STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

REPORTS OF THE
DIVISION OF WATER RESOURCES
EDWARD HYATT, STATE ENGINEER

REPORT ON

WATER MASTER SERVICE

ON

SUSAN RIVER AND TRIBUTARIES

LASSEN COUNTY, CALIFORNIA

DURING SEASON OF 1939

By

G. M. Vickroy
Water Master
Sacramento, California
March, 1943.

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EDWARD HYATT, STATE ENGINEER
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STATE OF CALIFORNIA
Department of Public Works
SACRAMENTO

DIVISION OF WATER RESOURCES
401 PUBLIC WORKS BUILDING

April 14, 1943

Mr. Harold Conkling
Deputy State Engineer
Sacramento, California

Attention: Mr. Gordon Zander,
Supervising Hydraulic Engineer.

Dear Sir:

A report on water master service on the Susan River in Lassen County during the season of 1939 is submitted herewith.

The report includes a history of the court reference proceedings during the year, a discussion of precipitation, water supply and use of water and a brief description of results obtained.

Tables showing precipitation and water supply data are included.

Respectfully submitted,

_____
Water Master

FOR VICTORY
BUY
UNITED STATES
SAVINGS
BONDS
AND STAMPS

Report on

Water Master Service

on

Susan River and Its Tributaries

Lassen County, California

During Season of 1939

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INTRODUCTION

Subsequent to the 1938 report on water master service and prior to the beginning of the 1939 irrigation season an interlocutory decree was entered in the proceedings providing for water master service during the 1939 season in accordance with the stipulation for judgment already filed in the action. The decree also provided the manner in which costs should be assessedand collected.

Mr. G. M. Vickroy acted as water master during the 1939 season, commencing the work March 24 and terminating it about the first of October.

DISCUSSION OF RESULTS

Precipitation during 1938-39

Table 1 has been prepared from the records of the United States Weather Bureau to show the monthly precipitation at Susanville for the seasonal year beginning October 1, 1938 and ending September 30, 1939, together with the 40 year monthly and annual means. The recorded and long time mean snowfall are also shown for the station. A comparison

with the annual mean indicates that the precipitation of the seasonal precipitation/during the 1938-39 season was only 46.7 per cent of normal. Observation of the snowfall data in the table shows that the snowfall at Susanville during the year was probably below normal an equal amount. The deficient precipitation indicated a dry year with run-off even farther below normal than the precipitation.

The result of the "California Cooperative Snow Surveys" published April 10, 1938, shows that the snowpack as of April 1, 1939, at Feather River stations adjoining this area was about fifty per cent of normal. The water content of the snow at the three stations nearest to the Susan River watershed was as follows:

Station	Elevation(feet)	Water Content(inches)	Percentage of Normal
Fredonia Pass	6400	5.2	40
Harkness Flat	6400	16.4	53
Mt. Lassen	8400	44.8	48

With the above data in mind it was estimated that the run-off of Susan River from April 1 to July 1, 1939 would be less than fifty per cent of normal and possibly considerably below that amount as with a light snow crop the efficiency of run-off is usually much lower than the water content of the snow would indicate.

Water Supply

Recorder stations were reinstalled at the principal stations in the stream system in 1939 and continuous records collected at Susan River below Ramsey Ditch and at Johnstonville, Old Susan River below the Woodstock Dam and on Willow Creek at Old Mill and at Cummings Bridge. As the recorder records did not cover the entire season the tables showing the flow on Susan River above Ramsey Ditch and at Johnstonville and on Old Susan below Woodstock Dam have been extended by reference to

intermittent observations and other data. No record was kept in 1939 on Gold Run, Lassen and Piute Creeks.

The actual water supply as shown in the tables was insufficient to supply full allotments at any time during the season. As the irrigation season progressed the shortage of water became more acute until by May 15th there was very little water left for general irrigation except where storage water was available.

1939 The Lassen Irrigation Company released their mountain storage at McCoy Flat and Hog Flat Reservoirs beginning the middle of May, with the reservoirs becoming empty by the middle of June. Their regulating reservoir, Lake Leavitt, supplied the Company with water until about August 1st after which no water was available. The release from the mountain reservoirs is given in Table 4.

