STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

EARL WARREN, Governor

C. H. PURCELL, Director of Public Works

A. D. EDMONSTON, State Engineer

REPORT ON WATERMASTER SERVICE

IN

SHASTA RIVER WATERMASTER SERVICE AREA
Siskiyou County, California

1949 Season

Sacramento, California
March, 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, hereby submit the within contained report entitled "Report on Watermaster Service in Shasta River Watermaster Service Area, Siskiyou County, California, 1949 Season".

/s/ L. C. JOPSON
Supervising Hydraulic Engineer

I, Gordon Zander, Principal Hydraulic Engineer, Division of Water Resources, Department of Public Works of the State of California, hereby approve the within contained report entitled "Report on Watermaster Service in Shasta River Watermaster Service Area, Siskiyou County, California, 1949 Season".

/s/ GORDON ZANDER
Principal Hydraulic Engineer

I, A. D. Edmonston, State Engineer and Chief of the Division of Water Resources, Department of Public Works of the State of California, hereby approve and adopt the within contained report entitled "Report on Watermaster Service in Shasta River Watermaster Service Area, Siskiyou County, California, 1949 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 day of .

DEPARTMENT OF PUBLIC WORKS

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

SEAL

ORGANIZATION

C. H. Purcell . . . . . Director of Public Works

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

P. H. Van Etten . . . . . Assistant State Engineer

Gordon Zander . . . . . Principal Hydraulic Engineer

This report was prepared under the direction of

L. C. JOPSON
Supervising Hydraulic Engineer

By

P. E. STEPHENSON . . . . . Senior Hydraulic Engineer

JOHN T. BLAIR . . . . . .Junior Civil Engineer

T. R. Merryweather
Administrative Assistant

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INTRODUCTION

The Shasta River Watermaster Service Area was created by order of the Division of Water Resources under date of March 1, 1933, to embrace the water rights on Shasta River and its tributaries in Siskiyou County, California, excepting certain tributaries and springs named in said order. The rights were established by decree of the Superior Court, Siskiyou County, California, in the Shasta River Adjudication proceeding No. 7035, entered on December 30, 1932. Subsequent to creation of the service area, the boundaries were changed to exclude the water rights on Willow Creek and its tributaries by order of the Division of Water Resources under date of December 30, 1935.

Watermaster service as provided in Part 4 of Division 2 of the Water Code was carried on throughout the 1949 season in accordance with the rights and priorities set forth in the decree. Such service extended over the period from April 1 to September 30. P. E. Stephenson, Watermaster, Shasta River Watermaster Service Area, administered the distribution of water throughout the period with John T. Blair, Deputy Watermaster, assisting in a portion of the area from June 13 to September 30.

WATER SUPPLY

Precipitation

Data on precipitation as compiled from records taken at the U.S. Weather Bureau Station at Yreka, are presented in Table 1.

The precipitation occurring at this station during the period from October 1, 1948 to September 30, 1949 was 73 per cent of the 34-year seasonal

average. About 79 per cent of the seasonal precipitation occurred during the period from October 1 to March 31, as compared with 33-year mean of 77 per cent.

The percentage relationship of the precipitation for the periods shown to the corresponding 34-year means are as follows:

Period	Per Cent
October 1, 1948 to September 30, 1949	73
October 1, 1948 to March 31, 1949	73
April 1 to June 30, 1949	82
July 1 to September 30, 1949	27

Snow Surveys

A record of the water content of the snow at Parks Creek, Sweetwater, North Fork of Sacramento and Mount Shasta snow survey courses as measured on or about April 1 of each year is presented in Table 2. The average water content of the snow at the four stations is considered representative of the snow pack on the Shasta River Watershed.

The average water content of snow on April 1, 1949 was 28.4 inches or about 93 per cent of the mean for the 13-year period of record. The precipitation at Yreka for the period October 1, 1948 to March 31, 1949, was about 73 per cent of the mean for the 34-year period of record.

A curve has been developed for forecasting the runoff of Shasta River from the data presented in Table 2 together with the portion of the measured runoff of Shasta River above the Edson-Foulke Yreka Ditch, which appears to be incidental to the melting snow. From the records it is indicated

that the average period during which this runoff will occur is directly related to the water content of the snow pack as shown in the following tabulation.

Water-Content of snow inches	Period during which Runoff occurs
over 44	April 1 to July 31
28 to 44	April 1 to June 30
16 to 28	April 1 to May 31

From the curve the water content of the snow on April 1, 1949 indicated that about 9,500 acre-feet of runoff would occur during April and May and June. The actual measured runoff incidental to melting snow totaled about 13,000 acre-feet and occurred during the period from April 1 to June 15.

A comparison of the measured runoff of Shasta River above the Edson-Foulke Yreka Ditch with the estimated runoff obtained by applying the average water content of the snow on April 1 to the above mentioned curve as shown in the following tabulation:

Year	Average Water-Content of snow in inches On April 1	Runoff in Acre-Feet	
		Measured	Estimated
1937	32.3	12,100**	11,900
1938	55.0	30,200***	30,200
1939	17.1	3,000*	3,000
1940	33.1	12,600**	12,500
1941	56.8	32,000***	31,800
1942	30.2	13,800**	10,500

Continued

Year	Average Water-Content of snow in inches on April 1	Run-off in Acre-Feet	
		Measured	Estimated
1943	25.7	7,100*	7,600
1944	16.8	3,600*	3,200
1945	26.7	9,000**	8,700
1946	33.9	11,600**	13,000
1947	21.6	4,210*	5,400
1948	17.5	14,000*	3,500
1949	28.4	13,000**	9,500

* April - May
** April - May - June
*** April - May - June - July

Stream Flow

Stream flow measuring stations equipped with water stage recorders were maintained during the period of watermaster service from about April 8 to September 30 on Shasta River above the Edson-Foulke Yreka Ditch; at Edgewood Bridge and near Montague; on Parks Creek above Edson-Foulke Yreka Ditch and at the 8-foot weir above the Robertson Ranch; and on Little Shasta River above the Harp Ditch. Records of discharge at these stations are presented in Tables 3 to 8, inclusive.

Intermittent measurements were made of the flows of Carrick and Cleland Springs during the season and are recorded in Tables 9 and 10, respectively.

Intermittent measurements were made at Big Springs to determine the water available for the Big Springs Irrigation District.

A summary comparing the seasonal runoff of various streams and springs in Shasta Valley for the 1948 Season with that of previous seasons is presented in Table 18 of this report.

DISTRIBUTION OF WATER

Distribution for the 1949 season followed the practices initiated during the past seasons with little modification. As a necessary adjunct to distribution, fourteen water-stage recorders were installed and operated during the season at critical points on streams and diversion conduits. These recorders were in addition to those mentioned heretofore and were located as follows:

Beaughan Creek below Long-Bell Mill Pond (2' Parshall Flume)

M. W. C. D. Parks Creek Canal at Head

Boles Creek below Enos Ditch

Carrick Creek at Carrick Ditch

Carrick Creek at Highway

Lake Dwinnell Reservoir in Outlet Tower

Soule Ditch at Head (4' weir)

Dennis Ditch at Head (4' weir)

Jones #1 and #2 Take-outs (4' weirs)

McKee Take-out (4'weir)

M. W. C. D. Shasta River Canal-McKee Check (9' weir)

M. W. C. D. Shasta River ~~Canal~~-Four Corners Road (10' weir)

M. W. C. D. Shasta River Canal-Little Shasta Road (12' weir)

Big Springs Lake at B. S. I. D. Pumping Station

The resulting distribution in each of the several sections, into which the stream system naturally divides, from the standpoint of water supply follows:

Shasta River above Confluence of Boles Creek

The water supply available to this area is the summation of the

flow of Shasta River above the Edson-Foulke Yreka Ditch, as set forth in Table 3, plus the combined discharge of the Dow Eddy Creek Ditch and the Hammond Scott Ditch diverting from Eddy Creek. This supply was sufficient to satisfy all irrigation demands until about June 17. Subsequent to that date there was insufficient water to meet the demands of the Edson-Foulke Yreka Ditch and those ditches diverting from Eddy Creek. A summary of the distribution for the 1949 Season is set forth in the following tabulation:

Month	Average Available Water Supply Cu. Ft. Per Sec.	Distribution in Per Cent of Priority Allotments		
		Hammond-Scott	Foulke, et al.	Dow
April	97	X	X	X
May	98	X	X	X
June	49	93	90	75
July	16	58	41	0
Aug.	7	23	20	0
Sept.	6	23	15	0

Shasta River Below Junction of Boles Creek and Boles Creek

During the 1949 season 100 per cent of allotments were available for all priorities including storage rights of the Montague Water Conservation District until about July 1. Subsequent to this date the water was distributed on an equal and correlative basis among water right owners down to and including the Mills Ranch. These ranches received about 100 per cent of allotments until about August 2. During the period from August 2 to September 25, an average of about 50 per cent of allotments was delivered to all ditches

except the Alexander Ditch which received 0.40 cubic feet per second for stock-watering purposes only. Subsequent to September 25 100 per cent of allotments were available.

Shasta River Below Lake Dwinnell Reservoir

Watermaster service on this section of the stream system involves the operation of the Montague Water Conservation District's Lake Dwinnell Reservoir during the irrigation season. The watermaster, in cooperation with the District, exercises control over deliveries from the reservoir to the District and to the water right owners below the reservoir; the latter group receives water from the reservoir in lieu of their natural flow rights.

Deliveries to the water right owners below the reservoir are made in accordance with the respective agreements between the District and the several water right owners. In general each agreement sets forth the total acre-feet to which the water right owner is entitled and provides that delivery from the reservoir shall be made upon demand of the water user. The watermaster receives and complies with all requests for such service and regulates the discharge from the reservoir and the various diversion ditches. Regulation of deliveries to the District is also handled by the watermaster; firstly, to avoid draining the reservoir through excessive delivery to the District before the "in lieu rights" are satisfied; and, secondly, to eliminate the confusion that would result under dual regulation.

Deliveries to the District commenced on April 7 and continued to about September 26. All demands of "in lieu rights" were satisfied and about 2,900 acre-feet remained in storage on October 1.

Summaries of the operation of the reservoir during the 1949 Season are set forth in the following tabulations:

Operation of Lake Dwinnel Reservoir during 1949 Season

Date	Storage On Hand Acre-Ft.	Storage Draft Acre-Ft.	Inflow to Reservoir Acre-Ft	Total Draft Acre-Ft.	Measured Release Acre-Ft.	Seepage and Evaporation Loss from Reservoir Acre-Feet
April 1	22,200					
May 1	22,900	+ 700	6,500	5,800	1,980	3,820
June 1	22,100	- 800	6,070	6,870	2,310	4,560
July 1	16,300	-5,800	2,230	8,030	3,030	5,000
Aug. 1	10,900	-5,400	0	5,400	3,690	1,710
Sept. 1	5,900	-5,000	0	5,000	3,860	1,140
Oct. 1	2,900	-3,000	0	3,000	2,530	470
Total		-19,300	14,800	34,100	17,400	16,700

Deliveries to Prior Right Owners Below Reservoir During 1949

Name of Water Right Owner	Allotment as per Agreement Acre-Feet	Amount delivered from Lake Dwinnell Reservoir for 1949 Season: Acre-Feet	Per Cent of Allot.
Leland Root	198	198	100
John Soule	692	692	100
Fred Dennis; K.K. Waters and Emily S. Waters	696	410*	60
McKee Company	1,200	1,200	100
Clarence C. Reed and Margaret R. Reed	596	0*	0

* Leakage from reservoir provided additional water sufficient to supply full irrigation demands.

Summaries of Deliveries from Lake Dwinnell Reservoir for 1949 Season

Month	Measured Release Acre-Feet	Deliveries in Acre-Feet		
		Prior Right	M.C.W.D.	Wastage
April	1,980	514	1,466	0
May	2,310	378	1,932	0
June	3,030	441	2,589	0
July	3,690	482	3,208	0
August	3,860	422	3,438	0
September	2,530	263	2,267	0
Totals	17,400	2,500	14,900	0

Additional data pertaining to Lake Dwinnell Reservoir are contained in Tables 11, 12, 13, 14, and 15.

Beaughan Creek

One measurement was made during the 1949 Season at the 8-foot rectangular weir (Long-Bell Upper Weir) located at the head of Beaughan Creek. The results are given below:

Date	Gage Height in Feet	Discharge in c.f.s.
6-30-49	0.375	6.00

This amount of water was sufficient to supply approximately 73 per cent of the total second priority allotments of 8.28 cubic feet per second. Distribution was made in accordance therewith during the 1949 season.

The Long-Bell Lumber Company diverts practically the entire flow of Beaughan Creek, including the downstream users' share of the available water, for use at its sawmill. After such use, the downstream users' share

of the water, which is 65 per cent of the measured flow at Long-Bell Upper Weir, must be returned to Beaughan Creek above the 2-foot Parshall Flume below the Long-Bell Mill Pond. Based upon the above measurement, the amount of water required at said Parshall Flume was 3.96 cubic feet per second. The daily discharge during the 1949 season was in excess of this amount at all times.

Carrick Creek

There was sufficient water available during the 1949 season to satisfy all irrigation requirements. The results of intermittent measurements of Carrick spring are set forth in Table 9.

Parks Creek

Distribution on Parks Creek for the 1949 season was in accordance with the practices followed during the past seasons. A summary of the distribution made during the 1949 season is set forth in the following tabulation:

Month	Measured Water Supply c.f.s.	Distribution in Per cent of Priority Allotments			
		Duke	Caledonia	Foulke, et al	Robertson
April	56.9	100	100	100	100
May	54.6	100	100	100	100
June	22.0	100	100	87	47
July	6.3	93	50	9	10
August	4.1	67	0	0	5
September	4.0	67	0	0	5

Records of the flow available for the above distribution are set forth in Tables 4 and 5.

The 21st and 24th priority rights of Frank H. Solus at the extreme lower end of Parks Creek received 100 per cent allotments throughout the season.

Big Springs

The water supply of Big Springs averaged about 31 cubic feet per second during April. The supply increased during May and June and an average of about 44 cubic feet per second was available during July, August and September.

The Big Springs Irrigation District diverted irrigation water through its pumping plant during the entire 1949 Season.

Clink Bros. operated their pumping plant nearly continuously from about April 15 to the end of the season. The pump was operated at its full capacity of 7.5 cubic feet per second. Ellis Louie diverted his full allotment of 10 cubic feet per second throughout the season.

Lower Shasta River

The water supply for this section of the stream was in excess of requirements at all times during the 1949 season. All ditches and pumping plants operated with a minimum of regulation during the season.

A record of the flow available to the water users below the Montague Bridge is presented in Table 7. Records of diversion by the Grenada Irrigation District and the Shasta River Water Association are submitted in Tables 16 and 17, respectively. A summary of these data is shown in the following tabulation:

Month	Average Diversion Grenada Irrigation District c.f.s.	Average Diversion Shasta River Water Association c.f.s.	Average Water Supply Below Montague Bridge c.f.s.
April	26.4	35.4	84
May	26.7	32.5	81
June	36.4	31.3	35
July	34.3	38.0	25
August	28.0	38.0	35
Sept.	16.0	25.7	107

Little Shasta River

Regulation was necessary on this stream beginning about July 7 when the available water supply was only sufficient to satisfy the full requirements of the first five priority classes.

The flow from Cleland Spring supplied enough supplementary flow to the natural flow of Little Shasta River to provide 100 per cent allotments throughout the season to the first four priority classes. The discharge of Cleland Spring during 1949 is shown in Table 10.

A summary of the distribution during the 1949 season is set forth in the following tabulation:

Month	Available Water Supply: Cubic Feet Per Second	Available Water Supply: Per Cent of total Allotments	Distribution in Per Cent of Priority Allotment: 1	2	3	4	5	6	7
April	51.6	66	100	100	100	100	100	100	0
May	38.4	49	100	100	100	100	100	30	0
June	20.9	27	100	100	100	100	100	0	0
July	9.5	12	100	100	100	100	15	0	0
August	6.0	5	100	100	100	100	10	0	0
Sept.	6.0	5	100	100	100	100	10	0	0

CHANGES IN OWNERSHIP OF LANDS AND WATER RIGHTS

The changes in ownership of lands and water rights which have occurred subsequent to filing "Statement for Shasta River Watermaster Service Area, County of Siskiyou, State of California for 1949" and which have been included in the statement for said watermaster service area for 1950 are listed in the following tabulation:

Tract No.	Name of Water Right Owner Appearing in 1949 Statement	Name of Water Right Owner as Changed in 1950 Statement	Amount of Water c.f.s.
5-65A	Browne, James H. and Browne, Alyce B.	Dougharty, Chester C. and Dougharty, Ida M.	2.35
---	The California Oregon Power Company, a corporation	Abandoned	Power 0.65
5-51	deSoza, George A.; in trust and deSoza, Annie	deSoza, George F. and deSoza, Alma Uvina	1.99
5-51	deSoza, George A., in trust and deSoza, Annie	deSoxa, Thomas and deSoza, Ruby Anna	1.98
5-51	deSoza, George A., in trust and deSoza, Annie	Hufford, Raymond and Hufford, Betty Lee	1.98
5-53	Foulke, Lewis M. and Foulke, Estate of Christine T.	Foulke, Lewis M.	1.45
5-53	Foulke, Lewis M. and Foulke, Estate of Christine T.	Foulke, Robert L. and Foulke, Ann M.	4.50
5-14, 5-28, 5-47	Hart, Raymond E. and Hart, Frederic P.	Hart, Raymond E. and Hart, Gladys I.	17.15
5-81	Hessig, J. H.	Hessig, Estate of J. H.	0.953
5-107	Kellogg, Frank A.; Hix, Mamie M.; and Martin, Adolph K.	Kellogg, Frank A.	1.80
5-16	Maggetti, James P. and Maggetti, Domencia M.	Maggetti, Peter J. and Maggetti, James A.	4.36
5-71	Nelson, Gus and Nelson, Ed.	Nelson, Gus V.	2.70
5-58	Rehling, Estate of Fred, and Brown, Orrin	Reed, Clarence C. and Reed, Margaret	2.40
5-63	Robinson, Roscoe E. and Robinson, Katherine	Epperson, Donald J. and Epperson, Elizabeth F.	4.80

TABLE 1

PRECIPITATION AT YREKA, SISKIYOU COUNTY - ELEVATION 2,625 FEET

Monthly, Seasonal and Average Amount in Inches

1938 - 1949

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Seas-onal
1938-39	.82	.80	1.38	2.15	1.23	1.51	.42	.45	.04	.35	.00	2.35	11.50
1939-40	.89	.00	6.12	2.36	5.13	3.52	.69	.32	.56	.09	.00	1.71	21.39
1940-41	1.34	.98	4.13	2.85	2.99	1.51	2.07	1.66	.95	.70	.54	.81	20.53
1941-42	1.01	1.84	8.01	1.88	2.65	.33	1.60	3.96	.30	.00	.13	.47	22.18
1942-43	.34	6.26	5.01	4.22	1.41	1.21	1.07	.66	1.07	.09	.01	.00	21.35
1943-44	2.24	1.17	.85	1.25	1.43	1.44	1.00	.73	.68	.60	.25	.22	11.86
1944-45	.45	2,86	1.15	.96	2.87	1.53	.69	4.06	.07	.13	.05	T	14.82
1945-46	2.06	2.86	4.55	2.25	1.99	1.13	.57	.89	.89	.41	T	.08	17.68
1946-47	1.07	3.15	.76	1.16	.93	1.84	.35	.73	1.13	.26	.85	.00	12.23
1947-48	2.46	.99	.74	5.35	1.36	1.56	2.50	.90	1.33	.29	2.54	.98	21.00
1948-49	.52	2.26	3.99	.39	1.76	.39	.32	1.29	.57	.00	.00	.30	11.79
34-Year Mean	1.16	2.42	2.87	2.27	2.29	1.37	1.03	.92	.69	.35	.24	.54	16.18

TABLE 2

SNOW SURVEY DATA

1937-1949

Year	Water Content of Snow as of April 1 - Inches				
	Parks Creek Elevation-6,500	Sweetwater Elevation-5,500	Mt. Shasta Elevation-8,000	No. Fk. Sacramento Elevation-6,800	Average
1937	31.8	18.4	43.4	35.5	32.3
1938	33.3	27.0	120.4	39.1	55.0
1939	24.8	10.5	23.3	9.9	17.1
1940	36.3	6.3	67.4	22.2	33.1
1941	54.6	18.8	108.6	45.3	56.8
1942	33.1	12.7	52.7	22.5	30.2
1943	34.2	11.8	41.5	15.4	25.7
1944	18.2	7.7	28.6	12.6	16.8
1945	29.3	10.9	46.7	19.9	26.7
1946	42.8	14.2	53.4	25.4	33.9
1947	29.7	6.1	37.2	13.4	21.6
1948	17.5	5.9	36.2	10.2	17.5
1949	33.4	17.7	34.6	28.1	28.4
13 Year Mean	32.2	13.0	53.4	23.0	30.4

TABLE 3

Daily Discharge in Cubic Feet per Second
SHASTA RIVER ABOVE EDSON FOULKE YREKA DITCH
APRIL 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1	40	45	93	14	10	3
2	40	78	72	13	10	3
3	40	72	66	12	9	3
4	40	70	60	12	8	4
5	50	60	58	18	8	4
6	54	52	54	18	8	4
7	62	50	66	16	7	4
8	75	58	60	16	7	4
9	77	72	58	16	7	5
10	93	93	54	15	7	5
11	116	110	50	14	6	4
12	120	142	54	12	6	4
13	100	168	60	12	6	4
14	100	155	52	12	5	4
15	98	155	47	12	5	4
16	110	142	38	12	5	4
17	120	114	35	11	6	4
18	130	100	28	10	6	4
19	114	82	27	10	3	4
20	100	78	27	10	3	4
21	100	72	23	10	3	4
22	102	60	22	10	3	4
23	110	54	21	10	3	4
24	100	60	21	10	3	4
25	107	60	22	10	3	5
26	93	66	23	10	3	6
27	93	60	22	10	3	6
28	96	78	21	10	3	6
29	54	110	21	10	3	6
30	60	100	15	10	3	6
31		93		10	3	
Total Sec. Feet Days	2,594	2,709	1,270	375	165	130
Mean Sec. Feet	86.5	87.4	42.3	12.1	5.3	4.3
Runoff in Ac. Ft.	5,150	5,370	2,520	740	330	260

Discharge during 183 day period - 14,400 acre-feet.

TABLE 4

Daily Discharge in Cubic Feet per Second
PARKS CREEK ABOVE DUKE NORTH DITCH
APRIL 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1	21	66	46	10	5	4
2	21	64	38	10	5	4
3	21	61	33	10	5	4
4	21	51	31	10	5	4
5	23	47	35	10	4	4
6	46	43	34	10	4	4
7	46	37	33	9	4	4
8	46	45	35	10	4	4
9	47	62	26	9	4	4
10	51	75	24	8	4	4
11	71	75	23	8	4	4
12	79	79	21	6	4	4
13	71	79	19	6	4	4
14	71	79	19	6	4	4
15	71	75	19	6	4	4
16	75	71	19	6	4	4
17	89	63	18	6	4	4
18	89	57	17	6	4	4
19	79	47	18	5	4	4
20	71	45	18	5	4	4
21	63	45	17	5	4	4
22	64	44	16	5	4	4
23	62	44	16	5	4	4
24	62	38	14	5	4	4
25	64	38	13	5	4	4
26	62	41	12	5	4	4
27	38	38	12	5	4	4
28	51	35	12	5	4	4
29	66	51	11	5	4	4
30	66	51	10	5	4	4
31		47		5	4	
Total Sec. Feet Days	1,707	1,693	659	211	128	120
Mean Sec. Feet	56.9	54.6	22.0	6.8	4.1	4.0
Runoff in Ac. Ft.	3,390	3,360	1,310	420	250	240

Discharge during period - 8,970 acre-feet.

TABLE 5

Daily Discharge in Cubic Feet per Second

PARKS CREEK AT ROBERTSON WEIR

JUNE 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1			16	3.5	1.1	0.6
2			16	3.0	.9	.8
3			16	2.5	.9	.8
4			16	2.6	.9	.7
5			16	2.5	.9	.4
6			16	2.6	.9	.4
7			16	3.1	.9	.4
8			14	2.9	.9	.4
9			12	2.2	.9	.4
10			7	1.7	.9	.4
11			6	.9	.8	.4
12			6	1.0	.8	.7
13			5	1.0	.8	.7
14			3.9	1.0	.8	.7
15	Surplus	Surplus	3.0	1.0	.8	.7
16			2.6	1.0	.4	.7
17			2.3	1.0	.4	.7
18			2.2	1.1	.4	.8
19			2.5	1.1	.4	.9
20			4.1	1.3	.4	1.1
21			6.3	1.3	.4	1.4
22			5.4	1.4	.4	1.4
23			4.7	1.3	.4	1.4
24			3.7	1.1	.4	1.4
25			2.9	1.0	.5	1.4
26			3.3	1.0	.5	1.4
27			3.5	1.4	.5	1.4
28			3.9	1.4	.5	1.4
29			3.9	1.3	.5	1.4
30			3.7	1.3	.5	1.4
31				1.3	.5	
Total Sec. Ft. Days			223.9	50.8	20.3	26.7
Mean Sec. Feet			7.5	1.6	0.7	0.9
Total Acre Feet			444	101	40	53

Total Acre-Feet 122 day period - 638

TABLE 6

Daily Discharge in Cubic Feet per Second
SHASTA RIVER AT EDGEWOOD BRIDGE
APRIL 1 to SEPTEMBER 30, 1949

Day	April	May	June	July	August	Sept.
1	70	70	120	10	7	6
2	70	110	90	10	6	6
3	70	90	60	10	6	6
4	68	80	60	9	5	6
5	74	74	60	8	5	6
6	80	66	50	8	5	5
7	80	66	70	9	5	5
8	76	67	46	9	6	6
9	84	124	49	9	6	7
10	100	138	48	9	6	6
11	130	154	49	9	7	6
12	153	154	42	9	7	7
13	130	154	41	9	7	7
14	96	154	35	9	7	6
15	96	154	31	9	6	6
16	138	154	26	8	6	6
17	158	138	24	8	6	6
18	164	110	22	8	6	7
19	153	94	20	8	6	7
20	152	75	22	8	6	6
21	137	74	18	8	6	6
22	136	66	24	8	6	7
23	154	64	25	8	6	7
24	136	58	12	7	6	7
25	110	57	12	7	6	12
26	102	57	12	7	6	12
27	98	52	12	7	6	12
28	104	51	10	7	6	12
29	90	98	17	7	6	12
30	70	138	16	7	7	12
31		120		7	6	
Total Sec. Feet Days	3,279	3,060	1,123	256	188	222
Mean Sec. Feet	109.3	98.8	37.4	8.3	6.1	7.4
Runoff in Ac. Ft.	6,500	6,070	2,230	510	370	440

Discharge during 183-day period - 16,100 acre-feet.

TABLE 7

Daily Discharge in Cubic Feet per Second
SHASTA RIVER NEAR MONTAGUE
APRIL 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1	110	89	32	32	19	59
2	110	103	38	27	32	85
3	110	103	36	23	37	65
4	111	107	37	30	26	65
5	105	100	39	37	24	70
6	107	96	36	44	44	89
7	111	94	32	29	61	115
8	107	89	38	21	56	130
9	100	89	42	25	32	115
10	94	89	38	28	34	103
11	89	89	36	30	44	100
12	86	82	32	28	32	102
13	82	103	38	23	32	96
14	79	111	28	22	28	102
15	72	102	32	21	23	93
16	70	89	30	21	23	102
17	67	94	28	21	23	121
18	65	94	33	21	28	122
19	62	94	40	21	32	122
20	59	84	38	21	32	121
21	96	75	40	21	38	130
22	98	67	54	21	39	122
23	89	62	42	26	38	122
24	86	67	34	32	38	122
25	59	64	30	24	38	120
26	47	67	29	24	44	120
27	42	59	28	23	44	119
28	62	44	27	20	32	122
29	69	38	20	18	44	122
30	75	38	36	17	30	122
31		32		16	31	
Total Sec. Feet Days	2,519	2,514	1,045	767	1,078	3,198
Mean Sec. Feet	84	81	35	25	35	107
Runoff in Ac. Ft.	5,000	4,990	2,070	1,520	2,140	6,340

Discharge during 183 - day period - 23,100 acre-feet.

TABLE 8

Daily Discharge in Cubic Feet per Second
LITTLE SHASTA RIVER ABOVE HARP DITCH
APRIL 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1	50	58	44	12	7	6
2	50	52	37	12	7	6
3	50	48	33	12	7	6
4	50	42	29	12	7	6
5	52	37	28	11	7	6
6	47	34	27	11	7	6
7	35	33	27	11	7	6
8	37	35	26	10	7	6
9	52	35	23	10	6	7
10	64	37	21	10	6	6
11	70	40	21	10	6	6
12	76	38	21	10	6	6
13	60	40	20	10	6	6
14	52	42	17	9	6	6
15	52	44	17	9	6	6
16	60	42	16	9	6	6
17	58	42	16	9	6	6
18	64	37	16	8	6	6
19	52	37	17	9	6	6
20	47	42	17	9	6	6
21	52	37	16	9	6	6
22	50	33	17	9	6	6
23	48	29	17	9	6	6
24	47	34	17	8	6	6
25	46	30	17	8	6	6
26	48	29	16	9	5	6
27	44	28	14	9	5	6
28	47	28	13	9	5	6
29	45	37	13	8	6	6
30	42	44	13	7	6	6
31		44		7	6	
Total Sec. Feet Days	1,547	1,188	626	295	191	180
Mean Sec. Feet	51.6	38.4	20.9	9.5	6.2	6.0
Runoff in Ac.Ft.	3,070	2,360	1,240	585	379	357

Discharge during period - 7,970 acre-feet.

TABLE 9

Discharge in Cubic Feet per Second
CARRICK SPRING
APRIL 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1					6.5	
2						
3		6.9	6.3			
4						6.5
5	6.9					
6						
7				6.4		
8						
9					6.5	
10		6.8				
11						
12	6.9					
13						6.5
14			6.2			
15					6.5	
16						
17						
18		6.8				
19				6.5		6.5
20						
21						
22					6.5	
23	6.9					
24						
25						6.5
26				6.5		
27		6.8				
28			6.5			
29					6.5	
30						
31						
Mean Sec. Ft.	6.9	6.8	6.3	6.5	6.5	6.5
Runoff in ac. ft.	410	420	370	390	400	387

Discharge during 183-day period - 2,380 acre-feet.

TABLE 10

Discharge in Cubic Feet per Second
CLELAND SPRING
APRIL 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1						
2						8.2
3		8.7				
4						
5						8.2
6				8.6		
7	8.7					
8					8.5	
9			8.7			
10						
11						
12						
13						
14						
15					8.5	8.2
16						
17						
18						
19			8.7			
20						
21						
22	8.7		8.7	8.7	8.5	
23						
24						8.6
25				8.6		
26						
27						
28		8.7				
29						
30						
31						
Mean Second-Feet	8.7	8.7	8.7	8.6	8.5	8.3
Runoff in Ac. Ft.	520	540	520	530	520	490

Discharge during 183-day period - 3,070 acre-feet.

TABLE 11

Daily Discharge in Cubic Feet per Second
M.W.C.D. PARKS CREEK CANAL
APRIL 6 TO JUNE 2, 1949

Day	April	May	June	July	August	September
1		30	10			
2		30	5			
3		25				
4		15				
5		10				
6	10	10				
7	10	5				
8	10	10				
9	10	25				
10	15	40				
11	35	40				
12	35	45				
13	35	45				
14	35	45		NO DIVERSION	NO DIVERSION	NO DIVERSION
15	35	40				
16	40	35				
17	50	25				
18	50	20				
19	45	10				
20	35	10				
21	25	10				
22	25	10				
23	25	10				
24	25	5				
25	25	5				
26	25	5				
27	10	5				
28	15	5				
29	30	10				
30	30	10				
31		10				
Total Sec. Feet Days	685	600	15			
Mean Sec. Feet	27.4	19.4	7.5			
Runoff in Ac. Ft.	1,360	1,190	30			

Discharge during 58-day period - 2,580 acre-feet.

TABLE 12

Daily Storage on Hand in Acre-Feet
LAKE DWINNELL RESERVOIR
APRIL 1 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1	22,200	22,900	22,100	16,300	10,900	5,900
2	22,200	22,900	22,000	16,300	10,700	5,700
3	22,200	22,900	21,900	16,300	10,600	5,500
4	22,200	22,900	21,800	16,300	10,400	5,300
5	22,200	22,900	21,700	16,300	10,200	5,100
6	22,200	22,900	21,600	16,100	10,000	4,900
7	22,200	22,900	21,500	15,900	9,800	4,800
8	22,200	22,900	21,400	15,700	9,600	4,700
9	22,200	22,900	21,300	15,500	9,400	4,600
10	22,200	22,900	21,200	15,300	9,200	4,500
11	22,200	22,900	21,000	15,000	9,100	4,300
12	22,200	22,900	20,800	14,800	8,800	4,200
13	22,200	22,900	20,600	14,600	8,700	4,100
14	22,200	22,900	20,400	14,400	8,500	4,000
15	22,200	22,900	20,200	14,200	8,400	3,900
16	22,300	22,900	19,900	14,000	8,300	3,800
17	22,300	22,900	19,600	13,900	8,100	3,700
18	22,400	22,900	19,300	13,800	7,900	3,600
19	22,500	22,800	19,000	13,800	7,800	3,500
20	22,600	22,800	18,700	13,800	7,600	3,400
21	22,700	22,700	18,400	13,800	7,500	3,300
22	22,800	22,700	18,100	13,600	7,300	3,200
23	22,900	22,600	17,800	13,400	7,200	3,100
24	22,900	22,600	17,500	13,200	7,100	3,000
25	22,900	22,600	17,200	13,000	7,000	2,900
26	22,900	22,500	16,900	12,700	6,800	2,900
27	22,900	22,500	16,600	12,400	6,600	2,900
28	22,900	22,400	16,400	12,100	6,400	2,900
29	22,900	22,400	16,300	11,800	6,300	2,900
30	22,900	22,300	16,300	11,500	6,200	2,900
31		22,200		11,200	6,000	

TABLE 13

Daily Release in Cubic Feet per Second
LAKE DWINNELL RESERVOIR
APRIL 6 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1		47	25	35	62	60
2		48	25	35	62	60
3		51	20	57	57	59
4		51	15	57	57	57
5		51	15	57	57	57
6	9	51	12	58	57	55
7	26	51	8	60	57	55
8	35	51	19	62	58	54
9	40	46	28	64	58	54
10	45	41	40	64	58	54
11	45	41	51	65	63	54
12	50	41	51	67	67	54
13	55	41	57	69	67	54
14	55	41	63	69	67	54
15	55	41	66	69	68	40
16	55	23	68	69	68	40
17	55	12	68	69	68	40
18	44	20	68	62	68	40
19	32	24	65	62	67	45
20	32	28	58	62	66	45
21	32	28	55	62	66	45
22	32	28	55	66	65	45
23	32	29	55	24	65	45
24	32	30	55	24	65	45
25	16	30	54	65	65	45
26	25	30	54	65	63	22
27	50	40	55	70	62	0
28	50	50	57	70	62	0
29	50	45	57	70	61	0
30	50	32	57	70	61	0
31		25		70	61	
Total Sec. Feet Days	1,002	1,167	1,376	1,866	1,948	1,276
Release Acre-Feet	1,990	2,310	2,720	3,700	3,860	2,530

Release during 178-day period - 17,110 acre-feet

TABLE 14

Summary of Deliveries to Prior Right Owners From
LAKE DWINNELL RESERVOIR
1929 - 1949

Year	Deliveries in Acre-Feet						Deliveries in percent of allotment
	Root	Soule	Dennis et al.	McKee	Reed et al.*	Total	
1929	—	—	—	—	—	—	—
1930	190	485	465	923	—	2060	61
1931	198	473	473	909	—	2050	61
1932	—	—	—	—	—	—	—
1933	198	692	687	1130	101	2210	83
1934	159	692	461	922	159	2390	71
1935	198	609	600	1075	234	2720	80
1936	198	637	527	1195	202	2759	82
1937	198	633	489	1200	120	2690	80
1938	198	—	—	1073	—	1271	38
1939	198	692	687	1138	308	3023	90
1940	198	471	562	1105	0	2336	69
1941	198	561	631	1200	51	2641	76
1942	198	344	618	1200	0	2360	70
1943	198	509	443	1200	0	2350	70
1944	198	692	460	1200	0	2550	76
1945	198	591	387	1050	0	2220	65
1946	198	484	486	1094	0	2262	67
1947	198	692	565	1147	0	2602	77
1948	198	511	386	1005	0	2100	62
1949	198	692	411	1192	0	2493	75

1929 - Record of deliveries missing.
1930-1931 - Record of deliveries to Terwilliger missing
1932 - Record of deliveries missing
1938 - Soule, Dennis and Terwilliger had sufficient water from reservoir seepage to supply irrigation demands.
1940 to 1949, inclusive) Reservoir seepage supplied additional water for Soule, Dennis and Terwilliger ranches.

*Accretions to the flow of Shasta River through the Dennis Ranch provide additional water, which is available for diversion by the Terwilliger Ranch, in amounts more than sufficient to make up the shortage in the amounts of water delivered from the reservoir.

TABLE 15

RECORD OF OPERATION OF LAKE DWINNELL RESERVOIR - 1929 TO 1949

Year	Reservoir Storage on April 1: A.F.	Inflow Apr. 1 to Sept. 30 A. F.	Total Available Water Supply A. F.	Maximum Storage in Reservoir A. F.	Maximum Storage in Reservoir Date	Delivery from Reservoir: M.W.C.D. A. F.	M.W.C.D. Period	Prior Rights A. F.	Prior Rights Period	Total A. F.	Storage in Res. when Delivery to MWCD Ceased A. F.	Seepage and Evaporation Loss A. F.
1929				4,500		No Rcd.		No Rcd.				
1930				10,500	Mar. 14	5,000	5/5/30-7/4/30	2,060	4/23/30-9/5/30	7,060	2,800	
1931				4,250	Apr. 4	0		2,050	4/1/41-7/25/31	2,050	2,800	
1932	5,500			5,500	Mar. 20	2,000	5/15/32-6/15/32	No Rcd.		2,000	2,000	
1933	5,200			6,500	May 3	4,750	4/21/33-7/16/33	2,810	4/10/33-9/3/33	7,560	2,200	
1934	4,850			5,000	Apr. 5	1,500	4/10/34-4/23/34	2,390	4/5/34-7/22/34	3,890	2,800	
1935	5,000	4,620	9,620	5,700	May 10	2,700	5/10/34-6/2/35	2,720	4/9/35-8/11/35	5,420	3,000	4,200
1936	5,460	4,720	10,180	6,020	Mar. 3	1,560	4/14/36-5/20/36	2,760	4/14/36-8/11/36	4,320	3,250	5,860
1937	5,940	14,040	19,980	9,800	May 6	7,360	5/5/37-9/15/37	2,690	4/26/37-9/9/37	10,050	0	9,930
1938	31,600	28,440	60,040	32,100	May 3	23,910b	5/1/38-9/30/38	1,270	5/1/38-9/30/38	25,180	2,850	32,010
1939	7,350	1,210	8,560	7,350	Apr. 1	2,350	4/9/39-5/5/39	3,020	4/4/39-8/10/39	5,370	3,525	3,190
1940	27,350	18,000	45,350	28,000	Apr. 6	18,570c	4/22/40-9/18/40	2,340	4/17/40-9/30/40	20,900	2,540	22,040
1941	31,680	48,060	79,740	34,400	Apr. 4	36,490d	4/1/41-9/30/41	2,640	5/1/41-9/30/41	39,130	13,600	27,010
1942	25,700	20,600	46,300	29,100	June 6	12,940e	4/13/42-9/30/42	2,360	4/13/42-9/30/42	15,300	10,000	21,000
1943	33,100	12,880	45,980	33,400	Apr. 5	19,770f	4/13/43-9/30/43	2,350	4/15/43-9/30/43	22,120	4,900	18,960
1944	14,200	5,370	19,570	14,200	Apr. 1	9,030	4/17/44-9/30/44	2,550	4/17/44-9/30/44	11,580	90	7,900
1945	17,550	12,450	30,000	18,600	June 11	9,840	4/13/45-9/30/45	2,220	4/13/45-9/30/45	12,060	2,500	15,400
1946	24,400	11,600	36,000	25,100	May 20	11,640	4/2/46-9/30/46	2,260	4/19/46-9/30/46	13,900	5,400	16,600
1947	17,800	3,600	21,400	17,800	Apr. 1	10,660	4/16/47-9/30/47	2,600	4/10/47-9/30/47	13,260	0	8,150
1948	12,400	25,680	38,080	27,200	June 21	9,030	4/21/48-9/30/48	2,100	4/21/48-9/30/48	11,130	10,200	16,750
1949	22,200	14,800	37,000	22,900	Apr. 23	14,900	4/7/49-9/26/49	2,500	4/6/49-9/30/49	17,400	2,900	16,700

TABLE 15 (Cont'd)

RECORD OF OPERATION OF LAKE DWINNELL RESERVOIR * 1929 to 1949

(a) In 1929 the District used water only for puddling its canal.

(b) Includes 831 acre-feet wasted through outlet to prevent increase in reservoir level and 9,980 acre-feet delivered by District to Stallcup and Big Springs Irrigation District.

(c) Includes 2,710 acre-feet wasted in April to maintain reservoir level and deliveries through the entire season to Big Springs Irrigation District.

(d) Includes 21,600 acre-feet wasted in April and May through outlet to prevent increase in reservoir level and 5,970 acre-feet delivered to Big Springs Irrigation District.

(e) Includes 3,390 acre-feet delivered to Big Springs Irrigation District.

(f) Includes 10,000 acre-feet wasted in April through outlet to maintain safe water-surface elevation in reservoir.

TABLE 16

Daily Discharge in Cubic Feet per Second
GRENADA IRRIGATION DISTRICT PUMPING PLANT
APRIL 9 TO SEPTEMBER 4, 1949

Day	April	May	June	July	August	September
1		34	0	34	34	17
2	NO	34	0	34	34	17
3		34	0	34	34	17
4	DISCHARGE	34	0	27	34	12
5		34	0	27	34	
6		34	0	27	17	
7		34	0	37	0	
8		34	21	34	25	
9	22	35	38	34	34	
10	34	35	38	34	34	
11	34	34	38	34	34	
12	34	34	38	34	34	NO
13	34	37	38	34	17	
14	34	37	38	34	17	
15	34	37	38	34	17	
16	28	37	38	34	17	
17	34	37	38	34	6	
18	34	37	38	17	22	
19	34	37	38	0	22	
20	34	37	38	35	22	
21	17	37	38	38	17	
22	17	37	38	38	34	DISCHARGE
23	17	21	38	38	34	
24	17	19	38	38	34	
25	17	7	38	38	34	
26	17	0	38	38	34	
27	17	0	38	38	34	
28	17	0	38	38	34	
29	22	0	28	34	34	
30	34	0	28	34	34	
31		0		0	25	
Total Sec. Feet Days	*582	827	837	984	836	**63
Mean Sec. Feet	26.4	26.7	27.9	31.7	28.0	**16
Runoff Acre-Feet	1,154	1,640	1,660	1,950	1,658	125

* 22-day period
** 4-day period

Discharge during 148-day period - 8,200 acre-feet.

TABLE 17

Daily Discharge in Cubic Feet per Second
SHASTA RIVER WATER ASSOCIATION PUMPING PLANT
APRIL 8 TO SEPTEMBER 30, 1949

Day	April	May	June	July	August	September
1	NO	38	0	38	38	38
2		38	0	38	38	38
3		38	0	38	38	38
4	DISCHARGE	38	0	38	38	37
5		38	0	38	38	38
6		38	26	38	38	38
7		38	38	38	38	15
8	24	38	38	38	38	4
9	38	38	38	38	38	18
10	38	38	38	38	38	38
11	38	38	38	38	38	31
12	38	32	38	38	38	27
13	38	27	38	38	38	31
14	38	28	38	38	38	38
15	38	38	38	38	38	38
16	38	38	38	38	38	29
17	18	38	38	38	38	38
18	28	38	38	38	38	38
19	26	38	38	38	38	38
20	38	38	38	38	38	38
21	38	38	38	38	38	33
22	38	38	38	38	38	11
23	34	38	38	38	38	11
24	38	38	38	38	38	11
25	38	38	38	38	38	8
26	38	38	38	38	38	7
27	38	38	38	38	38	11
28	38	38	38	38	38	9
29	38	38	38	38	38	11
30	38	0	38	38	38	11
31		0		38	38	
Total Sec. Feet Days	*814	1,075	938	1,178	1,178	771
Mean Sec. Feet	* 35.4	32.5	31.3	38	38	25.7
Runoff Acre-Feet	*1,610	2,130	1,860	2,340	2,340	1,530

* 23 day period.
Discharge during 176-day period - 9,930 acre-feet.

TABLE 18

SUMMARY OF RUNOFF IN ACRE-FEET
OF STREAMS IN SHASTA VALLEY

APRIL 1 TO SEPTEMBER 30, 1949

Name of Stream	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949
Shasta River Above Yreka Ditch	4,090	14,800	33,300	* 13,800	** 10,900	6,600	11,000	13,500	6,690	16,320	14,400
Parks Creek Above Duke North Ditch	4,490	16,000	18,100	* 9,880	** 8,800	5,670	9,720	10,540	5,770	** 11,870	8,970
Little Shasta River Above Harp Ditch	3,270	4,160	4,480	* 5,570	** 10,500	2,840	6,100	7,080	2,110	** 12,700	7,970
Beaughan Spring	1,810	1,810	2,200	2,140	2,100	2,150	2,450	2,450	2,150	2,214	2,180
Big Spring	12,100	—	—	*** 15,600	14,800	14,500	14,400	14,600	7,690	14,816	14,800
Carrick Spring	2,000	2,070	2,700	2,700	2,530	2,450	2,540	2,530	2,510	2,450	2,380
Cleland Spring	3,060	3,070	3,170	3,160	3,420	3,840	3,290	3,300	3,270	3,200	3,070

* Does not include April Runoff

** April partly estimated

*** Estimated from measurements made during July, August and September.