STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

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EARL WARREN, Governor

FRANK B. DURKEE, Director of Public Works

A. D. EDMONSTON, State Engineer

REPORT ON WATERMASTER SERVICE

IN

BIG VALLEY WATERMASTER SERVICE AREA
Modoc and Lassen Counties, California

1951 SEASON

Sacramento, California
December, 1951

SUBMISSION TO, AND ADOPTION BY
DEPARTMENT OF PUBLIC WORKS

I, L. C. Jopson, Supervising Hydraulic Engineer, Division of Water Resources, Department of Public Works of the State of California, submit this "Report on Watermaster Service in Big Valley Watermaster Service Area, Modoc and Lassen Counties, California, 1951 Season".

/s/ L. C. JOPSON
Supervising Hydraulic Engineer

I, Gordon Zander, Assistant State Engineer, Division of Water Resources, Department of Public Works of the State of California, approve this "Report on Watermaster Service in Big Valley Watermaster Service Area, Modoc and Lassen Counties, California, 1951 Season".

/s/ GORDON ZANDER
Assistant State Engineer

I, A. D. Edmonston, State Engineer and Chief of the Division of Water Resources, Department of Public Works of the State of California, approve and adopt this "Report on Watermaster Service in Big Valley Watermaster Service Area, Modoc and Lassen Counties, California, 1951 Season", as a report of the Department of Public Works.

WITNESS my hand and the seal of the Department of Public Works of the State of California, this 25th day of April, 1952.

DEPARTMENT OF PUBLIC WORKS

By /s/ A. D. EDMONSTON
A. D. Edmonston
State Engineer

SEAL

ORGANIZATION

Frank B. Durkee . . . . . Director of Public Works

A. D. Edmonston . . . . . State Engineer

Gordon Zander . . . . . Assistant State Engineer

This report was prepared under the direction of

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INTRODUCTION

The Big Valley Watermaster Service Area was created by order of the Division of Water Resources entered November 13, 1934, to include all the water rights on the Pit River in Big Valley as determined by agreement in writing entitled "Agreement Determining Right to Water and Use Thereof from Pit River in Big Valley in Modoc and Lassen Counties, California" dated October 16, 1933. The boundaries of the service area were enlarged by order dated March 11, 1949 to include the water rights on Ash Creek and its tributarties in Modoc and Lassen Counties, California, as established by decree entered by the Superior Court, Modoc County, California, on October 27, 1947, in case of Charles A. Gerig vs. C. W. Clarke Co., et al., No. 3670 and Application 10143, Permit 6236 issued prior to entry of said decree.

Watermaster service for 1951 covered the regulation of diversions from Pit River in Big Valley and regulation of diversions from Ash Creek and its tributaries in accordance with Part 4, Division 2 of the Water Code. The service extended over the period from April 1 to September 30, 1951. O. L. Abbott, Deputy Watermaster, administered the distribution of water during the irrigation season under the supervision of P. E. Stephenson, Senior Hydraulic Engineer.

WATER SUPPLY

Precipitation

The monthly precipitation at Bieber, California as compiled from records of California Cooperative Snow Surveys is presented in Table 1. The total precipitation for the seasonal year 1950-1951 was 15.98 inches or about 99.3 per cent of the normal precipitation for this station.

The water content of the snow on Eagle Peak, Cedar Pass, Adin Mountain and Blue Lake Ranch is shown in Table 2. The tabulation presents the record of the water content of the snow on about April 1 of each year for the period 1942 to 1951, inclusive. On April 1, 1951 the average water content of the snow for the four courses was about 65 per cent of the combined normal for the courses.

Stream Flow

The record of the daily discharge of Pit River at the U. S. Geological Survey gaging station near Canby for the season ending September 30, 1951 is presented in Table 3. The daily discharges shown were obtained by taking the gage heights from the recorder sheets of the U. S. Geological Survey and applying them to the 1950 U. S. Geological Survey rating curve. Figures to be published at a later date by the U. S. Geological Survey may vary slightly from those shown in the table. During the irrigation season, the flow passing the station is assumed to be the amount available for distribution in Big Valley. At the beginning of the season however, additional water is available from small tributaries between Canby and Lookout Dam.

A hydrograph of Pit River near Canby prepared from the data contained in Table 3 is shown on Plate 1. A comparison of the total available water supply and the water requirements is shown graphically on this plate. The monthly and total runoff of the Pit River at the Canby Station for each irrigation season from 1932 to 1951, inclusive, and 20-year means are presented in Table 4.

The water passing the U. S. Geological Survey gaging station near Canby comprised natural flow of Pit River plus storage water released from Big Sage Reservoir into Pit River for irrigation use within the Hot Springs Valley Area. Subsequent to August 10 the natural flow contribution was negligible.

Stream flow measuring stations, equipped with automatic water stage recorders were maintained on Ash Creek above Adin, Rush Creek above Round Valley and Willow Creek near Knudsen Ranch. The records of daily discharge at the stations are presented in Tables 5, 6 and 7, respectively. A hydrograph of Ash Creek above Adin prepared from data contained in Table 5 is shown on Plate 2. A comparison of the water available at the gaging station and the total water requirements below the gaging station is shown graphically on this plate.

DISTRIBUTION OF WATER

Pit River in Big Valley

Distribution of water during the 1951 season was in accordance with the water rights set forth in Schedules 1 and 2 and Paragraphs 8 and 9 of the "Agreement Determining Water Rights on Pit River in Big Valley in Modoc and Lassen Counties, California".

The water supply in Pit River in Big Valley was in excess of requirements up to about June 7, 1951. Diversion from Bieber Dam was begun on April 13, from McArthur Dam on April 23, and from Lookout and Gerig Dams on June 1. By June 27 there was little demand for water as most of the users in Big Valley were drying their lands for haying.

About July 29 and again on August 27 water was released from Roberts Reservoir for use by the interested owners. No record was kept of the amount released or of the rediversion as only stockwater was available in the river and the use of the reservoir water was handled by the shareholders.

Roberts Reservoir is not included in the service area.

On August 14, water was released from Hot Springs Valley but was only sufficient to provide a partial irrigation. On September 1, a larger release from Hot Springs Valley passed Canby Station which was adequate to fill all requirements at that season of the year.

A summary of the distribution of water on Pit River in Big Valley during the 1951 irrigation season is presented in the following tabulation.

Dates	Average Discharge Pit River near Canby c.f.s.	Percentage of Allotments Delivered			
		1st Priority	2nd Priority	3rd Priority	4th Priority
April	288	100	100	100	100
May	627	100	100	100	100
6/1 - 6/6	196	100	100	100	100
6/6 - 6/30	78	100	54	0	0
7/1 - 7/19	54	100	29	0	0
7/20 - 8/11	19	76	0	0	0
8/11 - 8/31	51	100	26	0	0
9/1 - 9/19	91	100	66	0	0
9/19 - 9/30	39	100	14	0	0

Ash Creek and Tributaries

Distribution of water from Ash Creek and tributaries was in accordance with water rights set forth in Schedules 3, 4, 5 and 6 of the decree entered in the case of Gerig vs. C. W. Clarke Co., et al, Superior Court, Modoc County, No. 3670.

Rush Creek

The available water supply from Rush Creek was in excess of total allotments until about August 1. During the remainder of the season the available supply was just sufficient to maintain 100 per cent of total allotments.

A summary of the distribution made during the 1951 season is set forth in the following tabulation:

Dates	Average Discharge Rush Creek above Round Valley *	Percentage of allotment delivered First Priority
April	18	100
May	28.5	100
June	7.4	100
July	5.2	100
August	4.3	100
September	4.4	100

* Does not include 0.90 c.f.s. diverted above gaging station.

Butte Creek

Sufficient water was available from Butte Creek to fill all requirements until June 20; subsequent thereto the available supply gradually decreased until July 1 when only about 1.00 cubic foot per second was available. The flow remained nearly constant at this amount for the remainder of the season.

