

FLOODS IN THE RACCOON RIVER BASIN, IOWA

U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS

OPEN-FILE REPORT 80-162

Prepared in cooperation with

Highway Research Board
Highway Division
Iowa Department of Transportation





UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
PLANNING BRANCH
IOWA CITY, IA 52244

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By Albert J. Heinitz

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UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

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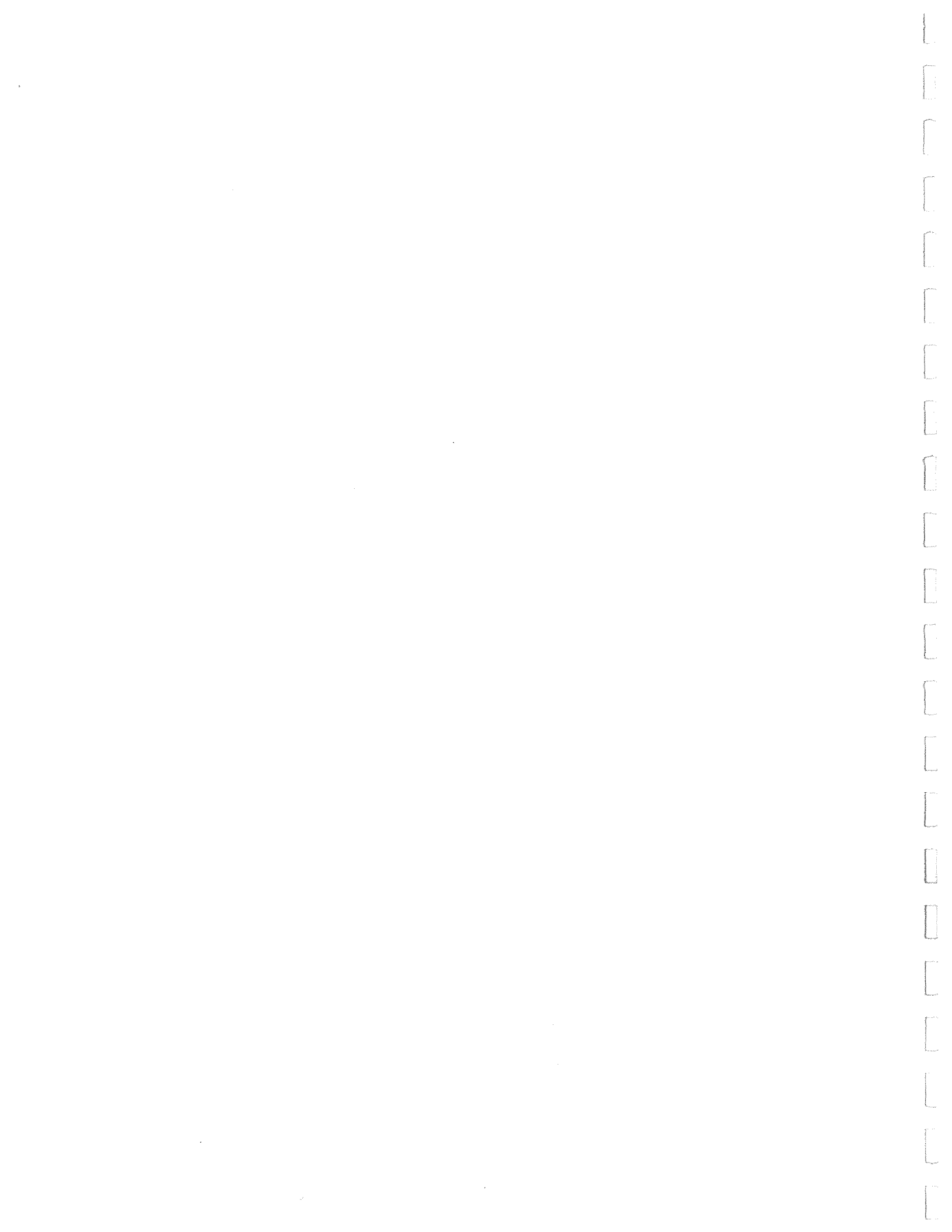
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FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

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)



FLOODS IN THE RACCOON RIVER BASIN, IOWA

by

Albert J. Heinitz

INTRODUCTION

Purpose and Scope

Evaluation of flood hazards, and the planning, design, and operation of various facilities on flood plains requires information on floods. This report provides information on flood stages and discharges, flood magnitude and frequency, bench mark data, and flood profiles for the Raccoon River and some of its tributaries. It covers the Raccoon River, the North Raccoon River to the northern boundary of Sac County and the lower reaches of the Middle and South Raccoon Rivers.

Acknowledgments

This report is the ninth 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.

The Raccoon River basin is in west-central Iowa (fig. 1). It covers 3,629 square miles and includes parts of 14 counties. The North Raccoon River flows in a southeasterly direction for almost the length of the basin. It drains about two-thirds of the Raccoon River basin before converging with the Raccoon River. The Raccoon River flows into the Des Moines River in the city of Des Moines. The Middle and South Raccoon Rivers drain nearly one-third of the basin and also join the Raccoon River near the downstream end of the basin.

The Middle Raccoon River marks the southern boundary of the advance of the Wisconsin glacier which was the last period of glaciation in Iowa, ending about 14,000 years ago (Ruhe, 1969). This relatively recent glaciated area has a youthful topography with an incompletely developed drainage system. In the small area of the basin south of the Middle Raccoon River, the topography is well developed, the streams are much more mature, and the uplands are well drained. Land use in the basin is predominantly agricultural.

Normal annual precipitation (1941-70) varies from 28.5 inches in the headwaters to 32 inches in the lower basin. Average annual runoff varies similarly from about 4 to 5 inches.

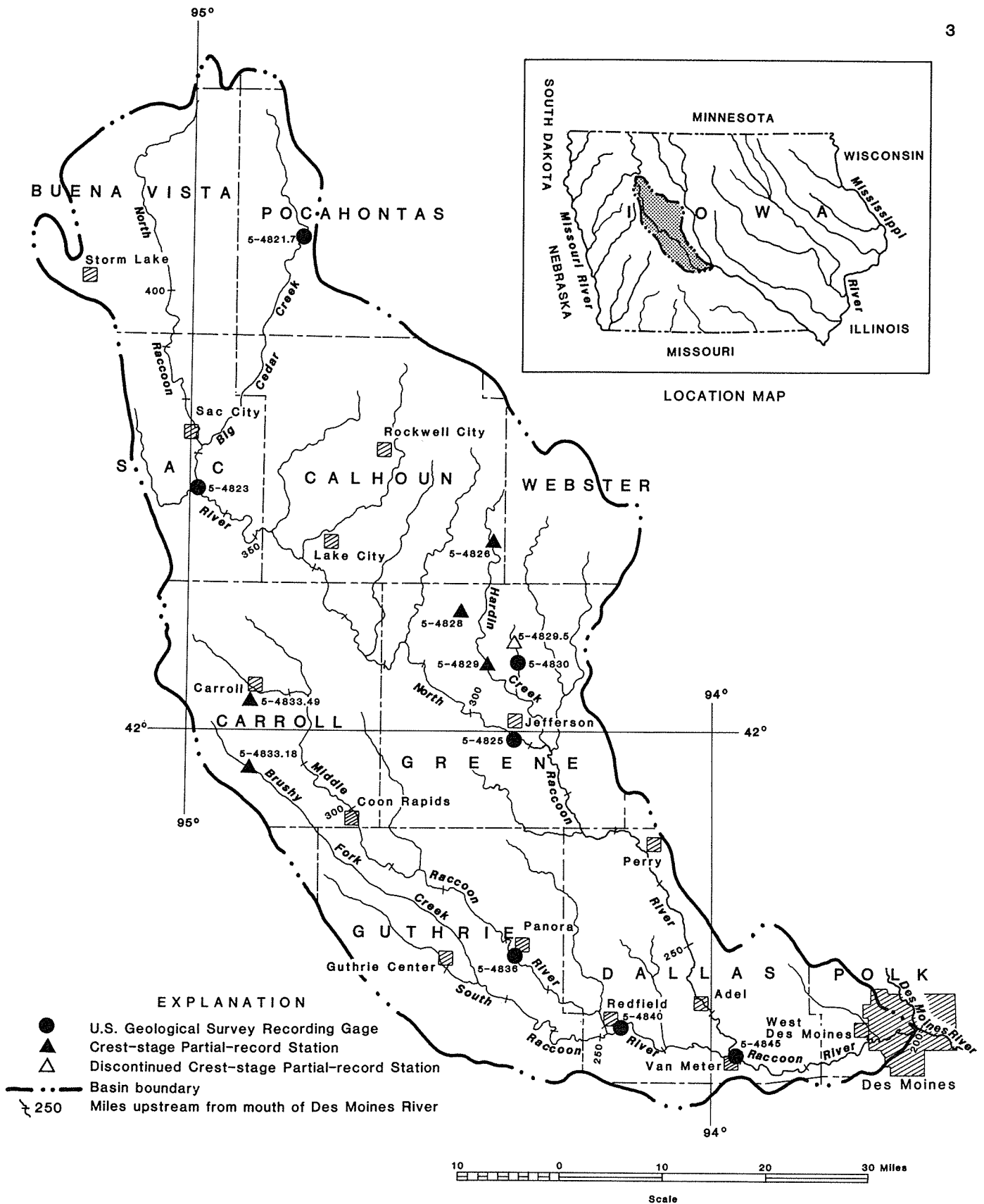


Figure 1. Raccoon River basin.

Recorded flood peaks in the Raccoon River basin began in 1915 when a stream-gaging station was established at Van Meter. A list of the gaging stations in the basin 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 three of the gaging stations in the Raccoon River basin are shown in figure 2. These graphs depict the years in which the greater floods occurred in the basin. Among these are the outstanding flood of 1958 on the South Raccoon River and the basinwide flood of 1947 which produced the greatest recorded floods on the North Raccoon and the Raccoon Rivers.

The greatest flood in nearly the last two decades over much of basin occurred in 1979. A complete list of flood peaks for each station is included in the section on Gaging Station Records.

A flood plain information report by the U.S. Army Corps of Engineers (1970) gives detailed information and pictures of floods prior to 1970 in the Sac City area. Detailed information on Raccoon River flooding in the cities of West Des Moines and Des Moines is given in the U.S. Department of Housing and Urban Development (1979, 1980) Flood Insurance Studies.

Table 1.--Maximum flood peaks at gaging stations in the Raccoon River basin, Iowa

Station number	Gaging station	Period of flood record	Drainage area (mi ²)	Maximum flood			
				Date	Gage height (ft)	Dis-charge (ft ³ /s)	Recur-ence inter-val (yrs)
05482170	Big Cedar Cr. nr Varina	1960-79	80.0	8/31/62	13.68	2,080	13
05482300	North Raccoon R. nr Sac City	1954, 1959-79	713	3/23/79	17.96	12,800	55
05482500	North Raccoon R. nr Jefferson	1940-79	1,619	6/23/47	22.3	29,100	*
05482600	Hardin Cr. at Farnhamville	1952-79	43.7	8/26/54	10.48	2,000	45
05482800	Happy Run at Churdan	1951-79	7.58	3/25/62	8.57	150	2
05482900	Hardin Cr. nr Farlin	1951-79	101	3/29/51	12.97	2,270	11
05482950	East Fork Hardin Cr. nr Paton	1952-55	7.57	3/24/53	7.77	68	1
05483000	East Fork Hardin Cr. nr Churdan	1952-79	24.0	5/5/60	8.92	413	2
05483318	Brushy Fork Cr. nr Templeton	1966-79	45.0	6/23/74	90.96	+	-
05483349	Middle Raccoon R. trib. at Carroll	1966-79	6.58	5/23/76	91.06	680	50
05483600	Middle Raccoon R. at Panora	1953, 1958-79	440	5/19/74	14.80	14,000	17
05484000	South Raccoon R. at Redfield	1940-79	988	7/2/58	29.04	35,000	*
05484500	Raccoon R. at Van Meter	1915-79	3,441	6/13/47	21.37	41,200	50

* Greater than the 100-year flood discharge

+ Discharge not determined

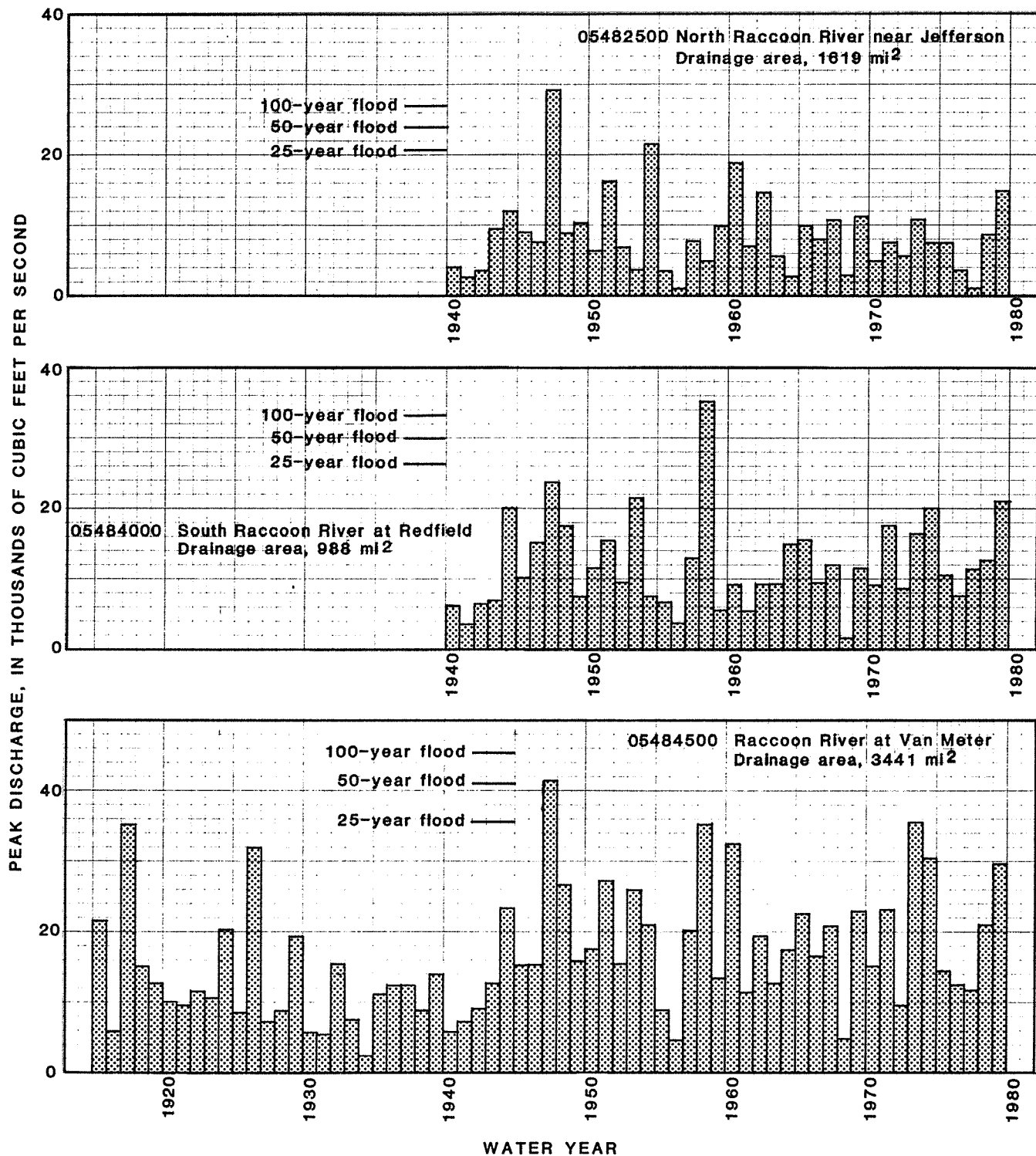


Figure 2. Annual peak discharges for period of record for selected gaging stations in the Raccoon River basin.

Gaging-station records are the primary means 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. The gaging stations in the Raccoon basin are identified in figure 1 and table 1. Discharge records for these stations are published in the annual streamflow reports of the U.S. Geological Survey (See References). The data on flood-peak stages and discharges from these records have been compiled by Lara (1976); they have been updated and are published in the section on Gaging-Station Records.

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 Raccoon River basin are shown in figure 3. 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 the section on Temporary Bench Marks.

ELEVATION, IN FEET, ABOVE NATIONAL GEODETIC VERTICAL DATUM OF 1929

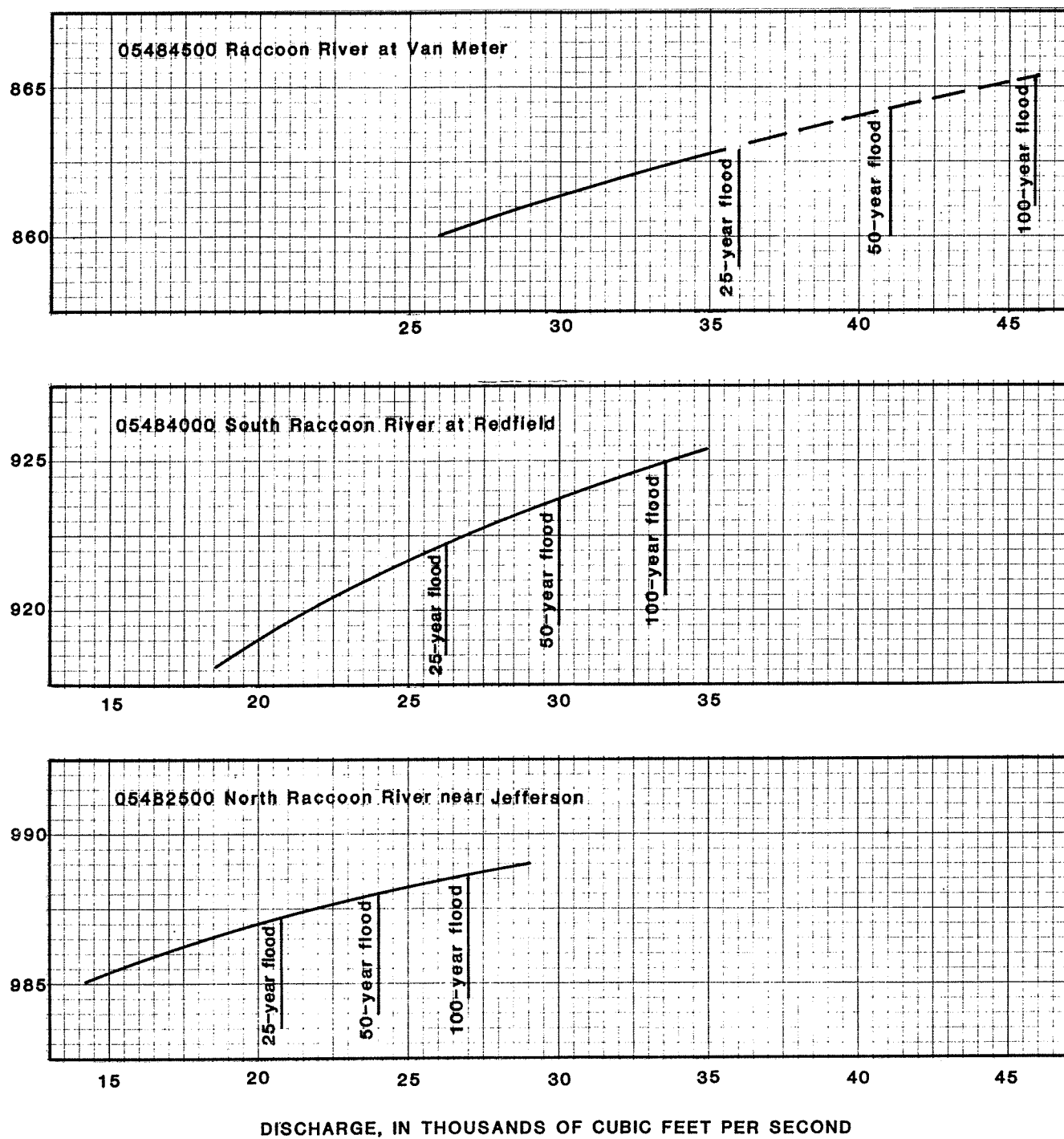


Figure 3. Stage-discharge relationships at selected gaging stations in the Raccoon River basin.

The physiographic differences between parts of the basins are factors contributing to the complexity of flood magnitude-frequency relations in the Raccoon Basin. A single simple relationship does not apply for the entire basin.

The flood discharges listed in table 2 for the complete-record gaging stations in the Raccoon River basin were computed using methods outlined in studies by Lara (1973) and the U.S. Water Resources Council (1977). The Middle Raccoon River is the approximate dividing line between two regions having sharply different flood characteristics. The relationships of the 100-year flood magnitude and drainage area for main stem streams in the Raccoon River basin are shown in figure 4.

Table 2.--Discharge and frequency of flood flows for complete-record gaging stations in the Raccoon River basin

Station number	Station name	Method *	Discharge, in cubic feet per second, for indicated recurrence interval, in years					
			2	5	10	25	50	100
05482170	Big Cedar Cr. nr Varina	A	796	1,430	1,920	2,520	3,010	3,530
05482300	North Raccoon R. nr Sac City	A	3,460	6,120	8,150	10,500	12,400	14,400
05482500	North Raccoon R. nr Jefferson	B	7,340	12,700	16,300	20,800	24,000	27,000
05483000	East Fork Hardin Cr. nr Churdan	A	354	639	866	1,150	1,380	1,630
05483600	Middle Raccon R. at Panora	C	6,300	9,800	12,200	15,200	17,500	20,000
05484000	South Raccoon R. nr Redfield	B	10,600	16,900	21,100	26,300	30,000	33,600
05484500	Raccoon R. At Van Meter	B	14,400	23,100	28,900	35,900	41,000	45,800

*Method used:

- A - Region II (Lara, 1973, p. 14.)
- B - Bulletin 17A (U.S. Water Resources Council, 1977)
- C - Region I, model 2 and Region II, proration by drainage area (Lara, 1973, p. 13, 14)

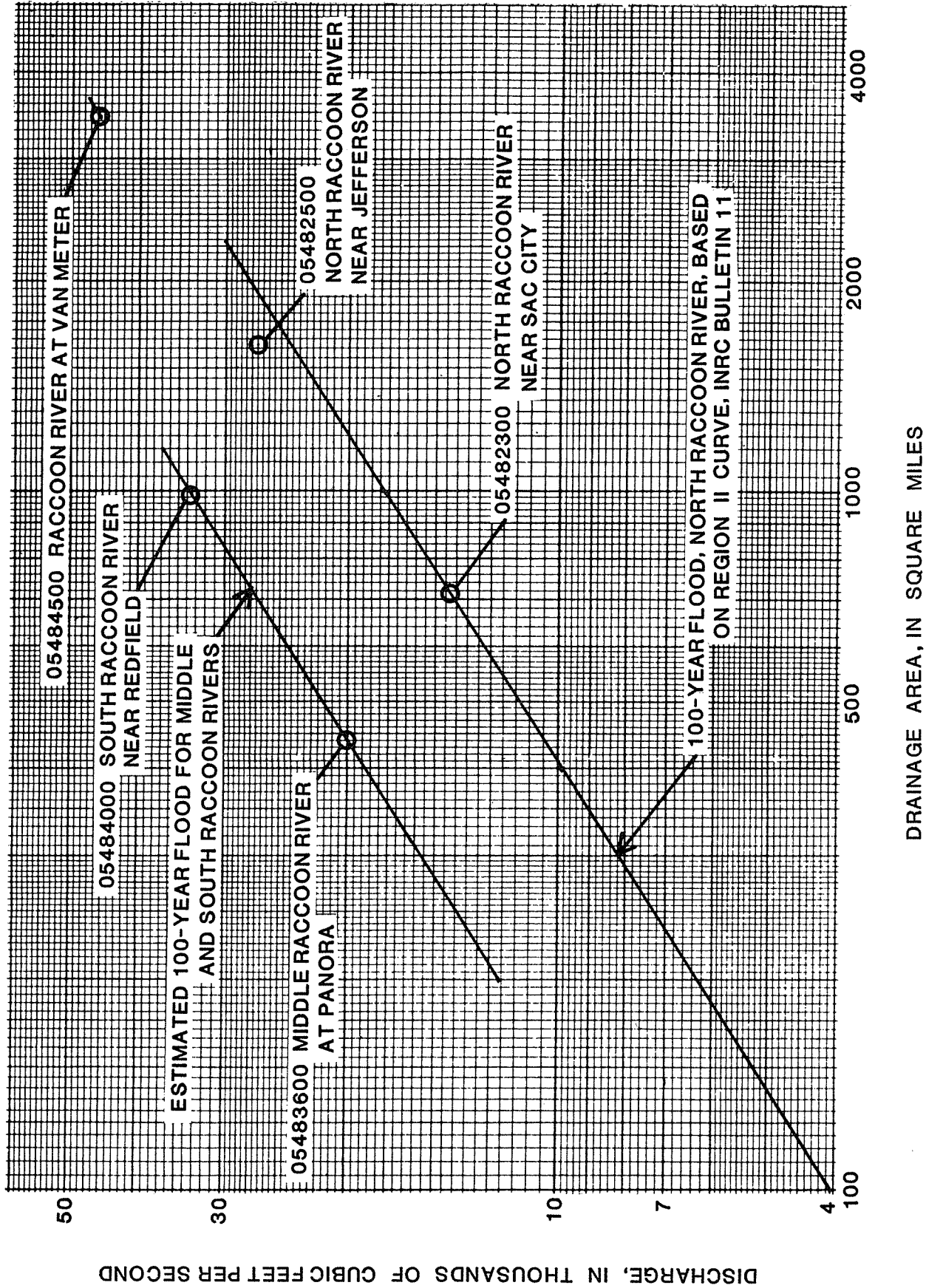


Figure 4. Relationship of 100-year flood discharge with drainage area for main stem rivers in the Raccoon River basin.

Figures 5-26 show profiles of the March 1979 flood on the Raccoon River and its principal tributaries. 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. Low-water profiles are also shown to indicate the approximate range of stage that applies along the profiled reaches. Also shown on the profile sheets is the June 13, 1947 flood in the city of Des Moines.

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 Des Moines River. Bridges and a few other points are designated by an index number that helps to identify their location. For example, 7827-22 NW refers to a location in T.78 N., R.27 W., NW 1/4 sec. 22.

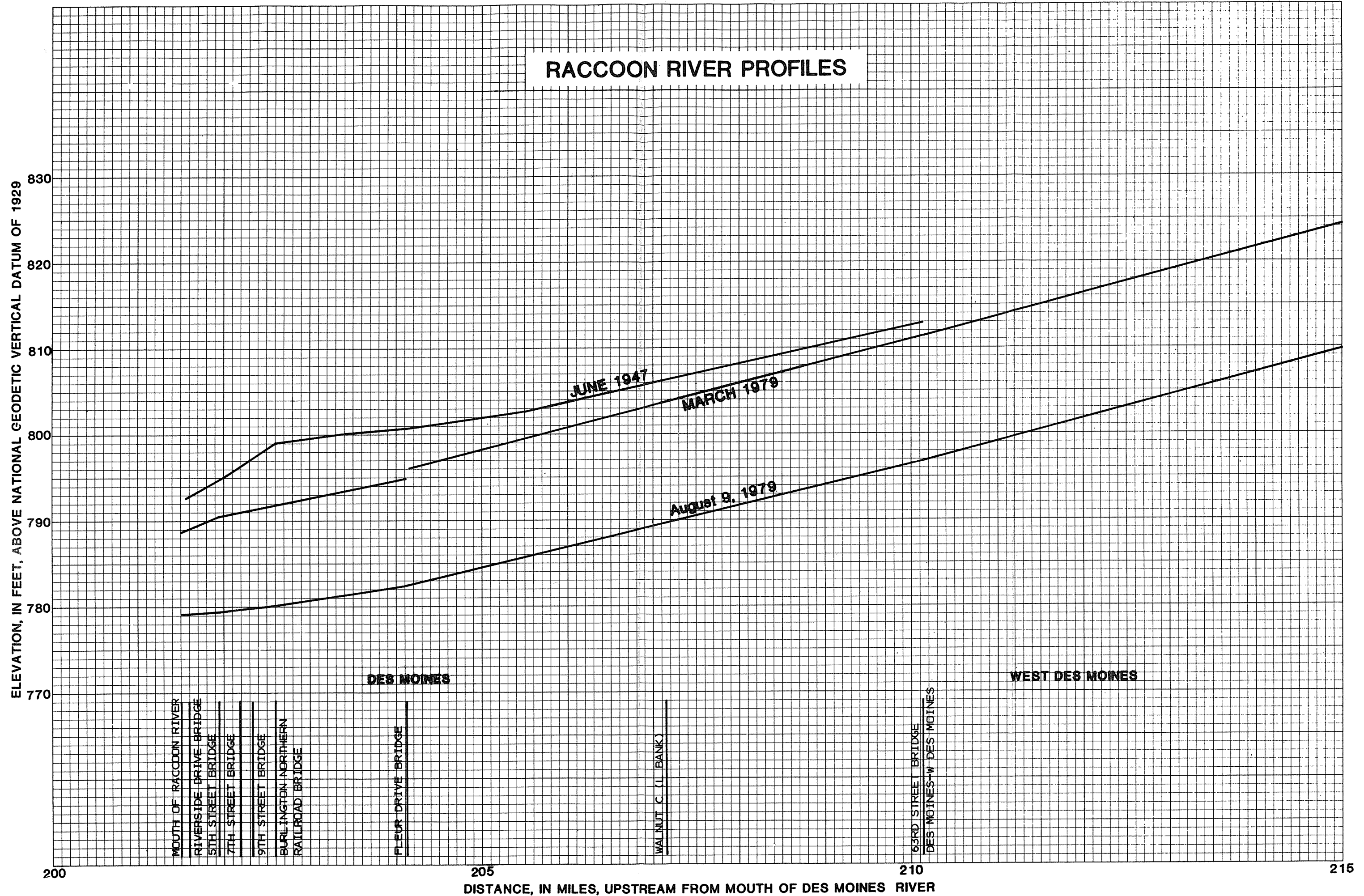
Flood magnitude-frequency relationships in this basin are complex, as has been noted. More flood peak data sites and longer periods of streamflow records will further improve their definition. Furthermore, these relationships are subject to continuing modification by factors such as changing meteorologic and climatic trends, and physical changes in the basin such as urbanization, installation of drainage systems, reservoir development, and shifting land use.

