

Floods of 1954

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1370

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UNITED STATES DEPARTMENT OF THE INTERIOR

FRED A. SEATON, *Secretary*

GEOLOGICAL SURVEY

Thomas B. Nolan, *Director*

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Floods of June 1954 in Iowa

By I. D. YOST

FLOODS OF 1954

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1370-A

*Prepared in cooperation with the States
of Iowa, Nebraska, and South Dakota,
and with agencies of the Federal
Government*



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PREFACE

This report on the floods of June 1954 in Iowa was prepared by the U. S. Geological Survey, Water Resources Division, under the general direction of C. G. Paulsen, chief, and J. V. B. Wells, chief, Surface Water Branch. The section containing sediment records was prepared under the general direction of S. K. Love, chief, Quality of Water Branch.

The collection of basic records of stage and discharge in the area described in this report is a part of a continuous cooperative program with the States of Iowa, Nebraska, and South Dakota; and with the Corps of Engineers, Department of the Army. The U. S. Weather Bureau, the American Red Cross, and several State, municipal and private organizations supplied information included in this report and acknowledgement of the data is made in the text at the place where the data appear.

The basic data were collected and compiled in the district offices of the Surface Water Branch under the supervision of the following district engineers: V. R. Bennion, Iowa; D. D. Lewis, Nebraska; and H. M. Erskine, South Dakota. Valuable assistance was given in the field and office work by R. E. Oltman, engineer in charge of the special reports office, Lincoln, Nebr.

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FLOODS OF 1954

FLOODS OF JUNE 1954 IN IOWA

I. D. Yost

ABSTRACT

Rainfall during the latter part of May and the first half of June 1954, culminating in a series of heavy rains June 15-22, caused streams in north-central and northwest Iowa to rise to record heights in many places. Affected in Iowa were the basins of Iowa, Cedar, Skunk, Des Moines, Big Sioux, Floyd, Little Sioux, and Soldier Rivers and Perry Creek. The Omaha Creek basin in Nebraska also was flooded.

Notable high rates of discharge produced by the extremely heavy rains include 108 cfs (cubic feet per second) per square mile from 2.14 square miles of drainage area on the East Fork Iowa River above Hayfield, Iowa; 242 cfs per square mile from a drainage area of 7.07 square miles on a small Otter Creek tributary. The greatest unit peak discharge was 1,110 cfs per square mile measured from an area of 0.056 square mile on a small tributary of the Boone River near Britt, Iowa. The unit discharge of 83.4 cfs per square mile on the Skunk River near Randall, Iowa, was unusual considering its much larger drainage area of 163 square miles.

The floods of June 1954 were the greatest known on the Iowa River above Eldora, on the Des Moines River below Fort Dodge to Des Moines, and on the Rock and the Little Sioux Rivers. Near-record floods occurred on the Des Moines River at and upstream from Fort Dodge, and on the Cedar River and tributaries upstream from Waterloo.

Flood damage amounted to nearly \$28 million. Much urban damage occurred; however the above total consisted mainly of agricultural damage with an estimated 725,000 acres of cropland in 26 northern counties of Iowa under water during the first 3 weeks in June.

INTRODUCTION

The floods of June 1954 in Iowa were of record or near-record height throughout much of the northern half of the State. Heavy rainfall during the last few days in May and the first half of June thoroughly saturated the soil throughout much of the northern half of Iowa and produced conditions favorable for the occurrence of flood runoff from the heavy rains that were to follow. Many streams in the northwestern and north-central part of the State began rising to flood stages as a result of the heavy rainfall, June 15-19. Additional heavy rains of June 20-22 throughout most of the same general area added runoff to the already swollen streams and produced

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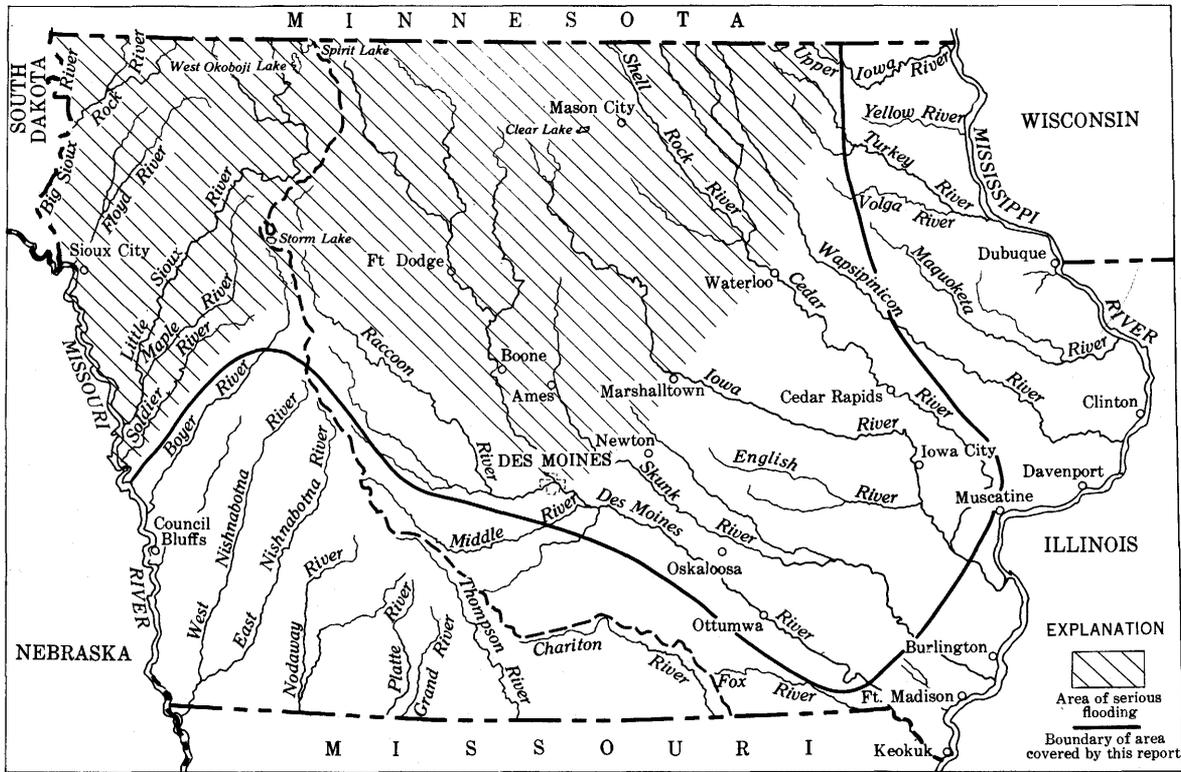


Figure 1. --Map showing area in Iowa covered by this report.

record or near-record floods at many places. Peak discharges were the greatest of record on the Iowa River above Eldora, on the Des Moines River from Fort Dodge to Des Moines, and on the Little Sioux River.

Figure 1 shows the location of the area covered by this report in which major floods occurred. Considerable urban damage occurred, but agricultural damages constituted most of the total which amounted to nearly \$28 million. Because of the large area of flooding, agricultural damages probably exceeded those of any previous flood.

The U. S. Geological Survey through the district office in Iowa City, Iowa, operates a network of stream-gaging stations in the area affected by this flood as a part of the regular Nationwide program for the investigation of water resources. These stations are maintained mainly in cooperation with municipalities, the State, and with Federal agencies. Some of these stations have been operated for long continuous periods thus giving systematic records of stage, discharge, and volume of flow covering the range from drought to flood conditions. This report contains records of stage and discharge at 55 gaging stations during the flood period, and a summary of peak discharges at 22 miscellaneous points within the flood area and other data pertinent to the flood.

GENERAL DESCRIPTION OF THE FLOODS

Causes

The floods in the northern half of Iowa in June 1954 were the result of successive periods of very heavy rainfall. During May the rainfall averaged near normal throughout the State and many stations reported rainfall well above normal. Soil moisture content was very low and most of the rain soaked into the ground with very little runoff until the last few days of May when rains and heavy thundershowers began moving across the State. June rainfall averaged nearly 2 inches above normal throughout the State with extremely heavy rains during the middle of the month in most of the northern half of the State. In general, the heavy rainfall during the first half of June saturated the soil throughout much of northwest and north-central Iowa and caused some runoff into the streams. Many streams in northern Iowa carried moderate amounts of floodwater but only the upper Skunk River basin produced record flooding during the first half of June. The heavy rains of June 15-19 over the northwestern and north-central part of the State fell on the already saturated soil, filled the many depressions which characterize the terrain in that part of the State, and the streams began rising to greater heights. This condition set the stage for the record

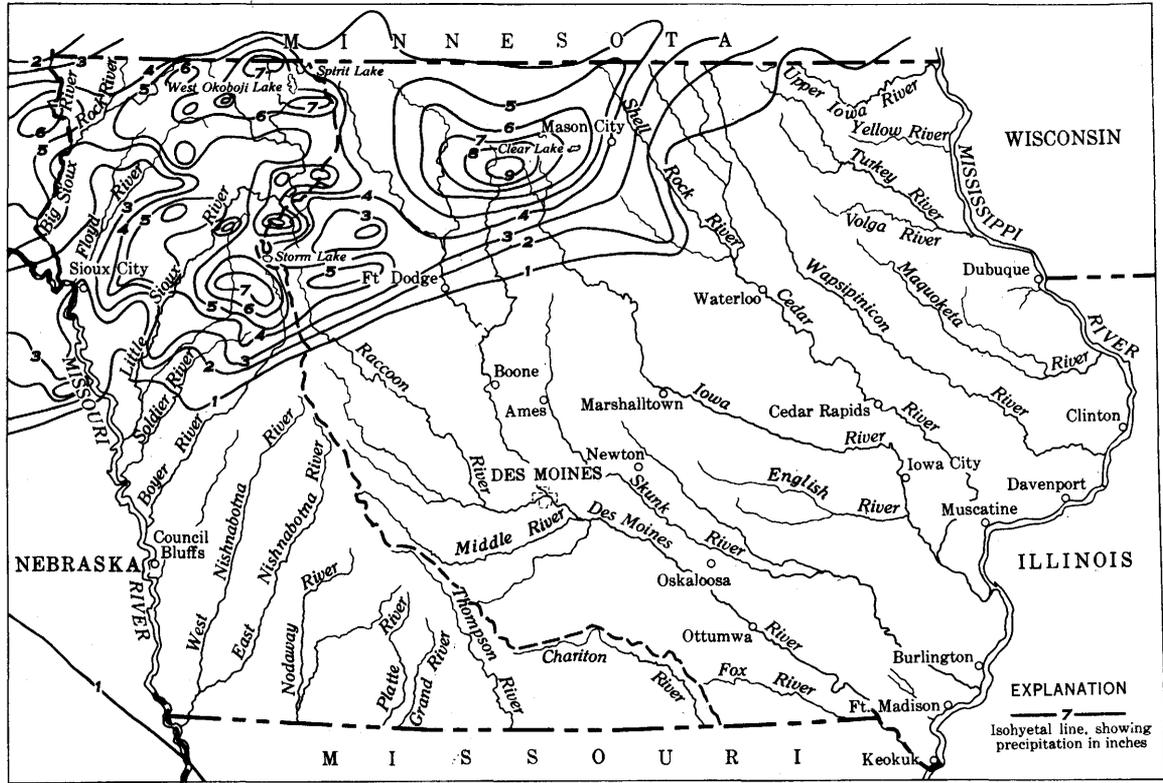


Figure 2. --Isohyetal map showing total precipitation, in inches, June 17-19, 1954.

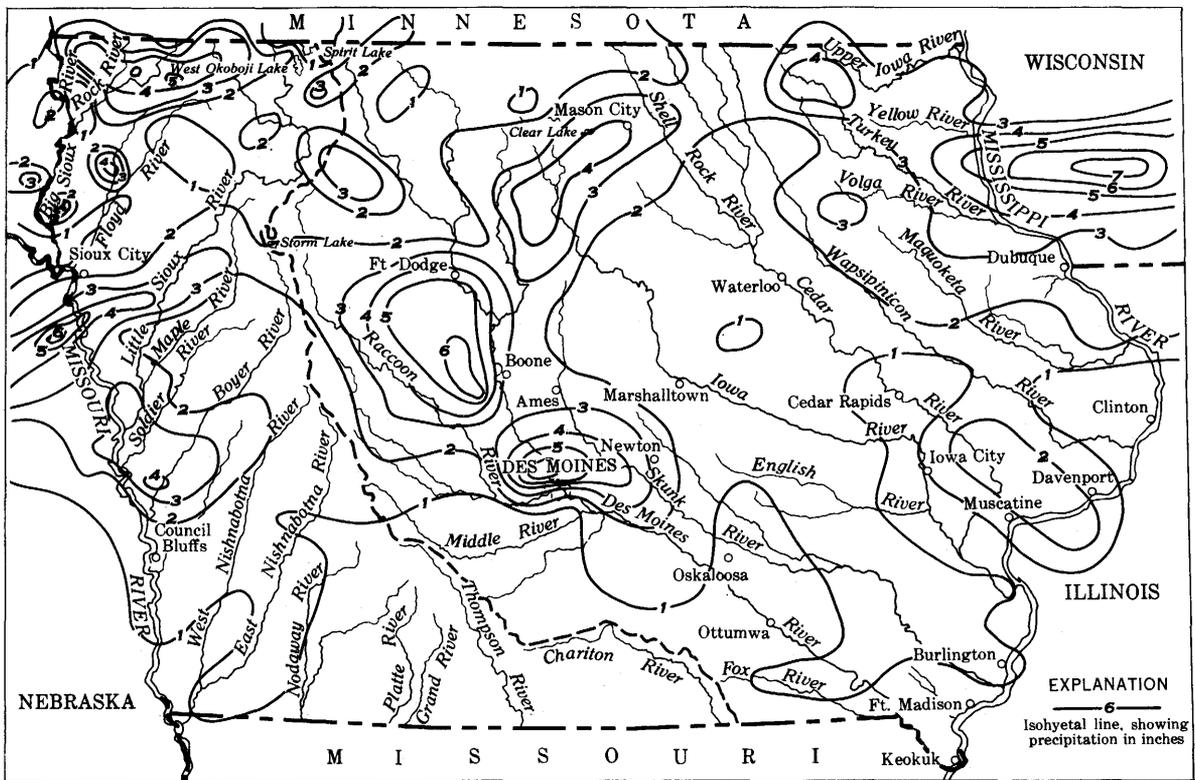


Figure 3. --Isohyetal map showing total precipitation, in inches, June 20-22, 1954.

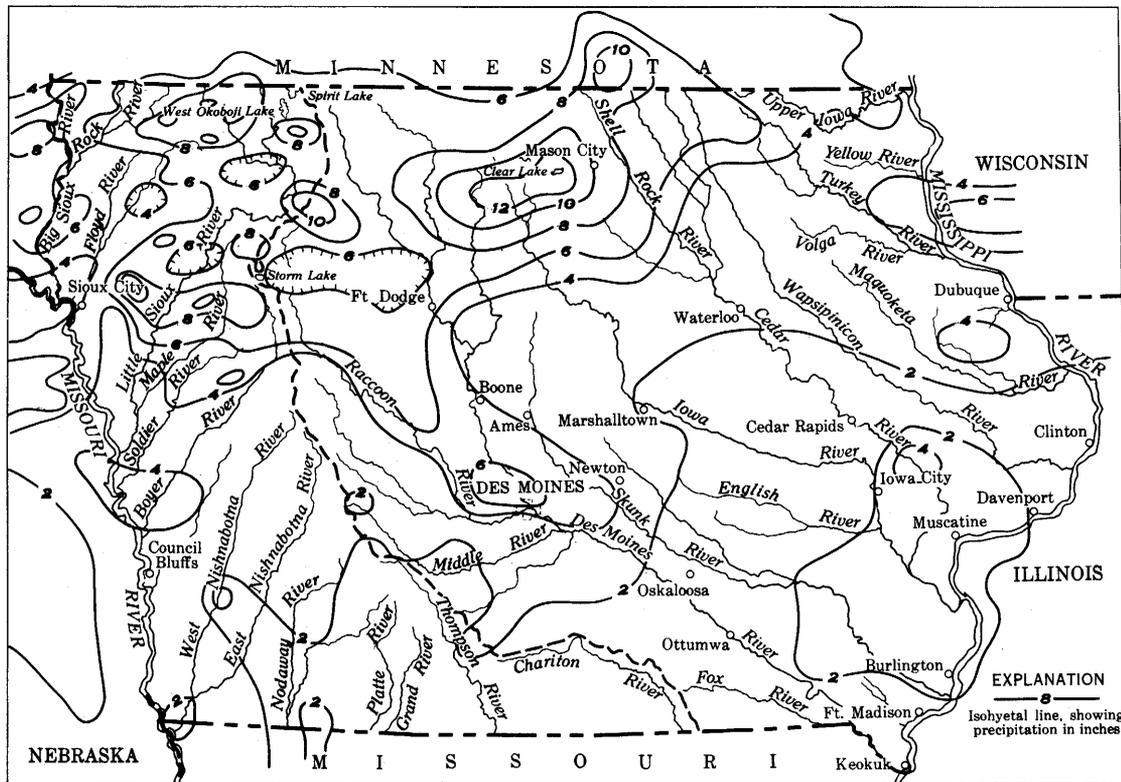


Figure 4. --Isohyetal map showing total precipitation, in inches, June 15-22, 1954.

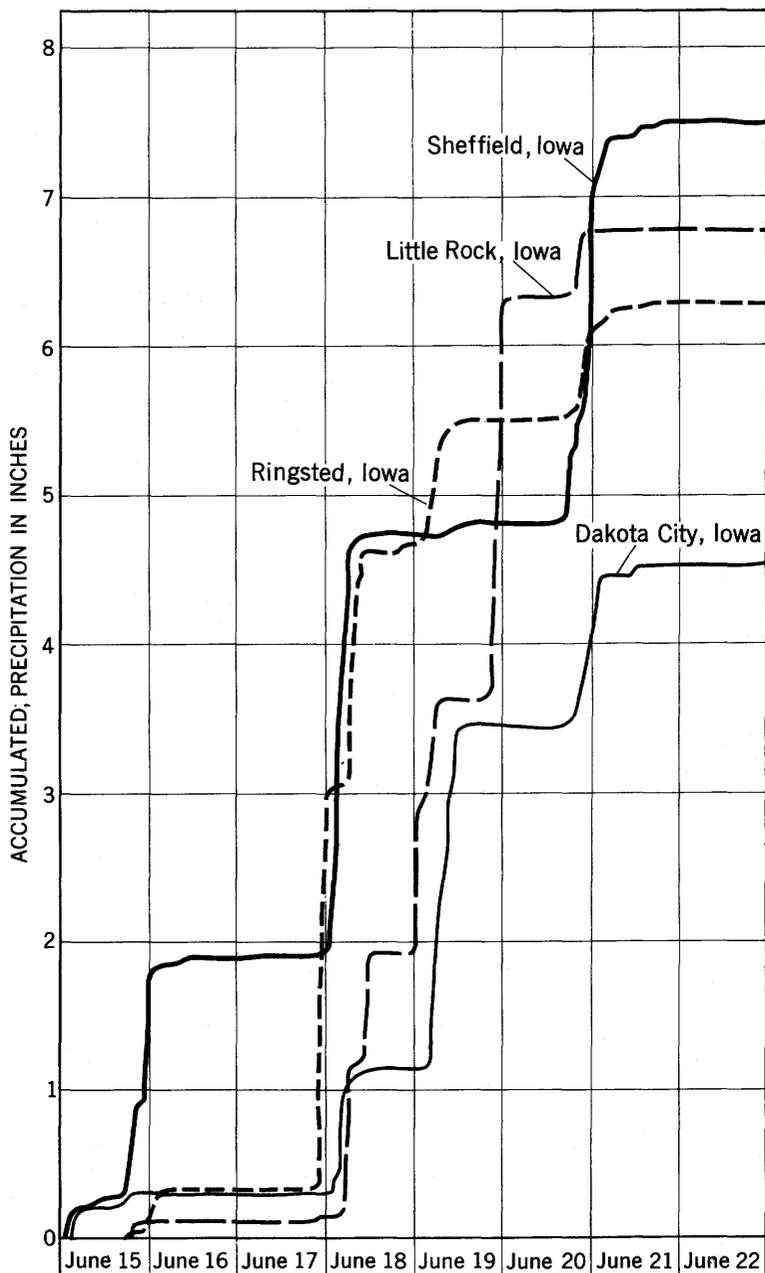


Figure 5. --Mass rainfall curves for storm of June 15-22, 1954.

floods produced by the additional heavy rains of June 20-22 over most of the same area.

Standing water caused almost a total loss to crops planted on land in the depressions. Almost 20 percent of Hancock County was under water on June 19, and many farmers who had started replanting after the June 10-11 rains found their land again submerged. If these depressions had not existed, thousands of acre-feet of water would have been added to the already flooded streams, thus producing much higher stages and causing much more damage to the downstream areas.

A discussion of the meteorology of the storms for June 17-21, 1954, together with more detailed weather records are contained in a report by the U. S. Department of Commerce (U. S. Weather Bureau, 1954a). Figures 2 to 4 are isohyetal maps prepared from maps furnished by the U. S. Weather Bureau which show the distribution of total precipitation in Iowa, June 17-22. Figure 5 was prepared from records of the U. S. Department of Commerce (U. S. Weather Bureau, 1954b) which show the hourly distribution of storm precipitation at four selected stations in the northern part of Iowa.

Iowa River and Tributaries

Record floods occurred on the Iowa River above Eldora from heavy runoff-producing rainfall over the headwaters, June 15-19. On June 19, crests on the East and West Forks of the Iowa River and below their confluence exceeded any previously recorded high stages. Both forks began to recede, then heavy rainfall during the night of June 20 produced additional runoff with the crest at the gaging station on the Iowa River near Rowan exceeding that recorded 2 days earlier (fig. 6). Floodwaters covered Highway 69 at several places in the vicinity of Belmont, closing the highway to traffic for several days. The county highway to the gaging station near Rowan and adjacent farmlands was also flooded (fig. 7). One death directly attributed to the flood occurred on the Iowa River near Dows where a boy was drowned while herding cattle out of the flooded area. The crest on the Iowa River remained at record height downstream through Iowa Falls and Eldora. The Iowa River at Iowa Falls was said to be the highest within the memory of the oldest residents. Very little runoff was contributed by tributaries below Eldora; consequently the crest began flattening as it progressed downstream, and no serious flooding was experienced in urban areas downstream from Marshalltown.

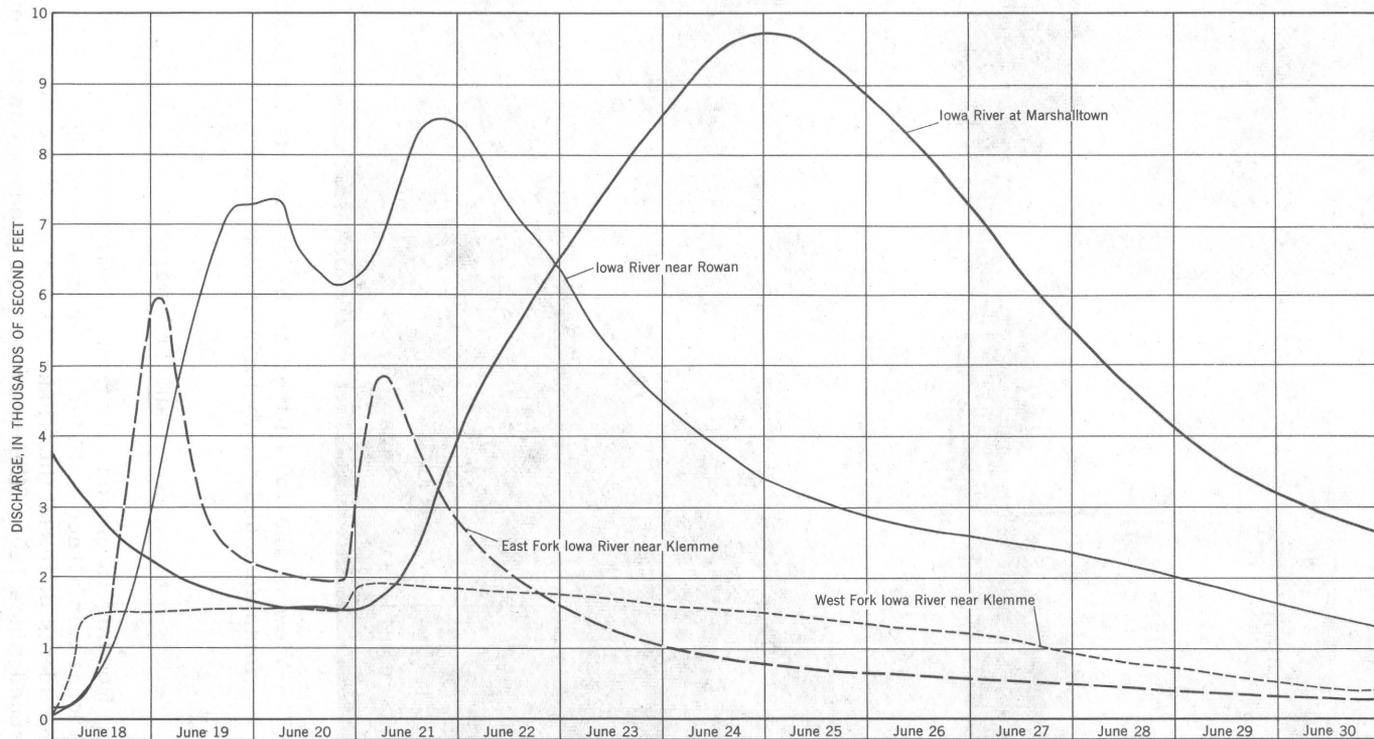


Figure 6. --Discharge hydrographs for selected streams, Iowa River basin, June 1954.

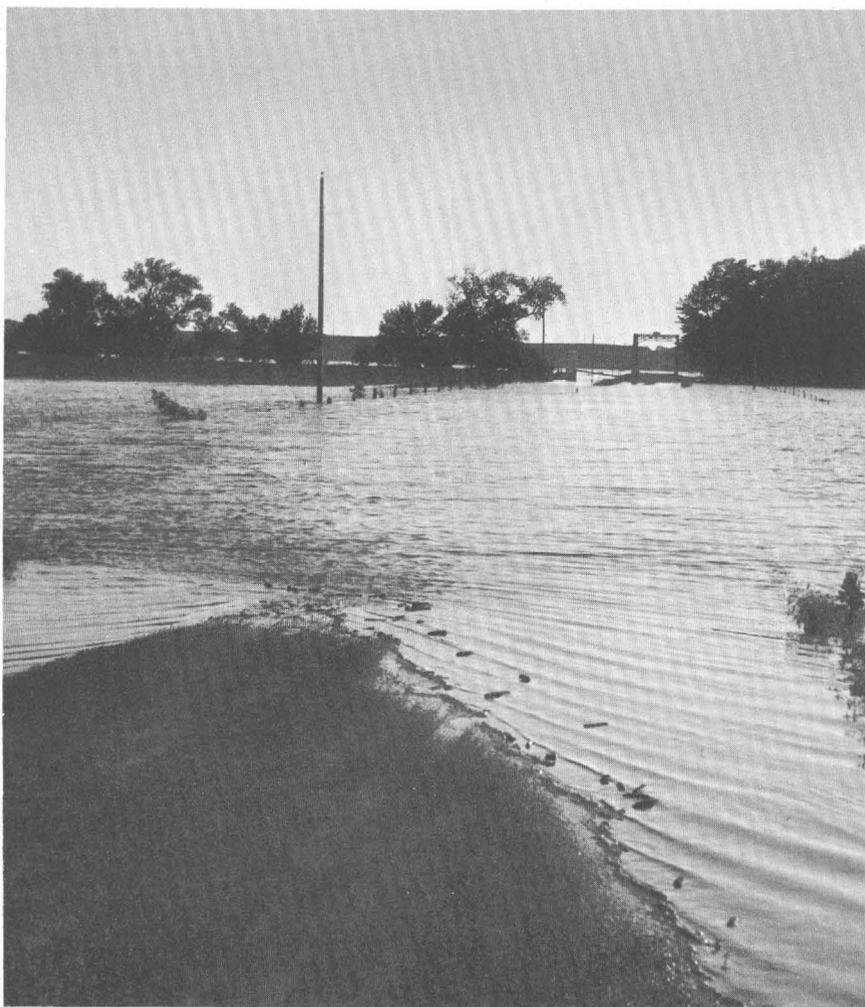


Figure 7. --View of the Iowa River at the gaging station flooding farmlands and county highway near Rowan.

Cedar River and Tributaries

Local flooding in Mason City from small creeks and from excessive local rainfall necessitated the evacuation of about 300 families. Residents declared this flood was the worst one the city had experienced since 1903. Heavy runoff was produced on the headwaters of the West Fork Shell Rock River and much flooding occurred

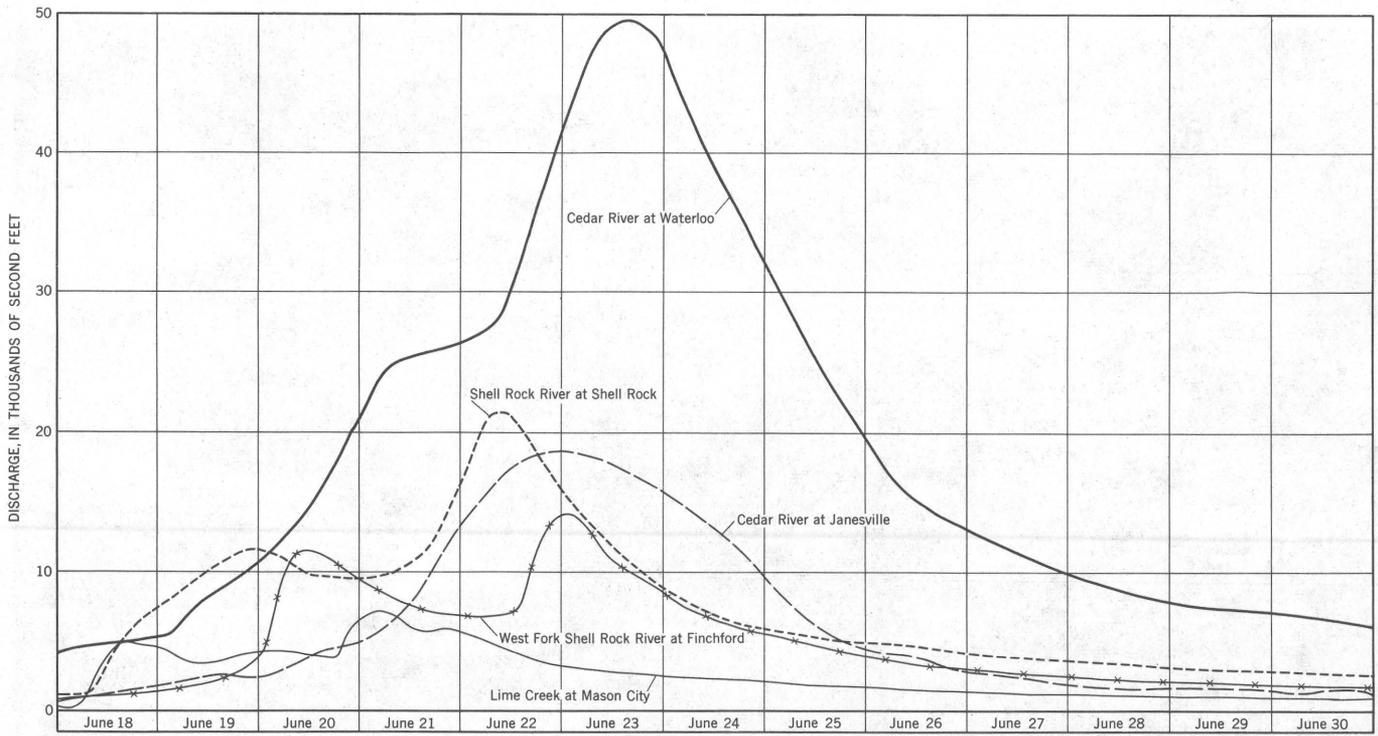


Figure 8. --Discharge hydrographs for selected streams, Cedar Rapids River basin, June 1954.



Figure 9. --Aerial view of part of Calhoun County showing water collected in the many depressions.
Photograph by Rockwell City Advocate.

in the upper reaches of the Shell Rock and Cedar Rivers. The crests from the West Fork Shell Rock River and the Shell Rock River coincided with the crest on the Cedar River producing a near-record crest downstream from the junction which caused considerable flooding at Waterloo a few miles downstream (fig. 8). Although it was necessary to evacuate only a few families, floodwaters inundated many thousands of acres of low-lying farmland and town areas along the flooded streams (fig. 9). Because of small amounts of tributary inflow downstream from Waterloo, the crest on the Cedar River flattened as it progressed downstream causing very little additional urban damage.

