EDWARD HYATT, STATE ENGINEER
CHIEF OF DIVISION

CULBERT L. OLSON
GOVERNOR OF CALIFORNIA

FRANK W. CLARK
DIRECTOR

STATE OF CALIFORNIA
Department of Public Works
SACRAMENTO

DIVISION OF WATER RESOURCES
401 PUBLIC WORKS BUILDING

January 3, 1940

Mr. Harold Conkling
Deputy State Engineer
Sacramento, California

Attention: Mr. Gordon Zander
Supervising Hydraulic Engineer

Dear Sir:

Herewith is submitted a report covering water master service on Pit River in Big Valley, Modoc and Lassen Counties, California, for the season of 1939.

This report considers the climatological and hydrographic features of the 1939 season and the general description of the results of the water distribution.

Respectfully submitted,

W. B. Alexander
Water Master Assistant

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ORGANIZATION

FRANK W. CLARK	Director of Public Works
EDWARD HYATT	State Engineer
HAROLD CONKLING	Deputy State Engineer

GORDON ZANDER
Supervising Hydraulic Engineer

Harrison Smitherum	Senior Hydraulic Engineer
W. A. Alexander	Water Master Assistant
C. E. Rose	Water Master Assistant

Sacramento, California

General Description of Work

Period of Field Work During 1939

Water master service in the Big Valley Water Master District was commenced on about April 1 and terminated about September 30, 1939.

Water Master

The work of water distribution in this area along Pit River in Big Valley was done by W. A. Alexander, as Deputy Water Master, in connection with similar work of trial distribution in the Ash Creek area. Harrison Smitherum was Supervising Water Master.

Regulation of Diversions

The following main river diversion dams were continuously operated during the 1939 season: Lookout, Fulcher, Gerig, Beiber, McArthur and Avilla.

Regulation of diversions was made in accordance with the established schedules of dam operation similar to the manner that has been employed for many years past. Slight variations were made from time to time throughout the season to make the best possible use of the available water supply. The schedule of operation is provided for in the agreement entitled "Agreement Determining rights to water and to the use Thereof from Pit River in Big Valley in Modoc and Lassen Counties, California", dated October 10, 1933. This agreement has been duly recorded in each of the offices of the County Recorder of Modoc and Lassen Counties in December, 1934.

The concrete and masonary structures constructed in 1938 to replace the old wooden dams and headgates were placed in service during the 1939 season: These structures greatly facilitated the distribution of water and resulted in a more efficient use of the available water supply.

The following regulating structures were replaced by concrete structures during the 1939 season:

Gerig Dam
Headgate Gerig Dam
McArthur Goble Slough Dam

Discussion of Results for Season

Precipitation - 1939

The results of the snow surveys made annually by the Division of Water Resources at the three snow courses in the Upper Pit River Watershed are shown in Table 1 at the end of this report. This table is arranged to show the 1939 seasonal record in comparison with the deduced normal (long time mean) and with the recorded average for the past 9 years.

Table 2 at the end of this report, gives the monthly and annual record of precipitation at Alturas, Jess Valley and Bieber Stations since 1929. The total precipitation for the seasonal year 1938-39 at Bieber was 9.02 inches, or 58 per cent of the seasonal mean of the 10-year record.

Water Supply - 1939

The water supply for irrigation from Pit River in Big Valley is mainly derived from the flow of Pit River above Big Valley and from the flow of Ash Creek reaching the river in the vicinity of the Gerig Dam. The accretion from Ash Creek is not measurable because it is spread over lands riparian to Pit River and finally reaching the main river through numerous channels. This supply failed about May 1, 1939. The flow of Pit River is continuously measured at the U.S.G.S. station below Canby.

Table 3 at the end of this report shows the daily flow at the U.S.G.S. station below Canby for the period April 1 to September 30, 1939. This flow is supplemented early in the season by numerous small streams tributary to Pit River between Canby Station and Big Valley. After May 15, 1939 the flow in these streams is negligible.

Plate 1 at the end of this report is a hydrograph of the flow at the U.S.G.S. station below Canby for the period April 1 to Semptember 30, 1939. The priorities of water use in Big Valley Water Master District are indicated by horizontal lines.

A comparison of the season total irrigation water supply entering Big Valley in Pit River is shown in the following tabulation. The flow is measured at Gouger Neck Station during 1930 and 1931 season and at Canby Station subsequently.

Season from April 1 to Sept. 30	Total Flow in Acre Feet
1930	18,000
1931	1,790
1932	68,400
1933	9,580
1934	1,900
1935	77,000
1936	53,000
1937	28,900
1938	212,000
1939	12,720

Use of Water - 1939

The total of all quantity allotments of Pit River water to Big Valley water users is 158.7 cubic feet per second as shown in the aforementioned agreement.

During the 1939 season water was available to all users until April 9. The supply failed rapidly after this date and on April 19 there was only sufficient flow to retain the channel storage above the river dams.

Water was distributed to all users beginning April 3 and one irrigation was completed April 17. The second irrigation was started on April 18, but was not completed until May 16.

The third irrigation was commenced May 24 and completed on June 13.

During the latter part of June the available water supply was distributed in accordance with the agreement to the users in the 3rd and 4th priority classes as haying was in progress on nearly all the ranches.

During July the supply diminished to first priority allotments by July 8 and remained below first priority throughout the month. Therefore, from July 10 to the end of the month no water was available for irrigation purposes.

The month of August showed a water supply below 50 per cent of 1st priority until August 21, from which point it raised throughout the remainder of the month.

September 1st had the peak flow of the month with 65 c.f.s. and steadily receded to 9.0 c.f.s. on September 30.

From August 21 to September 15 a partial irrigation was received upon all ranches with the exception of Avilla and McArthur for fall pasture.

Tables

TABLE 1

DIVISION OF WATER RESOURCES

SNOW SURVEY - UPPER PIT RIVER

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Eagle Peak Course - Elev. 7500 ft.											
Date of Survey	4/3	4/1	3/30	3/30	4/2	4/10	4/9	3/29	3/31	3/30	
Depth of Snow - Inches	24.3	13.3	43.8	38.1	9.9	66.1	52.0	47.3	71.3	27.2	
Water Content - Inches	11.0	5.2	18.7	14.3	3.3	22.6	22.0	17.5	23.6	10.4	
Density - Per cent	45.3	39.1	42.6	37.5	33.3	34.2	42.3	37.1	33.1	38.2	
Deduced Normal Water Content								20.0	20.0	20.0	
% of Deduced Normal	55.0	27.0	94.0	71.5	16.5	113.0	110.0	87.5	118.0	52.0	
Record Average - In.								14.32	15.35	14.8	
% of Record Average	78.0	36.3	131.0	100.0	23.0	158.0	154.0	122.0	153.7	70.5	
Cedar Peak Course - Elev. 7200 ft.											
Date of Survey	3/31	3/31	3/26	3/28	3/31	3/27	4/5	4/10	3/26	3/28	
Depth of Snow - In.	29.3	22.1	49.2	43.9	2.2	56.4	68.2	54.2	79.1	28.2	
Water Content - In.	13.0	8.0	19.8	16.3	0.9	21.1	26.2	21.6	25.2	10.5	
Density - Per cent	44.4	37.6	40.3	37.1	40.8	37.4	38.4	40.0	31.8	37.2	
Deduced Normal Water Content								22.2	22.2	22.2	
% of Deduced Normal	58.7	36.1	88.4	73.4	4.1	98.2	118.0	97.4	114.0	47.4	
Record Average - In.								15.9	16.9	16.3	
% of Record Average	82.0	50.4	118.0	102.5	5.7	133.0	165.0	136.0	149.1	6.44	
Adin Mountain Course Elev. 6500 ft.											
Date of Survey	3/27	3/27	3/24	3/27	4/1	4/17	3/26	4/7	4/8	3/31	
Depth of Snow - In.	13.3	6.1	30.0	37.6	0	45.9	47.2	37.4	61.4	17.5	
Water Content - In.	6.1	2.9	13.3	14.1	0	18.8	20.0	16.7	28.1	8.1	
Density - Per cent	45.6	47.3	44.3	37.5	0	40.9	42.3	44.8	45.8	46.2	
Deduced Normal Water Content								16.1	16.1	16.1	
% of Deduced Normal	37.9	18.0	82.5	87.6	0	116.6	124.3	104.0	174.	108.5	
Record Average - In.								11.5	13.3	12.8	
% of Record Average	53.0	25.2	115.6	122.5	0	163.7	174.0	145.2	211.3	63.3	