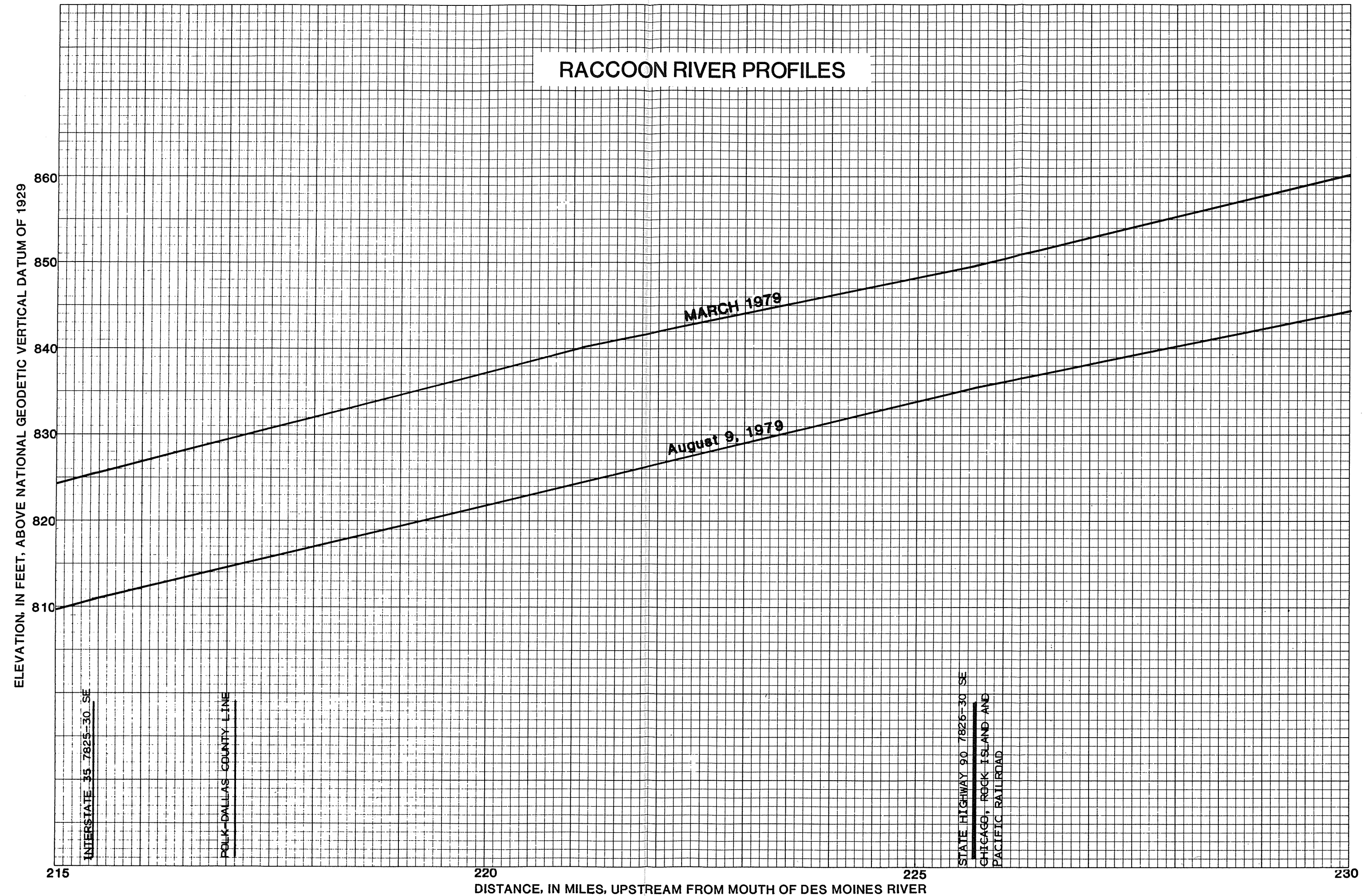
The hydraulics of the Raccoon River system are also complex. Wide, flat flood plains are typical of a part of the basin. Stage-discharge relationships for these areas are subject to seasonal changes because of the varying vegetative cover in the flood plain throughout the year.

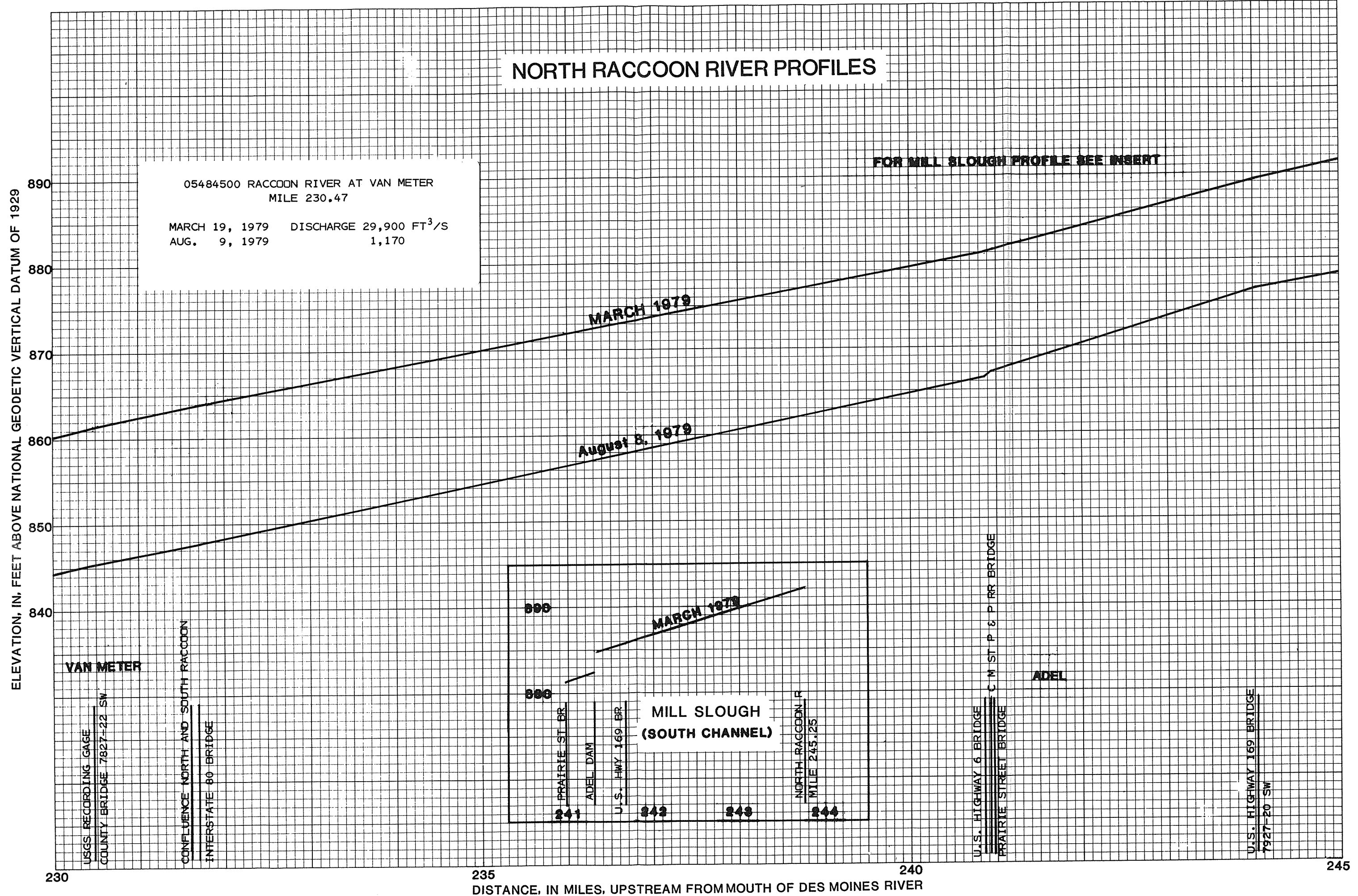
Debris and ice jams, both nearly impossible to predict, can cause dramatic temporary changes in stage-discharge relationships. Natural scour and fill, channel straightening and construction of bridges and levees can cause more lasting changes.

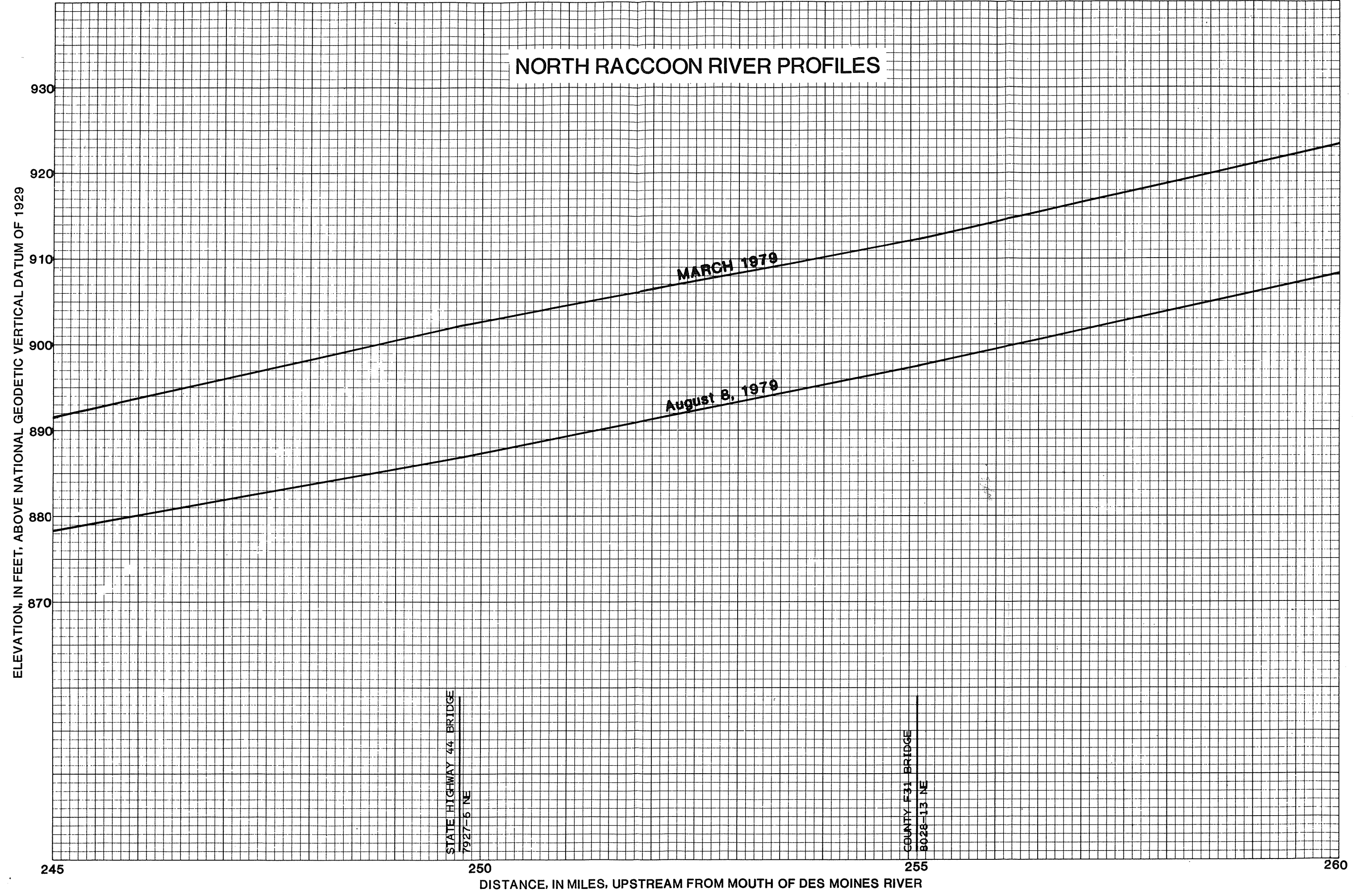
Thus, a river basin and its channel system are dynamic entities undergoing continual change. The relationships presented in this report represent the conditions existing at the time the field data were obtained.

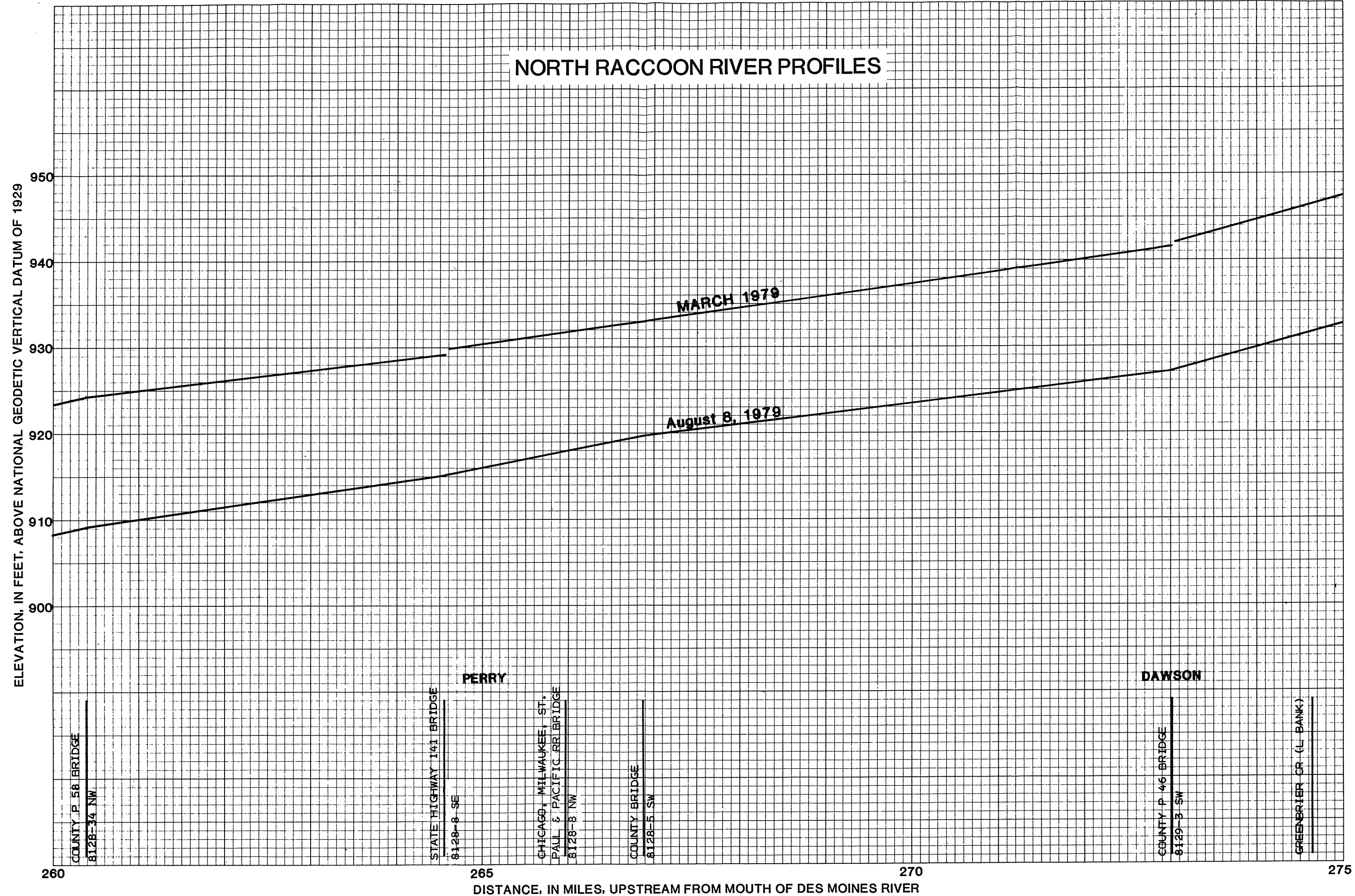
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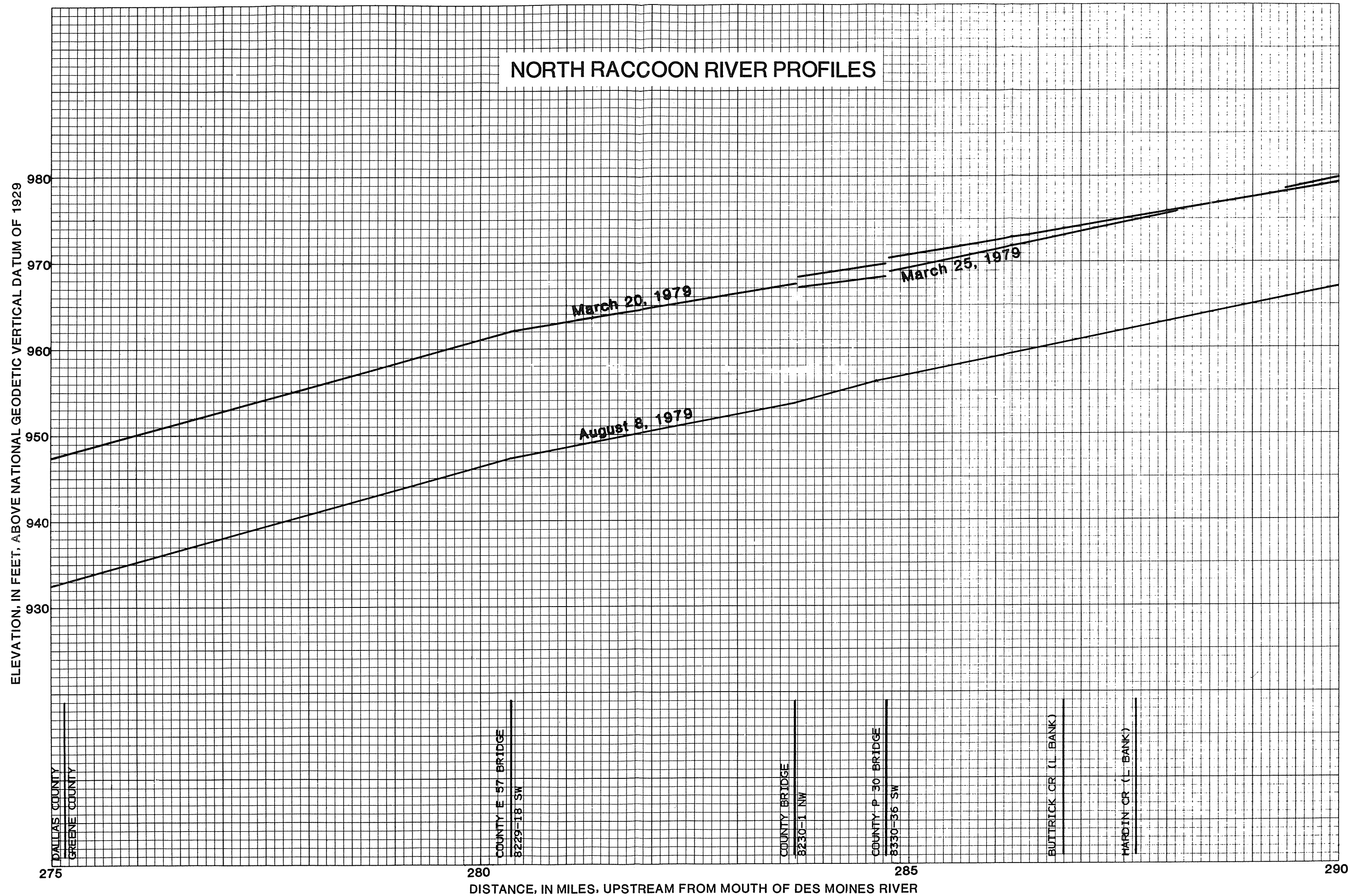


