UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

FLOODS IN THE WAPSIPINICON RIVER BASIN, IOWA

Prepared in cooperation with the

IOWA STATE HIGHWAY COMMISSION

Open-file Report

Iowa City, Iowa
February 1971

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By

Harlan H. Schwob, Hydraulic Engineer
United States Geological Survey

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ABSTRACT

Flood information is reported for 338 miles of the main stem and six tributaries of the Wapsipinicon River. The information will be of use to those concerned with the design of bridges and other structures and the conduct of various operations on the flood plains of the streams. Included in the report are flood-peak records, gaging-station records, frequency curves, and water-surface profiles.

Outstanding floods resulting from extremely heavy rainfall occurred in the upper basin in 1968 and 1969. Those in 1968 produced the highest flood of record at the gaging station at Independence. The flood of 26,800 cfs (cubic feet per second) at this station was the greatest in the period 1933-70. A number of the smaller tributaries experienced floods more than five times the computed 50-year flood.

The flood experience on the main stem downstream from Anamosa has not been outstanding. No flood of record has exceeded the 50-year flood in this reach.

Flood-profile sheets show profiles of actual flood occurrences and computed profiles of the 25- and 50-year floods at most locations. These sheets also contain tabulations of the flood discharges profiled. A low-water profile and tabulated discharge indicate the range in elevation and discharge along the streams.

INTRODUCTION

Purpose and Scope

The purpose of this report is to provide flood information on the Wapsipinicon River and six of its tributaries. This information can be used for planning, designing, and operating structures and conducting other activities on or across the flood plain and for assessing the severity of floods. This report provides data on (1) basin characteristics, (2) flood history with brief descriptions of the storms causing notable floods, (3) flood stages and discharges, (4) flood frequency, and (5) profiles of several major floods and of the 25- and 50-year floods on most of the streams. The report covers a total of 338 miles of streams as follows:

Main Stem Wapsipinicon River	218 miles
Little Wapsipinicon River (Upper)	6 miles
East Branch Wapsipinicon River	25 miles
Crane Creek	19 miles
Little Wapsipinicon River (Lower)	16 miles
Pine Creek	12 miles
Buffalo Creek	42 miles

Two of the tributaries in the basin are named "Little Wapsipinicon River." In the above listing, and only in the listing, they are designated (upper) and (lower) to avoid an apparent duplication. The upper has its source in west-central Howard County and its mouth at mile 195.8, the lower has its source in southeastern Chickasaw County and its mouth at mile 152.6. They are widely separated with no duplication of mileages in the report.

The discussion section in this report outlines some of the uses and limitations of the data presented.

Acknowledgments

This report is the fifth of a series prepared in a cooperative project with the Iowa State Highway Commission through the Iowa Highway Research Board. Collection of the information required for the report was by the Geological Survey. Acknowledgment of cooperation in operating gaging stations is contained in the annual streamflow reports of the U.S. Geological Survey (see references).

BASIN DESCRIPTION

The Wapsipinicon River has a long narrow basin lying diagonally across the northeast quarter and a corner of the southeast quarter of Iowa (plate 1). Of the 2,540 square miles total drainage area, all but about 13 square miles lies within the boundaries of the State. Tributary basins above Anamosa are long and narrow and are roughly parallel to the main stem. Those below Anamosa have the more normal dendritic pattern and are generally short by comparison with the upper tributaries. Land shapes range from flat in the upper basin to gently rolling in the lower basin. Flood plains are generally wide and flat, especially in the lower basin. The entire basin was covered by several of the prehistoric glaciers and soils and land shape result from this influence and subsequent erosion.

The climate of the basin is temperate. Average temperature for the basin is about 47°F ranging from 44°F in the north to

about 51°F in the south. Annual precipitation varies from 31 to 34 inches north to south; the average for the basin is 32.7 inches.

A number of cities and towns located along the main stem and tributaries covered in this report are affected by flooding. These and their 1960 population are:

City-Town	Population	City-Town	Population
Anamosa	4,616	Fredericksburg	797
Central City	1,087	Frederika	249
Coggon	672	Independence	5,498
Dunkerton	508	Stone City	---
Elma	706	Olin	703
Fairbank	650	Oxford Junction	725
		Quasqueton	373

FLOOD HISTORY

Little is known of the floods that occurred in the basin prior to the establishment of the gaging stations. (See gaging station records.) Brief descriptions of the causes of the floods of note that occurred during the period of gaging-station operation follow. More complete descriptions of causes and effects of the basin flooding can be found in U.S. Weather Bureau and Iowa Natural Resources Council publications (see references). Table 1 summarizes the flood data at gaging stations in the basin for selected floods.

The flood in 1892 at Stone City is the largest flood discharge known on any stream in the basin to date (table 1). Month and day of peak are not certain, but weather records indicate that it probably occurred late in June or early in July following

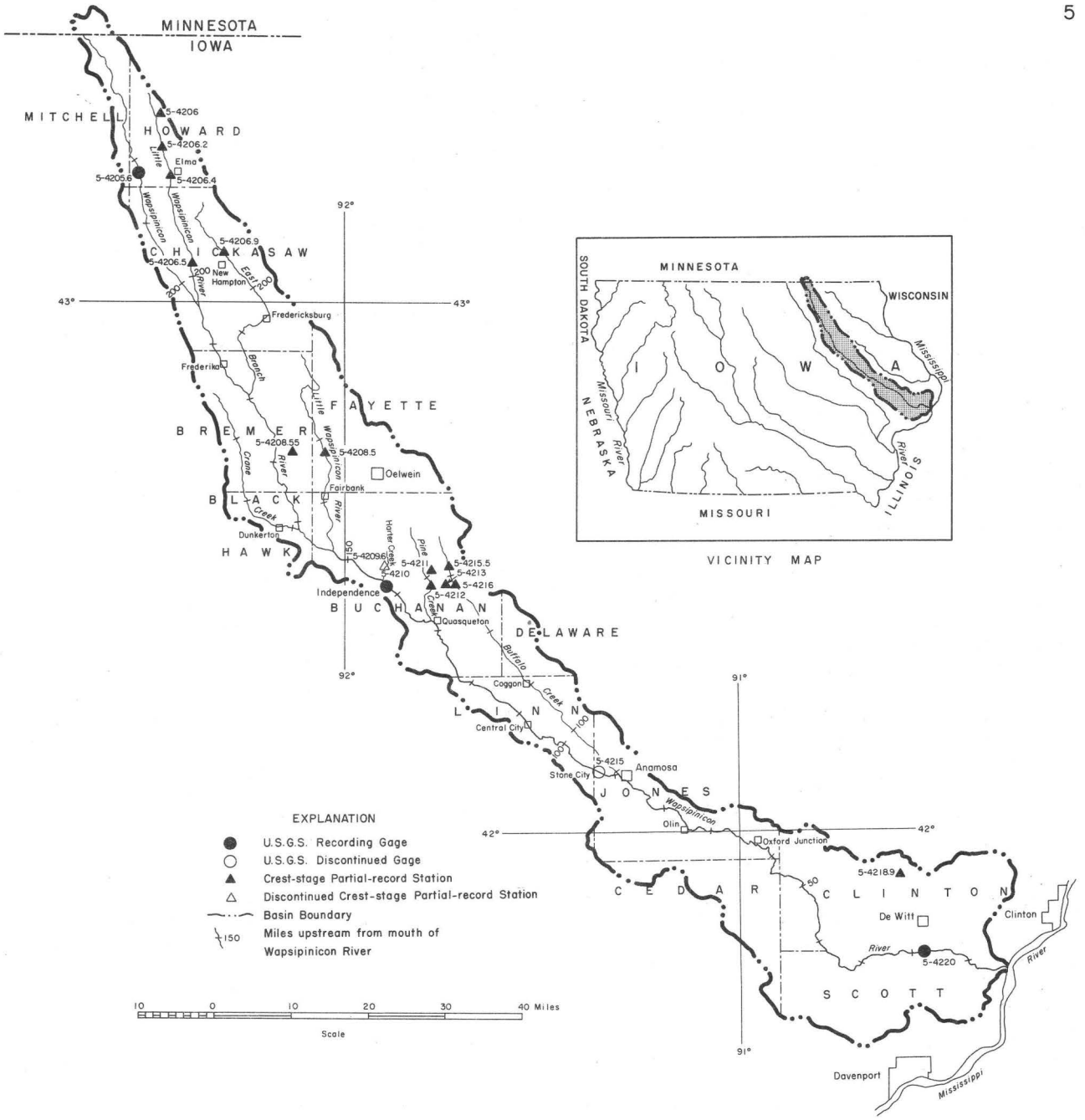


Plate 1. Map of Wapsipinicon River basin, Iowa.

Table 1.--Summary of selected flood data at gaging stations in the Wapsipinicon River basin, Iowa

Station number	Mile	Gaging stations	Period of flood record	Drainage area (sq mi)	1892			1944			1947		
					Date	Gage height (ft)	Discharge (cfs)	Date	Gage height (ft)	Discharge (cfs)	Date	Gage height (ft)	Discharge (cfs)
5-4205.6	217.88	Wapsipinicon R nr Elma	10/1958-	95.2	--	--	--	--	--	--	--	--	--
5-4206	----	[c]L Wapsipinicon R trib nr Riceville	1953-	.90	--	--	--	--	--	--	--	--	--
5-4206.2	----	[c]L Wapsipinicon R nr Acme	1953-	7.76	--	--	--	--	--	--	--	--	--
5-4206.4	----	[c]L Wapsipinicon R at Elma	1953-	37.3	--	--	--	--	--	--	--	--	--
5-4206.5	201.40	[c]LWapsipinicon R nr New Hampton	1966-	95.0	--	--	--	--	--	--	--	--	--
5-4206.9	205.70	[c]E Br Wapsipinicon R nr New Hampton	1966-	30.3	--	--	--	--	--	--	--	--	--
5-4208.5	168.20	[c]L Wapsipinicon R nr Oran	1966-	94.1	--	--	--	--	--	--	--	--	--
5-4208.55	----	[c]Buck Cr nr Oran	1966-	37.9	--	--	--	--	--	--	--	--	--
5-4209.6	----	[c]Harter Cr nr Independence	1952-63	6.17	--	--	--	--	--	--	--	--	--
5-4210	142.6	Wapsipinicon R at Independence	7/1933-	1,048	--	--	--	6-17	15.64	13,800	6-14	18.74	21,500
5-4211	----	[c]Pine Cr trib nr Winthrop	1953-	.334	--	--	--	--	--	--	--	--	--
5-4212	138.75	[c]Pine Cr nr Winthrop	1950-	28.3	--	--	--	--	--	--	--	--	--
5-4213	----	[c]Pine Cr trib no.2 at Winthrop	1953-	.704	--	--	--	--	--	--	--	--	--
5-4214	108.87	Wapsipinicon R at Central City	1929, 1941-50, 1968	1,263	--	--	--	6-19	16.8	12,400	6-15	19.3	22,500
5-4215	92.52	Wapsipinicon R at Stone City	1892 1903-13	1,324	July	28.0	[e]32,000	--	--	--	--	--	--
5-4215.5	131.5	[c]Buffalo Cr above Winthrop	1957-	68.2	--	--	--	--	--	--	--	--	--
5-4216	192.22	[c]Buffalo Cr nr Winthrop	1953-55 1966-	71.4	--	--	--	--	--	--	--	--	--
5-4220	18.20	Wapsipinicon R nr DeWitt	6/1934-	2,330	--	--	--	6-27	12.07	26,000	6-19	11.8	21,600

Station number	1951			1962			1966			1968			1969		
	Date	Gage height (ft)	Discharge (cfs)	Date	Gage height (ft)	Discharge (cfs)	Date	Gage height (ft)	Discharge (cfs)	Date	Gage height (ft)	Discharge (cfs)	Date	Gage height (ft)	Discharge (cfs)
5-4205.6	--	--	--	3-29	[a]14.84	[b] 5,700	7-14	12.31	1,280	7-23	12.31	1,280	6-29	14.53	5,500
5-4206	--	--	--	3-26 8-31	[a] 5.89 5.03	-- 703	-- 7-14	-- 4.38	-- 195	5-17 7-23	4.82 4.64	463 285	-- 6-26	-- 4.88	-- 520
5-4606.2	--	--	--	3-26 8-31	[a] 8.03 9.02	-- 2,380	7-14	5.84	458	5-17	6.98	749	6-26	8.58	1,720
5-4206.4	--	--	--	8-31	12.53	5,740	7-14	9.49	1,750	7-23	11.02	3,570	6-26	12.48	5,700
5-4206.5	--	--	--	--	--	--	7-14	87.12	2,250	7-25	86.92	2,000	6-26	88.72	9,200
5-4206.9	--	--	--	--	--	--	7-14	86.04	4,350	6-24	85.41	1,700	6-26	89.61	11,000
5-4208.5	--	--	--	--	--	--	7-14	87.85	1,450	7-17	90.00	5,000	6-27	88.61	2,350
5-4208.55	--	--	--	--	--	--	7-14	88.94	800	7-17	89.11	860	6-27	89.05	850
5-4209.6	--	--	--	5-5	9.96	2,280	--	--	--	--	--	--	--	--	--
5-4210	4-30	18.20	20,800	3-31	15.43	14,400	7-18	8.92	4,550	7-18	21.11	26,800	7-2	15.76	14,900
5-4211	--	--	--	5-5	6.24	140	6-12	5.45	92	7-17	8.97	334	7-18	6.06	123
5-4212	--	--	--	5-5	16.68	5,030	6-12	15.61	3,050	7-17	22.98	24,200	7-18	15.45	2,500
5-4213	--	--	--	5-29	6.37	104	6-12	6.61	168	7-17	7.26	570	7-18	7.15	470
5-4214	--	--	--	--	--	--	--	--	--	7-19	[d]17.29	23,000	--	--	--
5-4215	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5-4215.5	--	--	--	5-6	18.33	4,260	6-12	17.00	1,460	7-17	19.36	14,100	7-18	18.74	8,800
5-4216	--	--	--	--	--	--	6-12	88.64	2,000	7-17	91.12	14,800	7-18	90.36	8,800
5-4220	5-6	11.30	15,600	4-6	11.67	17,600	7-25	11.91	13,800	7-25	11.91	13,800	7-9	12.30	16,200

a. Affected by ice. b. About. c. Crest-gage partial record station. d. After construction of new dam. e. Estimated

two months of above normal rainfall. Only minor flooding occurred at Stone City in 1903-14.

Between 1914 and 1933 weather records indicate several possible periods of flooding in the basin. However, definite information for any locality is not available. After 1933 there was a period of 10 years during which only minor flooding was recorded at gages then in operation.

Heavy rains in the lower part of the basin on June 25 and 26, 1944, resulted in flooding from Independence to the mouth. The heaviest rainfall occurred in portions of Jones and Cedar Counties south and east of Anamosa, and the flood magnitudes were the greatest in the lower reaches of the river. The gaging station near DeWitt is about 18 miles upstream from the mouth and the 1944 flood at this gage is the greatest in the period 1933-70. Upstream from Anamosa the floods were less severe.

In June 1947 heavy rainfall was general over much of the State for the entire month. The rains on June 12-15 over the Wapsipinicon basin produced large floods along the main stem of the river from Independence to the mouth. The smaller streams, particularly those in the upper basin, were not gaged at the time so their flood experience for the year is unknown. The floods on the main stem were the second highest of the period 1933-70.

The flood of April-May 1951 resulted from a downpour in the upper basin (in Bremer County and surrounding areas) following an extremely wet period of about 2 months. Only the gages at Independence and DeWitt were in operation in 1951. As the flood

moved downstream, attenuation through storage and lack of sustaining tributary inflow caused a steady decline in the peak discharge.

The floods of March-April 1962 were the result of snow melt with only minor amounts of rain. Snow accumulation in the middle of March was reported in weather records as 40 inches at New Hampton and 20-25 inches at numerous other places. The temperature remained low until a warming trend after the 24th. Flood discharges were not exceptionally large on the lower main stem, but the upstream small tributaries and main stem carried floods approaching record discharges (table 1).

The floods in 1966, 1968, and 1969 were summer floods caused by exceptionally heavy rainfall over limited areas of the upper basin. Those in 1968 resulted from rainfall of up to 15 inches over parts of Black Hawk, Buchanan, Bremer, and Fayette Counties. Flood discharges far exceeded the 50-year flood on many of the tributary streams and produced the peak discharge of record at Independence. In 1969 storms occurred in two periods, at the end of June and the beginning of July. Rainfall was heavy in the northernmost part of the basin and over the Buffalo Creek watershed. Extremely large discharges occurred at gages on several of the upper tributaries (see table 1). Floods exceeding the 50-year flood also occurred on Buffalo Creek. Those on the lower end of the creek were exceptionally large.

BASIC DATA

Gaging-Station Records

The first stream-gaging station in the basin was established at Stone City in 1903. It was operated until 1914 and was discontinued following the construction of a dam 4 miles downstream at Anamosa. During its period of operation a high-water mark for the flood in 1892 was tied to gage datum. The peak discharge for this flood was later estimated as 32,000 cfs.

No gages were operated in the basin from 1914 until the establishment of the gage at Independence in June 1933. Since 1933 a total of 17 gages, including the gage at Independence, have been established. The list includes 3 recording-gaging stations, one non-recording gaging station, and 13 partial-record crest gages (at these, only the annual peak data are published). One special-purpose gaging station (at Central City) was operated from 1941-50 and then discontinued (records were not published), one crest gage was discontinued in 1963 after 12 years of operation. One crest gage shown on plate 1 (5-4218.9) north of DeWitt was established in 1966. It has not as yet been rated and furnishes little information on floods. For this reason it is shown only on plate 1 and is not considered otherwise in the report.

Flood-peak records (to 1965) at the 18 gages have been published (Schwob, 1966, Pt. 2). Daily records at the complete-record gaging stations and flood-peak records at crest-gage stations and miscellaneous sites are available in the annual streamflow publications of the U.S. Geological Survey. (See references.)

Table 2.--Summary of date and time of peaks of the 1944, 1947, 1968, and 1969 floods at gages in the Wapsipinicon River basin.

Gaging station	Mile	Drainage area sq.mi.	June 1944 Day	June 1944 Hour	June 1947 Day	June 1947 Hour	July 1968 Day	July 1968 Hour	June-July 1969 Day	June-July 1969 Hour
Wapsipinicon R nr Elma	217.88	95.2	--	--	--	--	--	--	29	2000
Wapsipinicon R at Independence	142.6	1,048	17	0800	14	0230	18	0430	2	0300
Wapsipinicon R nr DeWitt	18.20	2,330	27	0730	19	0900	25	1200	9	2000

Tabulations of selected peak data from the three recording gages are in an appendix to this report. Days of flood discharge have been subdivided for gage height and discharge and the data tabulated. Station descriptions for all 18 gages are also in the appendix. Table 2 contains a summary of date and time of peaks at recording gages for selected floods.

Profile Data

High-water marks of floods along the streams were identified a short time after the peak. These marks were located upstream and downstream from bridges and at intermediate points if needed to define the water-surface elevation along the streams. Low-water elevations were also obtained to indicate the approximate range in stage between low water and the several floods. Both low- and high-water marks were tied to mean sea level using the datum of the 1929 general adjustment.

Supplementary measurements of discharge were made at points other than gaging stations to help define the discharge along the streams for both low- and high-water profiles. Drainage areas were taken from a report by Larimer (1957).

Mileage System

River mileages were determined from the best available maps. Zero mileage is at the mouth of the Wapsipinicon River at mile 506.8 on the Mississippi River (above the mouth of the Ohio River). Bridges, creeks, and other easily identified points are indicated on the profile sheets. An index number, such as 8606-29 NE, is shown for bridges and other easily identified points to aid in

identifying map locations and mileage of the point. The number 8606-29 NE indicates a location in Twp. 86 N., R. 6 W., in the northeast quarter of section 29.

Flood Frequency

The 25- and 50-year flood discharges tabulated on the profile sheets (plates 2-19) were computed on the basis of a report by Schwob (1966).

Figure 1 shows the frequency curves at five selected gaging stations in the basin. Flood magnitudes are shown in cubic feet per second per square mile to facilitate comparison between stations. Figure 2 shows the frequency of specific annual floods at the gaging stations at Independence and Stone City for their period of record which is the longest available in the basin.

FLOOD PROFILES

The basic data described in the previous section were used to prepare flood profiles along the streams. High-water marks defined the peak elevations of the floods during the several years of observation. Gaging-station records and supplemental discharge measurements provided the peak discharges tabulated on the profile sheets (plates 2-19). Computed discharges and elevations for the 25- and 50-year floods have been used to prepare profiles for these two floods where they are shown. At some locations only the 50-year flood is shown because the difference in elevation between it and the 25-year flood was only a matter of a few tenths of a foot. At some locations data were not adequate to permit computation of the profiles for either flood frequency.

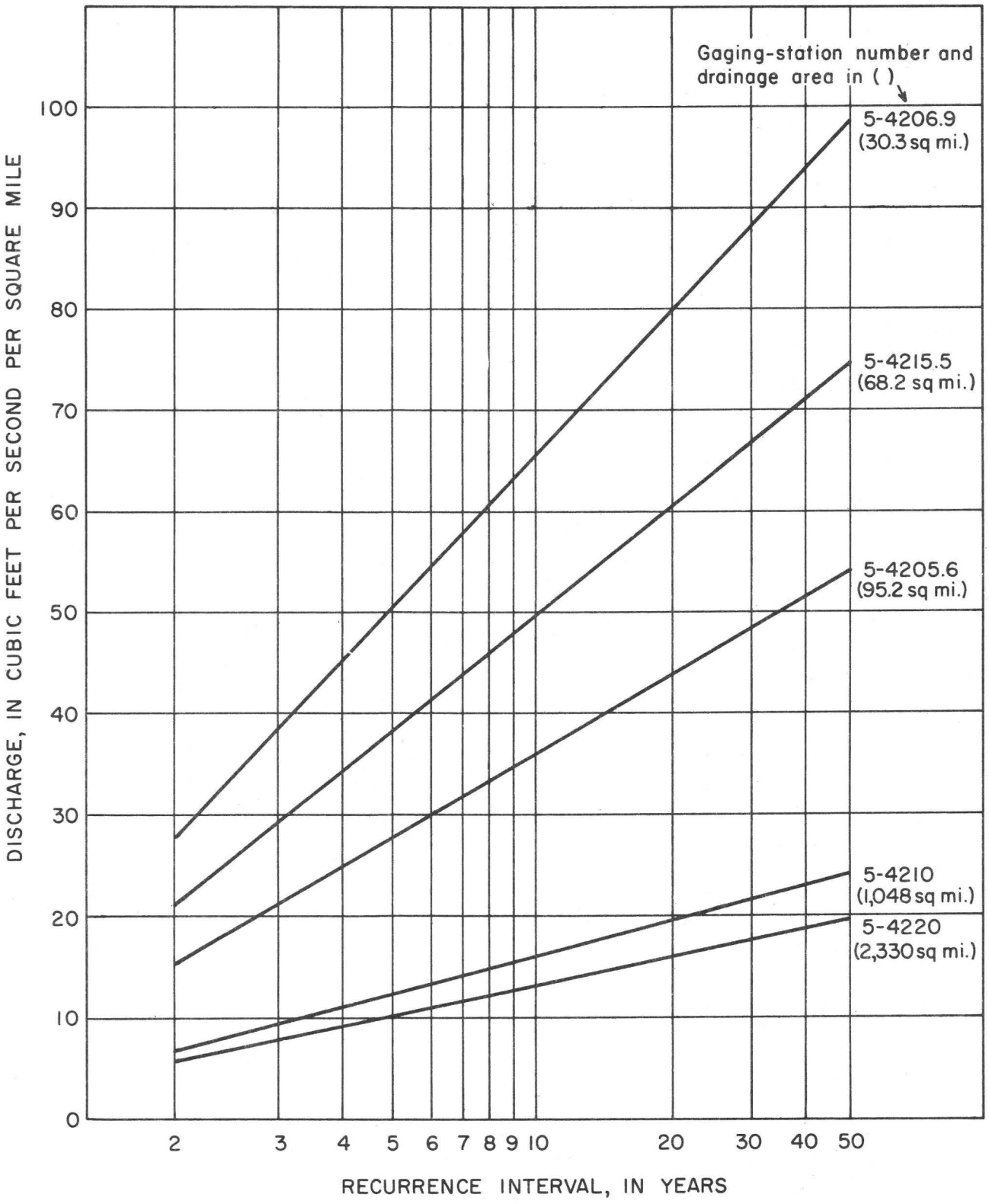


Figure 1. Flood-frequency curves for selected gaging stations, Wapsipinicon River basin.

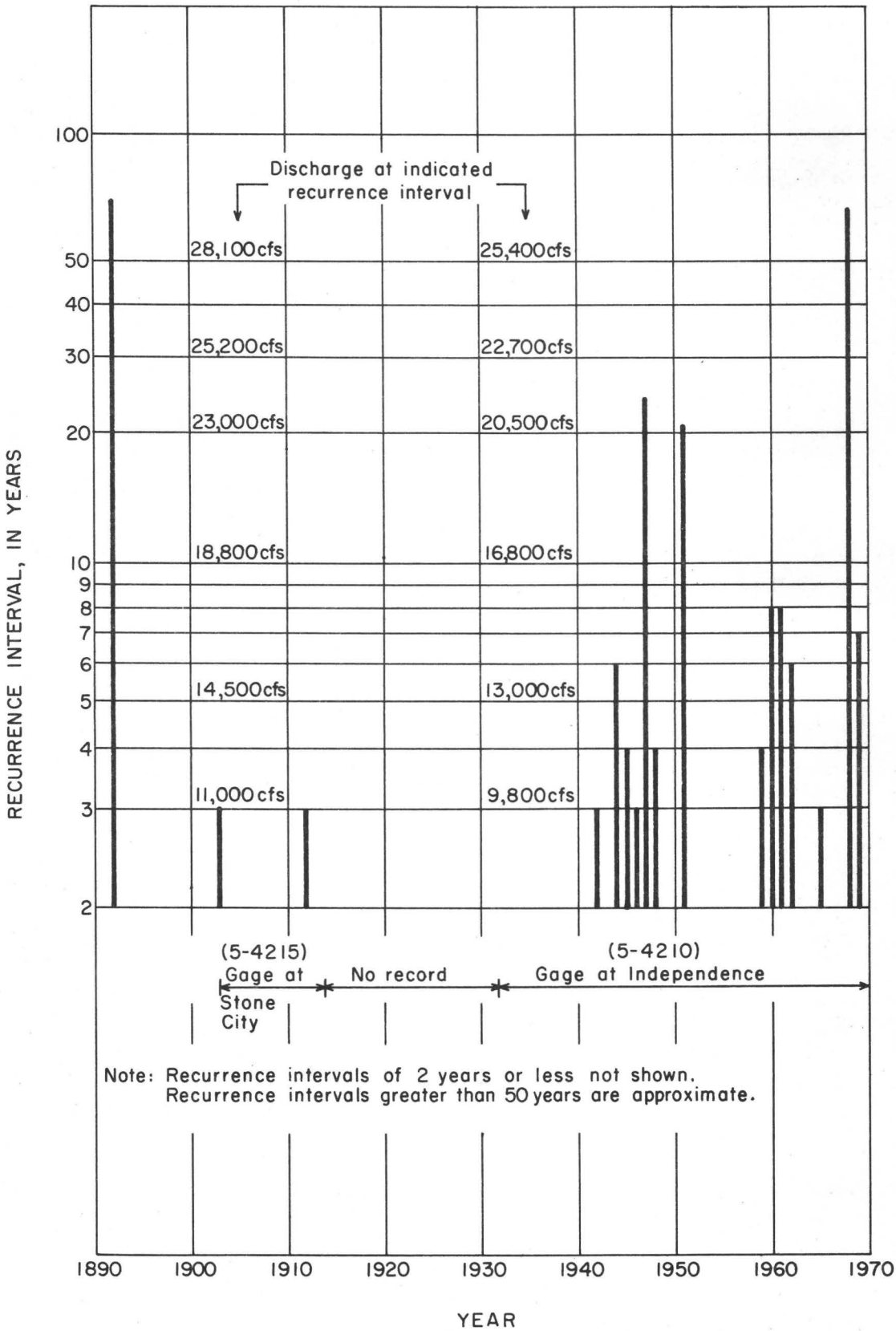


Figure 2. Frequency of known annual floods at gaging stations on Wapsipinicon River at Stone City and Independence

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: April 1962	July 1968	25-year	50-year	4-2-63 discharge cfs
3.25	2536	18,400	13,800	42,700	50,000	3100
11.75	2482	18,000	13,800	41,600	48,700	2900
11.80	2396	17,900	13,800	40,600	47,400	2900
18.20	2330	17,600	13,800	39,000	45,600	2850