The water users in the Tule area foresaw the shortage of water early in the 1939 season and secured permission to construct a canal from Horse Lake into Petes Valley Creek. By this means the Tule users were able to draw off from the ordinarily dry lake several feet of water which had collected there during the preceding wet season. The water passed down Petes Valley Creek to Willow Creek and thence into the Tule area. The water released from Horse Lake and from the reservoir constructed on the Walsh Ranch in Willow Creek Valley in 1937 maintained an average flow in lower Willow Creek of more than 25 cubic feet per second from about the middle of April until after the middle of June. The discharge of this amount of water over the two month period was adequate to mature a considerable portion of the crops in the Tule area.

Table 2 gives the discharge of Susan River below Ramsey Ditch without correction for released storage or upstream diversion. Table 3

gives the flow above Ramsey Ditch corrected for released storage and the the Ramsey Ditch diversion. Table 5 gives the diversion through the Old Channel below Woodstock Dam and Table 6 gives the discharge at Johnstonville below the A & B Canal. Table 4 is the estimated released storage from McCoy Flat and Hog Flat Reservoirs reaching Susanville. Tables 7 and 8 give the discharge of Willow Creek at the Old Milland at Cummings Bridge.

Hydrographs of Susan River below the Ramsey Ditch and of Willow Creek at Cummings Bridge for the periods shown in the tables for 1939 and for the entire 1935 season are shown in Plate 1

A comparison of the flow of Susan River in 1939 with that in 1935 shows that the water supply in 1939 was far below the latter season which in itself was probably below normal.

Use of Water

The distribution of water on Susan River was confined to the first and second rights receiving water after about April 20th. After June 15 there was water available for only the first priority class. By July 15th, water was critically short for domestic and stock watering purposes causing interruption of service on the lower end of Old Channel and Susan River below Johnstonville.

On Gold Run and Lassen Creeks there was insufficient water to irrigate more than the first priority rights after those rights began irrigating. On Piute Creek the flow from Bagley springs maintained a nearly constant supply throughout the season so that all users received some water.

Willow Creek Valley was dependent upon spring water and a limited release from the Walsh Reservoir which combined supplies gave that area a fair irrigation supply until about June 1st. Lower Willow Creek received a constant supply from springs of about eighteen cubic feet per second and additional water from Horse Lake as described hereinbefore, as well as some

water from the Walsh Reservoir. The combined supply was sufficient to produce fair crops in the Tule area.

Discussion of Results

In summarizing the water supply and use of water discussion, it is apparent that there was inadequate water under all schedules in 1939. The shortage was serious in all areas where no storage water was available and crop returns were far below normal in the area as a whole. Where some storage water was available the shortage did not become acute until after the middle of June.

In order to show the relationship of the available water supply during the years of water master service on the stream, the following table has been compiled:

Susan River above Ramsey Ditch in acre feet

Year	Month: April	May	June	Total
1935	23,300	15,200	2,790	41,290
1936	11,000	6,310	2,810	20,120
1937	13,100	7,660	1,590	22,350
1938	67,700	82,800	21,500	172,000
1939	2,500	950	398	3,848

It will be seen that the water supply in 1939 was less than twenty per cent of the lowest preceding year tabulated, which shows to some extent how extreme the shortage really was. The available storage released from McCoy Flat and Hog Flat Reservoirs was less than one-half of that released during any of the other years recorded. Most of the stored water was held over from the 1938 season.

Water master service in 1939 was instrumental in stretching the extremely short water supply over a maximum of area and preventing dissention and discord among the water users over its use. All of the users entitled to water received their pro-rata of the available supply except during the extreme low flow of the season when channel losses were too great to permit the water to reach some of the lower ranches on the water courses.

Efficiency of Distribution

At the beginning of the 1939 irrigation season, many of the dams and control works were still unworkable due to the high water of the preceding

spring. However, with the county and state cooperating with the land owners, a considerable part of the damage was repaired during the season. The Old Channel of Susan River was cleaned out between the Woodstock dam and the Jensen ranch. The main channel was cleaned out between the Jenkins ranch buildings and the Coulthurst upper dam and a short section of channel between the head of Dill Slough and the Reed Ditch. Also, a section of channel between the Fleming Reservoir and Antola. The improvement in the various channels permitted the free flow of the water along almost the entire course of the river. Several old dams are being rebuilt in the canalized channel which should add materially to the efficiency of distribution in the future.