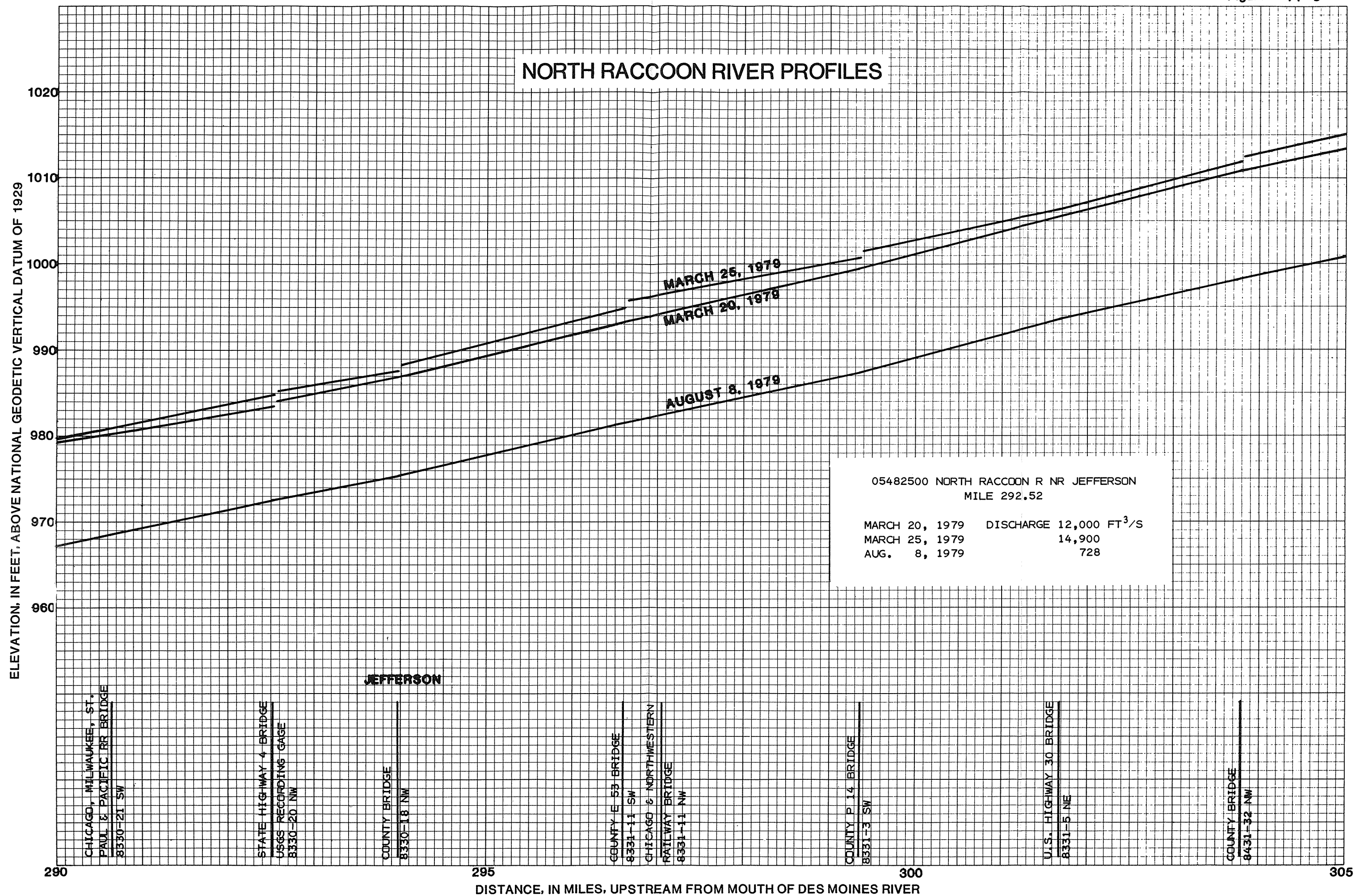


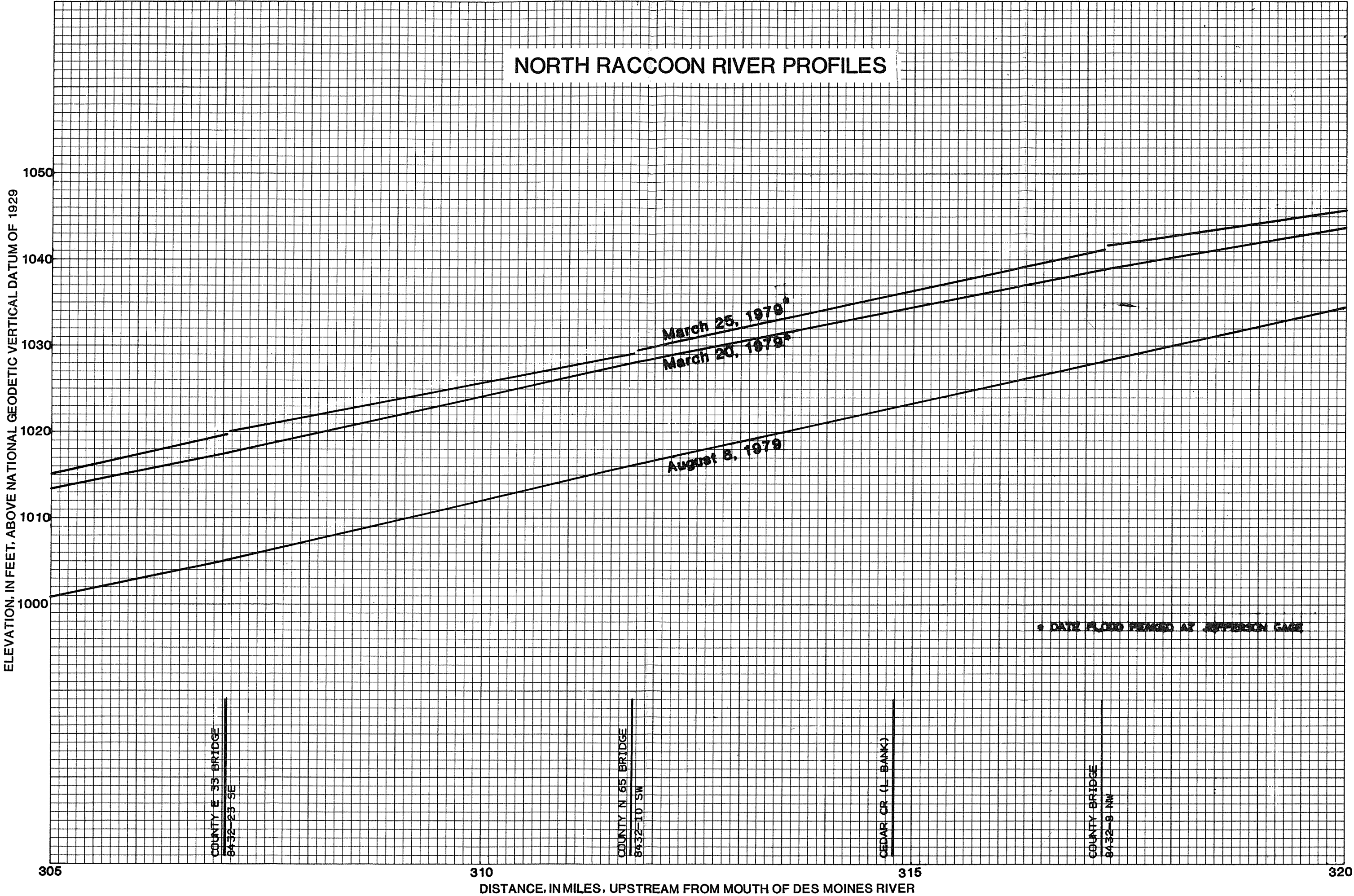


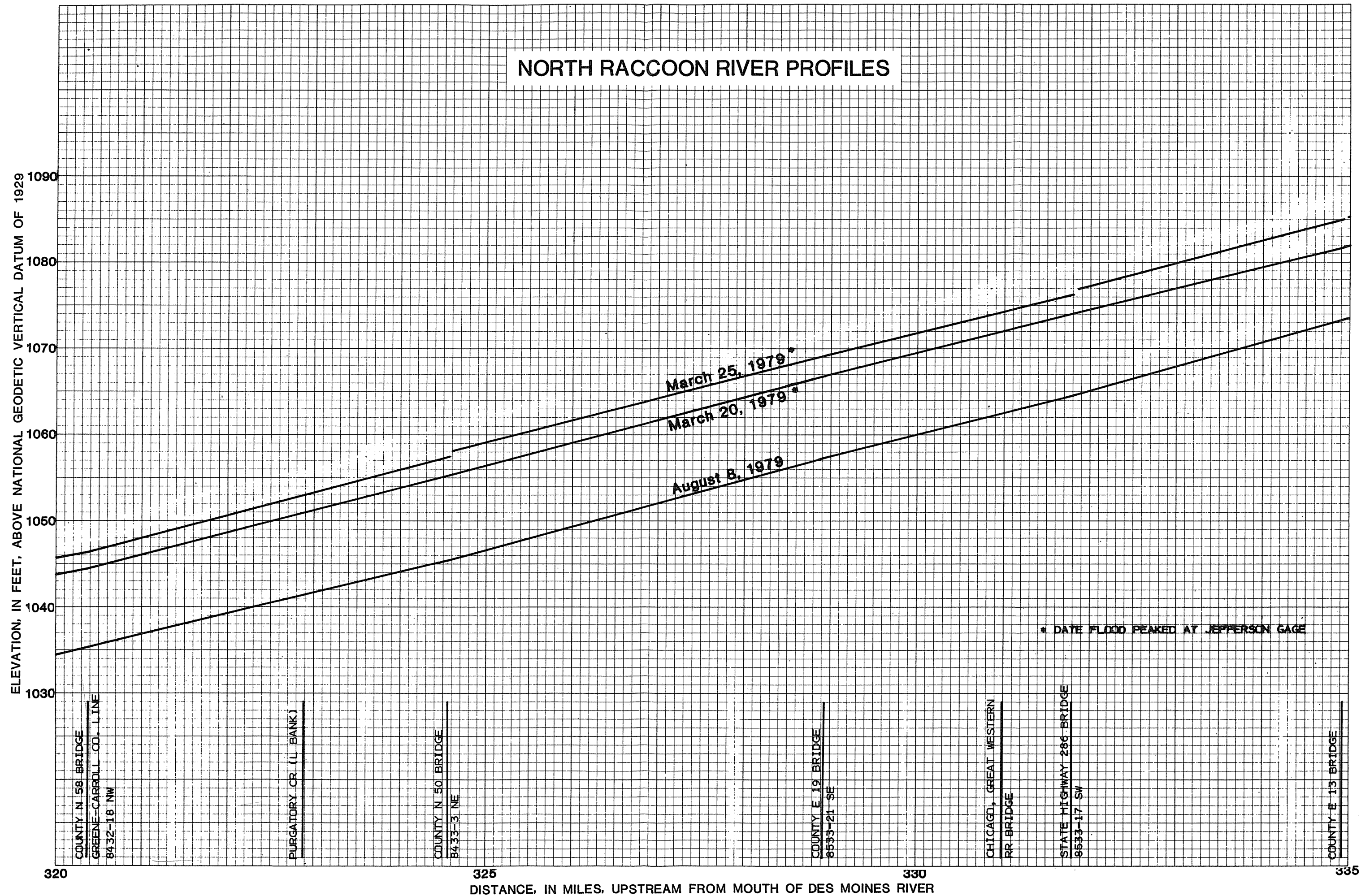


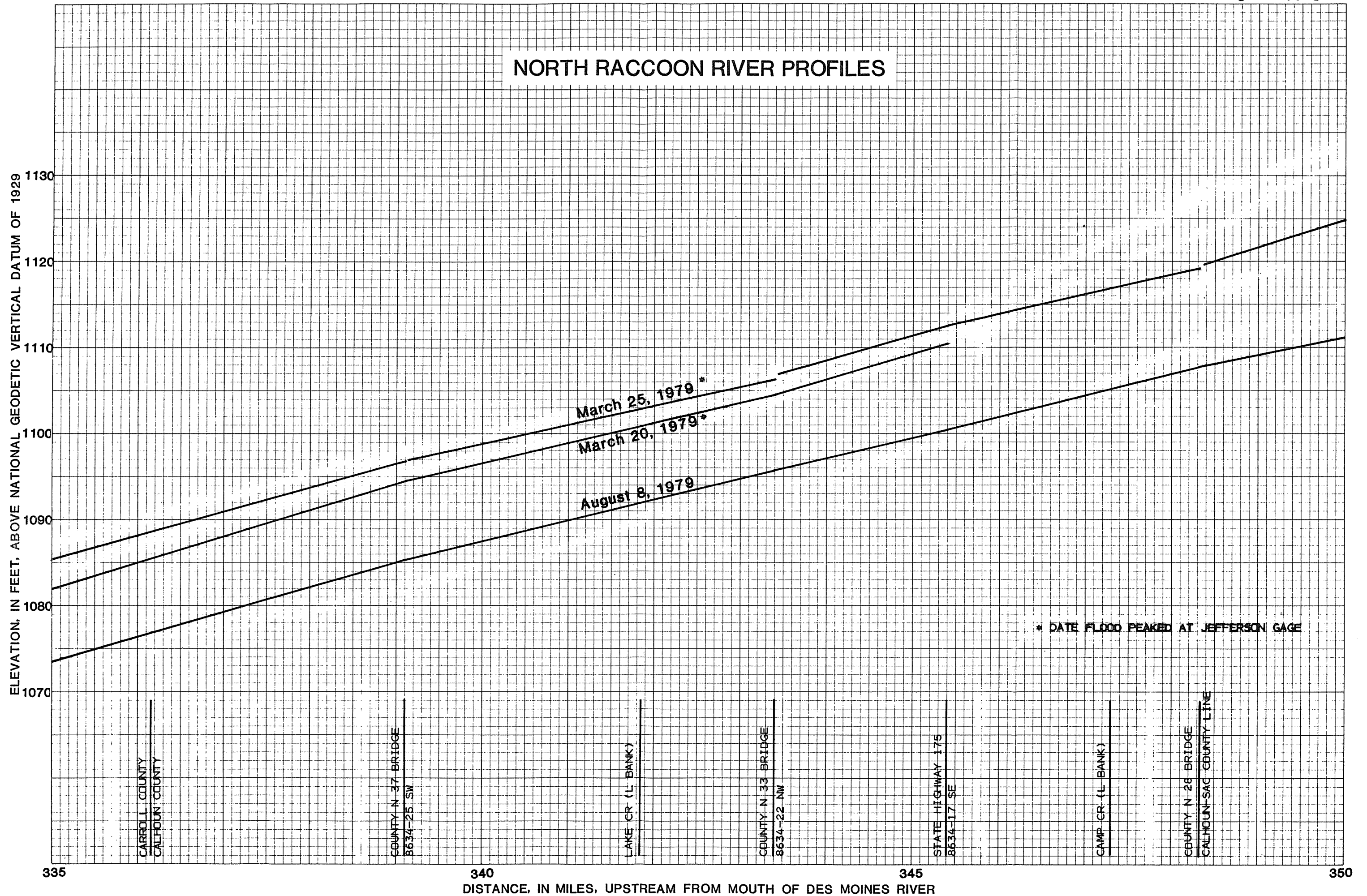


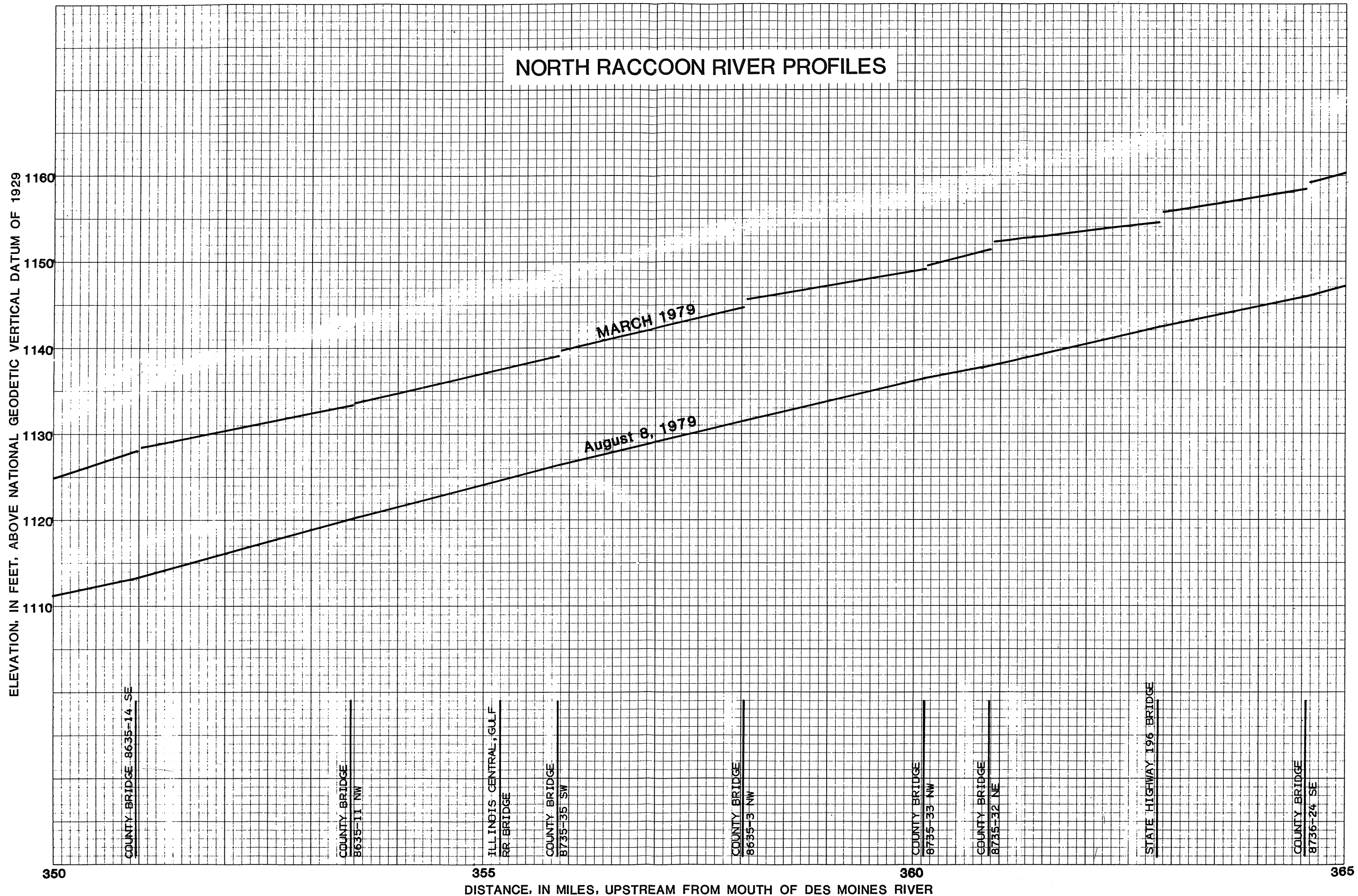


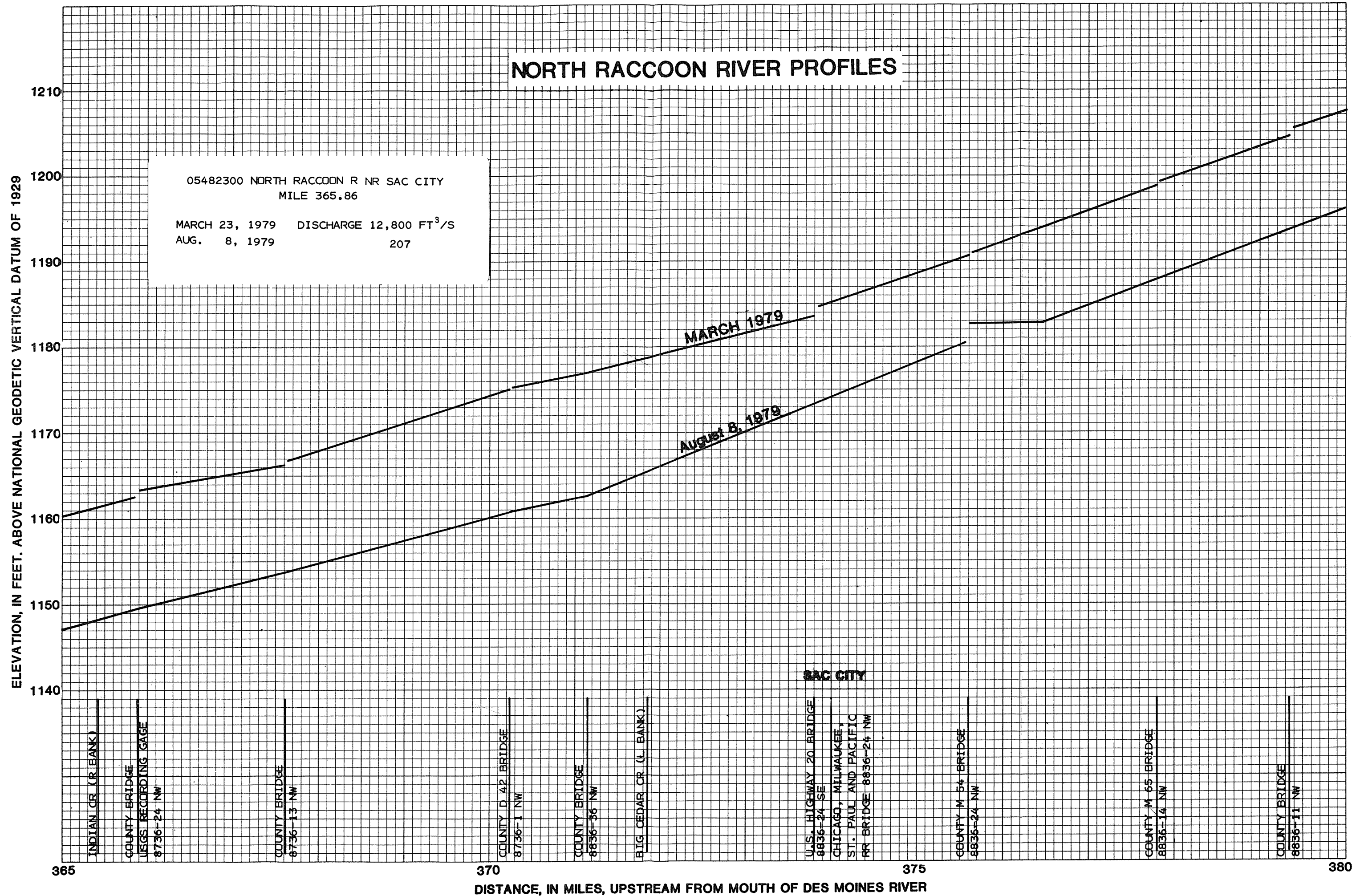


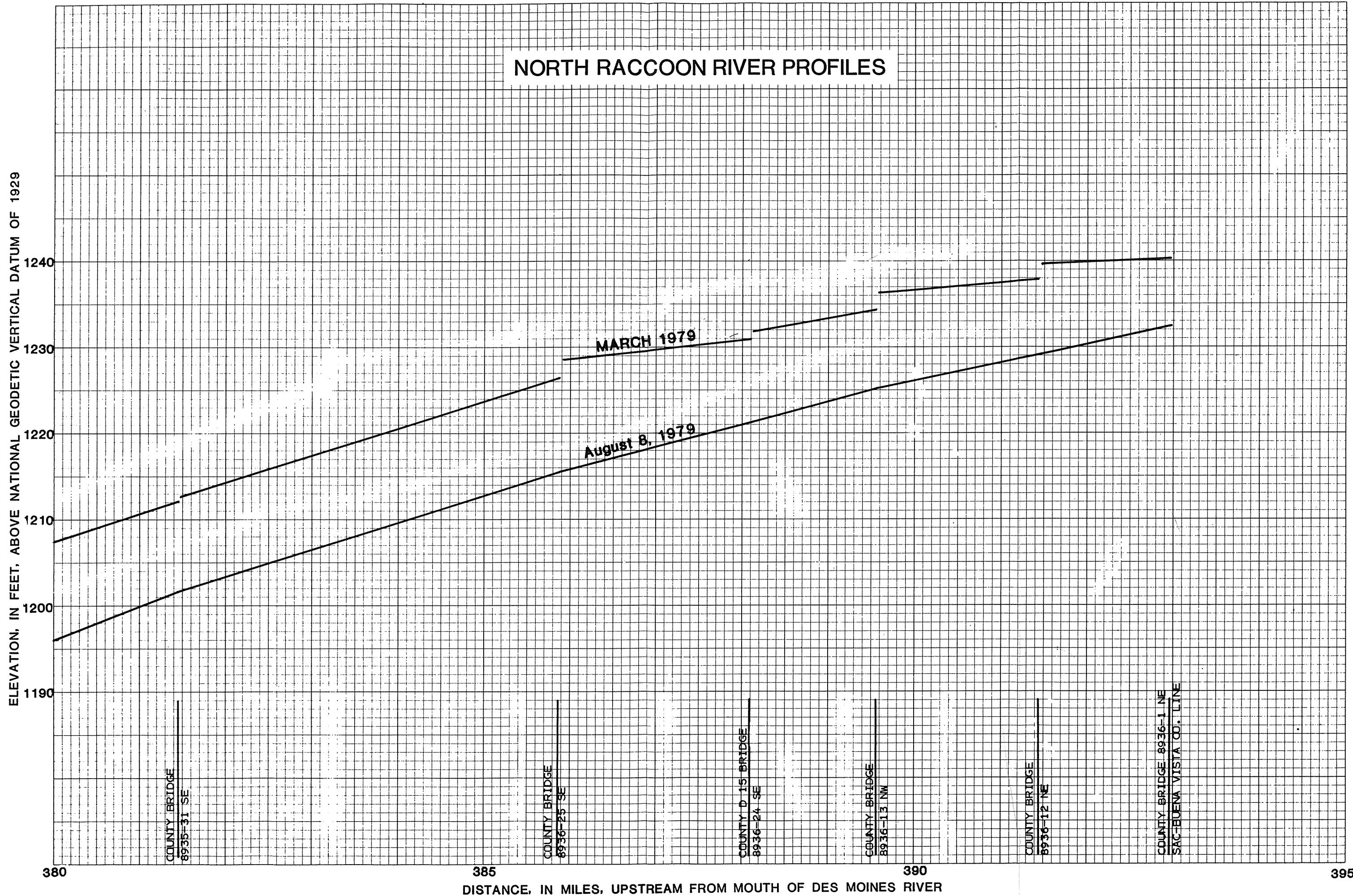


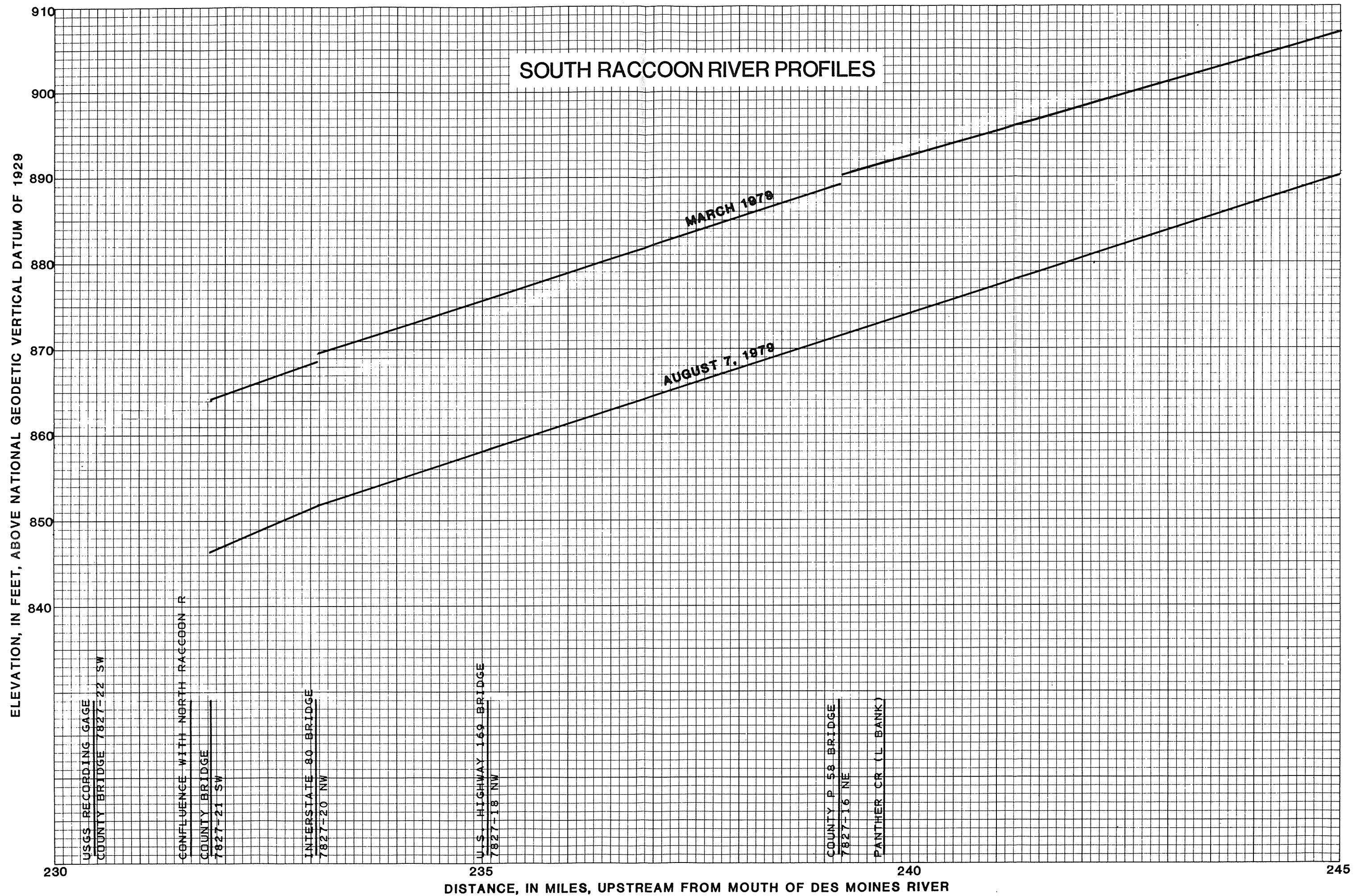


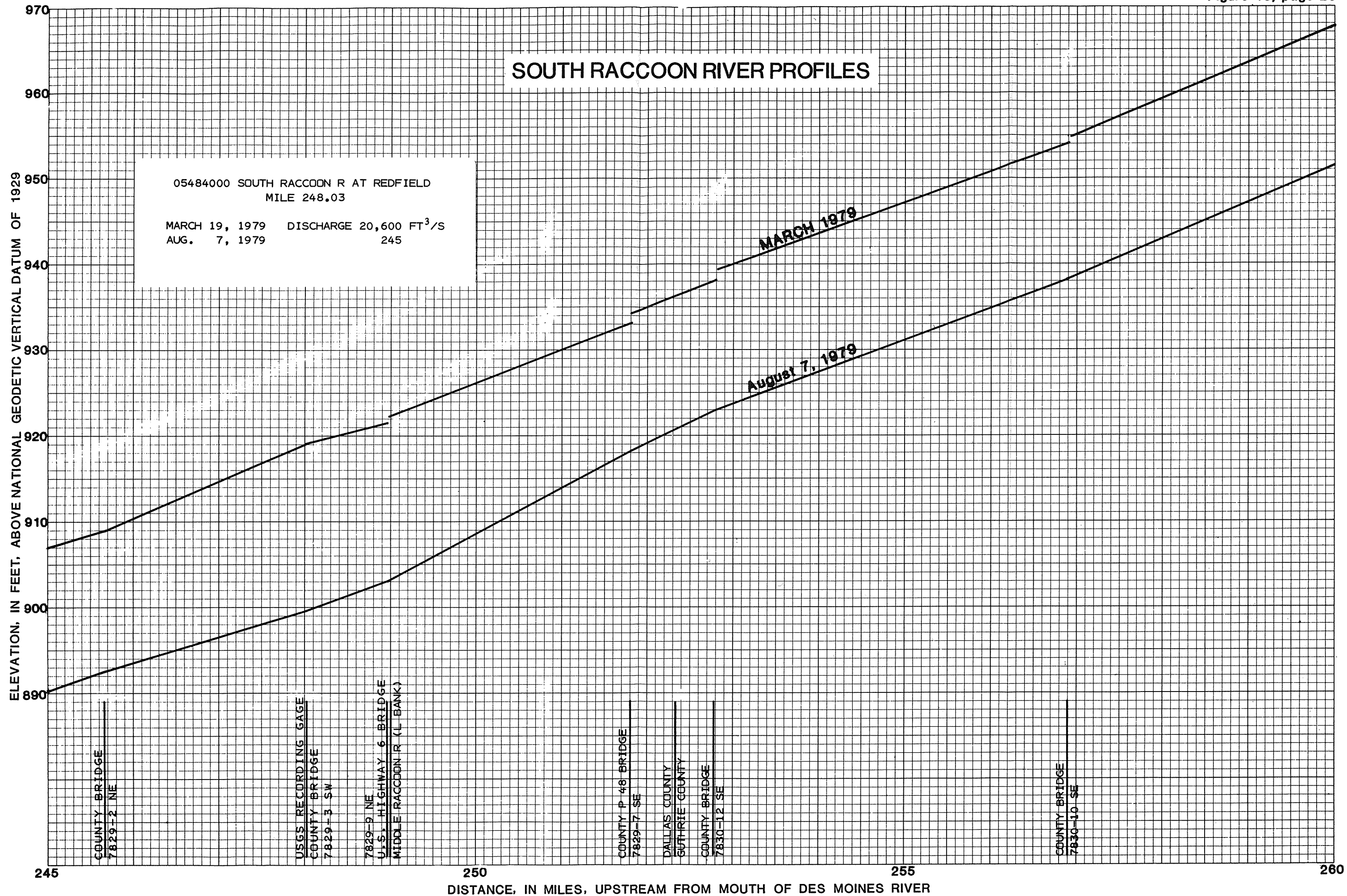


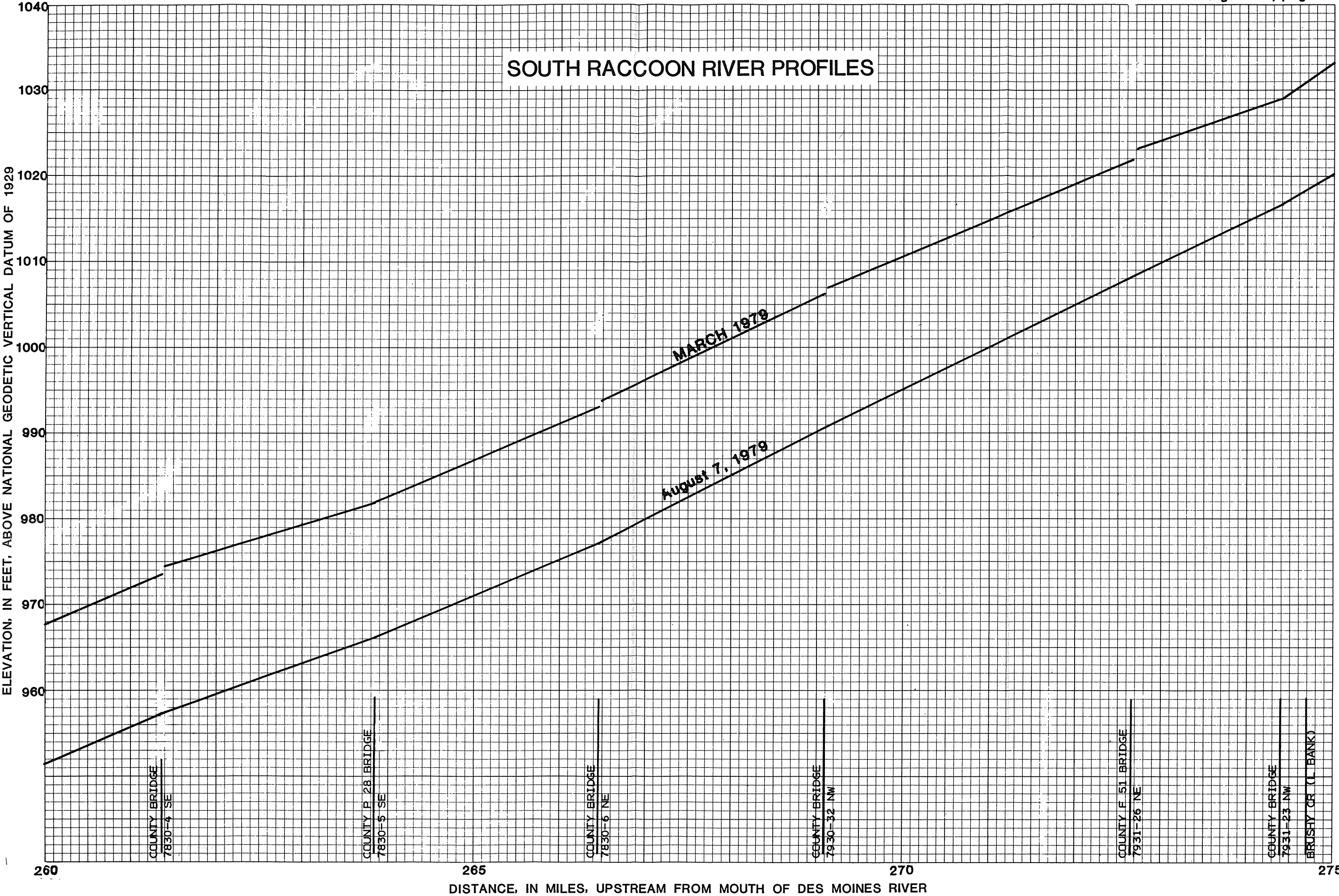




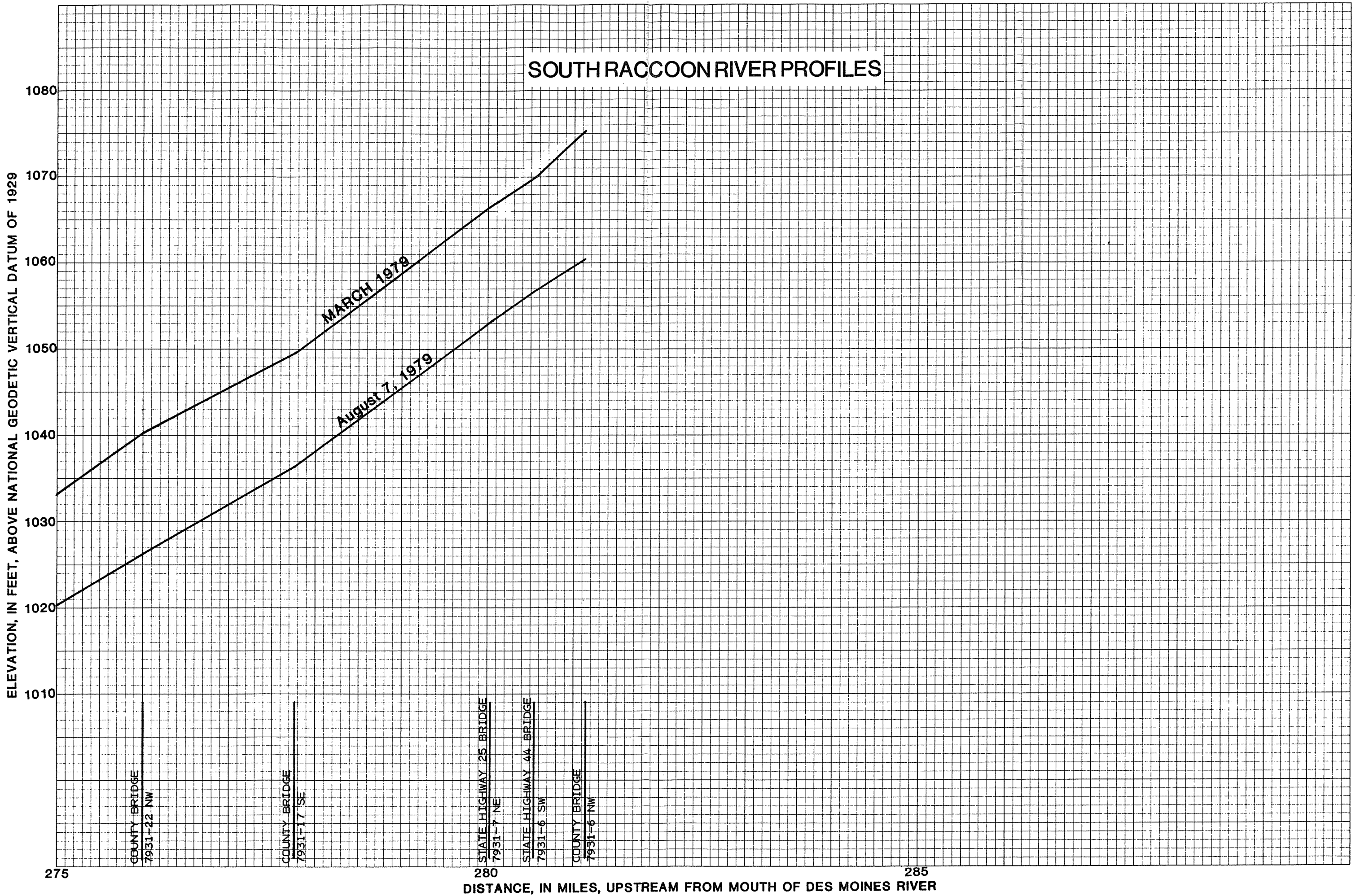


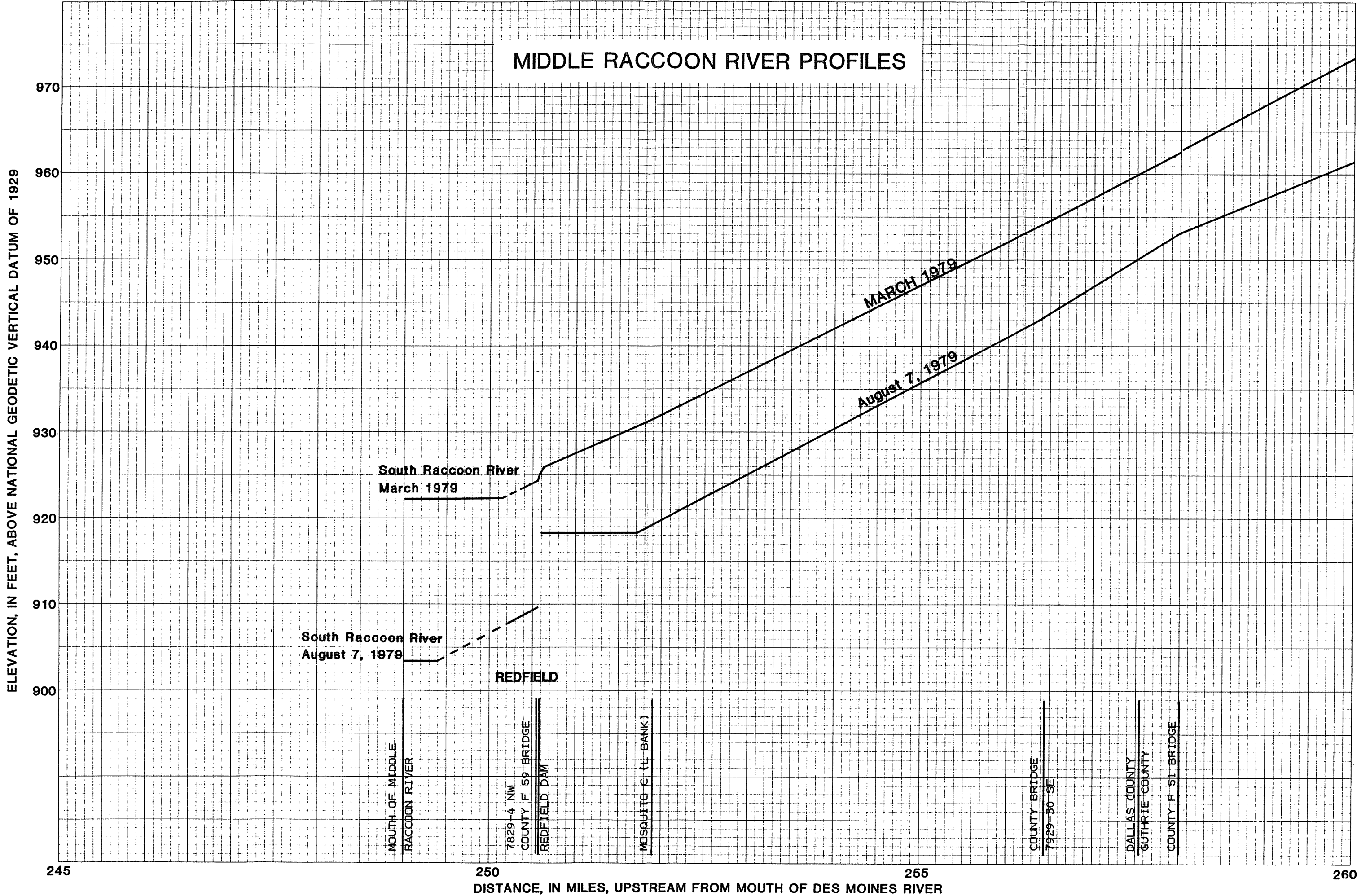


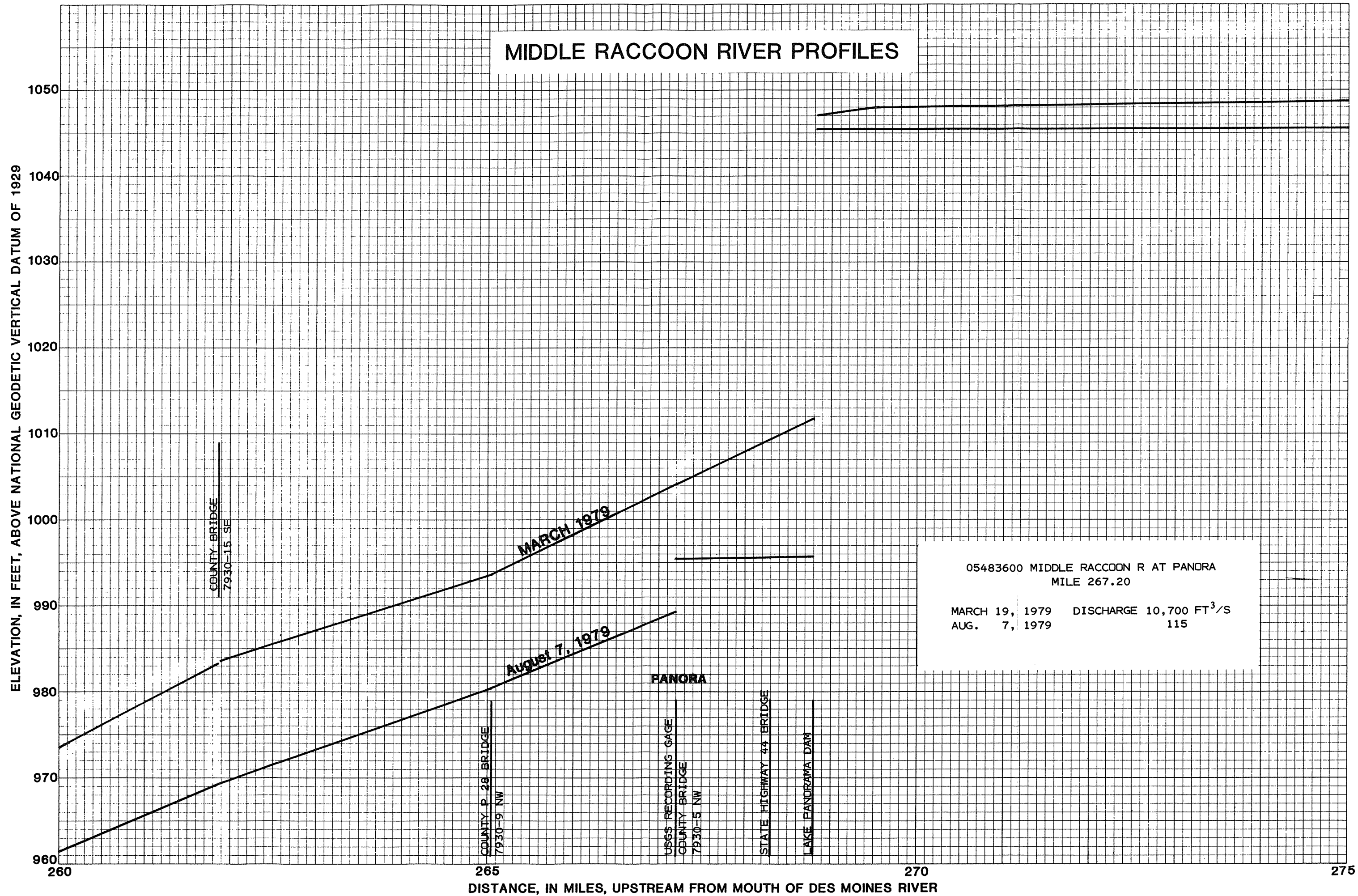


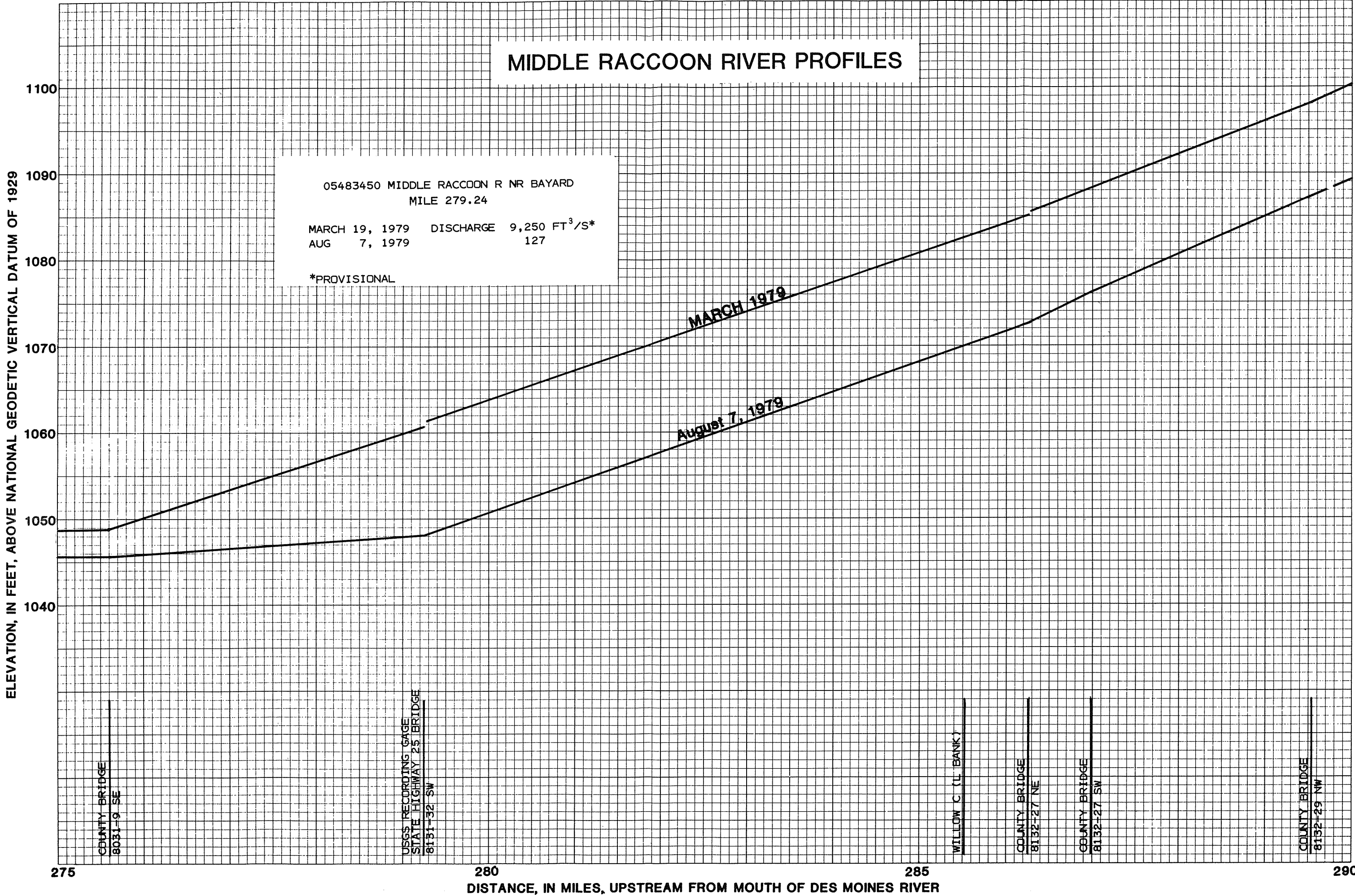


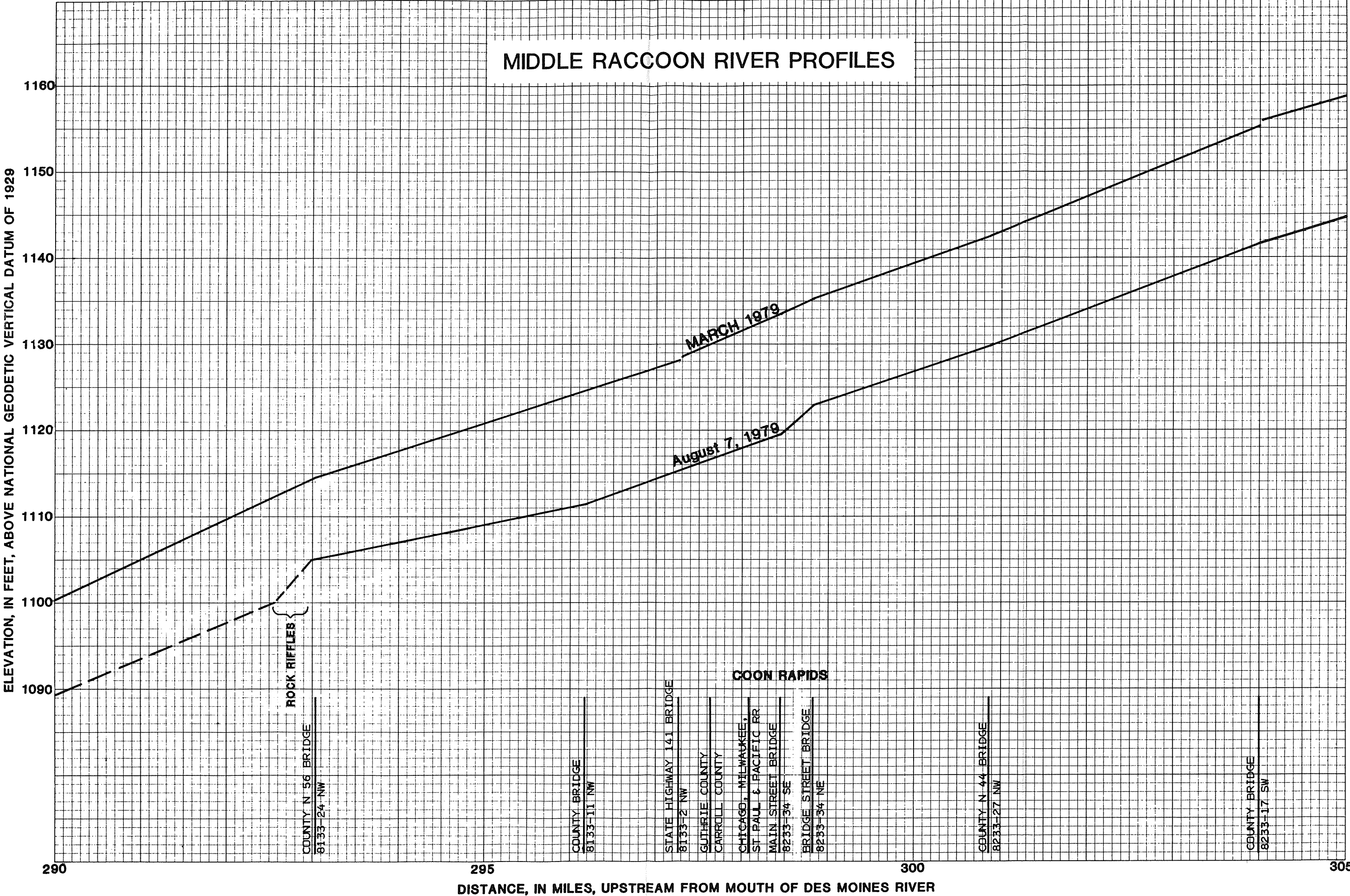
SOUTH RACCOON RIVER PROFILES

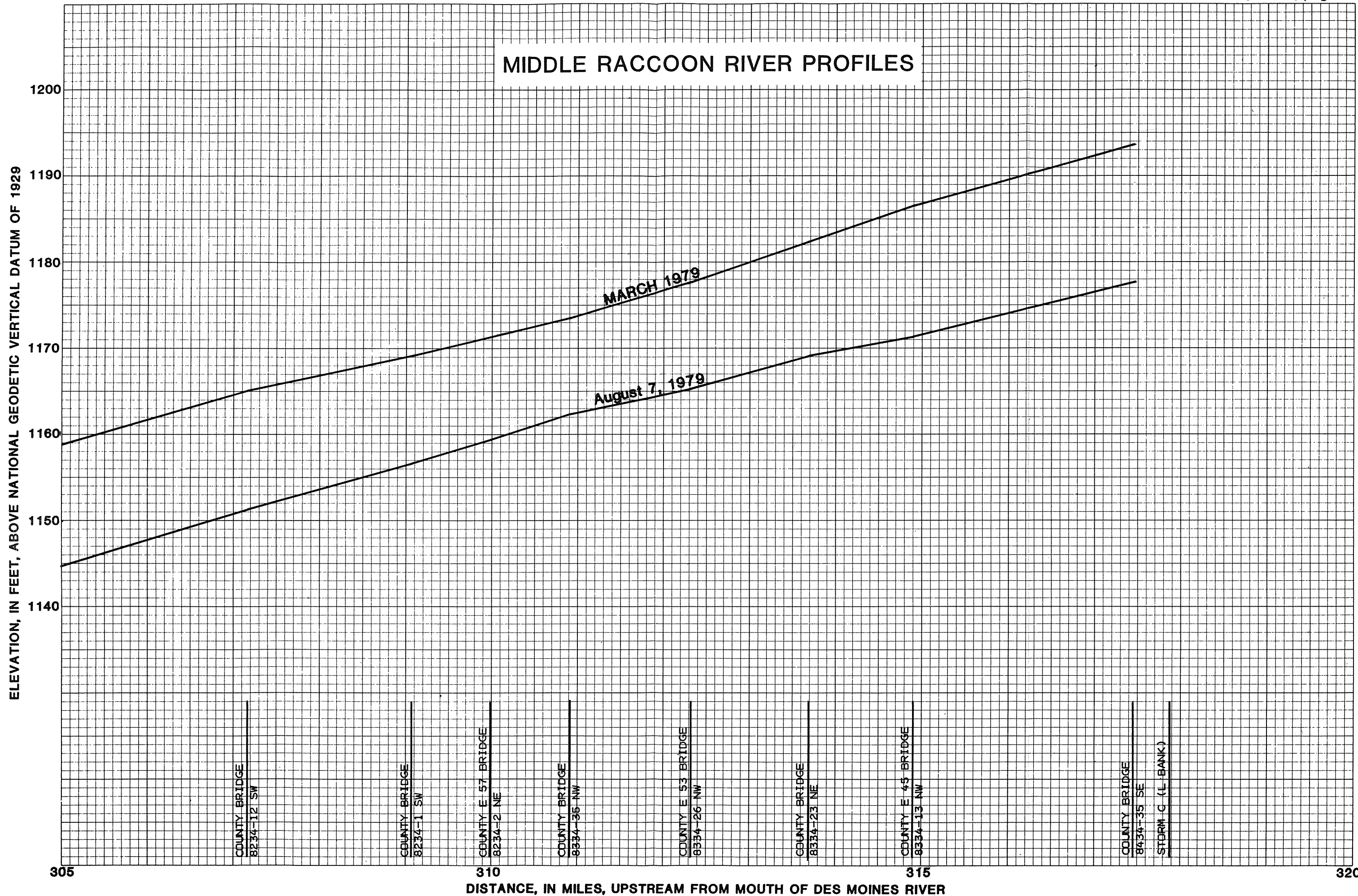












The data on peak stages and discharges at gaging stations that follow were compiled through Sept. 30, 1975, by Lara (1976), and were updated through Sept. 30, 1978, for this report. The flood events are designated by calendar date and grouped by water year (year ending September 30). For the partial-record 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 figures 1 and 3 and in tables 1 and 2. The datum of the gage, when given, is in feet above 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.

05-4821.70 Big Cedar Creek near Varina, Iowa

Location.--Lat 42°41'16", long 94°47'52", in NE1/4 NE1/4 sec.24, T.91 N., R.34 W., Pochahontas County, on left bank 5 ft downstream from bridge on county highway N33, 2.0 miles downstream from Drainage ditch 21, 3.5 miles upstream from Drainage ditch 74, and 5.5 miles northeast of Varina.

Drainage area.--80.0 sq mi.

Gage.--Water-stage recorder. Datum of gage is 1,225.12 ft above National Geodetic Vertical Datum of 1929.

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

Remarks.--Base for partial-duration series, 400 cfs.

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1960	Mar. 27, 1960	11.42	1,020
	June 16, 1960	8.27	466
1961	Mar. 2, 1961	--	400
	Mar. 25, 1961	11.88	1,460
1962	Mar. 29, 1962	14.49 a	--
	Mar. 31, 1962	--	1,000 b
	July 2, 1962	8.91	665
	July 4, 1962	10.15	960
	July 28, 1962	7.89	452
	Aug. 31, 1962	13.68	2,080
1963	Mar. 15, 1963	7.51 a	--
	June 2, 1963	6.57	333
1964	May 6, 1964	6.23	291
1965	Apr. 6, 1965	15.05 a	--
	Apr. 8, 1965	10.17	1,060
	June 6, 1965	7.00	404

a Affected by ice.

b About.

05-4821.70 Big Cedar Creek near Varina, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1966	Oct. 1, 1965	6.31 c	257
	Mar. 31, 1966	5.84	237
1967	June 10, 1967	7.82	548
	June 15, 1967	9.28	852
1968	July 19, 1968	3.99	45
1969	Mar. 24, 1969	10.44 a	700 b
	Apr. 4, 1969	8.89	744
	June 23, 1969	8.04	506
	June 25, 1969	10.76	992
	June 29, 1969	7.37	412
	July 27, 1969	10.49	938
1970	May 13, 1970	8.02	554
1971	Feb. 19, 1971	11.18 a	800 b
	Mar. 13, 1971	--	880 b
	Mar. 28, 1971	8.25	595
	June 7, 1971	10.66	1,010