TA 1 2

Division of Water Resources

Precipitation-Upper Pit River

		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Season
Jess Valley	1929 - 30			2.41	2.72	2.01	1.29	1.01	1.57	.13	.02	.05	1.94	13.15
	1930 - 31	.90	1.19	.13	.30	.88	1.64	.39	1.01	.61	.00	.28	.48	8.29
Elev. 5400 Ft.	1931 - 32	1.67	2.24	1.58	2.20	.74	2.45	3.37	2.64	.53	.11	.00	.08	17.61
	1932 - 33	.24	.52	1.64	3.09	.85	1.03	1.64	1.53	.19	.08	T	.72	11.73
	1933 - 34	.90	.07	1.14	1.36	1.58	2.04	.65	1.77	2.32	.11	.10	.40	12.44
	1934 - 35	.61	2.67	2.12	1.53	2.02	1.71	4.37	2.25	.00	T	.09	T	17.37
	1935 - 36	2.49	1.13	2.17	3.67	2.94	1.44	0.92	1.11	1.67	.38	.37	.91	19.20
	1936 - 37	.00	.00	1.06	2.78	2.43	1.72	1.83	.87	1.00	1.89	.00	.28	13.86
	1937 - 38	1.41	3.45	4.42	1.25	2.56	4.13	2.60	1.23	1.22	1.30	.00	.54	24.11
	1938 - 39	1.87	1.59	.40	1.66	1.87	1.54	.59	.81	.87	.80	.15	.60	12.75
	10 Yr. Record Mean	1.13	1.43	1.71	2.11	1.79	1.90	1.76	1.48	.85	.47	.10	.59	15.32
Alturas	1929 - 30	.54	.00	1.60	2.24	1.77	1.14	.64	.90	.10	T	.03	1.00	9.96
	1930 - 31	1.15	.57	.23	.67	.67	1.03	.46	.06	.57	.00	T	.64	6.05
Elev. 4460 Ft.	1931 - 32	1.33	1.54	2.50	1.65	.46	1.10	1.51	1.26	.29	.00	.00	.00	11.64
	1932 - 33	.07	.33	1.53	3.15	.23	.70	1.44	1.08	.24	.31	.70	.42	10.20
	1933 - 34	1.00	.00	.74	.54	.94	.87	.42	2.01	1.88	.00	.00	.59	8.99
	1934 - 35	.52	2.02	1.56	2.52	1.23	1.44	2.74	.81	.00	.12	T	.03	12.89
	1935 - 36	1.25	.57	1.54	4.93	2.95	.72	.56	1.03	.82	.19	.18	.49	15.20
	1936 - 37	.01	.03	.96	2.05	2.44	1.63	.97	.27	.30	.15	.00	.06	8.87
	1937 - 38	1.14	3.75	5.68	1.01	2.24	3.21	1.04	0.53	0.71	.98	.00	.43	20.72
	1938 - 39	1.56	.98	.07	.93	.45	.98	.28	.33	.36	.78	.08	.57	7.47
	10 Yr. Record Mean	.86	1.18	1.64	1.98	1.34	1.28	1.00	.84	.52	.25	.10	.42	11.40
	30 Yr. Record Mean	.82	1.18	1.39	1.77	1.29	1.38	1.05	.89	.33	.41	.24	.54	11.59
Bieber	1929 - 30	.83	.00	4.51	3.78	2.75	.67	.92	1.54	.02	T	.20	1.25	16.47
	1930 - 31	.43	.90	.28	1.38	1.98	1.44	.26	1.37	.31	T	.04	.59	8.98
Elev. 4200 Ft.	1931 - 32	2.25	1.18	4.09	1.94	.69	1.25	1.72	1.23	.20	.22	.00	T	14.77
	1932 - 33	.86	.73	1.78	3.39	.31	2.57	1.28	2.59	T	T	T	.42	13.93
	1933 - 34	2.16	.00	1.67	1.17	1.79	1.33	.12	1.93	.56	.21	.00	.50	11.44
	1934 - 35	1.05	3.23	1.89	2.51	1.60	2.91	4.75	1.01	.04	.02	.00	.04	19.05
	1935 - 36	1.96	.38	2.69	5.56	3.40	.95	.80	.81	.75	.10	.10	.54	18.04
	1936 - 37	.10	.00	1.70	2.03	5.05	1.85	1.46	.36	1.04	.18	.00	.10	13.87
	1937 - 38	2.10	5.30	5.46	1.92	4.62	6.59	1.01	0.54	0.60	0.70	.00	.45	29.29
	1938 - 39	1.30	.95	.59	1.83	.46	1.28	.68	.55	.31	.60	.00	.47	9.02
	10 Yr. Record Mean	1.31	1.27	2.47	2.54	2.27	2.08	1.30	1.19	.37	.20	.04	.43	15.47