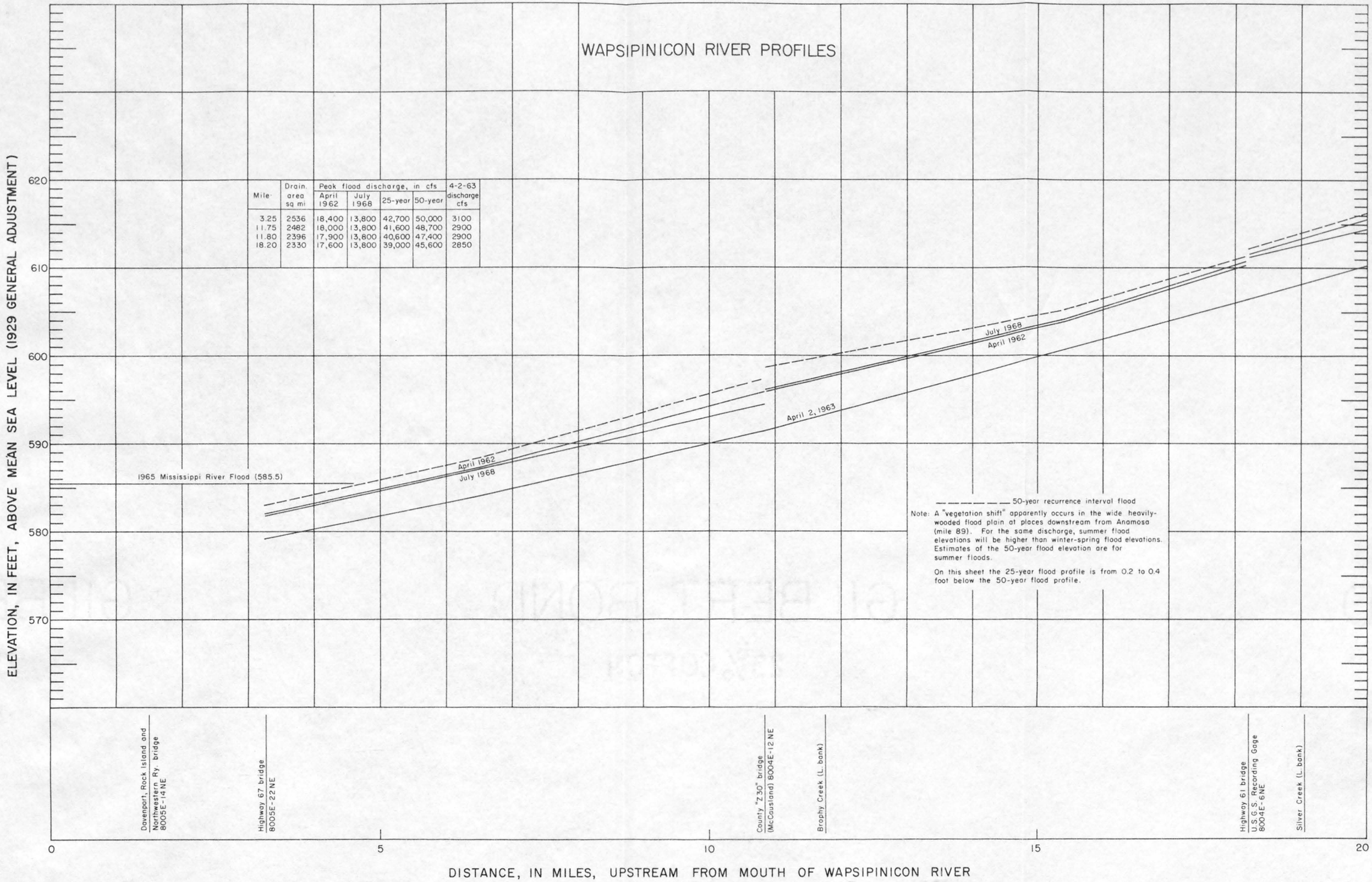


Plate 2. Wapsipinicon River profiles, mile 0 to mile 20.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs				4-2-63 discharge cfs
		April 1962	July 1968	25-year	50-year	
24.25	2236	17,400	13,800	37,100	43,400	2780
29.30	2207	17,200	13,800	36,800	43,100	2700
29.35	2087	17,200	13,800	35,000	40,900	2600
39.70	2052	16,800	14,000	33,900	39,700	2600
39.75	2013	16,800	14,000	33,400	39,100	2600

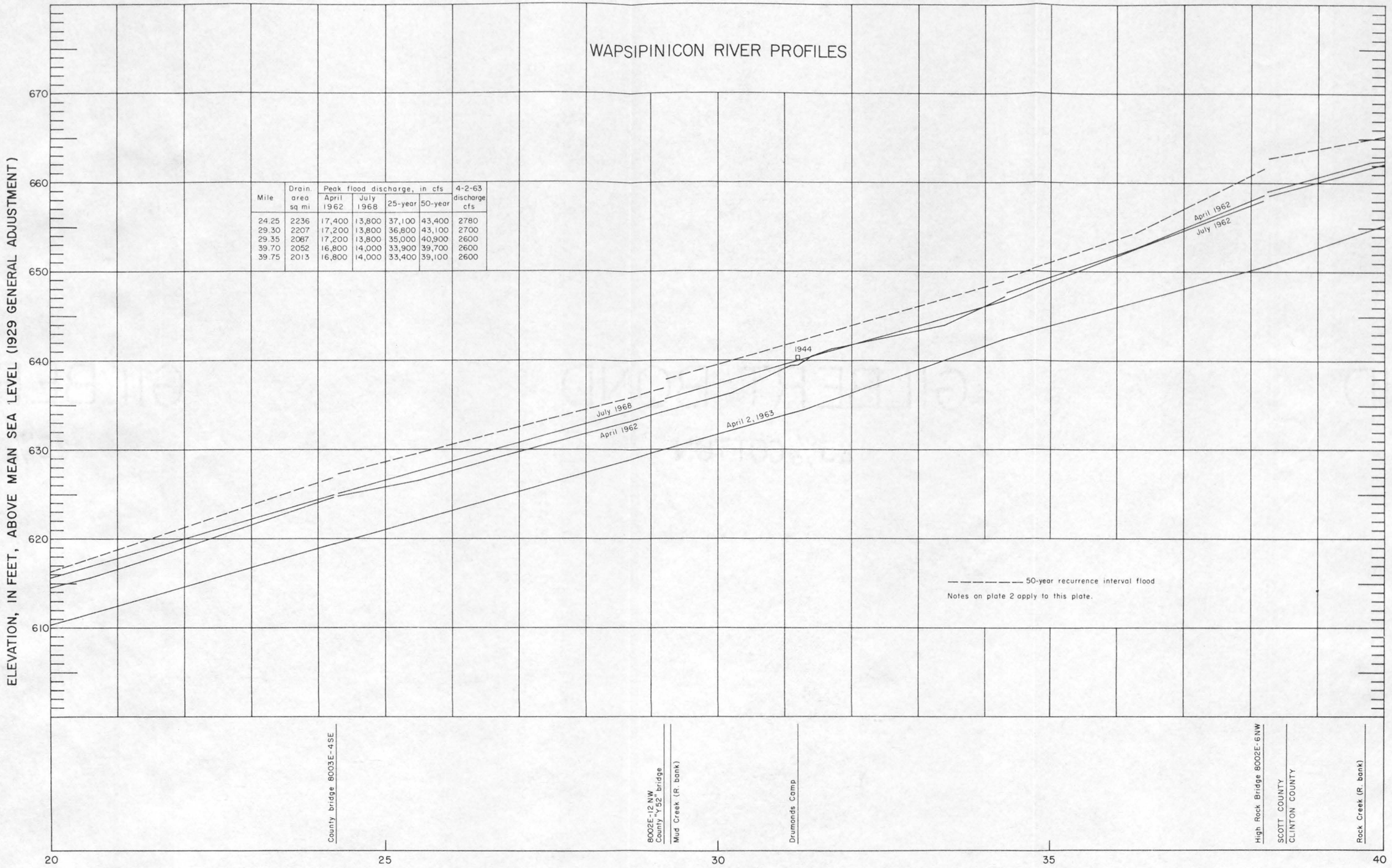


Plate 3. Wapsipinicon River profiles, mile 20 to mile 40.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs				4-2-63 discharge cfs
		April 1962	July 1968	25-year	50-year	
42.40	2009	16,600	14,100	33,100	38,800	2600
42.45	1952	16,600	14,100	32,300	37,800	2600
44.65	1928	16,500	14,200	31,800	37,200	2600
53.70	1834	16,300	14,700	30,700	35,700	2500

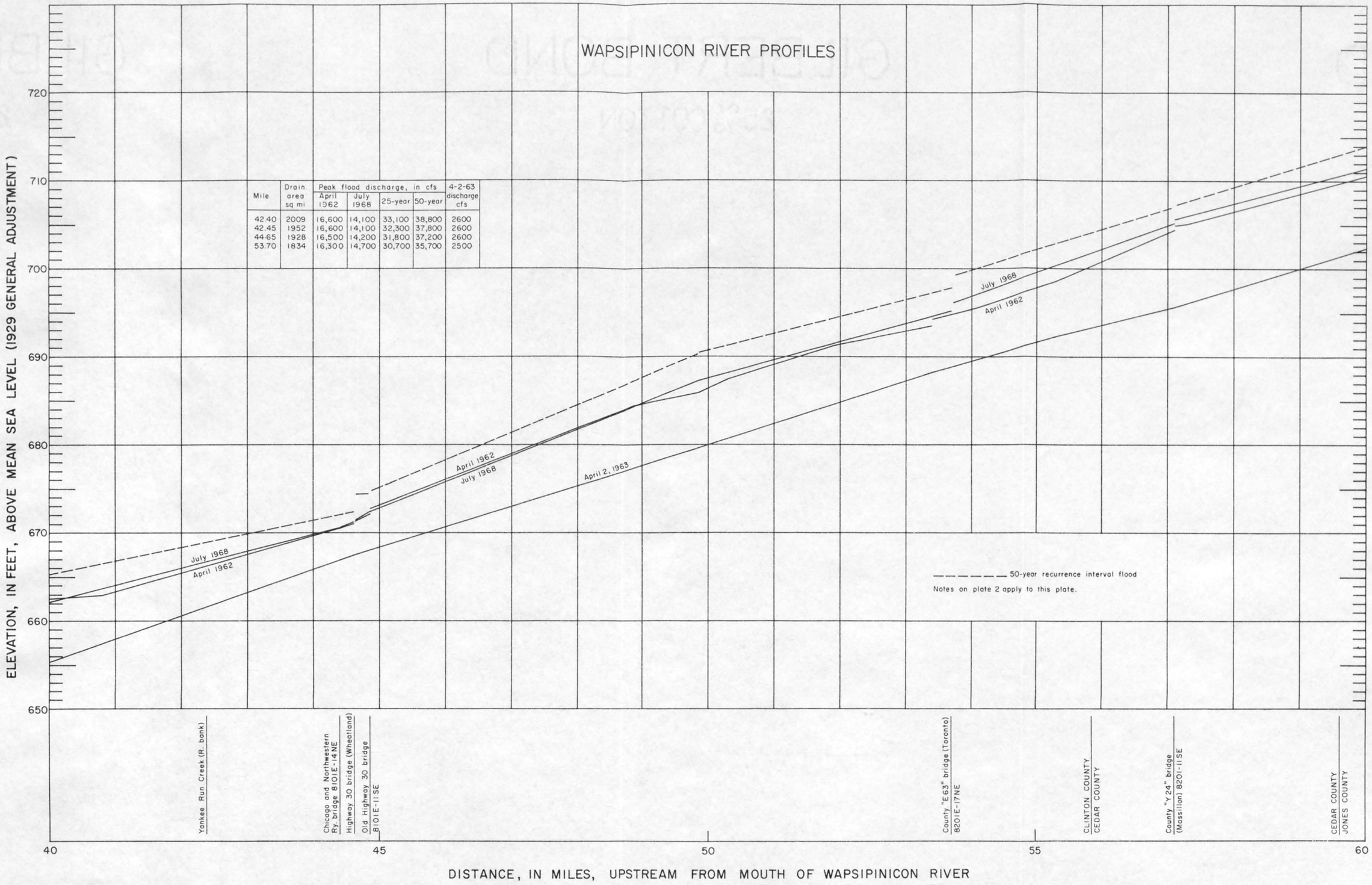


Plate 4. Wapsipinicon River profiles, mile 40 to mile 60.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs				4-2-63 discharge cfs
		April 1962	July 1968	25-year	50-year	
63.05	1788	16,000	15,600	30,000	34,900	2400
74.00	1719	15,800	17,000	29,200	34,100	2400
74.10	1621	15,800	17,000	27,800	32,600	2350

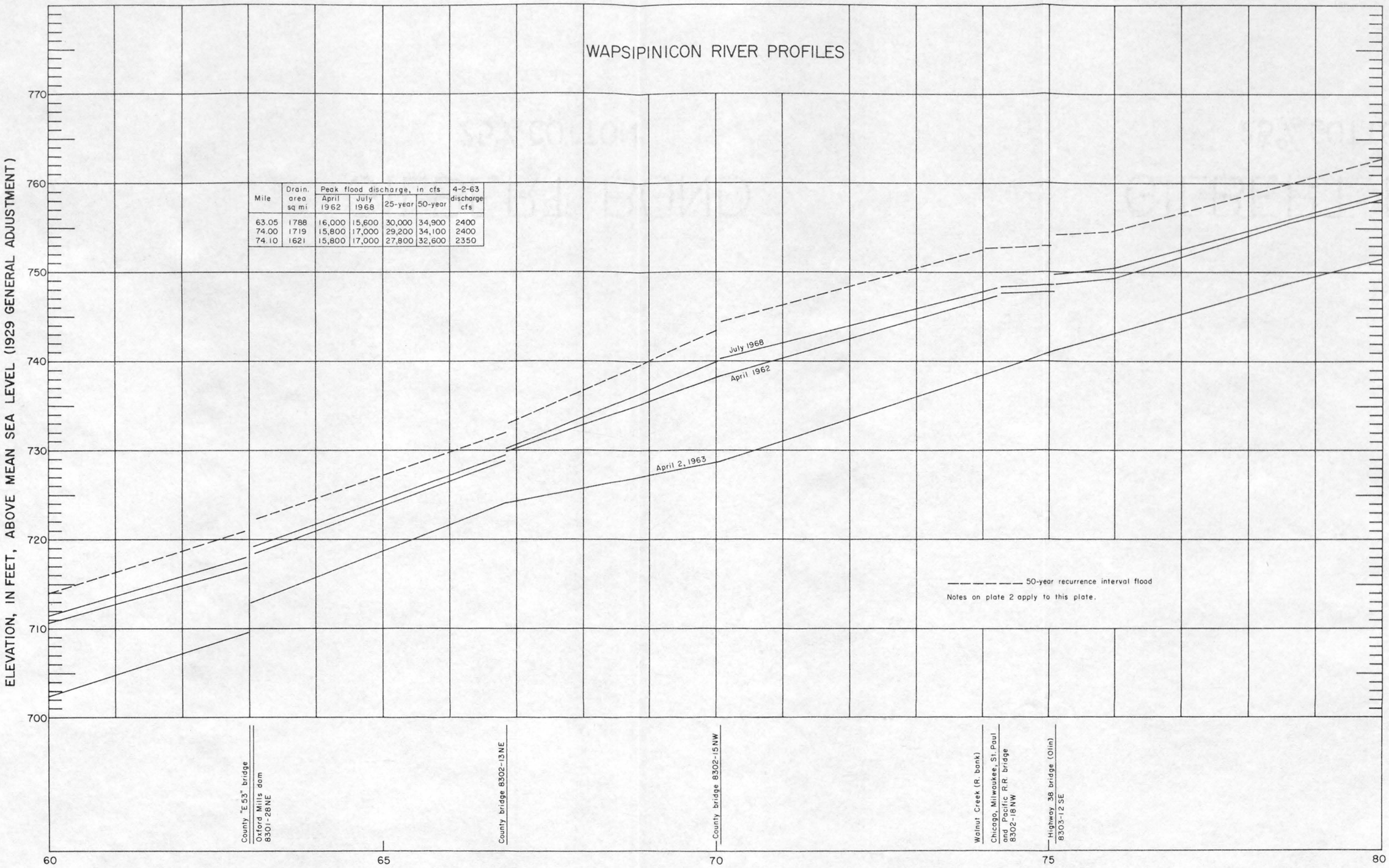


Plate 5. Wapsipinicon River profiles, mile 60 to mile 80.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: April 1962	July 1968	25-year	50-year	4-2-63 or 10-13-66 discharge cfs
80.45	1596	15,600	18,000	27,600	32,200	2300
88.75	1562	15,400	19,400	27,300	31,900	2250
						220
89.40	1562	15,400	20,200	27,300	31,900	152
89.50	1330	—	20,100	24,000	28,200	152
92.50	1324	—	20,100	24,000	28,100	152

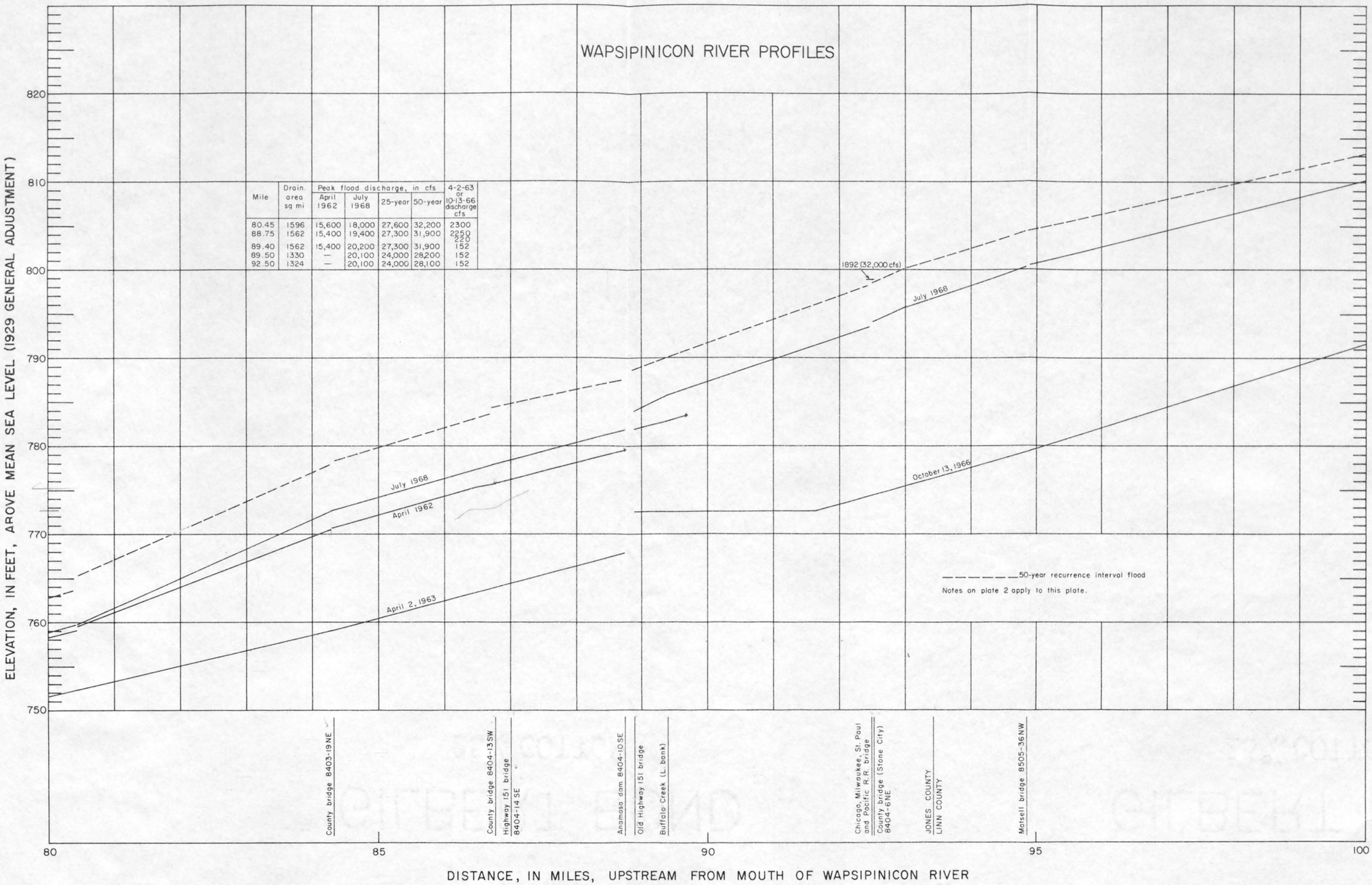


Plate 6. Wapsipinicon River profiles, mile 80 to mile 100.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1968	25-year	50-year	10-13-66 discharge cfs
105.95	1274	22,600	23,800	27,700	147
108.85	1263	23,000	23,800	27,600	146

July 1968

Oct. 13, 1966

50-year recurrence interval flood

County "E28" bridge (Waubeek) 8505-20NW

County bridge 8506-13NW

8506-3SE Illinois Central R.R. bridge

Bridge (Central City) Main Street bridge

Dam

Highway 13 bridge 8506-3NE

County "D66" bridge 8606-29NE

County bridge (Paris) 8606-19SE

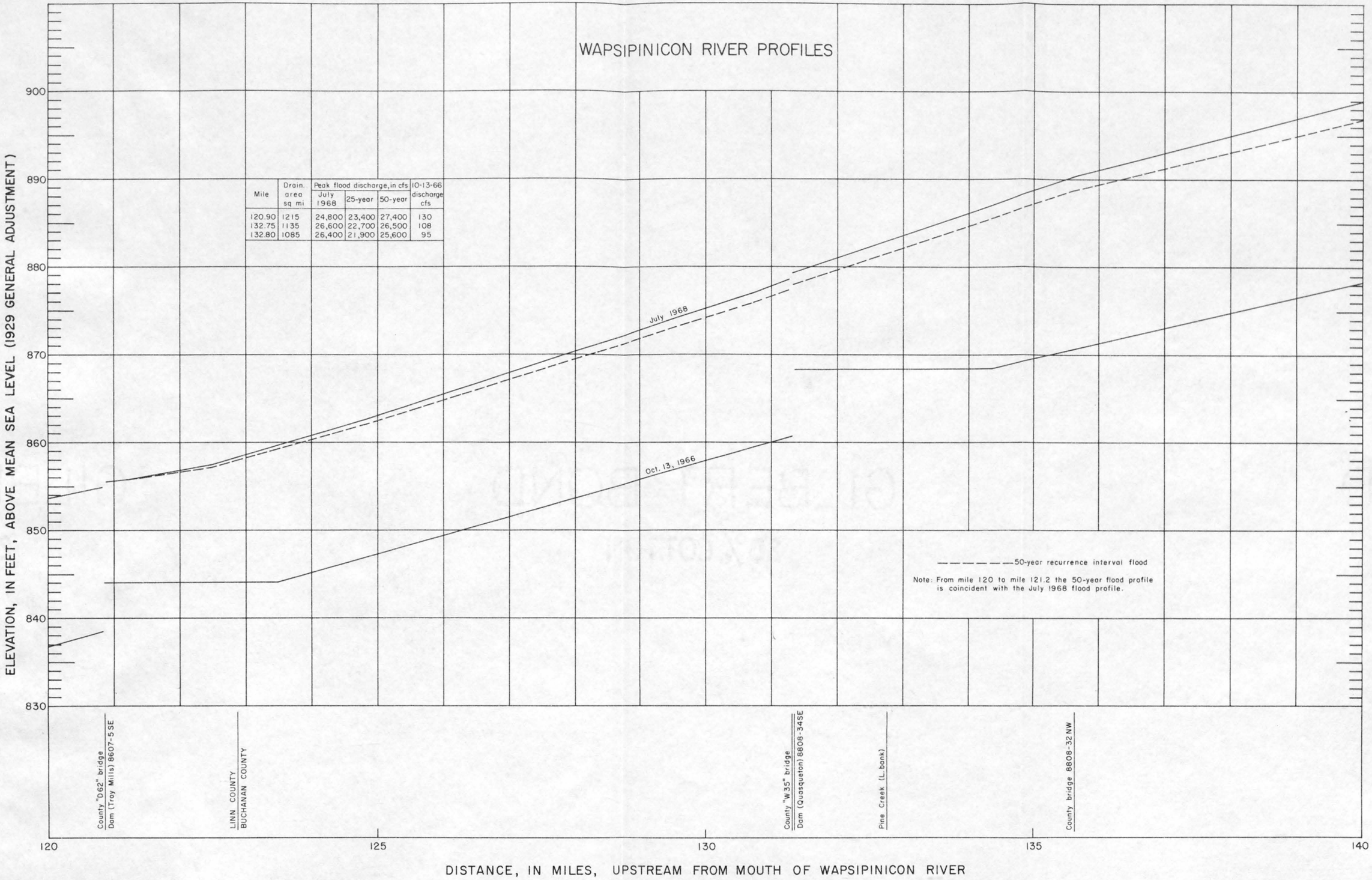
ELEVATION, IN FEET, ABOVE MEAN SEA LEVEL (1929 GENERAL ADJUSTMENT)

860
850
840
830
820
810
800
790

100
105
110
115
120

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF WAPSIPINICON RIVER

Plate 7. Wapsipinicon River profiles, mile 100 to mile 120.



Mile	Drain. area sq mi	Peak flood discharge, in cfs			10-13-66 discharge cfs
		July 1968	25-year	50-year	
120.90	1215	24,800	23,400	27,400	130
132.75	1135	26,600	22,700	26,500	108
132.80	1085	26,400	21,900	25,600	95

Plate 8. Wapsipinicon River profiles, mile 120 to mile 140.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1966	July 1968	June 1969	25-year	50-year	10-13-66 discharge cfs
142.50	1048	4550	27,000	15,000	21,700	25,400	86
147.35	1025	4600	27,600	—	21,400	25,000	84
147.40	917	4600	25,200	—	19,500	22,800	64
152.60	899	4600	30,600	—	19,500	22,800	62
152.65	693	4300	28,200	—	15,700	18,400	36
159.00	671	4700	28,200	—	15,600	18,200	34
159.05	561	4500	3,600	—	13,500	15,800	24

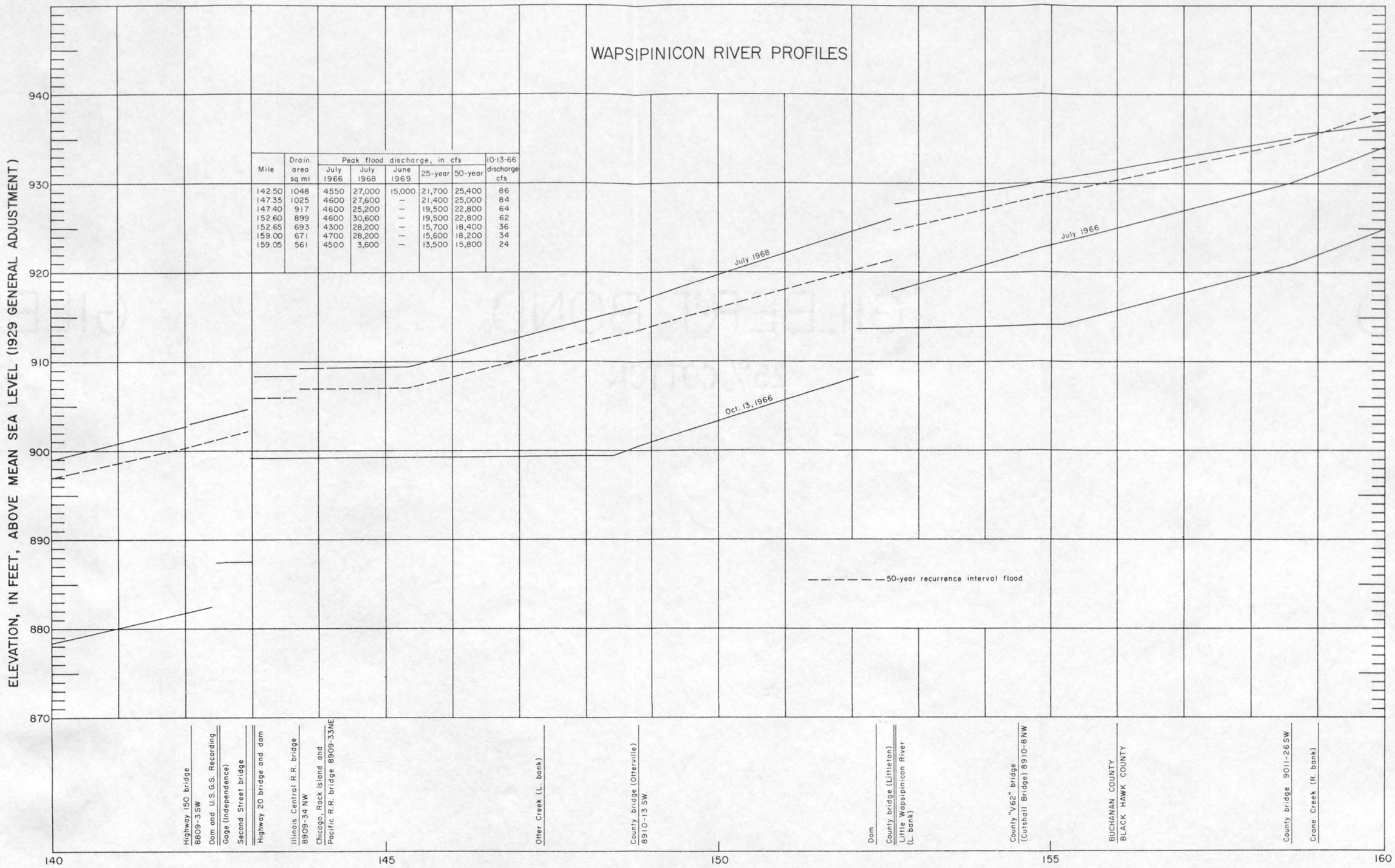


Plate 9 Wapsipinicon River profiles, mile 140 to mile 160.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1966	July 1968	June 1969	25-year	50-year	10-13-66 discharge cfs
164.60	545	4500	3000	17,300	13,400	15,700	23
175.80	511	4400	—	18,900	13,300	15,600	21

