Gage height (feet)	Discharge		
										cfs	cfsm	
1	5-4143.5	Little Maquoketa River	SE 1/4 sec. 20 T.89N., R.1E.	1951-72	39.6	7-8-51	15.78	7,220	14.59	6,100	154	9,450
2		Little Maquoketa River Tributary	W 1/2 sec. 17 T.89N., R.1E.		0.32					825	2,580	
3		Little Maquoketa River Tributary	NE 1/4 sec. 20 T.89N., R.1E.		0.71					1,300	1,830	
4		Little Maquoketa River	SW 1/4 sec. 11 T.89N., R.1E.		46.8					7,680	164	9,290
5		Middle Fork Little Maquoketa River	NE 1/4 sec. 2 T.89N., R.1W.		16.4					16,500	1,000	6,290
6		Middle Fork Little Maquoketa R. Trib.	SE 1/4 sec. 2 T.89N., R.1W.		3.42					5,200	1,520	3,710
7		Middle Fork Little Maquoketa R. Trib.	NW 1/4 sec. 5 T.89N., R.1E.		2.20					4,360	1,980	2,680
8	5-4144	Middle Fork Little Maquoketa River	SE 1/4 sec. 32 T.90N., R.1E.	1951-72	30.2	7-8-51	22.46	8,160	[b]27.7	[c]23,000	762	7,770
9	5-4144.5	North Fork Little Maquoketa River	NW 1/4 sec. 28 T.90N., R.1E.	1951-72	21.6	10-30-61	11.43	4,320	14.02	7,180	332	5,840
10		Middle Fork Little Maquoketa R. Trib.	SW 1/4 sec. 4 T.89N., R.1E.		0.49					1,210	2,470	
11	5-4145	Little Maquoketa River	NE 1/4 sec. 5 T.89N., R.2E.	1925, 1935-72	130	6-15-25	[d]22.1	[d]29,000	[e]23.82	40,000	308	[f]28,000
12	5-4146	Little Maquoketa River Tributary	NW 1/4 sec. 11 T.89N., R.2E.	1951-72	1.54	11-1-71	15.31	1,250	15.26	1,240	805	

a Regionalized flood frequency estimate based on drainage area and slope.
b From outside floodmarks.
c Estimated from enveloping curve of figure 2.
d About.
e From outside floodmarks; highwater mark inside gage, 23.13 feet.
f From station curve.

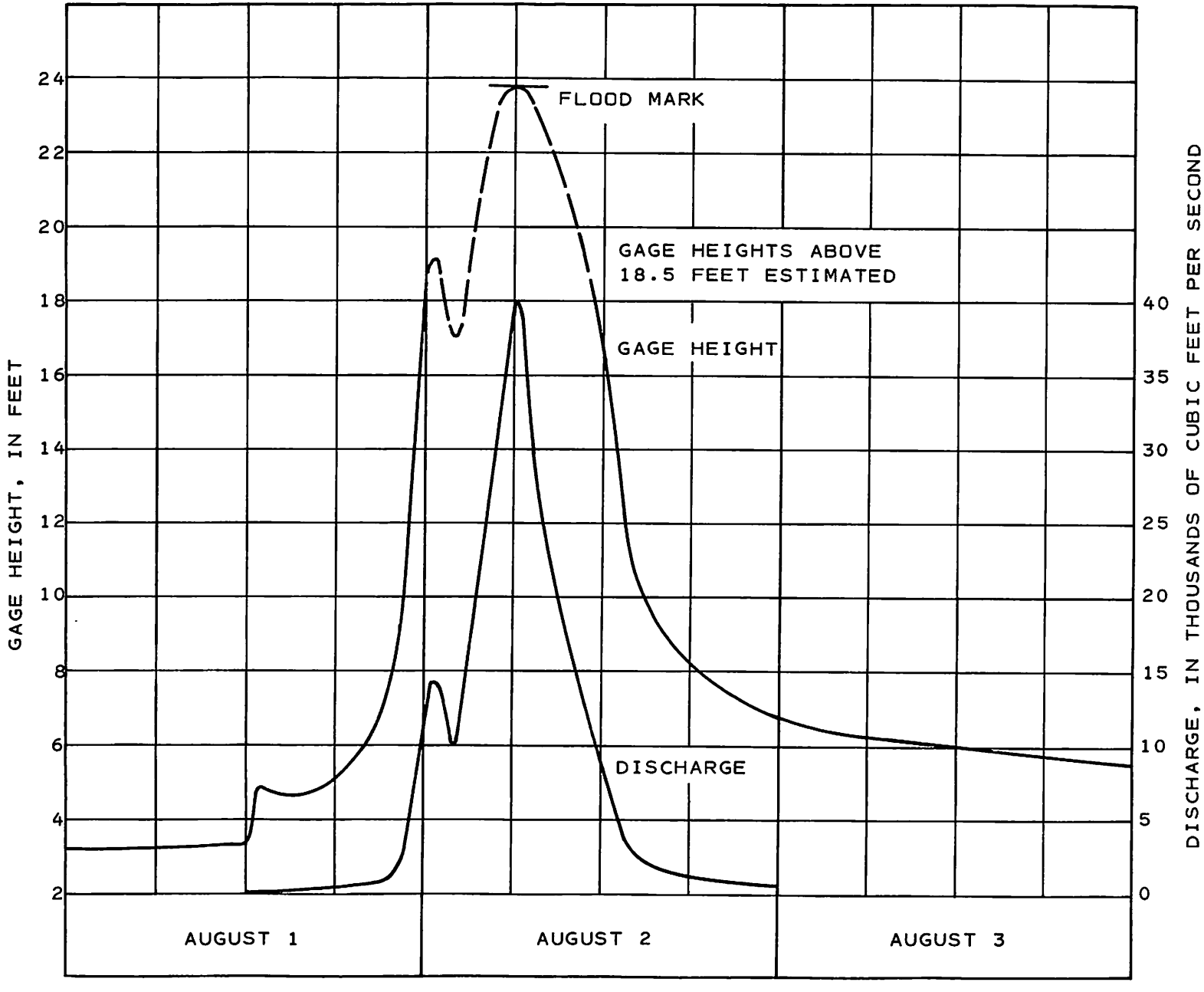


Figure 3. Stage and discharge hydrographs for Little Maquoketa River near Durango, site No.11, August 1-3, 1972.

FLOOD-FREQUENCY

Flood-frequency curves for the gaging station near Durango, no. 5-4145, and for two crest-stage gages, nos. 5-4143.5 and 5-4146, are shown in figure 4. The station curves shown were fitted to the observed peaks using the log-Pearson type III distribution function. Also shown for comparison are the curves for each station computed by using the regional equations developed in recent flood-frequency analyses (Lara, O. G., in preparation). The regional equations relate floods to the size of the drainage area and the slope of the stream.

The regional equations in Lara's report are limited to streams with drainage areas greater than 2 square miles. However, they were used here to investigate comparability of results obtainable from station and regional curves for station no. 5-4146, which has a drainage area of only 1.54 square miles.

For the gaging station near Durango, no. 5-4145, the discharges determined from the station frequency curve are nearly double those computed using regional equations. The difference between the two curves may be due to the physical characteristics of the basin and particularly to the fact that the gaging station is located just downstream from the confluence of the three principal streams that comprise the drainage system of the basin.

The Little Maquoketa River basin seems to illustrate a case where the peak flood discharge below the confluence of

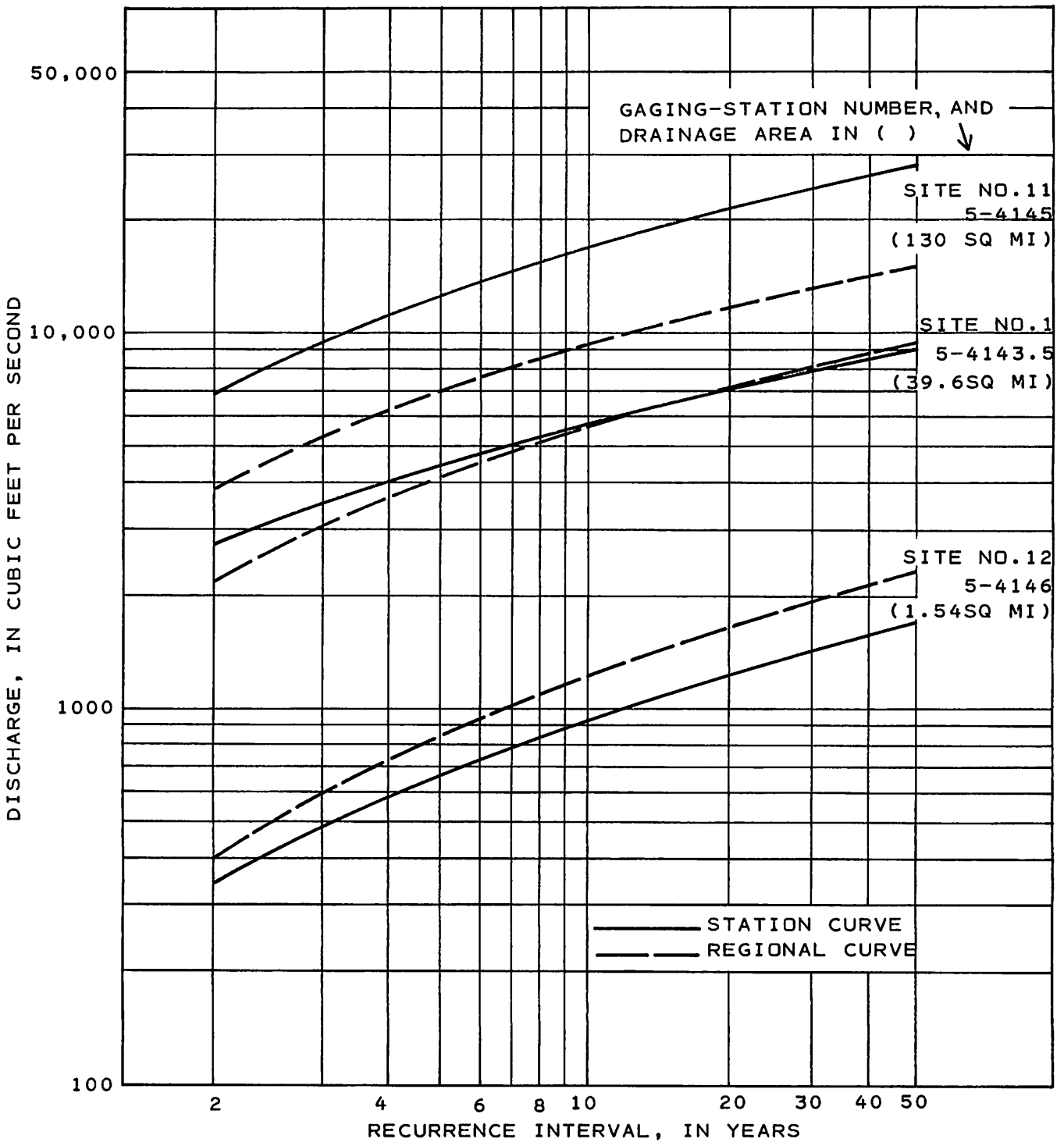


Figure 4. Flood-frequency curves for selected stations in the Little Maquoketa River basin.

principal tributaries is to some degree the accumulation of the peak discharges for the individual streams. This condition and the site experience of 38 years of record would justify using the station curve, rather than the regional curve, for determining the magnitude and probable frequency of flood discharges at the gaging station on the Little Maquoketa River near Durango.

SELECTED REFERENCES

Lara, O. G., in preparation, Floods in Iowa: Technical manual for estimating their magnitude and frequency: Iowa Natural Resources Council.

U.S. Geological Survey, issued annually since 1961, Water Resources data for Iowa--part 1, Surface-water records: Iowa City, Iowa, Water Resources Division.

_____, issued annually to 1960, Surface-water supply of the United States, part 5, Hudson Bay and Upper Mississippi River basin: U.S. Geol. Survey Water-Supply Papers.

U.S. Weather Bureau, issued monthly, Climatological data for Iowa.

APPENDIX

The data which follow are the annual flood peak stages and discharges for the gaging stations in the basin. These include four crest-stage gages and one recording gaging station. Also included for the recording station, no. 5-4145, are the flood peaks above a selected base. The base discharge is selected so that an average of about three peaks a year can be presented.

In the location description of the gaging stations, the terms "right" and "left" are used. These directions are determined as viewed facing in the direction of the flow of the stream.

Peak flood elevations (gage heights) for the gaging stations are measured from the zero of the selected datum for the gage. The datum of the gages is referenced to a permanent benchmark on the bridge. For the gaging station near Durango, the datum is also referenced to mean sea level.

Annual flood peaks are listed by water years; that is, the 12-month period beginning October 1 and ending the following September 30. This period is designated as the year ending September 30. For example, the period October 1, 1965, to September 30, 1966, is the 1966 water year.

Site No. 1

5-4143.5 Little Maquoketa River near Graf, Iowa

Location.--Lat. 42°30'09", long. 90°51'50", in SE 1/4 sec. 20, T.89N., R.01E., on downstream end of right abutment of bridge on county highway, about 300 feet downstream from Illinois Central Railroad bridge, and 0.5 mile northeast of Graf.

Drainage area.--39.6 sq mi.

Gage.--Crest-stage gage.

Stage-discharge relation.--Defined by current-meter measurements below 700 cfs and indirect measurement at 7,220 cfs.

Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1951	July 8, 1951	15.78	7,220
1952	Aug. 20, 1952	9.30	1,850
1953	Feb. 20, 1953	13.41	4,500
1954	May 31, 1954	11.79	3,250
1955	Feb. 19,20,1955	9.26	1,830
1956	July 8, 1956	10.65	2,690
1957	Jan. 21, 1957	8.54	1,520
1958		[a]	
1959	Apr. 1, 1959	13.10	4,590
1960	Jan. 12, 1960	13.93	5,280
1961	Sept. 13, 1961	8.36	1,560
1962	Nov. 2, 1961	13.18	4,660
1963	Mar. 18, 1963	11.43	3,300
1964	Apr. 2, 1964	10.69	2,810
1965	Feb. 28, 1965	8.16	1,300
1966	Feb. 8, 1966	8.17	1,490
1967	Jan. 24, 1967	[b]10.88	[c]1,140

Little Maquoketa River near Graf, Iowa--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1968		a	
1969	June 25, 1969	13.63	5,070
1970	July 30, 1970	9.18	1,950
1971	Feb. 26, 1971	10.09	2,500
1972	Aug. 2, 1972	14.59	6,100

a Peak stage did not reach bottom of gage
b Affected by ice
c About

Site No. 8

5-4144. Middle Fork Little Maquoketa River near Rickardsville, Iowa

Location.--Lat. 42°33'38", long. 90°51'35", in SE 1/4 sec. 32, T.90N., R.01E., on left downstream wingwall of bridge on county highway, 2 miles southeast of Rickardsville.

Drainage area.--30.2 sq mi.

Gage.--Crest-stage gage.

Stage-discharge relation.--Defined by current-meter measurements below 200 cfs and indirect measurement at 8,160 cfs.

Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1951	July 8, 1951	22.46	8,160
1952	Oct. 7, 1951	18.16	2,150
1953	Feb. 20, 1953	17.75	1,900
1954	May 31, 1954	17.87	2,000
1955	Feb. 20, 1955	15.36	760
1956	Dec. 25, 1955	15.12	690
1957	Jan. 21, 1957	15.17	690
1958	Aug. 20, 1958	14.56	540
1959	Apr. 1, 1959	16.89	1,400
1960	Jan. 12, 1960	19.04	2,900
1961	Feb. 18, 1961	16.07	1,020
1962	Oct. 30, 1961	19.13	3,000
1963	Mar. 18, 1963	16.64	1,300
1964	May 24, 1964	14.23	480
1965	Sept. 21, 1965	15.46	820
1966	Feb. 8, 1966	15.53	820
1967	Sept. 14, 1967	14.26	480

Middle Fork Little Maquoketa River near Rickardsville, Iowa--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1968	Aug. 8, 1968	16.30	1,120
1969	July 18, 1969	21.02	5,400
1970	Mar. 3, 1970	15.12	690
1971	Feb. 26, 1971	15.76	890
1972	Aug. 2, 1972	27.7	[a]23,000

a About

Site No. 9

5-4144.5 North Fork Little Maquoketa River near Rickardsville, Iowa

Location.--Lat. 42°35'09", long. 90°51'20", near NW corner sec. 28, T.90N., R.01E., on downstream end of right abutment of bridge on county highway, 1 mile northeast of Rickardsville.

Drainage area.--21.6 sq mi.

Gage.--Crest-stage gage.

Stage-discharge relation.--Defined by current-meter measurements below 420 cfs and indirect measurements at 1,670, 2,060, 3,510, and 7,180 cfs.

Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1951	July 8, 1951	10.84	3,510
1952	Aug. 20, 1952	10.63	3,040
1953	Feb. 19, 1953	9.70	2,190
1954	May 31, 1954	8.34	1,460
1955	Feb.19or20, 1955	7.07	964
1956		[a]	
1957	July 31, 1957	8.90	1,720
1958	Aug. 20, 1958	7.96	1,300
1959	Mar. 19, 1959	10.39	2,790
1960	Mar. 30, 1960	10.84	3,330
1961	Feb. 18, 1961	7.36	1,010
1962	Oct. 30, 1961	11,43	4,320
1963	Mar. 18, 1963	7.49	1,070
1964	May 24, 1964	5.71	551
1965	Sept. 21, 1965	6.90	865
1966	Feb. 8, 1966	7.05	910
1967	Jan. 24, 1967	[b]10.77	[c]960

North Fork Little Maquoketa River near Rickardsville, Iowa--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1968		a	
1969	June 26, 1969	10.87	3,560
1970	July 30, 1970	6.46	760
1971	Feb. 26, 1971	7.35	1,040
1972	Aug. 2, 1972	14.02	7,180

a Peak stage did not reach bottom of gage
b Affected by ice
c About

Site No. 11

5-4145. Little Maquoketa River near Durango, Iowa

Location.--Lat. 42°33'18", long. 90°44'46", in NW 1/4 NE 1/4 sec. 5, T.89N., R.02E., Dubuque County, on left bank 10 ft. upstream from bridge on county highway, 300 ft. upstream from Cloie Branch, 1.7 miles east of Durango, 5.6 miles northwest of court house at Dubuque, and 6.4 miles upstream from mouth.

Drainage area.--130 sq mi.

Gage.--Nonrecording prior to Jan. 5, 1939; recording thereafter. Datum of gage is 612.03 ft above mean sea level, datum of 1929.

Stage-discharge relation.--Defined by current-meter measurements below 2,000 cfs and 6 indirect measurements above, including one at 40,000 cfs.

Remarks.--Base for flood peaks, 5,100 cfs.

Peak stages and discharges

Water Year	Date	Gage height (feet)	Discharge (cfs)
1925	June 15, 1925	[c]22.1	[a]29,000
1935	Mar. 4, 1935	13.63	5,430
1936	Mar. 10, 1936	6.11	791
1937	Feb. 20, 1937	18.2	13,000
	Mar. 6, 1937	14.2	6,000
	June 21, 1937	20.75	21,000
1938	Feb. 5, 1938	15.73	7,850
	Aug. 5, 1938	14.1	5,950
	Sept. 7, 1938	15.6	7,800
1939	July 7, 1939	13.20	5,000
1940	Aug. 15, 1940	13.33	5,130
1941	Mar. 22, 1941	11.92	3,840
1942	June 29, 1942	11.59	3,640
1943	Aug. 13, 1943	14.95	6,820
1944	Feb. 26, 1944	13.7	5,800
	Mar. 14, 1944	13.3	5,300
	June 13, 1944	19.82	18,000
	June 16, 1944	15.4	7,100
	June 26, 1944	19.7	17,600
1945	July 21, 1945	12.60	4,720

Little Maquoketa River near Durango, Iowa--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1946	Jan. 5, 1946	16.3	9,000
	Mar. 6, 1946	17.05	10,400
1947	Apr. 10, 1947	13.4	5,100
	June 5, 1947	16.2	8,620
	June 13, 1947	21.23	23,000
	June 17, 1947	13.1	5,120
	July 5, 1947	14.0	5,900
	July 13, 1947	14.6	6,200
1948	Feb. 27, 1948	17.40	11,300
	Mar. 15, 1948	13.8	5,740
	Mar. 19, 1948	13.5	5,420
	May 10, 1948	14.6	6,400
1949	Mar. 4, 1949	13.94	5,790
1950	Mar. 5, 1950	14.80	6,550
1951	Feb. 25, 1951	[b]14.76	[a]5,500
	July 8, 1951	19.98	14,800
1952	Aug. 20, 1952	14.22	6,180
1953	Feb. 20, 1953	18.40	11,100
1954	June 1, 1954	14.35	6,460
	June 21, 1954	13.49	5,750
1955	Feb. 20, 1955	12.93	5,120
1956	July 8, 1956	10.67	3,490
1957	July 31, 1957	11.93	4,330
1958	Feb. 24, 1958	9.12	2,190
1959	Mar. 19, 1959	[b]14.44	[a]5,400
	Apr. 1, 1959	15.95	8,200
1960	Jan. 12, 1960	18.76	13,400
	Mar. 30, 1960	16.48	9,000
	May 6, 1960	17.48	10,700
1961	Sept. 13, 1961	12.70	4,110

Little Maquoketa River near Durango, Iowa--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1962	Oct. 29, 1961	17.94	11,400
	Nov. 2, 1961	18.70	13,100
	Nov. 2, 1961	15.95	7,900
	Nov. 16, 1961	16.60	8,980
	May 29, 1962	14.38	5,680
1963	Mar. 16, 1963	14.73	6,040
1964	Apr. 2, 1964	10.84	2,800
1965	Feb. 20, 1965	14.03	5,830
	Feb. 28, 1965	16.41	8,860
1966	Feb. 8, 1966	15.35	7,360
1967	Jan. 24, 1967	17.13	10,000
1968	Aug. 8, 1968	10.21	2,660
1969	Jan. 23, 1969	16.36	8,780
	June 25, 1969	16.49	7,030
	June 27, 1969	19.24	10,900
	June 29, 1969	15.26	5,920
	July 18, 1969	19.50	11,400
1970	June 15, 1970	11.80	3,740
1971	Feb. 26, 1971	15.71	7,840
	Sept. 9, 1971	14.03	5,830
1972	Aug. 2, 1972	[c]23.82	40,000
	Sept. 13, 1972	21.71	23,900

a About
b Affected by ice
c From outside highwater mark

Site No. 12

5-4146. Little Maquoketa River tributary at Dubuque, Iowa

Location.--Lat. 42°32'33", long. 90°41'38", near NW corner sec. 11, T.89N., R.02E., on right downstream wingwall of bridge on State Highway 386 near north city limits of Dubuque.

Drainage area.--1.54 sq mi.

Gage.--Crest-stage gage. Prior to June 1, 1966, gage located 600 feet upstream at U.S. Highway 52 bridge.

Stage-discharge relation.--Defined by current-meter, indirect measurements, and step-backwater computation.

Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1951	July 8, 1951	7.90	1,070
1952	Aug. 20, 1952	6.82	368
1953	July 26, 1953	6.87	388
1954	June 21, 1954	6.10	190
1955	June 2, 1955	5.48	107
1956	Aug. 30, 1956	6.92	408
1957	July 31, 1957	7.98	1,120
1958	Aug. 20, 1958	7.26	576
1959	Oct. 9, 1958	5.91	162
1960	Jan. 12, 1960	6.51	698
1961		a	
1962	Nov. 2, 1961	5.03	278
1963	Oct. 8, 1962	6.07	561
1964	Apr. 2, 1964	4.77	225
1965	Feb. 28, 1965	4.07	111
1966		a	
1967	Jan. 24, 1967	11.05	150
1968	Aug. 14, 1968	11.49	215

Little Maquoketa River tributary at Dubuque, Iowa--Continued

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (cfs)
1969	June 25, 1969	12.80	445
1970	July 30, 1970	12.48	375
1971		a	
1972	Nov. 1, 1971	15.31	1,250

a Peak stage did not reach bottom of gage

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