TABLE 3

CONTINUOUS RECORDS OF DAILY DISCHARGE IN CUBIC FEET PER SECOND OF PIT RIVER NEAR CANBY, CALIFORNIA, FOR THE PERIOD APRIL 1, TO SEPTEMBER 30, 1939.

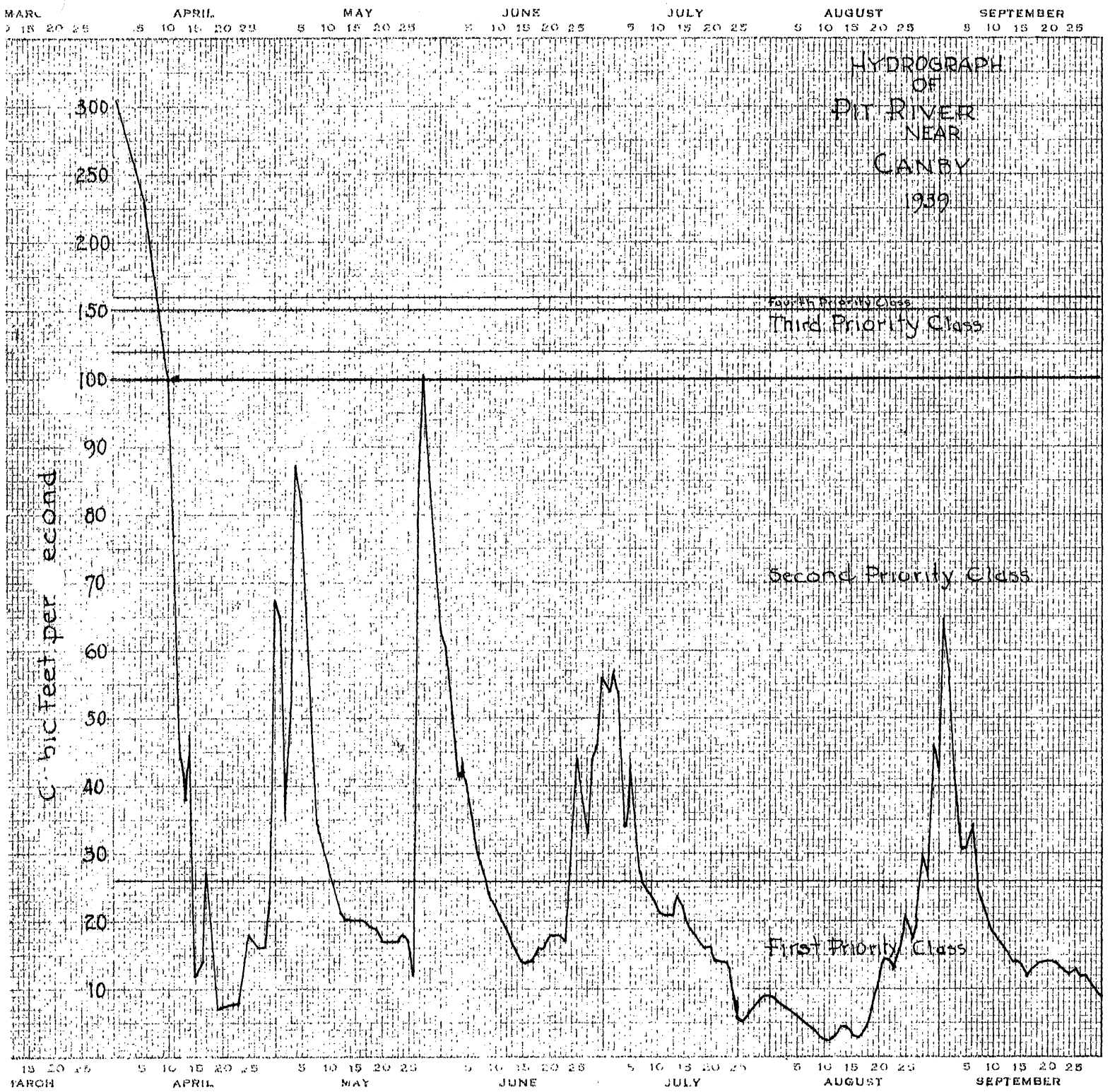
Day	April	May	June	July	Aug.	Sept.	
1	310	65.0	60.0	54.0	8.50	65.0	
2	285	35.0	50.0	57.0	7.50	56.0	
3	275	58.0	41.0	52.0	7.00	40.0	
4	260	87.0	44.0	34.0	6.50	31.0	
5	241	82.0	41.0	44.0	6.00	31.0	
6	232	60.0	33.0	33.0	5.00	34.0	
7	201	44.0	30.0	27.0	4.70	25.0	
8	155	34.0	28.0	25.0	3.80	23.0	
9	129	31.0	24.0	24.0	2.90	20.0	
10	101	28.0	23.0	22.0	2.60	18.0	
11	77.0	26.0	21.0	21.0	2.30	17.0	
12	46.0	21.0	19.0	21.0	3.20	16.0	
13	38.0	20.0	17.0	21.0	4.10	16.0	
14	48.0	20.0	15.0	24.0	4.40	15.0	
15	12.0	20.0	14.0	21.0	3.20	14.0	
16	14.0	20.0	14.0	19.0	2.90	14.0	