Skunk River

The first severe flooding occurred on the Skunk River at and upstream from the city of Ames. The Skunk River began rising on June 9 as a result of heavy thundershowers in Hamilton County and surrounding areas. Outstanding rates of runoff occurred north of Ames and a record flood was produced at the gaging station. Considerable damage was caused in low-lying agricultural areas under cultivation along the river but very little damage was done in urban areas.

Des Moines River and Tributaries

The flood on the Des Moines River developed in the upper reaches in the north-central part of the State as a result of heavy rainfall, June 15-19, with the additional runoff-producing rainfall of June 20-22 adding to the already swollen streams. The flood on the East Fork Des Moines River was at near-record height while the flood on the West Fork was of little consequence at and upstream from Estherville. However, the flood on the West Fork developed rapidly and was of near-record height by the time the crest reached the gaging station at Humboldt (fig. 11). The crests from the East and West Forks arrived at their confluence only a few hours apart. With the contribution of additional runoff from smaller tributaries, the crest was at near-record height by the time it reached the gaging station at Fort Dodge, being exceeded only by the flood of June 1947, which was 0.4 foot higher (fig. 10). Some flood damage was experienced in the city of Fort Dodge when several blocks of a low-lying residential area flooded, necessitating the evacuation of about 300 families.

Although not of record proportions, runoff of some consequence was produced on Lizard Creek, and many small creeks in north-central Iowa flooded as a result of scattered thunderstorm activity.



Figure 10.--View of floodwaters of the Des Moines River inundating a residential section of Fort Dodge. Photograph by Fort Dodge Messenger.

The headwaters of the Boone River received some of the heaviest rainfall during the flood period. Excessive rates of runoff were measured on some of the tributaries west of Britt. Fed by many small tributaries, the flood crest increased as it continued downstream, until by the time it reached Webster City the crest was several inches higher than any previously known flood in this city.

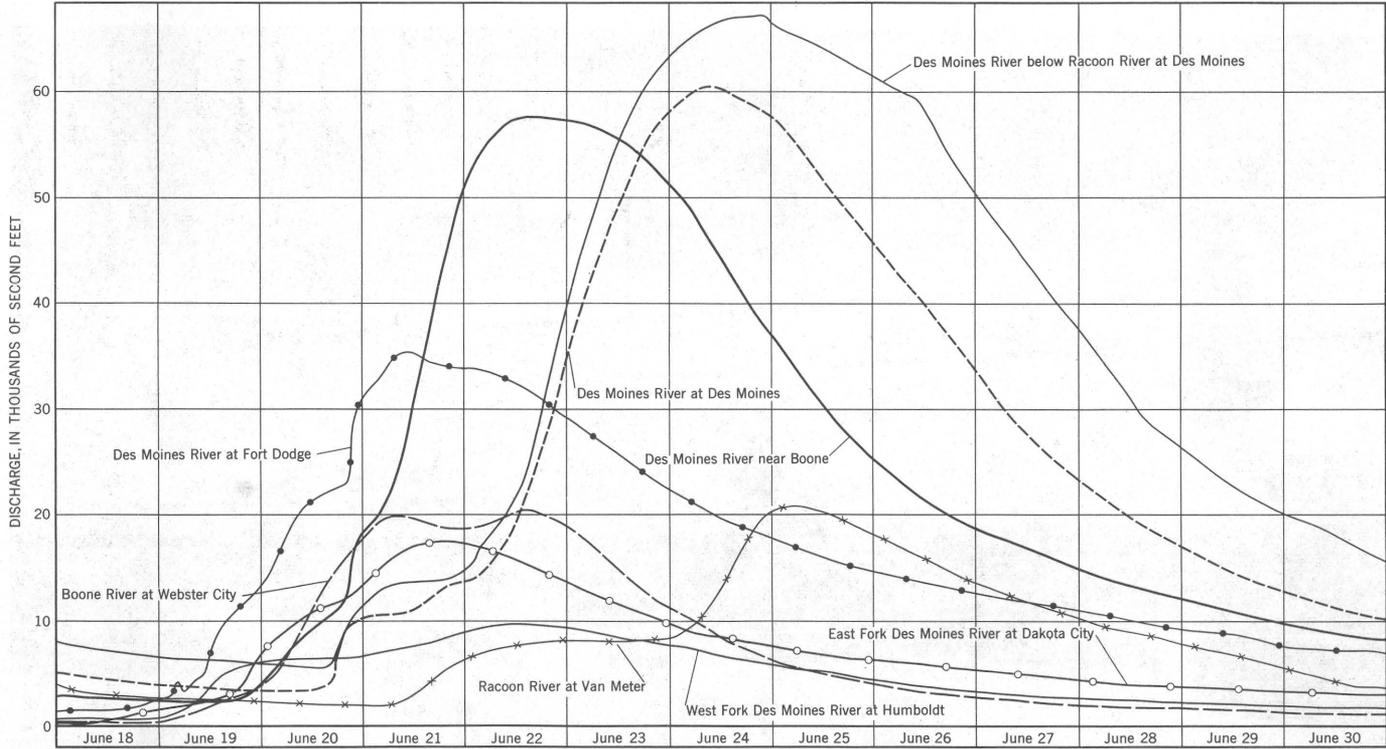


Figure 11. --Discharge hydrographs for selected streams, Des Moines River basin, June 1954.



Figure 12. --View of floodwaters of the Des Moines River flowing over Center Street Dam in Des Moines. Photograph by Corps of Engineers.

At the gaging station 2 miles south of Webster City the stage of 18.55 feet was 0.55 feet lower than the stage of the flood of 1918 which was the highest stage known since 1896 (fig. 11).

The addition of the Boone River floodwater to the already flooded Des Moines River produced the greatest flood in the history of the Des Moines River as far downstream as the city of Des Moines. The flood closed all east-west transportation routes in Boone County and only a few of the north-south roads and highways remained passable. The Fort Dodge, Des Moines and Southern Railway power-plant at Fraser stopped operating when floodwater inundated the plant, exploded a boiler and cut off all power and traffic on the railroad except for a few diesel engines. Temporary sandbag levees constructed during the flood kept the water from inundating the city water plant at Boone. The State hospital water plant at Woodward, a few miles downstream from Boone, was inundated and stopped operation.

The crest on the Des Moines River remained at record height after entering the city of Des Moines. Much of the residential area along the river was flooded, necessitating the evacuation of about 1,300 families. Center Street dam was almost submerged by the high stage (fig. 12). Temporary levees built just before and during the flood prevented the water from inundating more residential and industrial property within the city.

The Raccoon River, which enters the Des Moines River within the city of Des Moines, was carrying considerable floodwater but was several feet lower than the previous recorded high stage. At Des Moines, as well as for areas downstream, the crest on the Des Moines River preceded the Raccoon River crest by about 24 hours. If the two crests had reached Des Moines at the same time, much more serious flooding would have resulted (fig. 11).

Below the mouth of the Raccoon River there was little tributary runoff into the Des Moines River; consequently the crest flattened as it progressed downstream. Many small towns and homes throughout the entire river valley were flooded, however, and thousands of acres of farmland were inundated (fig. 13). The crest at the gaging station at Ottumwa was 3.3 feet below the previously recorded high stage, and a relatively small amount of flooding occurred within the city.

Tributaries to the Missouri River

Record or near-record floods developed on the tributaries to the Missouri River in northwest Iowa as a result of the heavy rainfalls, June 15-19 and June 20-22. At the gaging station on the Rock



Figure 13. --View of floodwaters of the Des Moines River spread out over bottomlands downstream from Des Moines. Photograph by Des Moines Register and Tribune.

River near Rock Valley, the crest recorded for this flood was 0.13 foot lower than that recorded for the June 1953 flood; however, the peak discharge during the current flood was slightly greater than that of the 1953 flood. The Big Sioux River at Sioux City was reported to be the highest in 70 years or more. No serious damage was reported, but about 500 families were evacuated from low-lying areas in the city.

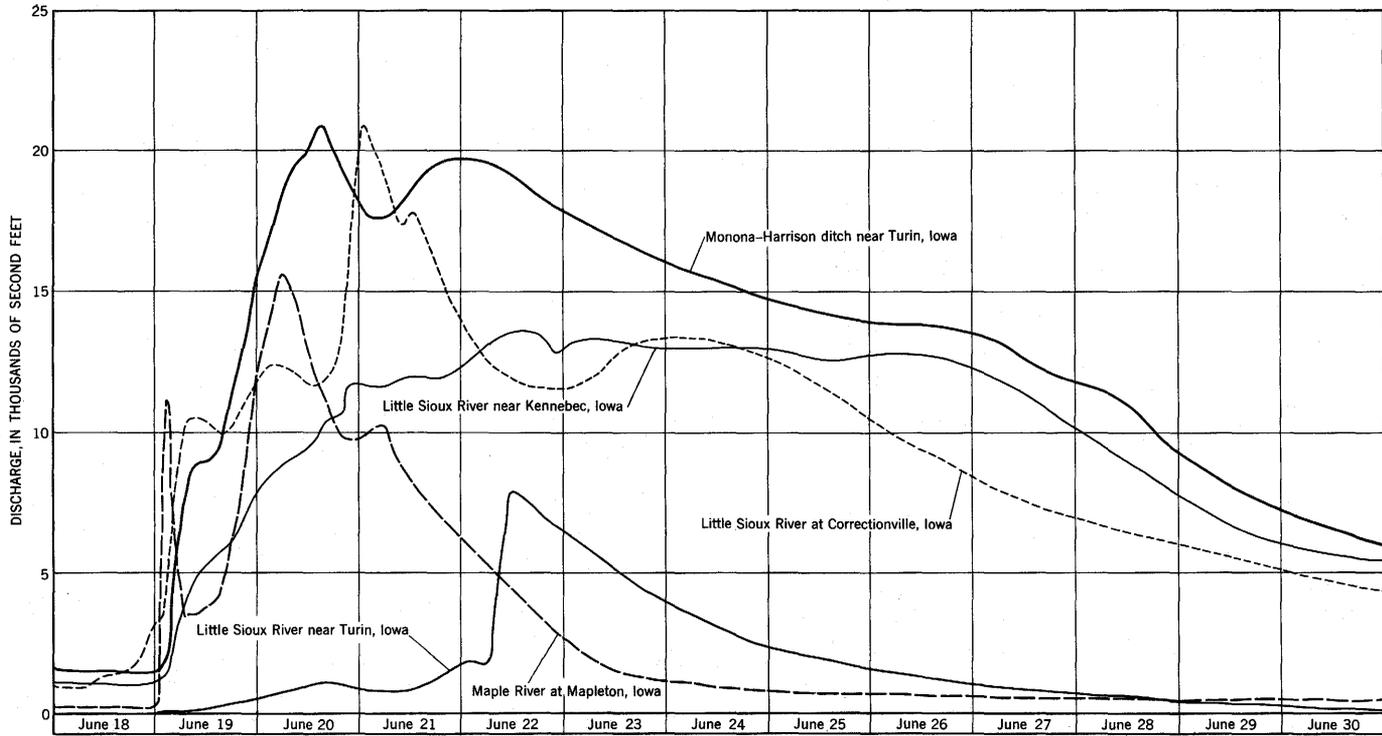


Figure 14. --Discharge hydrographs, Little Sioux River basin, June 1954.

The flood on the Little Sioux River was of record proportion and caused considerable flooding throughout the river valley. In the Cherokee area the Little Sioux River flooded the lowlands, roads, and fields nearly repeating the 1953 disaster. Floodwaters inundated State Highway 5 blocking traffic east of Cherokee, and several families in the south edge of the city were evacuated. Farther downstream at the gaging station at Correctionville, the crest on the Little Sioux River exceeded the previously recorded high stage and caused considerable damage in that area. Highway 20, one of the main east-west highways, was inundated and closed to traffic for several days. Also at the gaging station at Kennebec, the Little Sioux River exceeded the previously recorded high stage. The floodwaters were fairly well confined to the normal levee flood plain downstream to Smithland. Downstream from Smithland several breaks occurred in the levee system, and the floodwaters inundated much of the surrounding farmland. At Turin, several miles farther downstream, the Little Sioux and Maple Rivers flooded all highways into the town leaving it completely isolated. It was thought that the entire population of the town would have to be evacuated; however, this threat was alleviated when both rivers began to recede. Figure 14 presents graphs of discharge at selected gaging stations in the Little Sioux River basin.

FLOOD DAMAGES

The floods of June 1954 caused heavy damage to both urban and agricultural areas in the State of Iowa. Two lives were reported lost. A boy was drowned while trying to save cattle from the floodwaters, and a man was electrocuted when he came in contact with a live wire in his flooded home. The American Red Cross reported six persons required hospitalization for major injuries. The Corps of Engineers estimated the total damage to be \$27,948,000. Iowa croplands, particularly those planted in corn and soybeans, suffered heavy damage and total loss in many cases from water standing on the fields for a long time. The Soil Conservation Service estimated that during the first 3 weeks in June, 725,000 acres of cropland in 26 northern counties were under water.

Personnel of the Corps of Engineers from both the Rock Island, Ill., and Omaha, Nebr., district offices began collecting data on flood damages soon after the floodwaters receded (tables 1 and 2). The American Red Cross reported a total expenditure of \$147,428 for rehabilitation and emergency services in the State of Iowa (table 3). The Iowa National Guard assigned men and equipment to many flooded communities to perform guard duty and assist with sandbagging and temporary levee construction where necessary. Expenses are shown in table 4.

FLOODS OF JUNE IN IOWA

Table 1.--Summary of urban damages, in dollars, flood of June 1954

Location	Commercial and Industrial		Residential property		Public property		Total damages
	Direct	Indirect	Direct	Indirect	Direct	Indirect	
Cedar River basin							
Charles City-----	50	150	850	585	50	0	1,685
Cedar City-----	85	135	1,670	1,515	40	55	3,500
Cedar Falls-----	85	395	2,045	1,725	2,655	2,370	9,275
Waterloo-----	9,110	58,820	26,435	18,715	500	5,000	98,580
Evanston-----	0	0	6,085	3,825	0	0	9,710
Cedar Rapids-----	0	330	0	0	100	100	530
Mason City-----	38,500	19,300	120,115	14,280	7,050	11,165	211,310
Green-----	0	300	200	100	0	0	600
Total -----	47,850	60,030	157,400	40,545	10,395	18,990	335,190
Iowa River basin							
Belmond-----	5,650	2,400	3,050	705	0	550	12,355
Dows-----	0	0	2,600	640	0	230	3,470
Alden-----	0	350	0	10	0	5,850	6,335
Iowa Falls-----	1,850	2,850	225	565	100	0	5,590
Steamboat Rock-----	0	0	125	25	0	0	150
Marshalltown-----	200	875	1,650	1,245	15,000	0	18,970
Total -----	7,700	6,475	7,775	3,190	15,100	6,630	46,870
Des Moines River basin							
Fort Dodge-----	7,125	114,685	44,045	19,500	9,995	36,105	231,455
Kalo-----	0	0	4,875	1,525	0	0	6,400
Lehigh-----	17,805	3,695	25,050	4,425	50,405	50	101,430
Fraser-----	0	0	2,950	345	0	0	3,295
Boone-----	0	0	0	0	0	11,320	11,320
Woodward-----	0	500	0	0	125	15,230	15,855
Des Moines-----	202,240	448,755	257,830	66,305	78,350	479,975	1,533,455
Levey-----	0	0	1,150	4,100	0	0	5,250
Rummels-----	0	0	0	0	0	500	500
Red Rock-----	240	195	1,400	1,785	0	500	3,770
Harvey-----	0	0	1,055	45	0	0	1,100
Eddyville-----	0	2,520	3,815	8,800	0	21,645	36,780
Ottumwa-----	10,650	281,250	7,090	5,340	0	49,465	353,795
Eldon-----	250	250	0	0	0	0	500
Selma-----	0	0	45	115	0	0	160
Keosauqua-----	310	2,820	0	0	0	0	3,130
Webster City-----	3,300	2,500	57,725	21,350	5,400	28,950	119,225
Sac City-----	0	200	1,550	325	300	200	2,575
Adel-----	100	100	400	200	200	0	1,000
Total -----	242,020	857,470	408,980	134,160	144,775	643,590	2,430,995
Missouri River basin							
Little Sioux River and tributaries-----	-----	-----	115,100	-----	443,900	-----	559,000
Omaha Creek-----	-----	-----	17,100	-----	26,800	-----	43,900
Floyd River-----	-----	-----	0	-----	4,200	-----	4,200
Big Sioux River-----	-----	-----	0	-----	64,500	-----	64,500
Vermillion River-----	-----	-----	800	-----	62,800	-----	63,600
Total -----	-----	-----	133,000	-----	602,200	-----	735,200

Table 2.--Summary of agricultural damages, in dollars, flood of June 1954

Watershed	Total area flooded (acres)	Crop damage	Property damage	Total damages
Skunk River basin				
Main stem-----	25,000	716,880	81,800	798,680
Squaw Creek-----	5,000	89,980	-----	89,980
Indian Creek-----	700	11,700	-----	11,700
North Skunk River-----	800	11,760	400	12,160
Total -----	31,500	830,300	82,200	912,500
Cedar River basin				
Lime Creek-----	3,950	143,250	72,900	216,150
West Fork Shell Rock River-----	19,275	756,990	255,110	1,012,100
Shell Rock River, main stem and small tributaries-----	15,800	381,690	44,980	426,670
Cedar River, main stem and small tributaries-----	65,740	1,964,760	303,370	2,268,130
Total -----	104,765	3,246,690	676,360	3,923,050
Iowa River basin				
West Fork-----	9,000	769,940	74,020	843,960
East Fork-----	3,000	129,440	58,230	187,670
South Fork-----	1,850	80,690	10,150	90,840
Honey Creek-----	650	31,970	6,150	38,120
Main Stem-----	64,900	2,176,510	357,300	2,533,810
Total -----	79,400	3,188,550	505,850	3,694,400

FLOODS OF 1954

Table 2.--Summary of agricultural damages, in dollars, flood of June 1954--Cont.

Watershed	Total area flooded (acres)	Crop damage	Property damage	Total damages
Des Moines River basin				
West Fork-----	5,100	257,580	30,890	288,470
East Fork-----	18,900	864,730	58,550	923,280
Main Stem and small tributaries----	83,009	3,553,830	2,619,210	6,173,040
Lizard Creek-----	5,950	298,930	145,020	443,950
Boone River-----	20,900	1,016,480	440,230	1,460,710
Raccoon River-----	27,540	1,217,000	143,250	1,360,250
Total-----	161,399	7,208,550	3,441,150	10,649,700
Missouri River tributaries				
Little Sioux River and tributaries----	71,000	-----	-----	2,961,000
Omaha Creek-----	5,200	-----	-----	246,900
Floyd River-----	9,400	-----	-----	220,300
Big Sioux River-----	34,700	-----	-----	1,128,000
Vermillion River-----	27,300	-----	-----	662,900
Total-----	147,600	-----	-----	5,220,100

Table 3.-- American Red Cross Relief by counties, flood of June 1954 ^{1/}

County	Number of families suffering loss	Number of families assisted	Total expenditures for relief
Polk-----	600	243	\$76,360
Hamilton-----	100	54	16,477
Webster-----	238	147	36,279
Monona-----	30	1	192
Cedar Falls---	175	9	395
Blackhawk---	200	4	755
Warren-----	14	1	205
Boone-----	40	1	657
Kossuth-----	30	5	565
Clarion-----	20	3	217
Sac-----	15	3	130
Pocohantas---	25	3	146
Clay-----	12	5	201
Wright-----	25	8	444
Cerro Gordo---	300	29	8,184
Wapello-----	60	16	3,579
Benton-----	15	2	369
Ida-----	50	1	255
Woodbury-----	250	6	1,823
Marion-----	25	6	195
Total-----	2,224	559	\$147,428

^{1/} From statistical and cost report furnished by the Disaster Services of the American National Red Cross, Midwestern area.

Table 4.-- Iowa National Guard expenditures in dollars, by cities, flood of June 1954 ^{1/}

City	Payroll	Food	Gasoline	Medical	Miscellaneous	Total
Boone-----	6,118.97	426.68	-----	40.50	152.90	6,739.05
Des Moines-----	16,535.42	947.92	317.33	205.86	7,850.88	25,857.41
Eddyville-----	2,645.46	255.05	16.19	-----	-----	2,916.70
Fort Dodge and Webster City----	5,729.81	25.00	47.60	110.27	188.73	6,101.41
Ottumwa-----	2,276.80	195.87	37.83	6.00	57.92	2,574.42
Sioux City-----	243.45	-----	23.08	-----	15.65	282.18
Total-----	33,549.91	1,850.52	442.03	362.63	8,266.08	44,471.17

^{1/} Furnished by the State Adjutant General's Office.

DETERMINATION OF FLOOD DISCHARGES

The operation of a stream-gaging station consists principally of the measurement of stage and discharge and the definition of the stage-discharge relation from which discharge can be calculated for a known stage. The general method of determining discharge at gaging stations involves computing a stage-discharge relation from current-meter measurements of discharge at stages varying from low to high water and applying this relation to the records of stage. Short extensions of the stage-discharge relation curve are made by logarithmic plotting, from velocity-area studies, or by use of other measurable hydraulic factors.

In Iowa most of the stream channels are sandy or silty and are subject to scour and fill, especially during periods of flood flow where the relation between stage and discharge becomes unstable. Frequent current-meter measurements are necessary to define discharge reliably.

During major floods it is often impossible to obtain current-meter measurements because of impassable roads, insufficient flood warning on streams of rapidly changing stages, heavy floating debris, or destruction of structures from which flood measurements are made. However, during the June 1954 flood in Iowa current-meter measurements were obtained at most of the gaging stations affected by the flood, thereby defining reliable stage-discharge relations.

At a few miscellaneous sites where excessive runoff occurred, determination of the peak flow was made by indirect methods such as computation of flow over roadways or through contracted openings, slope-area, or a combination of these methods. A general description of these methods can be found in U. S. Geological Survey Water-Supply Paper 888, and more detailed information in publications of the Geological Survey.

STAGES AND DISCHARGES AT STREAM-GAGING STATIONS

Explanation of Data

The purpose of this report is to present detailed information regarding stages and discharges of streams in Iowa during the floods of June 1954. Much of the information presented is in addition to the records usually published in the annual water-supply papers. The data are presented in sufficient detail to be used in studies relative to flood control measures and watershed development.

The systematic collection of basic data at a stream-gaging station includes a record of stage, measurements of discharge, and any other general information pertinent to the determination of the daily flow of the stream at the gaging station. The record of stage is obtained either from periodic readings of some type of nonrecording gage or from an automatic water-stage-recorder installation which provides a continuous graphic record of stage. Measurements of flow are generally made by current meter.

In general, the data presented on the following pages consist of a description of the gaging station, a table showing the daily discharges for 3 months, May to July 1954, and tables of stages and discharges at indicated times for many of the stations during the flood period in June.

The description of the gaging station gives information relative to location, datum, type of gage, and drainage area. In addition, information is given describing the method of determining the stage during the flood. Information is also given relative to the definition of the stage-discharge relation throughout the ranges of stage experienced during the 1954 floods as well as the previously recorded maximum flood. The maximum stage and discharge at each gaging station are given for May to July 1954 and for the indicated period of previous record. Information regarding floods outside the period of gaging station record also is given in as much detail as is available. Remarks on cooperation, regulation and diversion, and other pertinent information are included where applicable.

The table of daily mean discharges is presented for May to July 1954. This period was chosen to show the relation of the flood discharges to the discharges of the preceding and the following periods. The table also shows the monthly mean discharge and the volume of runoff, in inches, and in acre feet.

The table of stages and discharges at indicated times is presented generally for the period from June 18 until such time as the recession reached the point where sufficient definition is furnished by the table of daily mean discharges. Central standard time is given throughout.

The stages were obtained from records of continuous water-stage recorders where available. For a station where the water-stage recorder was not functioning properly, the interrupted stage graph was completed on the basis of a floodmark or supplemental gage readings when available, and comparison with records on the same stream or nearby streams. For stations at which the records of stage consisted of one or more gage readings each day, a stage graph was drawn on the basis of these readings, floodmarks, and comparison with nearby stations. Details of the methods used in

defining the stage record are given in the section of the description concerning the gage-height record.

Records for several stations not published in the annual water-supply papers were included as a part of this report in order to present all available data on the flood area.

The stations are numbered and arranged in downstream order from headwater to mouth, with stations on tributaries inserted in corresponding order, and following the order in which the tributaries enter the main stream. Stations on streams tributary to the Mississippi River are shown first, beginning with the Wapsipinicon River at Independence, Iowa. Tributaries to the Missouri River which were affected by this flood are then presented in their proper downstream order. Records for streams on the fringe of the flooded area are included as well as for streams within the areas of intense flooding. Location of the gaging stations are shown by number on plate 1.

For other available published records of streamflow discussed in this report, reference may be made to the annual series of water-supply papers, part 5, Hudson Bay and upper Mississippi River basins, and parts 6A and 6B, Missouri River basin.

FLOODS OF JUNE IN IOWA

(8) East Fork Iowa River near Klemme, Iowa

Location.—Lat 43°01', long 93°37', between secs. 25 and 26, T. 95 N., R. 24 W., on upstream side of highway bridge, 1½ miles northwest of Klemme and 12½ miles upstream from confluence with West Fork Iowa River. Datum of gage is 1,180.13 ft above mean sea level, datum of 1929.

Drainage area.—120 sq mi, approximately.

Gage-height record.—Wire-weight gage read once daily except June 18, 19, 21. Gage heights for June 18-30 computed from graph based on daily gage readings, floodmarks, and occasional readings by engineer.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 5,960 cfs 2 a. m. June 19 (gage height, 11.2 ft, from flood-mark).

1948 to April 1954: Discharge, 3,440 cfs June 26, 1951 (gage height, 10.80 ft).

Maximum stage known prior to April 1948, about 10 ft in June 1944, from information by local residents.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	17	23	240	11	20	20	130	21	14	3,880	53	
2	84	34	215	12	20	18	97	22	14	2,140	58	
3	92	44	385	13	18	17	87	23	14	1,280	47	
4	57	51	318	14	15	17	71	24	14	888	44	
5	45	44	215	15	15	16	66	25	14	697	40	
6	45	39	200	16	15	16	61	26	17	614	39	
7	34	29	220	17	14	17	51	27	22	536	37	
8	30	29	185	18	14	1,780	49	28	28	442	37	
9	27	22	165	19	14	3,640	47	29	33	363	39	
10	22	18	150	20	14	2,110	47	30	29	291	41	
								31	26		42	
Monthly mean discharge, in cubic feet per second.....										27.0	637	112
Runoff, in acre-feet										1,660	37,910	6,890
Runoff, in inches										0.26	5.92	1.08

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge			
June 18														
4	3.48	128	6	9.18	2,100	N	9.17	2,080	N	6.64	538			
8	5.52	358	N	9.12	2,020	12	8.73	1,610	12	6.36	484			
N	7.64	823	4	9.07	1,960	June 23								
4	9.40	2,360	8	9.05	1,940	N	8.36	1,250	N	6.08	442			
8	10.44	4,120	12	9.80	2,920	12	8.05	1,030	12	5.81	402			
12	11.15	5,820	June 21											
June 19														
2	11.20	5,960	4	10.63	4,550	12	7.50	760	12	5.31	326			
4	11.08	5,630	6	10.74	4,820	June 25								
8	10.45	4,140	8	10.72	4,770	N	7.27	691	N	5.05	288			
N	9.88	3,050	N	10.48	4,200	12	7.12	646	12	4.82	262			
4	9.56	2,550	4	10.20	3,640	June 26								
8	9.37	2,320	8	9.94	3,140	N	7.01	613						
12	9.27	2,200	12	9.73	2,810	12	6.87	584						

FLOODS OF 1954

(9) Iowa River near Rowan, Iowa

Location.—Lat 42°45'35", long 93°37'20", in NE¼ sec. 25, T. 92 N., R. 24 W., on left bank 10 ft downstream from highway bridge, 3½ miles northwest of Rowan, and 10¼ miles downstream from confluence of East and West Forks. Datum of gage is 1,143.35 ft above mean sea level, datum of 1929.

Drainage area.—396 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used June 19-23.

Maxima.—May-July 1954: Discharge, 8,460 cfs 8 p. m. June 21 (gage height, 14.88 ft).
1940 to April 1954: Discharge, 5,610 cfs June 28, 1951 (gage height, 13.18 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	160	166	1,140	11	106	120	426	21	53	7,640	191
2	264	153	930	12	98	372	379	22	52	7,330	188
3	357	190	810	13	90	243	330	23	52	5,310	182
4	340	248	780	14	82	274	320	24	55	3,920	170
5	264	236	810	15	76	201	277	25	60	3,140	156
6	210	196	705	16	70	198	252	26	60	2,740	143
7	172	162	582	17	65	188	236	27	71	2,480	129
8	147	135	534	18	61	989	228	28	357	2,200	122
9	129	115	510	19	59	5,790	210	29	400	1,830	126
10	117	118	486	20	56	6,700	196	30	280	1,450	129
								31	192		129
Monthly mean discharge, in cubic feet per second.....									147	1,828	381
Runoff, in acre-feet.....									9,030	108,800	23,420
Runoff, in inches.....									0.43	5.15	1.11

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 18			June 19			June 20			June 21	
4	4.24	171	2	11.78	3,580	8	13.98	6,130	12	14.10	6,350
6	4.56	219	4	12.18	4,260	12	14.04	6,240		June 23	
8	5.19	321	6	12.55	4,850	4	14.19	6,530	6	13.75	5,740
10	6.23	511	8	12.74	5,130	8	14.51	7,180	6	12.98	4,820
N	7.19	718	N	13.25	6,080	N	14.75	7,900	12	12.66	4,480
2	8.01	953	4	13.59	6,780	4	14.86	8,420		June 24	
4	8.74	1,200	8	13.98	7,270	8	14.88	8,460	N	12.14	3,900
6	9.37	1,520	12	14.21	7,300	12	14.85	8,400	12	11.76	3,410
8	10.08	1,960		June 20			June 22			June 25	
10	10.78	2,520	6	14.30	7,340	6	14.73	7,860	N	11.48	3,120
12	11.34	3,030	N	14.19	6,530	N	14.56	7,270	12	11.24	2,890
			4	14.07	6,300	6	14.36	6,820			

FLOODS OF JUNE IN IOWA

(11) Iowa River at Marshalltown, Iowa

Location.—Lat 42°04', long 92°54', in SW $\frac{1}{4}$ sec. 24, T. 84 N., R. 18 W., on right bank in city park in Marshalltown, 300 ft upstream from Burnett Creek, 0.2 mile downstream from bridge on State Route 14, 2 miles upstream from Linn Creek, and at mile 189. Records include flow of Burnett Creek. Datum of gage is 853.10 ft above mean sea level, datum of 1929.

Drainage area.—1,530 sq mi, approximately, including that of Burnett Creek.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 11,200 cfs 8:30 p. m. June 16 (gage height, 16.02 ft).

1915-27, 1933 to April 1954: Discharge, 42,000 cfs June 4, 1918 (gage height, 17.74 ft), from rating curve extended above 19,000 cfs.

Remarks.—Some diurnal fluctuation caused by powerplant at Iowa Falls.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	420	3,600	2,490	11	465	7,850	815	21	220	2,130	390
2	747	5,010	2,070	12	455	4,280	765	22	210	5,370	390
3	1,360	2,670	1,820	13	390	2,190	705	23	202	7,600	363
4	1,130	2,020	1,600	14	345	1,770	630	24	210	9,400	354
5	990	1,640	1,400	15	339	1,740	585	25	207	9,400	330
6	885	1,360	1,200	16	324	7,640	510	26	189	8,100	309
7	750	1,160	1,130	17	283	7,020	465	27	248	6,340	274
8	645	990	1,100	18	274	2,810	465	28	525	4,780	223
9	570	920	1,020	19	256	1,870	450	29	955	3,590	220
10	510	3,100	920	20	234	1,560	435	30	832	2,880	205
								31	832		202
Monthly mean discharge, in cubic feet per second.....									516	4,026	769
Runoff, in acre-feet									31,700	239,600	47,280
Runoff, in inches									0.39	2.94	0.58

(12) Timber Creek near Marshalltown, Iowa

Location.—Lat 42°00'30", long 92°51'10", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 83 N., R. 17 W., 20 ft downstream from bridge on U. S. Highway 30 and about 3 miles southeast of Marshalltown.

Drainage area.—117 sq mi.

Gage-height record.—Water-stage recorder graph except for period 6 a. m. to 6 p. m. June 10 when recorder was not functioning properly. Gage height for this period estimated on basis of engineer's readings of wire-weight gage.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 1-2.

Maximum.—May-July 1954: Discharge, 2,270 cfs 2 p. m. June 10 (gage height, 13.47 ft, from graph based on gage readings).

Remarks.—Gage-height record and discharge measurements furnished by Corps of Engineers.

Discharge records computed for the flood period only, no previous records computed.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	32	502	26	11	17	310	14	21	12	196	12
2	106	152	24	12	16	115	13	22	11	237	11
3	148	320	24	13	15	84	12	23	12	76	11
4	49	164	23	14	14	119	12	24	12	75	11
5	36	105	22	15	14	114	11	25	12	79	10
6	28	94	20	16	13	807	10	26	12	61	9.4
7	22	71	19	17	12	210	10	27	14	42	9.4
8	22	57	18	18	12	92	11	28	57	35	9.8
9	20	52	17	19	12	74	11	29	35	32	9.6
10	19	1,320	15	20	12	66	12	30	20	29	9.0
								31	73		9.0
Monthly mean discharge, in cubic feet per second.....									28.7	190	14.0
Runoff, in acre-feet									1,760	11,290	863
Runoff, in inches									0.28	1.81	0.14

FLOODS OF 1954

(13) Iowa River near Belle Plaine, Iowa

Location.—Lat 41°51'20", long 92°14'20", in NW¼ sec. 5, T. 81 N., R. 12 W., on right bank 5 ft downstream from bridge on State Route 212, 0.5 mile downstream from Walnut Creek, and 2.7 miles south of Belle Plaine. Datum of gage is 749.82 ft above mean sea level, datum of 1929.

Drainage area.—2,420 sq mi, approximately, includes that of Salt Creek.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 1-12, June 1-7, 11-18, 21-24, 30, July 1-31.

Maxima.—May-July 1954: Discharge, 10,700 cfs 3:30 a. m. June 28 (gage height, 14.50 ft).

1939 to April 1954: Discharge, 34,000 cfs June 14, 1947 (gage height, 17.07 ft).

Flood of June 5, 1918, reached a stage of 17.9 ft (discharge, 43,000 cfs).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	1,460	2,480	4,860	11	922	2,620	1,240	21	461	3,680	645
2	1,510	2,830	3,360	12	810	3,600	1,140	22	444	4,100	605
3	2,010	4,100	2,690	13	745	4,200	1,040	23	444	4,100	585
4	2,270	4,300	2,340	14	685	5,380	990	24	415	4,300	548
5	2,010	4,300	2,140	15	605	5,240	922	25	405	4,980	530
6	1,690	3,120	1,880	16	565	3,120	852	26	398	6,660	495
7	1,460	2,410	1,650	17	548	3,440	788	27	405	9,620	478
8	1,290	2,010	1,510	18	512	3,680	725	28	461	10,100	461
9	1,120	1,750	1,400	19	478	6,420	685	29	530	8,730	444
10	990	1,570	1,340	20	461	7,420	665	30	900	6,420	418
								31	990		402
Monthly mean discharge, in cubic feet per second.....									903	4,556	1,219
Runoff, in acre-feet.....									55,520	271,100	74,950
Runoff, in inches.....									0.43	2.10	0.58

(14) Iowa River at Iowa City, Iowa

Location.—Lat 41°39'30", long 91°32'20", in SE¼ sec. 9, T. 79 N., R. 6 W., on right bank 25 ft downstream from University of Iowa hydraulics laboratory in Iowa City, 175 ft downstream from University dam, 1.5 miles upstream from Ralston Creek, 3.3 miles downstream from Clear Creek, and at mile 74.2. Datum of gage is 627.27 ft above mean sea level, datum of 1929.

Drainage area.—3,230 sq mi, approximately.

Gage-height record.—Water-stage recorder graph. No gage-height record May 30-31.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 7,690 cfs 4 a. m. July 3 (gage height, 8.31 ft).

1903 to April 1954: Discharge, 36,200 cfs June 7, 1918 (gage height, 19.45 ft, site and datum then in use).

Floods of 1851 and 1881 exceeded flood of 1918, stage and discharge not known.

Remarks.—Low flow regulated by powerplants above station.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	2,010	1,850	5,990	11	1,210	1,890	1,490	21	514	4,200	730
2	2,200	3,100	7,300	12	1,050	1,930	1,410	22	525	4,800	702
3	2,290	3,370	7,560	13	980	2,920	1,250	23	476	4,900	675
4	2,290	3,910	6,820	14	910	3,370	1,170	24	548	5,110	655
5	2,160	4,100	4,000	15	850	3,820	1,090	25	446	4,600	625
6	2,200	4,200	2,740	16	790	4,100	1,020	26	495	4,200	582
7	1,850	4,100	2,290	17	730	4,100	945	27	445	4,300	589
8	1,690	3,190	1,980	18	675	3,640	880	28	753	4,400	576
9	1,490	2,560	1,770	19	635	3,640	820	29	665	4,700	532
10	1,330	2,200	1,610	20	580	3,910	670	30	800	5,110	460
								31	1,000		444
Monthly mean discharge, in cubic feet per second.....									1,116	3,741	1,915
Runoff, in acre-feet.....									68,600	222,600	117,800
Runoff, in inches.....									0.40	1.29	0.68

FLOODS OF JUNE IN IOWA

(15) Cedar River at Janesville, Iowa

Location.—Lat 42°39', long 92°28', in NE¼ sec. 35, T. 91 N., R. 14 W., on left bank 300 ft downstream from highway bridge at Janesville and 3 miles upstream from Shell Rock River.

Drainage area.—1,660 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 18,400 cfs 12 p.m. June 22 (gage height, 12.08 ft).

1905-6, 1915-27, 1932-42, 1946 to April 1954: Discharge, 30,400 cfs Apr. 1, 1933 (gage height, 15.43 ft, site then in use).

Flood of Mar. 17, 1945, reached a stage of 16.2 ft, from floodmark at site 300 ft upstream (discharge, 34,300 cfs).

Remarks.—Diurnal fluctuation during low water caused by powerplant at Waverly, 9 miles upstream.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	1,370	966	1,220	11	889	485	690	21	414	8,280	411	
2	1,540	821	1,150	12	753	552	572	22	304	16,700	430	
3	2,330	886	1,160	13	650	424	657	23	382	17,300	428	
4	2,990	902	1,260	14	564	257	539	24	272	12,900	524	
5	2,630	854	980	15	584	338	332	25	424	6,540	494	
6	2,220	763	830	16	562	313	451	26	375	3,640	297	
7	1,560	538	920	17	340	536	359	27	350	2,310	411	
8	1,170	719	906	18	533	1,170	526	28	591	1,710	364	
9	980	595	805	19	340	2,280	304	29	775	1,550	351	
10	777	596	730	20	404	3,690	363	30	746	1,370	455	
								31	812		547	
Monthly mean discharge, in cubic feet per second.....										924	2,999	628
Runoff, in acre-feet										56,790	178,400	38,610
Runoff, in inches										0.64	2.02	0.44

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	N	4.72	3,810			June 23			June 26
4	2.11	840	4	5.04	4,220	4	12.04	18,300	6	4.90	4,040
8	2.29	1,020	8	5.30	4,560	8	11.93	18,000	N	4.69	3,770
N	2.45	1,180	12	5.60	4,950	N	11.73	17,500	6	4.18	3,150
4	2.57	1,310			June 21	4	11.53	16,900	12	3.87	2,770
8	2.75	1,500	4	6.07	5,580	8	11.27	16,200			June 27
12	2.96	1,740	8	6.67	6,420	12	11.01	15,500	N	3.49	2,320
		June 19	N	7.45	7,720			June 24	12	3.04	1,820
4	3.18	1,980	4	8.40	9,500	6	10.58	14,400			June 28
8	3.42	2,240	8	9.32	11,400	N	10.04	13,100	N	2.92	1,690
N	3.57	2,410	12	10.08	13,200	6	9.29	11,400	12	2.86	1,630
4	3.68	2,550			June 22	12	8.47	9,640			June 29
8	3.56	2,400	4	10.72	14,800			June 25	N	2.84	1,600
12	3.56	2,400	8	11.28	16,200	6	7.50	7,810	12	2.62	1,360
		June 20	N	11.66	17,300	N	6.50	6,180			June 30
4	3.78	2,660	4	11.87	17,800	6	5.73	5,120	N	2.72	1,470
8	4.22	3,190	8	12.04	18,300	12	5.22	4,460	12	2.45	1,180
			12	12.08	18,400						

FLOODS OF 1954

(16) Shell Rock River near Northwood, Iowa

Location.—Lat $43^{\circ}25'$, long $93^{\circ}13'$, between secs. 4 and 9, T. 99 N., R. 20 W., near center of span on downstream side of highway bridge, 1 mile south of Northwood, and about 85 miles upstream from mouth. Datum of gage is 1,176.48 ft above mean sea level, datum of 1929.

Drainage area.—380 sq mi, approximately.

Gage-height record.—Wire-weight gage read once daily; more often at high stages. Gage heights June 18-30 computed from graph based on daily gage readings. No gage-height record May 9, 23, 30, June 6, 13, July 4, 9, 11, 18, 25.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 1,360 cfs 9 a. m. June 22 (gage height, 7.96 ft, observed). 1948 to April 1954: Discharge, 2,430 cfs Apr. 10, 1951; gage height, 11.38 ft Apr. 7, 1951 (ice jam).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	272	245	465	11	168	102	120	21	49	1,340	58
2	327	228	405	12	152	102	105	22	48	1,360	55
3	405	225	378	13	138	90	84	23	50	1,300	51
4	420	232	320	14	118	80	84	24	59	1,200	49
5	363	208	278	15	104	75	74	25	107	1,080	45
6	327	180	250	16	98	102	72	26	95	930	41
7	278	150	215	17	87	92	68	27	111	858	38
8	260	146	178	18	80	411	60	28	272	758	59
9	220	128	160	19	61	1,100	53	29	260	670	51
10	191	120	142	20	61	1,240	51	30	255	562	47
								31	250		47
Monthly mean discharge, in cubic feet per second.....									183	510	132
Runoff, in acre-feet.....									11,280	30,370	8,140
Runoff, in inches.....									0.56	1.50	0.40

FLOODS OF JUNE IN IOWA

(17) Lime Creek at Mason City, Iowa

Location.—Lat 43°10', long 93°11', in sec. 3, T. 96 N., R. 20 W., on right bank 650 ft upstream from 13th Street bridge in Mason City and 0.5 mile upstream from Willow Creek. Datum of gage is 1,069.59 ft above mean sea level, datum of 1929.

Drainage area.—535 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 7,060 cfs 5 a. m. June 21 (gage height, 11.85 ft).

1932 to April 1954: Discharge, 9,400 cfs Mar. 30, 1933 (gage height, 15.70 ft, present datum).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	437	289	750	11	179	121	271	21	92	6,280	161
2	546	255	656	12	161	124	240	22	84	4,350	154
3	750	277	875	13	144	111	211	23	89	2,860	147
4	568	301	850	14	134	100	195	24	111	2,350	134
5	451	271	722	15	127	103	179	25	130	1,940	124
6	367	230	563	16	114	215	168	26	150	1,580	114
7	307	199	465	17	105	172	161	27	158	1,340	108
8	255	164	388	18	103	2,970	158	28	230	1,160	137
9	215	140	332	19	100	3,810	150	29	451	1,030	172
10	199	130	307	20	97	4,330	147	30	430	889	175
								31	339		179
Monthly mean discharge, in cubic feet per second.....										246	303
Runoff, in acre-feet										15,120	18,630
Runoff, in inches										0.53	0.65

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
	June 18									June 24	
2	1.94	195	2	7.60	3,520	10	11.21	6,490	N	5.83	2,350
4	2.12	277	4	7.85	3,700	N	10.77	6,090	N	5.50	2,150
6	2.72	651	6	8.10	3,880	2	10.38	5,740	12	June 25	
8	4.50	1,550	8	8.23	3,980	4	10.27	5,640			
10	6.86	3,000	10	8.34	4,070	6	10.50	5,850	N	5.15	1,940
N	8.00	3,800	12	8.43	4,140	8	10.57	5,910	12	4.81	1,740
2	9.76	4,730	June 20			10	10.50	5,850	June 26		
4	10.57	4,820	4	8.53	4,220	12	10.33	5,700	N	4.54	1,570
6	10.62	4,860	N	8.43	4,140	June 22			12	4.31	1,450
8	10.24	4,710	4	8.22	3,980	4	9.76	5,210	June 27		
10	9.72	4,700	6	8.04	3,830	8	9.18	4,740	N	4.11	1,340
12	9.21	4,530	8	7.93	3,750	N	8.61	4,290	12	3.91	1,240
	June 19		8	9.20	4,760	4	8.07	3,860	June 28		
2	8.70	4,360	10	10.33	5,700	8	7.62	3,530	N	3.74	1,160
4	8.23	3,980	12	11.05	6,340	12	7.27	3,290	12	3.58	1,080
6	7.81	3,670	June 21			June 23			June 29		
8	7.49	3,440	2	11.66	6,890	6	6.89	3,020	N	3.49	1,040
10	7.46	3,420	4	11.83	7,050	N	6.62	2,830	12	3.36	977
N	7.43	3,400	5	11.85	7,060	6	6.38	2,680	June 30		
			6	11.82	7,040	12	6.18	2,560	N	3.18	890
			8	11.61	6,850	12			12	3.00	800

FLOODS OF 1954

(18) Shell Rock River at Shell Rock, Iowa

Location.—Lat 42°42'35", long 92°35'05", in NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 11, T. 91 N., R. 15 W., on right bank 400 ft upstream from bridge on State Route 3 in Shell Rock and 11 miles upstream from mouth.

Datum of gage is 885.34 ft above mean sea level, datum of 1929.

Drainage area.—1,770 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used July 13-31.

Maxima.—May-July 1954: Discharge, 21,300 cfs 9:30 a. m. June 22 (gage height, 14.00 ft).

June 1953 to April 1954: Discharge, 4,720 cfs Aug. 4, 1953 (gage height, 8.79 ft).

Flood of 1856 reached a stage of 17.7 ft, from floodmark, furnished by Corps of Engineers at bridge 400 ft downstream (discharge not determined).

Remarks.—Some regulation at low stages from powerplant at Greene.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	725	1,020	2,340	11	750	510	1,100	21	349	11,400	425
2	1,350	908	2,130	12	675	460	1,010	22	341	19,100	565
3	1,670	881	2,000	13	640	700	902	23	341	12,100	550
4	1,670	886	2,270	14	590	535	825	24	280	7,120	530
5	1,620	919	2,130	15	420	470	750	25	324	5,300	495
6	1,380	850	1,870	16	510	720	675	26	358	4,500	460
7	1,180	760	1,680	17	375	1,100	635	27	460	3,810	425
8	1,040	670	1,440	18	371	3,680	620	28	625	3,300	425
9	930	605	1,290	19	380	9,830	585	29	958	2,900	405
10	825	510	1,200	20	358	10,200	565	30	1,120	2,630	500
								31	1,120		775
Monthly mean discharge, in cubic feet per second.....									779	3,612	1,018
Runoff, in acre-feet									47,870	215,000	62,620
Runoff, in inches									0.51	2.28	0.66

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 18		6	11.78	11,100	4	13.65	19,400	12	8.13	4,120
4	3.98	1,140	12	11.89	11,500	8	13.29	17,600		June 27	
8	4.46	1,420		June 20		12	12.90	15,700	N	7.74	3,790
10	5.85	2,300	N	11.42	9,960		June 23		12	7.41	3,530
N	7.48	3,580	12	11.27	9,510	N	11.99	11,900		June 28	
2	8.48	4,470		June 21		12	11.04	8,820	N	7.10	3,280
4	9.17	5,280	N	11.57	10,400		June 24		12	6.88	3,100
6	9.64	5,900	6	12.13	12,400	N	10.20	6,900		June 29	
8	10.01	6,520	12	13.05	16,400	12	9.60	5,840	N	6.59	2,870
10	10.20	6,900		June 22			June 25		12	6.48	2,780
12	10.40	7,300	4	13.68	19,500	N	9.15	5,260		June 30	
	June 19		8	13.98	21,200	12	8.79	4,820	N	6.29	2,630
6	11.01	8,730	9:30	14.00	21,300		June 26		12	6.11	2,490
N	11.48	10,100	N	13.94	21,000	N	8.53	4,520			

FLOODS OF JUNE IN IOWA

(20) West Fork Shell Rock River at Finchford, Iowa

Location. --Lat 42°37'40", long 92°32'45", in SE¼ sec. 6, T. 90 N., R. 14 W., on downstream side of highway bridge in Finchford, 2.5 miles upstream from mouth. Datum of gage is 867.06 ft above mean sea level, datum of 1929.

Drainage area. --860 sq mi, approximately.

Gage-height record. --Wire-weight gage read once daily, more often at high stages. Gage heights

June 18-30 computed from graph based on daily gage readings.

Discharge record. --Stage-discharge relation defined by current-meter measurements.

Maxima. --May-July 1954: Discharge, 14,200 cfs 1 a. m. June 23 (gage height, 14.9 ft, from floodmark).

1945 to April 1954: Discharge, 31,900 cfs June 27, 1951 (gage height, 17.28 ft).

Flood of March 1929 reached a stage of about 14 ft, from information by local resident.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	352	694	1,420	11	340	292	520	21	193	7,880	234	
2	565	532	1,180	12	315	269	460	22	191	8,830	232	
3	810	517	1,050	13	315	287	415	23	186	11,200	212	
4	950	526	970	14	304	523	378	24	175	6,780	221	
5	1,050	572	930	15	280	747	328	25	168	4,720	205	
6	1,010	547	990	16	264	775	304	26	168	3,440	193	
7	740	466	890	17	248	910	292	27	175	2,790	175	
8	565	390	722	18	239	1,160	271	28	237	2,300	173	
9	475	338	652	19	221	2,260	253	29	264	2,030	157	
10	402	313	582	20	207	9,610	244	30	535	1,760	149	
								31	792		151	
Monthly mean discharge, in cubic feet per second,.....										411	2,449	482
Runoff, in acre-feet										25,260	145,700	29,660
Runoff, in inches										0.55	3.18	0.65

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 18			June 20			June 22			June 24	
N	7.07	1,120	4	12.85	7,440	6	12.57	6,770	6	14.11	10,800
12	7.79	1,460	8	14.07	11,100	N	12.67	7,010	12	13.21	8,390
	June 19			June 21			June 23			June 25	
6	8.26	1,720	6	13.92	10,600	8	14.55	12,800	N	12.50	6,600
N	8.88	2,060	12	13.55	9,360	12	14.88	14,100	12	11.97	5,540
6	9.68	2,600		June 21			June 23			June 25	
12	11.00	3,900	N	12.95	7,630	1	14.90	14,200	N	11.50	4,680
			12	12.62	6,890	6	14.62	13,100	12	11.05	3,980

FLOODS OF 1954

(21) Beaver Creek at New Hartford, Iowa

Location.—Lat $42^{\circ}35'$, long $92^{\circ}37'$, in SE $\frac{1}{4}$ sec. 28, T. 90 N., R. 15 W., on downstream side of highway bridge, a quarter of a mile north of New Hartford, and 8 miles upstream from mouth.

Drainage area.—350 sq mi, approximately.

Gage-height record.—Wire-weight gage read once daily, more often at high stages.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 3, 4, June 12, 12, 17, 22.

Maxima.—May-July 1954: Discharge, 1,990 cfs 2 p.m. June 17 (gage height, 8.55 ft, from graph based on gage readings).

1948 to April 1954: Discharge, 11,600 cfs Mar. 29, 1951 (gage height, 11.7 ft).

Mean discharge, in cubic feet per second, 1954

Day	May		June		July		August		September		October		November		December	
	Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge	Day	Discharge
1	115	198	115	11	71	1,070	59	21	38	327	40					
2	207	309	105	12	67	927	61	22	38	1,190	38					
3	420	269	96	13	63	232	57	23	37	589	38					
4	328	302	87	14	57	170	53	24	35	302	37					
5	207	234	85	15	53	155	50	25	38	250	35					
6	140	167	81	16	48	274	45	26	32	226	32					
7	111	140	83	17	45	1,480	43	27	34	212	29					
8	91	132	71	18	43	586	43	28	59	155	29					
9	79	123	67	19	42	386	42	29	120	139	28					
10	75	170	65	20	46	301	40	30	128	124	28					
								31	95		28					
Monthly mean discharge, in cubic feet per second.....									95.5	371	55.2					
Runoff, in acre-feet.....									5,870	22,090	3,390					
Runoff, in inches.....									0.31	1.18	0.18					

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 10	12	4.58	426	8	8.00	1,610	4	3.92	305
N	2.68	120		June 13		N	8.42	1,890	8	4.33	377
4	2.86	144	4	3.70	269	2	8.55	1,990	12	5.30	585
8	3.52	240	8	3.38	219	4	8.50	1,950		June 22	
12	4.60	430	N	3.50	207	8	7.70	1,440	4	6.66	1,010
		June 11	12	3.16	186	12	6.70	1,020	8	7.78	1,480
4	5.68	694		June 14			June 18		10	7.86	1,530
8	6.75	1,040	N	3.04	169	4	5.70	700	N	7.81	1,500
N	7.40	1,290	12	2.96	157	8	5.25	572	4	7.33	1,260
2	7.56	1,360		June 15		N	5.07	528	8	6.90	1,090
4	7.64	1,410	N	2.92	152	12	4.70	450	12	6.46	946
8	7.50	1,250	12	2.98	160		June 19			June 23	
12	6.82	994		June 16		N	4.36	382	6	5.82	738
		June 12	N	3.39	220	12	4.06	329	N	5.17	552
4	6.40	930	4	3.74	275		June 20		6	4.53	416
8	6.72	1,020	8	4.31	373	N	3.87	297	12	4.20	353
N	7.22	1,210	12	5.48	634	12	3.77	280		June 24	
4	6.70	1,020		June 17			June 21		N	3.86	295
8	5.60	670	4	6.95	1,110	N	3.80	285	12	3.68	266

FLOODS OF JUNE IN IOWA

(22) Blackhawk Creek at Hudson, Iowa

Location.--Lat 42°24'20", long 92°27'45", in NE $\frac{1}{4}$ sec. 27, T. 38 N., R. 14 W., on left bank 35 ft downstream from bridge on State Route 58 and 0.2 mile northwest of Chicago Great Western Railway tracks in the west edge of Hudson. Datum of gage is 865.03 ft above mean sea level, datum of 1929.

Drainage area.--295 sq mi.

Gage-height record.--Water-stage recorder graph.

Discharge record.--Stage-discharge relation defined by current-meter measurements.

Maxima.--May-July 1954: Discharge, 2,040 cfs 4 p. m. June 11 (gage height, 13.58 ft).

1952 to April 1954: Discharge, 2,100 cfs July 7, 1953; gage height, 15.46 ft Feb. 21, 1953 (ice jam).

Mean discharge, in cubic feet per second, 1954

Day	Mean discharge, in cubic feet per second, 1954				Mean discharge, in cubic feet per second, 1954				Mean discharge, in cubic feet per second, 1954						
	May	June	July	Day	May	June	July	Day	May	June	July	Day	May	June	July
1	333	517	94	11	89	1,640	51	21	43	184	30				
2	384	1,310	97	12	82	744	49	22	40	405	30				
3	711	786	89	13	75	325	46	23	40	277	28				
4	437	696	81	14	70	277	43	24	37	198	26				
5	262	454	76	15	66	219	39	25	34	161	25				
6	198	349	73	16	62	258	37	26	33	149	25				
7	160	285	70	17	56	421	34	27	43	139	24				
8	132	233	65	18	53	233	34	28	338	123	24				
9	111	240	62	19	48	191	33	29	505	113	23				
10	97	469	55	20	45	165	32	30	262	103	23				
								31	184		22				
Monthly mean discharge, in cubic feet per second.....									162	389	46.5				
Runoff, in acre-feet									9,980	23,130	2,860				
Runoff, in inches									0.63	1.47	0.18				

FLOODS OF 1954

(23) Cedar River at Waterloo, Iowa

Location.—Lat 42°30'00", long. 92°19'40", in NW¼ sec. 25, T. 89 N., R. 13 W., on left bank at foot of East Seventh Street, 0.3 mile upstream from Eleventh Avenue bridge, and 1 mile downstream from Blackhawk Creek. Datum of gage is 824.09 ft above mean sea level, datum of 1929.

Drainage area.—5,190 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 1-6, June 22-24.

Maxima.—May-July 1954: Discharge, 49,400 cfs 3 p. m. June 23 (gage height, 18.40 ft).

1941 to April 1954: Discharge, 56,400 cfs Apr. 9, 1951 (gage height, 18.83 ft).

Flood of March 1929 reached a stage of about 20 ft, determined by Corps of Engineers from information by city of Waterloo.

Remarks.—Diurnal fluctuation at low flow caused by powerplants above station.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	2,720	3,380	5,570	11	2,520	2,650	2,590	21	1,220	24,700	1,480	
2	3,860	3,710	4,890	12	2,410	3,380	2,230	22	1,200	31,900	1,380	
3	5,400	3,920	4,250	13	2,170	2,150	2,210	23	1,130	47,300	1,530	
4	7,370	3,650	4,570	14	1,950	1,990	2,040	24	1,220	39,400	1,510	
5	6,760	3,300	4,410	15	1,830	1,910	1,810	25	925	25,800	1,510	
6	6,250	3,000	3,950	16	1,590	2,060	1,650	26	1,150	15,900	1,420	
7	4,570	2,610	3,680	17	1,380	3,050	1,570	27	1,250	11,300	1,240	
8	3,800	2,370	3,380	18	1,310	4,730	1,610	28	1,890	8,760	1,400	
9	3,100	2,210	3,050	19	1,340	8,060	1,570	29	2,450	7,470	1,270	
10	2,740	2,120	2,780	20	1,220	15,000	1,460	30	2,720	6,520	1,240	
								31	3,020		1,510	
Monthly mean discharge, in cubic feet per second.....										2,660	9,810	2,412
Runoff, in acre-feet										163,600	583,700	148,300
Runoff, in inches										0.59	2.11	0.54

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	
		June 19	N	12.84	25,200	N	18.34	49,000	N		June 26	
	N	7.86	8,150	6	12.95	25,600	3	18.40	49,400	N	10.01	15,500
12		8.62	10,700	12	13.10	26,200	8	18.28	48,900	12	9.31	13,100
		June 20		June 22		12	17.98	47,200			June 27	
6		9.12	12,400	6	13.40	27,200		June 24	N	8.77	11,200	
N		9.71	14,400	N	14.25	30,500	N	16.41	39,000	12	8.36	9,850
6		10.57	17,400	6	15.54	36,100	12	14.66	32,400		June 28	
12		11.67	21,100	12	16.84	41,300		June 25	N	8.01	8,660	
		June 21		June 23		N	12.91	25,500	12	7.77	7,850	
6		12.56	24,200	6	17.85	46,500	12	11.22	19,600			

FLOODS OF JUNE IN IOWA

(24) Cedar River at Cedar Rapids, Iowa

Location.—Lat 41°58'15", long 91°40'05", in sec. 28, T. 83 N., R. 7 W., on right bank 500 ft upstream from Eighth Avenue bridge in Cedar Rapids, 2.7 miles upstream from Prairie Creek, and at mile 80.5. Datum of gage is 700.33 ft above mean sea level, datum of 1929.

Drainage area.—6,640 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 41,400 cfs 8:30 a. m. June 26 (gage height, 14.02 ft).

1903 to April 1954: Discharge, 72,000 cfs Mar. 19, 1929 (gage height, 20.1 ft).

Flood of June 1851 reached a stage of about 20 ft.

Remarks.—Diurnal fluctuation at low stages caused by powerplant half a mile above station.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	5,220	5,290	8,530	11	3,570	3,380	3,540	21	1,610	7,690	1,910
2	5,040	5,040	7,390	12	3,070	3,190	3,250	22	1,500	10,300	1,830
3	5,760	5,760	6,480	13	2,960	3,960	2,960	23	1,520	14,000	1,760
4	6,120	6,440	5,760	14	2,720	4,100	2,640	24	1,470	21,400	1,720
5	6,660	5,580	5,400	15	2,480	2,960	2,570	25	1,420	34,900	1,740
6	7,390	4,830	5,400	16	2,300	2,690	2,370	26	1,400	40,000	1,740
7	6,840	4,340	5,040	17	2,110	2,600	2,110	27	1,360	31,900	1,660
8	6,120	3,850	4,690	18	1,950	2,640	2,010	28	2,050	22,100	1,570
9	4,860	3,250	4,240	19	1,720	3,960	1,950	29	2,220	15,100	1,470
10	4,060	3,540	3,920	20	1,660	5,400	1,870	30	2,500	11,000	1,570
								31	2,880		1,420
Monthly mean discharge, in cubic feet per second.....									3,308	9,700	3,242
Runoff, in acre-feet									203,400	577,200	199,400
Runoff, in inches									0.57	1.63	0.56

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 23			June 25			13.47	39,200	12	8.03	18,000
N	6.94	13,800	N	12.64	35,900	12	12.95	37,100			June 29
12	7.75	16,900	12	13.85	40,700			June 27	N	7.23	14,900
	June 24			June 26			11.66	31,900	12	6.62	12,600
N	8.75	20,700	6	13.97	41,200	12	10.31	26,600			June 30
12	10.45	27,200	8:30	14.02	41,400			June 28	N	6.17	10,900
			N	13.81	40,500	N	9.08	21,900	12	5.78	9,400

FLOODS OF 1954

(25) Cedar River near Conesville, Iowa

Location. --Lat 41°24'30", long 91°17'25", in SW $\frac{1}{4}$ sec. 2, T. 76 N., R. 4 W., on downstream side of highway bridge, 3 $\frac{1}{2}$ miles northeast of Conesville, 5 miles downstream from Wapsinonc Creek, and at mile 9.5. Datum of gage is 581.85 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).

Drainage area. --7,840 sq mi, approximately.

Gage-height record. --Water-stage recorder except May 1 to July 1 when wire-weight gage on downstream side of highway bridge, 150 ft upstream from recording gage, was read once daily.

Discharge record. --Stage-discharge relation defined by current-meter measurements. Shifting-control method used June 23 to July 1.

Maxima. --May-July 1954: Discharge, 36,600 cfs 6 p. m. June 28 (gage height, 14.80 ft, from graph based on gage readings).

1939 to April 1954: Discharge, 60,000 cfs June 18, 1947 (gage height, 15.35 ft).

Maximum stage known, 16 ft in March 1929, determined by Corps of Engineers from information by local residents.

Mean discharge, in cubic feet per second, 1954

Day	May			June			July					
	Day	May	June	Day	May	June	Day	May	June	July		
1		3,280	4,910	20,000	11	5,250	4,740	4,860	21	2,580	6,500	2,600
2		6,100	8,350	12,000	12	4,570	4,740	4,520	22	2,520	7,900	2,540
3		7,500	8,600	9,200	13	4,120	4,260	4,200	23	2,460	10,100	2,410
4		7,300	8,350	8,020	14	3,840	4,260	3,880	24	2,460	11,700	2,410
5		7,300	8,600	7,170	15	3,700	4,910	3,560	25	2,400	13,500	2,290
6		7,300	7,900	6,560	16	3,490	4,570	3,410	26	2,400	17,100	2,290
7		7,700	6,700	6,160	17	3,280	4,120	3,200	27	2,520	26,100	2,230
8		7,700	5,930	5,960	18	3,070	3,840	2,990	28	2,820	35,700	2,230
9		7,100	5,420	5,580	19	2,880	3,840	2,800	29	3,490	35,700	2,170
10		6,100	4,910	5,220	20	2,700	4,570	2,660	30	3,560	27,000	2,060
									31	3,560		2,000
Monthly mean discharge, in cubic feet per second.....										4,356	10,160	4,748
Runoff, in acre-feet.....										267,900	604,600	291,900
Runoff, in inches.....										0.64	1.45	0.70

Skunk River basin

(26) Skunk River near Ames, Iowa

Location.—Lat 42°04'06", long 93°37'02", in SW¼ sec. 23, T. 84 N., R. 24 W., on left bank 2½ miles north of Ames, 3½ miles downstream from Keigley Branch, and 5 miles upstream from Squaw Creek. Datum of gage is 893.6 ft above mean sea level, datum of 1929 (Iowa Highway Commission bench mark).

Drainage area.—322 sq mi.

Gage-height record.—Water-stage recorder graph except for period 6 a. m. June 2 to 10 p. m.