1972	Aug. 6, 1972	7.37	400
1973	Mar. 11, 1973	7.43	485
	Mar. 14, 1973	7.25	459
	Apr. 16, 1973	6.84	404
	May 28, 1973	7.78	530
	Aug. 23, 1973	9.82	904
	Sept. 26, 1973	9.25	850
1974	Oct. 11, 1973	7.75	573
	Nov. 21, 1973	8.11	642
1975	Apr. 9, 1975	--	800 b
	Apr. 12, 1975	--	600 b
	Apr. 28, 1975	10.88	1,250
	May 11, 1975	6.78	413
	June 18, 1975	7.04	452

a Affected by ice.

b About.

c Stage falling.

05-4821.70 Big Cedar Creek near Varina, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1976	June 29, 1976	4.71	157
1977	Mar. 9, 1977	3.91	64
1978	July 6, 1978	10.39	818
	Sept. 14, 1978	10.02	788

05-4823.00 North Raccoon River near Sac City, Iowa

Location.--Lat 42°20'28", long 94°59'05", in NE1/4 NW1/4 sec.24, T.87 N., R.36 W., Sac County, on right bank 15 ft downstream from bridge on county highway, 0.2 mile upstream from Indian Creek, 0.9 mile downstream from Drainage ditch 73, and 5.6 miles south of Sac City.

Drainage area.--713 sq mi.

Gage.--Water-stage recorder. Datum of gage is 1,144.60 ft above National Geodetic Vertical Datum of 1929 (levels by Iowa Natural Resources Council).

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

Remarks.--Base for partial-duration series, 2,000 cfs.

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
<u>1954</u>	June 21, 1954	15.61 a	7,000
1958	June 4, 1958	13.44	4,560 b
1959	May 31, 1959	14.51	5,200
1960	Mar. 30, 1960	16.73	9,020
	May 22, 1960	9.68	2,100
	May 26, 1960	10.94	2,840
	June 19, 1960	10.47	2,640
1961	Mar. 28, 1961	13.16	4,420
1962	Mar. 29, 1962	15.83	7,730
	June 9, 1962	9.96	2,010
	July 5, 1962	10.32	2,160
	Sept. 1, 1962	18.12	10,800
1963	June 3, 1963	9.32	1,910
1964	May 7, 1964	7.47	1,100
1965	Apr. 6, 1965	15.59	6,960
	Sept. 28, 1965	9.82	2,020

a From floodmark.

b Maximum for period June to September 1958.

05-4823.00 North Raccoon River near Sac City, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1966	June 12, 1966	9.49	1,860
1967	June 9, 1967	12.06	3,230
	June 16, 1967	15.73	7,150
1968	June 25, 1968	4.89	354
1969	Oct. 18, 1968	10.57	2,110
	Mar. 26, 1969	12.94	3,790
	Apr. 5, 1969	14.65	5,370
	June 7, 1969	10.69	2,430
	June 27, 1969	13.93	4,850
	July 28, 1969	12.72	3,780
1970	May 14, 1970	12.75	3,630
1971	Feb. 19, 1971	14.25 c	4,000 d
	Mar. 14, 1971	13.40	4,200
	Mar. 29, 1971	10.62	2,490
	June 10, 1971	11.82	3,070
1972	July 17, 1972	13.43	4,140
1973	Nov. 3, 1972	9.73	2,010
	Mar. 4, 1973	12.18 c	2,680 d
	Mar. 14, 1973	11.54	2,890
	Mar. 26, 1973	10.46	2,360
	Apr. 16, 1973	10.22	2,240
	May 28, 1973	--	2,790 d
	July 2, 1973	13.16	3,930
	July 9, 1973	--	3,190 d
	Aug. 24, 1973	12.62	3,550
1974	Sept. 27, 1973	13.90	4,520
	Oct. 12, 1973	13.33	4,060
	Nov. 21, 1973	12.11	3,250
1975	May 19, 1974	11.21	2,400
	Apr. 28, 1975	14.35	4,570
	May 12, 1975	10.37	2,160
	June 19, 1975	11.12	2,590

c Affected by ice.

d About.