17	27.0	20.0	14.0	18.0	3.20	12.0	
18	16.0	19.0	16.0	17.0	4.40	13.0	
19	7.00	19.0	16.0	16.0	7.00	14.0	
20	7.50	17.0	18.0	16.0	11.0	14.0	
21	7.50	17.0	18.0	14.0	14.0	14.0	
22	7.50	17.0	18.0	14.0	13.0	13.0	
23	8.00	17.0	17.0	14.0	16.0	13.0	
24	14.0	18.0	31.0	8.50	21.0	12.0	
25	18.0	17.0	44.0	5.50	17.0	13.0	
26	17.0	12.0	38.0	5.00	20.0	12.0	
27	16.0	85.0	33.0	7.00	30.0	12.0	
28	16.0	104	44.0	7.50	26.0	11.0	
29	22.0	87.0	46.0	8.00	46.0	10.0	
30	67.0	74.0	56.0	8.50	41.0	9.00	
31		63.0		9.00			
Total Sec.Feet Days	2674.	1231.	883.	667.	358.2	607.	183 Day Period
Mean Sec.Feet	89.2	39.7	29.4	21.5	11.6	20.2	35.1
Max. Sec.Feet	310.	104.	60.0	57.0	46.0	65.0	310
Min. Sec.Feet	7.00	12.0	14.0	5.00	2.30	9.00	2.30
Total Ac.Ft.	5300.	2440.	1750.	1320.	710.	1200.	1272.0