June 10, for which graph was estimated on basis of recorded range in stage and weather records.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 8,630 cfs 11 p. m. June 10 (gage height, 13.66 ft).

1920-27, 1933 to April 1954: Discharge, 8,060 cfs May 20, 1944 (gage height, 13.90 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	139	2,380	148	11	69	5,760	44	21	34	1,130	33
2	284	1,210	150	12	63	2,920	40	22	33	1,540	20
3	464	960	112	13	58	2,100	33	23	31	1,050	18
4	298	694	101	14	53	1,650	28	24	28	720	16
5	195	502	90	15	50	1,410	25	25	26	535	14
6	142	360	80	16	48	1,960	21	26	22	403	12
7	118	267	73	17	45	1,610	19	27	33	316	10
8	99	207	63	18	44	1,190	20	28	969	255	9.4
9	86	170	58	19	42	900	23	29	628	211	8.0
10	76	2,500	51	20	38	697	21	30	311	174	7.3
								31	362		7.7
Monthly mean discharge, in cubic feet per second.....									158	1,189	43.1
Runoff, in acre-feet.....									9,690	70,770	2,650
Runoff, in inches.....									0.56	4.12	0.15

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 10		10	11.24	6,140		June 15			June 19	
4	2.99	157	N	10.72	5,650	N	5.18	1,330	N	4.48	909
8	2.99	157	2	10.36	5,320	4	5.14	1,300	12	4.25	782
N	3.41	325	4	9.88	4,890	8	5.45	1,490		June 20	
1	4.08	689	6	9.42	4,480	12	5.67	1,640	N	4.09	694
2	5.08	1,270	8	9.02	4,120		June 16		12	3.95	618
3	6.38	2,120	10	8.68	3,840	4	5.96	1,820		June 21	
4	7.63	3,020	12	8.37	3,600	8	6.22	2,000	6	4.27	794
5	8.83	3,960		June 12		N	6.21	2,000	N	4.91	1,170
6	10.10	5,090	4	7.92	3,240	4	6.25	2,020	6	5.33	1,420
7	10.98	5,880	8	7.55	2,960	8	6.34	2,090	12	5.75	1,690
8	11.88	6,780	N	7.22	2,720	12	6.16	1,960		June 22	
9	12.68	7,580	4	7.02	2,560		June 17		N	5.58	1,580
10	13.38	8,320	8	6.85	2,440	6	5.89	1,770	12	5.13	1,300
11	13.66	8,630	12	6.70	2,340	N	5.58	1,580		June 23	
12	13.54	8,490		June 13		6	5.34	1,420	N	4.66	1,020
	June 11		N	6.35	2,100	12	5.28	1,390	12	4.37	848
2	12.98	7,880	12	5.98	1,840		June 18			June 24	
4	12.45	7,350		June 14		N	4.93	1,180	N	4.11	706
6	12.00	6,900	N	5.69	1,650	12	4.64	1,000	12	3.95	618
8	11.63	6,530	12	5.41	1,470						

FLOODS OF 1954

(29) Skunk River below Squaw Creek, near Ames, Iowa

Location.—Lat 42°00'30", long 93°35'40", in NE¼NW¼ sec. 13, T. 83 N., R. 24 W., on right bank 15 ft downstream from highway bridge, a quarter of a mile downstream from Squaw Creek, 1 mile downstream from bridge on U. S. Highway 30, and about 2 miles southeast of Ames.

Drainage area.—565 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 7,980 cfs 8 a. m. June 11 (gage height, 11.92 ft).

October 1952 to April 1954: Discharge, 1,620 cfs May 1, 1953 (gage height, 5.47 ft).

Flood of May 19, 1944, reached a stage of 13 ft.

Mean discharge, in cubic feet per second, 1954

Day	1954			Day	1954			Day	1954		
	May	June	July		May	June	July		May	June	July
1	231	4,790	260	11	105	7,020	77	21	39	2,430	71
2	435	2,360	229	12	93	3,860	71	22	38	3,440	71
3	708	1,970	205	13	84	2,650	64	23	39	1,920	49
4	498	1,320	181	14	77	2,080	56	24	43	1,200	41
5	318	876	160	15	69	1,830	51	25	39	864	34
6	243	627	142	16	60	2,980	45	26	39	672	30
7	193	465	123	17	54	2,290	43	27	58	543	25
8	162	348	107	18	49	1,610	39	28	1,480	444	24
9	142	286	96	19	47	1,210	45	29	1,040	369	21
10	121	2,050	89	20	43	994	43	30	532	306	18
								31	450		17
Monthly mean discharge, in cubic feet per second.....									243	1,793	81.5
Runoff, in acre-feet.....									14,930	106,700	5,010
Runoff, in inches.....									0.50	3.54	0.17

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 10	6	7.69	3,250			June 17	2	7.02	2,760
4	1.82	253	12	7.35	3,000	N	6.29	2,250	4	7.21	2,900
8	1.96	289			June 13	12	5.68	1,860	6	7.39	3,020
10	2.88	578	N	6.85	2,640			June 18	8	7.62	3,200
N	4.80	1,270	12	6.38	2,320	N	5.24	1,610	10	7.94	3,450
2	6.03	2,070			June 14	12	4.80	1,370	12	8.15	3,640
4	7.07	2,800	N	6.05	2,080			June 19			June 22
6	7.99	3,490	12	5.66	1,850	N	4.46	1,200	4	8.19	3,670
8	9.25	4,650			June 15	12	4.16	1,060	8	8.27	3,740
10	10.11	5,530	N	5.40	1,700			June 20	N	8.35	3,820
12	10.62	6,140	4	5.30	1,640	6	4.03	1,010	4	7.88	3,390
		June 11	8	5.80	1,930	N	3.90	960	8	7.25	2,920
4	11.51	7,360	12	6.55	2,440	6	3.96	984	12	6.76	2,580
8	11.92	7,980			June 16	12	3.95	980			June 23
N	11.77	7,700	4	7.30	2,960			June 21	6	6.15	2,160
4	11.28	7,020	8	7.56	3,150	2	4.59	1,260	N	5.69	1,860
8	10.70	6,240	N	7.60	3,180	4	4.91	1,430	6	5.33	1,660
12	10.03	5,440	4	7.40	3,030	6	5.40	1,700	12	4.93	1,440
		June 12	8	7.27	2,940	8	6.17	2,170			June 24
6	8.90	4,310	12	7.09	2,810	10	6.52	2,410	N	4.42	1,190
N	8.16	3,640				N	6.78	2,600	12	4.01	1,000

FLOODS OF JUNE IN IOWA

(30) Skunk River near Oskaloosa, Iowa

Location.—Lat 41°21'10", long. 92°39'20", in SW¼ sec. 25, T. 76 N., R. 16 W., on right bank 300 ft upstream from bridge on U. S. Highway 63 and 4 miles north of Oskaloosa.

Drainage area.—1,640 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 31 to July 31.

Maxima.—May-July 1954: Discharge, 5,420 cfs 3 p.m. June 24 (gage height, 15.89 ft).

1948 to April 1954: Discharge, 10,800 cfs Mar. 9, 1949; gage height, 18.46 ft Feb. 22, 1953.

Flood of May 1944 reached a stage of 25.8 ft (discharge not determined). Flood of June 15, 1947, reached a stage of 21.26 ft (discharge, 20,000 cfs).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	346	2,360	962	11	326	1,260	402	21	150	4,270	207
2	476	3,540	872	12	293	3,540	367	22	144	5,000	234
3	1,110	3,950	800	13	266	4,030	333	23	138	5,200	207
4	1,140	3,360	746	14	242	4,190	303	24	138	5,420	210
5	926	2,470	692	15	223	3,420	275	25	144	4,320	190
6	692	1,690	638	16	207	3,810	251	26	138	2,320	170
7	548	1,410	584	17	194	4,350	231	27	144	1,730	163
8	476	1,220	530	18	180	4,190	218	28	194	1,450	154
9	409	1,070	476	19	170	2,820	215	29	1,230	1,220	148
10	364	926	437	20	161	2,220	212	30	1,530	1,070	140
								31	998		132
Monthly mean discharge, in cubic feet per second.....									442	2,928	371
Runoff, in acre-feet									27,170	174,200	22,810
Runoff, in inches									0.31	1.99	0.26

FLOODS OF 1954

Des Moines River basin

(31) West Fork Des Moines River at Estherville, Iowa

Location.—Lat 43°24'00", long. 94°50'45", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 99 N., R. 34 W., on right bank in city park, 1,200 ft downstream from bridge on State Route 9 at Estherville, and 2.5 miles upstream from Brown Creek.

Drainage area.—1,408 sq mi.

Gage-height record.—Water-stage recorder graph. Doubtful gage-height record July 14-18.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 1,360 cfs 4 p. m. June 21 (gage height, 5.66 ft).

1951 to April 1954: Discharge, 10,800 cfs June 8, 1953 (gage height, 15.53 ft).

Mean discharge, in cubic feet per second, 1954

Mean discharge, in cubic feet per second, 1954											
Day	May	June	July	Day	May	June	July	Day	May	June	July
1	388	182	322	11	336	164	204	21	179	1,110	158
2	452	239	312	12	330	143	185	22	170	1,030	119
3	500	260	408	13	308	137	170	23	152	888	112
4	488	274	348	14	288	128	159	24	164	784	103
5	464	270	319	15	274	126	152	25	158	656	90
6	464	256	291	16	260	114	148	26	117	580	80
7	440	250	270	17	236	106	143	27	120	512	80
8	416	239	246	18	217	836	141	28	123	460	121
9	380	223	239	19	204	962	138	29	140	428	108
10	360	192	223	20	192	848	134	30	120	392	108
								31	126		111
Monthly mean discharge, in cubic feet per second.....									276	426	185
Runoff, in acre-feet									16,990	25,360	11,390
Runoff, in inches									0.23	0.34	0.15

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	12	5.56	1,320	8	3.83	632	8	4.78	1,010
2	3.00	305			June 19	10	3.82	628	N	4.93	1,070
4	3.25	400	2	5.57	1,330	12	3.87	648	4	5.66	1,360
6	3.27	408	4	5.52	1,310			June 20	8	5.55	1,320
8	3.83	632	6	5.36	1,240	4	4.22	788	12	5.30	1,220
10	4.39	856	8	5.17	1,170	8	4.64	956			June 22
N	4.74	996	10	4.94	1,080	N	4.58	932	6	4.94	1,080
2	4.81	1,020	N	4.65	960	4	4.34	836	N	4.77	1,010
4	4.88	1,050	2	4.31	824	8	4.36	844	6	4.63	952
6	5.08	1,130	4	4.06	724	12	4.22	788	12	4.54	916
8	5.28	1,210	6	3.91	664			June 21			
10	5.45	1,280				4	4.52	908			

FLOODS OF JUNE IN IOWA

(32) West Fork Des Moines River at Humboldt, Iowa

Location.—Lat 42°43'10", long 94°13'10", in SW¼ sec. 1, T. 91 N., R. 29 W., at bridge on First Avenue South in Humboldt, about 700 ft downstream from Iowa Public Service Co. powerplant, and 4 miles upstream from confluence with East Fork Des Moines River.

Drainage area.—2,295 sq mi.

Gage-height record.—Wire-weight gage read once daily. Gage heights June 18-30 computed from graph based on daily gage readings and occasional readings by engineer.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 9,490 cfs 12 m. June 22 (gage height, 11.33 ft, from graph based on gage readings).

1940 to April 1954: Discharge, 11,000 cfs June 23, 1947 (gage height, 12.2 ft).

Remarks.—Daily records not published for this station because of regulation by powerplant above gage. Stages and discharges at selected times during the flood period presented for this report.

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954											
Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
	June 18			June 20			June 23			June 27	
N	4.08	608	6	9.43	6,300	N	10.72	8,400	N	6.88	2,970
12	4.48	867	N	9.50	6,400	12	10.18	7,490	12	6.64	2,700
	June 19			June 21			June 24			June 28	
4	5.00	1,220	12	9.53	6,450	N	9.63	6,610	N	6.41	2,460
8	6.20	2,250		June 22		12	9.08	5,810	12	6.23	2,280
N	7.60	3,820	N	10.30	7,680		June 25			June 29	
4	8.50	5,000	12	10.97	8,850	N	8.54	5,060	N	6.06	2,110
8	8.90	5,560		June 23		12	7.98	4,280	12	5.92	1,970
12	9.18	5,950	N	11.33	9,490		June 26			June 30	
			12	11.16	9,190	N	7.53	3,740	N	5.76	1,820
						12	7.17	3,300	12	5.60	1,680

FLOODS OF 1954

(33) East Fork Des Moines River near Burt, Iowa

Location.—Lat 43°12'30", long. 94°10'30", in NW¼NE¼ sec. 20, T. 97 N., R. 28 W., on right bank 30 ft downstream from county road bridge, 0.8 mile upstream from Buffalo Creek, 2.5 miles northeast of Burt, and 4 miles downstream from Mud Creek.

Drainage area.—466 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 31, July 10-15.

Maxima.—May-July 1954: Discharge, 3,870 cfs 6 a. m. June 21 (gage height, 12.67 ft).

1951 to April 1954: Discharge, 1,680 cfs Mar. 31, 1952 (gage height, 11.42 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	153	121	840	11	110	32	450	21	49	3,590	168
2	244	88	782	12	100	28	378	22	44	2,950	163
3	315	94	720	13	93	24	322	23	43	2,340	148
4	343	103	720	14	85	21	280	24	46	2,010	133
5	315	104	705	15	77	20	244	25	61	1,660	124
6	232	85	690	16	66	20	226	26	79	1,440	109
7	185	66	690	17	60	18	208	27	69	1,240	98
8	153	49	600	18	60	491	202	28	128	1,100	120
9	133	40	514	19	57	2,710	185	29	202	1,000	190
10	120	36	504	20	52	2,980	163	30	250	914	196
								31	210		180
Monthly mean discharge, in cubic feet per second.....									133	846	357
Runoff, in acre-feet									8,200	50,330	21,920
Runoff, in inches									0.33	2.03	0.88

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18									June 25
2	4.67	40	N	12.21	2,880	8	12.66	3,850	N	11.38	1,660
4	4.97	60	2	12.42	3,310	N	12.56	3,620	12	11.24	1,540
6	5.50	98	4	12.53	3,560	4	12.52	3,530	12		June 26
8	6.90	225	6	12.56	3,620	8	12.47	3,420	N	11.12	1,440
10	8.74	474	8	12.55	3,600	12	12.43	3,340	12	10.98	1,320
N	9.41	628	10	12.49	3,470	6	12.36	3,190	N		June 27
2	9.67	696	12	12.45	3,380	N	12.25	2,960	N	10.86	1,230
4	9.82	741		June 20		6	12.12	2,710	12	10.75	1,160
6	9.94	779	4	12.36	3,190	12	12.04	2,560	N		June 28
8	10.05	820	8	12.30	3,060		June 23		N	10.65	1,100
10	10.15	860	N	12.22	2,880	N	11.89	2,300	12	10.56	1,050
12	10.28	916	4	12.14	2,750	12	11.83	2,210	N		June 29
	June 19		8	12.11	2,690		June 24		N	10.47	1,000
2	10.59	1,060	12	12.37	3,210	N	11.69	2,010	12	10.37	956
4	11.05	1,380		June 21		12	11.52	1,800	N		June 30
6	11.44	1,720	4	12.66	3,850				N	10.28	916
8	11.87	2,270	6	12.67	3,870				12	10.17	868

FLOODS OF JUNE IN IOWA

47

(34) East Fork Des Moines River near Hardy, Iowa

Location.—Lat 42°48'10", long 94°08'00", in NW¼NE¼ sec. 10, T. 92 N., R. 28 W., near center of span on downstream side of highway bridge, 4½ miles west of Hardy, 6 miles northeast of Dakota City, 7½ miles downstream from Lotts Creek, and 12 miles upstream from mouth.

Drainage area.—1,230 sq mi, approximately.

Gage-height record.—Wire-weight gage read once daily. Gage heights June 18-30 computed from graph based on daily readings.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 18,800 cfs 3 p.m. June 21 (gage height, 16.95 ft, from floodmark).

1940 to April 1954: Discharge, 13,000 cfs June 23, 1947 (gage height, 15.4 ft).

Maximum stage known, about 17.4 ft in September 1938, from information by local residents.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	360	1,140	2,540	11	371	492	1,360	21	189	17,800	382
2	481	996	2,420	12	360	426	1,260	22	167	14,100	371
3	680	1,040	2,150	13	328	404	1,120	23	159	9,920	371
4	790	940	2,000	14	286	352	850	24	297	7,750	350
5	790	850	1,820	15	276	331	790	25	360	6,490	328
6	760	790	1,740	16	266	297	730	26	382	5,660	318
7	680	680	1,660	17	256	268	584	27	426	4,470	318
8	607	630	1,580	18	212	726	492	28	515	3,780	297
9	526	561	1,500	19	205	2,900	448	29	820	3,440	276
10	459	533	1,430	20	197	8,950	382	30	850	3,060	339
								31	940		382
Monthly mean discharge, in cubic feet per second.....									451	3,326	987
Runoff, in acre-feet.....									27,760	197,900	60,670
Runoff, in inches.....									0.42	3.02	0.92

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
	June 18			June 19			June 20		N	16.92	18,600
4	3.65	303	4	8.57	1,810	6	13.45	6,450	3	16.95	18,800
8	4.37	463	8	9.40	2,200	N	13.97	7,490	8	16.87	18,400
N	5.20	655	N	10.21	2,680	6	15.40	11,800	12	16.70	17,500
4	6.03	889	4	11.02	3,280	12	16.18	14,900		June 22	
8	6.88	1,180	8	11.87	4,080		June 21	N	15.93	13,700	
12	7.70	1,460	12	12.75	5,220	6	16.70	17,500	12	15.32	11,600

FLOODS OF 1954

(35) East Fork Des Moines River at Dakota City, Iowa

Location.—Lat 42°43'25", long 94°11'25", in SE $\frac{1}{4}$ sec. 6, T. 91 N., R. 28 W., on right bank 50 ft upstream from old mill dam in city park at east edge of Dakota City, 500 ft upstream from bridge on State Route 3, and 3.2 miles upstream from confluence with West Fork Des Moines River.

Datum of gage is 1,038.71 ft above mean sea level, datum of 1929.

Drainage area.—1,262 sq mi.

Gage-height record.—Water-stage recorder graph. Station established June 9, 1954.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Discharge June 1-8 estimated on basis of record for station near Hardy to complete month.

Maxima.—June-July 1954: Discharge, 17,400 cfs 7 p. m. June 21 (gage height, 24.02 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1		1,200	2,750	11		570	1,300	21		16,300	428
2		1,100	2,440	12		593	1,180	22		15,700	391
3		1,080	2,230	13		460	1,090	23		11,700	382
4		1,000	2,030	14		374	970	24		8,580	374
5		900	1,900	15		325	790	25		6,890	347
6		850	1,700	16		295	655	26		5,790	316
7		780	1,640	17		270	570	27		4,880	283
8		700	1,540	18		671	524	28		4,130	262
9		556	1,480	19		2,860	474	29		3,560	254
10		570	1,390	20		10,400	451	30		3,100	270
								31			365
Monthly mean discharge, in cubic feet per second.....										3,539	993
Runoff, in acre-feet.....										210,600	61,040
Runoff, in inches.....										3.13	0.91

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	N	12.46	2,490			June 21	12	21.80	13,700
4	8.66	254	4	12.93	2,850	4	22.50	14,800		June 23	
8	8.75	291	8	14.36	4,100	8	23.25	16,100	N	20.48	11,600
N	9.36	566	12	16.96	6,850	N	23.75	17,000	12	19.23	9,720
4	9.92	862		June 20		4	23.97	17,300		June 24	
8	10.49	1,200	4	18.20	8,360	7	24.02	17,400	N	18.31	8,500
12	10.90	1,450	8	19.22	9,710	12	23.91	17,200	12	17.58	7,600
		June 19	N	19.96	10,800			June 22		June 25	
4	11.24	1,660	4	20.42	11,400	6	23.57	16,700	N	16.95	6,840
8	11.66	1,940	8	20.75	12,000	N	23.04	15,800	12	16.48	6,280
			12	21.56	13,300	6	22.45	14,800			

FLOODS OF 1954

(37) Des Moines River at Fort Dodge, Iowa

Location.—Lat 42°30'30", long 94°12'00", in SW $\frac{1}{4}$ sec. 19, T. 89 N., R. 28 W., on right bank 400 ft upstream from Soldier Creek, 1,800 ft downstream from Illinois Central Railroad bridge, and 2,000 ft downstream from Lizard Creek. Datum of gage is 969.38 ft above mean sea level, datum of 1929 (city of Fort Dodge bench mark).

Drainage area.—4,207 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used June 29 to July 31.

Maxima.—May-July 1954: Discharge, 35,400 cfs 11 a. m. June 21 (gage height, 19.28 ft).

1905-6, 1913-27, 1949 to April 1954: Discharge, 22,300 cfs Apr. 8, 1951 (gage height, 12.13 ft).

Maximum stage known, 19.7 ft June 23, 1947, from floodmark (discharge, 34,000 cfs).

Remarks.—Diurnal fluctuation at low flow caused by powerplant above station.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	1,630	2,720	6,360	11	1,580	8,190	2,330	21	850	34,000	977
2	2,500	2,810	5,720	12	1,470	6,470	1,980	22	804	32,000	934
3	3,150	2,860	4,980	13	1,380	4,320	1,940	23	874	25,700	889
4	3,500	3,210	4,480	14	1,260	3,140	1,640	24	1,240	20,000	874
5	3,140	2,810	4,100	15	1,230	2,400	1,550	25	1,210	16,200	822
6	2,790	2,310	3,470	16	1,120	2,020	1,320	26	1,160	13,700	732
7	2,470	2,000	3,310	17	1,080	1,720	1,240	27	1,280	11,800	693
8	2,230	1,680	2,910	18	1,010	1,770	1,160	28	2,060	10,200	666
9	1,900	1,440	2,740	19	956	7,260	1,100	29	2,020	8,560	640
10	1,770	5,150	2,430	20	884	20,700	1,030	30	1,950	7,220	730
								31	1,910		812
Monthly mean discharge, in cubic feet per second.....									1,691	8,812	2,083
Runoff, in acre-feet.....									103,900	524,300	128,000
Runoff, in inches.....									0.46	2.34	0.57

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 18			June 20			19.23	35,300		June 25	
N	4.04	1,440	2	9.20	14,400	4	18.85	34,500	N	9.90	16,100
12	4.60	2,620	4	9.88	16,000	8	18.60	34,000	12	9.40	14,900
	June 19		6	10.69	17,800	12	18.48	33,800		June 26	
2	4.54	2,480	8	11.45	19,400		June 22		N	8.90	13,600
4	5.23	4,180	10	11.89	20,400	6	18.28	33,400	12	8.53	12,700
6	4.83	3,180	N	12.34	21,300	N	17.76	32,300		June 27	
8	5.23	4,180	2	12.54	21,700	6	16.98	30,800	N	8.17	11,800
10	5.41	4,620	4	12.67	22,000	12	16.16	29,100	12	7.87	11,100
N	6.30	6,900	6	12.81	22,300		June 23			June 28	
2	7.03	8,820	8	13.05	22,800	6	15.28	27,400	N	7.55	10,100
4	7.50	10,100	10	15.55	27,900	N	14.44	25,700	12	7.29	9,380
6	7.80	10,900	12	17.06	30,900	6	13.55	23,900		June 29	
8	8.07	11,500		June 21		12	12.84	22,400	N	7.07	8,670
10	8.33	12,300	4	18.02	32,800		June 24		12	6.64	7,530
12	8.82	13,400	8	19.10	35,000	N	11.65	19,900		June 30	
			11	19.28	35,400	12	10.68	17,800	N	6.59	7,270
									12	6.41	6,790

FLOODS OF JUNE IN IOWA

51

(42) Boone River near Webster City, Iowa

Location.—Lat 42°25'50", long. 93°48'10", in SE¼ sec. 18, T. 88 N., R. 25 W., on right bank 10 ft upstream from bridge on State Route 60, 2 miles south of Webster City and 4.5 miles downstream from White Fox Creek.

Drainage area.—842 sq mi.

Gage-height record.—Water-stage recorder except for period 12 m. June 20 to 7 a. m. June 22 for which graph was estimated on basis of occasional gage readings and adjacent recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 20,300 cfs 2 p. m. June 22 (gage height, 18.55 ft).

1940 to April 1954: Discharge, 10,400 cfs June 28, 1951; gage height, 13.7 ft, in gage well, 13.9 ft, from outside gage, June 14, 1944.

Maximum stage known since 1896, 19.1 ft, from floodmarks, about June 10, 1918.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	578	681	1,020	11	334	1,240	321	21	150	19,100	133
2	940	604	865	12	306	925	291	22	145	19,500	129
3	1,350	750	765	13	279	965	257	23	143	14,900	126
4	1,140	805	668	14	258	715	223	24	145	8,580	118
5	890	805	600	15	238	627	195	25	152	5,060	108
6	690	735	535	16	218	600	172	26	227	3,340	99
7	556	604	464	17	199	531	159	27	238	2,430	92
8	472	487	414	18	186	470	155	28	844	1,920	87
9	414	414	384	19	173	1,960	155	29	865	1,550	81
10	368	2,290	349	20	160	10,700	143	30	622	1,250	83
								31	556		93
Monthly mean discharge, in cubic feet per second.....									446	3,485	299
Runoff, in acre-feet									27,440	207,300	18,410
Runoff, in inches									0.61	4.62	0.41

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 18			June 21			16.67	16,200		June 26	
N	3.35	458	4	18.06	19,200	N	15.92	14,700	N	7.57	3,300
12	3.40	475	8	18.32	19,800	4	15.20	13,500	12	7.02	2,770
	June 19		N	18.24	19,600	8	14.51	12,200		June 27	
4	3.98	730	4	18.00	19,100	12	13.87	11,100	N	6.57	2,410
8	4.98	1,280	8	17.79	18,700		June 24		12	6.21	2,120
N	6.00	1,970	12	17.77	18,600	4	13.27	10,200		June 28	
4	6.73	2,530		June 22		8	12.66	9,320	N	5.92	1,910
8	7.35	3,080	4	17.88	18,900	N	12.07	8,500	12	5.64	1,720
12	8.20	3,930	8	18.16	19,400	4	11.50	7,700		June 29	
	June 20		N	18.51	20,200	8	10.96	7,020	N	5.40	1,550
4	9.56	5,370	2	18.55	20,300	12	10.42	6,370	12	5.13	1,370
8	11.55	7,740	4	18.50	20,200		June 25			June 30	
N	13.70	10,800	8	18.32	19,800	6	9.80	5,630	N	4.93	1,250
4	15.30	13,600	12	17.87	18,800	N	9.23	5,000	12	4.72	1,120
8	16.47	15,800		June 23		6	8.70	4,430			
12	17.34	17,700	4	17.32	17,600	12	8.26	3,990			

FLOODS OF 1954

(43) Des Moines River near Boone, Iowa

Location.—Lat 42°04'40", long 93°55'55", in NE¼ sec. 24, T. 84 N., R. 27 W., on left bank 30 ft upstream from Boone Water Department dam, 2 miles northwest of Boone, and 2.2 miles upstream from Bluff Creek. Datum of gage is 871.52 ft above mean sea level, adjustment of 1912.

Drainage area.—5,490 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except for period 1 p. m. June 21 to 4 p. m. June 28 for which graph was based on hourly readings of staff gage.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 57,400 cfs 4 p. m. June 22 (gage height, 25.35 ft, from graph based on hourly gage readings).

1920-27, 1933 to April 1954: Discharge, 37,100 cfs June 24, 1947 (gage height, 19.85 ft).

Remarks.—Slight diurnal fluctuation caused by powerplants above station.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	1,720	3,330	7,550	11	2,250	14,500	2,830	21	1,170	31,700	1,670	
2	2,460	3,780	6,530	12	2,120	11,000	2,640	22	1,130	55,900	1,550	
3	3,780	4,060	5,830	13	1,980	8,240	2,480	23	1,070	55,000	1,510	
4	4,710	4,210	5,270	14	1,860	5,930	2,340	24	1,070	44,200	1,420	
5	4,570	4,290	4,850	15	1,720	4,680	2,160	25	1,440	30,800	1,370	
6	3,850	3,680	4,430	16	1,650	3,960	1,980	26	1,440	21,700	1,320	
7	3,290	3,010	4,000	17	1,550	3,160	1,930	27	1,530	16,700	1,240	
8	2,920	2,740	3,620	18	1,460	2,680	1,860	28	2,540	13,300	1,170	
9	2,740	2,400	3,200	19	1,390	2,640	1,770	29	3,380	10,900	1,110	
10	2,420	7,660	3,020	20	1,260	9,330	1,750	30	2,830	9,000	1,070	
								31	2,640		1,010	
Monthly mean discharge, in cubic feet per second.....										2,256	13,150	2,725
Runoff, in acre-feet.....										138,700	782,400	167,600
Runoff, in inches.....										0.47	2.67	0.57

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	10	10.44	16,100	8	25.29	57,200			June 26
N	1.62	2,680	12	11.70	18,100	12	25.29	57,200	6	14.42	23,300
12	1.52	2,480		June 21			June 23		N	13.59	21,600
		June 19	2	12.24	19,100	4	25.21	56,800	6	12.71	19,900
6	1.48	2,400	4	12.75	20,000	8	25.08	56,300	12	12.07	18,700
N	1.47	2,380	6	13.50	21,400	N	24.86	55,500			June 27
4	1.52	2,480	8	14.45	23,400	4	24.55	54,400	6	11.40	17,600
8	1.73	2,890	10	15.71	26,100	8	24.12	52,900	N	10.78	16,700
12	2.48	4,120	N	17.06	29,700	12	23.62	51,200	6	10.22	15,700
		June 20	2	18.40	33,700		June 24		12	9.70	14,900
2	2.92	4,740	4	19.82	38,000	6	22.71	48,000			June 28
4	3.52	5,580	6	20.87	41,500	N	21.63	44,200	6	9.12	14,000
6	4.28	6,640	8	21.85	45,000	6	20.56	40,400	N	8.68	13,300
8	4.90	7,550	10	22.67	47,800	12	19.47	36,900	6	8.26	12,600
10	5.45	8,380	12	23.37	50,300		June 25		12	7.87	12,000
N	5.92	9,080		June 22		6	18.41	33,700			June 29
2	6.33	9,700	4	24.44	54,000	N	17.37	30,600	N	7.11	10,800
4	6.72	10,300	8	24.99	56,000	6	16.29	27,600	12	6.45	9,880
6	7.16	10,900	N	25.27	57,100	12	15.35	25,400			June 30
8	7.83	11,900	4	25.35	57,400				N	5.85	8,980
									12	5.31	8,160

FLOODS OF JUNE IN IOWA

53

(44) Des Moines River at Des Moines, Iowa

Location.—Lat 41°36'45", long 93°37'05", in NE¼ sec. 34, T. 79 N., R. 24 W., on right bank 5 ft upstream from Second Avenue bridge in Des Moines, 1.8 miles upstream from Iowa Power and Light Co. dam, 2.8 miles upstream from Raccoon River, and 4.5 miles downstream from Beaver Creek. Datum of gage is 773.84 ft above mean sea level, datum of 1929.

Drainage area.—6,180 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except for periods May 1, 2, May 28 to June 1, June 7-21. Graph based on once-daily reading of wire-weight gage used June 7-21.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used July 3-10.

Maxima.—May-July 1954: Discharge, 60,200 cfs 9 a.m. June 24 (gage height, 30.16 ft).

1915-27, 1932 to April 1954: Discharge, 39,500 cfs June 26, 1947 (gage height, 26.5 ft), but may have been greater June 7, 1918; gage height, 16.5 ft June 7, 1918, site and datum then in use.