05-4823.00 North Raccoon River near Sac City, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1976	May 25, 1976	5.73	557
1977	Aug. 9, 1977	5.43	479
1978	June 18, 1978	11.53	2,890
	July 7, 1978	13.47	4,180
	Sept. 14, 1978	15.23	5,880

05-4825.00 North Raccoon River near Jefferson, Iowa
(Published as "Raccoon River near Jefferson", 1940-55)

Location.--Lat 41°59'17", long 94°22'36", in SW1/4 NW1/4 sec.20, T.83 N., R.30 W., Greene County, on right bank 5 ft downstream from bridge on State Highway 4, 0.1 mile downstream from Drainage ditches 33, and 40, 1.9 miles south of Jefferson, and 4.2 miles upstream from Hardin Creek.

Drainage area.--1,619 sq mi.

Gage.--Water-stage recorder. Datum of gage is 967.09 ft above National Geodetic Vertical Datum, of 1929. Prior to Apr. 22, 1946, nonrecording gage at site 4 miles upstream at different datum. Apr. 22 to June 25, 1946, nonrecording gage, June 26, 1946 to Sept. 30, 1955, water-stage recorder, Oct. 1, 1955 to Apr. 30, 1958, nonrecording gage, at present site and datum.

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

Flood stage.--10 feet.

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

<u>Peak stages and discharges</u>			
<u>Water</u> <u>year</u>	<u>Date</u>	<u>Gage</u> <u>height</u> <u>(feet)</u>	<u>Discharge</u> <u>(cfs)</u>
1940	Aug. 28, 1940	10.9	4,030
1941	June 14, 1941	9.1	2,420
1942	July 15, 1942	10.5	3,590
1943	Aug. 13, 1943	15.5	9,480
1944	May 22, 1944	15.4	9,860
	June 14, 1944	16.2	11,900
1945	Mar. 12, 1945	12.9	6,880
	Apr. 18, 1945	10.6	4,130
	Apr. 25, 1945	14.2	8,700
	May 24, 1945	13.1	7,120
	June 3, 1945	14.3	8,780
	June 10, 1945	13.5	7,630
	Aug. 8, 1945	10.7	4,230

05-4825.00 North Raccoon River near Jefferson, Iowa-- (Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1946	Mar. 16, 1946	11.5	5,160
	May 28, 1946	13.4	7,310
1947	June 14, 1947	12.4	5,780
	June 23, 1947	22.3	29,100
	July 8, 1947	11.6	5,420
1948	Mar. 20, 1948	13.8	8,630
1949	Mar. 7, 1949	14.8	10,100
1950	June 19, 1950	12.0	6,050
	June 23, 1950	11.1	4,710
1951	Mar. 29, 1951	17.39	16,000
	May 3, 1951	15.62	11,800
	June 3, 1951	12.88	6,720
	June 21, 1951	12.25	5,800
	July 4, 1951	12.58	6,320
	Aug. 18, 1951	12.41	6,060
	Aug. 30, 1951	12.97	6,860
1952	Apr. 1, 1952	12.80	6,580
	July 11, 1952	12.51	6,190
1953	July 1, 1953	10.10	3,490
1954	June 13, 1954	11.09	4,670
	June 22, 1954	19.52	21,300
	Aug. 29, 1954	14.19	9,360
1955	Apr. 26, 1955	9.78	3,580
1956	May 13, 1956	5.4	650
1957	June 16, 1957	13.49	7,800
1958	June 7, 1958	11.70	4,720
1959	June 3, 1959	15.06	9,800
1960	Mar. 31, 1960	19.43	18,600
	May 28, 1960	13.45	6,960

05-4825.00 North Raccoon River near Jefferson, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1961	Mar. 29, 1961	13.19	6,680
1962	Mar. 30, 1962	17.60	14,300
	June 10, 1962	11.90	5,050
	Sept. 4, 1962	16.33	11,700
1963	May 14, 1963	12.34	5,510
1964	May 8, 1964	8.61	2,280
1965	Apr. 5, 1965	15.29	9,890
	May 27, 1965	14.94	9,300
	Sept. 30, 1965	12.38	5,610
1966	June 12, 1966	14.11	7,980
	June 28, 1966	11.47	4,620
1967	June 11, 1967	15.61	10,400
	June 19, 1967	15.61	10,400
	June 24, 1967	12.04	5,200
	June 28, 1967	11.75	4,900
1968	June 26, 1968	9.05	2,620
1969	Oct. 19, 1968	11.06	4,160
	Mar. 26, 1969	15.85	10,800
	Apr. 7, 1969	14.46	8,500
	Apr. 19, 1969	11.06	4,200
	June 30, 1969	12.88	6,110
	July 10, 1969	13.72	7,410
	July 30, 1969	12.16	5,220
1970	May 16, 1970	11.64 a	4,690
1971	Feb. 21, 1971	15.75 b	6,300 c
	Mar. 15, 1971	13.70	7,160
1972	July 20, 1972	12.25	5,550

a From floodmark.

b Affected by ice.

c About.

05-4825.00 North Raccoon River near Jefferson, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1973	Feb. 27, 1973	13.19 b	5,460 c
	Mar. 4, 1973	14.37 b	7,370 c
	Mar. 15, 1973	13.34	6,720
	Mar. 27, 1973	11.64	4,940
	Apr. 13, 1973	10.91	4,260
	Apr. 18, 1973	12.56	6,030
	May 4, 1973	11.29	4,720
	May 9, 1973	13.42	6,940
	May 31, 1973	12.78	6,170
	June 19, 1973	10.95	4,260
	July 4, 1973	15.11	9,060
	July 11, 1973	12.38	5,680
	Aug. 26, 1973	11.13	4,150
	Sept. 29, 1973	15.97	10,400
1974	Oct. 14, 1973	14.06	7,240
	Nov. 23, 1973	12.04	5,340
	Feb. 20, 1974	15.11 b	5,900 c
	May 16, 1974	11.25	4,260
	May 18, 1974	13.35	6,400
1975	Apr. 28, 1975	12.84	6,060
	May 1, 1975	13.82	7,190
1976	May 24, 1976	10.31	3,330
1977	Aug. 26, 1977	5.29	404
1978	July 19, 1978	12.21	5,160
	Sept. 17, 1978	14.67	8,200
	Sept. 21, 1978	10.98	4,010

b Affected by ice.

c About.

05-4826.00 Hardin Creek at Farnhamville, Iowa

Location.--Lat 42°16'01", long 94°25'10", near NE corner sec.14,
T.86 N., R.31 W., Calhoun County at bridge on State Highway
175, near west city limits of Farnhamville.

Drainage area.--43.7 sq mi.

Gage.--Crest-stage gage.

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

Remarks.--Only annual peaks are shown.

<u>Peak stages and discharges</u>			
<u>Water</u> <u>year</u>	<u>Date</u>	<u>Gage</u> <u>height</u> <u>(feet)</u>	<u>Discharge</u> <u>(cfs)</u>
1952	Mar. 29, 1952	8.09	318
1953	July 14, 1953	8.44	429
1954	Aug. 26, 1954	10.48	2,000
1955	Mar. 11, 1955	8.76	557
1956	Mar. 21, 1956	6.78	118
1957	June 16, 1957	7.90	270
1958	June 7, 1958	7.69	225
1959	June 1, 1959	9.06	700
1960	Mar. 29, 1960	9.75	840
1961	Sept.30, 1961	7.91	272
1962	July 14, 1962	9.20	812
1963	May 13, 1963	9.55	995
1964	Apr. 13, 1964	8.54	466
1965	May 26, 1965	9.78	1,110
1966	May 23, 1966	7.93	277
1967	June 13, 1967	9.34	854

05-4826.00 Hardin Creek at Farnhamville, Iowa--(Continued)

<u>Peak stages and discharges</u>			
<u>Water</u> <u>year</u>	<u>Date</u>	<u>Gage</u> <u>height</u> <u>(feet)</u>	<u>Discharge</u> <u>(cfs)</u>
1968	June 25, 1968	8.79	570
1969	July 26, 1969	10.45	1,960
1970	--	a	b
1971	Mar. 12, 1971	9.38 c	480
1972	Oct. 31, 1971	9.09	700
1973	Mar. 17, 1973	9.27	820
1974	June 22, 1974	8.82	570
1975	Apr. 26, 1975	9.56	1,000
1976	--	a	b
1977	Aug. 21, 1977	7.85	250
1978	--	a	b

a Peak stage did not reach bottom of gage.

b Discharge not determined.

c Affected by ice.

05-4828.00 Happy Run at Churdan, Iowa

Location.--Lat 42°10', long 94°30', near SW corner sec.17, T.85 N., R.31 W., Greene County, at bridge near west city limits of Churdan.

Drainage area.--7.58 sq mi.

Gage.--Crest-stage gage.

Stage-discharge relation.--Defined by current-meter measurements and logarithmic extension above 100 cfs.

Remarks.--Only annual peaks are shown.

<u>Peak stages and discharges</u>			
Water year	Date	Gage height (feet)	Discharge (cfs)
1951	Mar. 29, 1951	7.72	110
1952	Mar. 19, 1952	6.25	54
1953	--	a	<19
1954	Aug. 26, 1954	7.87	116
1955	July 10, 1955	7.80	113
1956	--	a	<19
1957	June 17, 1957	7.81	71
1958	--	a	<19
1959	June 1, 1959	7.70	77
1960	May 6, 1960	6.50	48
1961	Sept.30, 1961	6.42	46
1962	Mar. 25, 1962	8.57	150
1963	--	a	b

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

05-4828.00 Happy Run at Churdan, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1964	Apr. 13, 1964	7.27	61
1965	Sept. 27, 1965	7.77	80
1966	June 12, 1966	7.36	64
1967	June 13, 1967	9.37	b
1968	--	a	b
1969	Mar. 26, 1969	6.29	b
1970	--	a	b
1971	Mar. 12, 1971	6.74	b
1972	--	a	b
1973	Apr. 28, 1973	4.87	b
1974	--	a	b
1975	--	a	b
1976	--	a	b
1977	Aug. 21, 1977	4.49	b
1978	--	a	b

a Peak stage did not reach bottom of gage.

b Discharge not determined.

05-4829.00 Hardin Creek near Farlin, Iowa

Location.--Lat 42°06', long 94°26', near N1/4 corner sec.14, T.84 N., R.31 W., Greene County, at bridge, 1.5 miles northeast of Farlin.

Drainage area.--101 sq mi.

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 (cfs)
1951	Mar. 29, 1951	12.97	2,270
1952	Mar. 29, 1952	9.11	472
1953	July 14, 1953	7.96	300
1954	Aug. 27, 1954	12.57	1,810
1955	July 10, 1955	10.03	631
1956	--	a	<120
1957	June 17, 1957	10.59	743
1958	--	a	<120
1959	June 1, 1959	11.40	980
1960	Mar. 29, 1960	13.32	1,960
1961	Mar. 27, 1961	8.82	324
1962	Mar. 26, 1962	12.48	2,000
1963	May 13, 1963	10.87	930
1964	Apr. 13, 1964	9.39	615

a Peak stage did not reach bottom of gage.

05-4829.00 Hardin Creek near Farlin, Iowa--(Continued)

<u>Peak stages and discharges</u>			
<u>Water year</u>	<u>Date</u>	<u>Gage height (feet)</u>	<u>Discharge (cfs)</u>
1965	Sept. 21, 1965	9.79	703
1966	June 12, 1966	9.13	474
1967	June 13, 1967	10.95	1,020
1968	--	a	<300
1969	July 26, 1969	12.17	1,950
1970	--	a	<300
1971	Mar. 12, 1971	12.37 b	1,110
1972	May 6, 1972	9.04	570
1973	Mar. 18, 1973	11.32	960
1974	May 28, 1974	9.79	700
1975	--	a	c
1976	--	a	c
1977	--	a	c
1978	Mar. 16, 1978	9.26	510

a Peak stage did not reach bottom of gage.

b Affected by ice.

c Discharge not determined.

05-4829.50 East Fork Hardin Creek near Paton, Iowa
(Discontinued September 1955)

Location.--Lat 42°08'15", long 91°23'00", near S1/4 corner
sec.20, T.85 N., R.30 W., Greene County, at bridge on county
road H, 6 miles west of Paton.

Drainage area.--7.57 sq mi.

Gage.--Crest-stage gage.

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

Remarks.--Only annual peaks are shown.

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1952	July 7, 1952	4.72	39
1953	Mar. 24, 1953	7.77	68
1954	Aug. 26, 1954	7.00	60
1955	July 10, 1955	7.37	64
Discontinued September 1955			

05-4830.00 East Fork Hardin Creek near Churdan, Iowa

Location.--Lat 42°06'27", long 94°22'12", in SE1/4 SW1/4 sec.5, T.84 N., R.30 W., Greene County, on left bank 35 ft upstream from bridge on county highway E26, 1.6 miles upstream from small left-bank tributary, 4.4 miles upstream from mouth, and 6.5 miles southeast of Churdan.

Drainage area.--24.0 sq mi.

Gage.--Water-stage recorder. Datum of gage is 1,050.90 ft above National Geodetic Vertical Datum of 1929.

Stage-discharge relation.--Defined by current-meter measurements below 180 cfs and above by logarithmic plotting.

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

Remarks.--Peak base for partial-duration series, 150 cfs. Small diversion for irrigation above station. Base was 200 cfs. prior to 1962.

<u>Peak stages and discharges</u>			
<u>Water</u> <u>year</u>	<u>Date</u>	<u>Gage</u> <u>height</u> <u>(feet)</u>	<u>Discharge</u> <u>(cfs)</u>
1952	July 14, 1952	4.33 a	79
1953	June 10, 1953	5.17	105
1954	Aug. 26, 1954	7.73	329
1955	Oct. 13, 1954	6.15	250
	July 10, 1955	6.60	252
1956	May 13, 1956	4.42	112
1957	June 14, 1957	6.57	216
	June 16, 1957	8.82	371
1958	July 19, 1958	6.10	186
1959	May 31, 1959	7.36	288

a Maximum for period July to September 1952.

05-4830.00 East Fork Hardin Creek near Churdan, Iowa-- (Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1960	Mar. 29, 1960	7.63 b	300 c
	Apr. 24, 1960	8.04	350
	May 5, 1960	8.92	413
	May 25, 1960	6.30	231
1961	Feb. 22, 1961	5.41 b	150 c
1962	Mar. 25, 1962	6.06	231
	May 29, 1962	5.20	160
	July 14, 1962	7.46	315
	July 20, 1962	5.42	173
1963	Apr. 29, 1963	7.78	300
1964	Apr. 13, 1964	5.36	172
	Apr. 27, 1964	5.18	159
1965	Mar. 31, 1965	8.28 b	300 c
	Apr. 5, 1965	6.13	214
	Sept. 27, 1965	5.45	170
1966	June 12, 1966	8.32	367
	June 27, 1966	6.27	180
1967	June 9, 1967	6.40	235
	June 13, 1967	6.83	265
	June 16, 1967	5.57	179
	June 19, 1967	5.21	157
	June 24, 1967	5.80	193
	June 27, 1967	6.70	256
1968	June 25, 1968	4.13	77
1969	Oct. 17, 1968	6.15	191
	Mar. 19, 1969	6.83	297
	Mar. 24, 1969	6.34	248
	May 5, 1969	5.97	215
	June 29, 1969	6.34	201
	July 9, 1969	7.46	306
	July 26, 1969	6.46	211

b Affected by ice.

c About.

05-4830.00 East Fork Hardin Creek near Churdan, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1970	May 14, 1970	3.89	70
1971	Feb. 19, 1971	7.86	200 c
1972	Mar. 6, 1972	5.86 b	160 c
	Aug. 1, 1972	5.72	195
1973	Feb. 24, 1973	--	157 c
	Mar. 1, 1973	--	152 c
	Mar. 11, 1973	5.74	208
	Apr. 15, 1973	5.78	199
	May 7, 1973	5.95	205
	July 2, 1973	6.46	248
	Aug. 23, 1973	5.58	177
	Sept. 26, 1973	8.26 d	385
1974	Oct. 11, 1973	5.65	197
	Feb. 17, 1974	5.25	159
	May 13, 1974	5.58	206
	May 16, 1974	6.13	243
	May 18, 1974	7.71	385
1975	Mar. 18, 1975	6.83 b	--
	Apr. 28, 1975	5.39	195
1976	May 23, 1976	5.11	148
1977	Sept. 30, 1977	6.02	197
1978	July 9, 1978	5.64	180
	Sept. 13, 1978	7.59	225
	Sept. 20, 1978	5.88	191

b Affected by ice.

c About.

d Backwater from debris.

05-4833.18 Brushy Fork Creek near Templeton, Iowa

Location.--Lat 41°57', long 94°53', in NW1/4 Sec. 1, T.82 N., R.35 W., Carroll County, at bridge on U.S. Highway 71, 1.4 miles northeast of Templeton.

Drainage area.--45.0 sq mi.

Gage.--Crest-stage gage.

Stage-discharge relationship.--

Remarks.--Only annual peaks are shown.

<u>Peak stages and discharges</u>			
<u>Water year</u>	<u>Date</u>	<u>Gage height (feet)</u>	<u>Discharge (cfs)</u>
1966	June 12, 1966	88.62	b
1967	June 7, 1967	88.70	b
1968	--	a	b
1969	July 26, 1969	86.99	b
1970	May 13, 1970	83.91	b
1971	Mar. 13, 1971	87.78 c	b
1972	Oct. 30, 1971	86.48	b
1973	Sept. 26, 1973	88.62	b
1974	June 23, 1974	90.96	b
1975	Apr. 27, 1975	85.72	b
1976	--	a	b
1977	--	a	b
1978	Sept. 12, 1978	87.56	1,850

a Peak stage did not reach bottom of gage.

b Discharge not determined.

c Affected by ice.

05-4833.49 Middle Raccoon River Tributary at Carroll, Iowa

Location.--Lat 42°03', long 94°53', in NW1/4 Sec. 36, T.84 N., R.35 W., Carroll County, at bridge on U.S. Highway 71, 1.5 miles south of Carroll.

Drainage area.--6.58 sq mi.

Gage.--Crest-stage gage.

Stage-discharge relationship.--

Remarks.--Only annual peaks are shown.

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1966	June 12, 1966	90.12	b
1967	June 27, 1967	90.45	b
1968	June 25, 1968	89.69	b
1969	July 26, 1969	90.37	b
1970	--	a	b
1971	Mar. 13, 1971	89.64 c	b
1972	Sept. 12, 1972	87.67	b
1973	July 1, 1973	90.58	580
1974	--	a	b
1975	Apr. 27, 1975	90.34	b
1976	May 23, 1976	91.06	680
1977	--	a	b
1978	--	a	b

- a Peak stage did not reach bottom of gage.
 b Discharge not determined.
 c Affected by ice.

05-4836.00 Middle Raccoon River at Panora, Iowa

Location.--Lat 41°41'14", long 94°22'15", in NE1/4 NW1/4 sec.5, T.79 N., R.30 W., Guthrie County, on left bank 15 ft downstream from bridge on county highway, 0.2 miles southwest of Panora, 1.5 miles upstream from Andy's Branch, and 1.7 miles downstream from Lake Panorama.

Drainage area.--440 sq mi.

Gage.--Water-stage recorder and concrete control. Datum of gage is 991.20 ft above National Geodetic Vertical Datum of 1929.

Stage-discharge relation.--Defined by current-meter measurements below 4,500 cfs and above by logarithmic plotting.

Remarks.--Base for partial-duration series, 2,500 cfs. City of Panora diverts approximately 100 acre-ft/yr above station. Flow regulated by dam on Lake Panorama since August 1970.

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
<u>1953</u>	June 10, 1953	14.3 a	14,000 b
1958	July 2, 1958	11.87	9,150 b
	July 3, 1958	8.95	4,200
	July 19, 1958	8.07	3,020
1959	June 1, 1959	7.50	2,480
1960	Mar. 31, 1960	9.68	5,320
	May 7, 1960	8.33	3,740
1961	June 16, 1961	7.82	2,730
1962	Mar. 26, 1962	9.29	4,620
	June 10, 1962	8.85	3,940
1963	Aug. 7, 1963	9.05	4,200
1964	June 22, 1964	10.47	6,300

a From floodmark.

b About.

05-4836.00 Middle Raccoon River at Pancra, Iowa-- (Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1965	Mar. 2, 1965	11.54 c	4,600 b
	Mar. 17, 1965	10.87	6,890
	Apr. 2, 1965	8.49	3,540
	Apr. 5, 1965	9.35	4,690
	May 27, 1965	7.90	2,840
1966	June 12, 1966	8.54	3,480
	June 29, 1966	8.79	3,800
1967	June 7, 1967	8.45	3,550
	June 10, 1967	9.95 a	5,600
	June 12, 1967	8.37	3,450
	June 25, 1967	9.53 a	5,010
1968	June 26, 1968	6.18	1,150
1969	Mar. 20, 1969	9.84 a	5,380
	Mar. 24, 1969	10.25	5,950
	July 10, 1969	7.93	2,870
1970	May 15, 1970	7.83	2,780
1971	Feb. 19, 1971	12.98 ac	8,900 b
1972	Mar. 1, 1972	7.63	2,670
	May 7, 1972	7.51	2,550
	June 17, 1972	8.17	3,300
	Aug. 2, 1972	9.64	5,110
1973	Mar. 2, 1973	7.87	2,970
	Apr. 16, 1973	8.35	3,370
	Apr. 26, 1973	8.39	3,380
	May 9, 1973	8.87	4,180
	June 4, 1973	8.04	3,190
	July 3, 1973	13.56 a	12,000
	July 30, 1973	9.39	4,570
	Sept. 28, 1973	8.99	4,090

a From floodmark.

b About.

c Affected by ice.

05-4836.00 Middle Raccoon River at Panora, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1974	May 17, 1974	7.85	2,810
	May 19, 1974	14.80	14,000
	May 21, 1974	9.00	4,240
	May 27, 1974	9.13	4,410
	June 14, 1974	8.13	3,150
1975	Apr. 29, 1975	8.36	3,420
	June 18, 1975	7.88	2,850
	Aug. 27, 1975	7.90	2,870
1976	May 23, 1976	11.05	7,300
1977	Aug. 26, 1977	7.75	2,690
1978	Mar. 20, 1978	8.97	4,180
	Sept. 13, 1978	9.18	4,470

05-4840.00 South Raccoon River at Redfield, Iowa

Location.--Lat 41°34'48", long 94°10'58", in SW1/4 SW14/ sec.3, T.78 N., R.29 W., Dallas County, on left bank 15 ft downstream from bridge on county highway at Redfield, 0.8 mile downstream from bridge on U.S. Highway 6, 1.0 mile downstream from Middle Raccoon River, and 15.6 miles upstream from mouth.

Drainage area.--988 sq mi.

Gage.--Water-stage recorder. Datum of gage is 896.43 ft above National Geodetic Vertical Datum of 1929. Prior to June 12, 1946, nonrecording gage, and June 12, 1946, to Sept. 30, 1966, water-stage recorder at site 20 ft upstream at same datum.

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

Flood stage.--14 feet.

Remarks.--Base for partial-duration series, 5,000 cfs.

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1940	July 31, 1940	13.3	6,100
1941	June 28, 1941	10.5	3,550
1942	May 11, 1942	13.0	5,740
	Aug. 28, 1942	13.4	6,380
1943	Aug. 25, 1943	14.1	6,610
1944	May 3, 1944	13.2	5,930
	May 20, 1944	23.8	20,000
	May 23, 1944	16.9	9,750
	June 11, 1944	13.7	6,430
1945	May 14, 1945	15.0	7,730
	May 22, 1945	17.2	10,100
	May 30, 1945	15.0	7,730
	June 6, 1945	13.1	5,830
1946	Aug. 24, 1946	18.9	12,000
	Sept. 8, 1946	21.4	15,200

05-4840.00 South Raccoon River at Redfield, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1947	June 2, 1947	19.9	15,000
	June 5, 1947	22.7	20,500
	June 12, 1947	24.3	23,800
	June 24, 1947	16.7	10,500
1948	Mar. 19, 1948	21.3	17,600
1949	Mar. 6, 1949	14.2	7,530
1950	May 5, 1950	14.7	7,990
	June 19, 1950	17.9	11,600
	June 23, 1950	13.8	7,080
1951	Mar. 29, 1951	20.10	15,400
	May 2, 1951	17.70	11,700
	June 2, 1951	18.14	12,200
	June 7, 1951	12.19	5,680
	July 3, 1951	16.26	10,100
1952	Mar. 13, 1952	11.53	5,160
	Mar. 31, 1952	14.39	7,840
	June 21, 1952	12.12	5,680
	June 27, 1952	16.06	9,740
1953	May 24, 1953	12.23	5,680
	June 10, 1953	23.08	21,300
1954	Aug. 22, 1954	13.84	7,200
1955	Apr. 24, 1955	12.86	6,310
1956	Sept. 4, 1956	9.80	3,840
1957	June 17, 1957	17.80	12,700
1958	July 2, 1958	29.04 a	35,000
	July 4, 1958	19.28	14,200
	July 19, 1958	15.80	9,580
	Sept. 6, 1958	25.12	25,500
1959	May 30, 1959	10.95	5,420

a From floodmark.

05-4840.00 South Raccoon River at Redfield, Iowa-- (Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1960	Mar. 30, 1960	15.29	9,340
	May 7, 1960	15.31	9,340
1961	Feb. 23, 1961	11.23	5,590
	Mar. 27, 1961	10.67	5,160
	June 14, 1961	10.78	5,250
	Sept. 30, 1961	11.00	5,420
1962	Mar. 19, 1962	17.50 b	--
	Mar. 24, 1962	14.42	8,350
	May 29, 1962	15.46	9,340
	June 9, 1962	13.01	7,090
1963	Mar. 3, 1963	13.43 b	6,300 c
	Apr. 29, 1963	15.25	9,240
	Aug. 7, 1963	10.85	5,080
1964	Apr. 13, 1964	13.57	7,720
	June 23, 1964	19.69	14,900
1965	Feb. 21, 1965	11.82 b	5,600 c
	Mar. 2, 1965	17.70	12,800
	Mar. 17, 1965	19.60	15,800
	Apr. 1, 1965	15.14	9,350
	Apr. 5, 1965	16.99	11,800
1966	June 12, 1966	15.17	9,460
1967	June 8, 1967	14.06	8,080
	June 10, 1967	17.12	12,000
	June 12, 1967	15.21	9,430
1968	Sept. 4, 1968	6.27	1,710
1969	Mar. 19, 1969	16.69	11,700
	Mar. 24, 1969	16.08	10,900
	June 29, 1969	11.75	5,990
	July 9, 1969	13.55	7,780
1970	May 14, 1970	14.50	9,050

b Affected by ice.

c About.

05-4840.00 South Raccoon River at Redfield, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1971	Feb. 19, 1971	20.82	17,800
	Mar. 14, 1971	14.61	9,200
	June 6, 1971	17.25	12,500
1972	Aug. 2, 1972	12.82	7,220
	Sept. 11, 1972	13.95	8,410
1973	Mar. 14, 1973	10.33	5,010
	Apr. 1, 1973	10.95	5,650
	Apr. 16, 1973	14.77	9,650
	May 8, 1973	17.63	13,000
	June 5, 1973	10.74	5,260
	July 4, 1973	19.97	16,500
	July 30, 1973	10.96	5,450
1974	Sept. 26, 1973	14.74	9,310
	Oct. 11, 1973	11.96	6,380
	Apr. 21, 1974	15.58	10,300
	Apr. 28, 1974	12.93	7,380
	May 16, 1974	10.64	5,210
	May 19, 1974	21.85	20,000
	May 21, 1974	13.42	8,300
1975	May 26, 1974	11.52	6,150
	Apr. 28, 1975	15.45	10,200
	June 18, 1975	14.28	8,680
1976	June 25, 1975	12.40	6,720
	Mar. 12, 1976	10.41	5,130
	May 23, 1976	12.71	7,490
1977	Aug. 26, 1977	15.90	11,300
	Aug. 28, 1977	13.76	8,740
	Sept. 3, 1977	12.97	7,870
1978	Mar. 21, 1978	a	8,640
	Mar. 22, 1978	14.02	8,990
	Apr. 17, 1978	17.13	12,700
	Sept. 13, 1978	13.79	8,770
	Sept. 14, 1978	14.63	9,760

a Affected by ice.

05-4845.00 Raccoon River at Van Meter, Iowa

Location.--Lat 41°32'02", long 93°56'59", in SW1/4 SW1/4 sec.22, T.78 N., R.27 W., Dallas County, on right bank 10 ft downstream from bridge on county highway R16, 0.3 mile northeast of Van Meter, 0.7 mile upstream from small left bank tributary, 1.2 miles downstream from confluence of North and South Raccoon River, and 30 miles upstream from mouth.

Drainage area.--3,441 sq mi.

Gage.--Water-stage recorder at present site after Aug. 9, 1934. Datum of gage is 841.16 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1915, chain gage at same site and at datum 2 ft higher. Oct. 1, 1915, to May 30, 1923, chain gage, May 31, 1923, to Sept. 30, 1927, water-stage recorder, and Oct. 1, 1927, to Aug. 8, 1934, chain gage, all at same site and datum.

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

Flood stage.--13 feet.

Remarks.--Base for partial-duration series, 10,000 cfs.

<u>Peak stages and discharges</u>			
<u>Water</u> <u>year</u>	<u>Date</u>	<u>Gage</u> <u>height</u> <u>(feet)</u>	<u>Discharge</u> <u>(cfs)</u>
1915	May 29, 1915	<u>15.19</u>	21,600
1916	Mar. 16, 1916	8.4	5,840
1917	June 7, 1917	18.4	35,200
	June 10, 1917	17.0	26,000
1918	June 6, 1918	13.7	14,800
1919	Apr. 24, 1919	12.6	12,400
	May 4, 1919	12.4	12,000
	June 4, 1919	11.7	10,700
	June 11, 1919	11.8	11,000
1920	Mar. 14, 1920	12.2 a	10,000 b
1921	Sept. 20, 1921	11.1	9,670

a Affected by ice.

b About.