TABLES

Table 1

Precipitation at Susanville, California
Elevation 4268 feet.

Comparison Between Precipitation for Seasonal Year
1938-39 and the 40-Year Mean

Month	Monthly Mean 40 Year		1938-39		Snowfall in Inches	
	Inches	Percent of total mean	Inches	Percent of Total Mean	Normal	1938-39
October	1.13	6.1	0.56	3.0		
November	2.09	11.3	.42	2.3		
December	3.08	16.6	.14	.7	15.3	0.5
January	3.38	18.2	1.71	9.2	26.3	6.0
February	2.79	15.0	1.15	6.2	11.0	- -
March	2.50	13.5	2.84	15.3	9.6	13.8
April	1.12	6.0	.14	.7	1.9	T
May	.83	4.5	1.30	7.0		
June	.49	2.6	.07	.4		
July	.28	1.5	.00	.0		
August	.33	1.8	.13	.7		
September	.54	2.9	.22	1.2		
Totals	18.56	100.0	8.68	46.7	64.1	*20.3

* 4 months only

Table 2

CONTINUOUS RECORD OF DAILY DISCHARGE IN CUBIC FEET PER SECOND OF SUSAN RIVER BELOW RAMSEY DITCH - 1939

Day	April	May	June	
1	No	19.0	54.0	
2	Record	18.0	52.0	
3		17.0	47.0	
4	66.0	16.0	42.0	
5	65.0	16.0	47.0	
6	60.0	15.0	41.0	
7	54.0	15.0	43.0	
8	57.0	14.0	39.0	
9	56.0	14.0	34.0	
10	45.0	13.0	31.0	
11	42.0	15.0	21.0	
12	41.0	13.0	17.0	
13	38.0	12.0	14.0	
14	33.0	12.0	11.0	
15	30.0	12.0	10.0	
16	29.0	11.0	8.50	
17	29.0	53.0	8.50	
18	29.0	96.0	9.50	
19	29.0	107.	9.50	
20	29.0	100		
21	28.0	103		
22	27.0	113		
23	25.0	105	No	
24	23.0	95.0	Record	
25	23.0	85.0		
26	21.0	80.0		
27	20.0	75.0		
28	19.0	70.0		
29	18.0	65.0		
30	18.0	60.0		
31	-	55.0		
Total Sec. Ft. Days	* 954.0	1494.0	** 539.00	77 Day Period
Mean Sec. Ft.	* 35.3	48.2	** 28.4	38.8
Max. Sec. Ft.	* 66.0	113	** 54.0	113
Min. Sec. Ft.	* 18.0	11.0	** 8.50	8.50
Total Ac. Ft.	*1890.	2960.	**1070	5920

*27 Day Period
**19 Day Period

Table 3

ESTIMATED NATURAL FLOW IN CUBIC FEET PER SECOND
OF SUSAN RIVER ABOVE RAMSEY DITCH - 1939

Day	April	May	June	July	August	September	
1	No	24.0	10.0	4.00	2.20		
2	Record	23.0	9.50	3.90	2.20		
3		22.0	9.00	3.80	2.20		
4	67.0	21.0	8.50	3.70	2.20		
5	66.0	20.0	8.50	3.60	2.20		
6	63.0	19.0	8.00	3.50	2.20		
7	57.0	19.0	8.00	3.40	2.20		
8	60.0	18.0	7.80	3.30	2.20		
9	59.0	18.0	7.60	3.20	2.20		
10	48.0	17.0	7.30	3.10	2.20		
11	45.0	18.0	7.00	3.00	2.20		
12	44.0	17.0	6.60	2.90	2.20		
13	41.0	16.0	6.20	2.80	2.20	No	
14	36.0	15.0	6.00	2.70	2.20	Record	
15	33.0	15.0	6.00	2.60	2.20		
16	32.0	14.0	6.50	2.50	2.20		
17	32.0	14.0	6.50	2.40	2.20		
18	32.0	14.0	7.50	2.30	2.20		
19	32.0	13.0	7.50	2.20	2.20		
20	32.0	13.0	6.50	2.20	2.20		
21	31.0	12.5	6.00	2.10	2.20		
22	30.0	12.5	5.80	2.10	2.30		
23	29.0	12.5	5.60	2.10	2.40		
24	27.0	12.0	5.30	2.20	2.40		
25	27.0	12.0	5.00	2.20	2.40		
26	26.0	12.0	4.90	2.30	2.40		
27	25.0	11.5	4.70	2.40	2.40		
28	24.0	11.5	4.60	2.50	2.40		
29	23.0	11.0	4.40	2.60	2.40		
30	23.0	11.0	4.20	2.50	2.40		
31	-	10.5	-	2.30	2.40		
Total: Sec.Ft. Days	*1044.0	479.0	201.00	86.40	70.10		150 Day Period
Mean: Sec.Ft.	* 38.7	15.4	6.70	2.79	2.26		12.54
Max.: Sec.Ft.	* 67.0	24.0	10.0	4.00	2.40		67.0
Min.: Sec.Ft.	* 23.0	10.5	4.20	2.10	2.20		2.10
Total: Ac.Ft.	*2070.	950.	398.	171.	139.		3730

*27 Day Period

Table 4

ESTIMATED DAILY RELEASE OF STORAGE FROM
McCOY FLAT AND HOG FLAT RESERVOIRS REACHING
SUSANVILLE - 1939

Day	May	June	
1		44.0	
2		42.0	
3		38.0	
4		34.0	
5		39.0	
6		33.0	
7		35.0	
8	No	31.0	
9	Release	26.0	
10		24.0	
11		14.0	
12		10.0	
13		8.00	
14		5.00	
15		4.00	
16		2.00	
17	39.0	2.00	
18	82.0	2.00	
19	94.0	2.00	
20	87.0	2.00	
21	90.0		
22	100		
23	92.0	No	
24	83.0	Record	
25	73.0		
26	68.0		
27	63.0		
28	59.0		
29	54.0		
30	49.0		
31	45.0		
Total Sec. Ft. Days	*1078.0	**397.00	35 Day PERIOD
Mean Sec. Ft.	* 71.9	** 19.85	42.1
Max. Sec. Ft.	*100	** 44.0	100
Min. Sec. Ft.	* 39.0	** 2.00	2.00
Total Ac. Ft.	*2130.	**787.0	2920.

*15 Day Period
**20 Day Period

Table 5

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF
OLD CHANNEL OF SUSAN RIVER BELOW WOODSTOCK DAM - 1939

Day	May	June	July	August	September	
1	10.0	3.50	1.50	0.50		
2	9.50	3.40	1.50	.50		
3	9.00	3.20	1.40	.50		
4	8.20	3.20	1.40	.50		
5	8.00	3.20	1.40	.50		
6	8.00	3.00	1.30	1.00		
7	8.00	3.60	1.30	.90		
8	7.80	3.00	1.30	.90		
9	7.80	3.00	1.30	.80		
10	7.60	2.80	1.20	.80		
11	8.00	2.80	1.20	.70		
12	7.60	2.80	1.10	.70		
13	7.00	2.60	1.00	.90		
14	7.00	2.60	1.00	.90		
15	6.50	2.40	.90	.90		
16	5.50	2.40	.80	.90		
17	5.00	2.40	.80	.90	No	
18	5.00	2.40	.80	.90	Record	
19	4.50	2.30	.80	.80		
20	4.50	2.30	.80	.80		
21	4.40	2.30	.80	.80		
22	4.30	2.20	.80	.80		
23	4.20	2.20	.70	.80		
24	4.20	2.10	.70	.90		
25	4.00	2.00	.70	.90		
26	4.00	1.90	.70	.90		
27	3.80	1.80	.70	.90		
28	3.80	1.70	.70	.90		
29	3.60	1.60	.60	.90		
30	3.60	1.50	.60	.90		
31	3.50	-	.60	.90		
Total Sec.Ft. Days	187.50	75.60	30.40	24.90		123 Day Period
Mean Sec.Ft.	6.65	2.52	.98	.80		2.59
Max. Sec. Ft.	10.0	3.50	1.50	1.00		10.0
Min. Sec.Ft.	3.50	1.50	.60	.50		.50
Total Ac. Ft.	371	150	60.2	49.4		631.

Table 6

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF
SUSAN RIVER AT JOHNSTONVILLE - 1939

Day	April	May	June	July	August	
1		7.00	6.00	1.60		
2		7.00	7.50	1.60		
3		7.00	7.50	1.60		
4		6.50	7.00	1.50		
5		6.00	6.50	1.50		
6		6.00	6.00	1.50		
7		6.00	6.00	1.40		
8		5.50	6.00	1.40		
9		5.00	5.50	1.40		
10		4.00	5.00	1.30		
11	27.0	4.00	4.50	1.30		
12	34.0	4.00	4.00	1.30	No	
13	29.0	4.00	3.50	1.20	Record	
14	24.0	4.00	2.50	1.20		
15	21.0	4.50	2.50	1.20		
16	18.0	4.00	2.50	1.20		
17	17.0	4.50	2.50	1.10		
18	14.0	5.50	3.00	1.10		
19	14.0	7.00	3.50	1.10		
20	13.5	6.00	3.00	1.10		
21	10.0	5.50	2.80	1.10		
22	8.00	6.00	2.60	1.00		
23	8.00	6.50	2.40	1.00		
24	8.00	6.00	2.20	1.00		
25	7.00	5.50	2.00	.90		
26	7.00	6.00	1.80	.90		
27	7.50	6.00	1.80	.90		
28	6.50	5.50	1.70	.90		
29	6.50	5.00	1.70	.90		
30	6.50	5.50	1.60	.80		
31	-	5.50	-	.80		
Total Sec. Ft. Days	*286.50	170.50	115.10	36.80		112 Day Period
Mean Sec. Ft.	* 14.32	5.50	3.84	1.19		5.44
Max. Sec. Ft.	* 34.0	7.00	7.50	1.60		34.0
Min. Sec. Ft.	* 6.50	4.00	1.60	.80		.80
Total Ac. Ft.	*567.	338	228	72.9		1210.

*20 Day Period

Table 7

CONTINUOUS RECORD OF DAILY DISCHARGE IN CUBIC FEET PER SECOND OF WILLOW CREEK AT OLD MILL - 1939

Day	April	May	June	Remarks
1		14.9		
2	No	14.9		
3	Record	14.9		
4		14.9		
5	14.6			
6	14.0			
7	14.0			
8	14.0			
9	14.2			
10	14.4			
11	14.5			
12	14.5			
13	14.5	No	No	
14	14.0	Record	Record	
15	14.0			
16	14.4			
17	14.5			
18	14.5			
19	14.5			
20	14.4			
21	14.0			
22	14.0			
23	14.5			
24	15.6			
25	15.2			
26	14.9			
27	14.5			
28	14.0			
29	14.0			
30	14.5			
31	-			
Total Sec. Ft. Days	* 374.2	** 59.6		30 Day Period
Mean Sec. Ft.	* 14.4	** 14.9		14.42
Max. Sec. Ft.	* 15.6	** 14.9		15.6
Min. Sec. Ft.	* 14.0	** 14.0		14.0
Total Ac. Ft.	* 741.	**118.		859.