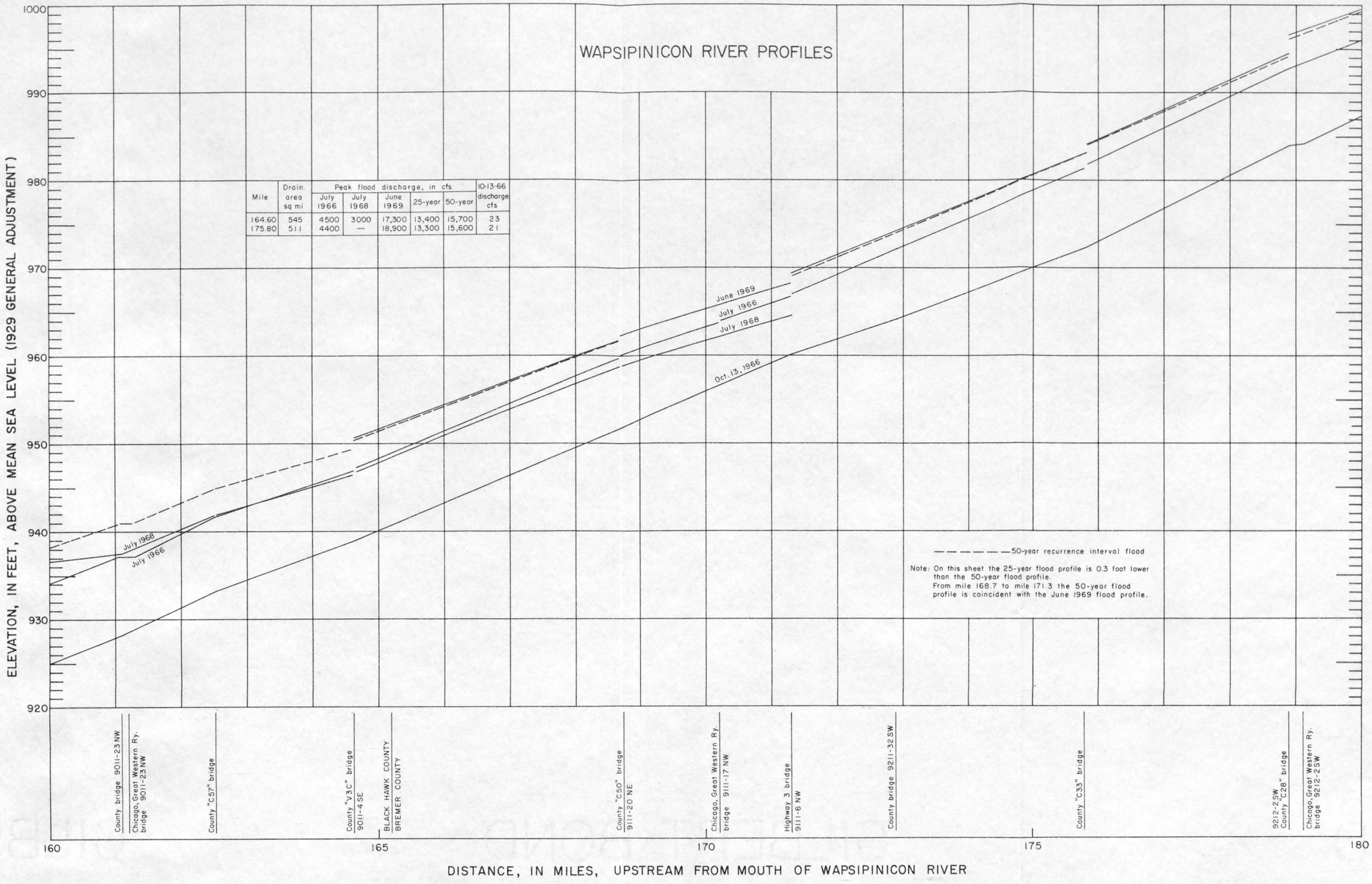


Plate 10. Wapsipinicon River profiles, mile 160 to mile 180.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: June 1966	June 1969	25-year	50-year	10-13-66 discharge cfs
180.40	493	4400	19,600	13,200	15,600	20
180.50	345	3800	18,800	9,880	11,600	19
186.10	~~380~~	3800	19,300	9,600	11,400	18
191.15	299	3700	19,800	9,380	11,000	16
195.80	287	3600	20,000	9,280	10,800	16
195.85	162	2500	15,900	5,640	6,600	9

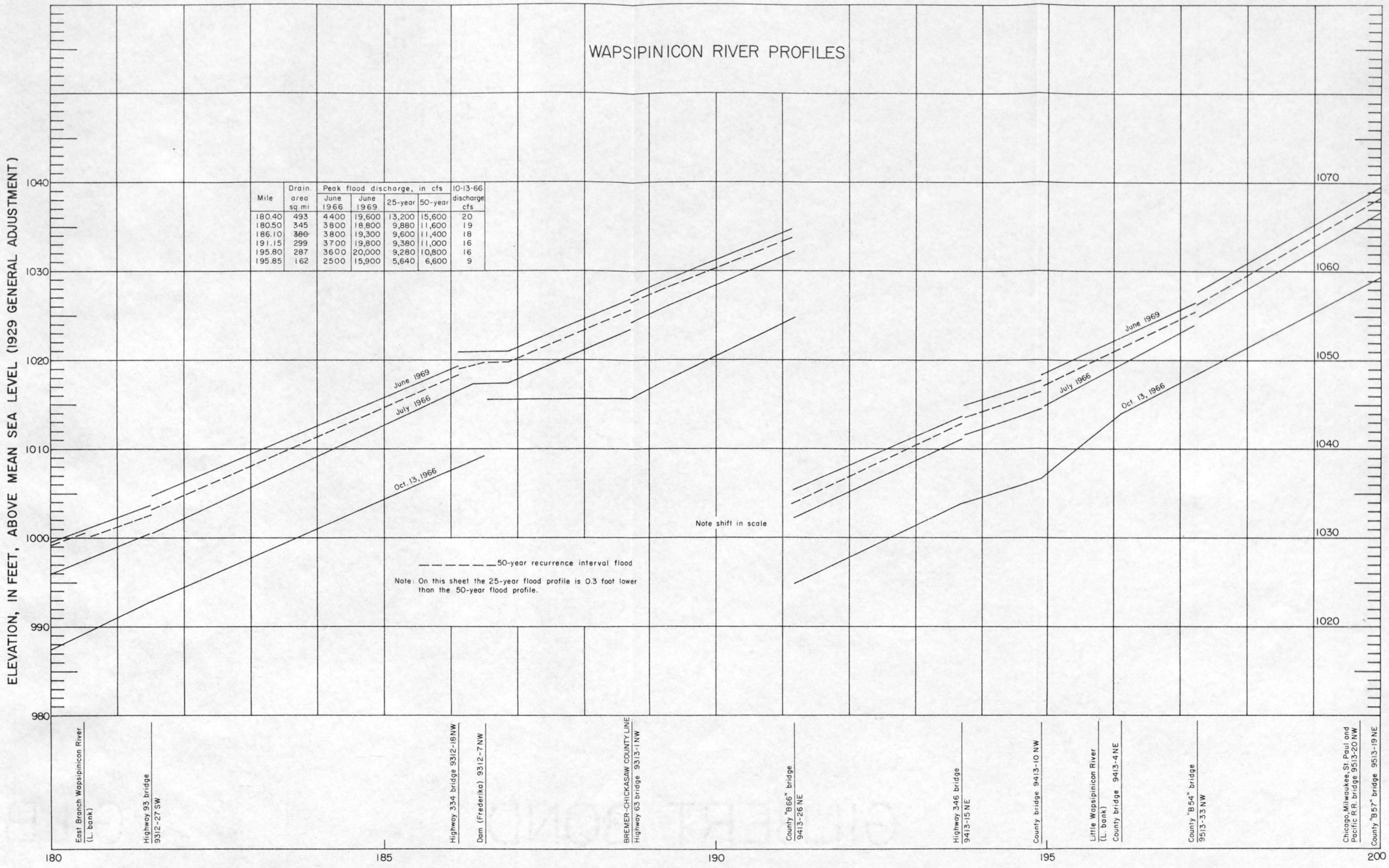


Plate 11. Wapsipinicon River profiles, mile 180 to mile 200.

WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: June 1966	June 1969	25-year	50-year	10-13-66 discharge cfs
200.00	155	2400	14,800	5560	6540	9
203.00	146	2300	13,800	5350	6240	8
205.80	138	2100	13,000	5250	6140	8
208.10	131	2000	12,000	5090	5950	8
211.20	120	1800	10,600	4880	5700	7
213.80	112	1600	9,300	4850	5520	7
215.50	102	1400	8,000	4560	5330	6
217.90	95.2	1280	5,500	4400	5150	6

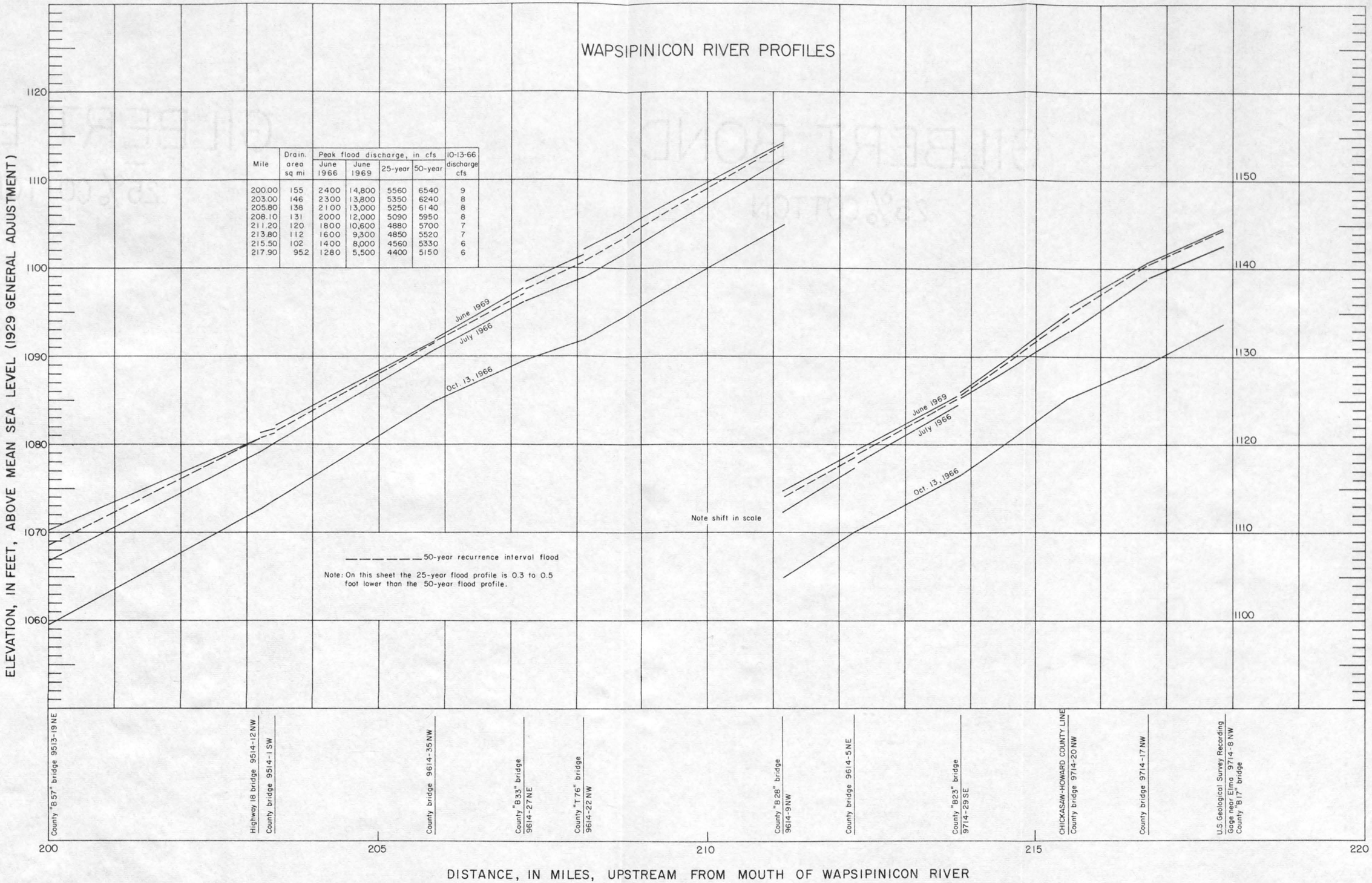


Plate 12. Wapsipinicon River profiles, mile 200 to mile 218.

BUFFALO CREEK PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs				10-7-68 discharge cfs
		July 1968	July 1969	25-year	50-year	
89.80	231	3400	17,800	9990	11,700	118
97.95	199	3800	16,500	8800	10,300	96
106.55	169	4300	14,400	7740	9,050	81

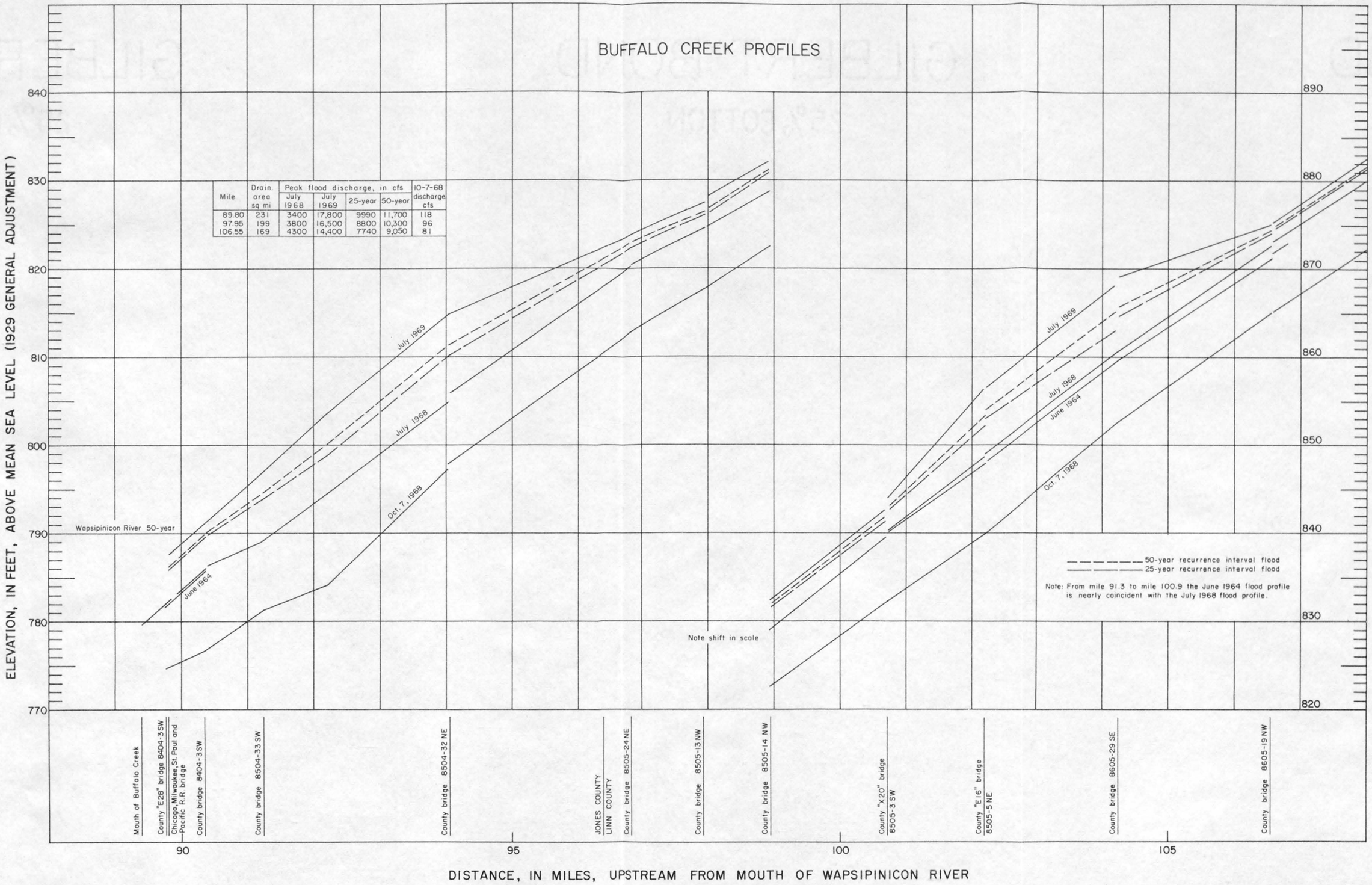


Plate 13. Buffalo Creek profiles, mile 89.5 to mile 108.

BUFFALO CREEK PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1968	July 1969	25-year	50-year	10-7-68 discharge cfs
110.15	149	4,750	13,400	7050	8250	73
116.60	122	5,800	11,700	6040	7070	63
122.20	962	8,200	10,100	5200	6080	53
129.20	71.4	13,100	8,800	4370	5120	41
131.50	68.2	14,100	8,800	4350	5090	38

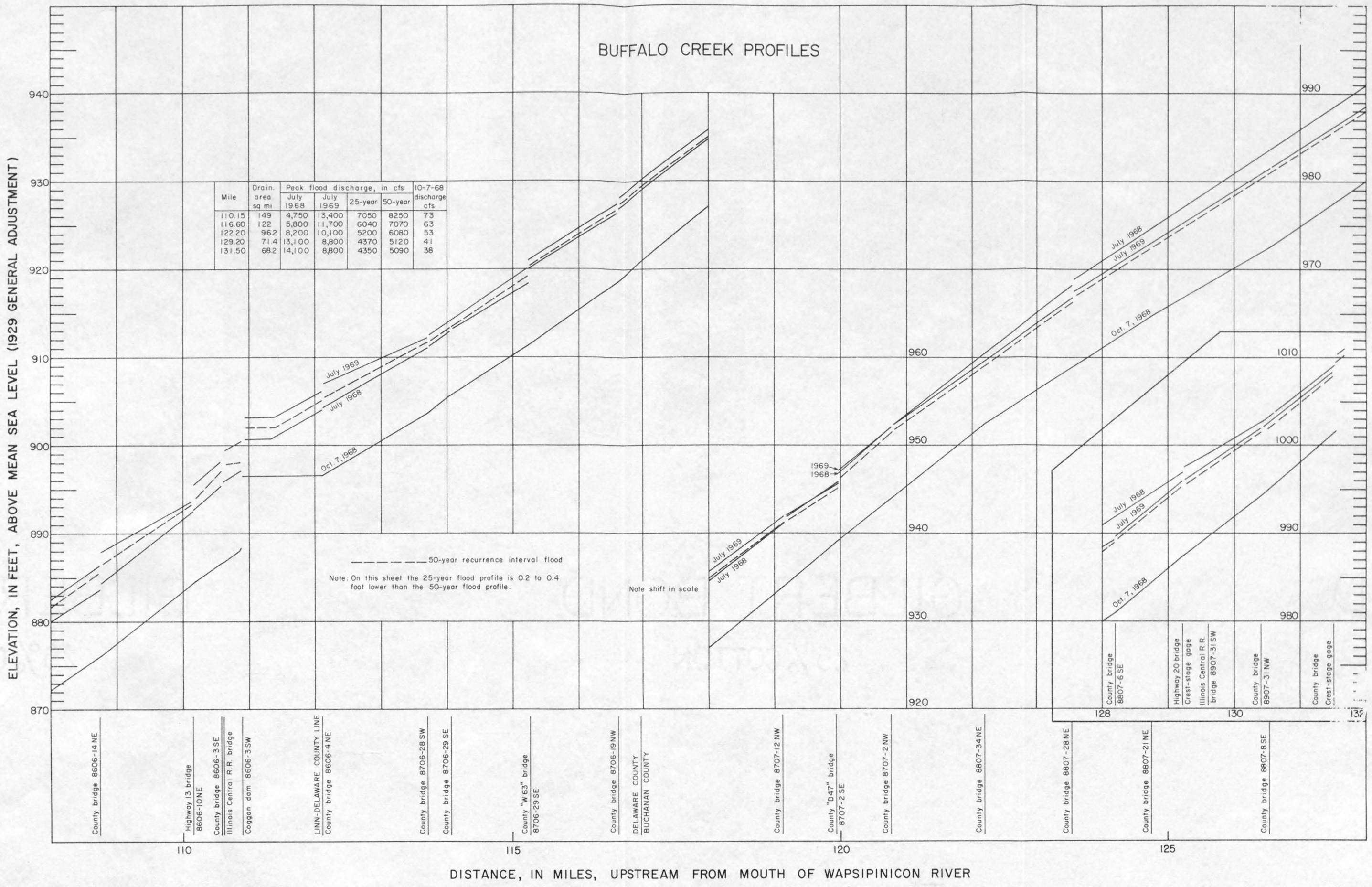


Plate 14. Buffalo Creek profiles, mile 108 to mile 131.5.

PINE CREEK PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1968	25-year	50-year	10-24-68 discharge cfs
132.80	49.7	21,000	4560	5330	27
134.10	42.4	23,100	4030	4700	23
134.15	35.2	24,800	3440	4000	20
138.65	28.6	24,200	3260	3820	16
142.50	20.3	20,000	2430	2850	11
145.35	11.7	13,000	2240	2620	6

ELEVATION, IN FEET, ABOVE MEAN SEA LEVEL (1929 GENERAL ADJUSTMENT)

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF WAPSIPINICON RIVER

Mouth of Pine Creek
County bridge 8808-28 NW
Unnamed Creek (L. bank)
County "W35" bridge 8808-21 SW
Dry Creek (L. bank)
County bridge 8808-20 NE
County bridge 8808-17 NE
County bridge 8808-9 NW
Highway 20 bridge 8808-4 NW
Illinois Central R. R. bridge 8908-34 SW
County bridge 8908-29 SE
County bridge 8908-20 NE
County bridge 8908-8 NW
County bridge 9008-32 SW

Wapsipinicon River 1968

July 1968
Oct. 24, 1968
Note shift in scale
50-year recurrence interval flood
Note: On this sheet the 25-year flood profile is approximately 0.5 foot lower than the 50-year flood profile.

Plate 15. Pine Creek profiles, mile 133.6 to mile 147.

LITTLE WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs July 1966	July 1968	25-year	50-year	10-13-66 discharge cfs
152.60	206	2200	10,500	7310	8550	26
155.60	202	2200	10,500	7210	8440	25
155.65	145	1850	7,600	5440	6350	16
162.00	125	1710	6,700	4770	5580	14
164.60	104	1540	5,600	4050	4740	11
168.20	94.1	1450	5,000	3740	4370	10

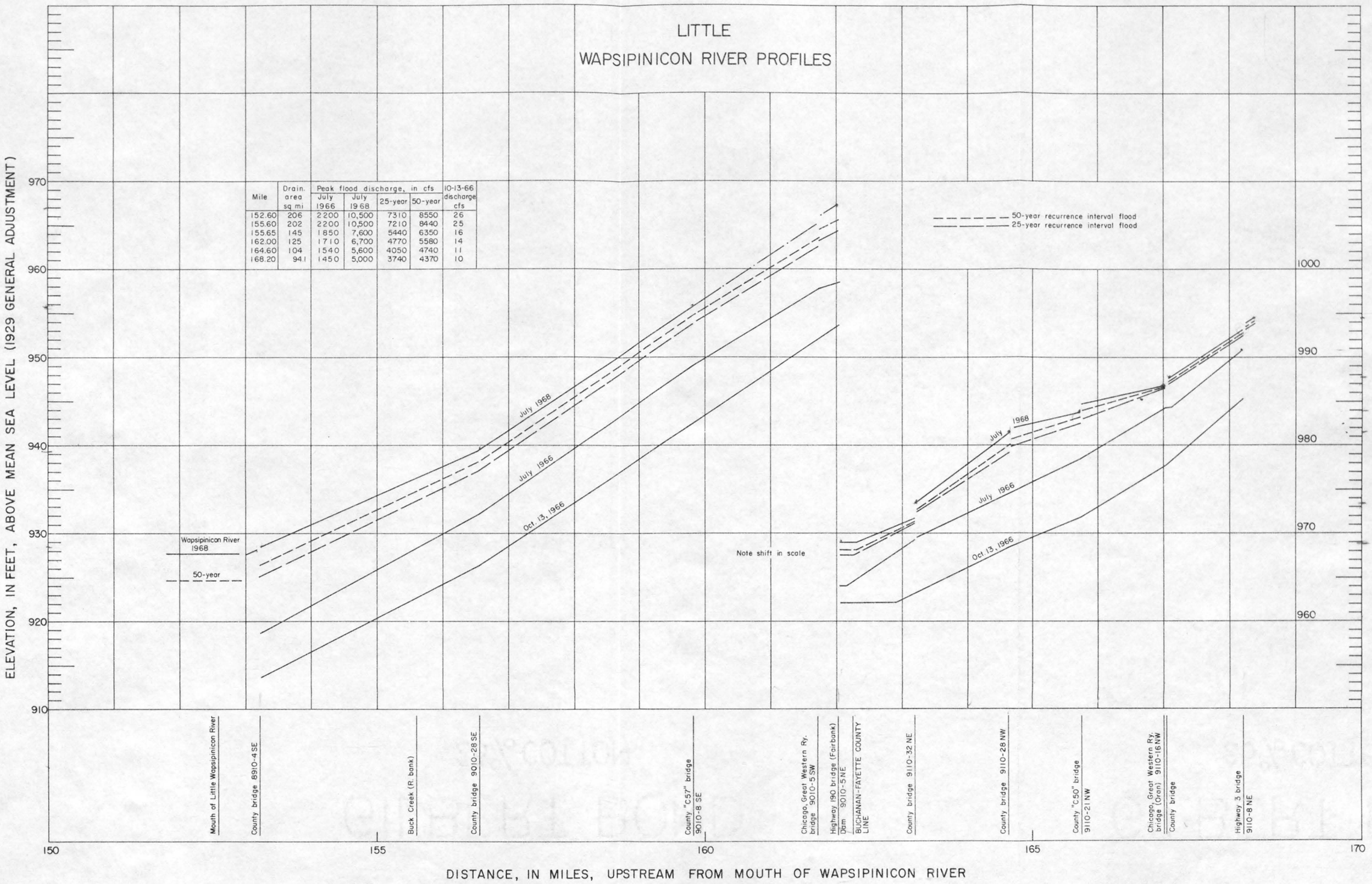


Plate 16. Little Wapsipinicon River profiles, mile 152.6 to mile 168.2.

CRANE CREEK PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1968	25-year	50-year	10-22-68 discharge cfs
159.30	109	—	3280	3840	57
160.70	105	—	3270	3820	52
163.20	101	—	3260	3800	45
165.50	98.2	—	3240	3780	40
165.60	84.2	—	2890	3380	39
166.40	82.3	17,000	2880	3370	38
168.30	80.0	15,800	2860	3350	35
168.40	71.9	12,100	2620	3060	34
171.50	63.6	8,600	2590	3030	30
174.30	58.9	6,900	2570	3010	25
178.00	45.5	2,750	2540	2980	21

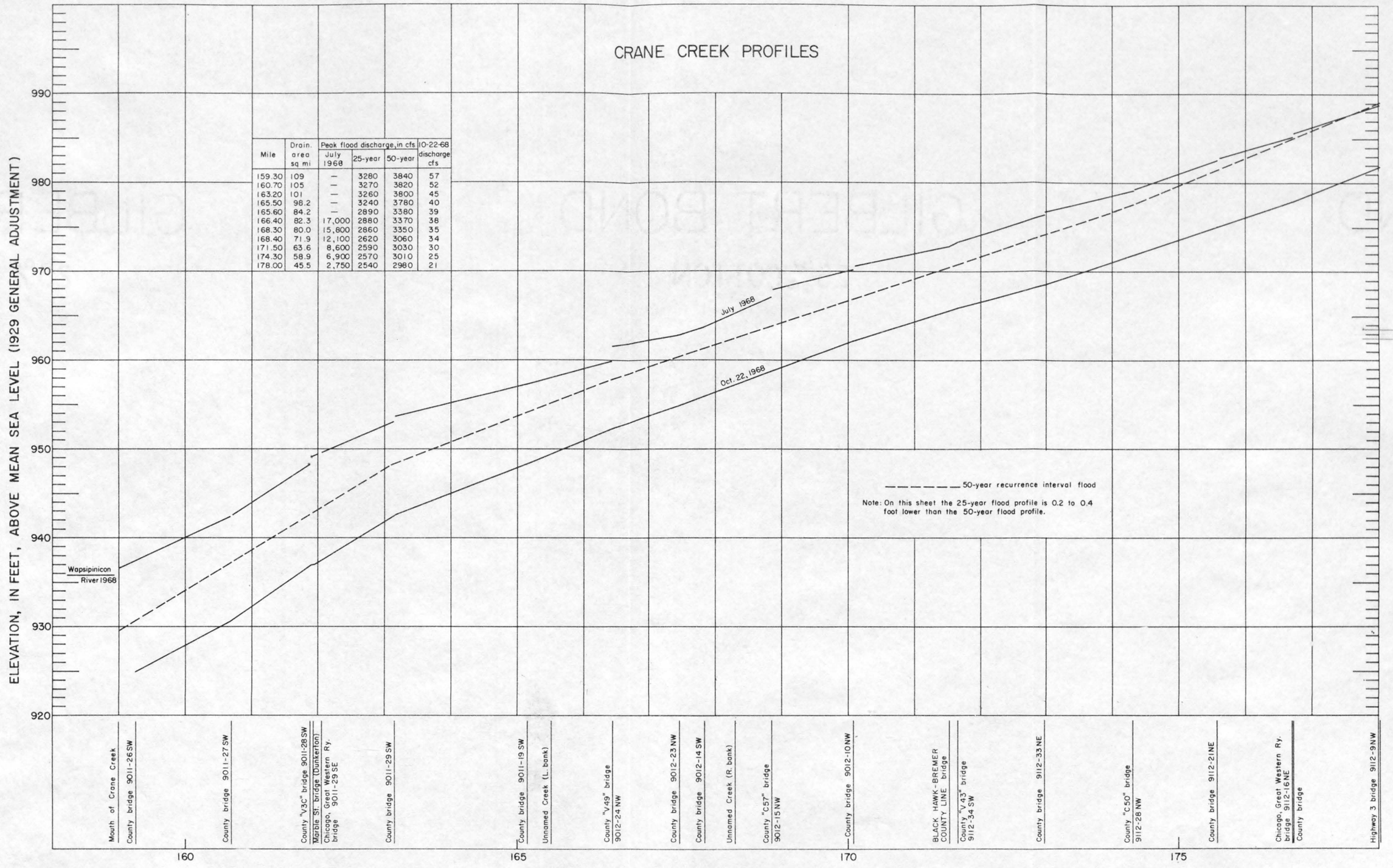


Plate 17. Crane Creek profiles, mile 159 to mile 178.

EAST BRANCH WAPSIPINICON RIVER PROFILES

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1966	June 1969	25-year	50-year	10-12-66 discharge cfs
180.45	148	8300	12,100	6150	7190	9
182.40	144	8300	12,100	6040	7070	–
186.00	125	8250	11,800	5540	6480	9
190.75	97.1	8000	11,600	4680	5420	–
195.20	73.6	7540	11,500	3820	4460	10

ELEVATION, IN FEET, ABOVE MEAN SEA LEVEL (1929 GENERAL ADJUSTMENT)

1070, 1060, 1050, 1040, 1030, 1020, 1010, 1000, 990

Wapsipinicon River 50-yr 1969

June 1969

July 1966

Oct. 12, 1966

50-year recurrence interval flood

Note: On this sheet the 25-year flood profile is 0.2 to 0.4 foot lower than the 50-year flood profile.

Note shift in scale

1100, 1090, 1080, 1070, 1060, 1050

Mouth of East Branch Wapsipinicon River

Sweet Marsh dam

Highway 93 bridge 9312-26NW

County "C18" bridge 9312-14 NW

County bridge 9312-10NW

BREMER COUNTY
CHICKASAW COUNTY
County bridge 9312-3NW

County "B66" bridge 9412-28NE

County bridge 9412-21NE

County bridge 9412-16SE

Highway 18 bridge (Fredericksburg) 9412-13NW

Chicago, Great Western Ry. bridge 9412-12SE

County bridge 9412-12NE

County bridge 9411-7NW

County "B54" bridge 9512-36 NW

180, 185, 190, 195, 200

DISTANCE, IN MILES, UPSTREAM FROM MOUTH OF WAPSIPINICON RIVER

Plate 18. East Branch Wapsipinicon River profiles, mile 180.5 to mile 200.

EAST BRANCH AND LITTLE WAPSIPINICON RIVER PROFILES

EAST BRANCH WAPSIPINICON RIVER

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1966	June 1969	25-year	50-year	10-12-66 discharge cfs
200.35	54.0	6850	11,500	3500	4090	–
202.05	51.9	6930	11,500	3440	4030	–
202.10	37.4	5500	11,500	2860	3350	–
202.45	36.5	5500	11,500	2860	3350	–
205.70	30.3	4350	11,000	2560	2990	0.77

LITTLE WAPSIPINICON RIVER

Mile	Drain. area sq mi	Peak flood discharge, in cfs: July 1966	June 1969	25-year	50-year	10-12-66 discharge cfs
195.75	125	2500	–	5860	6850	9
199.00	106	2360	–	5170	6050	8
201.40	95.0	2300	9200	4850	5680	7

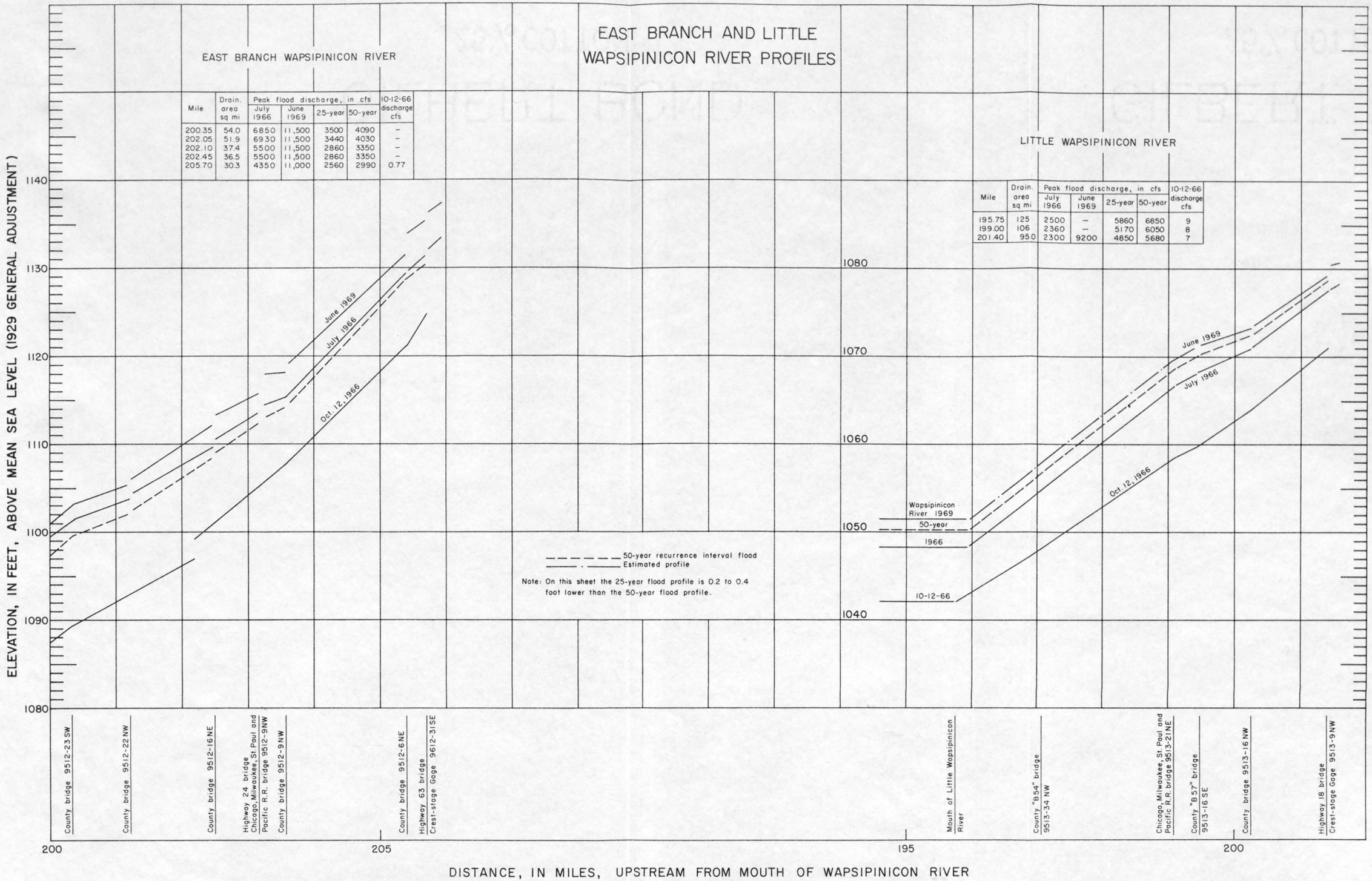


Plate 19. East Branch Wapsipinicon River profiles, mile 200 to mile 205.8 and Little Wapsipinicon River profiles, mile 195.8 to mile 201.4.

At still other locations estimates of the 50-year flood profile based upon extensions of rating curves were necessary because only minor floods occurred during the period of observation and there was no other basis for computing higher flood elevations. These variations are noted on the profiles.

The discharge data tabulated on the profile sheets together with elevations scaled from the profiles may be used to prepare a partial elevation-discharge relation curve at nearly all places along the streams. The only qualifications are that the number and distribution of the data must be adequate to define the curve for the range of interest. Estimated elevations for the 50-year flood are not adequate for this purpose.

DISCUSSION

Data for eight floods in the Wapsipinicon basin are given in this report. These data include the outstanding floods of 1968 and 1969 in the upper part of the basin and the historical flood of 1892 at Stone City. Additionally, 338 miles of profiles of actual floods and the computed 25- and 50-year flood profiles are given in the report. These data provide considerable information for those concerned with the problems of floods and flood-plain use in the basin. The probability that the floods in the upper basin in 1968-69 will be exceeded at the same location in the next 50 years is about 50 percent.

The profile elevations for the several floods reflect the flood plain and channel conditions at the time of the floods. If these conditions change, future flood elevations for the same

discharge can be expected to differ from those shown in the report. Downstream from Anamosa the flood plain is wide and flat and, in places, covered with dense vegetation. At gages and other places where an elevation-discharge rating has been developed, there is an indication of a "vegetation shift" especially in and above densely wooded reaches. If this occurs, summer flood flows would reach a higher elevation than the same flow when the vegetation is dead or dormant. At many places there is only a small difference in the elevations of the 25- and 50-year floods. This occurs at places where the flood plain is wide and flat and large changes in flood discharge cause only small changes in flood elevation.

The stage-discharge hydrograph data in the appendix furnish information that can be used in two ways; to prepare stage or discharge hydrographs and to compute flood volumes.

REFERENCES

Iowa Natural Resources Council, 1958, An inventory of water resources and water problems Northeastern Iowa river basins: Bull. no. 7, p. 47-55.

Larimer, O. J., 1957, Drainage areas of Iowa streams: Iowa Highway Research Board Bull. no. 7, 440 p.

Schwob, H. H., 1966, Magnitude and frequency of Iowa floods: Iowa Highway Research Board Bull. no. 28, pt. 1, 47 p., pt. 2, 376 p.

U.S. Geological Survey, issued annually, Water resources data for Iowa--part 1, surface-water records: open-file reports.

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

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

APPENDIX

The data which follow pertain to the gaging stations that are or have been operated in the basin. Gaging-station records are in the downstream order used by and explained in the annual reports of the U.S. Geological Survey. (See references.) These reports contain much data that supplement the information herein, particularly data for antecedent and post flood periods.

Each gaging-station record has the assigned permanent station number preceding the station name. This number is used to identify the station on plate 1 and in tables 1 and 2. The descriptive paragraphs following the station name contain material pertinent to the station location, period of record, and maximum known flood. Also shown for the complete-record gaging stations are tabulations of daily mean discharge and stage-discharge hydrograph data for the record flood at the Elma station.

At several stations indirect measurements of peak discharge were made and used in the stage-discharge relation. Such measurements are either contracted-opening (computation of discharge through bridges or culverts) or slope-area (computation of flow in a reach of the valley). In both cases surveys of high-water marks and hydraulic principles are used to compute the discharge.

5-4205.6 Wapsipinicon River near Elma, Iowa

Location.--Lat 43°14'34", long 92°31'48", in NW1/4NW1/4 sec.8, T.97 N., R.14 W., Howard County, on right bank 10 ft downstream from bridge on county highway B-17, 0.2 mile downstream from small left-bank tributary, 4.8 miles west of Elma, and at mile 217.9.

Drainage area.--95.2 sq mi.

Gage-height record.--Water-stage recorder. Datum of gage is 1130.36 ft above mean sea level.

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

Maxima.--March 1962: Discharge, about 5,700 cfs March 29 (gage height, 14.84 ft, backwater from ice).

Period of flood record, 1959-69 (excluding the 1962 flood): Discharge, 5,500 cfs August 31, 1962 (gage height, 14.72 ft) and June 29, 1969 (gage height, 14.53).

Mean discharge in cubic feet per second, 1969

Day	June	July	Day	June	July	Day	June	July
1.....	50	432	11....	43	370	21....	32	75
2.....	45	144	12....	163	100	22....	32	62
3.....	36	106	13....	440	70	23....	33	186
4.....	32	88	14....	164	93	24....	35	86
5.....	29	74	15....	87	81	25....	1,290	53
6.....	26	64	16....	62	64	26....	2,230	46
7.....	27	59	17....	51	62	27....	2,410	45
8.....	44	123	18....	44	442	28....	916	43
9.....	38	325	19....	40	407	29....	2,200	39
10....	30	138	20....	36	109	30....	2,020	37
						31....	---	34
Monthly mean.....							423	131
Runoff, in inches.....							4.96	1.58

Wapsipinicon River near Elma, Iowa--Continued

Gage height, in feet, and discharge in cubic feet per second at indicated time, 1969

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
June 24			June 27			June 30		
2400	4.43	28	0400	13.53	2,770	0400	13.67	3,080
			0700	13.65	3,030	0800	13.28	2,260
June 25			0800	13.65	3,030	1200	12.96	1,710
0900	4.41	27	1200	13.42	2,530	1800	12.47	1,260
1030	7.54	225	1800	13.03	1,820	2400	11.89	964
1130	12.71	1,520	2400	12.75	1,480			
1200	13.58	3,050				July 1		
1230	13.78	3,530	June 28			0600	10.63	646
1345	13.79	3,560	1200	11.88	960	1200	8.47	316
1430	13.67	3,260	1800	10.53	610	2400	7.01	178
1530	13.46	2,790	2400	8.26	284			
1700	13.23	2,320				July 2		
1900	13.06	2,010	June 29			1200	6.55	142
2200	12.90	1,740	0100	8.00	259	2400	6.23	120
2400	12.77	1,580	0300	9.07	377			
			0600	12.41	1,230			
June 26			0800	12.52	1,300			
0400	12.60	1,420	1400	12.32	1,170			
1000	12.82	1,640	1530	12.40	1,220			
1600	12.88	1,710	1700	13.86	3,530			
1700	13.17	2,210	1800	14.05	4,020			
1800	13.79	3,560	1900	14.45	5,210			
2000	14.02	4,160	2000	14.53	5,500			
2100	14.00	4,100	2100	14.53	5,500			
2400	13.81	3,610	2200	14.42	5,120			
			2400	14.15	4,310			

5-4206 Little Wapsipinicon River tributary near Riceville, Iowa

(Crest-stage station)

Location.--Lat 43°21', long 92°29', near S1/4 corner sec. 27, T. 99 N., R. 14 W., at culvert, 3.5 miles east of Riceville.

Drainage area.--0.90 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 117 cfs and by an indirect measurement at 703 cfs.

Maxima.--August 1962: Discharge, 703 cfs August 31 (gage height, 5.03 ft, revised).

Period of flood record, 1953-69 (excluding the 1962 flood): Discharge, 520 cfs June 26, 1969 (gage height, 4.88 ft).

5-4206.2 Little Wapsipinicon River near Acme, Iowa

(Crest-stage station)

Location.--Lat 43°20', long 92°29', at N1/4 corner sec. 10, T. 98 N., R. 14 W., at bridge on county road D, 1 mile north of Acme.

Drainage area.--7.76 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 861 cfs and by an indirect measurement at 2,380 cfs.

Maxima.--August 1962: Discharge, 2,380 cfs August 31 (gage height, 9.02 ft).

Period of flood record, 1953-69 (excluding the 1962 flood): Discharge, 1,720 cfs June 26, 1969 (gage height, 8.58).

5-4206.4 Little Wapsipinicon River at Elma, Iowa

(Crest-stage station)

Location.--Lat 42°14', long 92°27', in NW1/4 sec. 12, T. 97 N., R. 14 W., at bridge on county road A near west city limits of Elma.

Drainage area.--37.3 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,810 cfs and by an indirect measurement at 5,740 cfs.

Maxima.--August 1962: Discharge, 5,740 cfs August 31 (gage height, 12.53 ft).

Period of flood record, 1953-69 (excluding the 1962 flood): Discharge, 5,700 cfs June 26, 1969 (gage height, 12.48).

5.4206.5 Little Wapsipinicon River near New Hampton, Iowa

(Crest-stage station)

Location.--Lat 43°04', long 92°24', in NE1/4 sec. 9, T. 95 N., R. 13 W., at bridge on U.S. Highway 18, 4 miles west of New Hampton.

Drainage area.--95.0 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 2,150 cfs and by an indirect measurement at 9,200 cfs.

Maxima.--June 1969: Discharge, 9,200 cfs June 26 (gage height, 88.72 ft).

Period of flood record, 1966-69 (excluding the 1969 flood): Discharge, 2,250 cfs July 14, 1966 (gage height, 87.12 ft).

5-4206.9 East Branch Wapsipinicon River near New Hampton, Iowa

(Crest-stage station)

Location.--Lat 43°05', long 92°18', in SE1/4 sec. 31, T. 96 N., R. 12 W., at bridge on U.S. Highway 63, about 2 miles north of New Hampton.

Drainage area.--30.3 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 542 cfs and by indirect measurements at 4,350 cfs and 11,000 cfs.

Maxima.--June 1969: Discharge, 11,000 cfs June 26 (gage height, 89.61 ft).

Period of flood record, 1966-69 (excluding the 1969 flood): Discharge, 4,350 cfs July 14, 1966 (gage height 86.04 ft).

5-4208.5 Little Wapsipinicon River near Oran, Iowa

(Crest-stage station)

Location.--Lat 42°43', long 92°02', in NE1/4 sec. 8, T. 91 N., R. 10 W., at bridge on State Highway 3, about 2 miles northeast of Oran.

Drainage area.--94.1 sq mi.

Gage-height record.--Crest stages only.

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

Maxima.--July 1968: Discharge 5,000 cfs July 17 (gage height, 90.00 ft).

Period of flood record, 1966-69 (excluding the 1968 flood): Discharge, 2,350 cfs June 27, 1969 (gage height, 88.61 ft).

5-4208.55 Buck Creek near Oran, Iowa

(Crest-stage station)

Location.--Lat 42°43', long 92°08', in NE1/4 sec. 10, T. 91 N., R. 11 W., at bridge on State Highway 3, 2.5 miles northwest of Oran.

Drainage area.--37.9 sq mi.

Gage-height record.--Crest stages only.

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

Maxima.--July 1968: Discharge, 860 cfs July 17 (gage height, 89.11 ft).

Period of flood record, 1966-69 (excluding the 1968 flood): Discharge, 850 cfs June 27, 1969 (gage height, 89.05 ft).

5-4209.6 Harter Creek near Independence, Iowa

(Crest-stage station discontinued September 30, 1963)

Location.--Lat 42°30', long 91°54', near south quarter corner sec. 22, T. 89 N., R. 9 W., at bridge, 0.2 mile west of State Highway 150, 2 miles north of Independence.

Drainage area.--6.17 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 284 cfs and an indirect measurement at 2,280 cfs.

Maxima.--May 1962: Discharge, 2,280 cfs May 5 (gage height, 9.96 ft).

Period of flood record, 1952-63 (excluding the 1962 flood): Discharge, 1,450 cfs Mar. 26, 1959 (gage height, 9.17 ft).

5-4210 Wapsipinicon River at Independence, Iowa

Location.--Lat 42°27'49", long 91°53'42", in SE1/4 sec.4, T.88 N., R.9 W., Buchanan County, on right bank at Sixth Street in Independence, 1,800 ft downstream from dam at abandoned hydroelectric plant, 4.9 miles downstream from Otter Creek, 9.7 miles upstream from Pine Creek, and at mile 142.5.

Drainage area.--1,048 sq mi.

Gage-height record.--Water-stage recorder. Datum of gage is 882.85 ft above mean sea level.

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

Maxima.--July 1968: Discharge, 26,800 cfs July 18 (gage height, 21.11 ft).

Period of flood record, July 1933-69 (excluding the 1968 flood): Discharge, 21,500 cfs June 14, 1947 (gage height, 18.74 ft).

Mean discharge in cubic feet per second, 1968

Day	June	July	August	Day	June	July	August
1.....	306	1,690	1,790	16....	206	402	767
2.....	294	2,150	1,370	17....	183	15,200	717
3.....	278	2,070	981	18....	168	23,500	612
4.....	251	1,620	851	19....	150	11,000	565
5.....	219	982	3,190	20....	135	3,950	520
6.....	196	627	2,770	21....	135	2,140	470
7.....	168	487	1,620	22....	115	1,530	431
8.....	154	406	3,350	23....	116	2,550	394
9.....	175	357	7,140	24....	168	6,330	363
10....	253	302	4,050	25....	628	7,150	326
11....	242	271	2,730	26....	567	4,700	301
12....	236	243	2,170	27....	854	3,420	288
13....	301	224	1,550	28....	1,110	3,720	274
14....	306	206	1,100	29....	1,410	3,250	258
15....	241	190	864	30....	1,470	2,700	247
				31....	---	2,170	249
Monthly mean.....					368	3,404	1,365
Runoff, in inches.....					0.39	3.75	1.50

Wapsipinicon River at Independence, Iowa--Continued

Gage height, in feet, and discharge in cubic feet per second at indicated time, 1968

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
July 15			July 20			July 28		
2400	4.91	185	0600	9.03	4,690	0900	8.30	3,830
			1200	8.22	3,740	1300	8.40	3,940
July 16			1800	7.65	3,120	1600	8.35	3,890
1630	4.91	185	2400	7.29	2,690	2400	8.05	3,560
1830	5.15	325						
1900	5.12	304	July 21			July 29		
2100	5.16	332	0600	7.03	2,380	1200	7.77	3,250
2200	5.90	1,020	1200	6.80	2,100	2400	7.54	2,990
2300	6.86	2,170	1800	6.62	1,880			
2400	9.23	4,930	2400	6.53	1,780	Aug. 3		
						2400	5.76	856
July 17			July 22					
0100	12.50	9,300	1200	6.32	1,520	Aug. 4		
0230	14.02	11,500	2400	6.16	1,330	1600	5.67	760
0430	13.90	11,400				1800	5.74	834
0630	14.11	11,700	July 23			2000	5.73	823
0800	14.37	12,100	0400	6.14	1,310	2400	6.31	1,510
1000	14.66	12,600	0900	6.19	1,370			
1200	15.00	13,100	1200	6.68	1,960	Aug. 5		
1400	15.64	14,200	1800	8.31	3,840	0800	8.06	3,570
1600	16.66	16,100	2400	9.16	4,840	0830	7.91	3,400
1800	18.01	18,800				1200	8.04	3,540
2000	19.25	21,600	July 24			2400	7.81	3,290
2200	20.10	23,800	0600	9.91	5,780			
2400	20.62	25,400	1200	10.42	6,450	Aug. 6		
			1800	10.80	6,940	1200	7.47	2,900
July 18			2400	11.14	7,400	2400	6.59	1,850
0100	20.84	26,000						
0200	20.98	26,400	July 25			Aug. 7		
0300	21.04	26,600	0600	11.32	7,650	1200	6.28	1,480
0430	21.16	26,800	1200	11.13	7,380	2400	6.62	1,880
0600	21.08	26,700	1800	10.66	6,760			
0800	20.92	26,300	2400	10.08	6,000	Aug. 8		
1000	20.68	25,500				0600	6.70	1,980
1400	19.91	23,300	July 26			0715	6.92	2,240
1800	18.92	20,800	1200	8.99	4,640	0800	6.76	2,050
2200	17.80	18,400	2400	8.22	3,740	1200	7.09	2,450
2400	17.18	17,200				1800	8.97	4,610
			July 27			2400	10.86	7,020
July 19			1200	7.87	3,360			
0600	15.35	13,700	2000	7.81	3,290			
1200	13.49	10,700	2400	7.86	3,350			
1800	11.58	8,010						
2400	10.12	6,060						

Wapsipinicon River at Independence, Iowa--Continued

Gage height, in feet, and discharge in cubic feet per second at indicated time, 1968

Hour	Gage height	Dis-charge	Hour	Gage height	Dis-charge	Hour	Gage height	Dis-charge
Aug. 9			Aug. 10					
0300	11.26	7,560	1200	8.35	3,890			
0715	11.44	7,820	2400	7.63	3,090			
1000	11.37	7,720						
1600	10.84	6,990						
2400	9.81	5,650						

5-4211 Pine Creek tributary near Winthrop, Iowa

(Crest-stage station)

Location.--Lat 42°29', long 91°47', in SWi/4 sec. 27, T. 89 N., R. 8 W., at culvert, 1.4 miles north of U.S. Highway 20 and 2.5 miles northwest of Winthrop.

Drainage area.--0.334 sq mi.

Gage height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined b y indirect measurements at 167 and 304 cfs.

Maxima.--July 1968: Discharge, 334 cfs July 17 (gage height, 8.97 ft).

Period of flood record, 1953-69 (excluding the 1968 flood): Discharge, 304 cfs June 24, 1959 (gage height, 8.67 ft).

5-4212 Pine Creek near Winthrop, Iowa

(Crest-stage station)

Location.--Lat 42°28', long 91°47', in SW1/4 sec. 34, T. 89 N., R. 8 W., at railroad bridge 500 ft upstream from U.S. Highway 20 and 2.5 miles northwest of Winthrop.

Drainage area.--28.3 sq mi.

Gage-height record.--Crest stages only

Discharge record.--Stage-discharge relation defined by current-meter measurements below 1,000 cfs and indirect measurements above, including one at 24,200 cfs.

Maxima.--July 1968: Discharge, 24,200 cfs July 17 (gage height, 22.98 ft).

Period of flood record, 1950-69 (excluding the 1968 flood): Discharge, 14,500 cfs September 21, 1950 (gage height, 21.70 ft).

5-4213 Pine Creek tributary No. 2 at Winthrop, Iowa

(Crest-stage station)

Location.--Lat 42°28', long 91°44', at N1/4 corner sec. 2, T. 88 N., R. 8 W., at culvert on U.S. Highway 20 near west city limits of Winthrop.

Drainage area.--0.704 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 28 cfs and by an indirect measurement at 443 cfs.

Maxima.--July 1968: Discharge, 570 cfs July 17 (gage height, 7.26 ft).

Period of flood record, 1953-69 (excluding the 1968 flood): Discharge, 470 cfs July 18, 1969 (gage height, 7.15 ft).

5-4214 Wapsipinicon River at Central City, Iowa

(Gaging station, discontinued August 31, 1950)

Location.--Lat 42°12'20", long 91°31'55", in sec. 3, T. 85 N., R. 6 W., on State Highway 13 in Central City, Linn County, 4.3 miles downstream from Walton Creek and at mile 108.9.

Drainage area.--1,263 sq mi.

Gage-height record.--Nonrecording. Datum of gage is 811.41 ft above mean sea level (revised 1969).

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

Maxima.--July 1968: Discharge, 23,000cfs July 19 (gage height, 17.29 ft, after construction of new dam).

Period of flood record, 1929, 1941-50: Discharge, 22,500 cfs June 15, 1947 (gage height, 19.3 ft).

5-4215 Wapsipinicon River at Stone City, Iowa

(Gaging station, discontinued September 30, 1914)

Location.--Lat 42°07'00", long 91°21'10", in SW1/4NE1/4 sec. 6, T. 84 N., R. 4 W., at highway bridge at Stone City about 180 ft upstream from Chicago, Milwaukee, St. Paul & Pacific Railroad bridge, 3.1 miles upstream from Buffalo Creek and at mile 92.5.

Drainage area.--1,324 sq mi.

Gage-height record.--Nonrecording. Datum of gage is 770.9 ft above mean sea level.

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

Maxima.--July 1892: Discharge, estimated 32,000 cfs (gage height, 28.0 ft from information by local resident).

Period of flood record, 1892, 1903-13 (excluding the 1892 flood): Discharge, 11,500 cfs April 1, 1912 (gage height, 15.6 ft).

5-4215.5 Buffalo Creek above Winthrop, Iowa

(Crest-stage station)

Location.--Lat 42°30', long 91°44', near northeast corner sec. 25, T. 89 N., R. 8 W., at bridge, 1.5 miles northeast of Winthrop.

Drainage area.--68.2 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,640 cfs and by an indirect measurement at 14,100 cfs.

Maxima.--July 1968: Discharge, 14,100 cfs July 17 (gage height, 19.36 ft).

Period of flood record, 1957-69 (excluding the 1968 flood): Discharge, 8,800 cfs July 18, 1969 (gage height, 18.74 ft).

5-4216 Buffalo Creek near Winthrop, Iowa

(Crest-stage station)

Location.--Lat 42°28', long 91°43', in NE1/4 sec. 1, T. 88 N., R. 8 W., at bridge on U.S. Highway 20, about 1 mile east of Winthrop.

Drainage area.--71.4 sq mi.

Gage-height record.--Crest stages only.

Discharge record.--Stage-discharge relation defined by current-meter measurements below 4,580 cfs and extension of high-water rating by transfer of flood peak discharge from upstream station.

Maxima.--July 1968: Discharge, 14,800 cfs July 17 (gage height, 91.12 ft).

Period of flood record, 1953-55, 1966-69 (excluding the 1968 flood): Discharge, 8,800 cfs July 18, 1969 (gage height, 90.36 ft).

5-4220 Wapsipinicon River near DeWitt, Iowa

Location.--Lat 41°46'01", long 90°32'05", in SW1/4NE1/4 sec.6, T.80 N., R.4 E., Clinton County, on left bank 5 ft upstream from bridge on U.S. Highway 61, 0.9 mile downstream from Silver Creek, 4.0 miles south of water tower in DeWitt, 6.2 miles upstream from Brophy Creek, and 18.2 miles upstream from mouth.

Drainage area.--2,330 sq mi.

Gage-height record.--Water-stage recorder. Datum of gage is 598.81 ft above mean sea level.

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

Maxima.--June 1944: Discharge, 26,000 cfs June 27 (gage height, 12.07 ft).

Period of flood record, June 1934-69 (excluding the 1944 flood): Discharge, 21,600 cfs June 19, 1947 (gage height, 11.8 ft).

Mean discharge in cubic feet per second, 1944

Day	May	June	July	Day	May	June	July
1.....	2,650	3,820	4,340	16....	1,920	3,840	1,020
2.....	2,420	2,930	2,780	17....	2,050	4,180	941
3.....	2,330	2,550	2,510	18....	1,860	3,780	976
4.....	2,320	2,180	2,200	19....	1,800	3,840	924
5.....	2,110	1,910	1,970	20....	5,050	4,080	843
6.....	2,110	1,690	1,770	21....	8,720	4,660	810
7.....	2,170	1,550	1,590	22....	7,040	5,660	783
8.....	2,140	1,510	1,500	23....	6,900	7,390	747
9.....	2,240	1,610	1,530	24....	6,220	9,000	854
10....	2,230	1,900	1,330	25....	6,630	7,190	752
11....	2,180	1,800	1,280	26....	6,900	6,200	752
12....	2,160	1,800	1,340	27....	7,420	19,500	747
13....	2,090	2,100	1,200	28....	7,390	20,200	680
14....	1,960	2,260	1,130	29....	7,290	15,200	666
15....	1,790	2,480	1,090	30....	6,810	9,710	900
				31....	5,820	---	964
Monthly mean.....					3,959	5,217	1,320
Runoff, in inches.....					1.96	2.50	0.65

Wapsipinicon River near DeWitt, Iowa--Continued

Gage height, in feet, and discharge in cubic feet per second at indicated time, 1944

Hour	Gage height	Discharge	Hour	Gage height	Discharge	Hour	Gage height	Discharge
June 8			June 17			June 27		
2400	4.85	1,500	2400	7.77	4,000	0300	10.11	8,600
						0600	11.66	20,800
June 9			June 18			0830	12.07	26,000
2400	5.37	1,830	2400	7.66	3,880	1200	11.96	25,000
						1700	11.72	20,800
June 10			June 19			2400	11.78	22,100
2400	5.50	1,930	2400	7.72	3,880			
						June 28		
June 11			June 20			2400	11.40	17,200
2400	5.26	1,760	2400	8.03	4,250			
						June 29		
June 12			June 21			0800	11.27	16,200
1300	5.40	1,860	2400	8.56	5,160	0900	11.40	17,200
2400	5.29	1,780				2400	10.88	12,900
			June 22					
June 13			2400	9.22	6,220	June 30		
0500	5.65	2,030				1200	10.40	9,920
2400	6.00	2,270	June 23			2400	9.50	6,860
			2400	10.19	9,000			
June 14						July 1		
1200	5.93	2,220	June 24			1200	7.76	4,000
1800	5.88	2,170	0800	10.29	9,440	2400	6.93	3,060
2400	6.46	2,600	2400	10.02	8,240			
						July 2		
June 15			June 25			1200	6.56	2,810
0600	6.26	2,460	2400	9.24	6,220	2400	6.32	2,590
2400	6.23	2,450						
			June 26					
June 16			1200	9.10	6,030			
0600	7.64	3,760	2400	9.54	6,860			
1200	7.85	4,000						
2400	8.03	4,250						

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