05-4845.00 Raccoon River at Van Meter, Iowa--(Continued)

<u>Peak stages and discharges</u>			
Water year	Date	Gage height (feet)	Discharge (cfs)
1922	Apr. 11, 1922	12.1	11,400
1923	Mar. 27, 1923	11.6	10,300
1924	Oct. 3, 1923	11.2	10,000
	June 8, 1924	12.3	12,400
	June 25, 1924	15.2	20,100
1925	Aug. 7, 1925	10.1	8,060
1926	Sept. 20, 1926	19.0	32,000
1927	Feb. 8, 1927	9.7	6,880
1928	Aug. 27, 1928	10.8	8,480
1929	Mar. 14, 1929	16.2	19,400
1930	May 13, 1930	8.8	5,870
1931	June 21, 1931	8.3	5,270
1932	Nov. 24, 1931	14.6	15,200
	Jan. 1, 1932	12.5	11,400
	Mar. 4, 1932	14.2	14,200
1933	Apr. 5, 1933	10.1	7,550
1934	Apr. 7, 1934	5.0	2,020
1935	Mar. 5, 1935	13.1	11,000
1936	Mar. 5, 1936	13.9	12,200
1937	Mar. 4, 1937	13.9	12,200
1938	June 2, 1938	11.6	8,590
1939	Mar. 12, 1939	17.85 a	14,000 b
	Mar. 16, 1939	13.0	10,600

a Affected by ice.

b About.

05-4845.00 Raccoon River at Van Meter, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1940	July 31, 1940	9.2	5,770
1941	June 2, 1941	10.0	6,920
1942	May 11, 1942	11.7	8,800
1943	June 16, 1943	12.9	10,000
	Aug. 16, 1943	14.7	12,500
1944	May 21, 1944	18.3	23,400
	June 11, 1944	15.1	13,100
	June 16, 1944	17.2	17,900
1945	Mar. 15, 1945	13.7	11,600
	Apr. 28, 1945	12.7	10,200
	May 15, 1945	13.4	11,200
	May 23, 1945	15.7	14,300
	May 31, 1945	15.0	12,900
	June 6, 1945	16.1	15,100
	June 13, 1945	13.0	10,900
1946	Aug. 25, 1946	13.2	10,300
	Sept. 9, 1946	16.1	15,100
1947	June 3, 1947	17.4	19,800
	June 5, 1947	19.3	25,600
	June 13, 1947	21.37 c	41,200
	June 23, 1947	16.4	17,300
	June 25, 1947	21.1	38,000
1948	Mar. 19, 1948	19.0	26,700
1949	Mar. 6, 1949	15.7	15,900
1950	Mar. 7, 1950	12.4	11,300
	June 20, 1950	16.1	17,600
	June 24, 1950	14.0	13,700

c From floodmark.

05-4845.00 Raccoon River at Van Meter, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1951	Mar. 31, 1951	19.15	27,700
	May 2, 1951	17.00	19,900
	June 3, 1951	17.13	20,200
	June 8, 1951	14.47	14,400
	July 4, 1951	15.18	15,800
	July 6, 1951	11.55	10,100
1952	Apr. 1, 1952	14.81	15,100
	June 27, 1952	14.67	14,900
1953	June 11, 1953	19.42	26,000
1954	June 16, 1954	12.46	11,000
	June 25, 1954	17.40	20,800
	Aug. 22, 1954	12.07	10,200
	Aug. 31, 1954	14.14	13,800
1955	Apr. 24, 1955	11.43	8,620
1956	Sept. 4, 1956	7.43	4,150
1957	June 18, 1957	17.27	20,000
1958	July 3, 1958	21.77	35,200
	July 20, 1958	13.73	13,300
	Sept. 6, 1958	17.76	20,900
1959	June 4, 1959	13.22	13,500
1960	Apr. 2, 1960	21.18	32,300
	May 7, 1960	14.62	14,800
	May 26, 1960	11.76	10,400
1961	Mar. 27, 1961	12.35	11,300
1962	Mar. 31, 1962	17.23	19,700
	May 29, 1962	14.33	14,900
	June 11, 1962	12.42	11,900
	Sept. 7, 1962	11.45	10,400

05-4845.00 Raccoon River at Van Meter, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1963	Mar. 4, 1963	14.38 a	10,000 b
	Mar. 11, 1963	13.85	12,200
	Apr. 29, 1963	12.62	12,200
1964	June 23, 1964	15.92	17,400
1965	Mar. 2, 1965	14.73 a	13,000 b
	Mar. 17, 1965	18.20 a	20,100 b
	Apr. 1, 1965	13.93	14,300
	Apr. 6, 1965	18.35	22,300
	May 30, 1965	11.20	10,400
1966	June 13, 1966	15.15	16,200
1967	June 8, 1967	13.09	12,300
	June 10, 1967	17.04	18,700
	June 12, 1967	18.07	20,600
	June 26, 1967	12.11	10,900
1968	June 27, 1968	7.05	4,360
1969	Mar. 25, 1969	17.60	22,800
	Apr. 9, 1969	12.07	10,900
	June 29, 1969	12.95	12,400
	July 10, 1969	14.18	14,700
	July 18, 1969	11.74	10,400
1970	May 14, 1970	14.23	14,800
1971	Feb. 20, 1971	18.85 a	23,000 b
	Mar. 14, 1971	14.55	15,400
	June 6, 1971	13.44	13,300
1972	June 18, 1972	10.74	8,840
	Aug. 2, 1972	10.96	9,140
	Aug. 6, 1972	10.71	8,790
	Sept. 11, 1972	11.33	9,730

a Affected by ice.

b About.

05-4845.00 Raccoon River at Van Meter, Iowa--(Continued)

Peak stages and discharges			
Water year	Date	Gage height (feet)	Discharge (cfs)
1973	Feb. 2, 1973	15.15 a	14,300 b
	Feb. 25, 1973	11.00	9,200
	Mar. 7, 1973	13.43	13,300
	Mar. 14, 1973	14.80	16,000
	Apr. 1, 1973	13.48	13,400
	Apr. 16, 1973	17.59	22,700
	May 8, 1973	17.55	21,600
	June 1, 1973	10.68	8,750
	June 5, 1973	11.77	10,400
	July 1, 1973	20.74	32,400
	July 4, 1973	21.74	35,600
	Sept. 29, 1973	13.16	12,800
1974	Oct. 1, 1973	15.33	17,100
	Oct. 11, 1973	14.01	14,300
	Oct. 15, 1973	11.87	10,600
	Apr. 21, 1974	13.47	13,400
	Apr. 29, 1974	14.33	15,000
	May 19, 1974	20.13	30,400
	May 27, 1974	11.95	11,000
	May 29, 1974	10.71	9,380
	June 9, 1974	11.87	11,100
1975	Mar. 21, 1975	12.34	11,300
	Apr. 28, 1975	13.90	14,100
	June 18, 1975	14.01	14,300
	June 25, 1975	11.92	10,700
	June 27, 1975	10.59	8,630
1976	Apr. 24, 1976	10.69	8,710
	May 24, 1976	12.84	12,200
1977	Aug. 26, 1977	12.50	11,600
	Aug. 28, 1977	12.79	11,900
1978	Mar. 22, 1978	17.62a	20,800
	Aug. 18, 1978	14.48	15,300
	Sept. 14, 1978	13.14	12,800
	Sept. 20, 1978	12.63	11,800

a Affected by ice.

b About.

TEMPORARY BENCH MARKS
RACCOON RIVER BASIN
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 and the U.S. Geological Survey.

The streams covered by the level work were the Raccoon River, North Raccoon River, South Raccoon River and Middle Raccoon 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 8030 for Township 80 North and Range 30 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 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 information, 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.

TEMPORARY BENCH MARKS

- 7824-8 NE (1) - At Des Moines on Fleur Drive bridge over Raccoon River, at end of right downstream abutment guardrail post at sidewalk level; chiseled square. Elev. 809.23 feet.
- 7824-8 NE (2) - At Des Moines on Fleur Drive bridge over Raccoon River, on right downstream curb; chiseled triangle. Elev. 810.52 feet.
- 7824-8 NE (3) - (REFERENCE POINT) At Des Moines at Fleur Drive bridge over Raccoon River between 1st and 2nd handrail posts right of 4th pier from right bank on downstream side of bridge; chiseled arrow. Elev. 829.05 feet.
- 7824-8 NE (5) - At Des Moines at Fleur Drive bridge over Raccoon River and Chicago, Rock Island and Pacific Railroad, on 4th concrete pier from left downstream end of bridge, 40 feet south of south rail set in top of pier footing; a standard disk stamped "A 164 1950" (NGS). Elev. 797.357 feet.
- 7824-9 NE (1) - At Des Moines on 5th Street bridge over Raccoon River, on left downstream wingwall on landward corner; chiseled triangle. Elev. 801.99 feet.
- 7824-9 NE (2) - (REFERENCE POINT) At Des Moines on 5th Street bridge over Raccoon River, on top of 8th walkway post from left downstream; chiseled arrow. Elev. 807.74 feet.
- 7824-9 SE (2) - At Des Moines on 7th Street bridge over Raccoon River, on left downstream abutment base at corner with wingwall, at track level; white paint pencil square. Elev. 797.10 feet.
- 7824-9 SW (1) - At Des Moines on Burlington Northern railroad bridge over Raccoon River, on 1st pier from right bank on downstream landward bolt of girder seat; chiseled cross. Elev. 798.27 feet.
- 7824-9 SW (2) - (REFERENCE POINT) At Des Moines on Burlington Northern railroad bridge over Raccoon River, on downstream landward side of 8th steel floor beam from 2nd pier from right bank; chiseled arrow. Elev. 800.66 feet.
- 7824-10 NW (1) - In Des Moines at Riverside Drive bridge over Raccoon River, on left upstream wingwall; a chiseled square. Elev. 803.54
- 7824-10 NW (2) - (REFERENCE POINT) In Des Moines at Riverside Drive bridge over Raccoon River, on center of downstream handrail section at center light post, chiseled arrow. Elev. 809.76 feet.

- 7825-13 NE (1) - About 1.25 miles east of 63rd street between Chicago and North Western, and Chicago, Rock Island and Pacific Railroad on West abutment of bridge number 3611 over Walnut Creek; standard disk stamped "H4 1930". (NGS) Elev. 808.637 feet.
- 7825-14 NE (1) - At West Des Moines at the 63rd Street bridge over Raccoon River on left downstream wingwall curb; chiseled square. Elev. 823.85 feet.
- 7825-14 NE (2) - (REFERENCE POINT) At West Des Moines at 63rd Street bridge over Raccoon River, on 15th guardrail post from left downstream end of bridge; chiseled arrow. Elev. 831.75 feet.
- 7825-14 NE (3) - At Des Moines-West Des Moines boundary on 63rd Street crossing of Chicago, Rock Island and Pacific Railroad, 45 feet north and 43 feet east of crossing in south side of 2 foot by 1 foot power pole; railroad spike. Elev. 814.06 feet.
- 7825-14 NW (1) - In West Des Moines about 2000 feet west of 63rd Street in "Y" formed by Chicago and Northwestern Railway and Chicago, Rock Island and Pacific Railroad, 35 feet west of west property line of 6th Street extended, in southeast corner of 4 foot by 8 foot concrete slab on top of 2 inch bolt; chiseled cross. Elev. 813.40 feet.
- 7825-15 NE (1) - About 0.5 mile southwest of West Des Moines Post Office at a road crossing along Chicago, Rock Island and Pacific Railroad 0.1 mile east of Penn-Dixie Cement Plant, 33 feet northwest of northwest rail of most northwestern side track, 45 feet south of centerline of gravel road leading west to cement plant and at southwest edge of road crossing tracks, in top of concrete post 0.2 foot above ground; standard disk stamped "M155 1950". (NGS) Elev. 815.12 feet.
- 7825-15 SW (1) - About 1.2 miles southwest of Post Office in West Des Moines at bridge 3639 on Chicago, Rock Island and Pacific Railroad, on upstream end of right abutment 1 foot below level of track; standard disk stamped "N 155 1950". (NGS) Elev. 818.693 feet.

- 7825-21 NE (1) - About 1.3 miles northeast of Commerce along the Chicago, Rock Island and Pacific Railroad at a private road crossing leading southeast across tracks, 18 feet southwest of centerline of crossing, 41.5 feet northwest of northwest rail, 56 feet southeast of centerline of State Highway 90, 2.3 feet east of witness post set in top of a concrete post 0.3 foot above ground; a standard disk stamped "P 155 1950". (NGS) Elev. 820.061 feet.
- 7825-29 NE (1) - At Commerce 125 feet northwest of north end of former bridge location across Raccoon River, 38.5 feet north of north rail, 72 feet west of centerline of old road leading to former bridge, 25 feet south of centerline of east-west road and 2.2 feet east of witness post, set in top of concrete post 0.2 ft above ground; standard disk stamped "Q 155 1950". (NGS) Elev. 838.906 feet.
- 7825-30 NE (1) - About 0.9 mile west of Commerce along Chicago, Rock Island and Pacific Railroad, about 1400 feet west of Interstate 35 overpass at a private road crossing, 16 feet west of crossing, 47.5 feet north of north rail, 1.7 feet south of fence, 2.2 feet west of witness post, set in top of concrete post 0.4 feet above ground; standard disk stamped "R 155 1950". (NGS) Elev. 828.634 feet.
- 7825-30 NW (1) - About 1.3 miles west of Commerce along Chicago, Rock Island and Pacific Railroad at State Highway 90 overpass, set vertically in south face of most southeasterly of 4 concrete piers on north side of track and 2.1 feet above ground; a standard disk stamped "S 155 1950". (NGS) Elev. 833.614 feet.
- 7825-30 SE (1) - At West Des Moines at Interstate 35 bridge over Raccoon River, on left downstream wingwall curb of downstream bridge; chiseled cross. Elev. 835.70 feet.
- 7825-30 SE (2) - (REFERENCE POINT) At West Des Moines at Interstate 35 bridge over Raccoon River, on 35th guardrail post from left downstream end of downstream bridge; filed arrow. Elev. 839.03 feet.
- 7826-25 NW (1) - About 2.4 miles west of Commerce at Chicago, Rock Island and Pacific Railroad culvert, on right end of upstream headwall; a USGS standard disk stamped "Elev 834.903 ft". Elev. 834.933 feet.
- 7826-26 NW (1) - About 3.4 miles west of Commerce along Chicago, Rock Island and Pacific Railroad at bridge number 369.7, on top of downstream end of right abutment 1 foot below level of track; a standard disk stamped "T 155 1950". (NGS) Elev. 841.967 feet.

- 7826-28 NE (1) - About 1.9 miles east of Booneville along Chicago, Rock Island and Pacific Railroad at bridge number 370.9, in downstream end of right abutment; USGS standard disk stamped "Elev. 845.208 feet."
Elev. 845.261 feet.
- 7826-28 SW (1) - About 0.9 miles east of Booneville railroad station along State Highway 90, 118 ft south of centerline, 16 feet east of center of gate, 1.1 ft north of fence and 2.2 ft east of witness post, in top of concrete post 0.4 ft above ground; a standard disk stamped "U 155 1950". (NGS)
Elev. 854.234 feet.
- 7826-30 SW (1) - About 0.6 miles west of Booneville on Chicago, Rock Island and Pacific Railroad overflow bridge number 3735 west of main bridge over Raccoon River, in downstream end of right abutment 0.5 foot below level of track; standard disk stamped "V 155 1950". (NGS)
Elev. 856.813 feet.
- 7826-30 SW (2) - About 0.3 mile west of Booneville at State Highway 90 bridge over Raccoon River, on right downstream curb; Iowa Department of Transportation plug.
Elev. 863.18 feet.
- 7826-30 SW (3) - (REFERENCE POINT) About 3.0 mile west of Booneville at State Highway 90 bridge over Raccoon River, on top of guardrail beside 45th post from right downstream bridge; chiseled arrow.
Elev. 863.65 feet.
- 7827-7 SW (1) - About 4.0 miles south of Adel on U.S. Highway 169 at T-road west, 190 feet north and 50 feet west of intersection, on high bank 5 feet west of fence line, in concrete post; standard tablet stamped "2 AH 1948".
Elev. 992.709 feet.
- 7827-18 NW (1) - About 4.0 miles south of Adel at U.S Highway 169 bridge over South Raccoon River, and on left upstream wingwall; chiseled square.
Elev. 885.43 feet.
- 7827-18 NW (2) - (REFERENCE POINT) About 4.0 miles south of Adel at U.S. Highway 169 bridge over South Raccoon River, on top of guardrail beside 16th post from left downstream end of bridge; filed arrow.
Elev. 888.52 feet.
- 7827-20 NE (1) - About 2.0 miles northwest of Van Meter at Interstate 80 bridge over South Raccoon River, on left upstream wingwall curb of upstream bridge; Iowa Department of Transportation plug.
Elev. 879.05 feet.
- 7827-20 NE (2) - REFERENCE POINT) About 2.0 miles northwest of Van Meter at Interstate 80 bridge over South Raccoon River, on top of 30th guardrail post from left downstream end of downstream bridge; filed arrow.
Elev. 881.17 feet.

- 7827-20 SE (1) - About 1.9 miles west of Van Meter along Chicago, Rock Island and Pacific Railroad at a railroad bridge over Bulgers Creek, on top of right upstream abutment; a standard disk stamped "T 161 1950".
(NGS) Elev. 878.023 feet.
- 7827-21 NW (1) - About 1.5 miles northeast of Van Meter at Interstate 80 bridge over North Raccoon River, on downstream bridge on right downstream wingwall; Iowa Department of Transportation plug.
Elev. 875.64 feet.
- 7827-21 NW (2) - (REFERENCE POINT) About 1.5 miles northeast of Van Meter at Interstate 80 bridge over North Raccoon River, on top of 35th guardrail post from right downstream end of downstream bridge; chiseled arrow.
Elev. 877.40 feet.
- 7827-21 SW (1) - About 1.0 mile northwest of Van Meter near bridge over South Raccoon River, 48 feet northeast of right abutment of bridge, in base of power pole; pole spike and collar. Elev. 861.75 feet.
- 7827-21 SW (2) - (REFERENCE POINT) About 1.0 mile northwest of Van Meter at county road bridge over South Raccoon River, on 3rd vertical member from right downstream end of bridge; filed arrow.
Elev. 872.02 feet.
- 7827-21 SW (3) - About 1.0 mile northwest of Van Meter at county road bridge over South Raccoon River, on top of right downstream pier; chiseled square. Elev. 868.37 feet.
- 7827-21 SW (4) - About 1.5 miles west of Van Meter along Chicago, Rock Island and Pacific Railroad near site of new county road bridge over South Raccoon River, about 240 feet east of centerline of road and 42 feet north of track; Railroad spike in telegraph pole.
Elev. 867.73 feet.
- 7827-22 SW (1) - At Van Meter at USGS gage on Raccoon River at county highway N 16 bridge on right downstream wingwall; Reference Mark #11, chiseled square. Elev. 867.22 feet.
- 7827-22 SW (2) - At Van Meter at USGS gage on Raccoon River at county highway R 16 bridge, on right downstream bridge seat of new bridge; chiseled square. (RM 15) Elev. 866.11 feet.
- 7827-22 SW (3) - At Van Meter at USGS gage and county highway R 16 bridge over Raccoon River, on right downstream wingwall; chiseled square.
Elev. 870.34 feet.
- 7828-16 NE (1) - About 6.5 miles southeast of Redfield at county road P 58 bridge over South Raccoon River on right downstream wingwall; chiseled square. Elev. 898.96 feet.

- 7828-16 NE (2) - (REFERENCE POINT) About 6.5 miles southeast of Redfield at county road P 58 bridge over South Raccoon River, on top of guard-rail beside 33rd post from right downstream end of bridge; filed arrow. Elev. 901.16 feet.
- 7828-17 SE (1) - About 5.5 miles southeast of Redfield and about 0.8 mile west along dirt road in Earlham access from entrance at county road P58, 45 feet east from corrugated pipe culvert, in trunk of large basswood tree on right bank of South Raccoon River, pole spike and collar. Elev. 891.18 feet.
- 7828-17 NW (1) - About 5.0 miles southeast of Redfield at a telephone cable crossing over South Raccoon River, on left bank in base of north pole of cable support; railroad spike. Elev. 891.66 feet.
- 7829-02 NE (1) - About 2.25 miles east of Redfield at county road bridge over South Raccoon River, on top of left downstream concrete pier; chiseled square. Elev. 908.63 feet.
- 7829-02 NE (2) - (REFERENCE POINT) About 2.25 miles east of Redfield at county road bridge over South Raccoon River, on 4th vertical member from left downstream end of bridge; chiseled arrow. Elev. 917.01 feet.
- 7829-02 SE (3) - About 2.25 miles east of Redfield at county road bridge over South Raccoon River, near left upstream corner of bridge in power pole; railroad spike. Elev. 907.82 feet.
- 7829-03 SE (1) - About 1.5 miles east of Redfield along north-south section of generally east-west road, at a tile outlet collection pit and culvert between Sec 2 and 3, on west headwall; chiseled square. Elev. 918.44 feet.
- 7829-03 SW (1) - About 1 mile southeast of Redfield at USGS recording gage at bridge over South Raccoon River, 70 feet downstream from gage in upstream face of 48 inch Elm tree stump; 1/2 inch galvanized bolt. (Gage RM No. 6) Elev. 915.73 feet.
- 7829-03 SW (2) - About 1 mile southeast of Redfield at USGS recording gage at bridge over South Raccoon River, on left downstream pier; chiseled cross on rivet. Elev. 918.33 feet.
- 7829-04 NW (1) - At Redfield at county road F59 bridge over Middle Raccoon River, on left upstream wingwall; chiseled cross (found). Elev. 933.48 feet.

- 7829-04 NW (2) - (REFERENCE POINT) At Redfield at county road F59 bridge over Middle Raccoon River, on top of guardrail at 14th post from left downstream end of bridge; chiseled arrow.
Elev. 936.96 feet.
- 7829-04 SE (1) - About 0.5 mile south of Redfield at junction of U.S. Highway 6 and "T" road east, 54 ft south and 29 ft east of intersection in power pole; railroad spike. Elev. 960.46 feet.
- 7829-07 NW (1) - About 4 miles north of Dexter at first house west of county road P48 south of "T" road west, on southwest corner of concrete porch step; no mark. Elev. 1027.15 feet.
- 7829-07 SE (1) - About 3 miles north of Dexter at county road P48 bridge over South Raccoon River, on left downstream wingwall; chiseled square. Elev. 946.04 feet.
- 7829-07 SE (2) - (REFERENCE POINT) About 3 miles north of Dexter at county road P48 bridge over South Raccoon River on top of 22nd guardrail post from left downstream end of bridge; chiseled arrow. Elev. 948.33 feet.
- 7829-07 SW (1) - About 3 miles north of Dexter at junction of county road P48 and "T" road west, 77 ft west and 27 ft south of intersection in power pole; railroad spike. Elev. 939.66 feet.
- 7829-9 NE (1) - About 1.0 mile south of Redfield at U.S Highway 6 bridge over South Raccoon River, on top of left upstream guardrail Iowa Department of Transportation plug. Elev. 938.02 feet.
- 7829-9 NE (2) - (REFERENCE POINT) About 1.0 mile south of Redfield at U.S. Highway 6 bridge over South Raccoon River, on top of and at center of 10th concrete guardrail section from left downstream end of bridge; chiseled arrow. Elev. 939.28 feet.
- 7829-13 NE (1) - About 4 miles southeast of Redfield, south of "L" in county road to east and on tangent line with east ditch line, 40 feet northwest of center of road and on high bank 12 feet north of power pole, in concrete post; standard tablet stamped "4 RH 1948". Elev. 1055.920 feet.
- 7829-18 NE (1) - About 4.5 miles southeast of Redfield at entrance to Central Iowa Bible Camp which intersects with an east-west county road, 60 feet east and 39 feet south of intersection in base of a power pole; pole spike and collar. Elev. 1046.04 feet.
- 7830-04 SE (1) - About 4.5 miles southwest of Linden at a county road bridge over South Raccoon River, on right downstream curb; chiseled square. Elev. 979.86 feet.

- 7830-04 SE (2) - (REFERENCE POINT) About 4.5 miles southwest of Linden at a county road bridge over South Raccoon River, on top of 14th guardrail post from right downstream end of bridge; chiseled arrow. Elev. 981.81 feet.
- 7830-05 NE (1) - About 4 miles southwest of Linden at junction of county road P28 and "T" road west, 48 ft south and 23 ft east of intersection in power pole; railroad spike. Elev. 1145.79 feet.
- 7830-05 SE (1) - About 5.5 miles southwest of Linden at county road P28 bridge over South Raccoon River, on left downstream wingwall; chiseled square. Elev. 987.61 feet.
- 7830-05 SE (2) - (REFERENCE POINT) About 5.5 miles southwest of Linden at county road P28 bridge over South Raccoon River, on top of 22nd guardrail post from left downstream end of bridge; chiseled arrow. Elev. 990.29 feet.
- 7830-05 SE (3) - About 4.5 miles southwest of Linden on west side of county road P28 at a field entrance, 50 ft west and 14 ft north on top of 2 ft diameter corrugated metal culvert; punched hole. Elev. 1050.90 feet.
- 7830-06 NE (1) - About 5 miles southwest of Linden at county road bridge over South Raccoon River, on left downstream wingwall; chiseled square. Elev. 999.82 feet.
- 7830-06 NE (2) - (REFERENCE POINT) About 5 mile southwest of Linden at county road bridge over South Raccoon River, on top of 20th guardrail post from left downstream end of bridge; chiseled arrow. Elev. 1002.13 feet.
- 7830-10 SE (1) - About 4.5 miles northwest of Dexter at county road bridge over South Raccoon River, on right downstream bridge seat; chiseled cross on bolt. Elev. 958.23 feet.
- 7830-10 SE (2) - (REFERENCE POINT) About 4.5 miles northwest of Dexter at county road bridge over South Raccoon River, on 2nd vertical I-beam from right downstream end of bridge; chiseled arrow. Elev. 964.16 feet.
- 7830-12 SE (1) - About 3.25 miles northwest of Dexter at east-west county road bridge over South Raccoon River, on left upstream end of curb; chiseled square. Elev. 947.53 feet.
- 7830-12 SE (2) - (REFERENCE POINT) About 3.25 miles northwest of Dexter at east-west county road bridge over South Raccoon River, on top of 20th guardrail post from left downstream end of bridge; chiseled arrow. Elev. 948.98 feet.

- 7830-12 SW (1) - About 3.5 miles northwest of Dexter at a county road bridge over a tributary to South Raccoon River, on left downstream end of truss on rivet; chiseled cross. Elev. 950.49 feet.
- 7830-14 NW (1) - About 4 miles northwest of Dexter at intersection of county roads, 45 ft south and 32 ft west of intersection in power pole; railroad spike. Elev. 1025.72 feet.
- 7927-5 NW (1) - About 4.3 miles north of Adel at the intersection of State Highway 169 and 44, 50 feet west of highway 169 and 37 feet south of a power pole, in concrete post; standard tablet stamped "TT 2MT 1948". Elev. 1016.792 feet.
- 7927-6 NE (1) - About 5 miles north of Adel at State Highway 44 bridge over North Raccoon River, on left downstream wingwall curb; Iowa Department of Transportation plug. Elev. 952.84 feet.
- 7927-6 NE (2) - (REFERENCE POINT) About 5 miles north of Adel at State Highway 44 bridge over North Raccoon River, on top of guardrail beside 50th post from left downstream end of bridge; chiseled arrow. Elev. 935.52 feet
- 7927-20 SW (1) - About 0.8 mile north of Adel and 0.25 mile south of bridge over North Raccoon River on U.S. Highway 169 at "T" road west, about 500 feet west of intersection in west headwall of small concrete culvert under old Highway 169 south of "T" road; Iowa Department of Transportation plug. Elev. 894.93 feet.
- 7927-20 SW (2) - About 1.3 miles north of Adel at U.S. Highway 169 bridge over north channel of North Raccoon River, on right downstream wingpost; Iowa Department of Transportation plug. Elev. 901.82 feet.
- 7927-20 SW (3) - (REFERENCE POINT) About 1.3 miles north of Adel at U.S. Highway 169 bridge over North Channel of North Raccoon River, on top of guardrail beside 35th post from right downstream end of bridge; chiseled arrow. Elev. 901.25 feet.
- 7927-29 NW (1) - About 0.4 mile north of Adel at U.S. Highway 169 bridge over South Channel (Mill Slough) of North Raccoon River, on left downstream wingwall curb; chiseled square. Elev. 891.30 feet.
- 7927-29 NW (2) - (REFERENCE POINT) About 0.4 mile north of Adel at U.S. Highway 169 bridge over South Channel (Mill Slough) of North Raccoon River, on top of guardrail beside 9th post from left downstream end of bridge; chiseled arrow. Elev. 894.15 feet.

- 7927-29 SE (1) - At northeast edge of Adel and about 0.3 mile south of U.S. Highway 169 bridge over South Channel (Mill Slough) of North Raccoon River, on right wingwall of dam; chiseled square.
Elev. 885.93 feet.
- 7927-29 SE (2) - At Adel 720 feet south of courthouse along U.S. Highway 169, at Chicago. Milwaukee, Saint Paul and Pacific Railroad crossing, 18 feet north of center of track on concrete steps on west side of street, on bottom step; Reference Mark, chiseled square.
Elev. 892.23 feet.
- 7927-29 SE (3) - At Adel at Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over North Raccoon River, on rivet at right downstream end of truss; filed cross.
Elev. 888.50 feet.
- 7927-29 SE (4) - (REFERENCE POINT) At Adel at Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over North Raccoon River, on downstream center vertical member of west truss; filed arrow.
Elev. 890.58 feet.
- 7927-29 SE (5) - At Adel at Prairie St. bridge over North Raccoon River, on right upstream abutment; chiseled square.
Elev. 887.55 feet.
- 7927-29 SE (6) - (REFERENCE POINT) At Adel at Prairie St. bridge over North Raccoon River (Mill Slough branch), 3rd vertical member from right downstream end of bridge; chiseled arrow.
Elev. 892.41 feet.
- 7927-29 SE (7) - (REFERENCE POINT) At Adel at Prairie St. bridge over North Raccoon River, on 6th vertical member from left downstream end of bridge; chiseled arrow.
Elev. 892.89 feet.
- 7927-29 SE (8) - At Adel at U.S. Highway 6 bridge over North Raccoon River, on right upstream wingpost; Iowa Department of Transportation Plug.
Elev. 895.36 feet.
- 7927-29 SE (9) - (REFERENCE POINT) At Adel at U.S. Highway 6 bridge over North Raccoon River, near base of lamppost on downstream guardrail; chiseled arrow.
Elev. 895.92 feet.
- 7929-30 NW (1) - About 2 miles south of Linden north of a bend in a north-south county road, 33 feet east of road, 3 feet east of north-south fence line, 4 feet south of fence line east in concrete post; standard tablet stamped "TT 18J0 1951"
Elev. 1130.885 feet.
- 7929-30 SE (1) - About 2 miles south of Linden on north-south county road bridge over Middle Raccoon River, on left downstream wingwall curb; chiseled square.
Elev. 963.28 feet.

- 7929-30 SE (2) - (REFERENCE POINT) About 2 miles south of Linden on north-south county road bridge over Middle Raccoon River, on top of guardrail beside 20th post from left downstream end of bridge; filed arrow.
Elev. 966.00 feet.
- 7929-34 SW (1) - About 1.5 miles northwest of Redfield at county road bridge on Mosquito Creek, on left upstream end of truss on rivet; chiseled cross.
Elev. 933.57 feet.
- 7929-34 SW (2) (REFERENCE POINT) About 1.5 miles northwest of Redfield at county road bridge on Mosquito Creek, on 2nd vertical member from left downstream end of bridge; chiseled arrow.
Elev. 937.84 feet.
- 7930-5 NW (1) - Near southwest edge of Panora at U.S. Geological Survey gaging station at county bridge, on left upstream wingwall; chiseled square. (gage RM 6)
Elev. 1015.78 feet.
- 7930-5 NW (2)- Near southwest edge of Panora at U.S Geological Survey gaging station at County bridge, on left downstream wingwall; chiseled square. (gage RM 5)
Elev. 1015.81 feet.
- 7930-5 SE (1) - About 1.0 mile south of Panora at intersection of county road P28 and T-road east, west of intersection on top of westend of a 36" concrete culvert; chiseled square. Elev. 1115.81 feet.
- 7930-6 NE (1) - About 1.0 mile west of Panora at State Highway 44 bridge over Middle Raccoon River on right downstream wingwall curb; Iowa Department of Transportation plug.
Elev. 1036.19 feet.
- 7930-6 NE (2) - (REFERENCE POINT) About 1.0 mile west of Panora at State Highway 44 bridge over Middle Raccoon River, on top of 20th guardrail post from right downstream end of bridge; filed arrow.
Elev. 1034.41 feet.
- 7930-8 NE (1) - About 1.5 miles south of Panora at county road P28 bridge over Middle Raccoon River, on left upstream wingwall curb; bolt embedded in curb.
Elev. 1001.76 feet.
- 7930-9 NW (1) - (REFERENCE POINT) About 1.5 mile south of Panora at county road P28 bridge over Middle Raccoon River, on top of guardrail beside 14th post from left downstream end of bridge; filed arrow.
Elev. 1001.39 feet.
- 7930-13 SW (1) - About 1.5 miles west of Linden at intersection of county roads, in north-east corner of intersection in base of a power pole; pole spike and collar.
Elev. 1146.78 feet.

- 7930-14 SW (1) - About 2.5 miles west of Linden at intersection of county road and T-road north, south of intersection in base of power pole; pole spike and collar. Elev. 1062.21 feet.
- 7930-15 SE (1) - About 3.0 miles west of Linden at county road bridge over Middle Raccoon River on left downstream wingwall curb; chiseled square. Elev. 990.57 feet.
- 7930-15 SE (2) - (REFERENCE POINT) About 3.0 miles west of Linden at county road bridge over Middle Raccoon River, on top of 17th guardrail post from left downstream end of bridge; filed arrow. Elev. 992.58 feet
- 7930-23 SE (1) - About 1.5 miles south west of Linden at abandoned county road bridge over Middle Raccoon River, on top of a steel beam on right downstream pier; filed square. Elev. 970.39 feet.
- 7930-23 SE (2) - (REFERENCE POINT) About 1.5 miles southwest of Linden at abandoned county road bridge over Middle Raccoon River, on top of guardrail beside 3rd vertical member from right downstream end of bridge; filed arrow. Elev. 975.07 feet.
- 7930-24 SW (1) - About 2.0 miles southwest of Linden at a bend in county road, 20 feet northwest of center line of road, 15 northeast of centerline of a field entrance in base of a power pole; pole spike and collar. Elev. 1123.01 feet.
- 7930-25 SE (2) - About 2.0 miles southwest of Linden at county road F51 bridge over Middle Raccoon River, on left downstream wingwall curb; chiseled square. Elev. 973.72 feet.
- 7930-25 SE (3) - (REFERENCE POINT) About 2.0 miles southwest of Linden at county road F 51 bridge over Middle Raccoon River, on top of 20th guardrail post from left downstream end of bridge; filed arrow. Elev. 975.90 feet.
- 7930-26 SE (1) - About 2.5 miles southwest of Linden at intersection of county road F 51 and T-road north, south of intersection, in base of power pole; pole spike and collar. Elev. 1143.72 feet.
- 7930-27 SE (1) - About 3.0 miles southwest of Linden at intersection of county road P 28 and T-road F51 east, in south east corner of intersection, 26 feet north end 42 feet east of northeast corner of a church, in a concrete post; standard tablet stamped "TT 17 JO 1951 RESET 1956". Elev. 1153.396 feet.
- 7930-30 SE (1) - About 2.0 miles south of Linden at a county road bridge over Middle Raccoon River, on left downstream wingwall curb; chiseled square. Elev. 963.28 feet.

- 7930-30 SE (2) - (REFERENCE POINT) About 2.0 miles south of Linden at county road bridge over Middle Raccoon River on top of guard-rail beside 20th post from left downstream end of bridge; filed arrow. Elev. 966.00 feet.
- 7930-32 NW (1) - About 3 miles southeast of Montieth at county road bridge over South Raccoon River, on left downstream wingwall; chiseled cross. (INRC) Elev. 1012.33 feet.
- 7930-32 NW (2) - About 3 miles southeast of Montieth at county road bridge over South Raccoon River, on left downstream wingwall; chiseled square. Elev. 1012.80 feet.
- 7930-32 NW (3) - (REFERENCE POINT) About 3 miles southeast of Montieth at county road bridge over South Raccoon River, on top of 22nd guardrail post from left downstream end of bridge; chiseled arrow. Elev. 1014.84 feet.
- 7930-35 SW (1) - About 3.5 miles southwest of Linden in northeast corner of Junction of county roads P28 and F59, in base of power pole; pole spike and collar. Elev. 1151.34 feet.
- 7931-06 NW (1) - Near northwest corner of Guthrie Center at old bridge over South Raccoon River, on left downstream end of bridge on channel iron of abutment cap; chiseled cross. (INRC) Elev. 1077.82 feet.
- 7931-6 NW (2) - (REFERENCE POINT) Near northwest corner of Guthrie Center at old bridge over South Raccoon River, on 1st vertical member from left downstream end of bridge; filed arrow. Elev. 1083.56 feet.
- 7931-06 SW (1) - At west edge of Guthrie Center at State Highway 44 bridge over South Raccoon River, on right upstream end of concrete guardrail; Iowa Department of Transportation plug. Elev. 1080.05 feet.
- 7931-06 SW (2) - (REFERENCE POINT) At west edge of Guthrie Center at State Highway 44 bridge over South Raccoon River, on top of 5th concrete guardrail section from right upstream end of bridge; chiseled arrow. Elev. 1080.62 feet.
- 7931-07 SE (1) - About 1.0 mile south of Guthrie Center at State Highway 25 bridge over Mason Creek, on right downstream wingwall; chiseled square. (USGS UE 39-45 B) Elev. 1074.99 feet.
- 7931-07 NW (1) - Near south edge of Guthrie Center at State Highway 25 bridge over South Raccoon River, on northeast corner of left downstream wing-wall; no visible mark. Elev. 1074.84 feet.

- 7931-07 NW (2) - Near south edge of Guthrie Center at State Highway 25 bridge over South Raccoon River, on right downstream curb; chiseled square. Elev. 1075.16 feet.
- 7931-07 NW (3) - (REFERENCE POINT) Near south edge of Guthrie Center at State Highway 25 bridge over South Raccoon River, on 3rd vertical I-beam member from left downstream end of bridge; filed arrow. Elev. 1078.00 feet.
- 7931-07 NW (4) - Near south edge of Guthrie Center at State Highway 25 bridge over South Raccoon River, on left downstream curb; bolt. Elev. 1075.16 feet.
- 7931-17 SE (1) - About 2 miles southeast of Guthrie Center at county road bridge over South Raccoon River, on top of left upstream concrete pier cap; chiseled cross. (INRC) Elev. 1049.95 feet.
- 7931-17 SE (2) - (REFERENCE POINT) About 2 miles southeast of Guthrie Center at county road bridge over South Raccoon River, on 3rd vertical I-beam member from right downstream end of bridge; filed arrow. Elev. 1057.90 feet.
- 7931-21 NE (1) - About 1.5 miles northwest of Montieth along a northwest-southeast dead end road at a 5ft concret box culvert, on top of downstream headwall 3.5 ft higher than road; a standard disk stamped "U 102 1935". (NGS) Elev. 1042.747 feet.
- 7931-22 NE (1) - About 0.6 mile northwest of Montieth at junction of county road and "T" road west, 96 ft north and 41 ft west of intersection; chiseled square. Elev. 1040.50 feet.
- 7931-22 NW (1) - About 1.6 miles northwest of Montieth at a county road bridge over South Raccoon River, on right downstream curb; chiseled cross. (INRC) Elev. 1049.44 feet.
- 7931-22 NW (2) - (REFERENCE POINT) About 1.6 miles northwest of Montieth at a county road bridge over South Raccoon River, on top of 18th guardrail post from right downstream end of bridge; chiseled arrow. Elev. 1051.81 feet.
- 7931-23 NW (1) - About 0.8 mile northwest of Montieth at a county road bridge over South Raccoon River, on right downstream end of truss on bolt; filed cross. Elev. 1034.59 feet.
- 7931-23 NW (2) - (REFERENCE POINT) About 0.8 mile northwest of Montieth at a county road bridge over South Raccoon River, on top of 3rd vertical I-beam member from right downstream end of bridge; filed arrow. Elev. 1038.57 feet.

- 7931-23 SE (1) - About 0.5 mile east of Montieth at county road F51 bridge over South Raccoon River, on right upstream wingwall; chiseled cross. Elev. 1028.60 feet.
- 7931-23 SW (1) - At Montieth at junction of county road F51 and "T" road south, in southwest corner of intersection in base of east transformer power pole; railroad spike. Elev. 1040.94 feet.
- 7931-26 NE (1) - (REFERENCE POINT) About 0.5 mile east of Montieth at county road F51 bridge over South Raccoon River, on top of 15th guardrail post from right end of bridge; filed arrow. Elev. 1030.53 feet.
- 8028-11 NE (1) - About 1.9 miles west of Minburn along gravel road, thence about 1.1 mile northwest along North Raccoon River, about 400 feet east of barn on the Ross farm, 185 feet southeast of a fence corner in a northwest-southeast fence line, in a concrete post; standard table stamped "2 OC 1948". Elev. 947.131 feet.
- 8028-13 NE (1) - About 2 miles southwest of Minburn, at county road F31 bridge over North Raccoon River, on left downstream curb; Iowa Department of Transportation plug. Elev. 921.80 feet.
- 8028-13 NE (2) - (REFERENCE POINT) About 2 miles southwest of Minburn at county road F31 bridge over North Raccoon River, on top of guardrail beside 30th post from left downstream end of bridge; filed arrow. Elev. 925.12 feet.
- 8030-31 NW (1) - About 1.0 mile west of Panora at Lake Panorama dam on Middle Raccoon River, on right abutment of dam about 1.5 feet north of man-hole cover; chiseled square. Elev. 1067.44 feet.
- 8030-32 SE (1) - At Panora on State Highway 44, 100 feet west of the crossing of Chicago, Milwaukee, Saint Paul and Pacific Railroad at the southwest corner of intersection of the Steward road, 6.5 feet northwest of a power pole, 1.5 feet southwest of curb and about 3 inches lower than top of curb; A state survey standard disk stamped "39-65" and set in top of concrete post. Elev. 1051.697 feet.
- 8031-9 SE (1) - About 5.0 miles northeast of Guthrie Center at county road bridge over Middle Raccoon River, on right downstream wingwall curb; chiseled square. Elev. 1053.38 feet.
- 8031-9 SE (2) - (REFERENCE POINT) About 5.0 miles northeast of Guthrie Center at a county road bridge over Middle Raccoon River, on top of 30th guardrail post from right downstream end of bridge; filed arrow. Elev. 1055.29 feet.

- 8031-9 SW (1) - About 5.0 miles north of Guthrie Center at intersection of county road and T-road north, 244 feet east and 30.6 feet south of T-road north, 3 feet higher than center of road in concrete post; standard tablet stamped "TT 3 JO 1951". Elev. 1073.421 feet.
- 8128-8 NE (1) - About 1.20 miles west of Perry along Chicago, Milwaukee, Saint Paul and Pacific Railroad, north of Oscar Meyer stockyards along a gravel road north of and parallel to railroad tracks, 500 feet northeast of north west corner of stockyard fence, in base of power pole; Railroad spike. Elev. 945.32 feet.
- 8128-8 NW (1) - About 2.0 miles west of Post Office in Perry at Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over North Raccoon River, on left downstream corner of left downstream pier; chiseled square. Elev. 933.58 feet.
- 8128-8 NW (2) - (REFERENCE POINT) About 2.0 miles west of Post Office in Perry at Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over North Raccoon River, on a metal plate between vertical and diagonal members on right downstream bridge truss; chiseled arrow. Elev. 941.79 feet.
- 8128-8 NW (3) - About 2 miles west of Perry at county road bridge over North Raccoon River, on bolt in left downstream bridge seat plate; chiseled cross. Elev. 935.41 feet.
- 8128-8 NW (4) - (REFERENCE POINT) About 2 miles west of Perry at county road bridge over North Raccoon River, on first vertical member from left downstream end of bridge; filed arrow. Elev. 942.11 feet.
- 8128-8 SW (1) - About 1.5 miles west of Perry at State Highway 141 bridge over North Raccoon River, on left downstream wingwall curb; Iowa Department of Transportation plug. Elev. 944.53 feet.
- 8128-8 SW (2) - (REFERENCE POINT) About 1.5 miles west of Perry at State Highway 141 bridge over North Raccoon River, on top of 18th guard-rail post from left downstream end of bridge; chiseled arrow. Elev. 946.94 feet.
- 8128-10 SW (1) - At Perry at the Walford Street side of Post Office, in the water table under the grilled window, 10 feet from northwest corner of building, and about 2.5 feet above ground; a standard disk stamped "969.129 U3 1930". (NGS) Elev. 969.129 feet.
- 8128-16 NW (1) - About 1.0 mile west of Perry at intersection of State Highway 141 and road leading to Oscar Meyer, in southeast corner of intersection in base of middle power pole of three poles; railroad spike. Elev. 936.50 feet.

- 8128-25 SW (1) - About 2.75 miles southeast along Chicago and Northwestern Railroad from Perry, 0.3 mile northwest of mile post 280, 10 feet east of the east fence line of a north-south road and 37 feet southwest of centerline of track; a standard disk stamped "1026.307 W3 1930" and set in the top of a concrete post. (NGS)
Elev. 1026.307 feet.
- 8128-26 SW (1) - About 3.0 miles northwest of Minburn at intersection of east-west county road and T-road north, in northeast corner of intersection in base of power pole; Railroad spike.
Elev. 1002.42 feet.
- 8128-34 NW (1) - About 3.0 miles south of Perry at county road P58 bridge over North Raccoon River, on right upstream wingwall curb; bolt set flush with curb.
Elev. 940.29 feet.
- 8129-3 SW (1) - About 0.5 mile North of Dawson at county road P46 bridge over North Raccoon River, on right downstream curb; chiseled square.
Elev. 952.74 feet.
- 8129-3 SW (2) - (REFERENCE POINT) About 0.5 mile north of Dawson at county road P46 bridge over North Raccoon River, on top of guardrail beside 8th post from right downstream end of bridge; filed arrow.
Elev. 955.44 feet.
- 8129-4 SW (1) - About 1.0 mile northwest of Dawson at concrete bridge over small creek west of T-road south, on left upstream wingpost; chiseled square.
Elev. 950.81 feet.
- 8129-9 NW (1) - About 1.0 mile west of Dawson at intersection of county road and Chicago, Milwaukee, Saint Paul and Pacific Railroad 595 feet north of crossing, 23 feet east of gravel road, 1 ft west of cemetery fence line in a concrete post; standard tablet stamped "15 OC 1948".
Elev. 1033.063 feet.

- 8132-6 NW (1) - About 3.0 miles southeast of Coon Rapids, at Chicago, Milwaukee, Saint Paul and Pacific Railroad over pass over county road, on east end of the north headwall; Reference mark for "59 PJH 1969", chiseled square. Elev. 1135.18 feet.
- 8132-27 NW (1) - About 3.5 miles south of Bayard at county road N70 bridge over Middle Raccoon River, on right upstream wingwall curb; chiseled square. Elev. 1091.65 feet.
- 8132-27 NE (1) - (REFERENCE POINT) About 3.5 miles south of Bayard at county road N70 bridge over Middle Raccoon River, on top of guardrail beside 13th post from left downstream end of bridge; filed arrow. Elev. 1094.05 feet.
- 8132-27 SW (1) - (REFERENCE POINT) About 4 miles south of Bayard at bridge over Middle Raccoon River, on first vertical member from left downstream end of bridge; filed arrow. Elev. 1093.82 feet.
- 8132-28 SE (1) - About 4 miles south of Bayard at county road bridge over Middle Raccoon River, on right upstream end of truss on top of rivet in bridge seat plate; filed cross. Elev. 1088.42 feet.
- 8132-29 NW (1) - About 4 miles southwest of Bayard at a county road bridge over Middle Raccoon River, on right downstream end of truss; filed cross on bolt. Elev. 1104.33 feet.
- 8132-29 NW (2) - (REFERENCE POINT) About 4 miles southwest of Bayard at a county road bridge over Middle Raccoon River, on top of guardrail beside 2nd vertical member from left downstream end of bridge; filed arrow. Elev. 1107.63 feet.
- 8132-32 NW (1) - About 5 miles southwest of Bayard at intersection of county road F24 and north-south county road, in southeast corner of intersection in base of fence corner post; Railroad spike. (UE K7) Elev. 1284.32 feet.
- 8132-33 NE (1) - About 4.5 miles south of Bayard at intersection of county roads, in southwest corner of intersection on top of corrugated pipe culvert; punch marks. Elev. 1124.68 feet.
- 8133-2 NW (1) - About 1.0 mile southeast of Coon Rapids at State Highway 141 bridge over Middle Raccoon River, on right upstream wingwall curb; Department of Transportation plug. Elev. 1133.71 feet.
- 8133-2 NW (2) - (REFERENCE POINT) About 1.0 mile southeast of Coon Rapids at State Highway 141 bridge over Middle Raccoon River, on the 16th guardrail post from right downstream end of bridge; filed arrow. Elev. 1136.10 feet.

- 8133-11 NW (1) - About 2.0 miles southeast of Coon Rapids near a county road bridge over Middle Raccoon River, 20 feet southwest of the right downstream abutment, in base of a power pole; railroad spike. Elev. 1124.34 feet.
- 8133-11 NW (2) - (REFERENCE POINT) About 2.0 miles southeast of Coon Rapids at a county road bridge over Middle Raccoon River, on top of guardrail beside 2nd vertical member from left downstream end of bridge; filed arrow. Elev. 1128.50 feet.
- 8133-23 NE (1) - About 4.0 miles southeast of Coon Rapids at county road N56 bridge over Middle Raccoon River, 11 feet west and 2.9 feet higher than road, on top and in center of left upstream wingwall; chiseled square. Elev. 1129.07 feet.
- 8133-23 NE (2) - (REFERENCE POINT) About 4.0 miles southeast of Coon Rapids at county road N56 bridge over Middle Raccoon River, on top of guardrail beside 12th post from left downstream end of bridge; filed arrow. Elev. 1129.16 feet.
- 8229-18 SW (1) - About 4.0 miles east of Cooper at county road E57 bridge over North Raccoon River, in right downstream wingpost; a bolt sunk in concrete. Elev. 969.03 feet.
- 8229-18 SW (2) - (REFERENCE POINT) About 4.0 miles east of Cooper at county road E57 bridge over North Raccoon River, on top of 21st guardrail post from right downstream end of bridge; chiseled arrow. Elev. 970.68 feet.
- 8230-1 NW (1) - About 3.0 miles northeast of Cooper at intersection of county road P30 and T-road east, in northeast corner of intersection in base of a power pole; Railroad spike. Elev. 974.50 feet.
- 8230-1 NW (2) - About 3.0 miles northeast of Cooper at a county road bridge over North Raccoon River, in right upstream wingwall; horizontal bolt protruding out of wingwall. Elev. 972.36 feet.
- 8230-1 NW (3) - (REFERENCE POINT) About 3.0 miles northeast of Cooper at a county road bridge over North Raccoon River, on top of 9th guardrail post from left downstream end of bridge; chiseled arrow. Elev. 980.24 feet.
- 8230-12 NW (1) - About 2.5 miles northeast of Cooper at intersection of county road P30 and T road west, on east side of intersection in base of a power pole; railroad spike. Elev. 1036.40 feet.
- 8230-13 NW (1) - About 2.5 miles east of Cooper at intersection of county roads E57 and P30, in northeast corner of intersection in base of power pole; railroad spike. Elev. 1060.51 feet.

- 8230-14 NW (1) - About 1.5 miles east of Cooper at intersection of county road E 57 and T-road north in northeast corner of road junction in base of power pole; railroad spike. Elev. 1062.06 feet.
- 8230-16 NE (1) - At Cooper on the Chicago, Milwaukee, Saint Paul and Pacific Railroad of the southern most street crossing in town, 18 feet east of centerline of track, 40 feet south of street, and about 2 feet lower than track; A standard disk stamped "G 102 1935" and set in the top of a concrete post. (NGS) Elev. 1079.069 feet.
- 8233-17 SW (1) - About 3.0 miles northwest of Coon Rapids at a county road bridge over Middle Raccoon River, on right downstream wingpost; chiseled square. Elev. 1160.89 feet.
- 8233-17 SW (2) - (REFERENCE POINT) About 3.0 miles northwest of Coon Rapids at a county road bridge over Middle Raccoon River, on top of guardrail beside 15th post from right downstream end of bridge; filed arrow. Elev. 1161.58 feet.
- 8233-20 NW (1) - About 2.5 miles north west of Coon Rapids and about 0.25 mile southeast of a small cemetery, on west headwall of a concrete culvert; chiseled square. Elev. 1169.35 feet.
- 8233-20 SW (1) - About 2.0 miles northwest of Coon Rapids at intersection of county road and T-road north in northwest corner of intersection top of north end of a 1.5 ft corrugated pipe culvert; punch mark. (N8) Elev. 1261.52 feet.
- 8233-27 NW (1) - About 1.0 mile north of Coon Rapids at county road N44 bridge over Middle Raccoon River, 17 feet west and 0.8 feet higher than road, end of left upstream wingwall; chiseled square. (N5) Elev. 1147.86 feet.
- 8233-27 NW (2) - (REFERENCE POINT) About 1.0 mile north of Coon Rapids at county road N44 bridge over Middle Raccoon River, on 12th guardrail post from left downstream end of bridge; filed arrow. Elev. 1149.60 feet.
- 8233-34 NE (1) - At Coon Rapids at Bridge Street bridge over Middle Raccoon River, beside right upstream wingwall curb on sidewalk; chiseled square. Elev. 1167.59 feet.
- 8233-34 NE (2) - (REFERENCE POINT) At Coon Rapids at Bridge Street bridge over Middle Raccoon River, on 9th guardrail post from right downstream end of bridge; chiseled square. Elev. 1172.42 feet.
- 8233-34 SE (1) At Coon Rapids at Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over Middle Raccoon River, on left downstream abutment; chiseled square. Elev. 1161.61 feet.

- 8233-34 SE (2) - (REFERENCE POINT) At Coon Rapids at Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over Middle Raccoon River, in center of downstream concrete curb; chiseled arrow.
Elev. 1161.86 feet
- 8233-34 SE (3) - At Coon Rapids at Main St. bridge over Middle Raccoon River, on top of right downstream wingpost; chiseled square.
Elev. 1140.85 feet.
- 8233-34 SE (4) - (REFERENCE POINT) At Coon Rapids at Main St. bridge over Middle Raccoon River, on guardrail beside 10th post from right downstream end of bridge; filed arrow.
Elev. 1140.94 feet.
- 8234-1 NE (1) - About 8.0 miles south of Glidden near southeast edge of Carrollton, about 0.2 miles south of right angle curve in road, 13 feet west and 0.2 foot higher than road in top of west head wall of a concrete box culvert; chiseled square. (48 PJH A) Elev. 1205.80 feet.
- 8234-1 SW (1) - About 4.0 miles northeast of Dedham at a county road bridge over Middle Raccoon River, on left upstream end of truss; filed cross on bolt.
Elev. 1170.88 feet.
- 8234-1 SW (2) - (REFERENCE POINT) About 4.0 miles northeast of Dedham at county road bridge over Middle Raccoon River, on top of guardrail beside 3rd vertical member from left downstream end of bridge; filed arrow.
Elev. 1176.59 feet.
- 8234-2 NE (1) - About 4.0 miles northeast of Dedham at county road E57 bridge over Middle Raccoon River, on left downstream end of truss; filed cross on bolt.
Elev. 1174.40 feet.
- 8234-2 NE (2) - (REFERENCE POINT) About 4.0 miles northeast of Dedham at county road E57 bridge over Middle Raccoon River, on top of guardrail beside 2nd vertical member from left downstream end of bridge; filed arrow.
Elev. 1178.35 feet.
- 8234-12 SW (1) - About 3.5 miles northeast of Dedham at county road bridge over Middle Raccoon River, at right upstream corner of bridge; 8.0 feet north and 0.6 feet higher than road, 1.5 feet east of west end of wooden curb; top of iron bolt. (48 PJH A).
Elev. 1169.10 feet.
- 8234-12 SW (2) - (REFERENCE POINT) About 3.5 miles northeast of Dedham at county road bridge over Middle Raccoon River, on top of guardrail beside 4th vertical member from left downstream end of bridge; filed arrow.
Elev. 1172.00 feet.
- 8330-7 NE (1) - At Jefferson at intersection of Grinnel Road and Lincolnway, 21 feet east of Grinnel Rd. and 95 feet north of Lincolnway, in base of a power pole; pole spike and collar.
Elev. 1071.57 feet.

- 8330-8 NW (1) - At Jefferson, Greene county, on the Chicago and North Western Railway, 80 ft west of west end of station, at street crossing, 45 ft south of centerline of south track, 36 ft east of centerline of street, and 3 ft northeast of a pole. A standard disk, stamped "1055.303 F89 1935" and set in top of a concrete post. (NGS)
Elev. 1055.355 feet.
- 8330-18 NW (1) - At southwest edge of Jefferson on bridge over North Raccoon River, on curb at left downstream end of bridge; chiseled square.
Elev. 994.56 feet.
- 8330-18 NW (2) - (REFERENCE POINT) At southwest edge of Jefferson on bridge over North Raccoon River, on top of guardrail at 27th post from left downstream end of bridge; chiseled arrow.
Elev. 997.18 feet.
- 8330-20 NW (1) - About 2 miles south of Jefferson at State Highway 4 bridge over North Raccoon River, on right downstream pier on downstream face 2 feet above riprap; top of bolt head. (gage RM number 1)
Elev. 977.92 feet.
- 8330-21 NW (1) - About 1.7 miles south and 1.2 miles east of Jefferson at a Railroad, 30 feet south and 72 ft east of railroad crossing, 4 feet north of a fence corner, set in concrete post; standard tablet stamped "16 JDF 1953".
Elev. 1011.510 feet.
- 8330-21 SW (1) - About 2.5 miles southeast of Jefferson at the Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over North Raccoon River, on upstream end of bridge pier on left bank; chiseled square.
Elev. 985.91 feet.
- 8330-21 SW (2) - (REFERENCE POINT) About 2.5 miles southeast of Jefferson at the Chicago, Milwaukee, Saint Paul and Pacific Railroad bridge over North Raccoon River, on a cross brace perpendicular with 3rd vertical member from left downstream end of bridge; filed arrow.
Elev. 991.89 feet.
- 8330-22 SE (1) - About 3.5 miles southeast of Jefferson at county road bridge over Hardin Creek, on right downstream corner of bridge in piling; copper nail and washer.
Elev. 979.20 feet.
- 8330-36 SW (1) - About 3.5 miles northeast of Cooper at county road P30 bridge over North Raccoon River, on right downstream wingwall curb; chiseled square.
Elev. 979.59 feet.
- 8330-36 SW (2) - (REFERENCE POINT) About 3.0 miles northeast of Cooper at county road P30 bridge over North Raccoon River, on top of 15th guardrail post from right downstream end of bridge; chiseled arrow.
Elev. 981.69 feet.
- 8331-3 NW (1) - About 4.0 miles west of Jefferson at north-south county road P14 bridge over North Raccoon River, on left downstream wingwall curb; chiseled square.
Elev. 1012.12 feet.

- 8331-3 NW (2) - (REFERENCE POINT) About 4.0 miles west of Jefferson at north-south county road P14 bridge over North Raccoon River on top of 15th guardrail post from left downstream end of bridge; chiseled arrow. Elev. 1014.72 feet.
- 8331-5 NE (1) - About 5.0 miles west of Jefferson at U.S. Highway 30 bridge over North Raccoon River, on curb near left downstream corner of bridge; Iowa Department of Transportation plug. Elev. 1020.24 feet.
- 8331-5 NE (2) - (REFERENCE POINT) About 5.0 miles west of Jefferson at U.S. Highway 30 bridge over North Raccoon River, on top of guardrail beside 25th post from right downstream end of bridge; filed arrow. Elev. 1020.71 feet.
- 8331-11 NW (1) - About 2.5 miles west of Jefferson at intersection of Chicago and Northwestern Railway and a north-south county road, in the southeast corner of the intersection, on top of base from railroad crossing signal; chiseled square. Elev. 1061.25 feet.
- 8331-11 SW (1) - About 2.5 miles west of Jefferson at county road E53 bridge over North Raccoon River, on left downstream wingwall curb; chiseled square. Elev. 1001.52 feet.
- 8331-11 SW (2) - (REFERENCE POINT) About 2.5 miles west of Jefferson at county road E53 bridge over North Raccoon River, on top of guardrail 5ft left of 4th concrete post from left downstream end of bridge; chiseled arrow. Elev. 1004.67 feet.
- 8331-12 NW (1) - 1.7 miles west along Chicago and North Western Railway from the station at Jefferson, Greene County at a county road crossing 45 feet south of the centerline of the south track, 30 feet west of centerline of the road, 11 feet west and 2 feet north of a fence corner, and 3 feet lower than track. A standard disk stamped "G89 1935" and set in the top of a concrete post. (NGS) Elev. 1066.297 feet.
- 8333-08 NW(1) - About 3.0 miles south of Glidden at intersection of county road N44 and T-road west, 250 feet north, 14 feet east and 2.8 feet lower than T-road, on top near center of east headwall of a concrete culvert; Reference mark, chiseled square. Elev. 1215.83 feet.
- 8334-2 NE (1) - About 3.0 miles southwest of Glidden at T-road intersection on top of the west end of a concrete culvert; chiseled square. Elev. 1190.98 feet.

- 8334-12 NW (1) - About 3.0 miles south of Glidden at "L" in county road, 280 feet west of bend in road, 15 feet south of centerline of private drive in fence line, in base of power pole with red ring; pole spike and collar. Elev. 1225.05 feet.
- 8334-13 NW (1) - About 4.0 miles southwest of Glidden at county road E45 bridge over Middle Raccoon River, on left downstream wingwall curb; chiseled square. Elev. 1190.90 feet.
- 8334-13 NW (2) - (REFERENCE POINT) About 4.0 miles southwest of Glidden at county road E45 bridge over Middle Raccoon River, on 10th guardrail post from left downstream end of bridge; filed arrow. Elev. 1192.68 feet.
- 8334-14 SE (1) - About 5.0 miles southwest of Glidden at a county road bridge over Middle Raccoon River, on left upstream end of truss; filed cross on bolt. Elev. 1184.43 feet.
- 8334-22 SE (1) - About 6 miles southwest of Glidden at county road E53 bridge over Middle Raccoon River, on left upstream end of truss; filed cross on bolt. Elev. 1185.39 feet.
- 8334-23 NE (1) - (REFERENCE POINT) About 5.0 miles southwest of Glidden at a county road bridge over Middle Raccoon River, on top of guardrail beside 5th vertical member from left downstream end of bridge; filed arrow. Elev. 1189.09 feet.
- 8334-27 NE (1) - (REFERENCE POINT) About 6 miles southwest of Glidden at county road E53 bridge over Middle Raccoon River, on top of guardrail between 2nd and 3rd vertical members from left downstream end of bridge; filed arrow. 1188.89 feet.
- 8334-35 NW (1) - About 4.5 miles northeast of Dedham at a county road bridge over Middle Raccoon River, on truss at left downstream end of bridge; filed cross on bolt. Elev. 1179.32 feet.
- 8334-35 NW (2) - (REFERENCE POINT) About 4.5 miles northwest of Dedham at a county road bridge over Middle Raccoon River, on guardrail between 2nd and 3rd vertical members from left downstream end of bridge; filed arrow. Elev. 1182.67 feet.

- 8431-18 SW (1) - About 4.5 miles northeast of Scranton at intersection of county road E33 and north-south county road, in northeast corner of intersection, on top of north end of a concrete culvert; chiseled square. Elev. 1116.60 feet.
- 8431-19 NE (1) - About 5.0 miles northeast of Scranton at intersection of county road E33 with a north-south road, in southwest corner of intersection, in base of power pole, 36 ft south and 23 ft west of intersection; railroad spike. Elev. 1118.74 feet.
- 8431-31 NE (1) - About 3.5 miles northeast of Scranton at county road bridge over North Raccoon River, on top of curb at right downstream abutment; chiseled square. Elev. 1024.11 feet.
- 8431-31 NE (2) - (REFERENCE POINT) About 3.0 miles northeast of Scranton at county road bridge over North Raccoon River, on top of guardrail beside 12th post from right downstream end of bridge; chiseled arrow. Elev. 1026.74 feet.
- 8431-31 SE (1) - About 1.5 miles north and 6.0 miles west of Jefferson at intersection of U.S Highway 30 and county T-road south, 59 ft north and 350 ft west of intersection, 21 feet east of a power pole, 3 ft south of a north right-of-way-fence, in a concrete post; standard tablet stamped "14 T 1960 1126". Elev. 1126.082 feet.
- 8432-7 SE (1) - About 3.5 miles north of Ralston at east-west county road bridge over a small creek, in a post at intersection of abutment and wingwall at right downstream corner of bridge; pole spike and collar. Elev. 1059.38 feet.
- 8432-8 NW (1) - About 4.0 miles north of Ralston at east-west county road bridge over North Raccoon River, on left downstream wingwall; chiseled square. Elev. 1043.26 feet.
- 8432-8 NW (2) - (REFERENCE POINT) About 4.0 miles north of Ralston at east-west county road bridge over North Raccoon River, on top of 6th concrete guardrail post from left downstream end of bridge; chiseled arrow. Elev. 1045.92 feet.
- 8432-9 NW (1) - About 4.0 miles northeast of Ralston at T-road west, 42 ft north and 35 ft east of intersection, in base of power pole; pole spike and collar. Elev. 1115.22 feet.
- 8432-10 SW (1) - About 4.5 miles northeast of Ralston; on county road N65 bridge over North Raccoon River, on right downstream wingwall; chiseled square. Elev. 1041.46 feet.

- 8432-10 SW (2) - (REFERENCE POINT) About 4.5 miles northeast of Ralston on county road N65 bridge over North Raccoon River, on guardrail by 16th post from right downstream end of bridge; filed arrow.
Elev. 1044.19 feet.
- 8432-14 SE (1) - About 4.0 miles north of Scranton at intersection of county road E33 and county T-road north, in northeast corner of intersection, in base of power pole; pole spike and collar.
Elev. 1119.53 feet.
- 8432-18 NW (1) - About 3 miles north of Ralston at county road N58 bridge over North Raccoon River, on right downstream wingwall; chiseled square.
Elev. 1056.56 feet.
- 8432-18 NW (2) - (REFERENCE POINT) About 3 miles north of Ralston at county road N58 bridge over North Raccoon River, on 12th guardrail post from right downstream end of bridge; filed arrow.
Elev. 1059.15 feet.
- 8432-23 SE (1) - About 3.0 miles north of Scranton at county road E33 bridge over North Raccoon River, on left downstream wingwall curb; chiseled square.
Elev. 1025.56 feet.
- 8432-23 SE (2) - (REFERENCE POINT) About 3.0 miles north of Scranton at county road E33 bridge over North Raccoon River, on guardrail beside 11th post from left downstream end of bridge; filed arrow.
Elev. 1027.85 feet.
- 8433-3 NE (1) - About 4.5 miles southeast of Lanesboro at county road N50 bridge over North Raccoon River, on right downstream wingpost; chiseled square.
Elev. 1064.54 feet.
- 8433-3 NE (2) - (REFERENCE POINT) About 4.5 miles southeast of Lanesboro at county road N50 bridge over North Raccoon River, on concrete guardrail, above 1st gutter from right downstream end of bridge; chiseled arrow.
Elev. 1065.02 feet.
- 8433-24 NE (1) - About 2 miles north of Ralston at intersection of county road N58 and an east-west county road, in the south east corner of intersection on south end of concrete culvert; chiseled square.
Elev. 1090.70 feet.
- 8433-25 NW (1) - About 1 mile northwest of Ralston at intersection of U.S. Highway 30 and a county road, in the south east corner of intersection, on the east end of a concrete culvert; chiseled square.
Elev. 1110.82 feet.

- 8433-35 NE (1) - About 1 mile west of Ralston at intersection of Chicago and Northwestern Railway and county road, 48ft north of centerline of track, 40ft west of the centerline of road, 6ft northwest of inside fence corner, 2ft north of the fence; a standard disk stamped "R89 1935". (NGS) Elev. 1134.781 feet.
- 8434-35 SE (1) - About 2.5 miles southwest of Glidden at county road bridge over Middle Raccoon River, on left downstream abutment; chiseled square. Elev. 1194.55 feet.
- 8434-35 SE (2) - (REFERENCE POINT) About 2.5 miles southwest of Glidden at county road bridge over Middle Raccoon River, on 10th guard-rail post from left downstream end of bridge; filed arrow. Elev. 1198.61 feet.
- 8533-6 SW (1) - About 3 miles northwest of Lanesboro near corner of sections 1, 6, 7 and 12, 15ft east of a field entrance north of county road near base of a power pole; pole spike and collar. Elev. 1094.99 feet.
- 8533-7 NE (1) - About 2.5 miles northwest of Lanesboro at county road bridge over North Raccoon River, on right downstream wingpost; end of large horizontal bolt. Elev. 1093.37 feet.
- 8533-7 NE (2) - (REFERENCE POINT) About 2.5 miles northwest of Lanesboro at county road bridge over North Raccoon River, on 13th guardrail post from right downstream end of bridge; filed arrow. Elev. 1094.40 feet.
- 8533-17 SW (1) - About 2 miles southwest of Lanesboro at State Highway 286 bridge over North Raccoon River, on right downstream wingwall; chiseled square. Elev. 1082.38 feet.
- 8533-17 SW (2) - (REFERENCE POINT) About 2 miles southwest of Lanesboro at State Highway 286 bridge over North Raccoon River, on guardrail, beside 10th post from left downstream end of bridge; filed arrow. Elev. 1088.79 feet.
- 8533-20 NE (1) - About 1.5 miles southwest of Lanesboro at railroad bridge over North Raccoon River, on upstream side of southern most concrete pier on left bank of river, on an angle iron bolted onto pier; top of 18th bolt from top of pier. Elev. 1070.71 feet.
- 8533-21 SE (1) - About 2 miles south of Lanesboro at county road bridge over North Raccoon River, on right upstream wingwall; chiseled square. Elev. 1073.13 feet.
- 8533-21 SE (2) - (REFERENCE POINT) About 2 miles south of Lanesboro at county road bridge over North Raccoon River, on downstream guardrail bracket beside 3rd vertical member from left of center section; filed arrow. Elev. 1077.97 feet.

- 8533-27 SW (1) - About 3 miles south of Lanesboro at curve in county road from east to south, near base of power pole; pole spike and collar.
Elev. 1072.57 feet.
- 8533-34 SW (1) - About 3 miles south of Lanesboro at entrance to "Merritt Access", near base of pole; pole spike and collar.
Elev. 1059.93 feet.
- 8534-12 NE (1) - About 3.5 miles northwest of Lanesboro at a county road bridge over a small creek, in the center of the downstream curb; a standard tablet stamped "3 FWK 1975".
Elev. 1099.043 feet.
- 8534-13 SE (2) - About 3.5 miles southwest of Lanesboro at intersection of north-south county road and county road E17 in the northeast corner of intersection on the south side of a power pole; railroad spike.
Elev. 1150.27 feet.
- 8534-24 SE (1) - About 4 miles southwest of Lanesboro at T-road west 34 ft east and 15 ft north of intersection, 4.5 ft northwest of power pole in a 6 in. tile; a standard tablet stamped "2 FWK 1965".
Elev. 1164.453 feet.
- 8634-6 SW (1) - About 2 miles northeast of Auburn at county road N28 bridge over North Raccoon River, on right downstream wingwall; chiseled square.
Elev. 1135.97 feet.
- 8634-6 SW (2) - (REFERENCE POINT) About 2 miles northeast of Auburn at county road N28 bridge over North Raccoon River, on curb beside 19th guardrail post from right downstream end of bridge; chiseled arrow.
Elev. 1141.15 feet.
- 8634-14 SW (1) - About 2 miles southwest of Lake City at corner of a right angle county road, at quarter corner between sections 14 and 23, 40 ft northwest from centerline of road, near base of power pole; pole spike and collar.
Elev. 1159.34 feet.
- 8634-17 SE (2) - About 4.5 miles west of Lake City at State Highway 175 bridge over North Raccoon River, on left downstream wingwall; Iowa Department of Transportation plug.
Elev. 1118.57 feet.
- 8634-17 SE (2) - (REFERENCE POINT) About 4.5 miles west of Lake City at State Highway 175 bridge over North Raccoon River, on top of 13th guardrail post from left downstream end of bridge; chiseled arrow.
Elev. 1119.36 feet.
- 8634-22 NW (1) - About 3 miles southwest of Lake City at county road bridge over North Raccoon River, on left downstream wingwall; chiseled square.
Elev. 1112.63 feet.

- 8634-22 NW (2) - (REFERENCE POINT) About 3 miles southwest of Lake City on county road bridge over North Raccoon River, on downstream guard-rail beside 4th vertical member from left end of bridge; filed arrow. Elev. 1116.54 feet.
- 8634-23 NE (1) - About 1.5 miles southwest of Lake City near corner of sections 13,14, 23 and 24, at a field entrance west of north-south county road, 27 ft west of road, 16 ft south of field entrance. on south end of culvert; chiseled square. Elev. 1188.82 feet.
- 8634-23 NW (1) - About 2.5 miles southwest of Lake City at remains of old railroad bridge crossing over small creek, on highest remaining lime-stone block of left bridge abutment; chiseled square. Elev. 1123.96 feet.
- 8634-25 SW (1) - About 2.5 miles southwest of Lake City at county road N37 bridge over North Raccoon River, on upstream concrete curb between center and left spans of three span concrete bridge; a standard table stamped "4 FWK 1975". Elev. 1100.824 feet.
- 8634-25 SW (2) - (REFERENCE POINT) About 2.5 miles southwest of Lake City at county road N37 bridge over North Raccoon River between center and left spans of three span bridge on downstream concrete railing; chiseled arrow. Elev. 1104.29 feet.
- 8635-2 NW (1) - About 3 miles northwest of Auburn along county road at Illinios Central Gulf Railroad overpass on the south end of the bottom tier of blocks of the west abutmern; chiseled square. Elev. 1178.58 feet.
- 8635-3 NW (1) - About 7 miles east of Lake View at county road bridge over North Raccoon River, on left downstream curb; chiseled square. Elev. 1160.98 feet.
- 8635-3 NW (2) - (REFERENCE POINT) About 7 miles east of Lake View at county road bridge over North Raccoon River, on downstream guardrail beside the 20th guardrail post from the left end of bridge; filed arrow. Elev. 1162.89 feet.
- 8635-11 NE (1) - About 2 miles north of Auburn along a north-south county road, on the 2nd pole south of section line of fence, near base of power pole; pole spike and collar. Elev. 1201.11 feet.
- 8635-11 NW (1) - About 2 miles northwest of Auburn on a county road bridge over North Raccoon River, on left downstream end of truss; bolt marked with a filed cross. Elev. 1142.60 feet.
- 8635-11 NW (2) - (REFERENCE POINT) About 2 miles northwest of Auburn on a county road bridge over North Raccoon River, on top of guardrail between 3rd and 4th vertical members from right downstream end of bridge; filed arrow. Elev. 1146.53 feet.

- 8635-11 NW (3) - About 1.5 miles northwest of Auburn along a north-south county road leading north out of Grant City, about 0.1 mile south of a farm house on a large culvert on east side of road; chiseled square. Elev. 1156.05 feet.
- 8635-14 NE (1) - About 1 mile northwest of Auburn on a county road bridge over North Raccoon River, at left downstream end of truss; bolt marked with a filed cross. Elev. 1138.91 feet.
- 8635-14 NE (2) - (REFERENCE POINT) About 1 mile northwest of Auburn at a county road bridge over North Raccoon River, on top of guardrail beside 4th post from right downstream end of bridge; filed arrow. Elev. 1142.78 feet.
- 8735-29 NW (1) - About 4.5 miles northwest of Lake View at State Highway 196 bridge over North Raccoon River, on left downstream curb; chiseled square. Elev. 1169.81 feet
- 8735-29 NW (2) - (REFERENCE POINT) About 4.5 miles northeast of Lake View at State Highway 196 bridge over North Raccoon River, on curb beside 8th guardrail post from left downstream end of bridge; chiseled arrow. Elev. 1169.86 feet.
- 8735-32 NE (1) - About 6 miles east of Lake View at county road bridge over North Raccoon River, on left downstream curb; chiseled square. Elev. 1170.10 feet.
- 8735-32 NE (2) - (REFERENCE POINT) About 6 miles east of Lake View at county road bridge over North Raccoon River, on downstream guardrail post beside 3rd gutter from left end of bridge; filed arrow. Elev. 1171.83 feet.
- 8735-33 NW (1) - About 6 miles east of Lake View at county road bridge over North Raccoon River, on left downstream end of truss; on top of bolt marked with a filed cross. Elev. 1157.52 feet.
- 8735-33 NW (2) - (REFERENCE POINT) About 6 miles east of Lake View at county road bridge over North Raccoon River, on top of guardrail beside 2nd vertical member from left downstream end of bridge; filed arrow. Elev. 1160.65 feet.
- 8735-34 NE (1) - About 8 miles east of Lake View on east-west county road bridge over a small creek, on left upstream wingwall; chiseled cross. Elev. 1147.08 feet.
- 8735-34 NW (1) - About 7 miles east of Lake View at the intersection of county roads, in the south-west corner of intersection near the base of a power pole; pole spike and collar. Elev. 1170.70 feet.
- 8735-35 SW (1) - About 8 miles east of Lake View at county road bridge over North Raccoon River, on left downstream end of truss; bolt marked with a filed cross. Elev. 1147.69 feet.

- 8735-35 SW (2) - (REFERENCE POINT) About 8 miles east of Lake View at county road bridge over North Raccoon River, on downstream guardrail between 7th and 8th vertical members from right end of bridge; filed arrow.
Elev. 1151.82 feet.
- 8736-1 NW (1) - About 2.5 miles south of Sac City at county road bridge over North Raccoon River, on left downstream curb; chiseled square.
Elev. 1179.53 feet.
- 8736-1 NW (2) - (REFERENCE POINT) About 2.5 miles south of Sac City at county road bridge over North Raccoon River, on top of guardrail by 20th post from left downstream end of bridge; filed arrow.
Elev. 1182.42 feet.
- 8736-2 NE (1) - About 3 mile south of Sac City, near the center of the north half of section 2, 85 ft south, 29 ft east and 5.1 ft lower than the centerline of the road at curve, 37 ft east of the northeast corner of a small wooden shed, 22 ft east of east gate post, 1 ft north of the south right-of-way-fence; a standard tablet set inside of an 8-in concrete drain tile stamped "7DDB 1975".
Elev. 1268.650
- 8736-13 NW (1) - About 4.5 miles south of Sac City at county road bridge over North Raccoon River, on right downstream curb; chiseled square.
Elev. 1162.33 feet.
- 8736-13 NW (2) -(REFERENCE POINT) About 4.5 miles south of Sac City at county road bridge over North Raccoon River, on top of 16th guardrial post from right downstream end of bridge; filed arrow.
Elev. 1164.30 feet.
- 8736-13 SE (1) - About 5.5 miles south of Sac City at T-road south at field entrance in line with T-road, on the west end of a concrete culvert; chiseled square.
Elev. 1166.85 feet.
- 8736-13 SW (1) - About 5.5 miles south of Sac City at county road D46 bridge over North Raccoon River, in end piling of left upstream wingwall; top bolt head. (Gage RM 3)
Elev. 1162.69 feet.
- 8736-14 NE (1) - About 4.5 miles south of Sac City near the corner of sections 11, 12, 13 and 14, 419 ft south, 10 ft west and 4.5 ft lower than the centerline of crossroads, on top and at the north end of the west concrete railing of a small iron and concrete bridge; a standard tablet stamped "6DDB 1975".
Elev. 1169.167 feet.

- 8736-24 SE (1) - About 4 miles northeast of Lake View at county road bridge over North Raccoon River, on end of truss at left downstream end of bridge; on top of bolt marked with a filed cross.
Elev. 1160.72 feet.
- 8736-24 SE (2) - (REFERENCE POINT) About 4 miles northeast of Lake View at county road bridge over North Raccoon River, on top of guardrail beside the center vertical member; filed arrow.
Elev. 1164.59 feet.
- 8836-1 NW (2) - (REFERENCE POINT) About 2.5 miles south of Sac City at county road bridge over North Raccoon River, on top of the 16th guardrail post from the left downstream end of bridge; filed arrow.
Elev. 1182.42 feet.
- 8836-10 NE (1) - About 2 miles north of Sac City at a railroad bridge over county road, on pier on south side of road, in the north post of pier; pole spike and collar.
Elev. 1231.10 feet.
- 8836-11 NW (1) - About 2 miles north of Sac City at county road bridge over North Raccoon River, on left downstream end of truss; bolt marked with a chiseled cross.
Elev. 1209.31 feet.
- 8836-11 NW (2) - (REFERENCE POINT) About 2 miles north of Sac City at county road bridge over North Raccoon River, on top of guardrail beside 2nd vertical member from left downstream end of bridge; filed arrow.
Elev. 1213.78 feet.
- 8836-14 NW (1) - About 1.5 miles north of Sac City at county bridge over North Raccoon River, on right downstream wingwall; chiseled square.
1207.10 feet.
- 8836-14 NW (2) - (REFERENCE POINT) About 1.5 miles north of Sac City at county road bridge over North Raccoon River, on top of guardrail beside 16th post from right downstream end of bridge; filed arrow.
Elev. 1209.50 feet.
- 8836-24 NW (1) - In Sac City at county road M-54 bridge over North Raccoon River, on curb at right downstream end of bridge; chiseled square.
Elev. 1200.30 feet.
- 8836-24 NW (2) - (REFERENCE POINT) In Sac City at county road M54 bridge over North Raccoon River, on curb beside 13th guardrail post from right downstream end of bridge; chiseled arrow.
Elev. 1200.54 feet.
- 8836-24 NW (3) - In Sac City at county road M54 bridge over North Raccoon River, on wingwall at right upstream end of bridge; chiseled cross.
Elev. 1199.73 feet.

- 8836-24 SE (1) - In Sac City at U.S. Highway 20 bridge over North Raccoon River, on right downstream abutment; chiseled square.
Elev. 1190.25 feet.
- 8836-24 SE (2) - (REFERENCE POINT) In Sac City at U.S. Highway 20 bridge over North Raccoon River, on top of guardrail beside 10th post from right downstream end of bridge; filed arrow.
Elev. 1197.66 feet.
- 8836-24 SW (1) - At Sac City, near the intersection of Main Street and West State Street, in a park 60 yards south of county courthouse 129ft east of east curb of West State Street, 8.7 feet south of curb of Main Street, at the Union Solider's Memorial Monument 40.5 feet north east of the northwest corner of base; a standard disk stamped "1211.261 SAC CITY 1933" set in the top of a 4" iron pipe projecting 16 inches above ground.
Elev. 1211.261 feet.
- 8836-36 NW (1) - About 2 miles south of Sac City at county road bridge over North Raccoon River, on end of truss at left downstream end of bridge; bolt marked with a filed cross.
Elev. 1173.01 feet.
- 8836-36 NW (2) - (REFERENCE POINT) About 2 miles south of Sac City on county road bridge over North Raccoon River, on guardrail beside 5th vertical member from left downstream end of bridge; painted cross.
Elev. 1179.19 feet.
- 8935-4 NW (1) - About 3.2 miles south of Newell near corner of sections 4, 5, 32 and 33, 43.5 ft south, 53ft east and 2.3ft lower than Co. M 54 road, at road west; at northwest corner of grove of trees and 1 ft north of metal witness post; a standard tablet stamped "11 KED 1974" and approx. 1 in. below ground surface.
Elev. 1266.475 feet.
- 8935-6 NW (1) - About 4 miles northeast of Nemaha at county T-road south, east of dirt T road on headwall of a concrete culvert at intersection; a chiseled square.
Elev. 1238.82 feet.
- 8935-31 SE (1) - About 4 miles north of Sac City at county bridge over North Raccoon River, on downstream end of left abutment; chiseled square.
Elev. 1217.44 feet
- 8935-31 SE (2) - (REFERENCE POINT) About 4 miles north of Sac City at county road bridge over North Raccoon River, on top of 11th guardrail post from left downstream end of bridge; filed arrow.
Elev. 1220.17 feet.

- 8936-1 NE (1) - About 4 miles northeast of Nemaha at county road bridge over North Raccoon River, on left downstream end of truss; bolt marked with chiseled cross. Elev. 1241.64 feet.
- 8936-1 NE (2) - (REFERENCE POINT) About 4 miles northeast of Nemaha at county road bridge over North Raccoon River, on top of guardrail between 2nd and 3rd vertical member from left downstream end of bridge; filed arrow. Elev. 1245.57 feet.
- 8936-1 SE (1) - About 3.5 miles northeast of Nemaha at intersection of county road, at northwest corner of intersection near base of power pole; pole spike and collar. Elev. 1260.00 feet.
- 8936-12 NE (1) - About 3.5 miles northeast of Nemaha at county road bridge over North Raccoon River, on left downstream end of truss; bolt marked with a filed cross. Elev. 1239.38 feet.
- 8936-12 NE (2) - (REFERENCE POINT) About 3.5 miles northeast of Nemaha at county road bridge over North Raccoon River, on top of guardrail, beside 2nd vertical member from left downstream end of bridge; filed arrow. Elev. 1243.40 feet.
- 8936-12 SE (1) - About 3 miles northeast of Nemaha at intersection of county roads, at northwest corner of intersection, near base of power pole; pole spike and collar. Elev. 1280.61 feet.
- 8936-13 NW (1) - About 2 miles northeast of Nemaha at county road bridge over North Raccoon River, on left downstream pier on a metal plate; chiseled square. Elev. 1237.14 feet.
- 8936-13 NW (2) - (REFERENCE POINT) About 2 miles northeast of Nemaha on county road bridge over North Raccoon River, on guardrail beside 2nd vertical member from left downstream end of bridge; filed arrow. Elev. 1241.43 feet.
- 8936-24 NE (1) - About 2.5 miles east of Nemaha at county highway D15 bridge over North Raccoon River, on downstream end of left abutment; chiseled square. Elev. 1246.73 feet.
- 8936-24 NE (2) - (REFERENCE POINT) About 2.5 miles east of Nemaha at county highway D15 bridge over North Raccoon River, on top of 6th guardrail post from left downstream end of bridge; filed arrow. Elev. 1248.21 feet.

- 8936-25 SE (1) - About 3 miles southeast of Nemaha at county road bridge over North Raccoon River, on left downstream end of truss; bolt marked with filed cross. Elev. 1228.21 feet.
- 8936-25 SE (2) - (REFERENCE POINT) About 3 miles southeast of Nemaha at county road bridge over North Raccoon River, on top of guardrail beside 4th vertical member from left downstream end of bridge; filed arrow. Elev. 1232.32 feet.
- 9035-32 SW (1) - About 5 miles northeast of Nemaha at intersection of county road; at northeast corner of intersection near base of power pole; pole spike and collar. Elev. 1280.59 feet.



