STATE OF CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RIGHTS

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REPORT ON WATER MASTER SERVICE

On

LITTLE SHASTA RIVER AND TRIBUTARIES

SISKIYOU COUNTY, CALIFORNIA

DURING SEASON OF 1928.

oOo

By

A. S. Wheeler, Water Master

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Sacramento, California

February 1929

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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
SACRAMENTO

DIVISION OF WATER RIGHTS
401 PUBLIC WORKS BUILDING

February , 1929

Mr. Harold Conkling,
Chief of the Division of Water Rights,
Sacramento, California

Dear Sir:

ATTENTION: Mr. Gordon Zander, Hydraulic Engineer

Herewith is submitted a report covering the water master service on Little Shasta River in Siskiyou County, California, during the season of 1928.

This report includes a description of the regulation and distribution of the waters of Little Shasta River and its tributaries in accordance with the provisions of the Stipulation and Agreement entered into by the various water users on March 27, 1927, and an agreement for water master service entered into on June 15, 1928, and a discussion of the results that were accomplished.

Run-off records and other pertinent data are included together with a financial statement showing the cost of water master service and the sources from which such cost was met.

Respectfully submitted,

Water Master

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REPORT ON WATER MASTER SERVICE

ON

LITTLE SHASTA RIVER AND TRIBUTARIES

SISKIYOU COUNTY, CALIFORNIA

DURING SEASON OF 1928.

INTRODUCTION

A brief history of the case involving a determination of the relative rights of the various water users from Little Shasta River and its tributaries, has been given in the "Report on Water Supply and Use of Water from Shasta River and Tributaries", dated July 1, 1925, prepared by Harrison Smitherum, Assistant Hydraulic Engineer, under the general direction of Gordon Zander, Hydraulic Engineer.

Subsequent to the above mentioned report, a conference of the water users on Little Shasta River and its tributaries was held at Little Shasta on June 15, 1928, at which time an agreement was entered into by the water users providing for water master service and a schedule for the distribution of the waters of Little Shasta River and its tributaries in accordance with the "Stipulation and Agreement in the Matter of the Determination of the Relative Rights, Based Upon Prior Appropriations, of the Various Claimants to the Waters of Shasta River and its Tributaries, in Siskiyou County, California" entered into on March 27, 1927.

The water users at the meeting above referred to also appointed E. C. Hart, J. C. Martin and D. C. Earhart to act as a committee to represent them in their dealings with the Division of Water Rights.

The agreement of June 15, 1928, provides for water master service until such time as the court decree has been entered in the Shasta River

Adjudication Proceedings now pending before the Superior Court of Siskiyou County.

The stipulation and agreement of March 27, 1927, further provided that the amount of water allocated to each ditch should be measured at the point of diversion thereof from the stream system.

The request for water master service during 1928 was prompted by the shortage in the supply of water and by the desire on the part of the water users to determine the practicability of water master service and the schedule of distribution of water agreed upon.

The shortage of the supply during the 1928 period of water master service eliminated entirely any consideration of the sixth and seventh priorities as set forth in the schedule above referred to and consideration of the second priorities was eliminated due to the fact that this portion of the schedule of allotments covered several springs which did not contribute to the flow of Little Shasta River and several ditches which were not used during the 1928 irrigation season together with a small use in the mountains near the head of the river the regulation of which would have had no appreciable effect on the supply of water available to the main irrigated area of the stream system.

In view of the above the balance of this report deals entirely with the distribution of the supply of water available from Cleland Springs and from the Little Shasta River below a point just above the intake to the Harp Ditch.

The foregoing also eliminated a consideration of a portion of the first priorities as set forth in the schedule.

DISTRIBUTION OF WATER

(1) Functions of Water Master

The functions of the water master included in the distribution of the waters of Little Shasta River and its tributaries in accordance with the agreement described in the "Introduction" to this report and the collection of hydrographic and other pertinent data.

The water master service commenced in the field on June 27, 1928, and during the first three weeks thereof, measuring devices were installed in the several ditches for the purpose of providing accurate means of regulating the distribution of the available supply of water. The measuring devices installed in the ditches consisted of $1\frac{1}{2}$ foot rectangular weirs with the exception of the Terwilliger Main Cleland Ditch in which a 3 foot rectangular weir was installed.

In order to determine the net available supply a gauging station was established on Little Shasta River above the Harp Ditch at which point an acoustic current meter was used in connection with a staff gauge and automatic water stage recorder.

The net supply from Cleland Springs was determined by use of the 3 foot weir previously described and a 4 foot concrete rectangular weir installed by Mr. Martin in the Martin & Davis Ditch.

Occasional return flow measurements were made by means of an acoustic current meter on Little Shasta River just below the Terwilliger Estate which was the only place any return flow was experienced in the main irrigated areas. This return flow was found to exceed channel losses in the river at all times and consequently such losses were not considered with respect to the distribution of the available supply below the point of return flow.

During the period when the available supply was almost constant the probable percentage of allotments that could be delivered were calculated every seven days and the several ditches regulated in accordance therewith.

Records were kept of the water supply from June 29 to September 28, 1928, and the distribution thereof, from July 1st. to September 30, 1928.

(2) - Allotments Compared with Water Supply

As explained in the introduction to this report a portion of the first and all of the second, sixth and seventh priorities were not considered in the allocation of the available supply of water during the period of water master service for 1928.

The priorities which were taken into consideration totaled 35.30 second feet with the available supply ranging from 37% to 45% of this amount as illustrated in Plate I of this report and accordingly a careful distribution of the water was necessary.

(3) - Efficiency of Distribution

A fair degree of efficiency in the distribution of the available supply in accordance with the terms of the agreement was experienced, however, the lack of permanent diversion structures at the heads of the ditches operated to a certain extent against an accurate distribution.

The cooperation of the individual water users, particularly the upper users, was an important factor towards a fair distribution and their committee, appointed to represent them, was of great assistance at all times.

RUN-OFF RECORDS

And

RETURN FLOW

The usual and customary methods of securing run-off records were used and, as previously explained, these records are confined to the Little Shasta River above the Harp Ditch and to Cleland Springs.

The results from the data collected, are given in Tables 2 and 3 of this report.

Irrigation operations on the Terwilliger Estate supplied the only return flow experienced and occasional measurements of the flow in Little Shasta River below the Estate showed that the average return flow exceeded channel losses in the river by 0.11 second foot and accordingly the necessity of considering such losses was eliminated.

The hydrographs on Plate I of this report graphically show the combined net discharge of the sources considered during 1928 compared with the same during 1922 and the total allotments.

It will be noted in Table 3 that the discharge of Cleland Springs increased approximately one cubic foot per second during the latter part of August. In this connection it may be stated that for a period of about four weeks during July and August very hot weather was experienced accompanied by an unusual melting of the glaciers on the slopes of Mt. Shasta and although these glaciers are about twenty-five miles away it would appear that their action had a direct effect on Cleland Springs and other springs emerging from the lava beds of Little Shasta Valley.

PRECIPITATION

The precipitation at Mt. Shasta (Sisson) and at Montague for the seasonal year from October 1, 1927 to September 30, 1928 is compared with the average mean precipitation in Table 1 of this report.

As is shown in this table the total precipitation for the seasonal year of 1927-28 is 88.2% of the total average mean and 91% of this occurred between October 1, 1927 and May 1, 1928.

It will be further observed that during the balance of the seasonal year, viz. May 1st. to September 30, 1928, the precipitation is only 59.4% of the total average mean for this five month period.

USE OF WATER

Continuous records were kept of the distribution of the net available supply of water from July 1st. to September 30, 1928 and the results obtained are shown in Tables 5 to 12, inclusive, of this report which give the daily discharge of the several ditches involved.

It will be noted that in Table 5 all of the ditches on the Terwilliger Estate are grouped. Since the use of these ditches was rotated and the total daily allotment was almost invariably diverted by one of ditches no separate record was kept of each ditch.

The areas irrigated under the several ditches during the period of water master service have been estimated and have been tabulated in Table 4 of this report.

In those cases where the waters of a ditch are commingled with waters from other sources the ditch has not been included in the Table 4 as an accurate estimate of the acreage served in such cases could not be made.

It will be noted from Table 4 that only approximately one fifth of the normally irrigated area was irrigated during the period of water master service for 1928 and that the gross use during this period, for the acreage irrigated, was approximately one cubic foot per second to 97 acres.

CROPS

Since the quantity of water delivered through the several ditches to each individual user on a ditch was too small to permit of sufficient irrigation to grow crops, the small quantity available was used sparingly to keep pasture lands green and to prevent the alfalfa fields from dying during the hot weather.

Although crops were harvested during the period of water master service these crops were made by water delivered to the land prior to the commencement of the service.

In several instances it was noted that alfalfa fields showed signs of suffering through lack of water and it appeared that in some cases re-seeding would be necessary. This condition was, however, unavoidable.

The only areas supplied with sufficient water to grow crops were five small orchards totaling about 30 acres, two alfalfa fields totaling about 55 acres and 2 acres of potatoes and in these instances good crops were raised.

DISCUSSION OF RESULTS FOR 1928

In general it may be stated that the results of water master service during 1928 demonstrated that supervision and distribution of the water, in accordance with the Stipulation and Agreement signed by the water users of Little Shasta River and its tributaries on March 27, 1927, was a practical and satisfactory solution of their water problems.

The satisfaction experienced by the water users through operation of the schedule of allotments prompted a request by a majority of the users to the Division of Water Rights through their Water Committee, that the Stipulation and Agreement of March 27, 1927 be made permanent by court decree at the earliest possible date.

Of the thirty-three water users in the Little Shasta Valley, only three, or about 9% of the users expressed any dissatisfaction with respect to the Stipulation and Agreement.

FINANCIAL STATEMENT

The water master service during 1928 on Little Shasta River and its tributaries was financed partly by subscription from the water users and partly by contribution by the Division of Water Rights.

The subscription for Mrs. A. G. Babcock for $9.30, for the 1928 season has not been paid.

The total unit cost of the water master service per acre of irrigated land could not be determined.

A financial statement in which receipts and disbursements are itemized, follows.

FINANCIAL STATEMENT

LITTLE SHASTA RIVER DISTRIBUTION

1928 SEASON

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RECEIPTS

Contributed by Water users on Little Shasta River	$440.70	
Contributed by Division of Water Rights	$450.00	$890.70

DISBURSEMENTS

Salaries	$550.47	
Travel Expense	287.18	
Automobile Expense	53.05	$890.70

TABLE 1

CLIMATOLOGICAL DATA

Precipitation for Seasonal Year 1927-1928 compared with Mean Precipitation

Mount Shasta and Montague 1889-1928

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Month	Average Mean: Mount Shasta and Montague 1889-1928	Precipitation for seasonal year 1927-28: Mount Shasta (Sisson)	Montague	Average Mount Shasta and Montague	Per cent of Total Mean
October	1.49	1.60	2.07	1.84	7.6
November	4.33	6.15	2.48	4.32	17.8
December	2.83	2.80	1.02	1.91	7.7
January	3.28	2.75	1.26	2.00	8.2
February	3.89	4.50	0.60	2.55	10.6
March	2.69	6.40	3.11	4.76	19.6
April	2.40	3.50	0.83	2.16	8.9
May	1.22	0.70	0.78	0.74	3.1
June	0.50	0.45	0.35	0.40	1.6
July	0.24	0.00	0.57	0.29	1.2
August	0.25	0.20	0.01	0.10	0.4
September	0.99	0.40	0.35	0.37	1.5
Totals	24.31	29.45	13.43	21.44	88.2

TABLE 2

Continuous Records of Discharge from Little Shasta River

Above Harp Ditch for the Period July 1st. to September 30, 1928.

Day	July	August	September	
1	7.4	4.8	4.5	
2	7.0	4.7	4.5	
3	6.9	4.7	4.7	
4	6.8	4.7	4.7	
5	6.8	4.8	4.6	
6	6.7	4.8	4.5	
7	6.6	4.9	4.5	
8	6.6	4.8	4.5	
9	6.5	4.7	4.6	
10	6.5	4.9	4.6	
11	6.5	4.8	4.6	
12	6.4	4.7	7.5	
13	6.4	4.6	5.3	
14	6.4	4.5	5.3	
15	6.3	4.6	5.3	
16	6.2	4.7	5.0	
17	6.1	4.8	4.9	
18	6.0	4.8	4.9	
19	5.8	4.8	4.8	
20	5.7	4.9	4.8	
21	5.5	4.8	4.8	
22	5.4	4.7	4.7	
23	5.2	4.7	4.6	
24	5.2	4.5	4.6	
25	5.0	4.4	4.7	
26	4.9	4.3	5.2	
27	4.8	4.2	5.5	
28	4.7	4.2	5.6	
29	4.6	4.3	5.7	
30	5.4	4.4	5.7	
31	5.0	4.4		
Total Sec. Ft. Days	175.4	143.7	139.1	3 Month Period
Mean Sec. Ft.	5.7	4.6	4.6	5.0
Maximum Sec. Ft.	7.4	4.9	7.5	7.5
Minimum Sec. Ft.	4.6	4.2	4.5	4.2
Total Acre Feet	347.3	284.5	275.4	907.2

Guage heights from automatic water stage recorder.

TABLE 3

Continuous Records of Discharge from Cleland Springs

For the Period July 1st. to September 30, 1928.

Day	July	August	September	
1	8.5	8.4	8.9	
2	8.5	8.4	8.9	
3	8.5	8.4	8.9	
4	8.4	8.3	8.8	
5	8.4	8.3	8.8	
6	8.4	8.3	8.7	
7	8.4	8.3	8.7	
8	8.4	8.5	8.7	
9	8.4	8.6	8.7	
10	8.4	8.6	8.8	
11	8.4	8.7	8.8	
12	8.4	8.8	8.8	
13	8.4	8.9	8.8	
14	8.4	9.0	8.8	
15	8.4	9.1	8.8	
16	8.4	9.2	8.8	
17	8.4	9.3	8.7	
18	8.4	9.3	8.7	
19	8.4	9.3	8.7	
20	8.4	9.3	8.7	
21	8.4	9.2	8.7	
22	8.4	9.2	8.7	
23	8.4	9.2	8.7	
24	8.4	9.2	8.7	
25	8.4	9.1	8.7	
26	8.4	9.1	8.6	
27	8.4	9.1	8.6	
28	8.4	9.1	8.6	
29	8.4	9.0	8.6	
30	8.4	9.0	8.6	
31	8.4	9.0		
Total Sec. Ft. Days	260.7	274.2	262.0	3 Month Period
Mean Sec. Ft.	8.4	8.8	8.7	8.6
Maximum Sec. Ft.	8.5	9.3	8.9	9.3
Minimum Sec. Ft.	8.4	8.3	8.6	8.3
Total Acre Feet	516.2	542.9	518.8	1577.9

TABLE 4

Use of Water in 1928 from Little Shasta River and Cleland Springs

Ranch	Acres Irrigated		Acres Irrigated Per Ditch in 1928					Gross Diversion Acre Feet 1928	Acres Irrigated Per Second Foot 1928
	Normal	1928	Terwilliger Estate	Dimmich	Soule and Terwilliger	Musgrave and Linton	Babcock, Martin and Soule		
Babcock - A. L.	157.5	24.7					24.7	50.67	89
Drayer - E. F.	98.1	21.1				21.1		32.51	118
Earhart & Brown	19.6	1.0				1.0		6.04	30
Fairchild & Grisez	85.5	* 0.0				0.0		0.00	
Haight - A. C.	27.4	10.0					10.0	8.82	21
Haight - I. F.	27.3	15.3				15.3		16.12	173
Hickman, Grisez & Miclo	202.5	* 0.0				0.0		0.00	
Kegg - W. D.	4.6	2.7		2.7				19.96	25
Long - J. F.	288.1	84.5				84.5		142.54	107
Martin - W. T.	234.6	37.1					37.1	75.94	89
O'Connor - E	24.1	2.9				2.9		7.15	73
O'Connor - M. J.	330.9	53.1				49.7	3.4	98.97	98
Rohrer - J. B.	330.3	47.6				47.6		97.54	89
Soule - Ann	220.0	30.9				30.9	0.0	70.74	79
Soule - Charles	254.0	56.5			56.5			68.99	145
Soule - C. W.	156.1	15.9					15.9	50.03	58
Terwilliger Estate	219.0	129.2	129.2					244.22	94
Terwilliger - E. D.	368.8	33.3			33.3			68.98	88
Total	3,048.4	565.8	129.2	2.7	89.8	263.0	91.1	1,059.22	97

*Proportionate share of water used by J. F. Long.

Note: Ditches whose water commingles with water from other sources not included.

Only areas served between July 1st. and September 30, 1928, are listed.

TABLE 5

Continuous Record of Discharge of Terwilliger Estate Ditches

1928

Day	July	August	September	
1	1.57	1.38	1.39	
2	1.46	1.26	1.35	
3	1.46	1.26	1.35	
4	1.46	1.26	1.35	
5	1.46	1.26	1.35	
6	1.46	1.27	1.35	
7	1.46	1.27	1.35	
8	1.46	1.27	1.35	
9	1.45	1.27	1.29	
10	1.45	1.27	1.29	
11	1.45	1.27	1.29	
12	1.45	1.27	1.29	
13	1.45	1.29	1.29	
14	1.45	1.29	1.42	
15	1.45	1.29	1.42	
16	1.45	1.29	1.42	
17	1.45	1.29	1.42	
18	1.45	1.29	1.42	
19	1.45	1.43	1.42	
20	1.45	1.43	1.42	
21	1.45	1.43	1.42	
22	1.45	1.43	1.42	
23	1.37	1.43	1.31	
24	1.37	1.43	1.31	
25	1.37	1.43	1.31	
26	1.37	1.39	1.31	
27	1.37	1.39	1.31	
28	1.37	1.39	1.31	
29	1.37	1.39	1.31	
30	1.38	1.39	1.31	
31	1.38	1.39		
Total Sec. Ft. Days	44.44	42.40	40.45	3 Month Period
Mean Sec. Ft.	1.43	1.37	1.35	1.38
Maximum Sec. Ft.	1.57	1.43	1.42	1.57
Minimum Sec. Ft.	1.37	1.26	1.29	1.26
Total Acre Feet	83.99	80.14	80.09	244.22

Note: Includes Terwilliger North, Terwilliger South, Terwilliger Main and Harp Ditches.

TABLE 6

Continuous Record of Discharge of Martin and Davis Ditch

1928

Day	July	August	September	
1	6.00	5.59	5.77	
2	6.00	4.96	5.54	
3	6.00	4.96	5.54	
4	6.00	4.96	5.54	
5	6.00	4.96	5.54	
6	6.00	5.01	5.54	
7	6.00	5.01	5.54	
8	6.00	5.01	5.54	
9	6.00	5.01	5.11	
10	6.00	5.01	5.11	
11	6.00	5.01	5.11	
12	6.00	5.01	5.11	
13	6.00	5.07	5.11	
14	6.00	5.07	5.84	
15	6.00	5.07	5.84	
16	6.00	5.07	5.84	
17	6.00	5.07	5.84	
18	6.00	5.07	5.84	
19	6.00	5.90	5.84	
20	6.00	5.90	5.84	
21	6.00	5.90	5.84	
22	6.00	5.90	5.84	
23	5.44	5.90	5.27	
24	5.44	5.90	5.27	
25	5.44	5.90	5.27	
26	5.44	5.77	5.27	
27	5.44	5.77	5.27	
28	5.44	5.77	5.27	
29	5.44	5.77	5.27	
30	5.59	5.77	5.27	
31	5.59	5.77		
Total Sec. Ft. Days	181.26	166.84	164.82	3 Month Period
Mean Sec. Ft.	5.85	5.38	5.49	5.57
Maximum Sec. Ft.	6.00	5.90	5.84	6.00
Minimum Sec. Ft.	5.44	4.96	5.11	4.96
Total Acre Feet	358.89	330.34	326.34	1,015.57

TABLE 7

Continuous Record of Discharge of Dimmich Ditch

1928

Day	July	August	September	
1	0.12	0.12	0.12	
2	0.12	0.12	0.12	
3	0.12	0.12	0.12	
4	0.12	0.12	0.12	
5	0.12	0.12	0.12	
6	0.12	0.12	0.12	
7	0.12	0.12	0.12	
8	0.12	0.12	0.12	
9	0.12	0.12	0.12	
10	0.12	0.12	0.12	
11	0.12	0.12	0.12	
12	0.12	0.12	0.12	
13	0.12	0.00	0.12	
14	0.12	0.00	0.12	
15	0.12	0.00	0.12	
16	0.12	0.00	0.12	
17	0.12	0.00	0.12	
18	0.12	0.00	0.12	
19	0.12	0.00	0.12	
20	0.12	0.00	0.12	
21	0.12	0.12	0.12	
22	0.12	0.12	0.12	
23	0.12	0.12	0.12	
24	0.12	0.12	0.12	
25	0.12	0.12	0.12	
26	0.12	0.12	0.12	
27	0.12	0.12	0.12	
28	0.12	0.12	0.12	
29	0.12	0.12	0.12	
30	0.12	0.12	0.12	
31	0.12	0.12		
Total Sec. Ft. Days	3.72	2.76	3.60	3 Month Period
Mean Sec. Ft.	0.12	0.09	0.12	0.11
Maximum Sec. Ft.	0.12	0.12	0.12	0.12
Minimum Sec. Ft.	0.12	0.00	0.12	0.00
Total Acre Feet	7.37	5.46	7.13	19.96

TABLE 8

Continuous Record of Discharge of Soule and Terwilliger Ditch

1928

Day	July	August	September	
1	0.94	0.75	0.67	
2	0.83	0.76	0.71	
3	0.83	0.76	0.71	
4	0.83	0.76	0.71	
5	0.83	0.76	0.71	
6	0.83	0.75	0.71	
7	0.83	0.75	0.71	
8	0.83	0.75	0.71	
9	0.82	0.75	0.75	
10	0.82	0.75	0.75	
11	0.82	0.75	0.75	
12	0.82	0.75	0.75	
13	0.82	0.79	0.75	
14	0.82	0.79	0.75	
15	0.82	0.79	0.75	
16	0.76	0.79	0.75	
17	0.76	0.79	0.75	
18	0.76	0.79	0.75	
19	0.76	0.74	0.75	
20	0.76	0.74	0.75	
21	0.76	0.74	0.75	
22	0.76	0.74	0.75	
23	0.75	0.74	0.75	
24	0.75	0.74	0.75	
25	0.75	0.74	0.75	
26	0.75	0.67	0.75	
27	0.75	0.67	0.75	
28	0.75	0.67	0.75	
29	0.75	0.67	0.75	
30	0.75	0.67	0.75	
31	0.75	0.67		
Total Sec. Ft. Days	24.56	22.98	22.14	3 Month Period
Mean Sec. Ft.	0.89	0.74	0.74	0.79
Maximum Sec. Ft.	0.94	0.79	0.75	0.94
Minimum Sec. Ft.	0.75 T	0.67	0.67	0.67
Total Acre Feet	48.63	45.50	43.84	137.97

TABLE 9

Continuous Record of Discharge of Hart and Haight Ditch

1928

Day	July	August	September	
1	0.33	0.31	0.31	
2	0.33	0.32	0.31	
3	0.33	0.32	0.31	
4	0.33	0.32	0.31	
5	0.33	0.32	0.31	
6	0.33	0.31	0.31	
7	0.33	0.31	0.31	
8	0.33	0.31	0.31	
9	0.32	0.31	0.32	
10	0.32	0.31	0.32	
11	0.32	0.31	0.32	
12	0.32	0.31	0.32	
13	0.32	0.32	0.32	
14	0.32	0.32	0.32	
15	0.32	0.32	0.32	
16	0.32	0.32	0.32	
17	0.32	0.32	0.32	
18	0.32	0.32	0.32	
19	0.32	0.31	0.32	
20	0.32	0.31	0.32	
21	0.32	0.31	0.32	
22	0.32	0.31	0.32	
23	0.32	0.31	0.32	
24	0.32	0.31	0.32	
25	0.32	0.31	0.32	
26	0.32	0.31	0.32	
27	0.32	0.31	0.32	
28	0.32	0.31	0.32	
29	0.32	0.31	0.32	
30	0.31	0.31	0.32	
31	0.31	0.31		
Total Sec. Ft. Days	9.98	9.71	9.53	3 Months Period
Mean Sec. Ft.	0.32	0.31	0.32	0.32
Maximum Sec. Ft.	0.33	0.32	0.32	0.33
Minimum Sec. Ft.	0.31	0.31	0.31	0.31
Total Acre Feet	19.76	19.22	18.85	57.83

TABLE 10

Continuous Record of Discharge of Musgrave and Linton Ditch

1928

Day	July	August	September	
1	3.07	2.53	2.29	
2	2.75	2.55	2.42	
3	2.75	2.55	2.42	
4	2.75	2.55	2.42	
5	2.75	2.55	2.42	
6	2.75	2.52	2.42	
7	2.75	2.52	2.42	
8	2.75	2.52	2.42	
9	2.72	2.52	2.53	
10	2.72	2.52	2.53	
11	2.72	2.52	2.53	
12	2.72	2.52	2.53	
13	2.72	2.66	2.53	
14	2.72	2.66	2.53	
15	2.72	2.66	2.53	
16	2.57	2.66	2.53	
17	2.57	2.66	2.53	
18	2.57	2.66	2.53	
19	2.57	2.50	2.53	
20	2.57	2.50	2.53	
21	2.57	2.50	2.53	
22	2.57	2.50	2.53	
23	2.53	2.50	2.53	
24	2.53	2.50	2.53	
25	2.53	2.50	2.53	
26	2.53	2.29	2.53	
27	2.53	2.29	2.53	
28	2.53	2.29	2.53	
29	2.53	2.29	2.53	
30	2.53	2.29	2.53	
31	2.53	2.29		
Total Sec. Ft. Days	82.12	77.57	74.89	3 Month Period
Mean Sec. Ft.	2.65	2.50	2.50	2.55
Maximum Sec. Ft.	3.07	2.66	2.53	3.07
Minimum Sec. Ft.	2.53	2.29	2.29	2.29
Total Acre Feet	162.60	153.59	148.27	464.46

TABLE 11

Continuous Record of Discharge of Babcock, Martin and Soule Ditch

1928

Day	July	August	September	
1	1.24	1.05	0.97	
2	1.13	1.06	1.01	
3	1.13	1.06	1.01	
4	1.13	1.06	1.01	
5	1.13	1.06	1.01	
6	1.13	1.05	1.01	
7	1.13	1.05	1.01	
8	1.13	1.05	1.01	
9	1.11	1.05	1.05	
10	1.11	1.05	1.05	
11	1.11	1.05	1.05	
12	1.11	1.05	1.05	
13	1.11	1.09	1.05	
14	1.11	1.09	1.05	
15	1.11	1.09	1.05	
16	1.07	1.09	1.05	
17	1.07	1.09	1.05	
18	1.07	1.09	1.05	
19	1.07	1.04	1.05	
20	1.07	1.04	1.05	
21	1.07	1.04	1.05	
22	1.07	1.04	1.05	
23	1.05	1.04	1.05	
24	1.05	1.04	1.05	
25	1.05	1.04	1.05	
26	1.05	0.97	1.05	
27	1.05	0.97	1.05	
28	1.05	0.97	1.05	
29	1.05	0.97	1.05	
30	1.05	0.97	1.05	
31	1.05	0.97		
Total Sec. Ft. Days	33.86	32.28	31.14	3 Month Period
Mean Sec. Ft.	1.09	1.04	1.01	1.05
Maximum Sec. Ft.	1.24	1.09	1.05	1.24
Minimum Sec. Ft.	1.05	0.97	0.97	0.97
Total Acre Feet	67.04	63.91	61.66	192.61

TABLE 12

Continuous Record of Discharge of Hart, Haight and Prather Ditch

1928

Day	July	August	September	
1	2.65	2.07	1.81	
2	2.31	2.09	1.94	
3	2.31	2.09	1.94	
4	2.31	2.09	1.94	
5	2.31	2.09	1.94	
6	2.31	2.06	1.94	
7	2.31	2.06	1.94	
8	2.31	2.06	1.94	
9	2.29	2.06	2.07	
10	2.29	2.06	2.07	
11	2.29	2.06	2.07	
12	2.29	2.06	2.07	
13	2.29	2.21	2.07	
14	2.29	2.21	2.07	
15	2.29	2.21	2.07	
16	2.11	2.21	2.07	
17	2.11	2.21	2.07	
18	2.11	2.21	2.07	
19	2.11	2.03	2.07	
20	2.11	2.03	2.07	
21	2.11	2.03	2.07	
22	2.11	2.03	2.07	
23	2.07	2.03	2.07	
24	2.07	2.03	2.07	
25	2.07	2.03	2.07	
26	2.07	1.81	2.07	
27	2.07	1.81	2.07	
28	2.07	1.81	2.07	
29	2.07	1.81	2.07	
30	2.07	1.81	2.07	
31	2.07	1.81		
Total Sec. Ft. Days	68.25	63.18	60.93	3 Month Period
Mean Sec. Ft.	2.20	2.04	2.03	2.09
Maximum Sec. Ft.	2.65	2.21	2.07	2.65
Minimum Sec. Ft.	2.07	1.81	1.81	1.81
Total Acre Feet	135.11	125.10	120.64	380.85

FINANCIAL STATEMENT

LITTLE SHASTA RIVER DISTRIBUTION

1928 SEASON

oOo

RECEIPTS

Contributed by Water users on Little Shasta River	$440.70	
Contributed by Division of Water Rights	$450.00	$890.70

DISBURSEMENTS

Salaries	$550.47	
Travel Expense	287.18	
Automobile Expense	53.05	$890.70

TABLE 1

CLIMATOLOGICAL DATA

Precipitation for Seasonal Year 1927-1928 compared with Mean Precipitation

Mount Shasta and Montague 1889-1928

Month	Average Mean: Mount Shasta and Montague 1889-1928	Precipitation for seasonal year 1927-28: Mount Shasta (Sisson)	Montague	Average Mount Shasta and Montague	Per cent of Total Mean
October	1.49	1.60	2.07	1.84	7.6
November	4.33	6.15	2.48	4.32	17.8
December	2.83	2.80	1.02	1.91	7.7
January	3.28	2.75	1.26	2.00	8.2
February	3.89	4.50	0.60	2.55	10.6
March	2.69	6.40	3.11	4.76	19.6
April	2.40	3.50	0.83	2.16	8.9
May	1.22	0.70	0.78	0.74	3.1
June	0.50	0.45	0.35	0.40	1.6
July	0.24	0.00	0.57	0.29	1.2
August	0.25	0.20	0.01	0.10	0.4
September	0.99	0.40	0.35	0.37	1.5
Totals	24.31	29.45	13.43	21.44	88.2

1

TABLE 2

Daily ~~Continuous Records of~~ Discharge ~~from Little Shasta River~~ in Cubic Feet per Second of Little Shasta River Above Head of Harp Ditch — Cfs.

~~Above Harp Ditch~~ for the Period July 1 to September 30, 1928.

Day	July	August	September		
1	7.4	4.8	4.5		
2	7.0	4.7	4.5		
3	6.9	4.7	4.7		
4	6.8	4.7	4.7		
5	6.8	4.8	4.6		
6	6.7	4.8	4.5		
7	6.6	4.9	4.5		
8	6.6	4.8	4.5		
9	6.5	4.7	4.6		
10	6.5	4.9	4.6		
11	6.5	4.8	4.6		
12	6.4	4.7	7.5		
13	6.4	4.6	5.3		
14	6.4	4.5	5.3		
15	6.3	4.6	5.3		
16	6.2	4.7	5.0		
17	6.1	4.8	4.9		
18	6.0	4.8	4.9		
19	5.8	4.8	4.8		
20	5.7	4.9	4.8		
21	5.5	4.8	4.8		
22	5.4	4.7	4.7		
23	5.2	4.7	4.6		
24	5.2	4.5	4.6		
25	5.0	4.4	4.7		
26	4.9	4.3	5.2		
27	4.8	4.2	5.5		
28	4.7	4.2	5.6		
29	4.6	4.3	5.7		
30	5.4	4.4	5.7		
31	5.0	4.4			
Total Sec. Ft. Days	175.4	143.7	139.1	3 Month Period	
Mean Sec. Ft.	5.7	4.6	4.6	5.0	
Maximum Sec. Ft.	7.4	4.9	7.5	7.5	
Minimum Sec. Ft.	4.6	4.2	4.5	4.2	
Total Acre Feet	347.3	284.5	275.4	907.2	

Guage heights from automatic water stage recorder.

TABLE 3

Daily ~~Continuous Records of~~ Discharge in Cubic Feet per Second ~~of~~ Cleland Springs

CLELAND SPRINGS

For the Period July ~~1st.~~ to September 30, 1928.

Day	July	August	September	
1	8.5	8.4	8.9	
2	8.5	8.4	8.9	
3	8.5	8.4	8.9	
4	8.4	8.3	8.8	
5	8.4	8.3	8.8	
6	8.4	8.3	8.7	
7	8.4	8.3	8.7	
8	8.4	8.5	8.7	
9	8.4	8.6	8.7	
10	8.4	8.6	8.8	
11	8.4	8.7	8.8	
12	8.4	8.8	8.8	
13	8.4	8.9	8.8	
14	8.4	9.0	8.8	
15	8.4	9.1	8.8	
16	8.4	9.2	8.8	
17	8.4	9.3	8.7	
18	8.4	9.3	8.7	
19	8.4	9.3	8.7	
20	8.4	9.3	8.7	
21	8.4	9.2	8.7	
22	8.4	9.2	8.7	
23	8.4	9.2	8.7	
24	8.4	9.2	8.7	
25	8.4	9.1	8.7	
26	8.4	9.1	8.6	
27	8.4	9.1	8.6	
28	8.4	9.1	8.6	
29	8.4	9.0	8.6	
30	8.4	9.0	8.6	
31	8.4	9.0		
Total Sec. Ft. Days	260.7	274.2	262.0	3 Month Period
Mean Sec. Ft.	8.4	8.8	8.7	8.6
Maximum Sec. Ft.	8.5	9.3	8.9	9.3
Minimum Sec. Ft.	8.4	8.3	8.6	8.3
Total Acre Feet	516.2	542.9	518.8	1577.9

TABLE 4

Use of Water in 1928 from Little Shasta River and Cleland Springs

Ranch	Acres Irrigated		Acres Irrigated Per Ditch in 1928					Gross Diversion Acre Feet 1928	Acres Irrigated Per Second Foot 1928
	Normal	1928	Terwilliger Estate	Dimmich	Soule and Terwilliger	Musgrave and Linton	Babcock, Martin and Soule		
Babcock - A. L.	157.5	24.7					24.7	50.67	89
Drayer - E. F.	98.1	21.1				21.1		32.51	118
Earhart & Brown	19.6	1.0				1.0		6.04	30
Fairchild & Grisez	85.5	* 0.0				0.0		0.00	
Haight - A. C.	27.4	10.0					10.0	8.82	21
Haight - I. F.	27.3	15.3				15.3		16.12	173
Hickman, Grisez & Miclo	202.5	* 0.0				0.0		0.00	
Kegg - W. D.	4.6	2.7		2.7				19.96	25
Long - J. F.	288.1	84.5				84.5		142.54	107
Martin - W. T.	234.6	37.1					37.1	75.94	89
O'Connor - E	24.1	2.9				2.9		7.15	73
O'Connor - M. J.	330.9	53.1				49.7	3.4	98.97	98
Rohrer - J. B.	330.3	47.6				47.6		97.54	89
Soule - Ann	220.0	30.9				30.9	0.0	70.74	79
Soule - Charles	254.0	56.5			56.5			68.99	145
Soule - C. W.	156.1	15.9					15.9	50.03	58
Terwilliger Estate	219.0	129.2	129.2					244.22	94
Terwilliger - E. D.	368.8	33.3			33.3			68.98	88
Total	3,048.4	565.8	129.2	2.7	89.8	263.0	91.1	1,059.22	97

*Proportionate share of water used by J. F. Long.

Note: Ditches whose water commingles with water from other sources not included.

Only areas served between July 1st. and September 30, 1928, are listed.

TABLE 5

Continuous Record of Discharge of Terwilliger Estate Ditches

1928

Day	July	August	September	
1	1.57	1.38	1.39	
2	1.46	1.26	1.35	
3	1.46	1.26	1.35	
4	1.46	1.26	1.35	
5	1.46	1.26	1.35	
6	1.46	1.27	1.35	
7	1.46	1.27	1.35	
8	1.46	1.27	1.35	
9	1.45	1.27	1.29	
10	1.45	1.27	1.29	
11	1.45	1.27	1.29	
12.	1.45	1.27	1.29	
13	1.45	1.29	1.29	
14	1.45	1.29	1.42	
15	1.45	1.29	1.42	
16	1.45	1.29	1.42	
17	1.45	1.29	1.42	
18	1.45	1.29	1.42	
19	1.45	1.43	1.42	
20	1.45	1.43	1.42	
21	1.45	1.43	1.42	
22	1.45	1.43	1.42	
23	1.37	1.43	1.31	
24	1.37	1.43	1.31	
25	1.37	1.43	1.31	
26	1.37	1.39	1.31	
27	1.37	1.39	1.31	
28	1.37	1.39	1.31	
29	1.37	1.39	1.31	
30	1.38	1.39	1.31	
31	1.38	1.39		
Total Sec. Ft. Days	44.44	42.40	40.45	3 Month Period
Mean Sec. Ft.	1.43	1.37	1.35	1.38
Maximum Sec. Ft.	1.57	1.43	1.42	1.57
Minimum Sec. Ft.	1.37	1.26	1.29	1.26
Total Acre Feet	83.99	80.14	80.09	244.22

Note: Includes Terwilliger North, Terwilliger South, Terwilliger Main and Harp Ditches.

TABLE 6

Continuous Record of Discharge of Martin and Davis Ditch

1928

Day	July	August	September	
1	6.00	5.59	5.77	
2	6.00	4.96	5.54	
3	6.00	4.96	5.54	
4	6.00	4.96	5.54	
5	6.00	4.96	5.54	
6	6.00	5.01	5.54	
7	6.00	5.01	5.54	
8	6.00	5.01	5.54	
9	6.00	5.01	5.11	
10	6.00	5.01	5.11	
11	6.00	5.01	5.11	
12 *	6.00	5.01	5.11	
13	6.00	5.07	5.11	
14	6.00	5.07	5.84	
15	6.00	5.07	5.84	
16	6.00	5.07	5.84	
17	6.00	5.07	5.84	
18	6.00	5.07	5.84	
19	6.00	5.90	5.84	
20	6.00	5.90	5.84	
21	6.00	5.90	5.84	
22	6.00	5.90	5.84	
23	5.44	5.90	5.27	
24	5.44	5.90	5.27	
25	5.44	5.90	5.27	
26	5.44	5.77	5.27	
27	5.44	5.77	5.27	
28	5.44	5.77	5.27	
29	5.44	5.77	5.27	
30	5.59	5.77	5.27	
31	5.59	5.77		
Total Sec. Ft. Days	181.26	166.84	164.82	3 Month Period
Mean Sec. Ft.	5.85	5.38	5.49	5.57
Maximum Sec. Ft.	6.00	5.90	5.84	6.00
Minimum Sec. Ft.	5.44	4.96	5.11	4.96
Total Acre Feet	358.89	330.34	326.34	1,015.57

TABLE 7

Continuous Record of Discharge of Dimmich Ditch

1928

Day	July	August	September	
1	0.12	0.12	0.12	
2	0.12	0.12	0.12	
3	0.12	0.12	0.12	
4	0.12	0.12	0.12	
5	0.12	0.12	0.12	
6	0.12	0.12	0.12	
7	0.12	0.12	0.12	
8	0.12	0.12	0.12	
9	0.12	0.12	0.12	
10	0.12	0.12	0.12	
11*	0.12	0.12	0.12	
12	0.12	0.12	0.12	
13	0.12	0.00	0.12	
14	0.12	0.00	0.12	
15	0.12	0.00	0.12	
16	0.12	0.00	0.12	
17	0.12	0.00	0.12	
18	0.12	0.00	0.12	
19	0.12	0.00	0.12	
20	0.12	0.00	0.12	
21	0.12	0.12	0.12	
22	0.12	0.12	0.12	
23	0.12	0.12	0.12	
24	0.12	0.12	0.12	
25	0.12	0.12	0.12	
26	0.12	0.12	0.12	
27	0.12	0.12	0.12	
28	0.12	0.12	0.12	
29	0.12	0.12	0.12	
30	0.12	0.12	0.12	
31	0.12	0.12		
Total Sec. Ft. Days	3.72	2.76	3.60	3 Month Period
Mean Sec. Ft.	0.12	0.09	0.12	0.11
Maximum Sec. Ft.	0.12	0.12	0.12	0.12
Minimum Sec. Ft.	0.12	0.00	0.12	0.00
Total Acre Feet	7.37	5.46	7.13	19.96

TABLE 8

Continuous Record of Discharge of Soule and Terwilliger Ditch

1928

Day	July	August	September	
1	0.94	0.75	0.67	
2	0.83	0.76	0.71	
3	0.83	0.76	0.71	
4	0.83	0.76	0.71	
5	0.83	0.76	0.71	
6	0.83	0.75	0.71	
7	0.83	0.75	0.71	
8	0.83	0.75	0.71	
9	0.82	0.75	0.75	
10	0.82	0.75	0.75	
11	0.82	0.75	0.75	
12	0.82	0.75	0.75	
13	0.82	0.79	0.75	
14	0.82	0.79	0.75	
15	0.82	0.79	0.75	
16	0.76	0.79	0.75	
17	0.76	0.79	0.75	
18	0.76	0.79	0.75	
19	0.76	0.74	0.75	
20	0.76	0.74	0.75	
21	0.76	0.74	0.75	
22	0.76	0.74	0.75	
23	0.75	0.74	0.75	
24	0.75	0.74	0.75	
25	0.75	0.74	0.75	
26	0.75	0.67	0.75	
27	0.75	0.67	0.75	
28	0.75	0.67	0.75	
29	0.75	0.67	0.75	
30	0.75	0.67	0.75	
31	0.75	0.67		
Total Sec. Ft. Days	24.56	22.98	22.14	3 Month Period
Mean Sec. Ft.	0.89	0.74	0.74	0.79
Maximum Sec. Ft.	0.94	0.79	0.75	0.94
Minimum Sec. Ft.	0.75 T	0.67	0.67	0.67
Total Acre Feet	48.63	45.50	43.84	137.97

TABLE 9

Continuous Record of Discharge of Hart and Haight Ditch

1928

Day	July	August	September	
1	0.33	0.31	0.31	
2	0.33	0.32	0.31	
3	0.33	0.32	0.31	
4	0.33	0.32	0.31	
5	0.33	0.32	0.31	
6	0.33	0.31	0.31	
7	0.33	0.31	0.31	
8	0.33	0.31	0.31	
9	0.32	0.31	0.32	
10	0.32	0.31	0.32	
11	0.32	0.31	0.32	
12	0.32	0.31	0.32	
13	0.32	0.32	0.32	
14	0.32	0.32	0.32	
15	0.32	0.32	0.32	
16	0.32	0.32	0.32	
17	0.32	0.32	0.32	
18	0.32	0.32	0.32	
19	0.32	0.31	0.32	
20	0.32	0.31	0.32	
21	0.32	0.31	0.32	
22	0.32	0.31	0.32	
23	0.32	0.31	0.32	
24	0.32	0.31	0.32	
25	0.32	0.31	0.32	
26	0.32	0.31	0.32	
27	0.32	0.31	0.32	
28	0.32	0.31	0.32	
29	0.32	0.31	0.32	
30	0.31	0.31	0.32	
31	0.31	0.31		
Total Sec. Ft. Days	9.98	9.71	9.53	3 Months Period
Mean Sec. Ft.	0.32	0.31	0.32	0.32
Maximum Sec. Ft.	0.33	0.32	0.32	0.33
Minimum Sec. Ft.	0.31	0.31	0.31	0.31
Total Acre Feet	19.76	19.22	18.85	57.83

TABLE 10

Continuous Record of Discharge of Musgrave and Linton Ditch

1928

Day	July	August	September	
1	3.07	2.53	2.29	
2	2.75	2.55	2.42	
3	2.75	2.55	2.42	
4	2.75	2.55	2.42	
5	2.75	2.55	2.42	
6	2.75	2.52	2.42	
7	2.75	2.52	2.42	
8	2.75	2.52	2.42	
9	2.72	2.52	2.53	
10	2.72	2.52	2.53	
11	2.72	2.52	2.53	
12	2.72	2.52	2.53	
13	2.72	2.66	2.53	
14	2.72	2.66	2.53	
15	2.72	2.66	2.53	
16	2.57	2.66	2.53	
17	2.57	2.66	2.53	
18	2.57	2.66	2.53	
19	2.57	2.50	2.53	
20	2.57	2.50	2.53	
21	2.57	2.50	2.53	
22	2.57	2.50	2.53	
23	2.53	2.50	2.53	
24	2.53	2.50	2.53	
25	2.53	2.50	2.53	
26	2.53	2.29	2.53	
27	2.53	2.29	2.53	
28	2.53	2.29	2.53	
29	2.53	2.29	2.53	
30	2.53	2.29	2.53	
31	2.53	2.29		
Total Sec. Ft. Days	82.12	77.57	74.89	3 Month Period
Mean Sec. Ft.	2.65	2.50	2.50	2.55
Maximum Sec. Ft.	3.07	2.66	2.53	3.07
Minimum Sec. Ft.	2.53	2.29	2.29	2.29
Total Acre Feet	162.60	153.59	148.27	464.46

TABLE 11

Continuous Record of Discharge of Babcock, Martin and Soule Ditch

1928

Day	July	August	September	
1	1.24	1.05	0.97	
2	1.13	1.06	1.01	
3	1.13	1.06	1.01	
4	1.13	1.06	1.01	
5	1.13	1.06	1.01	
6	1.13	1.05	1.01	
7	1.13	1.05	1.01	
8	1.13	1.05	1.01	
9	1.11	1.05	1.05	
10	1.11	1.05	1.05	
11	1.11	1.05	1.05	
12	1.11	1.05	1.05	
13	1.11	1.09	1.05	
14	1.11	1.09	1.05	
15	1.11	1.09	1.05	
16	1.07	1.09	1.05	
17	1.07	1.09	1.05	
18	1.07	1.09	1.05	
19	1.07	1.04	1.05	
20	1.07	1.04	1.05	
21	1.07	1.04	1.05	
22	1.07	1.04	1.05	
23	1.05	1.04	1.05	
24	1.05	1.04	1.05	
25	1.05	1.04	1.05	
26	1.05	0.97	1.05	
27	1.05	0.97	1.05	
28	1.05	0.97	1.05	
29	1.05	0.97	1.05	
30	1.05	0.97	1.05	
31	1.05	0.97		
Total Sec. Ft. Days	33.86	32.28	31.14	3 Month Period
Mean Sec. Ft.	1.09	1.04	1.01	1.05
Maximum Sec. Ft.	1.24	1.09	1.05	1.24
Minimum Sec. Ft.	1.05	0.97	0.97	0.97
Total Acre Feet	67.04	63.91	61.66	192.61

TABLE 12

Continuous Record of Discharge of Hart, Haight and Prather Ditch

1928

Day	July	August	September	
1	2.65	2.07	1.81	
2	2.31	2.09	1.94	
3	2.31	2.09	1.94	
4	2.31	2.09	1.94	
5	2.31	2.09	1.94	
6	2.31	2.06	1.94	
7	2.31	2.06	1.94	
8	2.31	2.06	1.94	
9	2.29	2.06	2.07	
10	2.29	2.06	2.07	
11	2.29	2.06	2.07	
12	2.29	2.06	2.07	
13	2.29	2.21	2.07	
14	2.29	2.21	2.07	
15	2.29	2.21	2.07	
16	2.11	2.21	2.07	
17	2.11	2.21	2.07	
18	2.11	2.21	2.07	
19	2.11	2.03	2.07	
20	2.11	2.03	2.07	
21	2.11	2.03	2.07	
22	2.11	2.03	2.07	
23	2.07	2.03	2.07	
24	2.07	2.03	2.07	
25	2.07	2.03	2.07	
26	2.07	1.81	2.07	
27	2.07	1.81	2.07	
28	2.07	1.81	2.07	
29	2.07	1.81	2.07	
30	2.07	1.81	2.07	
31	2.07	1.81		
Total Sec. Ft. Days	68.25	63.18	60.93	3 Month Period
Mean Sec. Ft.	2.20	2.04	2.03	2.09
Maximum Sec. Ft.	2.65	2.21	2.07	2.65
Minimum Sec. Ft.	2.07	1.81	1.81	1.81
Total Acre Feet	135.11	125.10	120.64	380.85

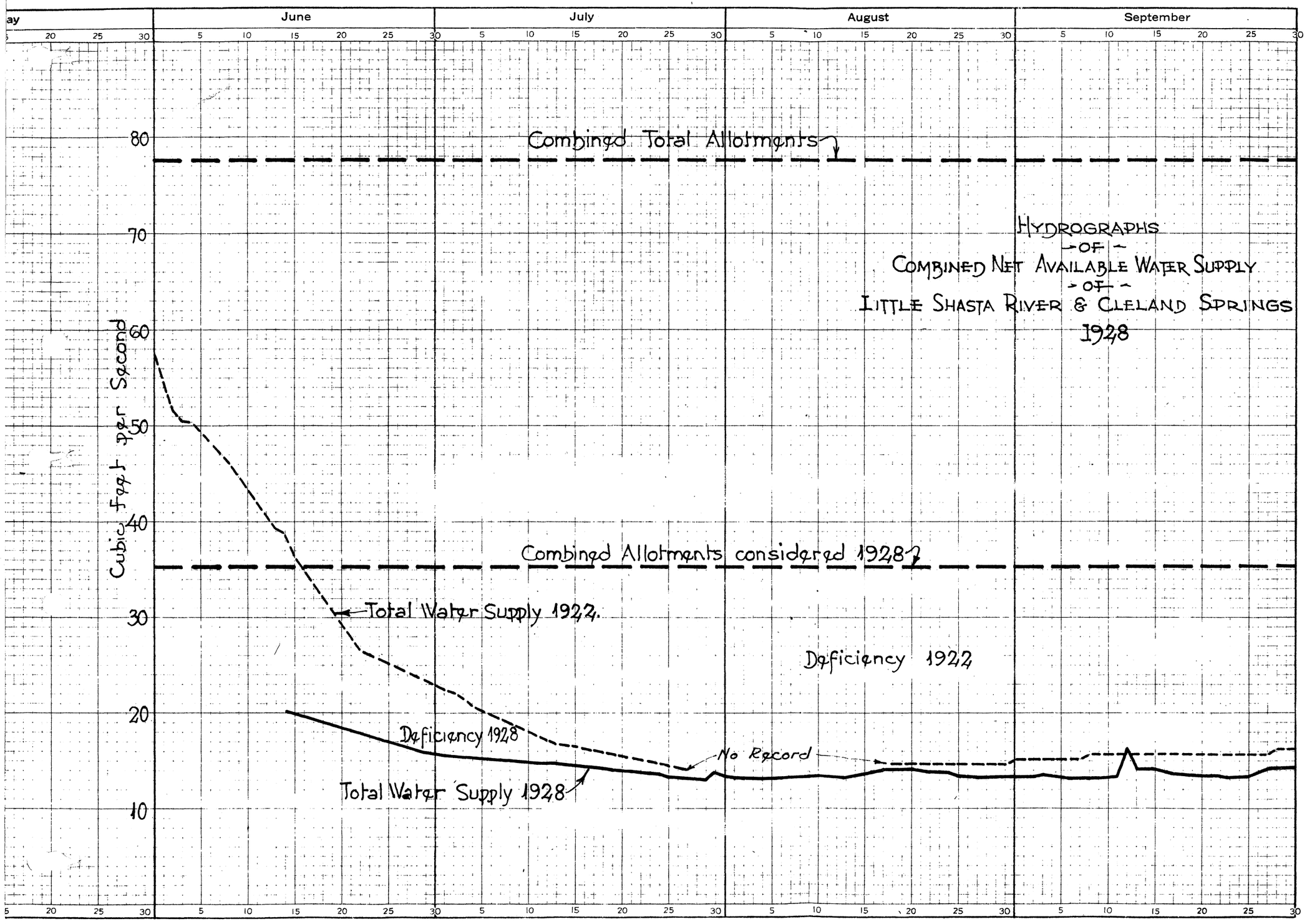
HYDROGRAPHS
-OF-
COMBINED NET AVAILABLE WATER SUPPLY
-OF-
LITTLE SHASTA RIVER & CLELAND SPRINGS
1928
Combined Total Allotments
Combined Allotments considered 1928
Total Water Supply 1922.
Deficiency 1922
Deficiency 1928
No Record
Total Water Supply 1928
Cubic Feet per Second
80
70
60
50
40
30
20
10
June
July
August
September

PLATE 1