A summary of the distribution made during the 1951 season is set forth in the following tabulation:

Month	Average Discharge Butte Creek *	Percentage of Allotments Delivered	
		1st Priority	2nd Priority
April	5.0	100	100
May	4.0	100	100
June	2.25	92	0
July	1.0	40	0
August	1.0	40	0
September	1.0	40	0

* Discharge from Butte Creek is summation of all diversions from the stream

Ash Creek

The available flow in Ash Creek was sufficient to satisfy all first and second priority allotments throughout the season. Full allotments were available to all users until about May 20. By June 25 the stream flow had decreased to 15 per cent for third priority allotment. The flow remained nearly constant at this amount for the remainder of the season.

A summary of the distribution made during the 1951 season is set forth in the following tabulation:

Dates	Average Discharge Ash Creek** near Adin	Percentage of allotments delivered 1st Priority	2nd Priority	3rd Priority	4th Priority	5th Priority
4/1 - 4/30	68.7	100	100	100	100	100
5/1 - 5/20	102	100	100	100	100	100
5/20- 5/31	36.5	100	100	60*	0	0
6/1 - 6/20	17.6	100	100	20*	0	0
6/20-6/30	10.0	100	100	12*	0	0
7/1 - 7/31	13.7	100	100	15*	0	0
8/1 - 8/31	14.4	100	100	15*	0	0
9/1 - 9/31	14.6	100	100	15*	0	0

* The percentage of allotment available is the per cent available as measured at the heads of ditches of the third priority users.

** Does not include 18.25 c.f.s. diverted above recorder station.

Willow Creek

Willow Creek supplied sufficient water to all requirements under the decree until about May 15. Thereafter the flow gradually decreased until about May 23, when the supply was insufficient to meet the demands of the third and fourth priority classes. The first priority requirements were satisfied throughout the season but the second priority users received an average of about 43 per cent of their allotments during August and September.

A summary of the distribution made during the 1951 season is set forth in the following tabulation:

Dates	Average Discharge Willow Creek near Knudson Ranch*	Percentage of allotment delivered			
		1st Priority	2nd Priority	3rd Priority	4th Priority
April	23.7	100	100	100	100
5/1 - 5/20	15	100	100	100	100
5/20 - 5/31	8.3	100	100	0	0
6/1 - 6/30	5.9	100	63	0	0
7/1 - 7/31	4.6	100	46	0	0
8/1 - 8/31	4.4	100	43	0	0
9/1 - 9/30	4.4	100	43	0	0

* Does not include 2.30 c.f.s. of 4th priority allotments diverted above the gaging station prior to May 20, 1951.

CHANGES IN OWNERSHIP OF LANDS AND WATER RIGHTS

Changes in ownership of lands and water rights which occurred subsequent to filing "Statement for Big Valley Watermaster Service Area, Counties of Modoc and Lassen, California, for 1951", and which shall be included in said statement for watermaster service area for 1952, are listed in the following tabulation:

Tract No.	Name of Water Right Owner Appearing in 1951 Statement	Name of Water Right Owner to Appear in 1952 Statement	Amount of Water c.f.s.
6-5	A. K. Longren	A. K. Longren, Estate of	0.80
6-27	Carrie E. Kramer	Andrew C. Babcock and Dorothy J. Babcock	0.94
6-69 6-71	A. L. Cannon	W. H. Hunt Estate Company	2.50
6-10	Carrie E. Kramer	Louis W. Kramer and Dorothy E. Kramer	6.98
6-36	A. H. Brunselmeir and Bertie Brunselmeir	W. D. Durkee and Mary Alice Durkee	0.10
6-82	John Vogt and Louise Vogt	Arthur J. Vogt and Gracie Frances Vogt	5.45
6-50	A. E. Krause	J. C. Stearns and Mabel M. Stearns	2.0
6-20	Clarence Holibaugh and Violet Holibaugh	Margarite Wilmont	1.13

TABLE 1

PRECIPITATION AT BIEBER, LASSEN

COUNTY, CALIFORNIA

1950 - 1951

Elevation 4,200 feet

Month	Normal Precipitation Inches	Precipitation 1950-51 Inches	Per cent of Normal
October	1.81	2.50	138
November	1.73	2.53	146
December	2.16	2.30	106
January	2.41	2.63	109
February	2.34	2.48	106
March	1.86	.43	23
April	1.28	2.22	173
May	1.26	.64	51
June	.40	.14	35
July	.22	.00	0
August	.14	.11	79
September	.48	.00	0
Total	16.09	15.98	99.3

Data compiled from Records of California-Cooperative Snow Surveys.

TABLE 2

SNOW SURVEY DATA - UPPER PIT RIVER AREA

April 1st Measurement
1951

Year	Water Content of Snow - Inches			
	Eagle Peak Elev.-7,500	Blue Lake Ranch Elev.-7,300	Cedar Pass Elev. - 7,200	Adin Mountain Elev. - 6,500
1942	14.7	11.4	19.3	13.9
1943	23.7	15.3	25.8	13.2
1944	13.5	8.5	12.3	9.4
1945	22.2	15.8	22.4	15.8
1946	21.2	16.2	22.9	16.2
1947	6.4	5.3	10.3	4.4
1948	14.4	10.1	15.7	9.9
1949	19.1	16.7	22.0	16.9
1950	17.9	11.3	19.1	8.9
1951	13.6	9.4	12.8	6.7
Computed 61-year Normal	18.7	11.6	20.6	14.7
Percent* of Normal	73	81	62	47

Data compiled from records of
California-Cooperative Snow Surveys

* Per cent of normal for 1951

TABLE 3

Daily Discharge in Cubic Feet Per Second

PIT RIVER NEAR CANBY

April 1 to September 30, 1951

Day	April	May	June	July	August	September
1	256	427	299	65	22	374
2	233	422	247	35	23	166
3	186	369	162	44	24	135
4	162	348	178	204	23	112
5	178	374	143	135	19.2	112
6	186	438	182	82	18.1	97
7	200	509	162	44	14.3	76
8	256	611	82	33	12.7	67
9	256	776	25	31	12.0	65
10	252	968	33	58	11.4	62
11	237	986	62	35	10.7	40
12	170	962	76	33	38	31
13	182	926	67	33	92	35
14	147	884	52	36	97	54
15	190	860	36	47	95	52
16	271	920	27	49	44	49
17	324	1020	44	56	35	65
18	384	1080	60	45	35	76
19	470	1010	69	40	28	69
20	492	944	82	20	25	44
21	460	800	190	15.2	33	30
22	438	651	95	19.2	36	30
23	343	595	67	24	49	16
24	328	427	76	25	56	31
25	324	348	74	25	49	33
26	299	333	74	23	52	30
27	290	309	45	22	44	27
28	358	309	40	20	40	40
29	384	299	84	19.2	38	82
30	395	280	84	22	38	65
31		252		22	24	
Total Sec. Ft. Days	8,651	19,437	2,917	1,361	1,138	2,165
Mean Sec. Ft.	288	627	97	44	37	72
Total Ac. Ft.	17,200	38,600	5,790	2,700	2,260	4,290

Total for 183-day period 70,840 acre-feet

TABLE 4

SEASONAL MONTHLY RUNOFF IN ACRE-FEET

Pit River Near Canby

1932 to 1951

Year	April	May	June	July	Aug.	Sept.	Totals
1932	17,100	37,500	9,520	3,170	480	684	68,454
1933	2,420	4,780	803	1,010	151	412	9,576
1934	77	427	934	427	13	16	1,894
1935	39,150	18,760	14,810	3,490	350	525	77,085
1936	30,120	13,170	5,770	1,410	864	1,710	53,044
1937	20,630	2,560	1,990	1,280	582	1,860	28,902
1938	112,100	72,160	19,760	3,680	1,310	3,210	212,220
1939	5,300	2,440	1,750	1,320	710	1,200	12,720
1940	23,200	5,370	3,080	1,090	2,450	2,190	37,380
1941	7,790	14,660	9,340	4,150	2,310	4,210	42,460
1942	29,930	34,100	21,010	4,670	1,710	3,750	95,170
1943	42,500	31,360	19,620	4,420	3,380	5,190	106,470
1944	10,820	8,520	15,430	3,470	1,950	4,970	45,160
1945	18,080	45,430	46,080	4,950	2,950	4,910	122,400
1946	22,550	15,110	4,680	2,960	1,820	2,640	49,760
1947	3,500	2,050	4,820	2,010	1,670	1,420	15,470
1948	28,020	33,480	38,450	4,140	2,460	3,800	110,350
1949	32,390	51,520	12,400	2,060	2,230	2,880	103,480
1950	18,770	14,600	7,930	2,620	1,350	2,990	54,260
1951	17,200	38,600	5,790	2,700	2,260	4,286	70,836
20-Yr. Mean	24,082	22,329	12,198	2,751	1,550	2,943	65,852

TABLE 5

Daily Discharge in Cubic Feet Per Second

ASH CREEK NEAR ADIN

April 3 to September 19, 1951

Day	April	May	June	July	August	September
1		69	21	12	15	20
2		54	20	12	13	21
3	89	60	17	13	13	21
4	92	69	17	13	13	21
5	96	66	18	17	13	21
6	95	108	18	18	13	17
7	92	230	19	18	13	14
8	89	159	19	16	12	13
9	86	127	19	15	12	13
10	83	106	18	15	13	13
11	80	119	18	13	13	14
12	59	106	18	12	13	14
13	54	143	18	12	13	14
14	71	136	15	13	13	13
15	72	106	15	13	13	13
16	72	89	16	13	13	11
17	80	83	18	13	13	11
18	77	77	17	12	13	12
19	71	72	16	14	13	12
20	58	68	16	15	13	
21	51	60	16	14	14	
22	47	54	18	13	14	
23	46	53	17	13	15	
24	50	46	15	13	16	
25	46	34	11	12	17	No Record
26	38	32	12	13	17	
27	36	29	12	13	18	
28	82	27	12	12	18	
29	85	23	13	13	18	
30	76	21	14	15	19	
31		23		15	20	
Total Sec. Ft. Days	1973*	2449	493	425	446	288**
Mean Sec. Ft.	70.5	79	16.4	13.7	14.4	15.0
Total Ac. ft.	3921*	4849	970	841	883	570**

*-28 day period
**-19 day period
Total runoff for 170 day period - 12,034 acre-feet

TABLE 6

Daily Discharge in Cubic Feet Per Second

RUSH CREEK ABOVE ROUND VALLEY

April 14 to September 22, 1951

Day	April	May	June	July	August	September
1		17.2	10.2	5.7	4.5	4.5
2		16.5	10.0	5.7	4.5	4.5
3		19.2	9.7	5.7	4.3	4.5
4		22.5	9.5	5.8	3.7	4.5
5		21.0	9.2	5.8	3.7	4.5
6		53.5	9.0	5.8	3.7	4.3
7		66.0	8.7	5.7	3.7	4.3
8		54.5	8.5	5.7	4.1	4.3
9		44.0	8.0	5.5	4.0	4.3
10		39.7	8.0	5.5	4.0	4.3
11		42.7	7.7	5.2	4.0	4.3
12		38.5	7.5	5.2	4.1	4.3
13		55.7	7.2	5.2	4.3	4.3
14	19.0	51.5	7.0	5.2	4.3	4.3
15	19.0	41.7	6.7	5.0	4.3	4.3
16	20.0	41.7	6.7	5.0	4.3	4.3
17	22.0	36.2	6.7	5.0	4.3	4.3
18	20.0	27.0	6.7	5.3	4.3	4.3
19	19.0	23.5	6.7	5.3	4.5	4.3
20	17.5	21.0	6.7	5.2	4.5	4.3
21	17.0	19.0	6.7	5.3	4.6	4.3
22	16.0	17.5	6.7	5.3	4.6	4.3
23	15.2	16.0	6.5	5.2	4.6	
24	14.7	14.5	6.5	5.2	4.5	
25	14.0	13.7	6.0	4.8	4.5	
26	12.5	12.7	6.0	4.6	4.5	No Report
27	12.0	12.2	6.0	4.6	4.3	
28	25.2	11.7	5.8	4.6	4.3	
29	23.5	11.2	5.7	4.6	4.3	
30	19.2	11.0	5.7	4.6	4.3	
31		10.5		4.6	4.5	
Total Sec. Ft. Days	324*	884	222	162	132	96**
Mean Sec. Ft.	18.0	28.5	7.4	5.2	4.3	4.4
Total Acre Feet	642	1750	440	321	261	190**

* -17 day period
** -22 day period

Total runoff for 162 day period - 3604 acre-feet

TABLE 7

Daily Discharge In Cubic Feet Per Second

WILLOW CREEK NEAR KNUDSON RANCH

April 3 to September 19, 1951

Day	April	May	June	July	August	September
1		19.1	7.3	5.0	4.3	4.2
2		16.5	7.1	5.0	4.3	4.3
3	33.8	15.5	6.9	5.0	4.3	4.3
4	33.8	15.5	6.7	5.0	4.3	4.3
5	33.4	14.5	7.1	4.8	4.3	4.5
6	32.8	18.0	6.9	4.8	4.3	4.5
7	32.4	19.1	6.4	4.8	4.3	4.5
8	31.4	19.2	6.4	4.8	4.3	4.5
9	30.5	16.5	6.3	4.8	4.3	4.6
10	29.2	13.2	6.1	4.8	4.3	4.6
11	27.2	13.0	6.1	4.8	4.3	4.6
12	25.2	14.0	6.1	4.8	4.3	4.3
13	23.8	15.5	5.9	4.6	4.3	4.3
14	22.5	16.7	5.9	4.6	4.3	4.3
15	21.4	13.7	5.9	4.6	4.3	4.3
16	22.0	12.5	5.9	4.6	4.3	4.5
17	24.4	12.3	5.8	4.6	4.3	4.6
18	23.6	12.0	5.8	4.5	4.3	4.6
19	20.6	11.1	5.6	4.5	4.3	4.6
20	18.6	10.5	5.6	4.5	4.3	
21	17.8	9.8	5.3	4.5	4.8	
22	14.0	9.6	5.3	4.5	4.5	
23	14.2	8.8	5.3	4.5	5.2	
24	18.9	8.8	5.3	4.5	4.6	No Record
25	16.3	8.6	5.7	4.5	4.3	
26	14.7	8.2	5.2	4.5	4.2	
27	13.7	8.2	5.2	4.5	4.2	
28	20.9	7.3	5.0	4.5	4.2	
29	24.6	7.3	5.0	4.5	4.2	
30	22.2	7.5	5.0	4.5	4.2	
31		7.6		4.5	4.2	
Total Sec. Ft. Days	664*	390	178	144	135	84**
Mean Sec. Ft.	22.1	12.5	5.9	4.6	4.4	4.4
Total Acre Feet	1315*	772	352	285	267	166**

* -28 day period
* -19 day period

Total runoff for 170 day period - 3157 acre-feet

PLATE 1

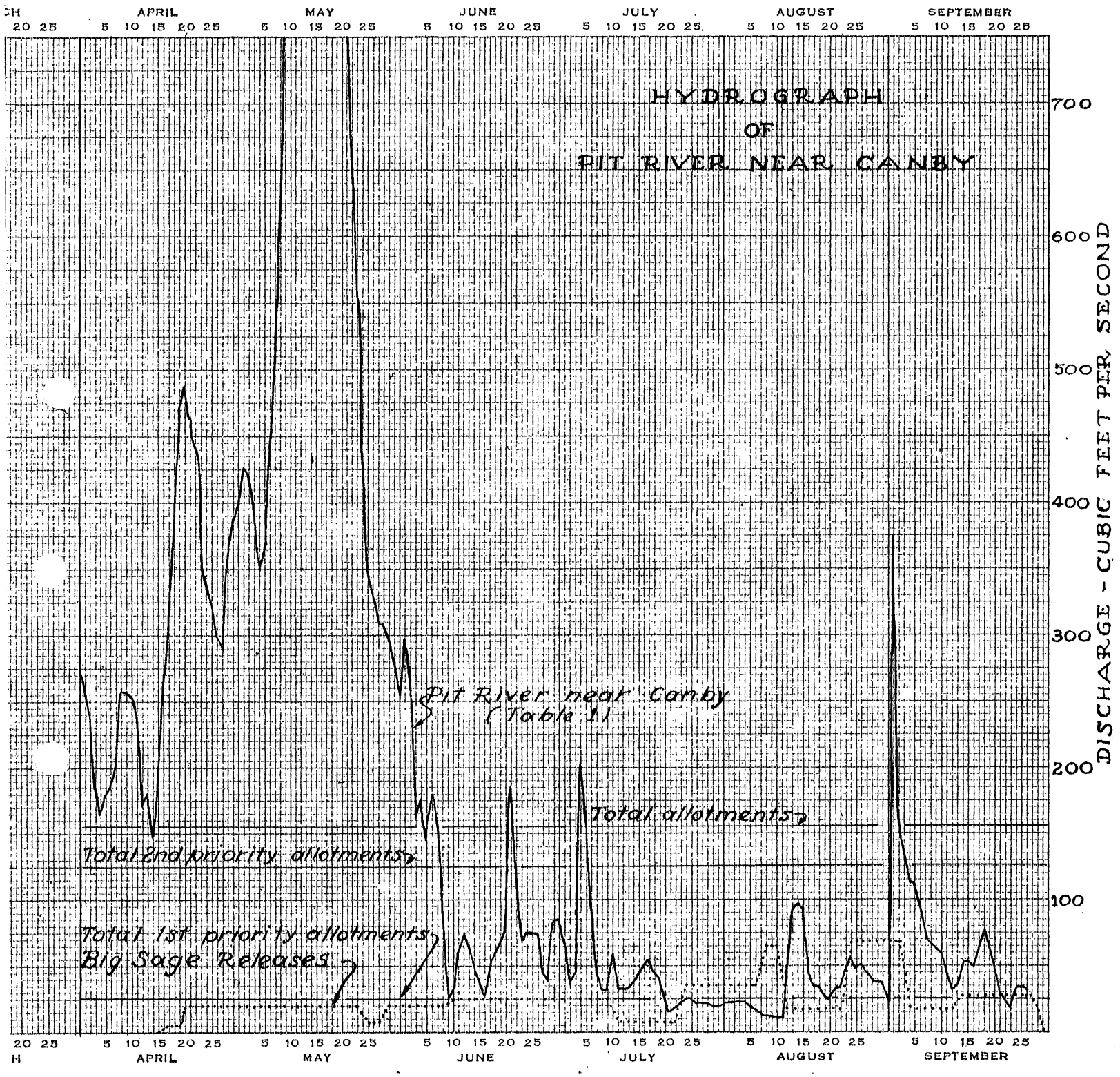
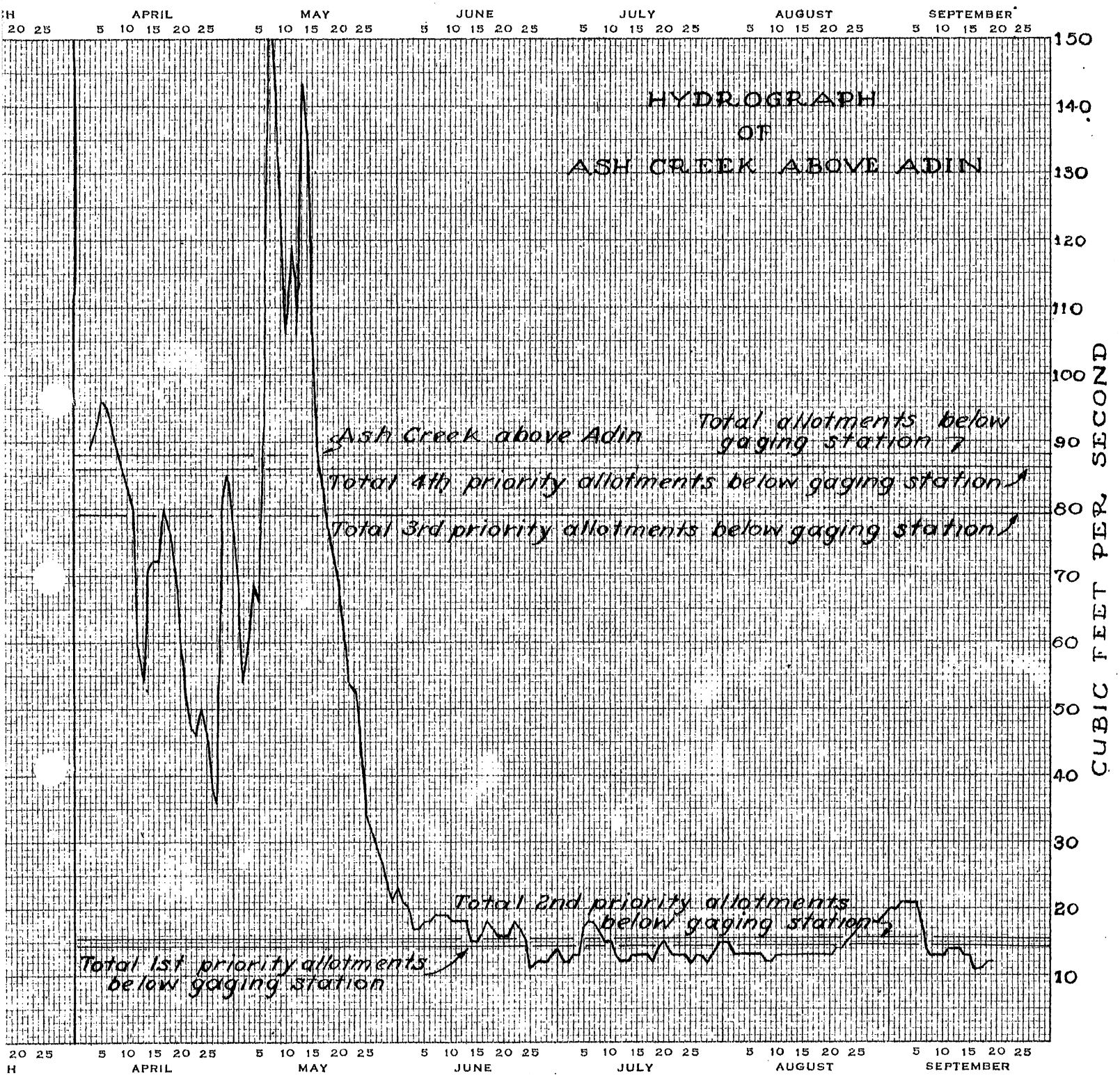

HYDROGRAPH
OF
PIT RIVER NEAR CANBY
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
DISCHARGE - CUBIC FEET PER SECOND
700
600
500
400
300
200
100
Pit River near Canby
(Table 1)
Total allotments
Total 2nd priority allotments
Total 1st priority allotments
Big Sage Releases

PLATE 2


HYDROGRAPH
OF
ASH CREEK ABOVE ADIN
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
CUBIC FEET PER SECOND
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
Ash Creek above Adin
Total allotments below gaging station 7
Total 4th priority allotments below gaging station
Total 3rd priority allotments below gaging station
Total 2nd priority allotments below gaging station
Total 1st priority allotments below gaging station