*26 Day Period
** 4 Day Period

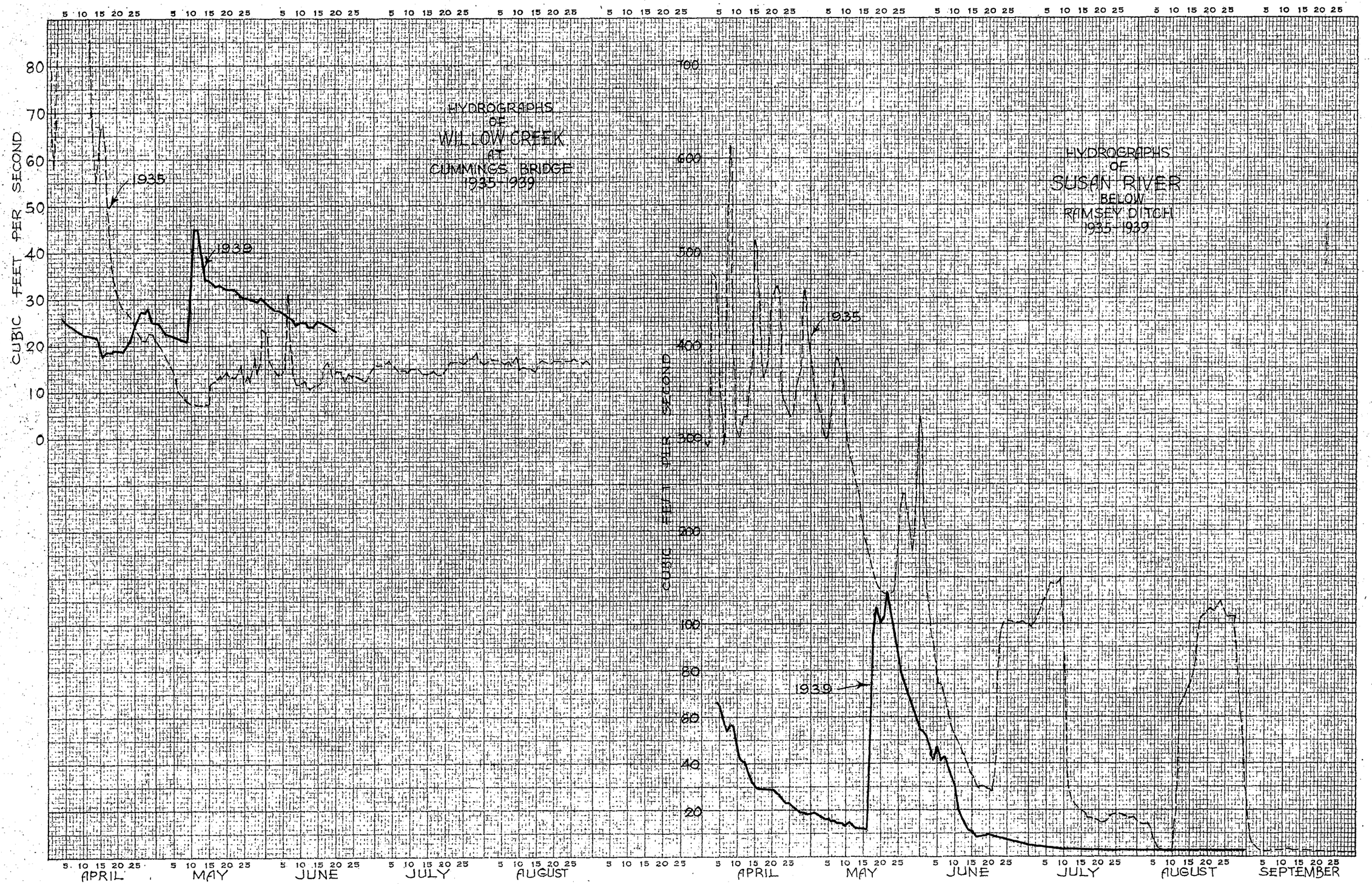
Table 8

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF
WILLOW CREEK AT CUMMINGS BRIDGE - 1939

Day	April	May	June	July	
1	No Record	24.0	28.5		
2		23.0	28.0		
3		22.5	27.5		
4	26.0	22.0	27.5		
5	25.0	22.0	27.0		
6	24.5	21.5	26.5		
7	24.0	21.0	26.0		
8	23.5	21.0	25.5		
9	23.0	21.0	24.0		
10	22.5	34.0	25.0		
11	22.0	45.0	25.0		
12	22.0	45.0	25.0		
13	21.5	40.0	24.0		
14	21.5	34.0	24.0		
15	19.0	34.0	25.0		
16	18.0	33.0	25.0		
17	18.5	32.5	24.5		
18	18.5	33.0	24.0		
19	19.0	32.5	23.5		
20	19.0	32.0	23.0		
21	19.0	32.0			
22	19.5	32.0		No Record	
23	20.0	31.0			
24	22.0	30.5			
25	24.5	30.5			
26	25.5	30.5			
27	27.0	30.0			
28	27.0	29.5			
29	26.0	29.5			
30	25.0	30.0			
31	-	29.0			
Total Sec. Ft. Days	* 603.0	927.5	**508.5		78 Day Period
Mean Sec. Ft.	* 22.3	29.9	** 25.4		26.1
Max. Sec. Ft.	* 27.0	45.0	** 28.5		45.0
Min. Sec. Ft.	* 18.0	21.0	** 23.0		18.0
Total Ac. Ft.	*1190.	1840.	**1010.		4040.

*27 Day Period
**20 Day Period

PLATE



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