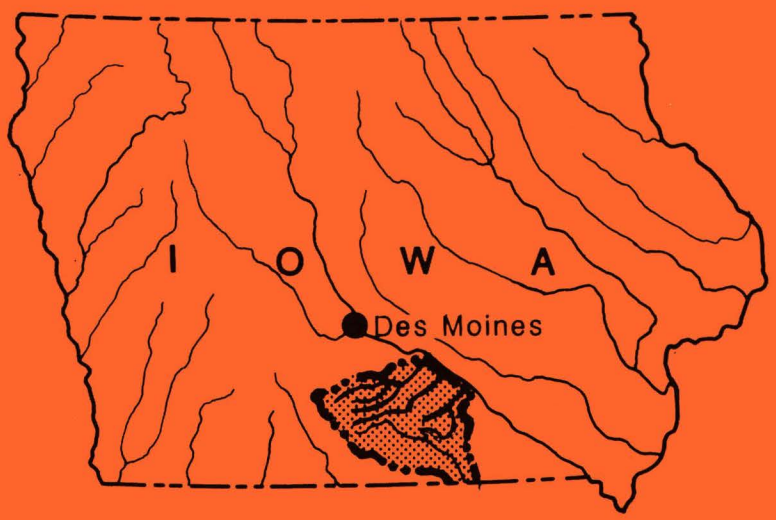
FLOODS IN SOUTH-CENTRAL IOWA

U.S. GEOLOGICAL SURVEY

Open-file Report 85-100



Prepared in cooperation with:

Highway Research Board
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By Albert J. Heinitz

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Iowa City, Iowa
1986

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, SECRETARY

GEOLOGICAL SURVEY

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CONTENTS

ILLUSTRATIONS

TABLES

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI)

Multiply inch-pound units	By	To obtain SI units
	-Length-	
inches (in)	25.4	millimeters (mm)
feet (ft)	.3048	meters (m)
miles (mi)	1.609	kilometers (km)
	-Area-	
acres	4,047	square meters (m^2)
square miles (mi^2)	2.590	Square kilometers (km^2)
	-Volume-	
cubic feet (ft^3)	0.02832	cubic meters (m^3)
cubic feet per second-day (ft^3/s-day)	2,447	cubic meters (m^3)
acre-feet (acre-ft)	1,233	cubic meters (m^3)
	-Flow-	
cubic feet per second (ft^3/s)	0.02832	cubic meters per second (m^3/s)

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ABSTRACT

Flood profiles and discharges for the great floods of 1981 and 1982 in south-central Iowa are given in this report. The profiles cover the South River, Squaw Creek, Otter Creek, White Breast Creek, Cedar Creek, North Cedar Creek, Chariton River and the South Fork Chariton River. The July 3, 1982, flood-peak discharge at the Cedar Creek gaging station (05489000) near Bussey was 4.4 times that of the regional 100-year flood to rank as one of the greatest floods ever recorded in the state. Flood peak discharges determined on other streams ranged up to 2.4 times that of the regional 100-year flood discharges.

Flood-frequency discharges for the Cedar Creek basin are greater than 2 times those defined by regional relations. These high flood peaks are probably caused from basin characteristics not yet defined.

INTRODUCTION

Purpose and Scope

Evaluation of flood hazards, and the planning, design, and operation of various facilities on flood plains require information on floods. This report provides information on flood stages and discharges, flood magnitude and frequency, bench mark data, and flood profiles of the great floods of 1981 and 1982 for streams in south-central Iowa. It covers the South River, Squaw Creek, Otter Creek, White Breast Creek, English Creek, Cedar Creek, North Cedar Creek, Coal Creek, Chariton River and the South Fork Chariton River. Profiles are not included for English Creek nor Coal Creek.

Acknowledgments

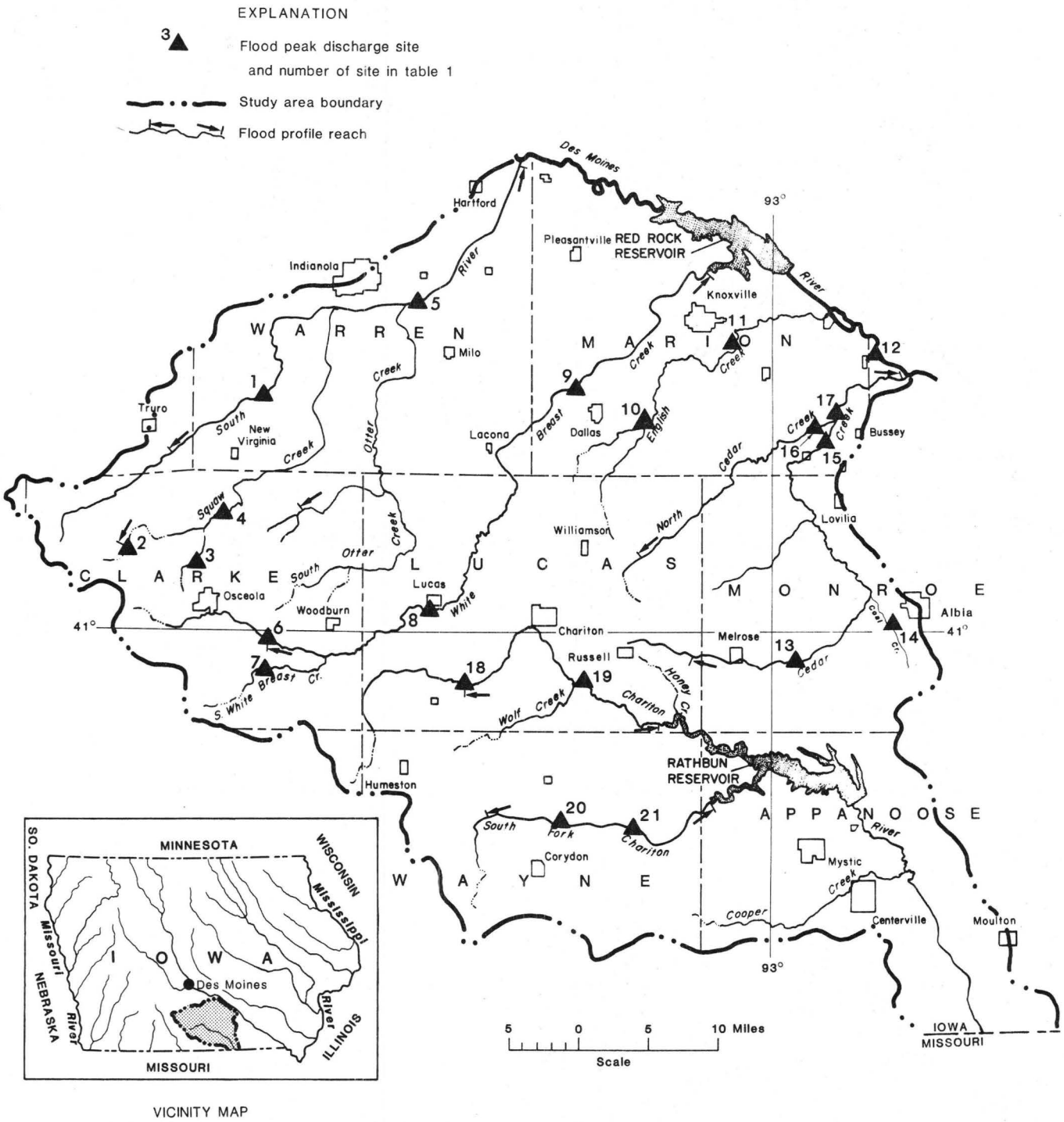
This report is the eleventh in a series prepared in cooperation with the Highway Research Board, Highway Division, Iowa Department of Transportation. Various federal, State and local agencies cooperated in the collection of the streamflow records used in this report, acknowledgment of which is contained in the annual streamflow reports of the U.S. Geological Survey.

STUDY AREA

The area covered by this report is in south-central Iowa just to the southeast of Des Moines (fig. 1). Stream basins included are the South River, White Breast Creek, English Creek, and Cedar Creek basins which are tributaries to the Des Moines River and the Chariton River basin which flows south into Missouri and is a tributary to the Grand River in Missouri. The area covers Lucas County and parts of Warren, Marion, Clarke, Monroe, Wayne and Appanoose counties.

Soil

South-central Iowa is in the southern Iowa loess soil area and the soils are mostly of loess origin. Loess consists of windblown silt that was deposited long after the Kansas glacier covered Iowa. The loess deposits came chiefly from the broad bottoms of the Missouri River, though some came from central Iowa (Prill, 1956). There are, however, a considerable amount of drift soils such as are found throughout the Southern Iowa loess area. These drift soils are derived from the Kansan till underlying the loess deposits in southern Iowa. The streams, in their development, have cut through successive layers of loess, glacial till, shale and alluvium.



VICINITY MAP

Figure 1.--Flood peak measuring sites for floods in south-central Iowa.

Topography

The topography of the area covered by this report is the result of several glaciations, wind-blown loess accumulations and subsequent erosion. The area may be divided topographically into the flood plains and terraces, uplands, and sideslopes. The flood plains and terraces occupy the valleys of the principal streams and their tributaries and are underlain by alluvial deposits. The uplands are for the most part relatively rugged, moderately-to-highly dissected areas composed of hills, knobs, and ridges, but at places the uplands are gently rolling and only slightly dissected (Cagle and Heinitz, 1978).

The local topographic relief, that between the stream valleys and adjacent divides, generally is between 100 to 200 feet. Total topographic relief for the area is about 700 feet. The slopes of the streams profiled in this report are a moderate 3- to 4-feet per mile. The smaller streams and the upstream reaches of the larger streams have much higher slopes than those shown on the profiles.

Climate

The climate of south-central Iowa is temperate. Average yearly temperature (1941-70) of the area is about 50 degrees F. Monthly mean temperatures throughout the area range from about 22 to 75 degrees F. Average annual precipitation (1941-70) for the area ranges from about 33 inches in the northwest to 35 inches in the southeast from data of the National Oceanic and Atmospheric Administration (NOAA). Stream runoff from the area amounts to about 8 inches of precipitation per year. A good portion of this runoff occurs during times of flood or high streamflow shortly after a rain.

FLOOD HISTORY

Floods in the area covered by this report have been well documented since about 1940 in annual reports of the U.S. Geological Survey (see references). The gaging station on the South River near Ackworth (05487470) was established in 1940; the flood of 1930 was documented from information supplied by local residents. Gaging station record on the White Breast Creek near Knoxville (now near Dallas, 05487980) began in 1946 and that on the Cedar Creek near Bussy (05489000) in 1948. The Corps of Engineers documented the 1946 flood on Cedar Creek. Streamflow records on the Chariton River began as early as 1938 at Centerville (06904000, discontinued in 1959).

The gaging stations in the area giving the period of flood record is contained in table 1; also shown is the maximum flood for the period of record. Graphs of the annual peak flood discharges for five gaging stations are shown in figures 2-6. These graphs show the 1981 and 1982 flood peaks to be some of the greatest of record.

A gaging station was established on the Des Moines River near Tracy (05488500) in 1920. The flood stage for the 1903 flood was documented and the flood of 1947 was determined as the greatest flood since at least 1851 (U.S. Geological Survey annual reports). Many of the flood peaks recorded on the Des Moines River near Tracy would not reflect runoff from streams in the report area because the greater part of the drainage area contributing flow to this gaging station comes from upstream of the report area. However, we do know from historical records of precipitation (NOAA) and streamflow records beginning as early as 1903 at some gaging stations in Iowa (U.S. Geological Survey, annual reports) that major floods occurred throughout much of the State in 1851, 1881, 1903, 1918 and 1947. The very large flood that occurred on the Cedar Creek on July 3, 1982, could very well be the greatest since at least 1851.

Table 1. Summary of selected flood data for gaging stations and flood peak discharges at miscellaneous sites for floods of 1981 and 1982 in South-central Iowa.

Site no.	Station number	Stream	Location	Period of flood record	Drainage area (sq mi)	Previous maximum flood			Flood of July 1981				Flood of July 1982			
						Date	Gage height (feet)	Discharge (cfs)	Date	Gage height (feet)	Discharge (cfs)	RI (+)	Date	Gage height (feet)	Discharge (cfs)	RI (+)
1	(m)	South R nr New Virginia	SW 1/4 Sec. 1 T.74N., R.25W.		92				4		21700	1.8				
2	(m)	Squaw Cr nr Osceola	NW 1/4 Sec. 32 T.73N., R.26W.		9.9				3		5520	1.2				
3	(m)	South Squaw Cr nr Osceola	NW 1/4 Sec. 6 T.72N., R.25W.		15.6				3		8460	1.5				
4	(m)	Squaw Cr nr New Virginia	SW 1/4 Sec. 16 T.73N., R.25W.		55				4		23600	2.4				
5	05487470	South R nr Ackworth	SE 1/4 Sec. 34 T.76N., R.23W.	1940-	460	6-05-47	24.6	34000	5	32.85	32700	1.4	16	32.00	26000	1.0
6	(m)	White Breast Cr nr Osceola	SW 1/4 Sec. 36 T.72N., R.25W.		32				4		14700	1.9				
7	05487600	S. White Breast Cr nr Osceola	SW 1/4 Sec. 12 T.71N., R.25W.	1953-81	28.0	6-07-81	15.66	11800	4	14.88	9200	1.3				
8	05487800	White Breast Cr at Lucas	NE 1/4 Sec. 23 T.72N., R.23W.	1953-	128	10-11-73	17.51	11000	4	18.27	15300	1.1				
9	05487980	White Breast Cr nr Dallas	NW 1/4 Sec. 3 T.74N., R.21W.	1946-	342	6-06-47	19.60a	14000	5	26.61	12300	0.6	16	33.45	37300	1.8
10	(m)	English Cr nr Melcher	SW 1/4 Sec. 16 T.74N., R.20W.		46.3								16		16100	1.8
11	(m)	English Cr nr Knoxville	NE 1/4 Sec. 16 T.75N., R.19W.		91.0								16		28000	2.3
12	05488500	Des Moines R nr Tracy	SE 1/4 Sec. 19 T.75N., R.17W.	1920-	12479	6-14-47	26.5	155000					16	19.62	35000	-
13	(m)	Cedar Cr nr Melrose	SE 1/4 Sec. 6 T.71N., R.18W.		40.2				4		13400	1.6				
14	05488620	Coal Cr nr Albia	SW 1/4 Sec. 20 T.72N., R.17W.	1966-	13.5	8-09-77	86.14	7000					3	88.51	12700	2.4
15	(m)	Cedar Cr nr Marysville	NE 1/4 Sec. 28 T.74N., R.18W.		241								3		64700	3.6
16	(m)	North Cedar Cr nr Marysville	NE 1/4 Sec. 20 T.74N., R.18W.		123								3		35900	2.7
17	05489000	Cedar Cr nr Bussey	SW 1/4 Sec. 11 T.74N., R.18W.	1948-	374	6----46	28.05	31500	4	28.83	26600	1.2	3	34.61	96000	4.4
18	(m)	Chariton R nr Derby	NE 1/4 Sec. 18 T.71N., R.22W.		79				4		10700	1.0				
19	06903400	Chariton R nr Chariton	NE 1/4 Sec. 15 T.71W., R.21W.	1966-	182	3----60b	23.00	15000	4	23.14	16600	1.0				
20	(m)	S. Fk. Chariton R nr Corydon	SE 1/4 Sec. 5 T.69N., R.21W.		80.2				4		20700	1.8				
21	06903700	S. Fk. Chariton R. nr Promise City	SW 1/4 Sec. 5 T.69N., R.20W.	1968-	168	6-03-80	22.92	11200	4	29.95	28000	1.8				

+ Ratio of flood discharge to that of regional 100-year flood.
(m) Miscellaneous measurement site.
a Gaging station nr Knoxville (05488000) 1946-61.
b Outside period of gaging station record.

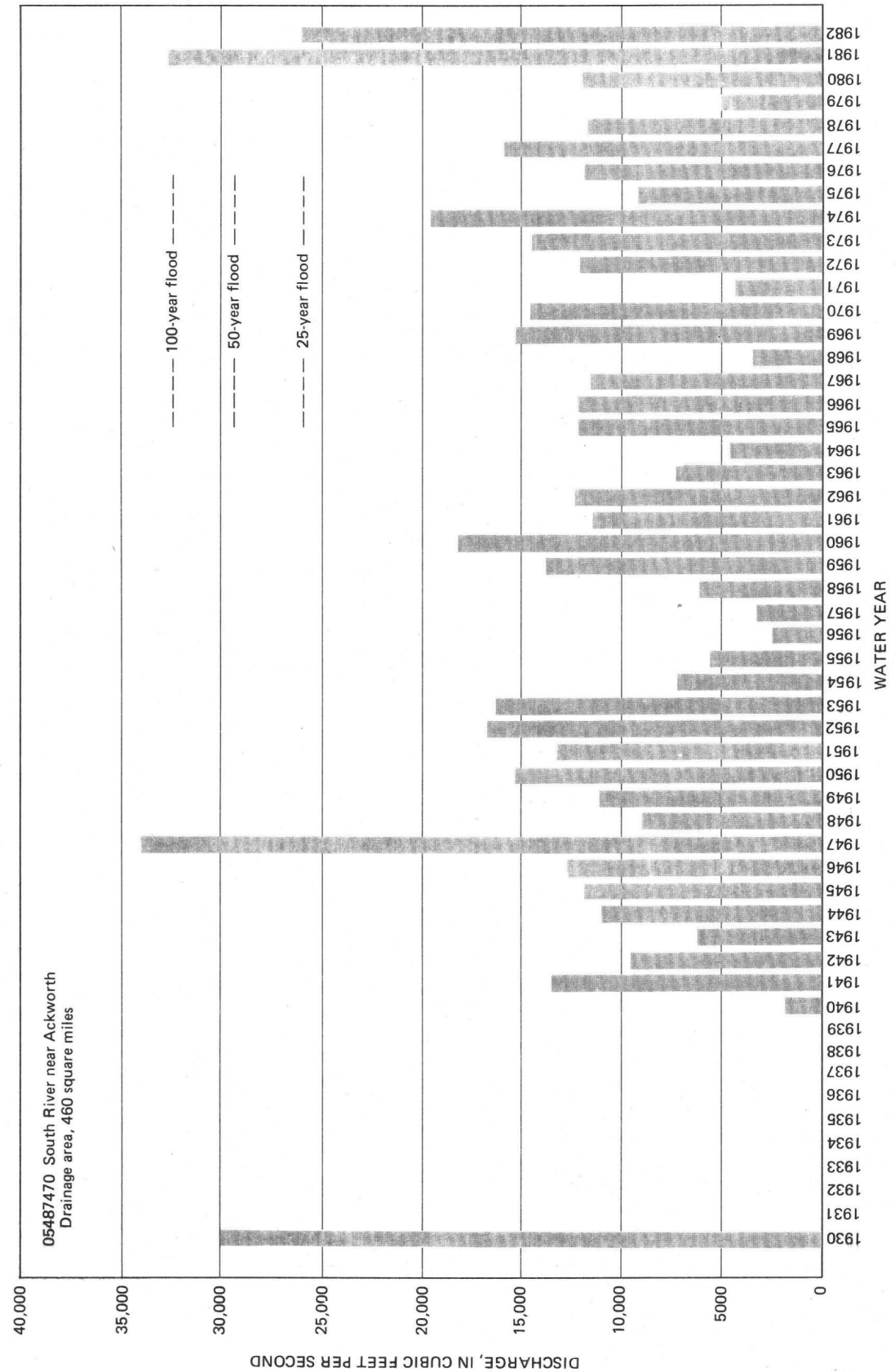


Figure 2. Annual peak discharges for period of record for South River near Ackworth gaging station.

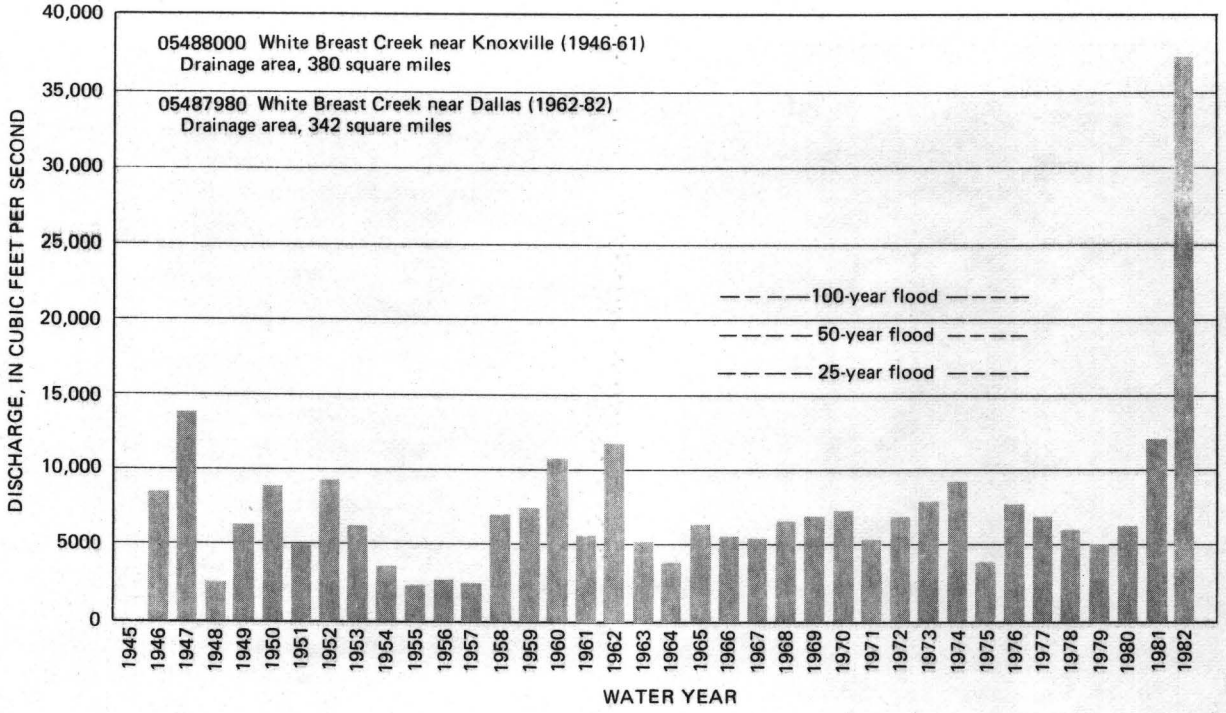


Figure 3. Annual peak discharges for period of record for White Breast Creek near Dallas gaging station.