TABLE 4

CONTINUOUS RECORDS OF DAILY DISCHARGE IN CUBIC FEET PER SECOND OF PIT RIVER NEAR CANBY, CALIFORNIA FOR THE PERIOD APRIL 1 TO SEPTEMBER 30, 1939.

Day	Apr.	May	June	July	Aug.	Sept.	
1	310	65.0	60.0	54.0	8.50	65.0	
2	285	95.0	50.0	57.0	7.50	55.0	
3	275	52.0	41.0	52.0	7.00	40.0	
4	260	87.0	44.0	34.0	6.50	31.0	
5	241	82.0	41.0	44.0	6.00	31.0	
6	232	60.0	33.0	33.0	5.00	34.0	
7	201	44.0	30.0	27.0	4.70	25.0	
8	155	34.0	28.0	25.0	9.80	23.0	
9	129	31.0	24.0	24.0	2.90	20.0	
10	101	28.0	23.0	22.0	2.60	18.0	
11	77.0	26.0	21.0	21.0	2.30	17.0	
12	46.0	21.0	19.0	21.0	3.20	16.0	
13	38.0	20.0	17.0	21.0	4.10	16.0	
14	48.0	20.0	15.0	24.0	4.40	15.0	
15	12.0	20.0	14.0	21.0	3.20	14.0	
16	14.0	20.0	14.0	19.0	2.90	14.0	
17	27.0	20.0	14.0	18.0	3.20	12.0	
18	16.0	19.0	16.0	17.0	4.40	13.0	
19	7.00	19.0	16.0	16.0	7.00	14.0	
20	7.80	17.0	18.0	16.0	11.0	14.0	
21	7.60	17.0	18.0	14.0	14.0	14.0	
22	7.50	17.0	18.0	14.0	14.0	13.0	
23	8.00	17.0	17.0	14.0	13.0	13.0	
24	14.0	18.0	31.0	8.50	16.0	12.0	
25	18.0	17.0	44.0	5.50	21.0	13.0	
26	17.0	12.0	38.0	5.00	17.0	12.0	
27	16.0	85.0	33.0	7.00	20.0	12.0	
28	16.0	104.	44.0	7.50	30.0	11.0	
29	22.0	87.	46.0	8.00	26.0	10.0	
30	67.0	74.0	56.0	8.50	46.0	9.00	
31		63.0		9.00	41.0		
Total Sec.-Feet	2674.5	1231.0	883.0	667.0	358.2	607.0	183 day Period
Days							
Mean Sec.-Feet	89.2	39.7	29.4	21.5	11.6	20.2	35.1
Max. Sec.-Feet	310.	104.	60.0	54.0	46.0	65.0	310.
Min. Sec.-Feet	7.00	17.0	14.0	5.00	2.30	9.00	2.30
Total Ac.-Ft.	5300.	2440.	1750.	1320.	710.0	1200.	12700

Plates


HYDROGRAPH OF PIT RIVER NEAR CANBY 1939
Fourth Priority Class
Third Priority Class
Second Priority Class
First Priority Class
Cubic feet per second
300
250
200
150
100
90
80
70
60
50
40
30
20
10
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER