

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

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

REPORT ON
WATER MASTER SERVICE
ON
PIT RIVER IN BIG VALLEY
MODOC AND LASSEN COUNTIES, CALIFORNIA
FOR THE SEASON OF 1938

BY

P. E. Stephenson
Assistant Hydraulic Engineer

Sacramento, California
March, 1939

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EDWARD HYATT, STATE ENGINEER
CHIEF OF DIVISION

CULBERT L. OLSON
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Department of Public Works

SACRAMENTO

DIVISION OF WATER RESOURCES
401 PUBLIC WORKS BUILDING

March 15, 1939

Mr. Harold Conkling
Deputy State Engineer
Sacramento, California

Attention: Mr. Gordon Zander
Supervising Hydraulic Engineer

Dear Sir:

Herewith is submitted a report covering the water distribution work in the Big Valley Water Master District, Modoc and Lassen Counties, California, during the period April 1 to September 30, 1938.

This report considers the climatologic and hydrographic features of this season, together with a description of the water distribution procedure.

Respectfully submitted,


Assistant Hydraulic Engineer

ORGANIZATION

Frank W. Clark	Director of Public Works
Edward Hyatt	State Engineer
Harold Conkling	Deputy State Engineer

GORDON ZANDER
Supervising Hydraulic Engineer

T. Russel Simpson	Senior Hydraulic Engineer
F. E. Stephenson	Assistant Hydraulic Engineer

Sacramento, California
March, 1939

GENERAL DESCRIPTION OF WORK

Period of Field Work During 1938

Water master service in the Big Valley Water Master District commenced on about April 1 and was continued to about September 30, 1938.

Water Master

The work of water distribution in this area along Pit River in Big Valley was done mainly by P. E. Stephenson, as Deputy Water Master, in connection with similar work in the Hat Creek and Burney Creek Water Master Districts and trial distribution in the Ash Creek Area. T. Russel Simpson was Supervising Water Master.

Regulation of Diversions

During the winter of 1937-38 the distribution system in Big Valley suffered severe loss due to floods and continued high water. During the 1938 irrigation season prior to June 15th distribution was only made possible by the high stage of Pit River. During the period from June 1 to June 15 temporary repairs were made at Fulcher Pipe, Spilling Slough and Ricketts Dam under the direction of the water master. These temporary repairs made possible a final irrigation to a large portion of the lands along Pit River in Big Valley. During the 1938 season the available water supply was in excess of the amount necessary to satisfy all priority classes set forth in the schedule of operation 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 was duly recorded in each of the offices of County Recorder of Modoc and Lassen Counties in December 1934.

The important diversion and regulating structures which were destroyed or partially destroyed by the flood waters during the 1937-38

winter are listed in order down stream as follows:

Regulating Dam Three Corners Slough - destroyed

Head gate ~~Order~~^{oiler} ditch - partially destroyed

Fulcher Pipe - completely washed out

Fulcher Dam - Abutments washed out

E. Egg Lake Slough Dam - destroyed

W. Egg Lake Slough Dam - destroyed

Ricketts Channel Dam - destroyed

Levees in McElroy Brown Field - badly washed

Levees in R. McArthur Field - badly washed

Numerous other less important regulating structures were damaged by the flood waters. On about June 15, the structure known as Bieber dam failed due probably to damage from winter floods.

On about June 1, 1938, an appropriation of \$2000.00 was made available to the water users in Big Valley along Pit River by the State of California, being an allocation from money appropriated to the Emergency Fund for flood relief by assembly Bill No. 25, 1938 session. This appropriation was for the purpose of purchasing materials and equipment here in the rehabilitation in Big Valley along Pit River of such structures having a distinct relationship to flood control as well as being a part of the distribution system of the Big Valley Water Master District. Immediately upon the moneys being made available steps were taken to do such work necessary at that time to bring the Pit River under temporary control. Due to abnormal high stage of flow in the Pit River only temporary repairs could be made at the damaged structures during June and July 1938.

Wherever possible diversions were regulated both as to time and quantity to give the best possible utilization of the available water to the benefit of each and all water users in the Water Master District.

The following regulating structures were replaced by concrete
or masonry structures during the 1938 season:

Three Corners Dam

Fulcher Pipe Diversion

Fulcher Dam

H. Egg Lake Slough Dam

W. Egg Lake Slough Dam

Spilling Slough Dam

Bieber Dam

Ricketts Dam

McArthur River Dam

Headgate Bieber Dam (Timber Structure)

DISCUSSION OF RESULTS FOR SEASON

Precipitation - 1937

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 1938 season record in comparison with the deduced normal (long time mean) and with the record average for the past eight 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. At Bieber the seasonal precipitation was 180 percent of the mean for nine years at this station. Crops derived some benefits from heavy showers late in June.

Water Supply - 1938

The water supply for irrigation from Pit River in Big Valley is mainly derived from the flow from Pit River above Big Valley and from the surplus 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 adjacent to Pit River finally reaching the river through numerous channels. Some surplus water was passing through the Ash Creek Area to Pit River until about June 10, in 1938. 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 recorded at the U. S. G. S. Station below Canby for the period April 1 to September 30, 1938. This flow is supplemented during the early season by numerous small streams flowing into the Pit River between Canby Station and Big Valley. After June 1 of most years 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 September 30, 1938.

The priority of water use in Big Valley Water Master District is indicated by horizontal lines.

A comparison of the seasonal 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 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	77,100
1936	53,000
1937	28,900
1938	212,000

It may be safely estimated that during the months of April, May and June in 1938 that the accretion to Pit River by the numerous small streams below Canby and the Ash Creek surplus would total approximately 60,000 acre-feet.

Use of Water - 1938

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.

It will be noted by the hydrograph shown in Plate 1 that there was sufficient water available during the period from April 1 to July 1 in 1938. to supply all priority classes in the Big Valley Water Master District. During the period subsequent to July 1 there was sufficient water available to supply all domestic and stock watering requirements. Irrigation water was available in September for irrigation of meadows for fall pasture. This water was largely drainage from Hot Springs Valley near Canby.

RECOMMENDATIONS

To insure continued efficient distribution and regulation of the water, in the Big Valley Water Master District, the following structures and levees should be constructed during the 1939 season:

1. Dam in East Branch Bull Run Slough South of Jim Holl's House.
2. Repair Swing Dam on Watson Ditch.
3. Repair Levee on Watson Ditch through Hollenbeak Field.
4. Construct Levee McElroy Brown field to prevent return to Gobel Slough.
5. Repair McArthur Dam on Gobel Slough.
6. Levee on Ernest Babcock Ranch to prevent return to Gobel Slough.

The above listed structures and levees do not take into account numerous additional structures needed for spreading purposes on individual ranches.

T A B L E S

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		
Depth of Snow - Inches	24.3	13.3	43.8	38.1	9.9	66.1	52.0	47.3	71.3		
Water Content - Inches	11.0	5.2	18.7	14.3	3.3	22.6	22.0	17.5	23.6		
Density - Per cent	45.3	39.1	42.6	37.5	33.3	34.2	42.3	37.1	31.1		
Deduced Normal Water Content								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		
Record Average - In.								14.32	15.38		
% of Record Average	78.0	36.3	131.3	100.0	23.0	158.0	154.0	122.0	193.7		
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		
Depth of Snow - In.	29.3	22.1	49.2	43.9	2.2	56.4	68.2	54.2	79.1		
Water Content - In.	13.0	8.0	19.8	16.3	0.9	21.1	26.2	21.6	25.2		
Density - Per cent	44.4	37.6	40.3	37.1	40.8	37.4	38.4	40.0	31.8		
Deduced Normal Water Content								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		
Record Average - In.								15.9	16.9		
% of Record Average	82.0	50.4	118.0	102.5	5.7	133.0	165.0	136.0	149.1		
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		
Depth of Snow - In.	13.3	6.1	30.0	37.6	0	45.99	47.2	37.4	61.4		
Water Content - In.	6.1	2.9	13.3	14.1	0	18.8	20.0	16.7	28.1		
Density - Per Cent	45.6	47.3	44.3	37.5	0	40.9	42.3	44.8	45.8		
Deduced Normal Water Content								16.1	16.1		
% of Deduced Normal	37.9	18.0	82.5	87.6	0	116.6	124.3	104.0	174.0		
Record Average - In.								11.5	11.3		
% of Record Average	53.0	25.2	115.6	122.5	0	163.7	174.0	145.2	211.3		

TABLE 2

Division of Water Resources
PRECIPITATION - UPPER PIT RIVER

	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38	1938-39
Jess Valley										
Elev. 5400 Ft										
Oct		.90	1.67	.24	.90	.61	1.80	.00	1.41	
Nov		1.19	2.24	.52	.07	2.67	.18	.00	3.45	
Dec	2.41	.13	1.58	1.64	1.14	2.12	.83	.23	4.42	
Jan	2.72	.80	2.20	3.09	1.36	1.53	1.41	.00	1.25	
Feb	2.01	.88	.74	.85	1.58	2.02	.94	.49	2.56	
Mar	1.29	1.64	2.45	1.03	2.04	1.71	.17	1.26	4.13	
Apr	1.01	.39	3.37	1.84	.65	4.37	.84	1.53	2.60	
May	1.57	1.01	2.64	1.53	1.77	2.25	1.11	.87	1.23	
June	.13	.61	.53	.19	2.32	.00	1.67	1.00	1.22	
July	.02	.00	.11	.08	.11	T	.38	1.89	1.30	
Aug	.05	.28	.00	T	.10	.09	.37	.00	.00	
Sept	1.94	.46	.08	T	.40	T	.91	.28	0.54	
Total	13.15	8.29	17.61	11.01	12.44	17.37	10.61	7.55	24.11	
Alturas										
Elev. 4360 Ft.										
Oct	.54	1.15	1.78	0.07	1.00	.52	1.22	.01	1.14	
Nov	.90	.57	1.54	.33	.00	2.02	.56	.03	3.75	
Dec	1.60	.83	1.78	1.53	.74	1.56	1.54	.96	5.68	
Jan	2.24	.67	1.65	3.12	.54	2.52	4.93	2.05	1.01	
Feb	1.77	.67	.46	.23	.94	1.23	2.95	2.44	2.24	
Mar	1.14	1.03	1.10	.70	.87	1.44	.72	1.63	3.21	
Apr	.64	.46	1.51	1.44	.42	2.74	.56	.97	1.04	
May	.90	.06	1.26	1.08	2.01	.81	1.03	.27	0.53	
June	.10	.57	.29	.24	1.88	.00	.82	.30	0.71	
July	T	.00	.00	.31	.00	T	.19	.15	0.98	
Aug	.03	T	.00	.70	.00	T	.18	.00	0.00	
Sept	1.00	.64	.00	.42	.59	.03	.49	.06	0.43	
Total	9.96	6.05	11.37	10.17	8.99	12.87	15.20	8.87	20.72	
Bieber										
Elev. 4200 Ft										
Oct	.83	.43	2.25	.86	2.16	1.05	1.96	.10	2.10	
Nov	.00	.90	1.18	.73	.00	3.23	.38	.00	5.30	
Dec	4.51	.28	4.09	1.78	1.67	1.89	2.69	1.70	5.46	
Jan	3.78	1.38	1.94	3.39	1.17	2.51	5.56	2.03	1.92	
Feb	2.75	1.98	.69	.31	1.79	1.60	3.40	5.05	4.62	
Mar	.67	1.44	1.25	2.57	1.33	2.91	.95	1.85	6.59	
Apr	.92	.26	1.72	1.28	.12	4.75	.80	1.46	1.01	
May	1.54	1.37	1.23	2.59	1.93	1.01	.81	.36	0.54	
June	.02	.31	.20	T	.56	.04	.75	1.04	0.60	
July	T	T	.22	T	.21	.02	.10	.18	0.70	
Aug	.20	.04	.00	T	.00	.00	.10	.00	0.00	
Sept	1.25	.59	T	.42	.50	.04	.54	.10	0.45	
Total	16.47	8.98	14.77	13.93	11.44	19.05	18.04	13.87	29.29	

CONTINUOUS RECORD OF DAILY DISCHARGE IN CUBIC FEET
 FOR SECTIONS OF PIT RIVER NEAR CASBY, CALIFORNIA FOR THE
 PERIOD APRIL 1 TO SEPTEMBER 30, 1938.

Day	Apr.	May	June	July	Aug.	Sept.	
1	1440	1850	668	45.0	21.0	205.	
2	1470	1820	644	33.0	18.0	136.	
3	2020	1780	620	33.0	18.0	85.0	
4	2960	1710	598	36.0	18.0	56.0	
5	3450	1640	570	56.0	17.0	78.0	
6	2880	1540	538	98.0	16.0	101.	
7	2640	1440	472	132.	16.0	93.0	
8	2560	1340	450	122.	14.0	71.0	
9	2340	1210	422	104.	12.0	60.0	
10	2130	1110	380	90.0	11.0	52.0	
11	1920	1040	325	83.0	8.50	47.0	
12	1850	1010	295	101.	7.00	45.0	
13	1710	962	270	104.	5.80	40.0	
14	1570	950	228	69.0	3.90	36.0	
15	1440	1040	205	58.0	2.30	33.0	
16	1370	1080	228	60.0	2.30	30.0	
17	1300	1040	151	56.0	3.50	28.0	
18	1270	1080	151	50.0	4.10	30.0	
19	1340	1110	270	47.0	3.80	32.0	
20	1400	1140	290	45.0	4.10	34.0	
21	1500	1210	295	47.0	5.00	35.0	
22	1600	1210	295	47.0	12.0	33.0	
23	1680	1180	290	42.0	40.0	35.0	
24	1680	1110	228	40.0	69.0	33.0	
25	1710	1020	236	38.0	89.0	32.0	
26	1780	944	236	42.0	56.0	35.0	
27	1740	860	205	40.0	31.0	32.0	
28	1880	806	179	40.0	31.0	32.0	
29	1960	758	140	35.0	32.0	31.0	
30	1920	710	83	33.0	31.0	24.0	
31		680		30.0	68.0		
Total							183
Sec. Feet	56510.	36380.	9962.	1856.	661.3	1616.	day
Days							Period
Mean	1884	1174	322	59.9	21.3	53.9	585.
Sec. Feet							
Max.	3450	1850	668	132.	83.0	205.	9450
Sec. Feet							
Min.							
Sec. Feet	1270	680	83	30.	2.30	20.0	2.30
Total							
Sec. Feet	112100	72,140	19,750	3680	1310	3200	212,000

PLATE

MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER
 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25

HYDROGRAPH
 OF
 PITTSBURGH RIVER
 NEAR
 CANBY
 938

CUBIC FEET PER SECOND

3500
 3000
 2500
 2000
 1500
 1000
 800
 600
 400
 200
 160
 120
 80
 40

4th Priority
 3rd Priority
 2nd Priority
 1st Priority

10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25 5 10 15 20 25
 MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER