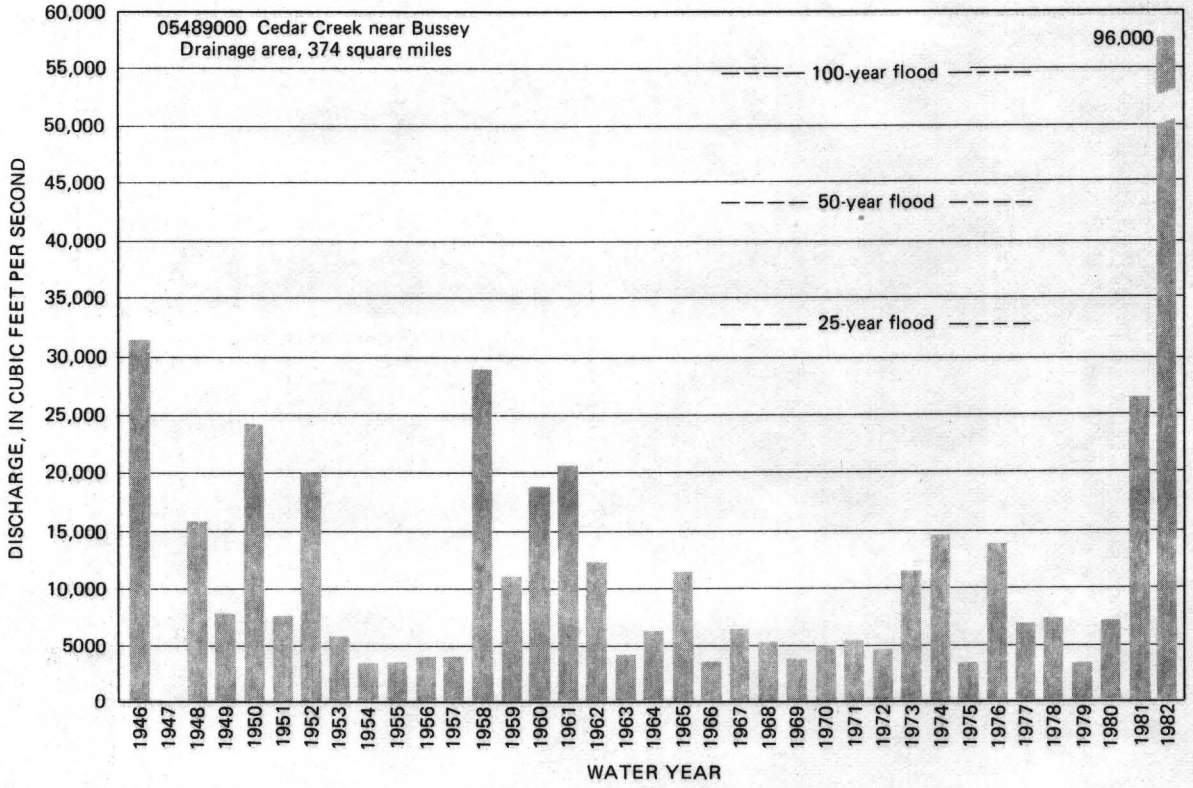


Figure 4. Annual peak discharges for period of record for Cedar Creek near Bussey gaging station.

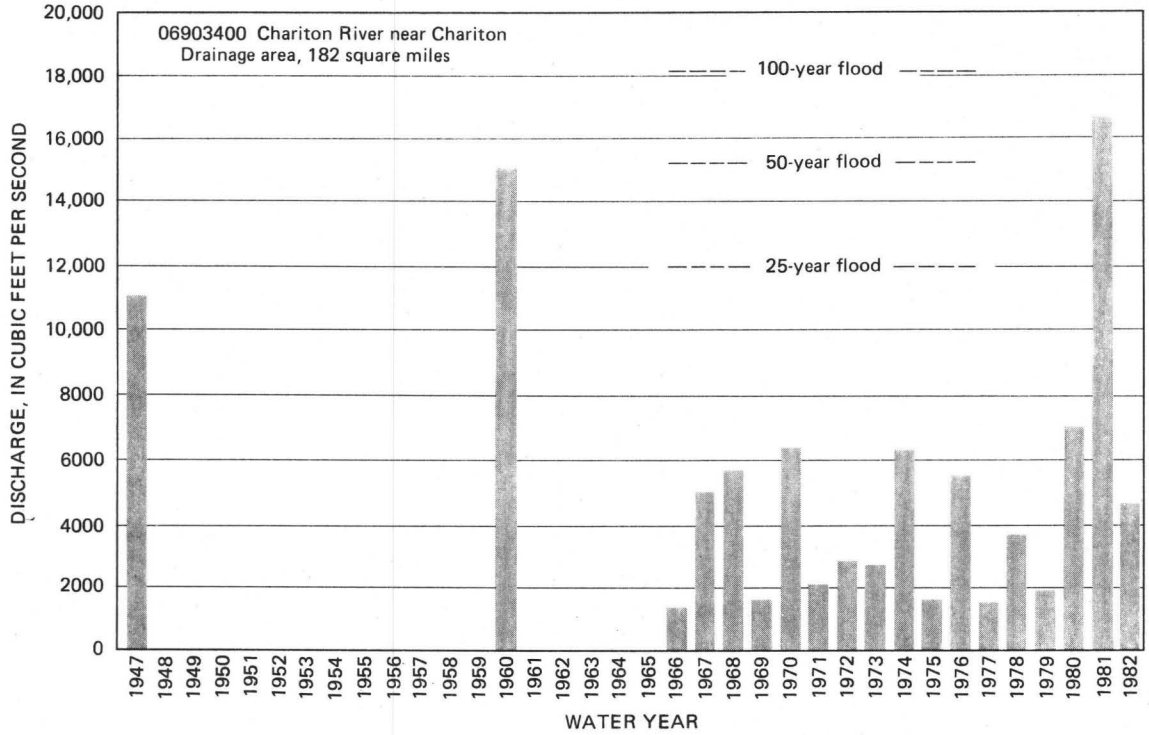


Figure 5. Annual peak discharges for period of record for Chariton River near Chariton gaging station.

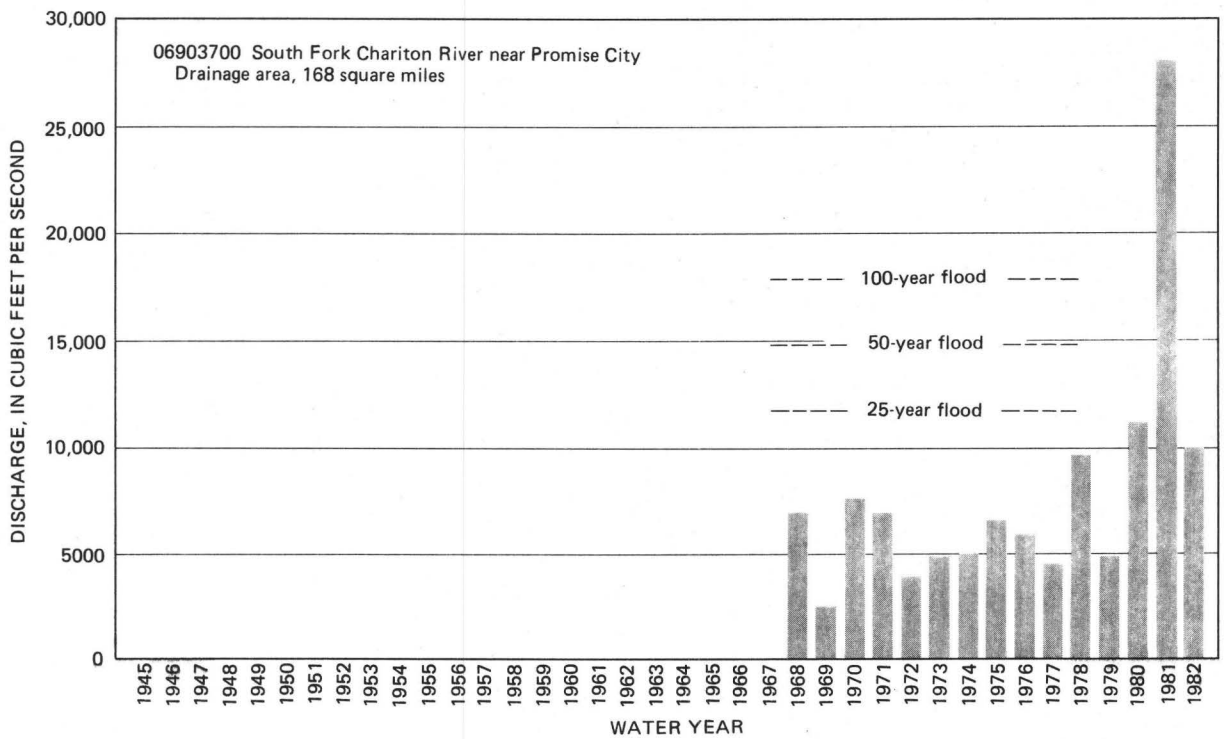


Figure 6. Annual peak discharges for period of record for South Fork Chariton River near Promise City gaging station.

HYDROLOGIC DATA

Gaging-station records are the primary source of data for analyzing and understanding the flood hydrology of a river basin. Flood information is obtained from the records of complete-record stations which provide a continuous chronology of streamflow, and from crest-stage, partial-record stations which provide only flood-peak data above preselected levels. Flood peak discharges and elevations are also determined at sites on streams where no gaging stations are located. These sites are referred to as miscellaneous sites. The gaging stations are numbered and listed in the downstream order used in the Water-Supply Papers of the U.S. Geological Survey. For identification and cross reference in this report, all gaging stations and flood determination sites have been assigned a site number. These numbers are also in a downstream order. The gaging stations and miscellaneous sites in the area covered by this report are located in figure 1 and listed in table 1. Discharge records for the gaging stations are published in the annual streamflow reports of the U.S Geological Survey (see references). The data on flood-peak stages and discharges have been compiled and are listed in Table 3 (at the end of report).

The derivation of discharge records at a gaging station depends basically upon the development of a relationship between water-surface elevations (stages) and the corresponding flow rates. The highwater portion of these stage-discharge relationships, or rating curves as they are sometimes called, tends to be relatively stable if the channel downstream from a gaging site remains unobstructed. Stage-discharge relationships for selected stations in the report area are shown in figures 7 and 8. Similar relationships have been developed for the other gaging stations in the basin. Gaging stations are important control points in the definition of the flood profiles presented in this report. In order to reference all the points along the profiles to a common datum, extensive leveling work was performed during which at least one bench mark and a reference point were established at each bridge in the profiled reaches. Bench mark and reference point descriptions and elevations are listed in Table 4 (at the end of report).

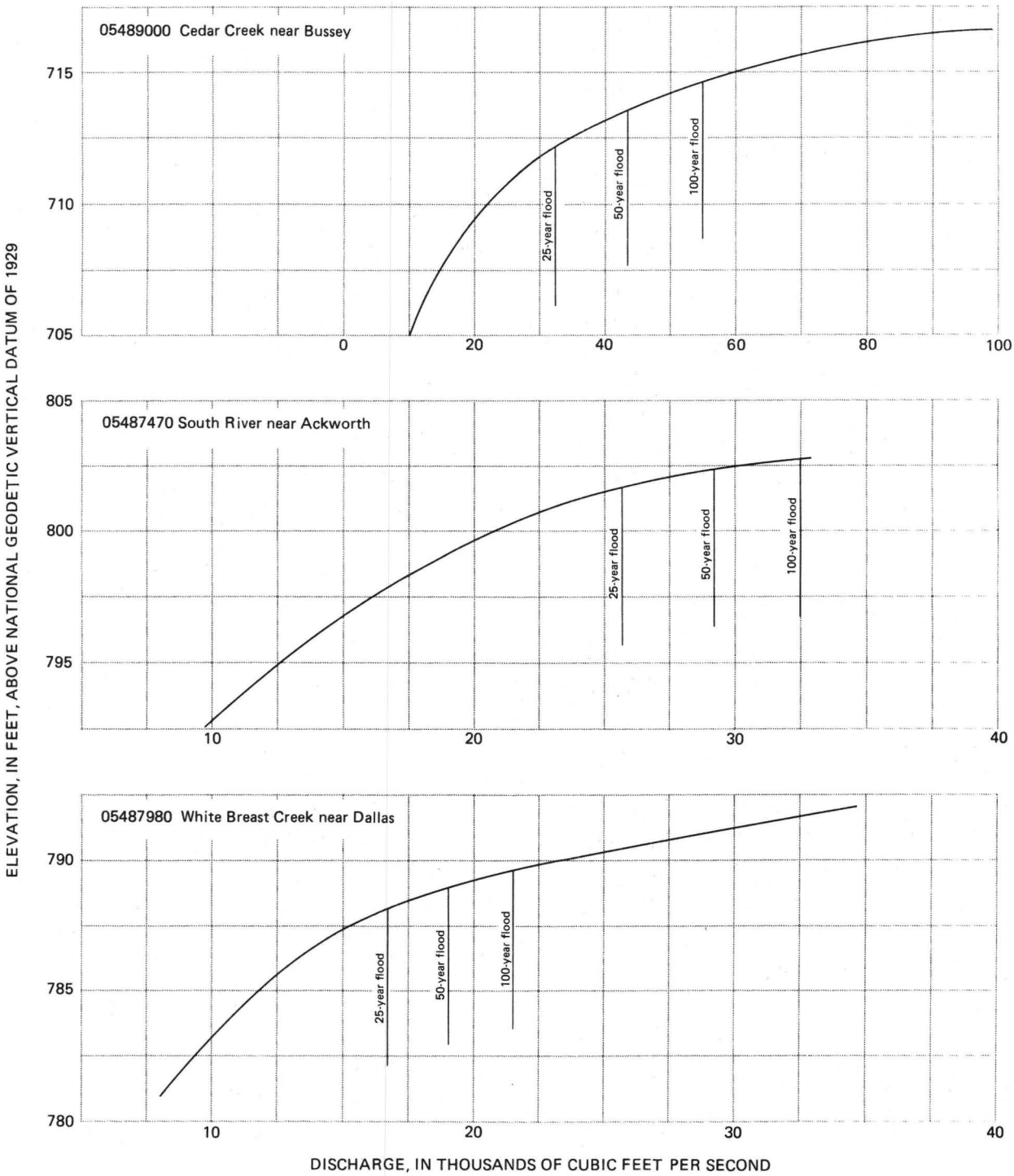


Figure 7. Stage-discharge relations for Cedar Creek, South River, and White Breast Creek gaging stations.

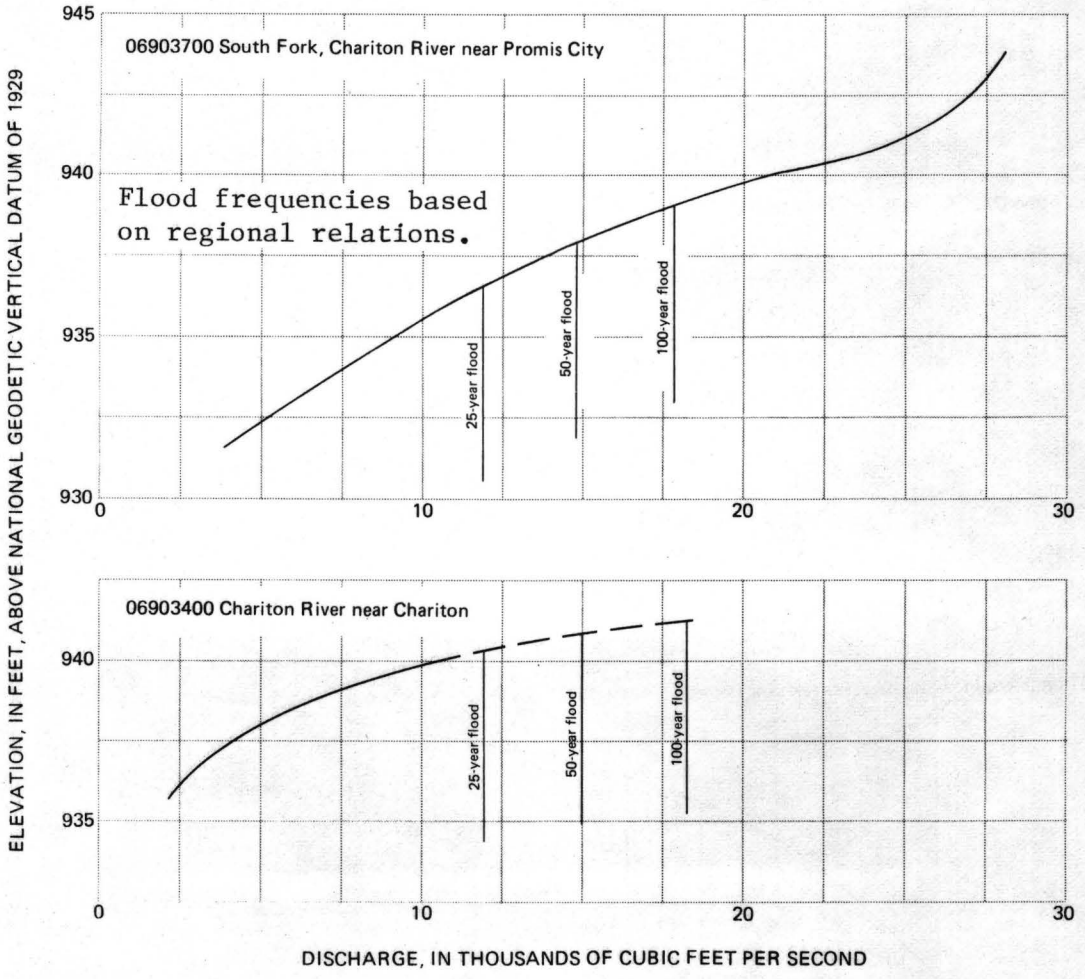


Figure 8 Stage-discharge relations for South Fork Chariton and Chariton River gaging stations.

FLOOD FREQUENCY

Methodology for determining flood-flow frequency discharges is outlined by the United States Water Resources Council (1981). The WRC recommends the use of the Pearson type III distribution with log transformation of the data as a base method for determining flood-flow frequency discharges. The discharges given in table 2 for selected gaging stations in south-central Iowa were determined using the above procedure.

A method for determining flood-flow frequency discharges at sites other than at gaging stations, using regional equations, is described by Lara (1973). Lara also used the Pearson type III distribution with log transformation as the base method for developing the regional equations. The curve for the regional 100-year flood for the area covered by this report is shown in figure 9. Also shown for comparison are the 100-year flood discharges determined for selected gaging stations in south-central Iowa. The 100-year flood discharges for many of the gaging stations tend to be slightly greater than those shown by the regional curve. On the basis of this relationship, the user of 100-year flood discharges for ungaged sites in the area of this report could increase the discharges by approximately 15 percent over those shown by the regional curve. The 15 percent increase in discharges is illustrated by the dashed curve in figure 9.

The regional and the station-data flood peak discharges for selected recurrence intervals for the gaging stations are listed in table 2. Data in this table can be used to plot comparisons of the 2-, 5-, 10-, 25- and 50-year flood discharges as was done for the 100-year discharges shown in figure 9.

Table 2. Discharge and frequency of flood flows for selected gaging stations in South-central Iowa.

Site no.	Station number	Station Name	Method *	Discharge, in cubic feet per second, for indicated recurrence interval, in years					
				2	5	10	25	50	100
5	05487470	South R	A	5.240	9.470	12.700	16.900	20.300	23.800
		nr Ackworth	B	11.000	17.200	21.200	25.900	29,300	32.400
7	05487600	S. White Breast Cr	A	1.170	2.330	3.300	4.740	5.960	7.320
		nr Osceola	B	1.740	3.130	4.220	5.770	7,050	8.420
8	05487800	White Breast Cr	A	2.640	4.990	6.850	9.460	11.600	13,900
		at Lucas	B	3.350	6.300	8,590	11.800	14.300	17,000
9	05487980	White Breast Cr	A	4.470	8,170	11.000	14.800	17,800	21.000
		nr Dallas	B	7.410	10.900	13.400	16.600	19.000	21.500
13	05488620	Coal Cr	A	790	1.620	2.330	3.400	4.330	5.380
		nr Albia	B	1.100	3.440	6.020	10.700	15.200	20.700
17	05489000	Cedar Cr	A	4.690	8.540	11.500	15.400	18.500	21.800
		nr Bussey	B	8,750	17.500	25.400	38.200	49,800	63.500
			B#	8,320	15.100	20.800	28,900	35.800	43,500
			B+	8,170	15.500	22.100	32.800	42.700	54.500
19	06903400	Chariton R	A	3.190	5.950	8,110	11.100	13.500	16.100
		nr Chariton	B	3.510	6.320	8,610	12.000	15.000	18.200
21	06903700	S. Fork Chariton	A	3.050	5.720	7.800	10.700	13.000	15.600
		nr Promise City	B	6.720	10.700	13.500	17.500	20.600	23.800

* Method used:
A - Region I, Model 1 (Lara. 1973. p. 12)
B - Bulletin 17B (U.S. Water Resources Council. 1981)
- Flood peaks through 1981
+ - 132-year historic period

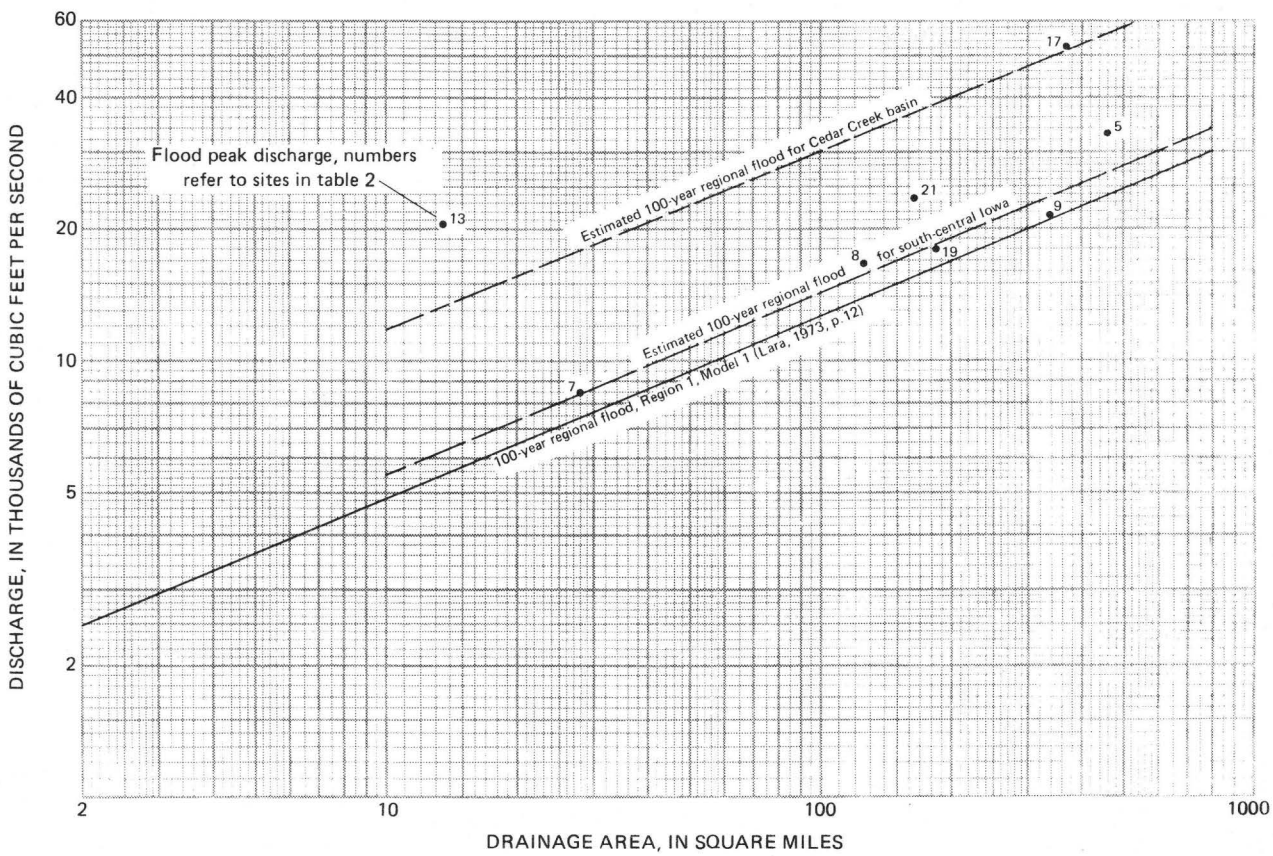


Figure 9. Relationship of 100-year flood peak discharges with drainage area for streams in South Central Iowa

THE EXCEPTIONAL FLOOD POTENTIAL OF THE CEDAR CREEK BASIN

The regional flood-frequency relations discussed in detail by Lara (1973) is an index of the average flood potential of streams in a region. In general, river basins within a hydrologic region have comparable flood potential. Occasionally a basin within a region is found that has a potential to produce floods of much greater magnitude than other basins in the region. This could be attributed, in most part, to the physiographic characteristics, such as shape of the drainage basin, stream density, drainage pattern, and other factors which are conducive to efficient drainage and higher peaks.

Cedar Creek

The Cedar Creek is a good example of a basin having a documented potential of producing floods of much greater magnitude than other basins in the region. To illustrate this point, frequency curves for Cedar Creek near Bussey (05489000) are shown in figure 10.

Curve A is the regional curve applicable to the Cedar Creek at Bussy. Curve B was computed using the 35 years of annual flood peaks prior to the 1982 flood. As can be seen, the flood discharges from the station curve are approximately double the discharges from the regional curve at all levels of frequency.

When the record 1982 flood-peak discharge is included as part of the systematic record of 36 years, the deviation from the regional curve becomes even greater, see curve C in figure 10. The 100-year flood discharge for the 36-year systematic record is 63,600 cfs. The 1982 flood peak discharge, however, is considered an outlier or an historic flood according to criteria set forth by the WRC (1981). If the 1982 flood peak on Cedar Creek were considered the greatest flood to have occurred since at least 1851, the flood-frequency discharges based on the 132-year historic period (curve D) are more compatible to those for the 1946-81 period even though the 100-year discharge of 54,500 cfs is still 25 percent greater than that for the 1946-81 period. The annual flood peaks used in the frequency analyses are shown in figure 3.

The flood-frequency relations developed from the flood peaks at the Cedar Creek near Bussey gaging station (05489000) comply with the recommendations for analyses by the WRD. The curve (D) utilizing the historic information should be used unless the comparison of the analyses, the magnitude of the observed peaks, or other factors suggest that the historic period is not indicative of the extended record. The lowest discharges that any user should consider would be those based on the flood peaks through 1981 shown as curve B in figure 10.

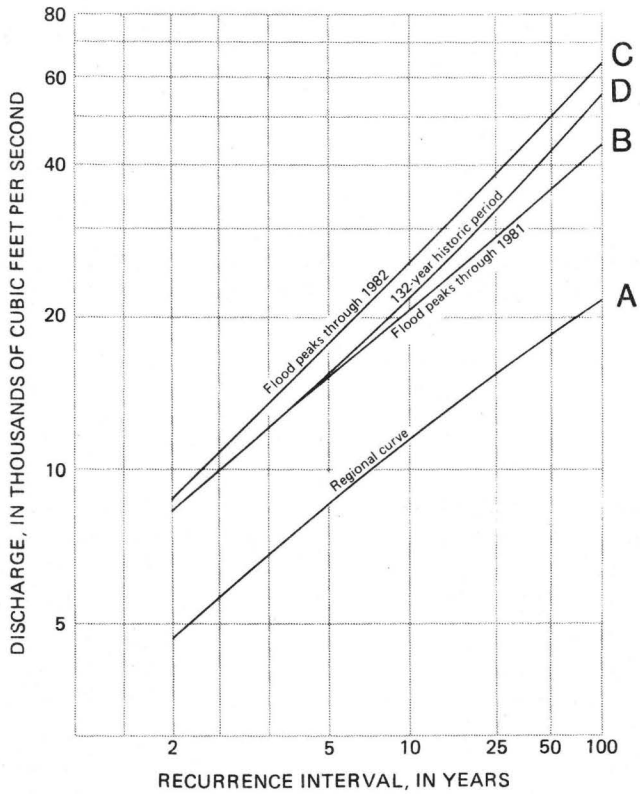


Figure 10. Flood-frequency curves for Cedar Creek near Bussey (05489000) gaging station

Coal Creek

Coal Creek near Albia is a tributary to Cedar Creek and also exhibits very high flood frequency discharges (site 13, figure 9). One very notable characteristic of the Coal Creek basin that is visible on the U.S. Geological Survey 7 1/2-minute topographic map is that the basin has a very high density of stream channels draining the basin. This may be one of the characteristics contributing to the relatively high peaks recorded at the Coal Creek gaging station (05488620). This station is a crest-stage gage with only 14 recorded annual flood peaks. The relatively short period of record plus the fact that the stage-discharge relation is not well defined does not warrant giving full weight to the discharge-frequency relations defined by the flood peaks. However, consideration must be given to the fact that this basin contributes to the high flood peaks on Cedar Creek. Therefore, the flood-peak frequency discharges used for Coal Creek should be at least the same order of magnitude times the regional discharges as those used on Cedar Creek.

FLOOD PROFILES

Figures 11-30 show profiles of the 1981 and 1982 floods on the South River, Squaw Creek, Otter Creek, White Breast Creek, Cedar Creek, North Cedar Creek, Chariton River and the South Fork Chariton River. The profiles were defined by field data obtained by the U.S. Geological Survey. To define these profiles, high-water marks located both upstream and downstream from bridges were identified and marked within a few days of passage of the flood peaks. The marks were referenced to a common datum by leveling. Profiles between the bridges are straight-line interpolations and are subject to some error. Low-water profiles are also shown to indicate the approximate range of stage that applies along the profiled reaches. Discharges at gaging stations for the profiles are noted on the appropriate illustrations.

River mileages, determined from the best available maps, are referenced to the mouth of the streams. Bridges and a few other points are designated by an index number that helps to identify their location. For example, 7422-24 NW refers to a location in T.74N., R.22W., NW1/4 sec. 24.

DISCUSSION

Flood magnitude-frequency relationships for streams in this report area are fairly well defined. More flood-peak data sites and longer periods of streamflow records will further improve their definition. Furthermore, these relationships are subject to continuing modification by factors such as changing meteorologic and climatic trends, and physical changes in the basin such as urbanization, installation of drainage systems, reservoir development, and shifting land use. Basin parameters that cause high flood-peak discharges like those recorded in the Cedar Creek basin need to be identified.

The 100-year flood peak discharges for the area covered by this report tend to be slightly greater than those defined by the regional equations for ungaged areas by about 15 percent. Flood-frequency discharges for the Cedar Creek basin would, of course, have to be at least double those defined by the regional equations.

The hydraulics of the stream systems are also complex. Wide, flat flood plains are typical of parts of the basins in the report area. Stage-discharge relationships for these areas are subject to seasonal changes because of the varying vegetative cover in the flood plain throughout the year.

Debris and ice jams, both nearly impossible to predict, can cause dramatic temporary changes in stage-discharge relationships. Natural scour and fill, channel straightening and construction of bridges and levees can cause more lasting changes.

Thus, a river basin and its channel system are dynamic entities undergoing continual change. The relationships presented in this report represent the conditions existing at the time the field data were obtained.

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SOUTH RIVER PROFILES

Mile 14.02: U.S.G.S. gaging station 05487470

July 5, 1981 discharge 32,700 ft^3/s

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

820
810
800
790
780
770
760
750
740

JULY 1981

JULY 1983

Low water

LAKE RED ROCK FLOOD POOL ELEVATION

MAXIMUM ELEVATION—MAY 14, 1973

BRIDGE DECK
LOW BRIDGE CHORD
APPROXIMATE

COUNTY BRIDGE
7622–17 NW

STATE HWY 92 BRIDGE
7622–19 NE

COUNTY S23 BRIDGE
7623–35 NE

U.S. GEOLOGICAL SURVEY
RECORDING GAGE
COUNTY BRIDGE
7623–34 SE

OTTER CREEK, R BANK

0
5
10
15

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

SOUTH RIVER PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

860
850
840
830
820
810
800
790
780

880
870
860
850
840
830
820

JULY 1981

JULY 1981

JULY 1983

Low water

JULY 1983

NOTE SHIFT IN SCALE

BRIDGE DECK
LOW BRIDGE CHORD

COUNTY BRIDGE
7523-4 NW

COUNTY BRIDGE
7523-5 NW

U.S. HIGHWAY 69 BRIDGE
7523-6 NW

COUNTY BRIDGE
7524-2 NE

SQUAW CREEK, R BANK

COUNTY R63 BRIDGE
7524-3 NE

COUNTY R57 BRIDGE
7524-5 SE

COUNTY G50 BRIDGE
7524-12 NE

15
20
25
30

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

SOUTH RIVER PROFILES

Mile 32.87: Miscellaneous site no. 1

July 4, 1981 discharge 21,700 ft^3/s

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

940
930
920
910
900
890
880
870
860
850
840

JULY 1981

JULY 1983

Low water

K BRIDGE DECK

K LOW BRIDGE CHORD

COUNTY BRIDGE
7525–36 SE

COUNTY BRIDGE
7425–1 SW

COUNTY BRIDGE
7425–2 SW

COUNTY R45 BRIDGE
7425–10 NW

COUNTY G64 BRIDGE
7425–9 SE

COUNTY BRIDGE
7425–17 SW

INTERSTATE 35 BRIDGE
7425–19 NW

30
35
40
45

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

SQUAW CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

870
860
850
840
830
820
810
800
790

910
900
890
880
870
860
850
840

JULY 1981
JULY 1983
Low water
JULY 1981
JULY 1983

NOTE SHIFT IN SCALE

BRIDGE DECK
LOW BRIDGE CHORD
APPROXIMATE

MOUTH OF SQUAW CREEK
COUNTY BRIDGE 7524-10 SE
COUNTY BRIDGE 7524-15 SE
COUNTY G64 BRIDGE 7424-4 SE
COUNTY BRIDGE 7424-15 NW
COUNTY G76 BRIDGE 7424-27 NW
COUNTY BRIDGE 7424-32 NE

20
25
30
35

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF SOUTH RIVER

SQUAW CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

950
940
930
920
910
900
890
880
870

JULY 1981
JULY 1983
Low water

NOTE SHIFT IN SCALE

Mile 43.35: Miscellaneous site no. 4

July 4, 1981 discharge 23,600 ft^3/s

970
960
950
940
930
920

JULY 1981
JULY 1983

K BRIDGE DECK
⊀ LOW BRIDGE CHORD
APPROXIMATE

COUNTY BRIDGE
7325-2 NE

COUNTY R51 BRIDGE
7325-2 SW

COUNTY BRIDGE
7325-15 NW

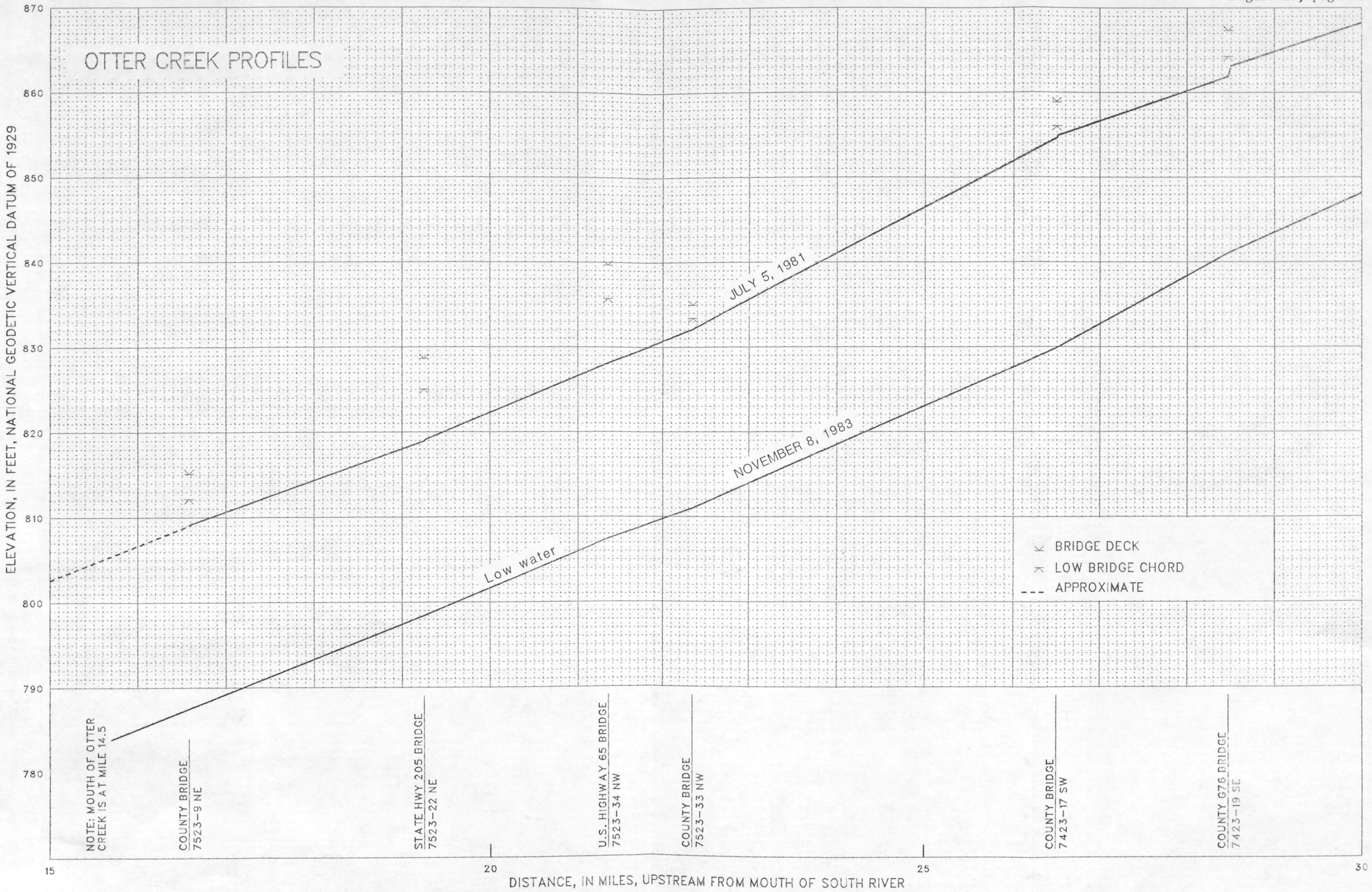
COUNTY R45 BRIDGE
7325-16 SW

COUNTY BRIDGE
7325-20 SW

INTERSTATE 35 BRIDGE
7325-19 SE

35 40 45 50

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF SOUTH RIVER


OTTER CREEK PROFILES
ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929
870
860
850
840
830
820
810
800
790
780
JULY 5, 1981
NOVEMBER 8, 1983
Low water
BRIDGE DECK
LOW BRIDGE CHORD
APPROXIMATE
NOTE: MOUTH OF OTTER CREEK IS AT MILE 14.5
COUNTY BRIDGE 7523-9 NE
STATE HWY 205 BRIDGE 7523-22 NE
U.S. HIGHWAY 65 BRIDGE 7523-34 NW
COUNTY BRIDGE 7523-33 NW
COUNTY BRIDGE 7423-17 SW
COUNTY G76 BRIDGE 7423-19 SE
15
20
25
30
DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF SOUTH RIVER

OTTER CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

940
930
920
910
900
890
880
870
860
850
840

JULY 5, 1981

NOVEMBER 8, 1983

Low water

BRIDGE DECK
LOW BRIDGE CHORD
APPROXIMATE

WARREN COUNTY
COUNTY BRIDGE
7423-32 SW
LUCAS COUNTY

COUNTY R73 BRIDGE
7323-8 SW

LUCAS COUNTY
CLARKE COUNTY

COUNTY R69 BRIDGE
7324-1 SW

COUNTY H20 BRIDGE
7324-15 SW

COUNTY BRIDGE
7324-17 SE

30 35 40 45

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF SOUTH RIVER

WHITE BREAST CREEK PROFILES

Mile 20.57: U.S.G.S. gaging station 05487980

July 5, 1981 discharge 12,300 ft^3/s
July 16, 1982 37,300

JULY 16, 1982

JULY 5, 1981

NOVEMBER 8, 1983

Low water

LAKE RED ROCK FLOOD POOL ELEVATION

MAXIMUM ELEVATION-MAY 14, 1973

BRIDGE DECK

LOW BRIDGE CHORD

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

830
820
810
800
790
780
770
760
750

COUNTY BRIDGE
7520-19 SW

STATE HWY 181 BRIDGE
7521-26 SE

U.S. GEOLOGICAL SURVEY
RECORDING GAGE
COUNTY BRIDGE
7421-3 NW

COUNTY BRIDGE
7421-5 NE

COUNTY BRIDGE
7421-8 SW

COUNTY BRIDGE
7421-18 SW
MARION-WARREN CO. LINE

COUNTY G76 BRIDGE
7422-24 NW

COUNTY BRIDGE
7422-22 SL

15 20 25 30

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

WHITE BREAST CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

870
860
850
840
830
820
810
800
790

JULY 5, 1981
JULY 16, 1982
NOVEMBER 8, 1983
1981
1982
Low water

BRIDGE DECK
LOW BRIDGE CHORD

COUNTY BRIDGE
7422-35 NW

WARREN-LUCAS CO. LINE
COUNTY BRIDGE
7422-35 SE

COUNTY BRIDGE
7322-14 SW

COUNTY BRIDGE
7322-22 SW

COUNTY BRIDGE
7322-33 NE

COUNTY BRIDGE
7322-32 SE

COUNTY BRIDGE
7322-5 SW

30
35
40

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

WHITE BREAST CREEK PROFILES

Mile 49.25: U.S.G.S. gaging station 05487800

July 4, 1981 discharge 15,300 ft^3/s

JULY 5, 1981

NOVEMBER 8, 1983

Low water

K BRIDGE DECK

K LOW BRIDGE CHORD

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

930
920
910
900
890
880
870
860
850

BURLINGTON NORTHERN RR BRIDGES

7222–17 SW

U.S. HIGHWAY 34 BRIDGE
7222–18 SW

COUNTY BRIDGE
7223–24 NW

U.S. HIGHWAY 65 BRIDGE
7223–23 NE

BURLINGTON NORTHERN RR BRIDGE
7223–23 NW

COUNTY BRIDGE
7223–14 SW

BURLINGTON NORTHERN RR BRIDGE

COUNTY BRIDGE
7223–22 NW

COUNTY BRIDGE
7223–32 NE

LUCAS COUNTY
CLARKE COUNTY

45 50 55 60

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

WHITE BREAST CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

980
970
960
950
940
930
920
910
900

JULY 5, 1981
NOVEMBER 8, 1983
Low water

K BRIDGE DECK
K LOW BRIDGE CHORD

COUNTY BRIDGE
712 4-2 SW

SOUTH WHITE BREAST CR
R BANK

COUNTY BRIDGE
712 4-3 SW

COUNTY BRIDGE
712 4-6 NE

60
65
70
75

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

CEDAR CREEK PROFILES

Mile 12.80: Miscellaneous site no. 15

July 3, 1982 discharge 64,700 ft^3/s

Mile 8.70: U.S.G.S. gaging station 05489000

July 4, 1981 discharge 26,600 ft^3/s
July 3, 1982 96,000

JULY 3, 1982

JULY 4, 1981

SEPT. 13, 1982

Low water

K BRIDGE DECK
K LOW BRIDGE CHORD

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

740
730
720
710
700
690
680
670
660

COUNTY BRIDGE
7517-31 NE

MAHASKA COUNTY
MARION COUNTY

BURLINGTON NORTHERN
RR BRIDGE 7518-36 SW

COUNTY BRIDGE
7418-2 NE

U.S. GEOLOGICAL SURVEY
RECORDING GAGE BUSSEY

STATE HWY. 156 BRIDGE
7418-11 SW

NORTH CEDAR CREEK
L BANK

STATE HWY. 5 BRIDGE
7418-28 NE

COUNTY BRIDGE
7418-29 SE MARYSVILLE

0 5 10 15

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

CEDAR CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

780
770
760
750
740
730
720
710
700

JULY 3, 1982
JULY 4, 1981
SEPT. 13, 1982
Low water

K BRIDGE DECK
K LOW BRIDGE CHORD

MARION COUNTY
MONROE COUNTY

COUNTY H16 BRIDGE
7318-8 SE

COUNTY BRIDGE
7318-16 SW

WHITE CREEK L BANK

COUNTY T19 BRIDGE
7318-27 NW

COUNTY BRIDGE
7218-2 NW

15
20
25
30

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

CEDAR CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

840
830
820
810
800
790
780
770
760

1981
1982
JULY 3, 1982
JULY 4, 1981
SEPT. 13, 1982
Low water

BRIDGE DECK
LOW BRIDGE CHORD

COUNTY H32 BRIDGE
7218–12 NW

COUNTY BRIDGE
7217–18 SW

BURLINGTON NORTHERN
RR BRIDGE 7217–24 NE

BURLINGTON NORTHERN
RR BRIDGE 7217–24 NE

U.S. HIGHWAY 34 BRIDGE
7218–26 NE

COUNTY BRIDGE
7218–34 SE

COUNTY BRIDGE
7118–4 SW

30
35
40
45

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

CEDAR CREEK PROFILES

Mile 46.45: Miscellaneous site no. 13

July 4, 1981 discharge 13,400 ft^3/s

JULY 4, 1981

JULY 3, 1982

SEPT. 13, 1982

Low water

1981

1982

K BRIDGE DECK

K LOW BRIDGE CHORD

COUNTY T13 BRIDGE
7118-6 SE

COUNTY BRIDGE MELROSE
7119-4 SE

COUNTY BRIDGE
7119-5 SW

MONROE COUNTY
LUCAS COUNTY

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

890
880
870
860
850
840
830
820
810

45
50
55
60

DISTANCE, IN MILES, UPSTREAM FROM MOUTH

NORTH CEDAR CREEK PROFILES

Mile 12.73: Miscellaneous site no. 16

July 3, 1982 discharge 35,900 $ft^3/_s$

JULY 16, 1982

JULY 4, 1981

SEPT. 13, 1982

Low water

PROFILE ESTIMATED

K BRIDGE DECK

K LOW BRIDGE CHORD

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

760
750
740
730
720
710
700
690
680

MOUTH OF NORTH CEDAR CREEK

COUNTY BRIDGE 7418-16 NE

STATE HWY. 5 BRIDGE 7418-20 NE

COUNTY BRIDGE 7419-24 SE

COUNTY COVERED BRIDGE 7419-26 SW

5 10 15 20

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF CEDAR CREEK

NORTH CEDAR CREEK PROFILES

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

800
790
780
770
760
750
740
730
720

JULY 16, 1982
JULY 4, 1981
SEPT. 13, 1982
Low water

PROFILE ESTIMATED
BRIDGE DECK
LOW BRIDGE CHORD

COUNTY BRIDGE
7419-27 SE

MARION COUNTY
MONROE COUNTY

COUNTY H16 BRIDGE
7319-4 NW

COUNTY BRIDGE
7319-4 SW

20
25
30
35

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF CEDAR CREEK

CHARITON RIVER PROFILES

Mile 32.83: U.S.G.S. gaging station 06903400

July 4, 1981 discharge 16,600 ft^3/s

July 1981

July 18, 1984

Low water

RATHBUN LAKE
FLOOD POOL ELEVATION

MAXIMUM, JULY 22, 1982

JULY 21, 1981

K BRIDGE DECK

K LOW BRIDGE CHORD

COUNTY S56 BRIDGE
7120-33 SW

COUNTY S50 BRIDGE
7120-19 SW

COUNTY BRIDGE
7121-24 SW

U.S. GEOLOGICAL SURVEY
RECORDING GAGE CHARITON
COUNTY S43 BRIDGE
7121-15 NE

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

970
960
950
940
930
920
910
900
890

20
25
30
35

DISTANCE, IN MILES, UPSTREAM FROM RATHBUN DAM

CHARITON RIVER PROFILES

BRIDGE DECK
LOW BRIDGE CHORD

July 1981

July 18, 1984

Low water

Mile 53.34: Miscellaneous site no. 18

July 4, 1981 discharge 10,700 ft^3/s

990
980
970
960
July 1981
July 18 1984
50
54

COUNTY BRIDGE
7121-8 NE

STATE HIGHWAY 14 BRIDGE
7221-32 SW

COUNTY BRIDGE CHARITON
7221-30 SW

COUNTY BRIDGE
7122-17 NW

COUNTY S23 BRIDGE
7122-15 NW

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

990
980
970
960
950
940
930
920
910

35
40
45
50

DISTANCE, IN MILES, UPSTREAM FROM RATHBUN DAM

SOUTH FORK CHARITON RIVER PROFILES

Mile 22.28: U.S.G.S. gaging station 06903700

July 4, 1981 discharge 28,000 ft^3/s

Mile 27.55: Miscellaneous site no. 20

July 4, 1981 discharge 20,700 ft^3/s

July 1981

July 18, 1984

Low water

RATHBUN LAKE FLOOD POOL ELEVATION

MAXIMUM, JULY 22, 1982

JULY 21, 1981

K BRIDGE DECK

K LOW BRIDGE CHORD

ELEVATION, IN FEET, NATIONAL GEODETIC VERTICAL DATUM OF 1929

990
980
970
960
950
940
930
920
910

COUNTY S56 BRIDGE
6920-10 SE

U.S. GEOLOGICAL SURVEY
RECORDING GAGE
COUNTY S50 BRIDGE
6920-5 SW

JORDAN CREEK L BANK
JACKSON CREEK R BANK

COUNTY S43 BRIDGE
6921-1 SW

COUNTY BRIDGE
6921-5 SE

STATE HIGHWAY 14 BRIDGE
6921-6 NW

COUNTY BRIDGE
7022-35 SW

COUNTY S23 BRIDGE
7022-34 SW

18 20 25 30 33

DISTANCE, IN MILES, UPSTREAM FROM RATHBUN DAM

Table 3. Gaging-station records.

The data on peak stages and discharges at gaging stations that follow were compiled through September 30, 1975, by Lara (1976), and were updated through September 30, 1982, for this report. The flood events are designated by calendar date and grouped by water year (year ending September 30). For the partial-record stations, those equipped with crest-stage gages, only the annual flood peaks are listed. In general, for the complete-record stations, independent flood peaks above a pre-selected base are listed (partial-duration series). The magnitude of the selected base discharge, given in the "Remarks" paragraph, was determined so that it would be equaled or exceeded on an average of about three or four times per year. Two flood peaks are considered independent if dry-weather flow is reached between them or if they are more than 48 hours apart and the discharge of the trough between them is 25 percent or more below that of the lower peak.

The gaging-station records are arranged in the downstream order explained in the annual water resources data reports of the U.S. Geological Survey (See References). Each gaging station is identified by a permanent number that is also used in figure 1 and in tables 1 and 2. The datum of the gage, when given, is the National Geodetic Vertical Datum of 1929 (previously called "mean sea level, 1929"). Bankfull and flood stages are given for some of the stations. Bankfull stage, as determined by the U.S. Geological Survey, is the stage at which a stream first overflows

its banks. Flood stage, however, as determined by the National Weather Service, is the stage at which overflow of the natural banks of the stream begins to cause damage in the reach in which the elevation is measured.

The following notations are used in the gaging station records:

1. A line in the "water year" column denotes a break or gap in the record of peaks.
2. A line beginning in the "date" column and continuing through the "discharge" column denotes a change in site and datum.
3. A line in the "gage height" column denotes a change in datum only.

The remainder of the information given is self-explanatory.

05487470 South River near Ackworth, Iowa

Location.--Lat 41°20'14", long 93°29'10", in SE1/4 SE1/4 sec.34, T.76 N., R.23 W., Warren Co., on right bank 15 ft downstream from bridge on co. road 2.2 mi southwest of Ackworth.

Drainage area.--460 mi^2.

Gage.--Water-stage recorder. Datum of gage is 769.97 ft NGVD of 1929. Prior to June 12, 1946, nonrecording gage, June 13, 1946, to Apr. 13, 1960, water-stage recorder, and Apr. 14, 1960, to Sept. 30, 1961, nonrecording gage, all at site 4.0 mi downstream at datum 8.06 ft lower.

Stage-discharge relation.--Defined by current-meter and indirect measurements.

Flood stage.--19 feet.

Remarks.--Base for partial-duration series, 5,000 ft^3/s.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1930	June ??, 1930	24.50 a	30,000 b
1940	Aug. 11, 1940	8.3	1,770
1941	June 9, 1941	20.6	13,400
	Sept.16, 1941	17.9	8,570
1942	Oct. 22, 1941	16.9	7,420
	Nov. 1, 1941	18.7	9,480
	Dec. 23, 1941	14.3	5,210
	July 19, 1942	18.4	9,090
1943	May 15, 1943	15.1	6,130
	June 12, 1943	13.8	5,130
1944	Apr. 22, 1944	13.4	5,030
	May 2, 1944	16.3	7,460
	May 22, 1944	19.7	10,900
	June 9, 1944	17.5	8,600
1945	Mar. 15, 1945	14.8	6,140
	Apr. 16, 1945	19.6	11,800
	May 14, 1945	18.5	10,100
	May 25, 1945	15.4	6,660
1946	Jan. 6, 1946	22.3 c	5,100 b
	Mar. 26, 1946	16.3	7,470
	June 19, 1946	20.0	12,600
	Aug. 25, 1946	15.5	7,470

a From information by local residents. b About.
c Affected by ice.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1947	Arp. 4, 1947	18.6	10,300
	Apr. 11, 1947	13.9	7,290
	May 29, 1947	19.8	12,400
	June 5, 1947	24.6	34,000
	June 13, 1947	23.1	22,500
	June 22, 1947	21.9	17,300
1948	Mar. 15, 1948	16.0	8,900
1949	Feb. 24, 1949	14.5	7,250
	June 25, 1949	17.8	11,000
1950	Feb. 28, 1950	16.6	10,300
	May 9, 1950	20.1	15,200
	June 14, 1950	13.9	7,350
	June 18, 1950	13.5	6,950
1951	Mar. 28, 1951	12.02	5,450
	Apr. 13, 1951	11.90	5,360
	May 1, 1951	16.80	10,500
	May 26, 1951	18.84	13,100
	June 2, 1951	15.12	8,660
	June 7, 1951	14.43	7,960
	July 3, 1951	12.17	5,980
1952	Mar. 13, 1952	12.23	5,980
	May 23, 1952	13.01	5,800
	June 22, 1952	21.83	16,600
	Aug. 15, 1952	14.32	7,780
1953	Feb. 20, 1953	12.81	6,220
	Mar. 30, 1953	12.53	5,950
	June 10, 1953	20.65	16,200
1954	Apr. 25, 1954	13.70	7,100
	June 1, 1954	12.37	5,860
	June 16, 1954	13.03	6,400
1955	July 10, 1955	12.02	5,500
1956	Aug. 18, 1956	7.69	2,350
1957	Apr. 3, 1957	9.01	3,130
1958	July 2, 1958	14.43	6,040
	July 19, 1958	13.88	5,590

05487470 South River near Ackworth, Iowa__(Continued)

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1959	Mar. 26, 1959	12.5	5,150
	Apr. 20, 1959	13.03	5,500
	May 22, 1959	22.81	13,700
	May 29, 1959	19.35	11,700
	June 30, 1959	19.52	11,800
	Aug. 7, 1959	14.83	6,940
	Sept.26, 1959	15.04	7,100
1960	Jan. 13, 1960	21.26	13,000
	Mar. 30, 1960	22.60	18,100
	May 6, 1960	16.6	8,190
	May 25, 1960	19.7	11,300
	Sept.24, 1960	18.0	9,450
1961	Feb. 18, 1961	19.80	11,400
	Mar. 13, 1961	19.60	11,000
1962	Nov. 16, 1961	23.62	9,480
	Feb. 5, 1962	18.73	5,790
	Mar. 19, 1962	25.53	12,300
	June 11, 1962	24.32	10,100
1963	Apr. 29, 1963	20.82	7,260
	Aug. 6, 1963	18.38	5,580
1964	June 23, 1964	16.90	4,480
1965	Mar. 17, 1965	25.47	12,100
	Apr. 6, 1965	16.62	5,080
	Apr. 8, 1965	18.57	6,450
	June 4, 1965	21.30	8,540
	Sept.21, 1965	23.31	9,350
1966	May 15, 1966	25.58	12,100
	June 9, 1966	21.53	8,780
	June 13, 1966	19.35	7,030
1967	June 12, 1967	25.35	11,500
	June 22, 1967	19.88	7,070
1968	Apr. 23, 1968	14.87	3,810
1969	June 12, 1969	18.82	6,660
	June 28, 1969	17.49	5,640
	July 18, 1969	28.20	15,200
	July 27, 1969	18.71	6,570
	Sept.23, 1969	17.70	5,790
1970	Aug. 8, 1970	27.46	14,500

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1971	Oct. 9, 1970	22.00	9,200
	May 24, 1971	17.27	5,490
1972	May 7, 1972	18.73	6,580
	Aug. 2, 1972	22.21	9,370
	Aug. 6, 1972	24.98	12,000
	Sept.13, 1972	24.42	11,400
1973	Dec. 30, 1972	--	13,000 b
	Feb. 2, 1973	27.35	14,400
	Mar. 11, 1973	17.66	5,760
	Mar. 14, 1973	17.43	5,600
	Mar. 25, 1973	19.78	7,420
	Mar. 31, 1973	24.42	11,400
	Apr. 13, 1973	18.50	6,500
	Apr. 16, 1973	25.53	12,500
	May 7, 1973	20.27	7,820
	May 27, 1973	22.89	9,910
	July 4, 1973	17.81	5,840
1974	Oct. 3, 1973	23.39	10,400
	Oct. 12, 1973	28.30	15,400
	Dec. 4, 1973	19.34	6,830
	Jan. 27, 1974	18.75	6,600
	Apr. 28, 1974	19.05	6,360
	May 18, 1974	22.54	8,880
	June 10, 1974	29.07	19,500
1975	Mar. 17, 1975	20.96	8,360
	June 25, 1975	20.72	8,150
	June 27, 1975	21.73	9,060
1976	Apr. 18, 1976	23.31	10,600
	Apr. 21, 1976	20.69	8,120
	Apr. 24, 1976	24.34	11,800
1977	Aug. 26, 1977	26.99	15,800
1978	Oct. 23, 1977	21.55	8,900
	Oct. 31, 1977	17.42	5,440
	Apr. 18, 1978	24.17	11,600
	June 23, 1978	19.51	7,110
	July 1, 1978	17.00	5,100
	Sept.20, 1978	22.81	10,000
1979	Apr. 25, 1979	16.68	4,880
1980	June 15, 1980	24.31	11,900

b About

05487470 South River near Ackworth, Iowa__(Continued)

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1981	June 8, 1981	18.00	5,600
	July 5, 1981	32.85	32,700
1982	Feb. 20, 1982	19.10	6,470
	Mar. 19, 1982	20.90	8,840
	Apr. 16, 1982	20.00	7,960
	May 6, 1982	24.00	12,300
	July 3, 1982	22.55	9,700
	July 6, 1982	24.60	12,000
	July 16, 1982	32.00	26,000

05487600 South White Breast Creek near Osceola, Iowa
(Discontinued September 30, 1981)

Location.--Lat 40°57'36", long 93°41'28", near southwest corner sec.12, T.71 N., R.25 W., Clarke County, at bridge, 6 mi southeast of Osceola.

Drainage area.--28.0 mi^2.

Gage.--Crest-stage gage.

Stage-discharge relation.--Defined by current-meter and inderict measurements.

Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1953	June 8, 1953	11.21	1,280
1954	May 29, 1954	5.27	302
1955	July 9, 1955	12.02	1,440
1956	--	a	<75
1957	Apr. 2, 1957	9.90	1,020
1958	July 3, 1958	11.57	1,350
1959	Aug. 6, 1959	13.09	1,680
1960	Mar. 27, 1960	11.44	1,330
1961	Sept.14, 1961	11.04	1,240
1962	Nov. 16, 1961	12.08	2,400
1963	Apr. 22, 1963	11.65	2,000
1964	Sept. 6, 1964	13.51	4,000
1965	May 8, 1965	11.99	2,300
1966	May 17, 1966	11.00	1,640
1967	June 21, 1967	13.05	3,500
1968	Apr. 23, 1968	10.16	1,150
1969	July 17, 1969	12.89	3,200

a Peak stage did not reach bottom of gage.

05487600 South White Breast Creek near Osceola, Iowa--(Continued)

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1970	May 13, 1970	12.87	3,200
1971	Feb. 19, 1971	10.59 c	500 d
1972	--	a	<140
1973	Apr. 15, 1973	12.05	2,400
1974	Oct. 11, 1973	13.51	3,400
1975	--	a	<140
1976	Apr. 24, 1976	13.33	3,300
1977	--	a	<140
1978	May 12, 1978	11.65	2,000
1979	May 2, 1979	12.06	2,500
1980	June 2, 1980	11.53	1,900
1981	July 4, 1981	14.88	9,200

Discontinued September 1981

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

05487800 White Breast Creek at Lucas, Iowa

Location.--Lat 41°01', long 93°28', in NE1/4 sec.23, T.72 N., R.23 W., Lucas County, at bridge on U.S Highway 65, near south city limits of Lucas.

Drainage area.--128 mi^2.

Gage.--Crest-stage gage.

Stage-discharge relation.--Defined by current-meter and indirect measurements.

Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1953	June 8, 1953	15.15	3,420
1954	May 29, 1954	8.52	583
1955	July 8, 1955	14.95	2,960
1956	--	a	<110
1957	Apr. 4, 1957	12.85	1,460
1958	July 30, 1958	13.59	1,760
1959	May 22, 1959	16.98	8,800
1960	Mar. 29, 1960	15.80	5,600
1961	Sept.14, 1961	14.41	2,570
1962	Nov. 16, 1961	15.20	3,700
1963	Apr. 22, 1963	14.10	2,310
1964	June 20, 1964	12.95	1,620
1965	May 8, 1965	14.67	2,820
1966	Apr. 19, 1966	13.26	1,770
1967	June 13, 1967	14.60	2,750
1968	Apr. 23, 1968	15.42	4,260
1969	July 17, 1969	14.81	3,020
1970	May 13, 1970	14.38	2,700

a Peak stage did not reach bottom of gage.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1971	Oct. 9, 1970	12.78	1,450
1972	Sept.11, 1972	16.58	7,300
1973	Feb. 2, 1973	16.68	7,700
1974	Oct. 11, 1973	17.51	11,000
1975	--	a	<250
1976	Apr. 25, 1976	16.68	7,700
1977	Aug. 26, 1977	16.05	6,100
1978	May 12, 1978	16.66	7,600
1979	Mar. 22, 1979	14.18	2,500
1980	June 2, 1980	13.60	2,000
1981	July 4, 1981	18.27	15,500
1982	May 6,1982	15.87	5,000

a Peak stage did not reach bottom of gage.

05487980 White Breast Creek near Dallas, Iowa

Location.--Lat 41°14'41", long 93°16'08", in NW1/4 NW1/4 sec.3, T.74 N., R.21 W., Marion County, on left bank 15 ft downstream from bridge on county highway, 0.5 mi downstream from Kirk Branch, and 1.7 mi northwest of Dallas.

Drainage area.--342 mi^2.

Gage.--Water-stage recorder. Datum of gage is 759.12 ft National Geodetic Vertical Datum of 1929 (Corps of Engineers bench mark).

Stage-discharge relation.--Defined by current-meter measurements.

Flood stage.--22 feet.

Remarks.--Base for partial-duration series, 3,000 ft^3/s.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1962	June 11, 1962	28.87 a	12,000 b
1963	Mar. 4, 1963	18.95	3,500
	Mar. 19, 1963	21.40	5,550
1964	May 8, 1964	17.24	3,490
	June 15, 1964	18.40	3,580
	June 22, 1964	19.74	4,200
1965	Mar. 17, 1965	22.49	6,640
	Apr. 5, 1965	19.44	4,870
	Apr. 8, 1965	16.43	3,360
	Apr. 11, 1965	16.18	3,240
	Apr. 25, 1965	16.15	3,400
	Sept.21, 1965	20.57	5,490
1966	Apr. 18, 1966	17.29	3,860
	May 15, 1966	20.32	5,350
	May 17, 1966	21.24	5,890
	May 24, 1966	16.61	3,530
1967	June 12, 1967	20.95	5,720
	June 16, 1967	17.74	4,020
	June 23, 1967	18.81	4,560
1968	Apr. 23, 1968	22.40	6,940
1969	Apr. 27, 1969	19.44	5,190
	June 28, 1969	19.39	5,090
	July 17, 1969	23.91	7,180

a From floodmark. Flood of June 6, 1947 may have been slightly higher. b About.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1970	Apr. 12, 1970	17.53	4,060
	Aug. 9, 1970	23.39	7,570
1971	Oct. 9, 1970	20.24	5,640
	Feb. 19, 1971	21.09 c	4,700 b
	Feb. 26, 1971	17.25	3,980
1972	May 7, 1972	18.80	4,780
	Aug. 2, 1972	20.15	5,590
	Aug. 6, 1972	22.35	6,910
	Sept.12, 1972	22.75	7,150
1973	Dec. 30, 1972	19.45 c	3,880 b
	Feb. 1, 1973	23.03	7,320
	Mar. 25, 1973	18.68	4,710
	Mar. 31, 1973	21.52	6,410
	Apr. 16, 1973	24.19	8,200
	May 2, 1973	19.92	3,080 b
	May 7, 1973	19.32	3,800 b
	May 27, 1973	24.15	5,500 b
	July 4, 1973	20.58	3,800 b
	Aug. 12, 1973	15.65	3,140
	Sept.29, 1973	19.77	5,360
1974	Oct. 3, 1973	23.00	7,300
	Oct. 11, 1973	26.04	9,430
	Dec. 4, 1973	17.25	3,820
	Jan. 27, 1974	--	3,400 b
	May 17, 1974	16.03	3,250
	May 18, 1974	23.25	7,270
	May 19, 1974	22.79	6,930
	June 9, 1974	25.58	8,410
1975	Mar. 17, 1975	18.37 c	4,200 b
	June 25, 1975	16.72	3,560
1976	Apr. 18, 1976	17.48	3,890
	Apr. 21, 1976	17.69	4,110
	Apr. 24, 1976	23.77	7,980
1977	Aug. 26, 1977	22.73	7,140
1978	Oct. 24, 1977	21.27	6,260
	Oct. 31, 1977	17.08	3,750
	Mar. 20, 1978	16.45	3,420
	Mar. 21, 1978	16.28	3,340
	Apr. 18, 1978	20.19	5,610

1978 CONTINUED ON NEXT PAGE

b About.

c Affected by ice.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1978 cont.	Apr. 19, 1978	17.11	3,770
	May 13, 1978	17.62	4,070
	June 23, 1978	19.10	4,960
	Sept.20, 1978	20.20	5,620
1979	Mar. 3, 1979	19.66	5,400
	Mar. 13, 1979	16.56	3,570
	Mar. 23, 1979	18.70	4,830
	May 2, 1979	17.66	4,200
1980	June 15, 1980	16.32	3,360
	June 19, 1980	21.78	6,570
	June 22, 1980	17.56	4,040
1981	Apr. 14, 1981	16.14	3,950
	June 9, 1981	16.95	4,480
	July 5, 1981	26.61	12,300
1982	Feb. 19, 1982	18.01	3,500
	Mar. 16, 1982	14.39	3,140
	Mar. 19, 1982	17.01	4,640
	May 6, 1982	19.28	6,120
	July 3, 1982	26.73	12,300
	July 6, 1982	14.57	3,240
	July 16, 1982	33.45	37,300
	Aug. 5, 1982	16.25	4,180
	Aug. 15, 1982	14.13	3,000
	Sept.17, 1982	17.36	4,860

05488000 White Breast Creek near Knoxville, Iowa
(Discontinued Sept. 30, 1962)

Location.--Lat 42°19'25", long 93°08'55", in NE1/4 SW1/4 sec.3, T.75 N., R.20 W., Marian County, on right bank 10 ft downstream from bridge on State Highway 92, 1.1 mi upstream from Butcher Creek, 2.2 mi west of Knoxville, and 11.1 mi upstream from mouth.

Drainage area.--380 mi^2.

Gage.--Recording. Datum of gage is 734.73 ft National Geodetic Vertical Datum of 1929 (Corps of Engineers bench mark). Prior to Feb. 16, 1949, nonrecording at same site and datum.

Stage-discharge relation.--Defined by current-meter measurements.

Bankfull stage.--High banks are not subject to overflow.

Remarks.--Base for partial-duration series, 3,000 ft^3/s.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1945	Aug. 2, 1945	--	300 a
1946	Jan. 7, 1946	--	5,000
	Mar. 17, 1946	11.7	--
	June 20, 1946	18.4	8,740
	Aug. 25, 1946	10.7	--
1947	Apr. 5, 1947	15.5	5,200
	Apr. 10, 1947	15.4	5,100
	May 29, 1947	17.0	7,050
	June 6, 1947	19.6	14,000
	June 13, 1947	16.7	6,620
	June 22, 1947	17.1	7,200
1948	Mar. 16, 1948	11.2	2,730
1949	Feb. 23, 1949	15.30	5,400
	June 25, 1949	16.38	6,580
1950	Feb. 28, 1950	15.83	5,900
	May 10, 1950	17.95	9,100
	June 18, 1950	12.16	3,540
1951	Mar. 28, 1951	11.17	3,290
	May 26, 1951	14.70	5,020
	July 3, 1951	14.98	5,200
1952	Mar. 13, 1952	12.49	3,880
	June 21, 1952	18.16	9,500
	Aug. 15, 1952	11.44	3,380

a Maximum for period July to September 1945.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1953	Nov. 17, 1952	15.89	6,000
	Feb. 20, 1953	11.25 b	3,100 c
	Mar. 30, 1953	13.72	4,700
	June 10, 1953	15.90	6,540
1954	Apr. 25, 1954	12.01	3,850
1955	July 10, 1955	9.74	2,590
1956	Aug. 8, 1956	10.79	3,000
1957	May 13, 1957	10.42	2,760
1958	July 2, 1958	18.37	7,300
	July 4, 1958	18.24	7,020
	July 19, 1958	12.35	3,660
1959	Mar. 20, 1959	11.31 b	3,600 c
	Mar. 26, 1959	14.0	4,850
	Apr. 20, 1959	14.2	5,000 c
	May 11, 1959	11.5	3,680
	May 22, 1959	17.75	7,800
	May 31, 1959	16.64	6,660
	Sept.26, 1959	10.77	3,390
1960	Jan. 12, 1960	17.10	7,100
	Mar. 30, 1960	19.02	11,000
	Apr. 17, 1960	12.4 d	3,900 c
	May 7, 1960	17.0	7,000
	May 25, 1960	16.7 d	8,000 c
1961	Feb. 18, 1961	15.74	5,940
	Mar. 6, 1961	12.80	4,260
	Mar. 13, 1961	15.48	5,800
	Mar. 23, 1961	10.27	3,190
	Sept.14, 1961	14.75	5,330
1962	Nov. 3, 1961	12.46	4,120
	Nov. 16, 1961	16.80	6,830
	Mar. 20, 1962	16.48	7,000
	June 11, 1962	19.30	11,700

Discontinued Sept. 30, 1962

b Affected by ice. c About. d Estimated.

05488500 Des Moines River near Tracy, Iowa

Location.--Lat 41°16'53", long 92°51'34", in NW1/4 SE1/4 sec.19, T.75 N., R.17 W., Mahaska County, on right bank 250 ft upstream from abandoned Bellefountaine Bridge, 0.5 mi downstream from bridge on State Highway 92, 0.8 mi east of Tracy, 3.1 mi upstream from Cedar Creek, 6.4 mi downstream from English Creek, and at mi 130.4.

Drainage area.--12,479 mi^2.

Gage.--Water-stage recorder. Datum of gage is 670.91 ft National Geodetic Vertical Datum of 1929. Prior to June 26, 1940, and June 30, 1952, to Nov. 4, 1960, nonrecording gage, and June 27, 1940, to June 29, 1952, water-stage recorder, at site 250 ft downstream at same datum.

Stage-discharge relation.--Defined by current-meter measurements.

Flood stage.--14 ft.

Remarks.--Base for partial-duration series, 20,000 ft^3/s. Peak discharge above base discontinued upon beginning of storage in Lake Red Rock Mar. 12, 1969.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1903	May 31, 1903	25. a	130,000 a
1920	Mar. 16, 1920	13.0	25,900
	Mar. 27, 1920	13.7	28,200
	Apr. 20, 1920	12.5	24,200
	May 14, 1920	15.0	32,800
	July 15, 1920	13.6	27,900
1921	Sept.17, 1921	13.3	26,900
1922	Apr. 13, 1922	12.4	23,100
	May 27, 1922	13.4	26,600
1923	Mar. 26, 1923	13.3	26,300
1924	Mar. 4, 1924	12.6	23,800
	Mar. 31, 1924	12.0	21,700
	June 27, 1924	16.5	38,200
1925	June 23, 1925	8.7	11,500
1926	June 15, 1926	13.0	25,200
	Sept.24, 1926	16.3	37,500

a About.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1927	Apr. 20, 1927	15.8	35,500
	Apr. 30, 1927	11.7	20,700
	May 24, 1927	11.9	21,400
1928	Aug. 4, 1928	11.4	19,700
1929	Mar. 16, 1929	18.6	45,500
1930	June 17, 1930	16.4	33,500
1931	June 22, 1931	9.0	11,800
1932	Nov. 26, 1931	16.5	34,000
1933	Apr. 7, 1933	16.7	35,000
1934	Apr. 9, 1934	5.5	4,950
1935	June 3, 1935	15.4	26,900
	June 20, 1935	15.7	28,000
	June 28, 1935	20.2	54,600
	July 4, 1935	18.6	43,300
1936	Mar. 5, 1936	14.2	23,100
1937	Mar. 5, 1937	17.9	38,900
1938	Sept.23, 1938	15.2	26,200
1939	Mar. 13, 1939	17.5	36,600
1940	Aug. 15, 1940	9.3	11,600
1941	June 11, 1941	13.8	21,500
1942	Nov. 2, 1941	15.7	28,000
	Jan. 26, 1942	13.4	20,900
	May 14, 1942	14.4	23,700
	July 15, 1942	13.2	20,400
	July 20, 1942	13.2	20,400
1943	May 17, 1943	15.7	28,000
	June 13, 1943	13.4	20,900
1944	Apr. 24, 1944	16.1	29,000
	May 4, 1944	16.8	32,200
	May 23, 1944	21.6	75,000
	June 10, 1944	17.3	35,500
	June 13, 1944	17.3	36,600
	June 19, 1944	18.9	46,200

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1945	Mar. 17, 1945	18.5	39,300
	Mar. 26, 1945	15.8	29,400
	Apr. 5, 1945	13.0	20,000
	Apr. 18, 1945	18.8	41,400
	Apr. 29, 1945	14.5	24,000
	May 16, 1945	16.6	32,000
	May 27, 1945	17.7	37,300
	June 10, 1945	16.4	31,100
	June 21, 1945	14.2	23,200
1946	Jan. 6, 1946	18.8	40,700
	Mar. 17, 1946	15.3	27,000
	Mar. 27, 1946	14.3	23,400
	May 31, 1946	13.6	21,300
	June 20, 1946	17.8	35,400
	Aug. 26, 1946	13.1	20,300
1947	Mar. 13, 1947	13.3	20,800
	Apr. 6, 1947	17.1	33,600
	Apr. 12, 1947	16.6	31,800
	Apr. 21, 1947	16.0	29,500
	May 30, 1947	16.8	32,500
	June 6, 1947	25.8	125,200
	June 14, 1947	26.5 b	155,000
	June 23, 1947	20.7	66,200
	June 27, 1947	21.5	76,000
1948	Feb. 28, 1948	14.4	25,400
	Mar. 17, 1948	13.7	23,000
	Mar. 22, 1948	20.1	59,700
1949	Mar. 5, 1949	19.6 c	27,000 a
	Mar. 9, 1949	15.4	29,300
	June 25, 1949	13.6	22,600
1950	Mar. 1, 1950	16.0	31,700
	May 10, 1950	15.6	30,100
	June 20, 1950	14.9	26,900
1951	Apr. 2, 1951	19.81	56,300
	Apr. 14, 1951	18.50	45,400
	May 5, 1951	18.74	46,800
	May 26, 1951	15.89	81,300
	May 26, 1951	15.89	31,300
	June 9, 1951	16.79	35,300
	July 3, 1951	16.87	35,800

a About. b Maximum stage known since 1851.
c Affected by ice.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1952	Mar. 13, 1952	14.93	27,300
	Mar. 23, 1952	13.23	21,300
	Apr. 4, 1952	15.25	28,500
	May 24, 1952	13.04	20,700
	June 22, 1952	17.40	38,400
	June 29, 1952	13.84	23,300
	July 14, 1952	12.91	20,400
1953	Feb. 21, 1953	12.93	20,100
	Mar. 31, 1953	13.26	21,600
	June 14, 1953	16.19	27,700
1954	June 17, 1954	14.02	23,500
	June 27, 1954	22.14	69,900
	Sept. 1, 1954	14.8	25,900
1955	July 12, 1955	10.63	14,300
1956	Aug. 20, 1956	5.80	4,480
1957	June 20, 1957	13.58	24,100
1958	July 3, 1958	16.64	28,200
	July 7, 1958	16.98	33,100
	July 21, 1958	14.12	22,900
1959	Mar. 20, 1959	13.20	21,300
	Mar. 27, 1959	13.85	22,900
	May 22, 1959	17.00	29,600
	May 31, 1959	17.92	38,900
	July 2, 1959	16.65	32,600
1960	Jan. 14, 1960	16.70	33,100
	Apr. 4, 1960	23.00	75,500
	Apr. 18, 1960	12.50	20,700
	May 7, 1960	17.80	38,400
	May 26, 1960	17.60	
1961	Feb. 19, 1961	15.81 c	25,000 a
	Mar. 7, 1961	14.37	23,800
	Mar. 14, 1961	16.89	32,900
	Mar. 23, 1961	13.27	20,200
	Apr. 2, 1961	18.12	38,200
	Apr. 13, 1961	14.10	22,700
	Sept. 14, 1961	14.92	25,500

a About. c Affected by ice.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1962	Nov. 17, 1961	16.98	29,300
	Mar. 20, 1962	19.34	42,300
	Apr. 5, 1962	20.69	50,600
	Apr. 21, 1962	13.47	20,800
	May 30, 1962	14.81	25,100
	June 12, 1962	19.68	45,800
	Sept. 8, 1962	14.07	23,800
1963	Mar. 5, 1963	16.00 c	22,000 a
	Apr. 30, 1963	13.87	22,100
1964	June 24, 1964	15.63	27,600
1965	Mar. 18, 1965	18.27	39,200
	Apr. 11, 1965	23.17	77,300
	Apr. 26, 1965	15.45	27,400
	May 31, 1965	13.57	21,000
	June 6, 1965	14.82	25,200
	Sept.22, 1965	16.18	30,000
1966	Oct. 4, 1965	13.60	21,100
	June 15, 1966	17.24 d	33,800
1967	June 17, 1967	20.38	47,400
1968	Apr. 24, 1968	11.07	14,300
1969	Apr.9-11,1969	--	29,500 e
	Apr. 11, 1969	15.87	--
1970	May 20, 1970	12.29	18,200
1971	Feb. 26, 1971	15.62	28,100
1972	Aug. 11, 1972	11.94	17,400
1973	May 7, 1973	15.69	28,900
1974	Mar. 7, 1974	13.40	22,600
1975	Mar. 23, 1975	14.11	25,100
1976	Apr. 24, 1976	12.69	20,900

a About. c Affected by ice.
d From graph based on gage readings. e Daily.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1977	Sept. 3, 1977	10.03	14,300
1978	Mar. 25, 1978	14.22	25,300
1979	Apr. 16, 1979	15.34	28,600
1980	June 21, 1980	10.64	15,800
1981	July 7, 1981	11.44	17,800
1982	July 16, 1982	19.62 f	35,000

f Backwater from Cedar Creek.

05488620 Coal Creek near Albia, Iowa

Location.--Lat 41°01'02",long 92°50'46",in SW 1/4 sec. 20, T.72 N., R.17 W., Monroe County, at bridge on U.S. Highway 34, 2 mi southwest of Albia.

Drainage area.--13.5 mi^2.

Gage.--Crest-stage gage.
/sp 1
Stage-discharge relation.--Defined by current-meter and indirect measurements.

Remarks.--Only annual peaks are shown.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1966	May 12, 1966	78.02	360
1967	June 9, 1967	84.61	4,500
1968	--	a	b
1969	--	a	b
1970	Sept.24, 1970	79.92	880
1971	Feb. 17, 1971	77.38	250
1972	--	78.92	570
1973	July 4, 1973	81.44	1,600
1974	June 9, 1974	81.92	1,900
1975	--	a	b
1976	Apr. 24, 1976	82.07	2,100
1977	Aug. 8, 1977	86.90	8,500
1978	May 7, 1978	80.09	920
1979	Mar. 24, 1979	77.77	320
1980	June 2, 1980	82.95	2,800
1981	July 4, 1981	82.56	2,400
1982	July 3, 1982	88.51	12,700

a Peak stage did not reach bottom of gage.
b Discharge not determined.

05489000 Cedar Creek near Bussey, Iowa

Location.--Lat 41°13'09", long 92°54'38", at SW corner sec.11, T.74 N., R.18 W., Marion County, on left bank 10 ft downstream from bridge on State Highway 156, 0.8 mi downstream from North Cedar Creek, 1.6 mi northwest of Bussey, 3.0 mi upstream from Honey Creek, and 8.9 mi upstream from mouth.

Drainage area.--374 mi^2.

Gage.--Water-stage recorder. Datum of gage is 682.15 ft National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Prior to Feb. 21, 1949, nonrecording gage at same site and datum.

Stage-discharge relation.--Defined by current-meter measurements.

Flood stage.--18 ft.

Remarks.--Base for partial-duration series, 4,000.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1946	June ??, 1946	28.05 a	31,500
1948	Feb. 28, 1948	24.90	15,900
	Mar. 16, 1948	19.98	5,760
	Mar. 20, 1948	19.18	5,040
1949	Feb. 24, 1949	21.58	7,800
	June 25, 1949	20.28	6,130
1950	Feb. 9, 1950	17.92	4,150
	Feb. 28, 1950	19.48	5,350
	May 9, 1950	27.50	29,300
	June 19, 1950	18.65	4,690
1951	May 11, 1951	20.02	5,800
	May 26, 1951	21.37	7,680
	July 3, 1951	18.00	4,200
1952	June 3, 1952	19.83	5,620
	June 21, 1952	25.72	20,100
1953	Nov. 18, 1952	19.18	5,080
	Mar. 31, 1953	20.12	5,920
1954	Aug. 26, 1954	16.44	3,460
1955	Feb. 20, 1955	16.46	3,500

a Gage height 28.45 ft on upstream side of bridge; from levels to floodmarks by Corps of Engineers.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1956	Aug. 9, 1956	17.20	3,980
1957	Apr. 3, 1957	17.37	4,060
1958	July 3, 1958	28.06	29,000
	July 4, 1958	17.60	4,140
	July 20, 1958	18.63	4,560
1959	Mar. 20, 1959	20.25	6,090
	Mar. 27, 1959	18.92	4,860
	Apr. 1, 1959	19.78	5,650
	Apr. 20, 1959	19.48	5,360
	May 21, 1959	22.84	11,000
	May 30, 1959	--	9,000 b
1960	Jan. 13, 1960	19.58	5,450
	Mar. 30, 1960	25.71	18,800
	Apr. 18, 1960	18.34	4,500
	May 7, 1960	25.00	16,000
	May 17, 1960	19.32	5,180
	May 25, 1960	20.62	6,630
1961	Mar. 6, 1961	19.60	5,370
	Mar. 8, 1961	16.84	3,820
	Mar. 14, 1961	19.90	5,580
	Mar. 27, 1961	17.50	4,100
	Sept. 13, 1961	27.54	20,800
1962	Nov. 3, 1961	24.60	12,300
	Nov. 16, 1961	24.23	11,400
	Mar. 20, 1962	21.75	8,620
	May 30, 1962	18.60	4,660
	June 11, 1962	23.06	11,800
1963	Mar. 19, 1963	17.91	4,300
1964	June 16, 1964	20.27	6,350
1965	Mar. 18, 1965	20.51	6,500
	Apr. 6, 1965	19.81	5,660
	Apr. 9, 1965	18.14	4,220
	Apr. 26, 1965	20.11	5,980
	Sept. 22, 1965	24.18	11,400
1966	Dec. 24, 1965	16.68	3,770
1967	June 11, 1967	21.57	6,520
	June 22, 1967	19.73	5,180

b About.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1968	Apr. 24, 1968	20.28	5,250
1969	Apr. 27, 1969	17.11	3,720
1970	Sept.18, 1970	18.75	4,980
1971	Oct. 10, 1970	20.59	5,420
	Feb. 19, 1971	20.26	5,240
1972	May 8, 1972	19.14	4,670
	Aug. 6, 1972	18.23	4,220
1973	Feb. 2, 1973	21.42	6,920
	Mar. 26, 1973	18.32	4,390
	Apr. 1, 1973	20.25	5,820
	Apr. 13, 1973	18.06	4,240
	Apr. 17, 1973	21.63	7,160
	Apr. 22, 1973	19.68	5,340
	May 2, 1973	21.20	6,700
	May 8, 1973	19.01	4,860
	May 28, 1973	24.27	11,500
	July 5, 1973	21.97	7,560
1974	Oct. 4, 1973	22.97	8,030
	Oct. 11, 1973	20.87	6,280
	Jan. 27, 1974	21.00	6,430
	May 19, 1974	25.52	14,700
	June 9, 1974	22.73	8,670
1975	June 25, 1975	16.33	3,420
1976	Apr. 24, 1976	25.27	13,900
	May 5, 1976	18.90	4,780
	May 16, 1976	23.11	9,300
1977	Aug. 9, 1977	21.37	6,870
	Sept.18, 1977	17.98	4,190
1978	Oct. 25, 1977	21.40	6,900
	Nov. 1, 1977	19.40	5,130
	Mar. 19, 1978	18.91	4,790
	Mar. 22, 1978	18.17	4,300
	Apr. 11, 1978	19.75	5,400
	Apr. 18, 1978	21.60	7,120
	May 14, 1978	21.74	7,290
	June 24, 1978	18.72	4,650
	June 29, 1978	18.59	4,560
	July 7, 1978	20.69	6,220
	July 23, 1978	17.72	4,060
	Sept.21, 1978	20.11	5,760

05489000 Cedar Creek near Bussey, Iowa--(Continued)

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1979	May 3, 1979	16.49	3,480
1980	June 5, 1980	20.60	6,140
	June 7, 1980	17.86	4,130
	June 15, 1980	21.69	7,230
1981	July 4, 1981	28.83	26,600
1982	Feb. 21, 1982	20.23	5,990
	Mar. 20, 1982	22.82	9,760
	Apr. 17, 1982	20.71	7,140
	May 7, 1982	18.93	5,510
	May 30, 1982	20.17	6,570
	July 3, 1982	34.61	96,000
	July 5, 1982	21.01	7,460
	July 14, 1982	23.66	11,000
	July 16, 1982	33.20	63,800
	Aug. 5, 1982	25.10	13,600

06903400 Chariton River near Chariton, Iowa

Location.--Lat 40°57'12", long 93°15'27", in SW1/4 NE1/4 sec.15, T.71 N., R.21 W., Lucas County, on right bank 15 ft downstream from bridge on co. road S43, 5.0 mi southeast of Chariton.

Drainage area.--182 mi^2.

Gage.--Water-stage recorder. Datum is 917.96 ft NGVD of 1929.

Stage-discharge relation.--Defined by current-meter measurements.

Flood stage.--18 ft.

Remarks.--Base for partial-duration series, 1,200 ft^3/s.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1947	June 5, 1947	21.65 a	11,000
1960	Mar. ??, 1960	23.0 b	15,000 b
1966	Feb. 9, 1966	15.90	1,360
1967	June 10, 1967	16.82	1,670
	June 14, 1967	18.08	2,820
	June 21, 1967	19.53	4,930
1968	Apr. 23, 1968	19.90	5,660
1969	Apr. 27, 1969	16.26	1,360
	July 10, 1969	16.21	1,340
	July 13, 1969	16.77	1,640
	July 21, 1969	16.32	1,390
1970	Apr. 19, 1970	16.61	1,550
	May 15, 1970	17.44	2,120
	Aug. 8, 1970	20.15	6,320
	Sept.17, 1970	18.29	3,230
1971	Oct. 9, 1970	17.28	2,080
1972	May 8, 1972	16.32	1,390
	Sept.13, 1972	17.29	1,990
	Sept.14, 1972	18.08	2,820
1973	Feb. 2, 1973	17.63	2,290
	Mar. 7, 1973	16.20	1,330
	Mar. 11, 1973	16.49	1,470
	Mar. 26, 1973	16.89	1,710

1973 CONTINUED ON NEXT PAGE

a From floodmarks. b About.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1973 cont.	Apr. 1, 1973	17.22	1,940
	Apr. 16, 1973	18.02	2,740
	May 2, 1973	17.01	1,790
	May 7, 1973	16.44	1,470
	May 27, 1973	17.30	2,080
	June 19, 1973	17.58	2,240
	July 4, 1973	16.12	1,290
	Aug. 12, 1973	16.46	1,460
	Sept.25, 1973	16.81	1,670
	Sept.28, 1973	16.03	1,250
1974	Oct. 3, 1973	15.98	1,230
	Oct. 12, 1973	20.20	6,300
	Dec. 5, 1973	15.95	1,220
	Jan. 27, 1974	17.55	2,220
	Apr. 21, 1974	16.85	1,750
	May 18, 1974	16.03	1,250
	June 9, 1974	17.89	2,590
	June 13, 1974	16.82	1,770
1975	Mar. 18, 1975	16.27	1,360
	June 28, 1975	16.82	1,670
1976	Apr. 21, 1976	17.17	1,430
	Apr. 25, 1976	18.59	2,490
	June 14, 1976	20.35	5,460
1977	Aug. 27, 1977	17.27	1,490
1978	Oct. 24, 1977	1934	3,520
	Oct. 31, 1977	17.28	1,500
	Mar. 22, 1978	17.48	1,300
	Apr. 10, 1978	18.22	3,340
	Apr. 18, 1978	17.66	1,730
	May 7, 1978	17.51	1,830
	May 13, 1978	17.43	1,770
	Sept.21, 1978	19.79	3,660
1979	Mar. 4, 1979	18.24 c	1,600
	Mar. 24, 1979	17.75	1,890
	May 3, 1979	17.09	1,540
1980	June 2, 1980	20.84	7,000
	June 4, 1980	20.31	5,380
	Sept. 1, 1980	16.70	1,210

c Affected by ice.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1981	Apr. 14, 1981	16.86	1,580
	June 8, 1981	18.47	2,800
	June 15, 1981	19.36	3,890
	July 4, 1981	23.14	16,600
1982	Mar. 19, 1982	18.54	2,880
	Apr. 17, 1982	17.83	2,220
	May 7, 1982	17.55	2,020
	May 21, 1982	17.55	2,020
	May 29, 1982	17.33	1,900
	July 3, 1982	18.97	3,360
	July 16, 1982	19.85	4,650
	Aug. 30, 1982	18.02	2,370

06903700 South Fork Chariton River near Promise City, Iowa

Location.--Lat 40°48'02", long 93°11'32", in SW1/4 SW1/4 sec.5, T.69 N., R.20 W., Wayne County, on right bank 20 ft downstream from bridge on county highway S50, 1.3 mi downstream from Jordan Creek and 4.3 mi northwest of Promise City.

Drainage area.--168 mi^2.

Gage.--Water-stage recorder. Datum of gage is 913.70 ft National Geodetic Vertical Datum of 1929.

Stage-discharge relation.--Defined by current-meter measurements.

Flood stage.--18 feet.

Remarks.--Base for partial-duration series, 2,000 ft^3/s.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1965	Sept 21, 1965	25.50 a	b
1968	Apr. 20, 1968	14.60	2,710
	Apr. 23, 1968	20.96	6,950
1969	Jan. 16, 1969	15.05 c	1,900 d
	Apr. 27, 1969	14.29	2,600
	July 13, 1969	13.81	2,290
1970	Apr. 18, 1970	13.69	2,250
	May 14, 1970	19.12	4,280
	Aug. 8, 1970	21.32	7,660
	Sept.17, 1970	20.44	6,160
	Sept.22, 1970	18.61	4,420
	Sept.24, 1970	14.53	2,690
1971	Oct. 9, 1970	20.98	6,970
	Feb. 18, 1971	18.93 c	3,300 d
	Feb. 26, 1971	14.90 c	2,300 d
	Mar. 11, 1971	12.38	2,010
1972	Sept.14, 1972	17.68	3,930
1973	Dec. 29, 1972	--	3,000 d
	Jan. 17, 1973	--	2,600 d
	Feb. 2, 1973	18.73	4,500
	Mar. 7, 1973	14.60	2,710
	Mar. 11, 1973	13.97	2,490
	Mar. 25, 1973	18.41	4,300

1973 CONTINUED ON NEXT PAGE

a From floodmark. b Discharge not determined.
c Affected by ice. d About.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1973 cont.	Mar. 31, 1973	19.14	4,810
	Apr. 12, 1973	14.82	2,800
	Apr. 16, 1973	19.21	4,870
	Apr. 21, 1973	12.78	2,130
	May 2, 1973	18.81	4,560
	May 7, 1973	14.82	2,790
	May 27, 1973	18.20	4,170
	June 18, 1973	13.25	2,280
1974	Oct. 3, 1973	15.13	2,900
	Oct. 12, 1973	19.35	4,980
	Dec. 4, 1973	12.49	2,030
	Jan. 27, 1974	17.72 c	3,000 d
	May 31, 1974	15.43	3,000
	June 9, 1974	18.98	4,680
	June 13, 1974	14.34	2,620
	July 4, 1974	16.80	3,540
1975	Apr. 24, 1975	13.06	2,170
	June 28, 1975	20.85	6,580
1976	Mar. 5, 1976	17.88	4,030
	Apr. 24, 1976	20.27	5,930
	May 16, 1976	14.25	2,590
	June 14, 1976	20.29	5,960
1977	Aug. 26, 1977	18.75	4,520
	Sept. 13, 1977	15.27	2,940
1978	Oct. 24, 1977	19.72	5,300
	Oct. 31, 1977	17.08	3,660
	Apr. 10, 1978	21.92	9,700
	Apr. 18, 1978	18.74	4,510
	May 7, 1978	19.78	5,460
	May 13, 1978	18.32	4,250
	Sept. 20, 1978	17.73	3,970
1979	Mar. 4, 1979	19.74 c	2,900
	Mar. 13, 1979	14.73	2,710
	Mar. 24, 1979	19.18	4,910
	May 3, 1979	16.59	3,480
	June 8, 1979	12.59	2,100
	June 27, 1979	15.40	3,000
1980	June 3, 1980	22.92	11,200
	June 4, 1980	19.61	5,800
	Sept. 1, 1980	21.48	8,550
	Sept. 5, 1980	12.83	2,140

c Affected by ice. d About.

Peak stages and discharges

Water year	Date	Gage height (feet)	Discharge (ft^3/s)
1981	Dec. 8, 1981	18.20	4,190
	Apr. 12, 1981	12.67	2,120
	Apr. 14, 1981	17.58	3,940
	June 8, 1981	16.18	3,290
	July 4, 1981	29.95	28,000
	July 15, 1981	17.8	3,790
1982	Feb. 20, 1982	c	2,140
	Mar. 16, 1982	14.43	2,510
	Mar. 19, 1982	21.97	9,420
	Apr. 16, 1982	16.37	3,330
	May 6, 1982	14.25	2,450
	May 21, 1982	12.93	2,010
	May 29, 1982	20.27	6,680
	June 9, 1982	12.99	2,030
	July 16, 1982	22.32	10,000
	July 19, 1982	20.24	6,640
	July 21, 1982	17.84	4,050
	Sept.17, 1982	15.24	2,850

c Affected by ice.

Table 4. Temporary bench marks, South-Central Iowa.

The temporary bench marks listed in this tabulation have been established by the Water Resources Division, Iowa District, U.S. Geological Survey. Elevations for the bench marks were established by the U. S. Geological Survey except those for which credit is given in the description of the bench mark. The work was done as a part of a stream profile project cooperatively financed by the Highway Research Board, Highway division, Iowa Department of Transportation (IDOT) and the U.S. Geological Survey.

The streams covered by the level work were the South River, Squaw Creek, Otter Creek, White Breast Creek, Cedar Creek, North Cedar Creek, Chariton River, and the South Fork Chariton River. Bench marks were set at all bridges and at intermediate points to preserve the level lines.

Level lines to establish the third order accuracy bench marks shown herein were run from first or second order bench marks established and adjusted by the National Geodetic Survey or from third order bench marks established and adjusted by the U.S. Geological Survey, Topographic Division. Errors of closure in the Water Resources Division's level work were adjusted throughout the line to the elevations published by the National Geodetic Survey and the Topographic Division. These bench marks are repeated in this listing. All elevations are in National Geodetic Vertical Datum of 1929.

The bench marks have been identified by an index number which is composed of the Congressional township, range, and section number and the quarter-section in which they are located. The township and range numbers have been combined into a four-digit number, such as 7420 for Township 74 North and Range 20 west. This is followed by a dash and the section number in which the mark is located. Within the section, the quarter in which the mark is located is designated by NE, SE, NW, and SW. A number in parentheses following this letter designation indicates the number of the mark in that particular quarter section. The index number serves to describe the landline location of the mark without further reference in the body of the description.

Standard marks such as chiseled squares and crosses were used on concrete or steel. On trees or poles a 20-penny pole spike driven horizontally through a short piece of 1/8-inch galvanized pipe (referred to as a PSC) or a railroad spike was used. Existing marks were used wherever available and the agency responsible for the mark, when known, is indicated in the description. Marks indicated as (REFERENCE POINT) following the name of the stream were established to permit water surface elevations to be determined by use of a tape and weight. The terms "right and left" in the descriptions are determined as viewed facing in the direction of the flow of the stream.

Additional informatiom, if available, can be obtained by writing to the following address: U.S. Geological Survey, P.O. Box 1230, 400 South Clinton Street, Iowa City, Iowa 52244.

7118-4 SW (1) - About 5.5 miles east of Melrose on county bridge over Cedar Creek, on left downstream guardrail post; 2 chisel marks. Elev. 831.21 feet.

7118-4 SW (2) - (REFERENCE POINT) - About 5.5 miles east of Melrose on county bridge over Cedar Creek, on top of downstream guardrail at 11th post from left abutment; 3 chisel marks. Elev. 830.77 feet.

7118-6 SE (1) - About 4 miles east of Melrose at county T13 bridge over Cedar Creek, on left downstream wingpost; chiseled square. Elev. 844.55 feet.

7118-6 SE (2) - (REFERENCE POINT) - About 4 miles east of Melrose at County T13 bridge over Cedar Creek, in center of bridge on downstream guardrail; 3 chisel marks. Elev. 844.04 feet.

7118-6 SW (1) - 3.5 miles east of Melrose on county H40 bridge over Contrary Creek, on left downstream bridge seat; a standard tablet stamped "3 KEE 1979." Elev. 842.301 feet.

7119-4 SE (1) - At Melrose on county bridge over Cedar Creek, on left upstream curb; 1 1/2 inch plug with cross on top. Elev. 874.28 feet.

7119-4 SE (2) - (REFERENCE POINT) - At Melrose on county bridge over Cedar Creek, on 10th vertical "T" brace from left downstream abutment; 3 notches. Elev. 875.69 feet.

7119-4 SW (1) - At Melrose along Burlington Northern Railroad, about 0.25 miles west of county road crossing, on north end of concrete culvert 50 feet west of mile post 319; standard tablet stamped "F 111 1935." Elev. 871.901 feet.

7119-5 SW (1) - About 1 mile west of Melrose on county bridge over Cedar Creek, on top of left downstream guardrail post; 2 chisel marks. Elev. 886.95 feet.

7119-5 SW (2) - (REFERENCE POINT) - About 1 mile west of Melrose on county bridge over Cedar Creek, on downstream guardrail between 8th and 9th posts from left abutment; 3 chisel marks. Elev. 887.03 feet.

7121-8 NE (1) - About 2.5 miles southeast of Chariton, Lucas County, at east-west county road bridge over Chariton River, on 4th guardrail post from left upstream abutment; 2 chisel marks. Elev. 948.07 feet.

7121-8 NE (2) - (REFERENCE POINT) - About 2.5 miles southeast of Chariton, Lucus County, at east-west county road bridge over Chariton River, on 9th guardrail post from right downstream abutment; 2 chisel marks. Elev. 947.89 feet.

7121-15 NW (1) - About 4.5 miles southeast of Chariton, Lucas County, on county S43 bridge over Chariton River, at end of right upstream wing-wall; Top of protruding 1 inch bolt. Elev. 945.06 feet.

7121-15 NE (1) - About 4.5 miles southeast of Chariton, Lucas County, on county S43 bridge over Chariton River, at end of right downstream wingwall; Top of protruding 1 inch bolt. Elev. 945.09 feet.

7121-15 SW (1) - About 5 miles southeast of Chariton, Lucas County, on county H50 bridge over Wolf Creek, on right downstream batter post at guardrail height; chiselled cross on rivet. Elev. 951.06 feet.

7121-15 SW (2) - About 5 miles southeast of Chariton, Lucas County, at "T" intersection west of County roads S43 and H50, in northwest corner of intersection, in power pole; nail on south side 6 inches above ground. Elev. 1026.17 feet.

7121-21 NE (1) - About 5 miles southeast of Chariton, Lucas County, at county road H50 overpass over railroad, 6 poles south of overpass 179 along tracks, 40 ft west of centerline of tracks, 10 ft east of right-of-way fence and about 2.5 ft higher than the tracks; a standard tablet stamped "V113-1935" and set in concrete post. Elev. 979.555 feet.

7121-24 SW (1) - About 3.5 miles southwest of Russell, Lucas County, on county S50 bridge over Chariton River, on right downstream batter post, on downstream rivet at guardrail height; chiselled cross. 940.22 feet.

7121-24 SW (2) - (REFERENCE POINT) About 3.5 miles southwest of Russell, Lucas County, on county S50 bridge over Chariton River, on top of downstream guardrail 6 inches left of center vertical beam of truss portion of bridge; chiselled arrow. Elev. 940.27 feet.

7121-26 NE (1) - About 4 miles southwest of Russell, Lucas County, at county "T" road west, northwest corner of intersection 240 ft north, in east side of power pole about 6 inches above ground; pole spike and collar. Elev. 995.02 feet.

7121-27 NW (1) - About 6.5 miles southeast of Chariton and about 5 miles southwest of Russell, Lucas County, at Junction of county S43 road and east-west county road, in southeast corner of intersection, in east side of power pole about 6 inches above ground; pole spike and collar. Elev. 1045.64 feet.

7124-2 SE (1) - About 2 miles south of Woodburn, at county road bridge over White Breast Creek, on left downstream wingwall; chiseled square. Elev. 933.18 feet.

7124-2 SE (2) - (REFERENCE POINT) - About 2 miles south of Woodburn, at county road bridge over White Breast Creek, on downstream handrail, 1.5 feet left of 7th post from left; chiseled arrow. Elev. 935.23 feet.

7124-3 SW (1) - About 2.5 miles south of Woodburn, at county road bridge over White Breast Creek, on left downstream wingpost; chiseled square. Elev. 946.06 feet.

7124-3 SW (2) - (REFERENCE POINT) - About 2.5 miles south of Woodburn, at county road bridge over White Breast Creek, on downstream handrail at 11th post from left; chiseled arrow. Elev. 947.08 feet.

7124-4 SE (1) - About 2.5 miles south of Woodburn, at county road bridge over White Breast Creek, at left upstream wingpost, at curb height; chiseled square. Elev. 943.89 feet.

7124-4 SW - About 2.5 miles southwest of Woodburn, at county road bridge over small creek, in left upstream foundation post, in top of post 0.5 feet above road level; railroad spike. Elev. 941.48 feet.

7124-5 NW - About 3 miles southwest of Woodburn, 0.2 miles east of county road T-road east intersection, in power pole south side of road and house, power pole with transformer, 1 foot above ground, PSC. Elev. 990.10 feet.

7124-5 SW (1) - About 3.5 miles southwest of Woodburn, at county road bridge over White Breast Creek, on top of left downstream wingwall; chiseled square. Elev. 961.33 feet.

7124-5 SW (2) - (REFERENCE POINT) - About 3.5 miles southwest of Woodburn, at county road bridge over White Breast Creek, on downstream guardrail between 7th and 8th posts from right; chiseled arrow. Elev. 961.23 feet.

7124-9 NE - About 3 miles south of Woodburn, at county road bridge over South White Breast Creek, on top of left upstream wingpost; chiseled square. Elev. 952.50 feet.

7124-10 NW (1) - About 3 miles south of Woodburn, at county road bridge over South White Breast Creek, at right downstream curb by wingpost, chiseled cross on rivet. Elev. 953.44 feet.

7124-10 NW (2) - (REFERENCE POINT) - About 3 miles south of Woodburn, at county road bridge over South White Breast Creek, on downstream handrail between 8th and 9th posts from left end; chiseled arrow. Elev. 953.62 feet.

7217-18 SW (1) - 3 miles west of Albia on county bridge over Cedar Creek, on right upstream wingpost; chiseled square. Elev. 793.55 feet.

7217-18 SW (2) - (REFERENCE POINT) - 3 miles west of Albia on county bridge over Cedar Creek, on center downstream guardrail post; 3 chisel marks. Elev. 794.48 feet.

7218-2 SE (1) - About 5 miles south of Lovilia on east-west abandoned county bridge over Cedar Creek, on left upstream caisson pier, on upstream landward rivet of shoe plate; chiseled cross. Elev. 771.17 feet.

7218-2 NW (1) - 4 miles south of Lovilia on north-south county bridge over Cedar Creek, on top of left downstream guardrail post; 2 chisel marks. Elev. 775.66 feet.

7218-2 NW (2) - (REFERENCE POINT) - 4 miles south of Lovilia on north-south county bridge over Cedar Creek, on 13th guardrail post from left downstream abut; 3 chisel marks. Elev. 776.03 feet.

7218-12 NW (1) - 4.5 miles northwest of Albia on county H32 bridge over Cedar Creek, on right downstream wingpost; chiseled square. Elev. 786.58 feet.

7218-12 NW (2) - (REFERENCE POINT) - 4.5 miles northwest of Albia on county H32 bridge over Cedar Creek, on center guardrail post of downstream guardrail; 3 chisel marks. Elev. 786.76 feet.

7218-24 NE (1) - About 3.5 miles west of Albia at a signal bridge along Burlington Northern Railroad, on top of south corner of concrete base of northwest leg; standard tablet "W 111 1935." Elev. 806.488 feet.

7218-26 NE (1) - 4 miles west of Albia at U.S. Highway 34 bridge over Cedar Creek, on right downstream wingwall; I DOT plug. Elev. 812.79 feet.

7218-26 NE (2) - (REFERENCE POINT) - 4 miles west of Albia at U.S. Highway 34 bridge over Cedar Creek, on downstream guardrail by 9th post from right abutment; 3 chisel marks. Elev 814.96 feet.

7218-34 SE (1) - About 6 miles southwest of Albia on county bridge over Cedar Creek, on top of left downstream caisson pier; left downstream landward bolt; chiseled cross. Elev. 812.19 feet.

7218-34 SE (2) - (REFERENCE POINT) - About 6 miles southwest of Albia on county bridge over Cedar Creek, on top of right downstream caisson pier; 3 chisel marks. Elev. 812.21 feet.

7221-30 NE (1) - At Chariton, Lucas County, along Burlington Northern Railroad, 4 poles north of overpass 338.81, 70 ft east of track, 134 ft south of intersection of Main and Armory Streets, 53 ft south and 36 ft east of southeast corner of house at 301 South Main Street, a State Survey standard tablet stamped "59-38" and set in top of concrete post. Elev. 1037.304 feet.

7221-30 SW (1) - Near southwest corner of Chariton, Lucas County, on county road (extension of 16th Street) bridge over Chariton River, on right downstream batter post, on rivet at guardrail height; chisseled cross. Elev. 960.21 feet.

7221-30 SW (2) - (REFERENCE POINT) - Near southwest corner of Chariton, Lucas County, on county road (extension of 16th Street) bridge over Chariton River, on top of guardrail near 6th post from right downstream abutment; 2 chisel marks. Elev. 960.26 feet.

7221-32 NW (1) - 0.7 mile south along Chicago, Rock Island and Pacific Railroad from Burlington Northern Railroad overhead crossing at Chariton, Lucas County, on a 4x6 ft concrete box culvert, on top of south end of west headwall; a standard tablet stamped "T113 1935". Elev. 979.558 feet.

7221-32 SW (1) - About 1.5 miles south of Chariton, Lucas County, on State Highway 14 bridge over Chariton River, on right upstream wingpost; Iowa Department of Transportation plug. Elev. 959.26 feet.

7221-32 SW (2) - (REFERENCE POINT) - About 1.5 miles south of Chariton, Lucas County, on State Highway 14 bridge over Chariton River, on 8th guardrail post from left downstream abutment; 2 chisel marks. Elev. 959.63 feet.

7222-5 SW - About 3 miles northeast of Lucas, at northeast corner of county road intersection, in power pole 0.5 feet above ground in south side of pole, PSC. Elev. 900.08 feet.

7222-5 SE (1) - About 3.5 miles northeast of Lucas, at county road bridge over White Breast Creek, on left downstream wingpost; chiseled square. Elev. 869.48 feet.

7222-5 SE (2) - (REFERENCE POINT) - About 3.5 miles northeast of Lucas, at county road bridge over White Breast Creek, on downstream handrail, 0.5 feet left of 12th guardrail post from right; chiseled arrow. Elev. 868.01 feet.

7222-18 SW - 1.1 miles northeast along the CB&Q Railraod from the station at Lucas, 250 feet east of a road crossing, at a bridge, and in the center of the top of the north headwall; a standard disk stamped "X 110 1935." Elev. 876.898 feet.

7222-18 SE (1) - About 2 miles east of Lucas, at Highway 34 bridge over White Breast Creek on left upstream wingwall; chiseled square. Elev. 882.08 feet.

7222-18 SE (2) - (REFERENCE POINT) - About 2 miles east of Lucas, at Highway 34 bridge over White Breast Creek, on downstream side of bridge between 13th and 14th handrail posts from right; chiseled arrow. Elev. 882.42 feet.

7222-18 NE - About 2 miles northeast of Lucas, at county road culvert over a small creek, on northwest corner of cement culvert headwall; chiseled square. Elev. 870.79 feet.

7223-13 SE - In Lucas, 300 feet north of CB&Q Railraod tracks, at intersection of Main and Division, on northeast corner, 11 feet north and 1 foot east of power pole, at road level; standard tablet stamped "895 Iowa 1913." Elev. 895.090 feet.

7223-14 SW (1) - About 0.5 miles west of Lucas, at county road bridge over White Breast Creek, on right downstream batter post of bridge truss, at handrail height; chiseled cross on rivet. Elev. 889.71 feet.

7223-14 SW (2) - (REFERENCE POINT) - About 0.5 miles west of Lucas, at county road bridge over White Breast Creek, on downstream side of bridge, on 2nd beam from right end bridge, at handrail height; chiseled arrow. Elev. 889.80 feet.

7223-20 SE - About 3 miles southwest of Lucas, at county road bridge over a small creek, at left upstream side of bridge, at handrail height; chiseled cross in rivet. Elev. 905.71 feet.

7223-23 NE (1) - At south edge of Lucas, at Highway 65 bridge over White Breast Creek, on backwall at left downstream corner of bridge; chiseled square. Elev. 886.94 feet.

7223-23 NE (2) - (REFERENCE POINT) - At south edge of Lucas, at Highway 65 bridge over White Breast Creek, on downstream guardrail section, in center of 6th section from left; chiseled arrow. Elev. 890.06 feet.

7223-23 NW (1) - 0.6 miles west along CB&Q Railroad from station in Lucas, at bridge 343.58, in top step of southwest corner of bridge; standard tablet "V 110." Elev. 898.138 feet.

7223-29 SE - About 3 miles southwest of Lucas, at county road bridge over small creek, on right upstream foundation post, 0.5 feet below top of pole; PSC. Elev. 898.64 feet.

7223-30 NE - About 4 miles southwest of Lucas, just south of a bridge over a small creek, at a road crossing with Burlington Northern Railroad, at southwest corner of crossing, in a power pole with 2 guy wires, 1 foot above ground on south side of pole; PSC. Elev 912.48 feet.

7223-30 SW - About 4.5 miles southwest of Lucas, at Burlington Northern Railroad bridge over a small stream, at mile 348.04, on top of south end of west abutment; chiseled square, TBM 10. Elev. 929.900 feet.

7223-32 NW (1) - About 4 miles southwest of Lucas, along north quarter line, at county road bridge over White Breast Creek, at left upstream batter post of truss, at handrail height; chiseled cross on rivet. Elev. 910.15 feet.

7223-32 NE (1) - (REFERENCE POINT) - About 4 miles southwest of Lucas, along north quarter line, at county road bridge over White Breast Creek, on left downstream batter post, 0.5 feet above handrail height, on downstream edge of post; chiseled arrow. Elev. 910.93 feet.

7224-27 NE - At Woodburn, 110 feet west of Railroad crossing, at a Railroad bridge, on top of north end of west abutment of bridge; chiseled square. Elev. 960.86 feet.

7224-35 NE - About 1.2 miles southeast of Woodburn, at a T-road south intersection, north side of intersection, at an old schoolyard, on right side of drive leading into schoolyard, in large fence post, 1 foot above ground on south side of post; PSC. Elev. 1,079.32 feet.

7318-8 SE (1) - 2.5 miles west of Lovilia on county H16 bridge over Cedar Creek, on left upstream guardrail post; 2 chisel marks. Elev. 757.87 feet.

7318-8 SE (2) - (REFERENCE POINT) - 2.5 miles west of Lovilia on county H16 bridge over Cedar Creek, on center of downstream guardrail; 3 chisel marks. Elev. 758.32 feet.

7318-16 SW (1) - 2 miles southwest of Lovilia on county bridge over Cedar Creek, on right upstream wingpost; chiseled square. Elev 763.29 feet.

7318-16 SW (2) (REFERENCE POINT) - 2 miles southwest of Lovilia on county bridge over Cedar Creek, on center of downstream guardrail; 3 chisel marks. Elev. 763.00 feet.

7318-23 SW (1) - About 2 miles south of Lovilia near center of Section 23, at end of road going west off State Highway 5 at fence corner by a witness post, in a concrete post; a standard tablet stamped "EB NO.6 1924 Iowa." Elev 931.007 feet.

7318-27 NE (1) - 3 miles southwest of Lovilia, east of T-road south, on upstream end of metal culvert; chisel marks. Elev. 810.32 feet.

7318-27 NW (1) - About 2.5 miles southwest of Lovilia on county T19 bridge over Cedar Creek, on left upstream batter post, upstream rivet at guardrail height; chiseled cross. Elev. 760.85 feet.

7318-27 NW (2) - (REFERENCE POINT) - About 2.5 miles southwest of Lovilia on county T19 bridge over Cedar Creek, on left downstream guardrail near batter post; 3 saw marks. Elev. 760.88 feet.

7319-2 NW (1) - About 1 mile north and 6 miles west of Lovilia, Monroe County, 44 feet north and 30 feet east of intersection of county road H16 and north-south county road; a standard USGS tablet stamped "7 KEE 1979." Elev. 917.495 feet.

7319-4 NW (1) - About 7.5 miles northwest of Lovilia, Monroe County, at county road H-16 bridge over North Cedar Creek, on right downstream handrail post; 2 chisel marks. Elev. 773.51 feet.

7319-4 NW (2) - (REFERENCE POINT) - About 7.5 miles northwest of Lovilia, Monroe County, at county road H-16 bridge over North Cedar Creek, on center of downstream handrail; 3 file marks. Elev. 773.47 feet.

7319-4 SW (1) - About 8 miles northwest of Lovilia, Monroe County, at county road S-65 bridge over North Cedar Creek, on top of left downstream wingpost; chiseled square. Elev. 778.71 feet.

7319-4 SW (2) - (REFERENCE POINT) - About 8 miles northwest of Lovilia, Monroe County, at county road S-65 bridge over North Cedar Creek, on center of downstream handrail; 3 file marks. Elev. 779.38 feet.

7322-13 SE - About 2 miles northeast of Oakley, north of T-road south intersection, 37 feet east and 3 feet south of corner fence post, iron post with stamped disk; "BM 933." Elev. 933.20 feet.

7322-14 SE - About 1.5 miles northeast of Oakley, at county road bridge over small creek, on upper beam at right downstream side of truss bridge,; chiseled cross on rivet. Elev. 866.54 feet.

7322-14 SW (1) - About 1.5 miles north of Oakley, at county road bridge over White Breast Creek, on right downstream wingwall; chiseled square. Elev. 847.90 feet.

7322-14 SW (2) - (REFERENCE POINT) - About 1.5 miles north of Oakley, at county road bridge over White Breast Creek, on downstream handrail at 15th post from left; chiseled arrow. Elev. 849.42 feet.

7322-22 SW (1) - About 1 mile northwest of Oakley, at county road H20 bridge over White Breast Creek, on right upstream wingpost of bridge; chiseled square. Elev. 851.06 feet.

7322-23 W - About 0.7 miles north of Lacona, at northeast corner of T-road intersection with county road S23, in power pole 1 foot above ground on south side; PSC. Elev. 965.28 feet.

7322-32 SE (1) - About 4.5 miles northeast of Lucas, at county road bridge over White Breast Creek, at right upstream abutment, at handrail height; hex bolt head. Elev 865.83 feet.

7322-32 SE (2) - (REFERENCE POINT) - About 4.5 miles northeast of Lucas, at county road bridge over White Breast Creek, on downstream handrail post, 15th post from left; chiseled arrow. Elev. 865.11 feet.

7322-32 SW - About 4 miles northeast of Lucas, in southwest corner of T-road south intersection, in power pole 1 foot above ground in north side of pole, PSC. Elev. 951.29 feet.

7323-8 SW (1) - About 6 miles east of Liberty, at county road R73 bridge over Otter Creek, on top of downstream handrail post at left end of bridge; two chisel marks. Elev. 895.65 feet.

7323-8 SW (2) - (REFERENCE POINT) - About 6 miles east of Liberty, at county road R73 bridge over Otter Creek, on top of downstream handrail between 7th and 8th posts from left; chiseled arrow. Elev. 895.73 feet.

7323-17 NW - About 10 miles east of Jamison and 2 miles northwest of Norwood, at T-road south intersection, at southeast corner of intersection, in west side and 0.5 feet above ground in power pole; PSC. Elev. 989.19 feet.

7323-18 S - About 9 miles east of Jamison, near south one-sixteenth corner section 18, about 250 feet northeast of northeast corner of a farmhouse, 19 feet south and 21 feet west from point of intersection of curve in road, 24 feet south of T-fence west, in concrete post; standard tablet stamped "10 RDS 1950." Elev. 1,040.631 feet.

7324-1 SW (1) - About 4 miles east of Liberty, at county road R69 bridge over Otter Creek, on handrail post at right downstream end of bridge; two chisel marks. Elev. 907.66 feet.

7324-1 SW (2) - (REFERENCE POINT) - About 4 miles east of Liberty, at county road R69 bridge over Otter Creek, on downstream handrail at 8th post from left wingwall; chiseled arrow. Elev 907.48 feet.

7324-11 NE - About 4 miles east of Liberty, at a cemetery on east side of road, 2 power poles south of chapel at central entrance to cemetery, in west side of power pole 0.5 feet above ground; PSC. Elev. 1,029.69 feet.

7324-14 SE - About 4 miles west of Norwood, at site of abandoned school house, on northeast corner of concrete pump base; chiseled square. Elev. 1,030.91 feet.

7324-14 SE - About 4 miles west of Norwood, at T-road intersection west, in southwest corner of intersection, in power pole 1 foot above ground; PSC. Elev. 1,047.63 feet.

7324-15 SE - About 7 miles north of Woodburn, across from driveway to farm south, in power pole on north side of road, 1 foot above ground on south side pole; PSC. Elev. 1,034.73 feet.

7324-15 SW (1) - About 7 miles north of Woodburn, at county road H20 bridge over Otter Creek, on handrail at right downstream end of bridge; chiseled cross on bolt head. Elev. 924.86 feet.

7324-15 SW (2) - (REFERENCE POINT) - About 7 miles north of Woodburn, at county road H20 bridge over Otter Creek, on downstream handrail between 7th and 8th post from right; chiseled arrow. Elev. 924.96 feet.

7324-17 SE (1) - About 4 miles east of Jamison, at county road bridge over Otter Creek, on top of wingpost at right downstream end of bridge; chiseled square. Elev. 939.63 feet.

7324-17 SE (2) - (REFERENCE POINT) - About 4 miles east of Jamison, at county road bridge over Otter Creek, on downstream guardrail between 2nd and 3rd post from left; chiseled arrow. Elev. 939.59 feet.

7324-20 NE - About 7.5 miles north of Woodburn, at T-road south intersection, in southwest corner of intersection, in north side and 1 foot above ground of power pole; PSC. Elev. 1,046.22 feet.

7325-2 NE (1) - About 2 miles northwest of Liberty, at county road bridge over Squaw Creek, on top of left upstream pier; top of 1 inch anchor bolt. Elev. 916.71 feet.

7325-2 NE (2) - (REFERENCE POINT) - About 2 miles northwest of Liberty, at county road bridge over Squaw Creek, 4 feet left of 1st right downstream vertical support column, on downstream beam of dual interior batter post, at handrail height; chiseled arrow. Elev. 922.80 feet.

7325-2 NW - About 3 miles west and 1 mile north of Liberty, at north edge county, at T-road east intersection, in southeast corner of intersection, in north side power pole, 1 foot above ground; PSC. Elev. 972.91 feet.

7325-2 SW (1) - (REFERENCE POINT) - About 2 miles north of Jamison, at county road R51 bridge over Squaw Creek, on downstream handrail, to right of 9th guardrail post from left end bridge; chiseled arrow. Elev. 928.49 feet.

7325-3 SE (1) - About 2 miles north of Jamison, at county road R51 bridge over Squaw Creek, on top of upstream handrail post at right end bridge; two chisel marks. Elev. 928.44 feet.

7325-7 SE - About 6.5 miles west of Liberty, on an east-west gravel road, 247 feet east of intersection with county road R37, 32 feet north of center of road, in concrete post; standard tablet stamped "TT 35 MT." Elev. 1,097.964 feet.

7325-11 NW - About 1.4 miles north of Jamison, along county road R51, at a power pole on top of second rise south of Squaw Creek, 2nd power pole north of driveway west, on east side road, on west side of power pole, 1 foot above ground; PSC. Elev. 1,023.09 feet.

7325-11 SW - About 0.6 miles north of Jamison, at southwest corner of Section 11, on 3rd power pole north of intersection; PSC. Elev. 1,057.12 feet.

7325-15 SE - At northeast edge of Jamison, on east-west road, on bridge over a small creek, on top of pier, on top of left downstream round bolt; chiseled cross. Elev. 943.46 feet.

7325-15 NW (1) - (REFERENCE POINT) - About 0.6 miles northwest of Jamison, at county road bridge over Squaw Creek, on top of downstream handrail between 13th and 14th post from right; a chiseled arrow. Elev. 943.49 feet.

7325-15 SW - About 0.4 miles west and 0.2 miles north of Jamison, 2nd power pole south of T-road east, 1 foot above ground on south side of pole; PSC. Elev. 1,041.32 feet.

7325-16 SW (1) - (REFERENCE POINT) - About 1.5 miles west of Jamison, at county road R45 bridge over Squaw Creek, on top of downstream handrail between 8th and 9th guardrail post from right; a chiseled arrow. Elev 953.62 feet.

7325-16 S - About 1 mile west of Jamison, at county road, wooden bridge over small creek, on pile of SW wingpost; nail on disk. Elev. 947.25 feet.

7325-16 NE - About 0.6 miles northwest of Jamison, at county road bridge over Squaw Creek, on top of upstream handrail post at right end of bridge; two file marks. Elev. 944.59 feet.

7325-17 SE (1) - About 1.5 miles west of Jamison, at county road R45 over Squaw Creek, on top of upstream handrail post at right end of handrail; two file marks. Elev. 953.45 feet.

7325-19 SE (1) - About 3 miles west and 1.2 miles south of Jamison, at a partially abandoned farm, in a light pole between two grain silos, 1 foot above ground, on north side of pole; PSC. Elev. 982.47 feet.

7325-19 SE (2) - About 5 miles north of Osceola at I-35 bridge over Squaw Creek, in left upstream wingwall of upstream bridge; chiseled square. Elev. 964.47 feet.

7325-19 SE (3) - (REFERENCE POINT) - About 5 miles north of Osceola, at I-35 bridge over Squaw Creek, on upstream bridge, on top of downstream guardrail between 7th and 8th guardrail posts from right; chiseled arrow. Elev 967.49 feet.

7325-19 SE (4) - (REFERENCE POINT) - About 5 miles north of Osceola, at I-35 bridge over Squaw Creek, on downstream bridge, on downstream guardrail between 7th and 8th guardrail posts from right; chiseled arrow. Elev. 967.66 feet.

7325-20 SW (1) - About 2.5 miles southwest of Jamison, at a bridge over Squaw Creek on a north-south gravel road, on left downstream wingwall pile, at bolt with 2 nuts; top of nut. Elev. 953.70 feet.

7325-20 SW (2) - (REFERENCE POINT) - About 2.5 miles southwest of Jamison, at a bridge over Squaw Creek on a north-south gravel road, on downstream side bridge rail, between 7th and 8th guardrail post from right about 6 inches below road level; PSC. Elev. 957.99 feet.

7325-21 NW - About 1.4 miles west and 0.5 miles south of Jamison, 490 feet south of T-road east, 39 feet east of road, 1 foot west of fence, in a concrete post; standard tablet stamped "TT 6 MT 1950." Elev. 994.957 feet.

7418-2 NE (1) - 2 miles southwest of Tracy on county bridge over Cedar Creek, on left downstream wingpost; chiseled square. Elev. 713.44 feet.

7418-2 NE (2) - (REFERENCE POINT) - 2 miles southwest of Tracy on county bridge over Cedar Creek, in center of downstream guardrail; 3 saw marks. Elev 713.61 feet.

7418-9 SE (1) - About 2.5 miles northwest of Bussey, Marion County, 420 feet east of intersection of north-south county gravel road and State Highway 156, on north end of culvert; chiseled cross. Elev. 741.52 feet.

7418-11 SW (1) - About 1.5 miles northwest of Bussey at U.S. Geological Survey recording gage at State Highway 156 overhead steel truss bridge over Cedar Creek, on top of lower chord extension at right downstream end of truss, on downstream landward rivet; chiseled cross. Elev. 712.40 feet.

7418-16 NE (1) - About 2.5 miles northwest of Bussey, Marion County, at bridge over North Cedar Creek, on top of second handrail post from left downstream end; chiseled arrow. Elev. 715.14 feet.

7418-16 NE (2) - (REFERENCE POINT) - About 2.5 miles northwest of Bussey, Marion County, at bridge over North Cedar Creek, on top of downstream handrail about 50 feet from left end of bridge; 3 file marks. Elev. 715.33 feet.

7418-20 NE (1) - About 1.5 miles north of Marysville, Marion County, near T-intersection southwest of county graveled road and State Highway 5, 500 feet southeast of intersection at concrete culvert; chiseled square. Elev. 815.54 feet.

7418-20 NE (2) - About 1.5 miles north of Marysville, Marion County, at overhead steel truss bridge over North Cedar Creek on State Highway 5, on left upstream abutment; chiseled square. Elev. 723.88 feet.

7418-20 NE (3) - (REFERENCE POINT) - About 1.5 miles north of Marysville, Marion County, on State Highway 5 overhead steel truss bridge over North Cedar Creek, on top of downstream handrail near center of bridge; 3 file marks. Elev. 727.00 feet.

7418-28 NE (1) - About 1 mile northeast of Marysville, Marion County, at overhead steel truss bridge over Cedar Creek, on right upstream abutment at curb height; chiseled square. Elev. 722.94 feet.

7418-28 NE (2) - (REFERENCE POINT) - About 1 mile northeast of Marysville, Marion County, at overhead steel truss bridge over Cedar Creek, on center of downstream handrail; 3 file marks. Elev. 724.98 feet.

7418-29 SE (1) - At Marysville, Marion County, on bridge over Cedar Creek, on left downstream guardrail at abutment; chiseled square. Elev. 733.05 feet.

7418-29 SE (2) - (REFERENCE POINT) - At Marysville, Marion County, on bridge over Cedar Creek, on center of downstream guardrail; chiseled arrow. Elev. 733.61 feet.

7419-14 SW (1) - About 4 miles northwest of Marysville at cemetery along county road G76, 10 feet northeast of cemetery gate and 1 foot outside fence; a USGS NMD standard tablet stamped "8 KEE 1979." Elev. 916.478 feet.

7419-24 SE (1) - About 2 miles northwest of Marysville, Marion County, on bridge over North Cedar Creek, on right downstream batter post; chiseled cross on rivet at handrail height. Elev. 746.28 feet.

7419-24 SE (2) - (REFERENCE POINT) - About 2 miles northwest of Marysville, Marion County, on bridge over North Cedar Creek, 18 feet left of benchmark 7419-24 SE (1), on top of downstream handrail; 3 file marks. Elev. 745.83 feet.

7419-26 SW (1) - About 3 miles west of Marysville on county covered bridge over North Cedar Creek, on left downstream guardrail post; 2 chisel marks. Elev. 748.32 feet.

7419-26 SW (2) - (REFERENCE POINT) - About 3 miles west of Marysville on county covered bridge over North Cedar Creek, on right downstream guardrail where guardrail joins covered section of bridge; 3 file marks. Elev. 748.26 feet.

7419-27 SE (1) - About 4 miles west of Marysville, Marion County, at bridge over North Cedar Creek, on top of 4X4 wooden piling at left downstream corner of bridge; a copper nail and washer-USGS NMD benchmark. Elev. 748.78 feet.

7419-27 SE (2) - About 4 miles west of Marysville at bridge over North Cedar Creek, on top of downstream guardrail 0.7 feet from left abutment; 2 chisel marks. Elev. 752.24 feet.

7419-27 SE (3) - (REFERENCE POINT) - About 4 miles west of Marysville, Marion County, at bridge over North Cedar Creek, on center of downstream handrail; 3 file marks. Elev. 752.17 feet.

7421-2 NE - At north edge of Dallas, 0.7 miles north along railroad from station at Melcher, 110 feet north of wooden bridge over railroad tracks, 22 feet north of power pole, 30 feet east of center of Highway; tablet stamped "63-156." Elev. 944.417 feet.

7421-5 NE (1) - About 3 miles northwest of Dallas, at county road bridge over White Breast Creek, on top of left upstream abutment post; bronze tablet. Elev. 802.06 feet.

7421-5 NE (2) - (REFERENCE POINT) - About 3 miles northwest of Dallas, at county road bridge over White Breast Creek, on upstream handrail post, 18th post from left; chiseled arrow. Elev. 802.14 feet.

7421-8 SW (1) - About 3.5 miles west of Melcher, at county road bridge over White Breast Creek, on top of first guardrail post on right upstream side of bridge. Elev. 806.66.

7421-8 SW (2) - About 3.5 miles west of Melcher, at county road bridge over White Breast Creek, on right downstream caisson pier; chiseled cross on rivet in bridge seat. Elev. 802.48 feet.

7421-8 SW (3) - (REFERENCE POINT) - About 3.5 miles west of Melcher, at county road bridge over White Breast Creek, on top of downstream handrail at center of bridge; chiseled arrow. Elev. 806.72 feet.

7421.16 NW - About 2.5 miles west and 0.5 miles south of center of Melcher, on east side of T-road west, in northwest corner of farmfield; iron post stamped "Iowa 947, 1913." Elev. 946.66 feet.

7422-11 NE (1) - About 3.5 miles northeast of Lacona, about 0.35 west of northeast corner of section 11, at county road culvert over samll creek, 3.6 feet lower than road, on top center of south headwall of concrete culvert; 1 JLK 1977. Elev. 826.117 feet.

7422-22 SE (1) - About 1 mile east of Lacona, at county road bridge over White Breast Creek, on top of left downstream wingpost; IHC plug. Elev. 826.10 feet.

7422-22 SE (2) - (REFERENCE POINT) - About 1 mile east of Lacona, at county road bridge over White Breast Creek, on top of downstream handrail post, 16th post from left; chiseled arrow. Elev. 826.06 feet.

7422-24 NW (1) - About 2 miles northeast of Lacona, at county road G76 bridge over White Breast Creek, at left upstream batter post of truss, upstream rivet at handrail height; chiseled cross. Elev. 819.24 feet.

7422-24 NW (2) - (REFERENCE POINT) - About 2 miles northeast of Lacona, at county road G76 bridge over White Breast Creek, on downstream handrail left of center of bridge; chiseled arrow. Elev 819.46 feet.

7422-26 NW - About 1.5 miles east of Lacona, near center of section 26, 2nd power pole northwest of entrance to community park, in power pole 1 foot below road level on south side of pole, PSC. Elev. 972.25 feet.

7422-35 NE - About 2 miles southeast of Lacona, at intersection of southeast 92nd Avenue and southeast 89th Street, in power pole 1 foot above ground, PSC. Elev. 984.08 feet.

7422-35 SE (1) - About 2.5 miles southeast of Lacona, at south county line bridge over White Breast Creek, on left upstream end of bridge, at handrail height; chiseled cross on rivet. Elev. 829.84 feet.

7422-35 SE (2) - (REFERENCE POINT) - About 2.5 miles southeast of Lacona, at south county line bridge over White Breast Creek, on downstream handrail, 3.5 posts from left; chiseled arrow. Elev. 829.80 feet.

7422-36 SW - About 2.5 miles southeast of Lacona, at spillway of pond on dirt path between fields separated by a small stream, at left upstream edge of spillway; chiseled square. Elev. 824.20 feet.

7423-15 SW - In Liberty Center, at north edge of town, on US Highway 65 near Iowa State Highway Commission Maintenance Shed, 44 feet south of power pole at southwest corner of Maintenance Yard, standard USC & GS disk stamped "Reference Mark #2, 1928." Elev. 1,023.264 feet.

7423-17 SW (1) - About 1.5 miles northwest of Liberty, at west-south bend in road, 2 power poles west of house; PSC. Elev. 897.31 feet.

7423-17 SW (2) - About 2 miles northwest of Liberty, at county road bridge over Otter Creek, on top of right upstream wingpost; chiseled square. Elev. 861.35 feet.

7423-17 SW (3) - (REFERENCE POINT) - About 2 miles northwest of Liberty, at county road bridge over Otter Creek, on downstream cement curb, 0.5 feet left of 14th post from right; chiseled arrow. Elev. 859.58 feet.

7423-19 SE (1) - About 2 miles southwest of Liberty Center, at county road G76 bridge over Otter Creek, on downstream handrail at right end bridge; chiseled cross on bolt. Elev. 870.06 feet.

7423-19 SE (2) - (REFERENCE POINT) - About 2 miles southwest of Liberty Center, at county road G76 bridge over Otter Creek, on downstream handrail between 13th and 14th post from right; chiseled arrow. Elev. 872.24 feet.

7423-21 NW - About 0.5 miles west of Liberty, near quarter corner sections 16 and 21, at cemetery on south side road, in northwest corner of east concrete and brick gate post at west entrance to cemetery; chiseled square. Elev. 996.22 feet.

7423-30 NE - About 2.5 miles southwest of Liberty Center at county road R73 bridge over small creek, on downstream guardrail at left end bridge; chiseled cross on rivethead. Elev. 871.09 feet.

7423-31 NE - About 2.5 miles southwest of Liberty Center, at county road culvert over small stream, in northwest corner of concrete culvert; chiseled square. Elev. 868.39 feet.

7423-32 SW (1) - About 3.5 miles southwest of Liberty Center, at south county line road bridge over Otter Creek, on downstream batter post at left end of bridge truss, at handrail height; chiseled cross on rivet. Elev. 878.39 feet.

7423-32 SW (2) - (REFERENCE POINT) - About 3.5 miles southwest of Liberty Center, at south county line bridge over Otter Creek, on central downstream lower tension beam, 1 foot from right end; chiseled arrow. Elev. 874.43 feet.

7424-4 SE (1) - (REFERENCE POINT) - About 6 miles northeast of New Virginia, at county road G64 bridge over Squaw Creek, on downstream handrail at 12th post from right; two chisel marks. Elev. 868.82 feet.

7424-9 NW - About 6 miles northeast of New Virginia, at T-road north intersection, in northwest corner of intersection, in a power pole; PSC. Elev. 919.47 feet.

7424-9 NE (1) - About 6 miles northeast of New Virginia, at county road G64 bridge over Squaw Creek, on left upstream end of bridge truss, at handrail height; chiseled cross on rivet. Elev. 868.89 feet.

7424-10 SW - About 2.5 miles north of Medora, about 1.3 miles west of Highway 69, on south side of county road, in power pole 1 foot above ground; PSC. Elev. 985.22 feet.

7424-15 NW (1) - About 2 miles northwest of Medora, at county road bridge over Squaw Creek, on left downstream end of bridge truss, at handrail height; chiseled cross on rivet. Elev 874.90 feet.

7424-15 NW (2) - (REFERENCE POINT) - About 2 miles northwest of Medora, at county road bridge over Squaw Creek, on downstream side of bridge, on metal support between bridge truss and 1st batter post from left, at road level; chiseled arrow. Elev. 871.17 feet.

7424-22 W - About 1 mile northwest of Medora, at county T-road north, southwest 78th Avenue and southwest 25th Street, south of intersection, in power pole; PSC. Elev. 958.29 feet.

7424-27 NW (1) - About 0.5 miles west of Medora, at county road G76 bridge over Squaw Creek, top of left upstream pier; chiseled cross on bolt head. Elev. 886.57 feet.

7424-27 NW (2) - (REFERENCE POINT) - About 0.5 miles west of Medora, at county road G76 bridge over Squaw Creek, on downstream handrail, 2 feet left of 1st vertical truss member from right; chiseled arrow. Elev. 890.28 feet.

7424-29 SE - About 2 miles west of Medora, near center of section 29, 2nd power pole south of farm entrance at top of hill, in north side of power pole, 6 inches above ground; PSC. Elev. 994.84 feet.

7424-32 NE (1) - About 3 miles southwest of Medora, at county road bridge over Squaw Creek, at left downstream end of bridge truss, at handrail height; chiseled cross on rivet. Elev. 899.14 feet.

7424-32 NE (2) - (REFERENCE POINT) - About 3 miles southwest of Medora, at county road bridge over Squaw Creek, on downstream diagonal support, 32 feet from left end bridge, on support I-beam, 10 inches below handrail height; chiseled arrow. Elev. 897.69 feet.

7425-1 SW (1) - (REFERENCE POINT) - About 4.5 miles northeast of New Virginia, at county road bridge over South River, on downstream handrail, at 12th handrail post from right; two chisel marks. Elev. 895.01 feet.

7425-2 SE (1) - About 4.5 miles northeast of New Virginia, at county road bridge over South River, at right upstream end of bridge, on top of bolt head; chiseled cross. Elev. 895.09 feet.

7425-9 SE (1) - About 2.5 miles south of New Virginia, at county road G64 bridge over South River, on top of downstream handrail post at left end of handrail; chiseled cross. Elev. 916.95 feet.

7425-9 SE (2) - (REFERENCE POINT) - About 2.5 miles south of New Virginia, at county road G64 bridge over South River, on downstream handrail between 11th and 12th handrail post from left end; chiseled arrow. Elev. 917.09 feet.

7425-10 NW (1) - About 3 miles north of New Virginia, at county road R45 bridge over South River, on left upstream handrail post; two chisel marks. Elev. 908.01 feet.

7425-10 NW (2) - (REFERENCE POINT) - About 3 miles north of New Virginia, at county road R45 bridge over South River, on downstream handrail, at 16th handrail post from right end; two chisel marks. Elev. 908.13 feet.

7425-12 NW - About 4 miles northeast of New Virginia, at T-road east intersection, in power pole north of intersection, 1 foot above ground; PSC. Elev. 912.60 feet.

7425-14 NE - About 3 miles northeast of New Virginia, at southwest corner of T-road south, in power pole 1 foot above ground; PSC. Elev. 1,046.53 feet.

7425-14 NW - About 2.5 miles northeast of New Virginia, at small tributary bridge on county road, on bridge plank at left downstream end of bridge; PSC. Elev. 914.11 feet.

7425-15 NW - About 2 miles north of New Virginia, at culvert at intersection of county roads R45 and G64, in culvert at southwest corner of intersection; PSC. Elev. 1,026.91 feet.

7425-17 NE - About 2.5 miles northwest of New Virginia, in power pole southeast of intersection of farm drive and county road G45; PSC. Elev. 951.84 feet.

7425-17 NW - About 3 miles northwest of New Virginia, at intersection of county roads in northwest corner of section 17, in power pole 1 foot above ground; PSC. Elev. 1,019.56 feet.

7425-17 SW (1) - About 3 miles northwest of New Virginia, at county road bridge over South River, on top of right upstream caisson pier; chiseled cross on bolt. Elev. 917.32 feet.

7425-17 SW (2) - (REFERENCE POINT) - About 3 miles northwest of New Virginia, at county road bridge over South River, on downstream handrail, at 1st handrail post from left abutment; two chisel marks. Elev. 917.83 feet.

7425-18 SE (1) - About 3 miles northwest of New Virginia at T-road west at quarter corners of section 18, in power pole 1 foot above ground; PSC. Elev. 916.00 feet.

7425-18 SE (2) - About 3 miles northwest of New Virginia, on dead-end county T-road west in the center of section 18, on 1st power pole east of buildings; PSC. Elev. 941.41 feet.

7425-19 NW (1) - About 3 miles northwest of New Virginia, at Interstate 35 bridge over South River, on downstream bridge, on 1st downstream handrail post from left downstream end of bridge; chiseled cross. Elev. 936.85 feet.

7425-19 NW (2) - (REFERENCE POINT) - About 3 miles northwest of New Virginia, at Interstate 35 bridge over South River, on downstream bridge, on downstream handrail, on 14th handrail post from left; two chisel marks. Elev. 936.95 feet.

7517-31 NE (1) - 2 miles southeast of Tracy on county bridge over Cedar Creek, on right downstream guardrail post; 3 chisel marks. Elev. 699.3 feet.

7517-31 NE (2) - (REFERENCE POINT) - 2 miles southeast of Tracy on county bridge over Cedar Creek, in center of bridge on downstream guardrail; 3 file marks. Elev. 697.3 feet.

7517-32 SW (1) - 2.5 miles southeast of Tracy, 31 feet north and 2 feet east of T-intersection south, in a concrete post; standard tablet stamped "EB No. 9 1924 Iowa." Elev. 817.0 feet.

7518-25 NW (1) - About 0.5 miles southwest of Tracy, Marion County, on county G62 bridge over Walnut Creek, on right upstream end of wheel guard; chiseled square. Elev. 703.61 feet.

7518-36 SW (1) - About 1.5 miles south of Tracy on railroad bridge over Cedar Creek, on right upstream abutment; bolt head (painted red). Elev. 716.62 feet.

7518-36 SW (2) - About 1.5 miles south of Tracy on railroad bridge over Cedar Creek, on right upstream pile cap; bolt head (painted red). Elev. 714.92 feet.

7521-26 SE (1) - About 2 miles north of Dallas, at Highway 181 bridge over White Breast Creek, on top of right upstream wingpost; IHC plug. Elev. 790.36 feet.

7521-26 SE (2) - (REFERENCE POINT) - About 2 miles north of Dallas, at Highway 181 bridge over White Breast Creek, on downstream handrail at 12th post from right; chiseled arrow. Elev. 790.28 feet.

7521-32 SE - About 1.5 miles north and 2.5 miles west of Melcher, 47 feet north and 30.5 feet west of county road intersection, 10 feet north and 1 foot east of fence corner; standard tablet set in concrete post and stamped "2 JLK 1977." Elev. 788.326 feet.

7523-4 NW (1) - (REFERENCE POINT) - About 3.5 miles southwest of Ackworth, at county road bridge over South River, on 11th handrail post from right downstream end; chiseled arrow. Elev. 815.50 feet.

7523-5 NE - About 3.5 miles southwest of Ackworth, at county road bridge over South River, on left upstream bridge truss, at handrail height; chiseled cross. Elev 815.57 feet.

7523-5 NW (1) - About 1 mile south of Indianola, at county road bridge over South River, 1 mile east of Highway 65, top of downstream handrail post, 1st post from left end; two chisel marks. Elev. 819.83 feet.

7523-5 NW (2) - (REFERENCE POINT) - About 1 mile south of Indianola, at county road bridge over South River, 1 mile east of Highway 65, on top of downstream handrail post, 18th post from left end; chiseled arrow. Elev. 820.04 feet.

7523-6 SE (1) - About 2.5 miles southeast of Indianola, on county T-road west about 1 mile east of Highway 65, on 2nd power pole west of intersection, 1 foot above ground; PSC. Elev. 895.16 feet.

7523-6 SW - About 2 miles south of Indianola, on T-road east, about 0.25 miles east of Highway 65, in power pole brace post, 1 foot above ground; PSC. Elev. 816.83 feet.

7523-6 NW (1) - (REFERENCE POINT) - About 2 miles south of Indianola, at Highway 65 bridge over South River, on top of downstream handrail post, 13th post from right; two chisel marks. Elev. 825.74 feet.

7523-9 NE (1) - About 3.5 miles northwest of Milo, at county road bridge over Otter Creek, on top of left upstream wingpost; a chiseled square. Elev. 868.57 feet.

7523-9 NE (2) - About 4 miles northwest of Milo, 0.5 miles north of Otter Creek bridge, in power pole 30 feet southwest of large grain bin, set at ground level; PSC. Elev. 868.57 feet.

7523-9 NE (3) - (REFERENCE POINT) - About 3.5 miles northwest of Milo, at county road bridge over Otter Creek, on top of 16th handrail post from right upstream end; two chisel marks. Elev. 817.95 feet.

7523-10 NE - About 2.5 miles northwest of Milo, at T-road west intersection, 54 feet south and 43 feet east of intersection, 14 feet south of a power pole and 9 feet west of a fence, 7.6 feet west of a metal witness post, level with T-road west; a standard tablet stamped "28 JHB 1964," set in top of a concrete post. Elev. 958.927 feet.

7523-22 NE (1) - About 2.5 miles west of Milo, at State Highway 205 bridge over Otter Creek, on top of left downstream wingpost; a chiseled cross. Elev. 831.73 feet.

7523-22 NE (2) - (REFERENCE POINT) - About 2.5 miles west of Milo, at State Highway 205 bridge over Otter Creek, on downstream handrail 73 feet left of R abutment and near 10th vertical truss member from right; chiseled square and notch. Elev. 831.86 feet.

7523-22 SE (1) - About 2 miles west of Milo, about 0.2 miles east of Otter Creek bridge, at cattle underpass under State Highway 205, at right downstream corner; a chiseled square. Elev. 845.26 feet.

7523-23 SW - About 1.8 miles west of Milo, at intersection of State Highway 205 and southeast 35th Street, 147 feet south and 37 feet west of intersection, 6 feet north and 2 feet west of fence corner, 3.4 feet north of metal witness post, 11.2 feet lower than crossroad; a standard tablet stamped "29 JHB 1964" and set flush with ground. Elev. 890.740 feet.

7523-28 SW - About 4.5 miles southwest of Milo, at T-road east intersection, in power pole in northeast corner of intersection, 1 foot above ground; PSC. Elev. 966.51 feet.

7523-31 NE - About 5 miles northwest of Liberty, 44 feet south of center of road, 43 feet west of oak tree at northeast corner of schoolyard, 40 feet west of extended tangent of T-road north, in concrete post; standard tablet stamped "TT 3 MT 1950." Elev. 948.462 feet.

7523-32 NE - About 4.5 miles southwest of Milo, at county road bridge over Otter Creek, on left upstream batter post, at handrail height; chiseled cross on rivet. Elev. 837.65 feet.

7523-33 NW (1) - (REFERENCE POINT) - About 4.5 miles southwest of Milo, at county road bridge over Otter Creek, 36 feet left from right downstream batter post, 4 feet below handrail height; two chisel marks on large nut. Elev. 833.75 feet.

7523-34 NW (1) - About 4 miles north of Liberty, at U.S. Highway 65 bridge over Otter Creek, on top of left downstream wingpost; Department of Transportation plug. Elev. 842.03 feet.

7523-34 NW (2) - (REFERENCE POINT) - About 4 miles north of Liberty, at U.S. Highway 65 bridge over Otter Creek, on downstream handrail, 6 inches left of 13th handrail post from left abutment; two chisel marks. Elev. 842.37 feet.

7524-1 NE (1) - About 2 miles south of Indianola, at U.S. Highway 65 bridge over South River, on curb at left upstream side bridge; Department of Transportation plug. Elev. 824.09 feet.

7524-2 NE (1) - About 2 miles south of Indianola, at county road bridge over South River, 1 mile west of U.S. Highway 65, at left downstream end of truss; chiseled cross on rivet. Elev. 825.90 feet.

7524-2 NE (2) - (REFERENCE POINT) - About 2 miles south of Indianola, at county road bridge over South River, 1 mile west of U.S. Highway 65, on top of downstream handrail at 14th post from left end; two chisel marks. Elev. 829.37 feet.

7524-3 NW - About 4 miles southwest of Indianola, at county road bridge over South River, on bridge seat on left upstream pier; chiseled cross. Elev. 830.29 feet.

7524-3 NE - (REFERENCE POINT) - About 4 miles southwest of Indianola, at county road bridge over South River, on downstream side of bridge at 3rd handrail post from right; chiseled square. Elev. 836.26 feet.

7524-5 SE (1) - About 5 miles southwest of Indianola, at county road R57 bridge over South River, at left upstream truss base; chiseled cross on rivet. Elev. 845.72 feet.

7524-5 SE (2) - (REFERENCE POINT) - About 5 miles southwest of Indianola, at county road R57 bridge over South River, at downstream side of bridge, at 13th handrail post from right; chiseled square. Elev. 849.20 feet.

7524-7 NE - About 6 miles southwest of Indianola, at third power pole west of T-road west, on county road G50 in power pole, 1 foot above ground; PSC. Elev. 861.46 feet.

7524-8 SE - About 5 miles southwest of Indianola, about 0.1 miles west of T-road south, in power pole, 1 foot above ground; PSC. Elev. 896.50 feet.

7524-8 NW - About 5 miles southwest of Indianola, about 0.4 miles south of bridge over South River, in power pole, 1 foot above ground; PSC. Elev. 953.58 feet.

7524-9 SE - About 4.5 miles southwest of Indianola, 77 feet from center of intersection of county roads, in power pole, 1 foot above ground; PSC. Elev. 919.78 feet.

7524-9 NE - About 4 miles southwest of Indianola, along county road about 0.9 miles south of bridge over South River, in power pole, 1 foot above ground; PSC. Elev. 891.64 feet.

7524-10 SE (1) - (REFERENCE POINT) - About 4 miles southwest of Indianola, at county road bridge over Squaw Creek, on top of downstream handrail, between 5th and 6th handrail posts from left; two chisel marks. Elev. 837.19 feet.

7524-10 SE (2) - About 4 miles southwest of Indianola, at county road bridge over Squaw Creek, at left downstream end of truss; chiseled cross on rivet. Elev. 834.05 feet.

7524-11 NE - About 3 miles southwest of Indianola, along county gravel road, 50 yards from crest of hill, in power pole, 1 foot above ground; PSC. Elev. 917.63 feet.

7524-14 NE - About 4 miles southwest of Indianola, 50 yards northeast from intersection of county roads, in power pole, 1 foot above ground; PSC. Elev. 964.72 feet.

7524-15 SE (1) - About 5 miles southwest of Indianola, at county road bridge over Squaw Creek, on seat of left downstream end of truss; chiseled cross on bolt head. Elev. 840.96 feet.

7524-15 SE (2) - (REFERENCE POINT) - About 5 miles southwest of Indianola, at county road bridge over Squaw Creek, on downstream handrail post, 3rd post from left end, on angle iron; two chisel marks. Elev. 844.66 feet.

7524-22 NW - About 5 miles southwest of Indianola, at southeast corner of county road intersection, in power pole, 1 foot above ground; PSC. Elev. 907.39 feet.

7524-31 SE - About 6 miles northeast of New Virginia, in northwest corner of county road intersection, in power pole, 1 foot above ground; PSC. Elev. 985.47 feet.

7524-33 NE - About 5 miles north of Medora, at Hewitt Cemetery, near north sixteenth corner sections 33 and 34, 48 feet north and 32 feet east from point of intersection of curve in road, 15 feet north of entrance to cemetery, 2 feet west of woven wire fence, in concrete post; standard table stamped "3 RDS 1950." Elev. 973.504 feet.

7524-33 SW - About 7 miles northeast of New Virginia, at T-road west intersection, in power pole east of intersection; PSC. Elev. 1,003.96 feet.

7525-12 NE (1) - About 3 miles east of St. Marys, at county road G50 bridge over South River, on left downstream end of bridge truss, at handrail height; chiseled cross. Elev. 857.49 feet.

7525-12 NE (2) - (REFERENCE POINT) - About 3 miles east of St. Marys, at county road G50 bridge over South River, on downstream handrail at 12th post from left; chiseled square. Elev. 857.42 feet.

7525-36 SE (1) - (REFERENCE POINT) - About 5 miles northeast of New Virginia, at county road bridge over South River, on top of 15th downstream handrail post from left; chiseled arrow. Elev. 886.31 feet.

7525-36 SE (2) - About 5 miles northeast of New Virginia, at county road bridge over South River, on top of handrail post at left downstream end of bridge; two chisel marks. Elev. 886.31 feet.

7623-27 SE - About 1 mile southwest of Ackworth, at south to east curve in road 50 feet northwest from curve, in power pole, 1 foot above ground; PSC. Elev. 904.53 feet.

7623-27 SW - About 2 miles southwest of Ackworth, at T-road north intersection at southwest corner of section 27, 55 feet from center of road, 1 foot above ground, in power pole; PSC. Elev. 834.20 feet.

7623-28 SW - About 2.5 miles southwest of Ackworth, at crossroads at southwest corner of section 28, 53 feet northeast from center of intersection, in power pole, 1 foot above ground; PSC. Elev. 890.25 feet.

7623-30 SE - About 1 mile east and 0.5 miles south of intersection of Highways 65 and 92 in Indianola, 33 feet northwest from center of intersection crossroads, in power pole, 1 foot above ground; PSC. Elev. 944.23 feet.

7623-34 SE (1) - About 2 miles south of Ackworth, at county road bridge over South River, on right downstream pier; chiseled cross on head of bolt. Elev. 800.22 feet.

7623-34 SE (2) - (REFERENCE POINT) - About 2 miles south of Ackworth, at county road bridge over South River, on downstream handrail, 19 feet left of right pier; chiseled arrow. Elev. 806.38 feet.

7623-35 NE (1) - About 1.5 miles southeast of Ackworth, at county road bridge over South River on 1st handrail post from left downstream end; two chisel marks. Elev. 805.10 feet.

7623-35 NE (2) - (REFERENCE POINT) - About 1.5 miles southeast of Ackworth, at county road bridge over South River, on downsteam side bridge, on 20th handrail post from left; chiseled arrow. Elev. 806.69 feet.