Flood of May 31, 1903, reached a stage of about 27.3 ft, present site and datum, from flood profile by office of City engineer (probably backwater from Raccoon River).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	2,030	4,400	8,960	11	2,620	6,820	3,470	21	1,360	11,500	1,600
2	2,430	4,970	7,530	12	2,430	12,200	3,170	22	1,280	20,800	1,470
3	2,900	5,140	6,610	13	2,250	14,000	2,870	23	1,230	48,100	1,330
4	4,090	5,240	5,920	14	2,070	10,300	2,670	24	1,150	59,100	1,260
5	4,820	5,200	5,340	15	1,950	6,800	2,430	25	1,090	51,600	1,200
6	4,720	5,040	4,900	16	1,790	7,260	2,210	26	1,340	39,600	1,170
7	4,200	4,430	4,790	17	1,690	5,680	1,970	27	1,470	27,900	1,090
8	3,690	3,950	4,680	18	1,610	4,680	1,770	28	2,270	19,900	1,020
9	3,290	3,490	4,240	19	1,490	3,600	1,670	29	3,000	14,800	960
10	3,000	3,050	3,800	20	1,440	4,980	1,600	30	3,490	11,400	900
								31	3,890		870
Monthly mean discharge, in cubic feet per second.....									2,454	14,200	3,015
Runoff, in acre-feet.....									150,900	844,800	185,400
Runoff, in inches.....									0.46	2.56	0.56

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	8	18.65	13,200	9	30.16	60,200			June 27
N	15.15	4,620	12	18.80	13,500	N	30.12	60,000	4	24.01	31,400
12	14.83	3,950			June 22	4	30.03	59,400	8	23.52	29,500
		June 19	4	19.14	14,500	8	29.90	58,600	N	23.06	27,600
N	14.64	3,570	8	19.77	16,400	12	29.70	57,400	4	22.62	26,100
12	14.51	3,310	N	20.54	18,900			June 25	8	22.23	24,700
		June 20	4	21.81	23,200	4	29.40	55,700	12	21.84	23,300
N	14.56	3,410	8	23.25	28,400	8	29.02	53,600			June 28
2	14.65	3,590	12	24.60	33,800	N	28.62	51,600	6	21.30	21,500
4	14.83	3,950			June 23	4	28.24	49,800	N	20.80	19,800
6	15.96	6,360	4	26.07	39,900	8	27.76	47,500	6	20.34	18,300
8	17.13	9,120	8	27.12	44,600	12	27.30	45,600	12	19.94	17,000
10	17.41	9,820	N	28.00	48,600			June 26			June 29
12	17.50	10,000	4	28.88	52,900	4	26.85	43,300	N	19.16	14,600
		June 21	8	29.42	55,800	8	26.43	41,500	12	18.49	12,800
4	17.63	10,400	12	29.76	57,800	N	26.01	39,600			June 30
8	17.69	10,500			June 24	4	25.56	37,800	N	17.89	11,300
N	17.88	11,000	4	29.99	59,200	8	25.06	35,700	12	17.34	10,000
4	18.23	12,000	8	30.13	60,000	12	24.50	33,400			

FLOODS OF 1954

(45) Raccoon River near Jefferson, Iowa

Location.—Lat 41°59'20", long 94°22'30", in NW¼ sec. 20, T. 83 N., R. 30 W., on right bank 50 ft downstream from bridge on State Route 17, 2 miles south of Jefferson and ¾ miles upstream from Hardin Creek.

Drainage area.—1,630 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except for period May 1-5, for which graph based on once-daily readings of wire-weight gage was used.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used July 16-31.

Maxima.—May-July 1954: Discharge, 21,300 cfs 11:30 p. m. June 22 (gage height, 19.52 ft).

1940 to April 1954: Discharge, 29,100 cfs June 23, 1947 (gage height, 22.3 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	372	1,120	2,030	11	531	1,650	531	21	268	5,780	289	
2	474	2,600	1,670	12	495	4,140	467	22	254	13,700	271	
3	845	3,550	1,490	13	456	4,590	418	23	251	19,100	254	
4	1,300	3,080	1,330	14	421	4,420	375	24	243	14,100	240	
5	1,300	2,700	1,160	15	391	2,920	346	25	240	11,200	216	
6	1,050	2,010	980	16	369	2,070	331	26	235	9,300	197	
7	868	1,490	845	17	343	1,700	319	27	240	7,380	179	
8	755	1,210	755	18	319	1,440	310	28	353	5,370	179	
9	650	1,000	670	19	298	1,190	304	29	1,300	3,420	166	
10	590	886	590	20	280	1,860	301	30	1,200	2,540	158	
								31	845		153	
Monthly mean discharge, in cubic feet per second.....										565	4,584	565
Runoff, in acre-feet.....										34,740	272,800	34,760
Runoff, in inches.....										0.40	3.14	0.40

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
	June 20		N	11.76	5,540	N	18.78	19,300		June 27	
6	6.47	1,060	6	12.00	5,850	6	18.16	17,700	N	12.98	7,370
10	6.77	1,220	12	12.48	6,570	12	17.57	16,200	12	12.39	6,440
N	7.28	1,480	June 22		June 24		June 25		June 28		
2	7.91	1,860	4	12.99	7,380	N	16.52	13,900	N	11.68	5,430
4	8.41	2,160	8	14.17	9,310	12	15.77	12,300	12	10.66	4,180
6	8.85	2,460	N	16.26	13,400	June 26		June 29			
8	9.14	2,680	4	18.22	17,900	N	15.20	11,200	N	9.88	3,330
10	9.53	3,010	8	19.23	20,500	12	14.70	10,300	12	9.36	2,860
12	11.40	5,070	11:30	19.52	21,300	June 26		June 30			
	June 21		12	19.51	21,200	N	14.15	9,270	N	8.93	2,520
2	11.95	5,780	June 23		12	13.59	8,340	12	8.55	2,260	
6	11.83	5,630	6	19.32	20,700						

FLOODS OF JUNE IN IOWA

(49) East Fork Hardin Creek near Churdan, Iowa

Location.—Lat 42°06'25", long 94°22'00", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 84 N., R. 30 W., on left bank 35 ft upstream from highway bridge on county road D, 4.4 miles upstream from mouth, and 6.5 miles southeast of Churdan, Greene County.

Drainage area.—22.7 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 31 to June 2.

Maxima.—May-July 1954: Discharge, 156 cfs 12 p. m. May 31 (gage height, 5.94 ft).
1952 to April 1954: Discharge, 105 cfs June 10, 1953 (gage height, 5.17 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	4.0	121	4.4	11	1.7	6.5	1.3	21	0.7	111	0.6
2	9.7	78	3.8	12	1.6	6.0	1.1	22	.6	44	.5
3	9.6	57	3.4	13	1.4	5.7	.9	23	.7	24	.4
4	5.7	32	3.0	14	1.3	5.2	.8	24	.7	18	.4
5	4.2	24	2.6	15	1.2	5.2	.7	25	.6	14	.3
6	3.8	18	2.3	16	1.0	5.7	.6	26	.6	9.6	.2
7	2.8	14	2.2	17	.9	5.7	.6	27	1.0	8.0	.2
8	2.4	9.6	1.8	18	.9	5.0	.6	28	4.9	7.1	.2
9	2.0	8.3	1.6	19	.8	4.7	.6	29	2.8	6.0	.2
10	1.8	7.4	1.4	20	.7	8.4	.6	30	1.9	5.2	.2
								31	31		.2
<u>Monthly mean discharge, in cubic feet per second.</u>									3.32	22.5	1.21
<u>Runoff, in acre-feet</u>									204	1,340	74
<u>Runoff, in inches</u>									0.17	1.10	0.06

(50) South Raccoon River at Redfield, Iowa

Location.—Lat 41°34'30", long 94°10'40", in SE $\frac{1}{4}$ sec. 3, T. 78 N., R. 29 W., on left bank 10 ft upstream from highway bridge at Redfield, 0.8 mile downstream from bridge on U. S. Highway 6, 1 mile downstream from Middle Raccoon River, and 14.5 miles upstream from mouth.

Drainage area.—995 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 1,760 cfs 10 p. m. June 21 (gage height, 6.59 ft).
1940 to April 1954: Discharge, 23,800 cfs June 12, 1947 (gage height, 24.3 ft).

Remarks.—Some diurnal fluctuation during low flow caused by powerplant at Panora.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	289	501	113	11	116	142	56	21	74	923	58
2	353	501	99	12	110	395	52	22	70	1,500	54
3	510	506	94	13	102	181	50	23	70	967	49
4	416	403	91	14	96	139	47	24	68	532	49
5	274	305	89	15	91	524	44	25	72	333	42
6	210	232	82	16	89	1,170	42	26	79	243	38
7	174	195	74	17	84	341	42	27	91	192	37
8	154	164	70	18	82	232	44	28	819	157	37
9	136	181	66	19	82	171	44	29	780	136	37
10	118	161	58	20	77	151	49	30	463	121	34
								31	278		38
<u>Monthly mean discharge, in cubic feet per second.</u>									207	390	57.4
<u>Runoff, in acre-feet</u>									12,750	23,200	3,530
<u>Runoff, in inches</u>									0.24	0.44	0.07

FLOODS OF 1954

(51) Raccoon River at Van Meter, Iowa

Location.—Lat 41°32'00", long 93°56'50", in SW¼ sec. 22, T. 78 N., R. 27 W., on right bank 10 ft upstream from highway bridge, 0.3 mile northeast of Van Meter, 1 mile downstream from South Raccoon River, and 30 miles upstream from mouth. Datum of gage is 841.16 ft above mean sea level, datum of 1929.

Drainage area.—3,410 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except July 8-14 when graph based on once-daily readings of wire-weight gage was used.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 5, 6, May 30 to June 30, July 6-26.

Maxima.—May-July 1954: Discharge, 20,800 cfs 6 a. m. June 25 (gage height, 17.40 ft).

1915 to April 1954: Discharge, 46,800 cfs June 13, 1947 (gage height, 21.4 ft, in gage well, 21.6 ft, from outside floodmark).

Remarks.—Diurnal fluctuation at low flow caused by powerplant at Adel, 10 miles upstream.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	869	1,850	3,210	11	829	1,450	802	21	438	3,520	411
2	945	2,260	2,760	12	763	2,400	700	22	411	7,340	385
3	1,200	3,740	2,360	13	675	4,330	614	23	385	8,130	374
4	1,420	4,240	2,080	14	644	4,960	555	24	379	13,600	359
5	1,720	4,130	1,840	15	590	5,440	504	25	379	19,900	345
6	1,720	3,620	1,610	16	573	7,420	487	26	379	15,800	326
7	1,460	2,940	1,390	17	555	3,640	438	27	369	11,800	308
8	1,200	2,320	1,200	18	538	2,880	421	28	1,200	8,960	295
9	1,050	1,910	1,050	19	493	2,440	400	29	1,160	6,670	286
10	945	1,650	903	20	460	2,000	395	30	2,040	4,360	281
								31	2,080		273
Monthly mean discharge, in cubic feet per second.....									899	5,523	883
Runoff, in acre-feet									55,280	328,600	54,270
Runoff, in inches									0.30	1.81	0.30

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 21	12	10.47	7,980	12	17.15	20,100			June 27
4	4.85	1,940			June 23			June 25	N	13.02	11,800
8	5.42	2,460	6	10.56	8,100	6	17.40	20,800	12	12.09	10,300
N	6.10	3,110	N	10.53	8,070	N	17.19	20,200			June 28
4	7.25	4,240	6	10.56	8,100	6	16.79	19,300	N	11.18	8,890
8	8.22	5,310	12	10.89	8,550	12	16.26	18,200	12	10.35	7,760
12	8.98	6,190			June 24			June 26			June 29
		June 22	4	11.36	9,220	6	15.70	16,900	N	9.51	6,720
4	9.54	6,850	8	12.20	10,600	N	15.15	15,800	12	8.48	5,490
8	9.81	7,180	N	13.64	12,900	6	14.50	14,400			June 30
N	10.03	7,440	4	15.17	15,800	12	14.00	13,500	N	7.32	4,180
6	10.28	7,760	8	16.48	18,600				12	6.77	3,610

FLOODS OF JUNE IN IOWA

(52) Des Moines River below Raccoon River, at Des Moines, Iowa

Location.—Lat 41°34'53", long 93°36'45", in NW¼ sec. 10, T. 78 N., R. 24 W., in upstream end of first pier from left bank of Scott Street bridge in Des Moines, 5 ft upstream from Scott Street dam, 100 ft downstream from Raccoon River, 1 mile downstream from dam of Iowa Power and Light Co., and at mile 200.1. Datum of gage is 773.84 ft above mean sea level, datum of 1929, and at city datum.

Drainage area.—9,770 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except for period June 1-7 and July 24-31, for which once-daily readings of wire-weight gage were used.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used June 1-7.

Maxima.—May-July 1954: Discharge, 67,300 cfs 10 p. m. June 24 (gage height, 20.08 ft).

1940 to April 1954: Discharge, 77,000 cfs June 26, 1947 (gage height, 20.8 ft, in gage well, 21.6 ft, from outside floodmark).

Flood of May 31, 1903, reached a stage of 20.9 ft, present site and datum, from flood profile by office of City engineer. Flood of June 26, 1947, is the maximum stage known.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	2,590	7,170	13,800	11	3,560	6,580	4,350	21	1,800	13,300	2,080
2	3,160	7,230	10,000	12	3,200	11,800	4,010	22	1,690	24,000	1,950
3	4,060	7,950	8,250	13	2,880	14,600	3,740	23	1,690	53,600	1,830
4	5,430	8,550	7,590	14	2,660	13,200	3,380	24	1,610	65,800	1,720
5	6,310	8,610	6,930	15	2,520	10,700	3,080	25	1,520	63,900	1,580
6	6,480	8,070	6,480	16	2,360	14,700	2,730	26	1,770	56,400	1,520
7	5,870	7,530	5,920	17	2,230	9,510	2,560	27	1,890	43,800	1,450
8	5,160	6,640	5,480	18	2,140	7,230	2,360	28	2,760	31,300	1,400
9	4,550	5,760	5,000	19	2,020	6,200	2,200	29	4,750	23,100	1,320
10	4,010	4,850	4,600	20	1,920	6,540	2,080	30	5,100	18,000	1,230
								31	5,650		1,180
Monthly mean discharge, in cubic feet per second.....									3,354	18,890	3,929
Runoff, in thousand acre-feet.....									205.0	1,124	241.6
Runoff, in inches.....									0.39	2.16	0.46

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 20	N	10.90	21,600	6	20.02	66,800	12	14.94	37,400
N	5.98	5,540	6	13.14	28,600	10	20.08	67,300			June 28
6	6.14	6,420	12	15.45	40,000	12	19.94	66,300	N	13.60	30,700
12	6.98	11,300			June 23			June 25	12	12.55	26,400
		June 21	6	17.00	47,700	N	19.63	64,100			June 29
N	7.40	13,100	N	18.25	55,200	12	19.22	61,200	N	11.38	22,900
N	7.50	13,500	6	19.05	60,000			June 26	12	10.32	20,200
6	7.54	13,600	12	19.47	63,000	N	18.56	57,100			June 30
12	7.87	14,600			June 24	12	17.41	50,200	N	9.23	18,100
		June 22	6	19.75	65,000			June 27	12	8.20	15,600
6	9.33	18,300	N	19.97	66,500	N	16.22	43,800			

FLOODS OF 1954

(53) Des Moines River near Tracy, Iowa

Location.—Lat 41°16'55", long 92°51'30", in SE $\frac{1}{4}$ sec. 19, T. 75 N., R. 17 W., near right bank on downstream side of Bellefontaine highway bridge, 1 mile east of Tracy, 3 miles upstream from Cedar Creek, and 6 miles downstream from English Creek. Datum of gage is 671.78 ft above mean sea level, adjustment of 1912.

Drainage area.—12,400 sq mi, approximately.

Gage-height record.—Wire-weight gage read once daily.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 69,900 cfs 3 a. m. June 27 (gage height, 22.14 ft, observed). 1920-27, 1933-35, 1940 to April 1954: Discharge, 155,000 cfs June 14, 1947 (gage height, 26.5 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	3,090	12,000	23,600	11	4,480	5,440	5,600	21	2,220	8,710	2,880
2	3,600	15,100	13,100	12	4,000	7,650	4,960	22	2,090	18,000	2,740
3	7,320	10,900	12,900	13	3,680	15,800	4,640	23	1,910	20,200	2,670
4	6,900	11,800	11,100	14	3,380	16,100	4,480	24	1,970	26,500	2,540
5	6,140	10,700	9,820	15	3,090	19,600	4,320	25	2,030	35,900	2,340
6	6,500	10,000	8,720	16	2,880	18,500	3,920	26	1,850	63,600	2,220
7	6,500	9,380	8,100	17	2,670	22,400	3,680	27	1,790	69,000	2,150
8	6,140	8,300	7,300	18	2,540	13,600	3,460	28	2,090	58,400	1,970
9	5,280	6,900	6,700	19	2,480	9,380	3,160	29	2,740	47,100	1,910
10	4,800	5,960	6,140	20	2,540	7,300	2,950	30	4,480	37,000	1,790
								31	5,120		1,670
Monthly mean discharge, in cubic feet per second.....									3,745	20,710	5,598
Runoff, in thousand acre-feet.....									230.3	1,232	344.2
Runoff, in inches.....									0.35	1.86	0.52

(54) Des Moines River at Ottumwa, Iowa

Location.—Lat 41°00', long 92°24', in NE $\frac{1}{4}$ sec. 25, T. 72 N., R. 14 W., on right bank 10 ft downstream from Vine Street bridge at Ottumwa, 5.5 miles upstream from Village Creek, 10 miles downstream from South Avery Creek, and at mile 93.9. Datum of gage is 622.77 ft above mean sea level, datum of 1929.

Drainage area.—13,200 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 61,400 cfs 10 p. m. June 28 (gage height, 16.89 ft).

1917 to April 1954: Discharge, 135,000 cfs June 7, 1947 (gage height, 20.2 ft).

Flood of May 31, 1903, reached a discharge of about 100,000 cfs.

Remarks.—Diurnal fluctuation at low flow caused by powerplant above station.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	3,080	6,660	36,600	11	4,430	5,430	5,800	21	2,340	6,450	2,830
2	3,630	16,600	20,800	12	4,180	4,930	5,070	22	2,040	14,400	2,520
3	5,270	11,700	14,100	13	3,450	11,200	4,790	23	2,250	18,100	2,630
4	8,060	11,400	11,700	14	3,280	15,600	4,560	24	1,930	22,700	2,480
5	6,060	10,800	10,300	15	3,110	14,700	4,300	25	2,040	26,900	2,320
6	6,190	9,720	9,160	16	2,890	14,600	3,740	26	2,070	32,000	2,300
7	6,320	9,160	8,330	17	2,840	21,700	3,520	27	1,820	46,100	1,960
8	6,060	8,060	7,520	18	2,550	17,400	3,430	28	2,200	60,000	2,120
9	5,430	6,980	6,710	19	2,640	10,600	3,060	29	2,530	58,100	1,910
10	4,800	6,060	6,190	20	2,240	7,790	2,840	30	2,450	48,000	1,790
								31	4,610		1,620
Monthly mean discharge, in cubic feet per second.....									3,638	18,460	6,348
Runoff, in thousand acre-feet.....									223.7	1,098	390.3
Runoff, in inches.....									0.32	1.56	0.55

FLOODS OF JUNE IN IOWA

(55) Des Moines River at Keosauqua, Iowa

Location.—Lat 40°44', long 91°57', in sec. 36, T. 69 N., R. 10 W., on right bank 10 ft upstream from bridge on State Route 1 at Keosauqua, 4 miles downstream from Chequest Creek, and at mile 50.6. Datum of gage is 558.10 ft above mean sea level, datum of 1912 (levels by Corps of Engineers).

Drainage area.—13,900 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used June 27 to July 31.

Maxima.—May-July 1954: Discharge, 60,800 cfs 2 p.m. June 29 (gage height, 16.14 ft).

1903-6, 1910 to April 1954: Discharge, about 135,000 cfs June 1, 1903 (gage height, 27.85 ft, from floodmark).

Flood of June 1, 1851, reached a stage of 24 ft.

Remarks.—Some diurnal fluctuation at medium and low stages caused by powerplant at Ottumwa.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	5,560	6,990	45,400	11	5,300	6,340	5,950	21	2,160	7,810	2,880
2	5,300	13,500	27,900	12	5,040	5,690	5,560	22	2,180	9,930	2,780
3	6,730	16,200	15,800	13	4,650	6,990	4,910	23	1,920	18,200	2,390
4	7,810	12,300	12,900	14	3,760	16,200	4,650	24	2,050	21,000	2,570
5	7,810	12,300	11,000	15	3,500	16,200	4,390	25	1,760	25,800	2,300
6	6,600	11,000	9,520	16	3,380	14,800	4,260	26	1,890	30,300	2,170
7	6,730	10,400	8,650	17	3,380	19,300	3,630	27	1,910	39,900	2,020
8	6,730	9,520	7,810	18	3,040	22,100	3,380	28	1,740	53,000	1,680
9	6,730	8,370	7,120	19	2,610	13,900	3,140	29	2,090	60,300	1,900
10	6,080	7,120	6,340	20	2,480	9,810	3,020	30	2,530	57,100	1,760
								31	4,260		1,640
Monthly mean discharge, in cubic feet per second.....									4,120	18,770	7,085
Runoff, in thousand acre-feet.....									253.3	1,117	435.6
Runoff, in inches.....									0.34	1.51	0.59

FLOODS OF 1954

Vermillion River basin

(56) Vermillion River near Wakonda, S. Dak.

Location.—Lat $42^{\circ}59'20''$, long $96^{\circ}57'50''$, in SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 94 N., R. 52 W., near center of span on downstream side of bridge on State Route 19, 3 $\frac{1}{2}$ miles downstream from Frog Creek, 7 $\frac{1}{2}$ miles southeast of Wakonda, and 16 $\frac{1}{2}$ miles downstream from Turkey Ridge Creek. Altitude of gage is 1,160 ft (by barometer).

Drainage area.—1,680 sq mi, approximately.

Gage-height record.—Graph based on once- or twice-daily wire-weight gage readings at main channel. Graph based on twice-daily staff gage readings at overflow section except June 21, 24, 26-28, June 30 to July 5 when no readings were made.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Levees broke at 8 a. m. June 19; discharge thereafter to July 5 is combined flow of bypass and main channel.

Maxima.—May-July 1954: Discharge, 3,790 cfs 12 m. June 21 (includes 1,850 cfs bypass flow from levee break); gage height, 16.56 ft 8 a. m. June 19.

1945 to April 1954: Discharge, 3,280 cfs Apr. 4, 1952 (includes 840 cfs bypass flow from levee break); gage height, 16.63 ft June 13, 1947, from graph based on gage readings.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	88	100	493	11	93	417	121	21	48	3,650	66
2	123	116	403	12	85	297	111	22	48	3,340	63
3	186	151	331	13	76	179	98	23	45	2,980	61
4	194	166	264	14	70	130	89	24	43	2,660	61
5	177	165	237	15	64	104	81	25	43	2,290	59
6	158	164	228	16	61	93	78	26	44	1,890	56
7	138	138	209	17	57	89	74	27	47	1,540	52
8	122	122	190	18	56	665	73	28	49	1,200	56
9	110	123	158	19	55	2,410	72	29	73	888	57
10	99	230	139	20	51	2,740	68	30	77	642	54
								31	112		58
Monthly mean discharge, in cubic feet per second.....									86.8	989	134
Runoff, in acre-feet.....									5,340	58,870	8,250
Runoff, in inches.....									0.06	0.66	0.09

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	8	16.56	2,670	6	15.32	2,930			June 22
4	5.49	136	N	16.24	2,540	12	15.44	3,290	N	15.50	3,350
8	6.22	213	4	15.66	2,360			June 21	12	15.41	3,140
N	8.97	516	8	15.50	2,450	6	15.73	3,650			June 23
4	11.92	887	12	15.42	2,430	9	15.85	3,770	N	15.30	2,970
8	13.71	1,310			June 20	N	15.83	3,790	12	15.21	2,830
12	14.93	1,760	6	15.32	2,500	6	15.71	3,700			June 24
		June 19	N	15.29	2,650	12	15.64	3,570	N	15.05	2,660
4	16.02	2,340							12	14.88	2,490

FLOODS OF JUNE IN IOWA

Big Sioux River basin

(62) Rock River near Rock Valley, Iowa

Location.—Lat 43°11'55", long 96°20'10", in NE¼ sec. 25, T. 97 N., R. 47 W., on downstream side of bridge on U. S. Highway 18, 1.8 miles west of Rock Valley and 17 miles upstream from mouth. Datum of gage is 1,216.00 ft above mean sea level (Iowa Highway Commission bench mark).

Drainage area.—1,630 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 19,200 cfs 6 a. m. June 21 (gage height, 15.86 ft).

1948 to April 1954: Discharge, 18,900 cfs June 8, 1953 (gage height, 15.99 ft).

Flood of 1897 reached a stage of 17.0 ft (discharge not determined), from information by Iowa Highway Commission.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	320	233	453	11	228	139	203	21	147	16,600	118	
2	396	216	409	12	216	127	186	22	141	8,290	118	
3	462	223	394	13	203	120	173	23	137	3,560	118	
4	445	233	350	14	194	115	157	24	133	1,910	113	
5	409	230	330	15	182	110	146	25	129	1,310	107	
6	368	223	300	16	174	107	138	26	127	1,190	102	
7	323	199	275	17	169	103	132	27	143	990	96	
8	292	176	252	18	161	412	130	28	189	780	100	
9	265	157	231	19	157	5,500	124	29	187	636	103	
10	246	157	213	20	153	13,200	120	30	314	517	153	
								31	295		252	
Monthly mean discharge, in cubic feet per second.....										236	1,925	197
Runoff, in acre-feet.....										14,490	114,600	12,090
Runoff, in inches.....										0.17	1.32	0.14

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
		June 17	8	10.69	3,880			June 21	8	12.31	6,020
N	4.74	103	N	12.01	5,880	4	15.82	18,900	12	11.86	5,240
12	4.76	107	4	12.93	7,610	6	15.86	19,200	June 23		
		June 18	8	13.49	8,850	8	15.78	18,700	6	11.09	4,100
4	4.77	108	12	13.49	8,850	N	15.51	17,400	N	10.51	3,420
8	4.83	118	June 20			4	15.16	15,600	6	9.96	2,860
N	5.03	157	4	13.66	9,380	8	14.79	13,800	12	9.51	2,440
4	6.31	519	8	14.09	11,000	12	14.43	12,300	June 24		
8	7.28	945	N	14.75	13,600	June 22			6	9.12	2,110
12	7.65	1,140	4	15.06	15,100	4	14.05	10,800	N	8.82	1,870
		June 19	8	15.34	16,500	8	13.61	9,230	6	8.56	1,670
4	8.67	1,800	12	15.61	17,800	N	13.21	8,030	12	8.34	1,520
						4	12.75	6,900			

FLOODS OF 1954

(63) Dry Creek at Hawarden, Iowa

Location.—Lat 42°59'30", long 96°28'10", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 94 N., R. 48 W., on left bank 6 ft downstream from bridge on State Route 10 at east edge of Hawarden and 1.7 miles upstream from mouth. Datum of gage is 1,170.42 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark).

Drainage area.—48 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements below 860 cfs and by contracted-opening determination of peak flow at gage height 17.57 ft. Shifting-control method used June 21-23.

Maxima.—May-July 1954: Discharge, 630 cfs 7 a. m. June 19 (gage height, 12.14 ft).

1948 to April 1954: Discharge, 10,900 cfs June 7, 1953 (gage height, 17.57 ft).

Flood of September 1926 reached a stage of 18.0 ft (discharge not determined), and flood of 1934 reached a stage of 15.8 ft (discharge not determined), from information by Iowa Highway Commission.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	12	2.0	8.4	11	4.5	29	4.5	21	1.8	263	3.0
2	11	2.8	8.1	12	4.2	15	4.2	22	1.6	88	2.8
3	11	6.8	8.4	13	3.6	12	3.6	23	1.4	41	2.8
4	8.8	9.6	8.1	14	3.0	8.4	3.0	24	1.4	30	2.6
5	7.8	6.4	7.4	15	2.8	5.8	3.0	25	1.4	19	2.4
6	6.8	5.1	7.4	16	2.6	3.0	2.8	26	1.8	17	2.2
7	6.1	4.8	7.4	17	2.4	1.4	2.8	27	3.6	15	2.4
8	5.8	3.3	6.4	18	2.6	3.6	3.0	28	3.3	13	3.0
9	5.1	3.0	5.5	19	2.6	359	2.8	29	2.2	10	2.8
10	4.8	272	5.1	20	2.0	216	2.8	30	1.6	8.8	2.8
								31	2.4		3.3
Monthly mean discharge, in cubic feet per second.....									4.26	50.2	4.35
Runoff, in acre-feet.....									262	2,990	267
Runoff, in inches.....									0.10	1.17	0.10

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	6	10.72	415			June 20	8	8.62	247
4	5.27	1.1	7	12.14	630	4	9.64	290	N	8.38	253
8	5.69	14	8	11.93	594	8	8.85	212	4	8.32	247
N	7.09	90	10	11.45	516	N	7.84	134	8	8.19	224
4	6.61	66	N	11.15	472	4	7.22	94	12	7.67	165
8	6.08	35	2	10.67	408	8	7.12	89			June 22
12	5.87	23	4	10.34	369	10	10.97	447	6	6.94	107
		June 19	6	10.19	351	12	10.88	435	N	6.51	78
2	7.82	132	8	10.15	346			June 21	6	6.30	62
4	8.47	181	10	10.16	348	4	9.49	307	12	6.17	48
			12	10.02	332						

FLOODS OF JUNE IN IOWA

63

(64) Big Sioux River at Akron, Iowa

Location.—Lat 42°49'40", long 96°33'50", in W½ sec. 31, T. 93 N., R. 48 W., on left bank 300 ft downstream from highway bridge in Akron and 2-3/4 miles upstream from Union Creek. Datum of gage is 1,118.90 ft above mean sea level, datum of 1929.

Drainage area.—8,851 sq mi.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 1 to June 1, June 10-21, July 13-31.

Maxima.—May-July 1954: Discharge, 21,700 cfs 4 a. m. June 22 (gage height, 19.95 ft).

1928 to April 1954: Discharge, 33,000 cfs Apr. 1, 1952 (gage height, 19.75 ft), from rating curve extended above 20,000 cfs on basis of velocity-area study.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	941	1,140	1,490	11	1,120	1,640	833	21	730	17,000	561
2	1,080	1,120	1,360	12	1,070	1,150	805	22	722	20,100	566
3	1,190	1,080	1,270	13	1,020	1,020	762	23	708	12,800	578
4	1,290	1,080	1,200	14	970	919	725	24	694	7,730	543
5	1,310	1,090	1,130	15	922	889	691	25	685	3,900	520
6	1,300	1,010	1,090	16	882	878	658	26	643	2,820	492
7	1,260	1,010	1,040	17	841	848	631	27	697	2,570	475
8	1,230	1,010	973	18	809	1,580	619	28	762	2,190	478
9	1,190	1,090	923	19	780	6,750	598	29	867	1,880	459
10	1,150	1,950	874	20	748	9,760	578	30	870	1,640	478
								31	1,140		667
<u>Monthly mean discharge, in cubic feet per second</u>									955	3,655	776
<u>Runoff, in acre-feet</u>									58,710	217,500	47,740
<u>Runoff, in inches</u>									0.12	0.46	0.10

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 18		8	15.76	7,890		June 22		8	16.57	8,550
4	5.13	823	12	15.91	8,120	2	19.83	21,000	N	16.10	7,860
6	5.25	867		June 20		4	19.95	21,700	4	15.43	7,070
8	6.12	1,190	4	16.05	8,330	6	19.87	21,200	6	14.54	6,180
10	5.98	1,140	8	16.25	8,720	N	19.83	21,000	12	13.42	5,240
N	6.65	1,390	N	16.48	9,170	4	19.66	20,000		June 25	
4	7.49	1,780	4	16.86	10,000	8	19.42	18,500	4	12.42	4,530
8	8.47	2,320	8	17.46	11,400	12	19.12	17,000	8	11.68	4,050
12	10.28	3,400	10	17.92	12,800		June 23		N	11.18	3,730
	June 19		12	18.16	13,400	4	18.77	15,200	4	10.86	3,530
2	11.71	4,310		June 21		8	18.44	13,800	8	10.58	3,360
4	13.31	5,450	4	18.67	15,000	N	18.09	12,400	12	10.34	3,210
5	14.70	6,660	8	19.09	16,400	4	17.76	11,300		June 26	
6	14.50	6,470	N	19.38	17,500	8	17.49	10,600	6	9.99	3,000
8	14.61	6,570	4	19.68	18,600	12	17.21	9,840	N	9.56	2,750
N	15.01	6,960	6	19.43	18,400		June 24		6	9.34	2,630
4	15.49	7,530	8	19.40	18,400	4	16.91	9,180	12	9.23	2,570
			12	19.52	19,100						

FLOODS OF 1954

Perry Creek basin

(66) Perry Creek at 38th Street, Sioux City, Iowa

Location.—Lat 42°32', long 96°25', in SW $\frac{1}{4}$ sec. 9, T. 89 N., R. 47 W., on right upstream abutment of bridge on 38th Street in Sioux City, 3.6 miles upstream from mouth. Datum of gage is 1,117.04 ft above mean sea level (city of Sioux City bench mark).

Drainage area.—60 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except for period May 26-28, 31, June 2, 3, 7 for which graph was drawn based on once-daily or more frequent wire-weight gage readings and portions of recorder graph. Once-daily wire-weight gage readings used May 1-19, 24, 25, 29, 30, June 1, 4-6, 23-27.

Discharge record.—Stage-discharge relation defined by current-meter measurements below 1,700 cfs and extended above on basis of indirect determinations made at 7,800 cfs and 9,600 cfs.

Shifting-control method used May 26, 27, 31, June 1, 2, 19.

Maxima.—May-July 1954: Discharge, 4,010 cfs 3:30 a. m. June 19 (gage height, 13.75 ft).

1945 to April 1954: Discharge, 7,780 cfs Sept. 10, 1949 (gage height, 21.80 ft), from rating curve extended above 1,700 cfs on basis of slope-area determination of peak flow.

Flood of July 7, 1944, reached a stage of about 25.5 ft, from floodmarks (discharge, 9,600 cfs, by contracted-opening method, by Corps of Engineers).

Mean discharge, in cubic feet per second, 1954

Day		May	June	July	Day	May	June	July	Day	May	June	July
1		11	13	15	11	9.8	9.6	7.8	21	7.4	106	6.5
2		11	177	11	12	9.8	9.4	7.6	22	7.6	26	6.5
3		11	49	10	13	9.6	9.1	7.0	23	7.4	14	6.5
4		11	17	9.6	14	9.4	9.1	6.7	24	7.4	14	5.8
5		10	15	9.6	15	9.1	9.4	6.5	25	8.0	13	5.3
6		11	13	9.6	16	8.7	9.4	6.5	26	94	13	5.1
7		11	12	9.8	17	8.7	8.9	6.8	27	325	12	5.1
8		11	11	8.9	18	8.3	9.6	6.8	28	23	12	6.0
9		10	10	8.3	19	8.1	982	6.8	29	14	12	7.0
10		10	10	8.1	20	7.4	78	6.5	30	15	11	8.1
									31	200		8.9
Monthly mean discharge, in cubic feet per second.....										29.2	56.5	7.67
Runoff, in acre-feet										1,790	3,360	471
Runoff, in inches										0.56	1.05	0.15

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 19	6	12.50	3,450	12	2.72	121			June 21
1	1.70	11	7	9.25	2,200			June 20	1	3.18	239
2	2.40	64	8	7.17	1,560	6	2.37	60	3	2.92	167
3	6.65	1,420	10	5.82	1,180	N	2.19	38	6	2.81	141
3:30	13.75	4,010	N	4.00	515	6	2.09	28	N	2.53	85
4	13.65	3,960	4	3.39	302	10	3.07	207	6	2.41	66
5	13.62	3,950	8	3.06	204	12	2.93	170	12	2.25	44

Floyd River basin

(67) Floyd River at James, Iowa

Location.—Lat 42°34'40", long 96°18'40", in NW¼NW¼ sec. 32, T. 90 N., R. 46 W., on right bank 10 ft downstream from bridge on Plymouth County road J at James, 9.5 miles upstream from mouth, and 14 miles downstream from West Floyd River. Datum of gage is 1,102.59 ft above mean sea level, datum of 1929.

Drainage area.—918 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except for periods May 27, May 31 to June 17, June 19, 24, 25 for which graph was drawn based on once-daily or more frequent wire-weight gage readings and shape of recorder graph, July 25-27, 29, 30 when once-daily wire-weight gage readings were used. No gage-height record July 28.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used June 11-12, 19-25, July 5-31.

Maxima.—May-July 1954: Discharge, 6,250 cfs 2-6 a.m. June 22 (gage height, 19.88 ft).
1934 to April 1954: Discharge, 71,500 cfs June 8, 1953 (gage height, 25.3 ft, from flood-marks at downstream side of bridge), by contracted-opening and flow-over-embankment determination.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	159	174	351	11	149	1,770	194	21	89	5,590	134
2	204	256	326	12	144	978	184	22	84	6,040	129
3	221	274	300	13	134	421	174	23	83	3,880	128
4	239	237	285	14	126	274	164	24	81	1,580	122
5	227	214	285	15	119	234	154	25	78	886	115
6	210	183	264	16	113	209	149	26	77	710	108
7	189	188	245	17	104	189	139	27	439	602	104
8	179	160	233	18	100	186	144	28	292	501	104
9	169	120	216	19	98	2,350	139	29	252	446	103
10	159	184	204	20	93	4,910	134	30	189	388	107
								31	292		112
Monthly mean discharge, in cubic feet per second.....									164	1,138	179
Runoff, in acre-feet.....									10,100	67,700	11,010
Runoff, in inches.....									0.21	1.38	0.22

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 19			June 20			June 22			June 24	
2	8.75	257	6	19.42	5,320	2	19.88	6,250	6	16.18	2,030
4	16.73	2,310	N	19.24	4,950	6	19.88	6,250	N	14.16	1,340
6	16.92	2,410	6	19.21	4,900	N	19.85	6,170	6	13.35	1,150
8	16.98	2,450	12	19.38	5,250	6	19.75	5,920	12	12.83	1,030
N	17.05	2,480		June 21		12	19.48	5,450		June 25	
4	17.18	2,550	6	19.41	5,300		June 23		6	12.45	942
8	17.60	2,860	N	19.47	5,420	6	19.03	4,550	N	12.14	872
12	18.45	3,670	6	19.72	5,920	N	18.53	3,770	6	11.91	826
			12	19.86	6,200	6	17.97	3,190	12	11.70	782
						12	17.26	2,610			

FLOODS OF 1954

Omaha Creek basin

(69) Omaha Creek at Homer, Nebr.

Location.—Lat $42^{\circ}20'$, long $96^{\circ}29'$, in SE $\frac{1}{4}$ sec. 11, T. 27 N., R. 8 E., on right pier on downstream side of bridge on main street of Homer. Datum of gage is 1,082.43 ft above mean sea level, datum of 1929 (preliminary).

Drainage area.—170 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except June 5-9, June 27 to July 7.

Discharge record.—Stage-discharge relation defined by current-meter measurements below 4,000 cfs and extended to peak stage by logarithmic plotting. Discharge for periods of no gage-height record computed on basis of two discharge measurements, weather records, and trend of flow. Shifting-control method used May 1 to July 31.

Maxima.—May-July 1954: Discharge, 10,200 cfs 4:30 a.m. June 21 (gage height, 21.41 ft).

1946 to April 1954: Discharge, 5,950 cfs May 23, 1952 (gage height, 20.22 ft, at site half a mile downstream at datum 8.03 ft lower).

Flood of June 4, 1940, reached a stage of about 32.5 ft (discharge not determined).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	27	37	38	11	21	24	26	21	17	3,660	21
2	73	177	37	12	21	23	24	22	16	156	21
3	45	291	35	13	20	22	22	23	16	108	21
4	29	45	34	14	20	22	21	24	19	86	20
5	24	30	33	15	19	22	20	25	16	64	19
6	23	27	32	16	18	24	20	26	16	527	19
7	22	26	31	17	17	22	19	27	46	285	18
8	22	26	29	18	18	32	19	28	22	80	70
9	21	26	28	19	20	350	19	29	17	50	27
10	21	27	27	20	18	1,440	19	30	16	42	24
								31	196		29
Monthly mean discharge, in cubic feet per second.....									28.9	258	26.5
Runoff, in acre-feet									1,780	15,370	1,630
Runoff, in inches.....									0.20	1.70	0.18

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
	June 19										
2	1.61	64	4	2.30	225	11	13.83	5,550	8	16.97	7,430
4	1.61	64	8	2.26	214	12	13.72	5,480	9	15.24	6,390
5	2.50	285	12	2.23	205		June 21		10	12.7	4,870
6	3.17	494		June 20		1	13.76	5,510	11	9.51	3,160
7	4.14	846	4	1.87	108	2	15.15	6,340	N	6.64	1,850
8	4.58	1,020	1	1.59	48	3	17.62	7,820	1	4.7	1,070
9	4.15	850	5	1.51	37	4	21.02	9,910	2	3.3	540
10	3.40	575	6	1.90	116	4:30	21.41	10,200	3	3.0	435
11	3.69	676	7	12.0	4,450	5	21.21	10,000	5	2.6	315
N	3.11	474	8	17.63	7,830	6	19.97	9,230	7	2.4	255
2	2.65	330	9	15.8	6,730	7	18.38	8,280	12	2.2	197
			10	14.23	5,790						

FLOODS OF JUNE IN IOWA

Little Sioux River basin

(70) Little Sioux River near Cherokee, Iowa

Location.—Lat 42°49', long 95°30', in sec. 1, T. 92 N., R. 40 W., on downstream handrail of bridge, 5 miles north of Cherokee. Datum of gage is 1,171.42 ft above mean sea level, datum of 1929.

Drainage area.—1,920 sq mi, approximately.

Gage-height record.—Graph drawn on basis of frequent staff or wire-weight gage readings.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used July 15-31.

Maxima.—May-July 1954: Discharge, 16,000 cfs 4:30 a. m. June 20 (gage height, 16.36 ft, from graph based on gage readings).

1949 to April 1954: Discharge, 21,400 cfs June 11, 1953 (gage height, 17.48 ft).

Cooperation.—Records furnished by Corps of Engineers, Department of the Army.

Mean discharge, in cubic feet per second, 1954

Day	1954				1954							
	May	June	July	Day	May	June	July	Day	May	June	July	
1	334	615	3,620	11	497	2,210	1,040	21	209	10,800	444	
2	470	558	3,060	12	444	2,480	931	22	209	11,700	444	
3	668	624	2,540	13	393	1,640	861	23	209	12,300	444	
4	827	668	2,180	14	368	967	762	24	230	11,100	393	
5	895	638	1,900	15	344	775	699	25	209	9,080	368	
6	827	574	1,700	16	320	730	638	26	209	7,090	344	
7	699	538	1,600	17	297	662	580	27	252	5,960	320	
8	609	470	1,410	18	281	2,360	552	28	418	5,020	320	
9	580	1,100	1,260	19	252	6,210	497	29	320	4,510	320	
10	524	3,160	1,160	20	230	13,100	480	30	552	4,050	320	
								31	762		344	
Monthly mean discharge, in cubic feet per second.....										433	4,056	1,017
Runoff, in acre-feet										26,650	241,300	62,540
Runoff, in inches										0.32	2.91	0.76

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	June 18		Hour	June 20		Hour	June 23		Hour	June 27	
	Gage height	Discharge									
4	5.50	967	4	16.33	15,900	6	15.28	12,300	N	12.90	6,100
8	7.65	1,880	4:30	16.36	16,000	N	15.18	12,000	12	12.37	5,270
N	9.15	2,610	8	15.95	14,500	6	15.36	12,600	June 28		
4	10.05	3,130	N	15.45	12,800	12	15.20	12,000	N	12.19	5,040
8	10.32	3,310	4	15.15	11,900	June 24		12	11.94	4,740	
12	11.00	3,830	8	15.08	11,700	N	14.90	11,100	June 29		
June 19											
4	11.64	4,420	12	14.95	11,300	12	14.55	10,100	N	11.74	4,530
8	12.12	4,950	N	14.68	10,500	N	14.22	9,150	12	11.47	4,250
N	12.50	5,430	12	14.60	10,800	12	13.75	7,920	N	11.25	4,060
4	12.94	6,170	June 22		June 26		12	10.99	June 30		
8	13.80	8,040	N	15.14	11,800	N	13.37	7,030	4,860		
12	15.40	12,700	12	15.33	12,500	12	13.06	6,390	3,820		

FLOODS OF 1954

(71) Mill Creek near Cherokee, Iowa

Location.—Lat $42^{\circ}47'$, long $95^{\circ}33'$, in SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 15, T. 92 N., R. 40 W., on downstream hand-rail of bridge on U. S. Highway 59, 2 miles north of Cherokee. Datum of gage is 1,179.89 ft above mean sea level, datum of 1929.

Drainage area.—292 sq mi, approximately.

Gage-height record.—Graph drawn on basis of frequent wire-weight gage readings. No gage-height record July 11-17, discharge interpolated.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 9,050 cfs 3:30 p. m. June 19 (gage height, 13.00 ft, from graph based on gage readings).

1949 to April 1954: Discharge, 11,500 cfs June 8, 1953 (gage height, 14.30 ft).

Flood of June 24, 1891, reached a stage of 31.0 ft, from floodmarks.

Cooperation.—Records furnished by Corps of Engineers, Department of the Army.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	60	270	98	11	40	384	46	21	29	1,360	31
2	100	262	81	12	36	167	43	22	28	714	28
3	136	255	66	13	34	130	36	23	32	664	30
4	113	234	66	14	34	113	32	24	32	571	26
5	93	209	63	15	33	96	31	25	34	482	25
6	78	117	59	16	33	98	29	26	39	395	24
7	72	85	56	17	33	130	24	27	147	196	22
8	68	77	55	18	30	518	24	28	194	136	22
9	57	72	52	19	31	5,150	30	29	203	136	22
10	55	1,060	49	20	30	1,970	32	30	253	112	22
								31	604		19
Monthly mean discharge, in cubic feet per second,									89.0	539	40.1
Runoff, in acre-feet									5,470	32,060	2,470
Runoff, in inches									0.37	2.14	0.16

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	8	9.15	3,210	8	7.55	1,970	8	7.08	1,660
6	3.60	295	N	11.85	6,940	N	6.75	1,480	10	7.50	1,930
N	4.10	424	3:30	13.00	9,050	4	6.18	1,190	N	7.28	1,790
6	4.95	680	4	12.95	8,960	8	5.85	1,040	4	6.62	1,400
12	6.10	1,150	8	11.82	6,890	12	5.80	1,010	8	6.10	1,150
		June 19	12	10.55	4,920			June 21	12	5.68	962
4	7.40	1,870			June 20	4	5.97	1,090			
			4	9.03	3,190						

FLOODS OF JUNE IN IOWA

(72) Little Sioux River at Correctionville, Iowa

Location.—Lat 42°28', long 95°47', in N½ sec. 1, T. 88 N., R. 43 W., on right bank 10 ft upstream from bridge on U. S. Highway 20, 0.2 mile upstream from Bacon Creek, 0.5 mile west of Correctionville, and 0.8 mile downstream from Pierson Creek. Datum of gage is 1,096.49 ft above mean sea level, datum of 1929.

Drainage area.—2,450 sq mi, approximately.

Gage-height record.—Water-stage recorder graph.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used at times.

Maxima.—May-July 1954: Discharge, 20,900 cfs 1:30 a. m. June 21 (gage height, 23.36 ft).

1918-25, 1928-32, 1936 to April 1954: Discharge, 17,900 cfs Apr. 7, 1951 (gage height, 22.58 ft).

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July	
1	501	1,820	4,120	11	727	3,550	1,260	21	358	17,500	644	
2	564	1,070	3,680	12	660	2,820	1,150	22	337	12,400	628	
3	727	1,300	3,070	13	612	2,960	1,070	23	329	12,600	596	
4	956	1,180	2,620	14	533	1,940	994	24	342	13,200	564	
5	1,150	1,080	2,220	15	505	1,290	920	25	380	11,700	548	
6	1,180	1,000	1,990	16	486	1,070	866	26	350	9,430	516	
7	1,110	913	1,810	17	442	1,000	830	27	442	7,590	486	
8	994	816	1,630	18	414	1,400	778	28	710	6,480	471	
9	902	734	1,500	19	400	9,210	727	29	620	5,570	471	
10	795	1,370	1,380	20	383	12,800	677	30	583	4,720	471	
								31	1,820		456	
										655	5,017	1,263
										40,290	298,500	77,640
										0.31	2.28	0.59

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
June 18											
4	8.56	906	2	14.02	3,500	4	21.59	12,400	10	22.97	19,100
8	8.59	916	4	18.50	7,000	8	21.43	12,200	N	22.82	17,800
N	9.48	1,260	6	19.64	8,880	N	21.22	11,700	2	22.87	17,600
4	9.88	1,430	8	20.42	10,400	4	21.18	11,800	6	22.57	16,000
8	10.76	1,830	N	20.90	10,400	8	21.56	13,500	12	22.11	14,000
10	12.17	2,510	4	20.84	9,960	12	23.06	19,600	June 22		
12	13.48	3,190	8	21.10	10,700	June 21			N	21.38	11,900
			12	21.47	11,800	1:30	23.36	20,900	12	21.09	11,600
						2	23.32	20,700			

FLOODS OF 1954

(73) Little Sioux River near Kennebec, Iowa

Location.—Lat 42°05', long 96°00', on S½ sec. 18, T. 84 N., R. 44 W., on left bank 15 ft downstream from bridge on county road A, 1.3 miles south of Kennebec, 5.5 miles northeast of Onawa, and 6.5 miles upstream from Maple River. Datum of gage is 1,027.89 ft above mean sea level, datum of 1929 (Corps of Engineers benchmark).

Drainage area.—2,730 sq mi, approximately.

Gage-height record.—Water-stage recorder graph except May 28-31 for which a graph was drawn based on once-daily or more frequent wire-weight gage readings.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 27, June 3, 19-29.

Maxima.—May-July 1954: Discharge, 13,500 cfs 12 m. to 6 p. m. June 22; gage height, 26.63 ft 7:30 p. m. June 21.

1939 to April 1954: Discharge, 12,000 cfs Apr. 11, 1951; gage height, 25.03 ft Aug. 7, 1945.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	528	2,450	4,760	11	788	2,400	1,500	21	404	11,800	715
2	620	1,520	4,220	12	737	3,420	1,380	22	380	13,100	680
3	686	1,440	3,650	13	686	3,050	1,260	23	368	13,100	665
4	839	1,470	3,180	14	636	2,930	1,140	24	368	13,000	635
5	1,040	1,510	2,730	15	556	1,770	1,030	25	368	12,600	605
6	1,160	1,190	2,450	16	528	1,300	960	26	392	12,700	575
7	1,200	1,060	2,180	17	500	1,130	890	27	1,050	11,400	530
8	1,080	935	2,000	18	472	1,030	855	28	771	8,910	500
9	964	822	1,820	19	444	4,750	802	29	754	6,740	485
10	892	784	1,660	20	416	9,650	768	30	620	5,680	485
								31	790		500
Monthly mean discharge, in cubic feet per second.....									679	5,115	1,471
Runoff, in acre-feet									41,730	304,300	90,470
Runoff, in inches									0.29	2.09	0.62

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 18	8	19.70	6,630	10	25.44	11,700			June 22
6	8.88	957	12	21.66	7,850	12	25.28	11,700	N	26.16	13,500
12	9.34	1,140		June 20			June 21		6	25.75	13,500
		June 19	4	23.10	8,500	6	24.98	11,600	10	25.08	12,800
4	11.42	2,020	8	24.14	9,040	N	25.57	11,900	12	25.10	13,000
8	15.80	4,390	N	24.62	9,420	6	26.61	11,900			June 23
N	17.20	5,190	4	25.32	10,300	12	26.48	12,300	N	24.75	13,200
4	18.25	5,730	8	24.72	10,600				12	24.12	13,000

FLOODS OF 1954

(75) Little Sioux River near Turin, Iowa

Location.—Lat 41°58', long 95°58', on line between secs. 28 and 33, T. 83 N., R. 44 W., near center of span on upstream side of bridge on Brown's grade, 1 mile east of gaging station on Monona-Harrison ditch near Turin, 2.4 miles downstream from equalizer ditch connecting Little Sioux River and Monona-Harrison ditch, 3.5 miles downstream from Maple River, 3.8 miles south of Turin, 6.5 miles northeast of Blencoe, and 16.5 miles upstream from mouth. Datum of gage is 1,020.00 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark).

Drainage area.—4,460 sq mi, approximately (combined area above this station and above station on Monona-Harrison ditch, 1 mile west).

Gage-height record.—Wire-weight gage read once daily except May 2, June 8, 10, 15, 29, 30, July 3-19, 21-31 when there was no gage-height record; doubtful gage readings May 6-18, 20-23, June 5-13.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 19, 24-28, May 31 to June 4, June 14, 16-21. Discharge for June 22 to July 2 includes flow outside levees that does not influence channel gage heights.

Maxima.—May-July 1954: Discharge, 7,920 cfs 12 m. June 22; gage height, 25.5 ft about 1 a.m. June 22.

1939 to April 1954: Discharge, 6,620 cfs Aug. 8, 1945; gage height observed, 26.0 ft Mar. 4, 1949 (ice jam), from floodmark.

Remarks.—Part or all of flow is diverted into Monona-Harrison ditch (see p.) through an equalizer ditch at a point 2.4 miles above station.

Mean discharge, in cubic feet per second, 1954

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	2.8	12	145	11	1.5	2.5	1.3	21	1.0	1,040	0.3
2	4.0	9.4	71	12	1.5	2.0	1.0	22	1.0	5,220	.3
3	7.6	5.5	40	13	1.4	2.0	.8	23	1.0	5,170	.3
4	4.0	4.0	21	14	1.4	1.8	.7	24	3.5	3,170	.3
5	1.9	2.5	13	15	1.3	1.7	.6	25	1.6	1,970	.3
6	1.8	2.0	8.0	16	1.3	1.6	.5	26	.8	1,330	.3
7	1.7	2.0	5.6	17	1.2	1.4	.4	27	24	900	.3
8	1.7	2.0	4.0	18	1.1	1.2	.4	28	5.5	570	.3
9	1.6	1.8	2.7	19	1.0	191	.3	29	1.2	345	.3
10	1.6	4.0	2.0	20	1.0	865	.3	30	.8	210	1.0
								31	7.6		3.0
Monthly mean discharge, in cubic feet per second.....									2.88	701	10.5
Runoff, in acre-feet.....									177	41,730	645
Runoff, in inches 1/.....									0.33	1.98	0.47

1/ Based on combined flow of Little Sioux River and Monona-Harrison ditch.

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 19	N	20.56	970	4	20.81	1,070	12	22.83	6,440
6	14.47	5.0	4	21.24	1,080	8	22.71	1,390		June 23	
N	15.51	99	8	20.37	939	12	25.16	1,790	N	21.69	5,110
6	16.69	386	12	19.71	834			June 22	12	20.83	4,010
12	17.91	546			June 21	1	25.50	1,840		June 24	
		June 20	8	19.33	797	6	25.21	1,670	N	20.21	3,110
6	19.21	754	N	19.45	835	N	24.36	7,920	12	19.85	2,460
						6	23.55	7,130			

FLOODS OF JUNE IN IOWA

73

(76) West Fork ditch at Holly Springs, Iowa

Location.—Lat 42°16', long 96°05', on line between secs. 9 and 16, T. 86 N., R. 45 W., near center of span on upstream side of bridge on State Route 141 at west edge of Holly Springs, 12 miles upstream from Wolf Creek, 16.5 miles north of Onawa, and 22 miles southeast of Sioux City. Datum of gage is 1,052.82 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark).

Drainage area.—395 sq mi, approximately.

Gage-height record.—Wire-weight gage read once daily and oftener at high stages.

Discharge record.—Stage-discharge relation defined by current-meter measurements.

Maxima.—May-July 1954: Discharge, 7,860 cfs 12 p. m. June 20 (gage height, 22.91 ft).

1939 to April 1954: Discharge, 6,600 cfs Aug. 6, 1945 (gage height, 22.4 ft, from flood-marks).

Mean discharge, in cubic feet per second, 1954

Day		May	June	July	Day		May	June	July	Day		May	June	July
1		79	391	197	11		69	949	102	21		38	5,910	67
2		103	231	174	12		68	422	92	22		36	2,790	63
3		132	636	163	13		60	202	86	23		41	875	62
4		125	510	160	14		58	152	79	24		46	406	62
5		103	380	154	15		49	132	74	25		45	366	59
6		88	334	143	16		51	124	72	26		54	276	56
7		84	142	126	17		44	112	72	27		124	236	54
8		79	125	118	18		42	107	69	28		106	226	54
9		74	107	112	19		40	745	72	29		102	210	52
10		72	212	107	20		37	5,440	66	30		93	204	58
										31		154		60
Monthly mean discharge, in cubic feet per second.....												74.1	765	93.1
Runoff, in acre-feet												4,550	45,520	5,720
Runoff, in inches												0.22	2.16	0.27

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 19	N	20.04	5,940	6	18.18	4,850	6	12.62	2,160
6	5.54	159	6	22.16	7,330	12	16.70	4,050	12	11.02	1,540
N	6.25	270	12	22.91	7,860			June 22			June 23
6	10.76	1,440			June 21	6	15.46	3,430	N	8.48	741
12	12.50	2,110	6	21.70	7,010	N	14.10	2,780	12	7.34	478
		June 20	N	19.85	5,830						
6	15.60	3,500									

FLOODS OF JUNE IN IOWA

Soldier River basin

(78) Soldier River at Pisgah, Iowa

Location.—Lat 41°50', long 96°56', in NW¼ sec. 14, T. 81 N., R. 44 W., near center of span on downstream handrail of highway bridge at west edge of Pisgah, 2.5 miles downstream from Stowe Creek, and 13 miles upstream from mouth. Datum of gage is 1,036.53 ft above mean sea level, datum of 1929.

Drainage area.—417 sq mi, approximately.

Gage-height record.—Wire-weight gage read twice daily.

Discharge record.—Stage-discharge relation defined by current-meter measurements. Shifting-control method used May 1 to July 21.

Maxima.—May-July 1954: Discharge, 15,200 cfs about 6 a. m. June 19 (gage height, 23.35 ft).
1940 to April 1954: Discharge, 22,500 cfs June 12, 1950 (gage height, 28.17 ft).

Mean discharge, in cubic feet per second, 1954

Day	1954				1954				1954			
	May	June	July	Day	May	June	July	Day	May	June	July	
1	88	610	90	11	64	123	67	21	47	2,910	67	
2	670	317	592	12	61	95	66	22	47	331	66	
3	211	694	108	13	58	92	66	23	289	197	64	
4	101	190	90	14	55	95	62	24	263	163	60	
5	81	133	84	15	53	95	60	25	77	136	58	
6	77	131	84	16	53	110	60	26	72	128	55	
7	72	113	79	17	48	97	61	27	2,040	120	53	
8	70	103	74	18	50	88	62	28	356	103	55	
9	67	108	72	19	55	5,880	61	29	126	108	56	
10	64	108	68	20	50	404	62	30	95	90	55	
								31	562		110	
Monthly mean discharge, in cubic feet per second									194	462	86.0	
Runoff, in acre-feet									11,940	27,510	5,290	
Runoff, in inches									0.54	1.24	0.24	

Gage height, in feet, and discharge, in cubic feet per second, at indicated time, 1954

Hour	Gage height	Discharge									
		June 19	N	15.50	6,870	N	7.11	331	4	17.73	9,130
2	12.25	3,850	4	10.24	2,310	6	7.03	294	6	12.98	4,600
4	18.60	10,000	8	8.60	1,220	10	7.07	312	8	10.18	2,260
6	23.35	15,200	12	7.75	708	12	7.95	824	N	8.63	1,240
8	21.83	13,400			June 20			June 21	6	7.89	798
10	18.65	10,000	6	7.23	392	2	19.63	11,000	12	7.53	568

SUMMARY OF FLOOD STAGES AND DISCHARGES

The results of the determinations of peak flow at stream-gaging stations and at other miscellaneous points on streams in the area covered by this report are summarized and presented in table 5. The reference numbers in this table are applicable to plate 1, and will aid in identifying the place where the discharge was determined.

The figures for peak discharge at gaging stations were obtained from defined stage-discharge relations, which were a part of the station record. At most of the miscellaneous points listed, crest-stage gages are maintained and peak discharges were obtained from defined stage-discharge relation. The peak discharges at a few miscellaneous points were obtained by special methods as noted under Measurement of Flood Discharges. These are indicated by headnote in the summary table. Gaging stations and miscellaneous sites can be identified in table 5. A period of record is shown for all regular gaging stations, whereas a leader indicates a miscellaneous point where no record of discharge has been systematically collected.

Table 5.--Summary of flood stages and discharges

[Maximum discharges for the floods of June 1954 were obtained from records at gaging stations or at rated crest-stage stations or from current-meter measurements, except as otherwise indicated by the following symbols: A, contracted-opening measurements; B, flow-through-culvert measurement; C, slope-area measurement.]

No.	Stream and place of determination	Drainage area sq mi	Period of record	Maximum flood previously known			Maximum during October 1954 flood				
				Date	Gage height (feet)	Discharge		Date and hour	Gage height (feet)	Discharge	
						Cfs	Cfs per sq mi			Cfs	Cfs per sq mi
1	Crane Creek near Lourdes, Iowa-----	75.4	-----	-----	-----	-----	-----	-----	-----	2,760	36.6
2	Wapsipicon River near Independence, Iowa.	1,060	1933-54	June 14, 1947	18.74	21,500	20.3	May 3, 1:30 p.m.--	7.30	2,780	2.62
3	West Fork Iowa River near Klemme, Iowa.	110	1948-54	Apr. 7, 1951 June 26, 1951	11.84 12.38	1,420	12.9	June 21, 4 a.m.---	14.97	1,920	17.5
4	East Fork Iowa River above Hayfield, Iowa.	2.14	-----	-----	-----	-----	-----	June 18-----	-----	232	108
5	East Fork Iowa River near Hayfield, Iowa.	8.35	-----	-----	-----	-----	-----	June 18-----	-----	460	55.1
6	East Fork Iowa River near Garner, Iowa.	46.2	-----	-----	-----	-----	-----	June 18-----	-----	1,150	24.9
7	Unnamed Creek (tributary to East Fork Iowa River) near Garner, Iowa.	5.64	-----	-----	-----	-----	-----	June 18-----	-----	210	37.2
8	East Fork Iowa River near Klemme, Iowa.	120	1948-54	June 26, 1951 June 1944	10.80 10	3,440	28.7	June 19, 2 a.m.---	11.2	5,960	49.7
9	Iowa River near Rowan, Iowa-----	396	1940-54	June 28, 1951	13.18	5,610	14.2	June 21, 8 p.m.---	14.88	8,460	21.4
10	Minerva Creek near Clemons, Iowa----	153	-----	-----	-----	-----	-----	June 10, 1 p.m.---	9.3	5,700	37.3
11	Iowa River at Marshalltown, Iowa----	1,530	1915-27, 1933-54	June 4, 1918	17.74	42,000	27.5	June 16, 8:30 p.m.---	16.02	11,200	7.32
12	Timber Creek near Marshalltown, Iowa-	117	-----	-----	-----	-----	-----	June 10, 2 p.m.---	13.47	2,270	19.4
13	Iowa River near Belle Plaine, Iowa---	2,420	1939-54	June 14, 1947 June 5, 1918	17.07 17.9	34,000 43,000	14.0	June 28, 3:30 a.m.---	14.50	10,700	4.42
14	Iowa River at Iowa City, Iowa-----	3,230	1903-54	a June 7, 1918	b 19.45	36,000	11.2	July 3, 4 a.m.---	8.31	7,690	2.38
15	Cedar River at Janesville, Iowa-----	1,660	1905-6, 1915-27, 1932-42, 1946-54	Apr. 1, 1933 Mar. 17, 1945	c 15.43 16.2	30,400 34,300	18.3	June 22, 12 p.m.---	12.08	18,400	11.1

Table 5.--Summary of flood stages and discharges--Continued

No.	Stream and place of determination	Drainage area sq mi	Period of record	Maximum flood previously known			Maximum during October 1954 flood				
				Date	Gage height (feet)	Discharge		Date and hour	Gage height (feet)	Discharge	
						Cfs	Cfs per sq mi			Cfs	Cfs per sq mi
16	Shell Rock River near Northwood, Iowa.	380	1948-54	Apr. 7, 1951 Apr. 10, 1951	d 11.38 9.55	----- 2,430	----- 6.39	June 22, 9 a.m.---	e 7.96	1,360	3.58
17	Lime Creek at Mason City, Iowa-----	535	1932-54	Mar. 30, 1933	15.70	9,400	17.6	June 21, 5 a.m.---	11.85	7,060	13.2
18	Shell Rock River at Shell Rock, Iowa	1,770	1953-54	Aug. 4, 1953 1856	8.79 f 17.7	4,720	2.67	June 22, 9:30 a.m.---	14.00	21,300	12.0
19	West Fork Shell Rock River near Dumont, Iowa.	286	-----	-----	-----	-----	-----	June 19-----	-----	19,500A	68.2
20	West Fork Shell Rock River at Finchford, Iowa.	860	1945-54	June 27, 1951 March 1929	17.28 14	31,900	37.1	June 23, 1 a.m.---	14.9	14,200	16.5
21	Beaver Creek at New Hartford, Iowa--	350	1948-54	Mar. 29, 1951	11.7	11,600	33.1	June 17, 2 p.m.---	8.55	1,990	5.69
22	Blackhawk Creek at Hudson, Iowa-----	295	1952-54	Feb. 21, 1953 July 7, 1953	d 15.46 13.71	----- 2,100	----- 7.12	June 11, 4 p.m.---	13.58	2,040	6.92
23	Cedar River at Waterloo, Iowa-----	5,190	1941-54	Apr. 9, 1951 March 1929	18.83 20	56,400	10.9	June 23, 3 p.m.---	18.40	49,400	9.52
24	Cedar River at Cedar Rapids, Iowa----	6,640	1903-54	Mar. 19, 1929 June 1851	20.1 20	72,000	10.8	June 26, 8:30 a.m.---	14.02	41,400	6.23
25	Cedar River near Conesville, Iowa---	7,840	1939-54	June 18, 1947 March 1929	15.35 16	60,000	7.65	June 28, 6 p.m.---	14.80	36,600	4.67
26	Skunk River near Randall, Iowa-----	163	-----	-----	-----	-----	-----	June 10-----	-----	13,600A	83.4
27	East Long Dick Creek near Ellsworth, Iowa.	4.71	-----	-----	-----	-----	-----	June 10-----	-----	501B	106
28	Skunk River near Ames, Iowa-----	322	1920-27, 1933-54	May 20, 1944	13.90	8,060	25.0	June 10, 11 p.m.---	13.66	8,630	26.8
29	Skunk River below Squaw Creek near Ames, Iowa.	565	1952-54	May 1, 1953 May 19, 1944	5.47 13	1,620	2.87	June 11, 8 a.m.---	11.92	7,980	14.1
30	Skunk River near Oskaloosa, Iowa----	1,640	1948-54	Mar. 9, 1949 Feb. 22, 1953 May 1944 June 15, 1947	18.27 18.46 25.8 21.26	10,800	6.59	June 24, 3 p.m.---	15.89	5,420	3.30

31	West Fork Des Moines River at Estherville, Iowa.	1,408	1951-54	June 8, 1953	15.53	10,800	7.67	June 21, 4 p.m----	5.66	1,360	0.97
32	West Fork Des Moines River at Humboldt, Iowa.	2,295	1940-54	June 23, 1947	12.2	11,000	4.79	June 22, 12 m-----	11.33	9,490	4.14
33	East Fork Des Moines River near Burt, Iowa.	466	1951-54	Mar. 31, 1952	11.42	1,680	3.61	June 21, 6 a.m----	12.67	3,870	8.30
34	East Fork Des Moines River near Hardy, Iowa.	1,230	1940-54	June 23, 1947 Sept. 1938	15.4 17.4	13,000	10.6	June 21, 3 p.m----	16.95	18,800	15.3
35	East Fork Des Moines River at Dakota City, Iowa.	1,262	1954	-----	-----	-----	-----	June 21, 7 p.m----	24.02	17,400	13.8
36	North Lizard Creek near Clare, Iowa-	257	1940-54	June 23, 1947	16.0	10,000	38.9	June 20, 4 a.m----	13.21	6,210	24.2
37	Des Moines River at Fort Dodge, Iowa	4,207	1905-6, 1913-27, 1949-54	Apr. 8, 1951 June 23, 1947	12.13 19.7	22,300 34,000	5.30	June 21, 11 a.m---	19.28	35,400	8.41
38	Unnamed Creek (tributary to Boone River) near Britt, Iowa.	.056	-----	-----	-----	-----	-----	June 19-----	-----	62.2B	1,110
39	Unnamed Creek (tributary to Boone River) near Britt, Iowa.	1.68	-----	-----	-----	-----	-----	June 19-----	-----	579B	345
40	Boone River near Hutchins, Iowa----	14.8	-----	-----	-----	-----	-----	June 19-----	-----	1,100A	74.3
41	Boone River near Goldfield, Iowa----	443	-----	-----	-----	-----	-----	June 21-----	-----	16,600A	37.5
42	Boone River near Webster City, Iowa-	842	1940-54	June 14, 1944 June 28, 1951 June 10, 1918	g 15.37 19.1	10,400	12.4	June 22, 2 p.m----	18.55	20,300	24.1
43	Des Moines River near Boone, Iowa---	5,490	1920-27, 1933-54	June 24, 1947	19.85	37,100	6.76	June 22, 4 p.m----	25.35	57,400	10.5
44	Des Moines River at Des Moines, Iowa	6,180	1915-27, 1932-54	June 7, 1918 June 26, 1947 May 31, 1903	b 16.5 26.5 27.3	39,500	6.39	June 24, 9 a.m----	30.16	60,200	9.74
45	Raccoon River near Jefferson, Iowa--	1,630	1940-54	June 23, 1947	22.3	29,100	17.9	June 22, 11:30 p.m	19.52	21,300	13.1
46	Hardin Creek at Farnhamville, Iowa--	69.5	-----	-----	-----	-----	-----	June 21-----	-----	1,530	22.0
47	Happy Run at Churdan, Iowa-----	3.87	-----	-----	-----	-----	-----	June 21-----	-----	128	33.1
48	Hardin Creek near Farlin, Iowa-----	104	-----	-----	-----	-----	-----	June 22-----	-----	1,780	17.1
49	East Fork Hardin Creek near Churdan, Iowa.	22.7	1952-54	June 10, 1953	5.17	105	4.63	May 31, 12 p.m----	5.94	156	6.87

Table 5.--Summary of flood stages and discharges--Continued

No.	Stream and place of determination	Drainage area sq mi	Period of record	Maximum flood previously known				Maximum during October 1954 flood			
				Date	Gage height (feet)	Discharge		Date and hour	Gage height (feet)	Discharge	
						Cfs	Cfs per sq mi			Cfs	Cfs per sq mi
50	South Raccoon River at Redfield, Iowa.	995	1940-54	June 12, 1947	24.3	23,800	23.9	June 21, 10 p.m---	6.59	1,760	1.77
51	Raccoon River at Van Meter, Iowa----	3,410	1915-54	June 13, 1947	h	46,800	13.7	June 25, 6 a.m----	17.40	20,800	6.10
52	Des Moines River below Raccoon River at Des Moines, Iowa.	9,770	1940-54	June 26, 1947 May 31, 1903	1 20.9	77,000 -----	7.88 -----	June 24, 10 p.m---	20.08	67,300	6.89
53	Des Moines River near Tracy, Iowa---	12,400	1920-27, 1933-35, 1940-54	June 14, 1947	26.5	155,000	12.5	June 27, 3 a.m----	e22.14	69,900	5.64
54	Des Moines River at Ottumwa, Iowa---	13,200	1917-54	June 7, 1947 May 31, 1903	20.2 -----	135,000 100,000	10.2 -----	June 28, 10 p.m---	16.89	61,400	4.65
55	Des Moines River at Keosauqua, Iowa-	13,900	1903-6, 1910-54	June 1, 1903 June 1, 1851	27.85 24	135,000 -----	9.71 -----	June 29, 2 p.m---	16.14	60,800	4.37
56	Vermillion River near Wakonda, S. Dak.	1,680	1945-54	June 13, 1947 Apr. 4, 1952	16.63 -----	----- 3,280	----- 1.95	June 19, 8 a.m---- June 21, 12 m----	16.56 15.85	----- 3,790	----- 2.26
57	Otter Creek near Sibley, Iowa-----	13.1	-----	-----	-----	-----	-----	June 20-----	-----	751	57.3
58	Unnamed Creek (tributary to Otter Creek), Iowa.	1.53	-----	-----	-----	-----	-----	June 19-----	-----	85	55.6
59	Otter Creek at Sibley, Iowa-----	31.0	-----	-----	-----	-----	-----	June 20-----	-----	3,860	125
60	Unnamed Creek (tributary to Otter Creek), Iowa.	7.07	-----	-----	-----	-----	-----	June 20-----	-----	1,710A	242
61	Otter Creek near Ashton, Iowa-----	88.7	-----	-----	-----	-----	-----	June 20-----	-----	7,080C	79.2
62	Rock River near Rock Valley, Iowa---	1,630	1948-54	June 8, 1953 1897	15.99 17.0	18,900 -----	11.6 -----	June 21, 6 a.m----	15.86	19,200	11.8
63	Dry Creek at Hawarden, Iowa-----	48	1948-54	June 7, 1953 Sept. 1926	17.57 18.0	10,900	227	June 19, 7 a.m----	12.14	630	13.1
64	Big Sioux River at Akron, Iowa-----	8,851	1928-54	Apr. 1, 1952	19.75	33,000	3.73	June 22, 4 a.m----	19.95	21,700	2.45
65	Perry Creek near Hinton, Iowa-----	30.6	-----	-----	-----	-----	-----	June 19-----	-----	1,660C	54.2

66	Perry Creek at 38th Street, Sioux City, Iowa.	60	1945-54	Sept. 10, 1949 July 7, 1944	21.80 25.5	7,780 9,600	130 -----	June 19, 3:30 a.m.	13.75	4,010	66.8
67	Floyd River at James, Iowa-----	918	1934-54	June 8, 1953	25.3	71,500	77.9	June 22, 2 to 6 a.m	19.88	6,250	6.81
68	South Omaha Creek at Walthill, Nebr-	55	-----	-----	-----	-----	-----	June 21-----	24.87	14,000	255
69	Omaha Creek at Homer, Nebr-----	170	1946-54	May 23, 1952 June 4, 1940	m20.22 32.5	5,950	35.0 -----	June 21, 4:30 a.m-	21.41	10,200	60.0
70	Little Sioux River near Cherokee, Iowa.	1,920	1949-54	June 11, 1953	17.48	21,400	11.1	June 20, 4:30 a.m-	16.36	16,000	8.33
71	Mill Creek near Cherokee, Iowa-----	292	1949-54	June 8, 1953 June 24, 1891	14.30 31.0	11,500	39.4 -----	June 19, 3:30 p.m-	13.00	9,050	31.0
72	Little Sioux River at Correction- ville, Iowa.	2,450	1918-25, 1928-32, 1936-54	Apr. 7, 1951	22.58	17,900	7.31	June 21, 1:30 a.m-	23.36	20,900	8.53
73	Little Sioux River near Kennebec, Iowa.	2,730	1939-54	Aug. 7, 1945 Apr. 11, 1951	25.03 24.33	----- 12,000	----- 4.40	June 21, 7:30 p.m- June 22, 12 m to 6 p.m.	26.63 26.61	----- 13,500	----- 4.95
74	Maple River at Mapleton, Iowa-----	661	1941-54	June 12, 1950 June 27, 1952	22.1 19.05	----- 13,400	----- 20.3	June 20, 6 a.m----	20.4	15,600	23.6
75	Little Sioux River near Turin, Iowa-	n 4,460	1939-54	Aug. 8, 1945 Mar. 4, 1949	----- 26.0	6,620	----- -----	June 22, 1 a.m---- June 22, 12 m-----	25.5 -----	----- 7,920	----- -----
76	West Fork ditch at Holly Springs, Iowa.	395	1939-54	Aug. 6, 1945	22.4	6,600	16.7	June 20, 12 p.m---	22.91	7,860	19.9
77	Monona-Harrison ditch near Turin, Iowa.	n 4,460	1939-54	Mar. 4, 1949 Mar. 27, 1951	d 25.6 -----	----- 17,000	----- -----	June 20, 4:15 p.m-	23.40	21,000	-----
78	Soldier River at Pisgah, Iowa-----	417	1940-54	June 12, 1950	28.17	22,500	54.0	June 19, about 6 a.m.	23.35	15,200	36.5

a Floods of 1851 and 1881 exceeded flood of 1918, stage and discharge not known.

b Site and datum then in use.

c Site then in use.

d Caused by ice jam.

e Observed.

f From floodmark furnished by Corps of Engineers at bridge 400 ft downstream.

g Gage height, 13.7 ft in gage well, 13.9 ft from outside gage.

h Gage height, 21.4 ft in gage well, 21.6 ft from outside floodmark.

i Gage height, 20.8 ft in gage well, 21.6 ft from outside floodmark.

j Includes 840 cfs by-pass flow from levee break.

k Includes 1,850 cfs by-pass flow from levee break.

m At site 0.5 mile downstream at datum 8.03 ft lower.

n Combined drainage area of Little Sioux River and Monona-Harrison ditch.

FREQUENCY OF PEAK DISCHARGES

A flood frequency report for the State covers the entire area affected by the floods of June 1954 in Iowa (Schwob, 1953). That report contains peak discharge data and describes the method used to develop regional frequency relations. It was found that frequency characteristics differed among 8 regions, A to H. Figures 2a and 2b of the flood-frequency report show the relation of peak discharge to drainage area for the 50-year recurrence interval in each of the 8 regions.

The frequency regions that are defined are shown in figure 15 of this report. The flood of June 1954 extended over 6 of these regions, C to H. The unit peak discharges for the June flood have been plotted against drainage area in each appropriate region as shown in figures 16 to 21. Also plotted are the 50-year recurrence interval lines as defined in the flood frequency report. The line of the 10-year recurrence has also been added to give an approximate scale of vertical dimension.

The principal use of these regional curves is to indicate whether the floods of June 1954 were greater or less than the 50-year flood and the relative magnitude thereof. Although the 50-year recurrence interval curve may be used with a fair degree of confidence, no attempt should be made to estimate the recurrence intervals of points which are plotted an appreciable distance from the curve.

Region C contains 22 stations in the Wapsipinicon River basin, the Iowa River basin with the exception of the headwaters of the main stem, and the Skunk River basin. The greatest rate of runoff occurred in the Skunk River basin and tributaries to the upper Cedar River. The recurrence intervals of the floods on West Fork Shell Rock River near Dumont (19) and of the Skunk River near Randall (26) were greatly in excess of 50 years while those on East Long Dick Creek near Ellsworth (27), and Minerva Creek near Clemons (10) slightly exceeded 50 years. Five other stations had recurrence intervals between 10 and 50 years and the 13 remaining stations all had recurrence intervals of less than 10 years. The Wapsipinicon River near Independence was on the east edge of the flood area and the peak discharge was about 40 percent of its mean annual flood. The lower reaches of the Iowa, Skunk and Shell Rock Rivers produced peaks of similarly low-recurrence intervals.

For 8 of the 17 stations in region D the recurrence interval exceeded 50 years by a considerable amount, reflecting the high rate of runoff in the East Fork Des Moines River (34, 35), the headwaters of the Des Moines River (37), the Boone River (41), and the upper Iowa River (9). In the headwaters of the West and East Fork

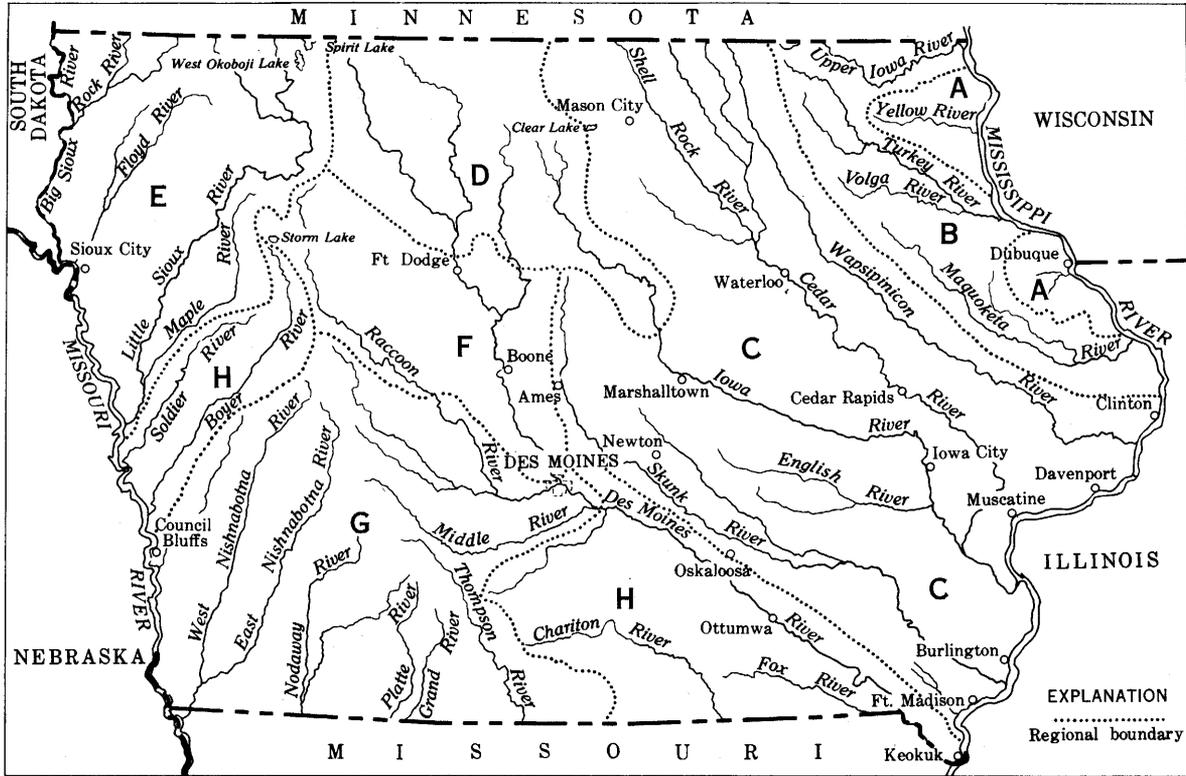


Figure 15. --Regional runoff areas in Iowa.

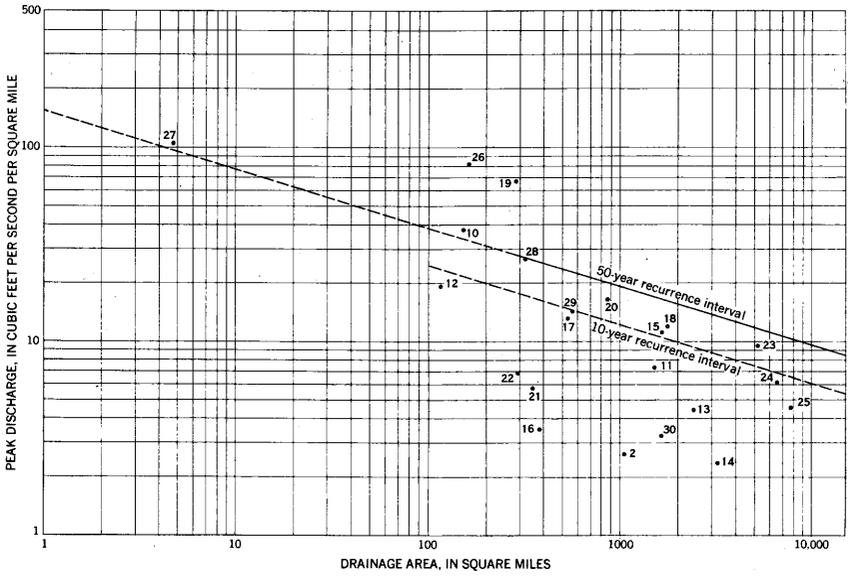


Figure 16. --Relation of unit discharge to size of drainage area for region C.

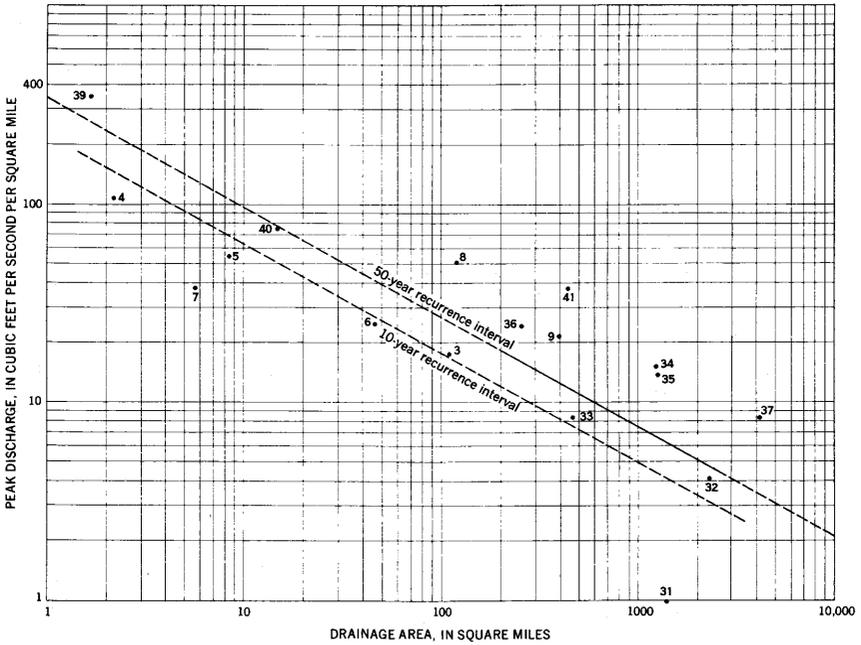


Figure 17. --Relation of unit discharge to size of drainage area for region D.

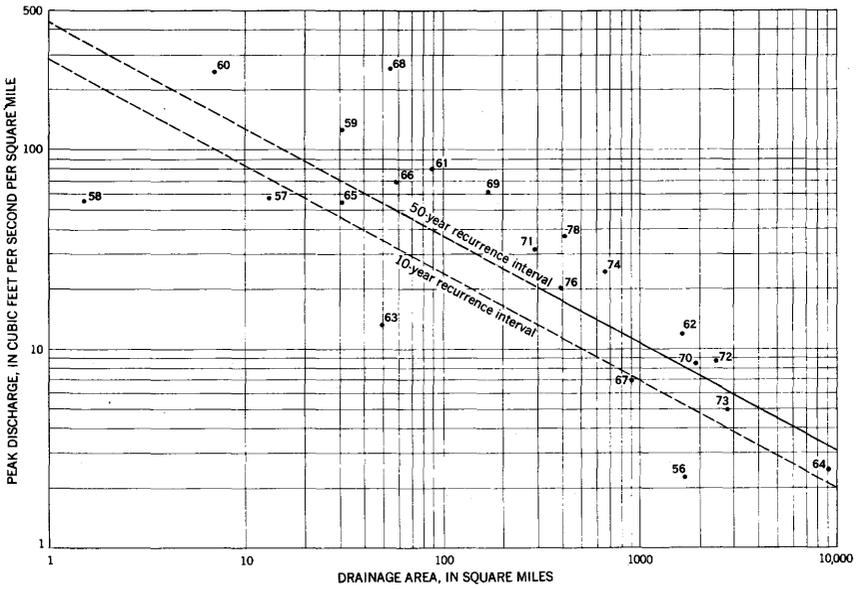


Figure 18. --Relation of unit discharge to size of drainage area for region E.

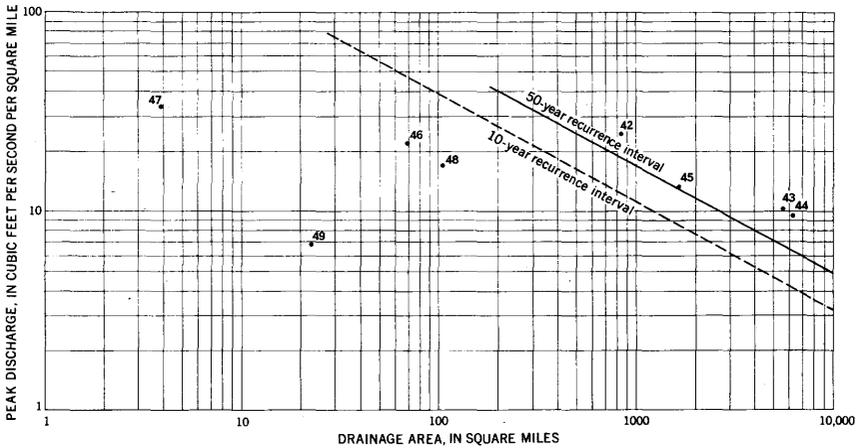


Figure 19. --Relation of unit discharge to size of drainage area for region F.

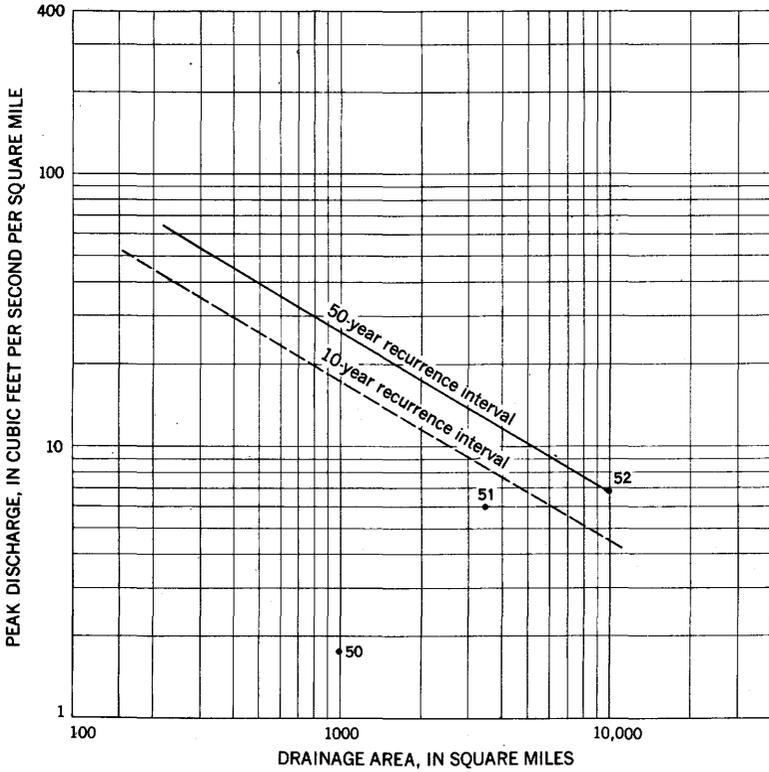


Figure 20. --Relation of unit discharge to size of drainage area for region G.

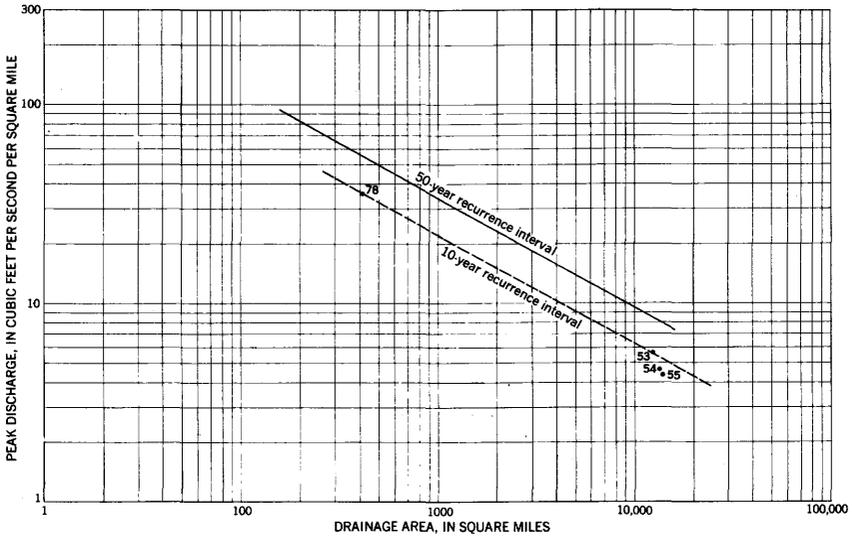


Figure 21. --Relation of unit discharge to size of drainage area for region H.

Iowa River, the peak discharges at 8 stations were well below the 50-year recurrence interval, and 5 of them were below the 10-year recurrence interval.

The extreme northwestern part of region E produced peak discharges mostly below the 50-year recurrence interval but the discharges became progressively greater toward the south. On South Omaha Creek at Walthill, Nebr. (68) the peak discharge was 255 cfs per square mile from 55 square miles, whereas the discharge for the 50-year recurrence interval in this Iowa area is about 51 cfs per square mile.

In region F the peak discharges of about half of the stations: Boone River near Webster City (42), Des Moines River near Boone (43) and at Des Moines (44), and Raccoon River near Jefferson (45), somewhat exceeded the 50-year flood while those at the other half (tributaries to the Raccoon River) were small.

The 3 stations in region G were at the south edge of the flood area, and only the Des Moines River below Raccoon River at Des Moines (52) equaled the 50-year flood while the other 2 stations which are in the Raccoon River basin had very low peak discharges. The peak discharge at Van Meter was about 50 percent greater than its mean annual flood and that at Redfield was only about one-fourth of its mean annual flood.

The discharges of all four stations in region H were about equal to or less than the 10-year recurrence interval.

FLOOD-CREST STAGES

Records of flood-crest elevations were obtained by the Corps of Engineers and the Geological Survey along major streams in the area flooded during June 1954. These flood-crest elevations are the highest known over much of the area covered by this report and, therefore, will serve as a useful guide for the design of structures to be built on or adjacent to the flood plains.

Table 6 contains data on flood-crest stages along the West Fork Des Moines River. Table 7 contains similar data for the Little Sioux River above Correctionville. Figures 22 to 26 are profiles of flood-crest elevations along the Des Moines River from the confluence of the East and West Forks downstream to Ottumwa, and figures 27 to 29 are profiles along the Iowa River from above the confluence of the East and West Forks downstream to Tama. These profiles show the comparison between the elevations of the June 1954 and those of previous record floods with distance above river mouth and cultural features noted in order that the locations can be

identified. The profiles were furnished by the Corps of Engineers and the original field notes are on file in their district office in Rock Island, Ill. Original notes for the flood-crest elevations shown in tables 6 and 7 are on file in the district office of the Geological Survey, Iowa City, Iowa.

Flood crest elevations may be determined at Geological Survey gaging stations when the gage datums are known, by adding the maximum gage height during the flood to the datum of the gage above mean sea level.

Table 6.--Flood-crest stages, West Fork Des Moines River, flood of June 1954

Location	Miles above mouth	Altitude in feet (datum of 1929)
Left upstream wingwall of bridge in sec. 27, T. 97 N., R. 33 W.....	385.8	1,214.03
Left upstream wingwall of main channel bridge on Highway 18 at line between secs. 14 and 23, T. 96 N., R. 33 W.....	380.3	1,204.40
Left upstream side of approach span of bridge in sec. 35, T. 96 N., R. 33 W.....	377.2	1,196.07
Right upstream pier of bridge on State Highway 17, east line sec. 12, T. 95 N., R. 33 W.....	374.7	1,190.77
Right downstream wingwall of bridge in sec. 21, T. 95 N., R. 31 W.....	371.2	1,180.52
Right upstream pier of bridge in sec. 29, T. 95 N., R. 31 W.....	366.1	1,163.80
Left downstream wingwall of bridge at line between secs. 5 and 8, T. 94 N., R. 31 W.....	364.0	1,158.12
Left abutment of bridge in sec. 17, T. 94 N., R. 31 W.....	362.5	1,153.21
Left upstream abutment of bridge at line between secs. 20 and 29, T. 94 N., R. 31 W.....	361.0	1,148.43
Right downstream abutment of bridge at line between secs. 1 and 2, T. 93 N., R. 31 W.....	357.3	1,138.07
Right downstream abutment of bridge in sec. 1, T. 93 N., R. 31 W.....	355.1	1,128.62
Left downstream wingwall of C.B. & Q. Ry. bridge in sec. 6, T. 92 N., R. 30 W.....	346.6	1,120.04
Right downstream wingwall of bridge on State Highway 287, at line between secs. 8 and 17, T. 92 W., R. 30 W.....	344.9	1,116.02
Left downstream wingwall of bridge in sec. 23, T. 92 N., R. 30 W.....	340.5	1,106.72
Left upstream end of Rutland dam in sec. 29, T. 92 N., R. 29 W.....	336.7	1,098.5
Left bank below Rutland dam in sec. 29, T. 92 N., R. 29 W.....	336.7	1,092.2
Left abutment of bridge in sec. 29, T. 92 N., R. 29 W.....	336.5	1,090.03
Left downstream wingwall of bridge in sec. 34, T. 92 N., R. 29 W.....	333.5	1,082.42
Right upstream pier of bridge on State Highway 3 at line between sec. 34, T. 92 N., R. 29 W., and sec. 3, T. 91 N., R. 29 W.....	332.9	1,081.89
At Humboldt powerplant intake in sec. 2, T. 91 N., R. 29 W.....	331.5	1,078.00
Left wingwall below Humboldt powerplant dam, in sec. 2, T. 91 N., R. 29 W.....	331.5	1,070.32

Table 7.--Flood-crest stages, Little Sioux River, flood of June 1954

Location	Altitude in feet (datum of 1929)
20 ft upstream from bridge on Highway 18, in SW $\frac{1}{4}$ sec. 27, T. 97 N., R. 37 W., 3.8 mi. northwest of Spencer, Clay County.....	1,322.77
Upstream side bridge on Highway 18, in SW $\frac{1}{4}$ sec. 15, T. 96 N., R. 36 W., 3.2 mi southeast of Spencer, Clay County.....	1,301.32
Downstream side bridge on Highway 18, in SW $\frac{1}{4}$ sec. 15, T. 96 N., R. 36 W., 3.2 mi southeast of Spencer, Clay County.....	1,300.97
Bridge on county road A, NE $\frac{1}{4}$ sec. 25, T. 95 N., R. 36 W., west of Gillette Grove, Clay County.....	1,278.87
Downstream end of right abutment of bridge on State Highway 10, NE $\frac{1}{4}$ sec. 27, T. 94 N., R. 39 W., 4.5 mi southeast of Sutherland, O'Brien County.....	1,214.95
Illinois Central Railroad bridge, SW $\frac{1}{4}$ sec. 34, T. 92 N., R. 40 W., in Cherokee, Cherokee County.....	1,169.48
Upstream side of roadfill at left end of bridge on county road M, on west line of sec. 1, T. 90 N., R. 41 W., 0.4 mi north of Quimby, Cherokee County.....	1,150.84
Downstream side of roadfill at left end of bridge on county road M, on west line of sec. 1, T. 90 N., R. 41 W., 0.4 mi north of Quimby, Cherokee County.....	1,150.65
Upstream side roadfill at right end of bridge on county road L, on south line of sec. 30, T. 90 N., R. 41 W., 0.5 mi west of Washta, Cherokee County.....	1,136.41
Upstream side bridge on Highway 20 at USGS gage, in NE $\frac{1}{4}$ sec. 1, T. 88 N., R. 43 W., 0.5 mi west of Correctionville, Woodbury County.....	1,119.84

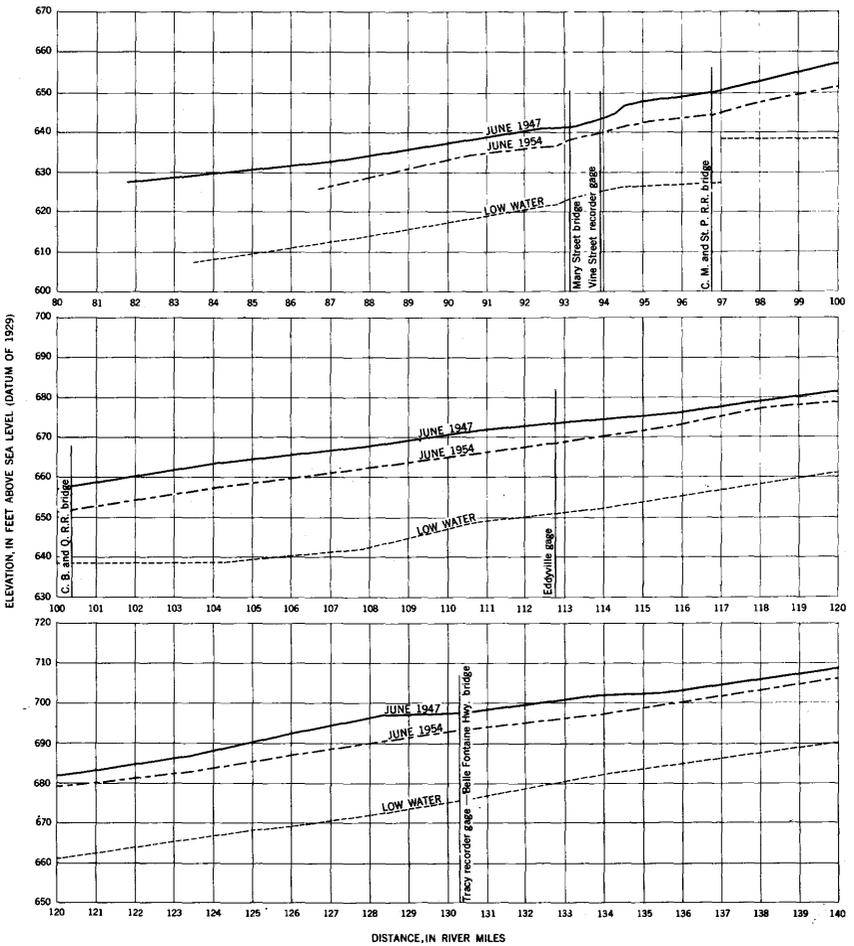


Figure 22. --Profiles of flood-crest elevations on the Des Moines River from 80 to 140 miles upstream from the mouth.

FLOODS OF 1954

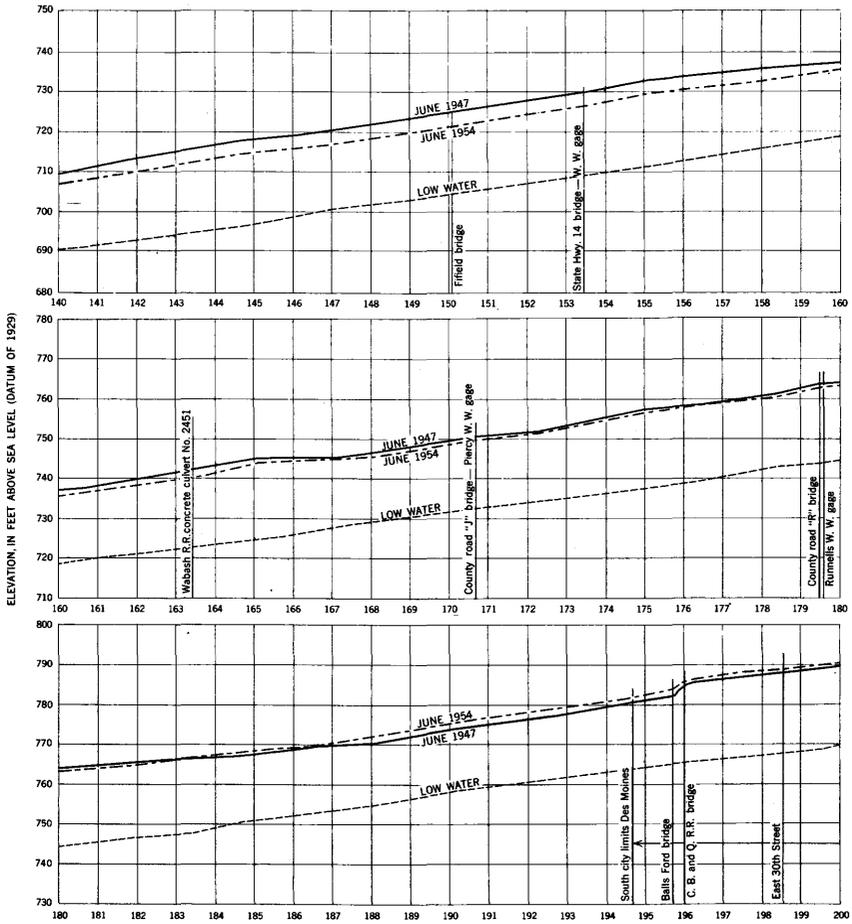


Figure 23. --Profiles of flood-crest elevations on the Des Moines River from 140 to 200 miles upstream from the mouth.

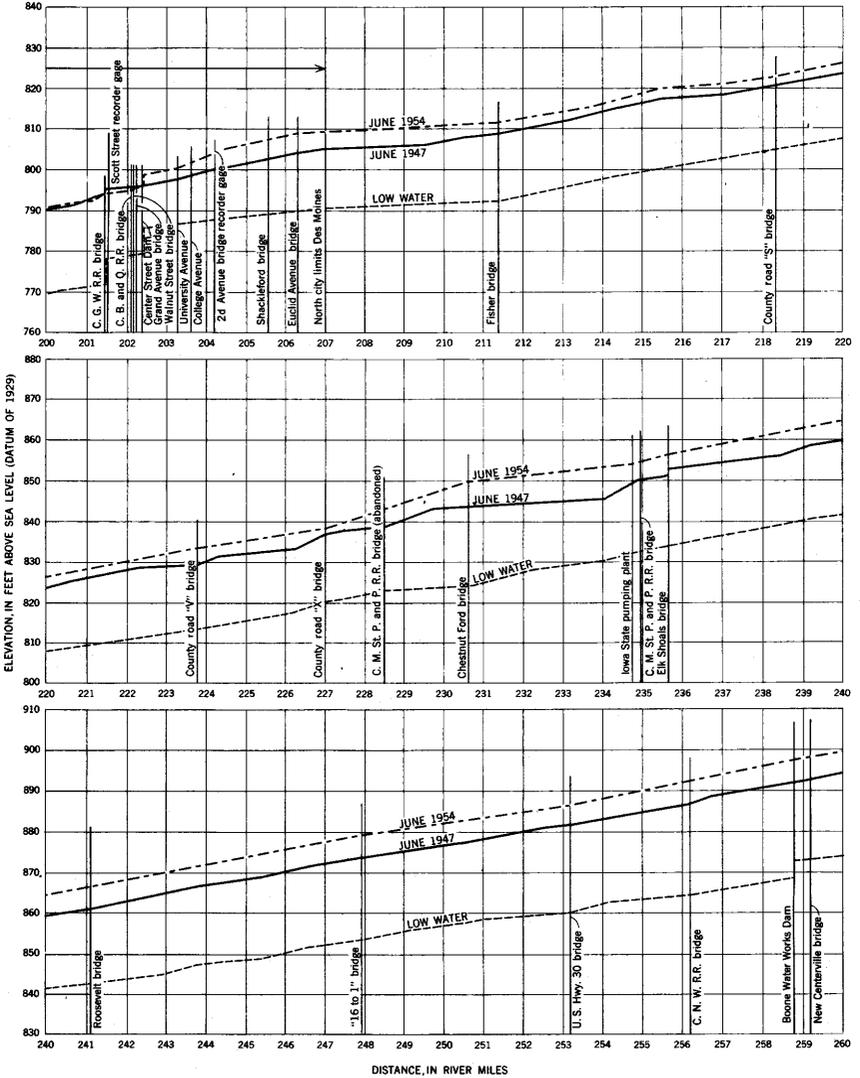


Figure 24. --Profiles of flood-crest elevations on the Des Moines River from 200 to 260 miles upstream from the mouth.

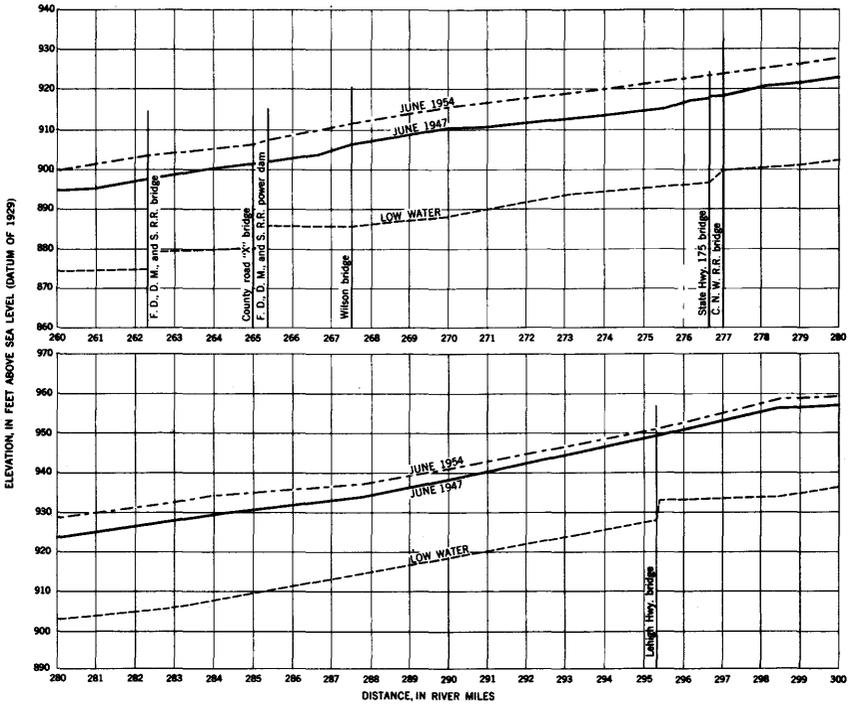


Figure 25. --Profiles of flood-crest elevations on the Des Moines River from 260 to 300 miles upstream from the mouth.

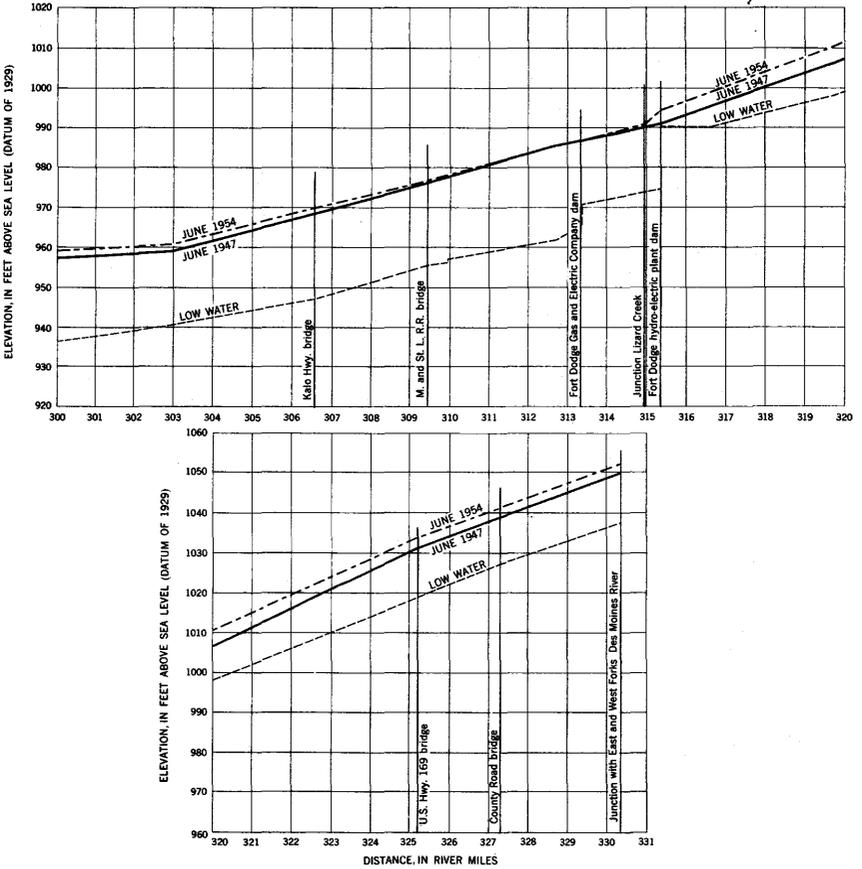


Figure 26. --Profiles of flood-crest elevations on the Des Moines River from 300 to 331 miles upstream from the mouth.

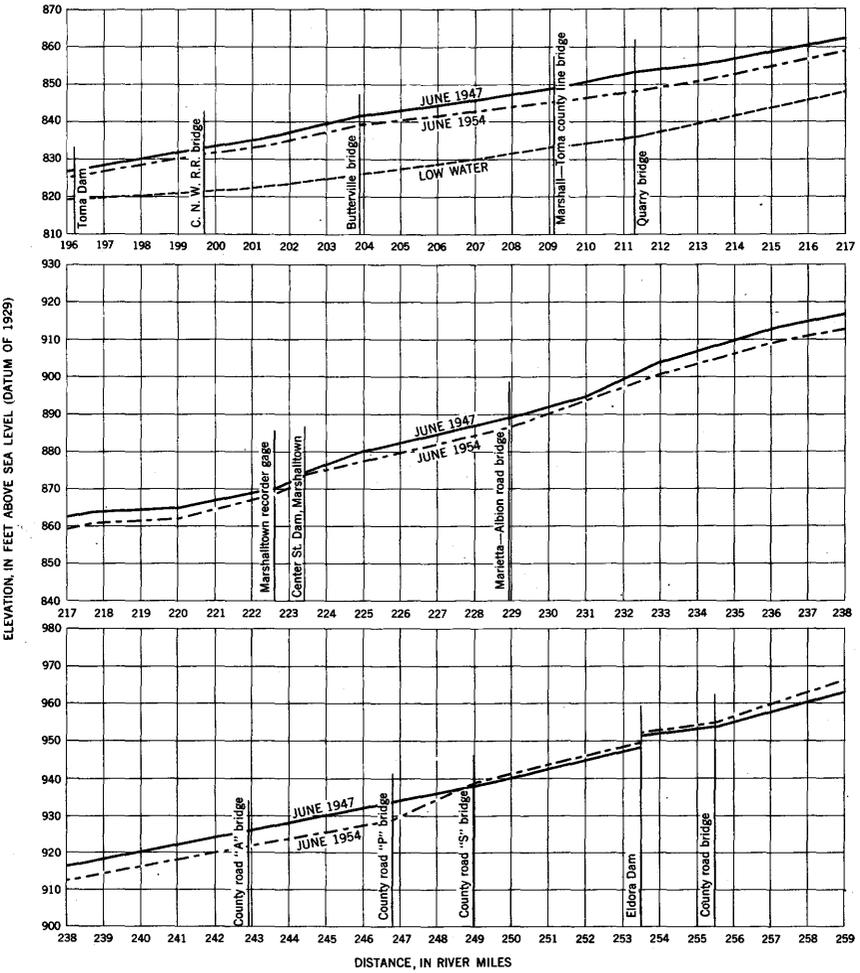


Figure 27. --Profiles of flood-crest elevations on the Iowa River from 196 to 259 miles upstream from the mouth.

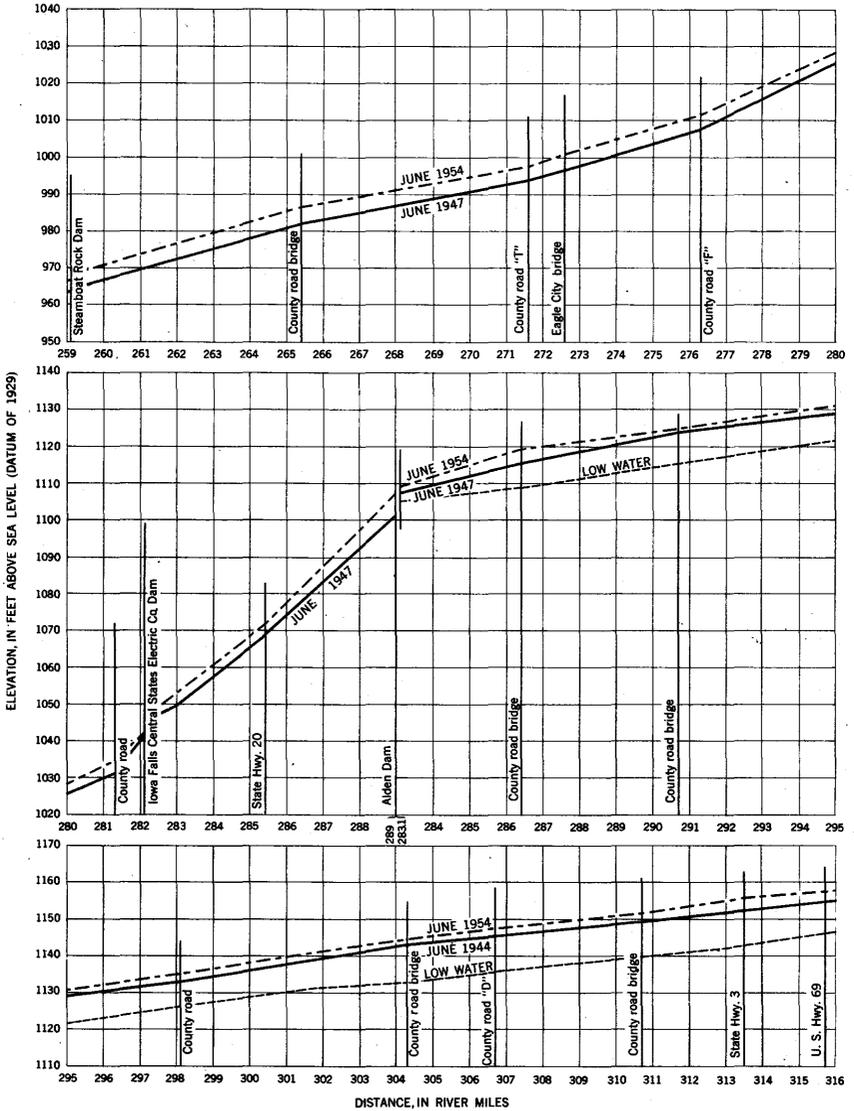


Figure 28. --Profiles of flood-crest elevations on the Iowa River from 259 to 316 miles upstream from the mouth.

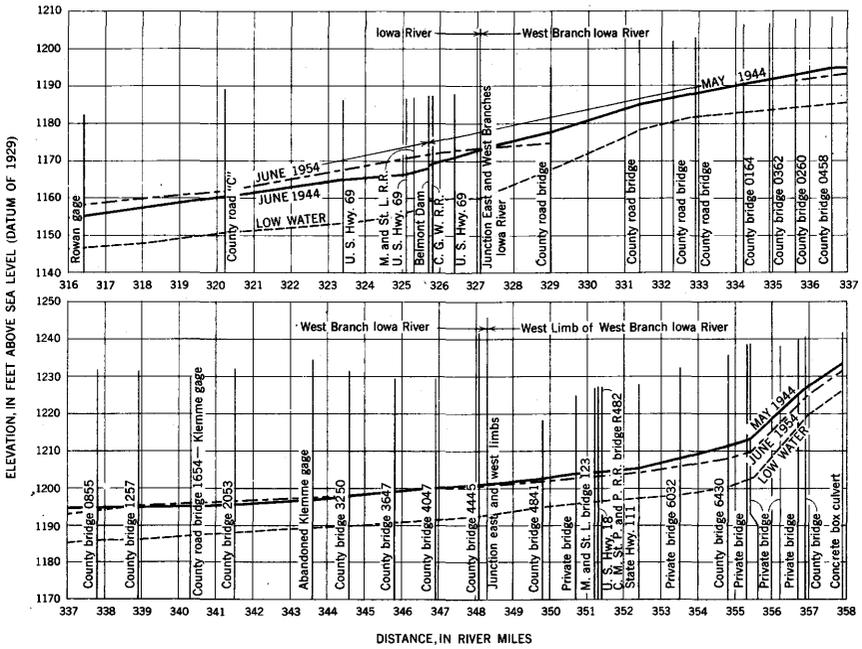


Figure 29. --Profiles of flood-crest elevations on the Iowa River from 316 to 358 miles upstream from the mouth.

RECORDS OF PREVIOUS FLOODS

At a few locations streamflow records have been collected in Iowa by the U. S. Geological Survey since 1903, and intermittent gage-height records at Des Moines were collected as early as 1893. Therefore some information is available at these locations on major floods which occurred during the 20th century. Historical information indicates that before 1900, notable floods occurred in Iowa in July 1851, April 1862, June 1865, June 1869, July 1881, April 1888 and May 1892. Little information is available on the relative magnitude of these historical floods other than the ones which occurred in 1851.

A special report is available on magnitude and frequency of floods in Iowa (Schwob, 1953). This report contains an analysis on a regional basis of floods measured at Geological Survey gaging stations. Graphs show the mean annual flood in cubic feet per second and the magnitude of floods of several recurrence intervals.

Other Geological Survey publications contain information on previous floods which occurred in the area covered by this report (U. S. Geological Survey, 1955a, 1955b, 1955c).

Iowa River basin

Streamflow records, which began in 1903 on the Iowa River at Iowa City and Wapello, indicate the flood of June 1918 was the greatest known at Iowa City during the period of record. Historical information indicates that floods during 1851 and 1881 exceeded the 1918 flood at Iowa City. At Wapello, farther downstream, the flood of June 1947 is the greatest known; however no information is available on the 1851 or 1881 floods in this vicinity. On most of the headwaters of the Iowa River as far downstream as Eldora, the current flood is reported to be the highest known. The Iowa River at Iowa Falls in June 1954 was said to be the highest within the memory of the oldest residents.

Cedar River basin

On the Cedar River at Cedar Rapids the flood of March 1929 exceeded any recorded during the period of record beginning in 1903. The stage of 1851 was about equal to that of the 1929 flood. Other noteworthy floods within the basin occurred in 1933, 1947 and 1951.

Des Moines River basin

Streamflow records have been collected for the Des Moines at Keosauqua and Des Moines since 1903 with intermittent gage-height records at Des Moines dating back to 1893. During the period of record noteworthy floods occurred in 1903, 1917, 1935, 1944, 1946, 1947 and 1954. The most severe floods throughout the basin were those of 1851, 1903, 1947 and 1954.

The flood of June 1947 exceeded all previous records at many gaging stations in the Des Moines River basin; however, the June 1954 flood was the highest ever recorded between Fort Dodge and Des Moines. During the 1947 flood a major part of the runoff was contributed by streams tributary to the Des Moines River between Des Moines and Tracy, whereas during the 1954 flood practically all the runoff originated upstream from Des Moines.

Little Sioux River basin

Little information is available on great floods in the Little Sioux River basin. Reports indicate the storm in June 1891 caused considerable flooding, the most severe floods having occurred on the middle and lower parts of the basin. The gaging station records on the Little Sioux River at Correctionville, which have been collected during the years 1918-25, 1928-32 and 1936 to the present time, indicate the June 1954 flood was the highest during the period of record.

SEDIMENT LOAD OF LITTLE SIOUX RIVER

This section is included as a part of the report to show the effect of flood discharges on the suspended-sediment load of the Little Sioux River. The excessive rainfalls which produced the floods washed large quantities of soil into the streams resulting in a serious loss of soil from the agricultural lands.

Sediment records for the Little Sioux River at Correctionville and near Kennebec have been obtained since May 1950, and are presented for the flood period, May to July 1954, to bring out the significant increase in suspended-sediment load carried by the stream at these two sites. Although the drainage area increases slightly from 2,450 to 2,730 square miles between these 2 stations, the total suspended-sediment load for the month of June 1954 increased from 858,260 tons to 1,366,450 tons, an increase of nearly 60 percent. It is also significant that the total suspended-sediment load at each station for the month of June 1954 was about 70 percent of the total for the entire water year, October 1953 to September 1954.

The data presented on the following pages consist of descriptions of the sediment sampling stations, tables showing the daily mean water discharge in cubic feet per second, the daily mean suspended-sediment concentration in parts per million, and the daily suspended-sediment load in tons per day. The tables cover the period May to July 1954.

FLOODS OF 1954

Little Sioux River Basin

Little Sioux River at Correctionville, Iowa

Location. --At gaging station at the bridge on Highway 20, 0.2 mile upstream from Bacon Creek, 0.5 mile west of Correctionville, Woodbury County, and 0.8 mile downstream from Pierson Creek.

Drainage area. --2,450 sq mi, approximately.

Maxima. --May-July 1954: Sediment concentration: Maximum daily, 11,900 ppm June 19.

Sediment load: Maximum daily, 257,000 tons June 19.

May 1950 to September 1954: Sediment concentration: Maximum daily, 12,200 ppm July 12, 1950.

Sediment load: Maximum daily, 257,000 tons June 19, 1954.

Suspended sediment, May to July 1954

Day	May			June			July		
	Mean dis-charge (second-foot)	Suspended sediment		Mean dis-charge (second-foot)	Suspended sediment		Mean dis-charge (second-foot)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	501	214	289	1,820	6,680	a 35,200	4,120	916	10,200
2	584	220	335	1,070	2,410	6,960	3,680	898	8,920
3	727	400	785	1,300	2,220	7,790	3,070	932	7,730
4	956	696	1,800	1,180	1,490	4,750	2,620	927	6,560
5	1,150	815	2,530	1,080	1,020	2,970	2,220	899	5,390
6	1,180	855	2,720	1,000	950	2,570	1,990	828	4,450
7	1,110	698	2,090	913	846	2,090	1,810	782	3,720
8	994	522	1,400	816	692	1,520	1,630	663	2,920
9	902	450	1,100	734	600	1,190	1,500	632	2,560
10	795	392	841	1,370	6,100	ab 27,000	1,380	586	2,180
11	727	350	687	3,550	7,400	ab 70,000	1,260	575	1,960
12	660	312	556	2,820	3,590	27,300	1,150	570	1,770
13	612	293	484	2,960	2,270	18,100	1,070	508	1,470
14	533	300	432	1,940	1,350	7,070	994	472	1,270
15	505	612	854	1,290	1,050	3,660	920	461	1,150
16	486	520	682	1,070	900	2,600	866	415	870
17	442	375	448	1,000	755	2,040	830	398	890
18	414	300	335	1,400	9,400	ab 50,000	778	366	769
19	400	247	267	9,210	11,900	a 257,000	727	300	589
20	383			12,800	3,320	a 120,000	677	317	579
21	358			17,500	2,000	94,500	644		
22	337	158	149	12,400	764	25,600	628	282	474
23	329			12,600	554	18,800	596		
24	342			13,200	415	14,800	548	249	365
25	360	174	179	11,700	357	11,300	548		
26	350	200	189	9,430	380	9,680	516	242	308
27	442	850	ab 1,200	7,590	432	8,850	486		
28	710	2,060	3,950	6,480	470	8,220	471		
29	620	1,270	2,130	5,570	500	7,520	471		
30	583	785	1,240	4,720	720	9,180	471		
31	1,820	7,700	a 47,300				456		
Total	20,312	-----	75,548	150,513	-----	858,260	39,143	-----	70,106

a Sediment discharge computed by subdividing day.

b Computed from partly estimated concentration graph.

Little Sioux River near Kennebec, Iowa

Location. --At gaging station, at the bridge on County road A, 1.3 miles south of Kennebec, Monona County, 5.5 miles northeast of Onawa, and 6.5 miles upstream from Maple River.

Drainage area. --2, 730 sq mi, approximately.

Maxima. --May-July 1954: Sediment concentration: Maximum daily, 20, 700 ppm May 27.

Sediment load: Maximum daily, 255, 000 tons June 19.

May 1950 to September 1954: Sediment concentration: Maximum daily, 40, 800 ppm June 18, 1950.

Sediment loads: Maximum daily, 520, 000 tons June 18, 1950.

Suspended sediment, May to July 1954

Day	May			June			July		
	Mean discharge (second-feet)	Suspended sediment		Mean discharge (second-feet)	Suspended sediment		Mean discharge (second-feet)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	528	595	648	2,450	13,100	86,700	4,760	1,810	23,300
2	620	1,240	2,080	1,520	7,210	29,600	4,220	1,610	18,300
3	686	620	1,150	1,440	5,690	22,100	3,650	1,500	14,800
4	839	685	1,570	1,470	2,970	11,800	3,180	1,410	12,100
5	1,040	1,000	2,810	1,510	2,000	7,070	2,750	1,260	9,290
6	1,150	1,180	3,700	1,190	1,820	5,210	2,450	1,120	7,410
7	1,200	1,090	3,530	1,060	1,510	4,320	2,180	1,090	6,420
8	1,080	875	2,550	955	1,300	3,280	2,000	984	5,310
9	964	698	1,820	822	1,100	2,440	1,820	903	4,440
10	892	520	1,250	784	1,200	2,540	1,660	840	3,760
11	788	487	1,040	2,400	8,080	a 57,500	1,500	806	3,260
12	737	462	919	3,420	6,820	a 64,600	1,380	750	2,790
13	686	390	722	3,050	4,210	34,700	1,260	704	2,400
14	636	346	594	2,930	2,800	22,200	1,140	652	2,010
15	556	445	668	1,770	1,910	9,130	1,030	610	1,700
16	528	730	1,040	1,500	1,470	5,160	960	564	1,460
17	500	496	670	1,130	1,360	4,150	890	524	1,260
18	472	400	510	1,030	1,350	3,750	855	563	1,300
19	444	325	390	4,750	18,400	a 255,000	802		
20	416	265	298	9,650	5,930	a 151,000	768		
21	404	280	316	11,800	8,240	199,000	715	509	1,020
22	380	300	308	15,100	2,210	78,200	680		
23	368	300	b 300	13,100	1,560	55,200	665		
24	368	216	215	13,000	1,360	47,700	635	508	850
25	368	195	194	12,600	1,320	44,900	605		
26	392	250	265	12,700	1,210	41,500	575		
27	1,050	20,700	a 75,300	11,400	1,110	34,200	550		
28	771	17,500	36,400	8,910	1,200	29,900	500	513	693
29	754	6,090	12,400	6,740	1,560	28,400	485		
30	620	3,650	6,110	5,680	1,710	26,200	485		
31	790	4,870	a 11,800				500	661	892
Total	21,037	-----	171,767	153,441	-----	1,366,450	45,610	-----	132,454

a Sediment discharge computed by subdividing day.
 b Computed from an estimated concentration graph.

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