STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

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PUBLICATIONS OF THE
DIVISION OF WATER RESOURCES
EDWARD HYATT, State Engineer

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# REPORT ON INVESTIGATION AND WATER MASTER SERVICE ON COTTONWOOD CREEK MODOC COUNTY, CALIFORNIA DURING SEASON OF 1934

By

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Assistant Hydraulic Engineer

Sacramento, California
January, 1935

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Sacramento, Calif.
January 30, 1935

Mr. Harold Conkling
Deputy State Engineer
Sacramento, California.

Dear Sir: Attention: Mr. Gordon Zander, Supervising Hydraulic Engineer

A report covering the investigation and water master service on Cottonwood Creek, in Modoc County, California, during the season of 1934, is submitted herewith.

This report includes a description of the regulation and distribution of the waters of Cottonwood Creek in accordance with the provisions of the agreement entered into by the various parties in the case of Charles M. Oliver vs. Isaac Robnett, et al., on March 21, 1934, and a discussion of the results that were accomplished thereby.

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

Respectfully submitted,

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Assistant Hydraulic Engineer

## ORGANIZATION

| | |
|---|---|
| Earl Lee Kelly | Director of Public Works |
| Edward Hyatt | State Engineer |
| Harold Conkling | Deputy State Engineer |

GORDON ZANDER

Supervising Hydraulic Engineer

| | |
|---|---|
| T. Russel Simpson | Senior Hydraulic Engineer |
| Leslie C. Jopson | Assistant Hydraulic Engineer |
| J. W. McPartland | Water Master |

## INTRODUCTION

A brief history of the case of Charles M. Oliver vs. Isaac Robnett, et al., and of subsequent actions has been given in prior reports dealing with the investigation by the Division of Water Resources in 1932 and 1933.

Subsequent to the reports referred to above, a conference of the water users on Cottonwood Creek was held at New Pine Creek on March 21, 1934. The conference was called to acquaint the water users and their representatives with the data that were collected by the Division of Water Resources in 1933, and to discuss a program for future action.

During the 1933 season the waters of Cottonwood Creek were administered by the Division of Water Resources in accordance with a tentative schedule of use entered into by the various water users in March of that year, but due to the inadequate water supply during the 1933 season it was agreed at the conference to use the same schedule of use in 1934 with such modifications as appeared necessary from the information gathered in 1933. This modified schedule was to be effective during the 1934 season only. The principal changes in the schedule were to increase the duty of water on the meadow lands and to lower it on the alfalfa lands in accordance with the recommendations contained in the 1933 report on "Investigation and Water Master Service". A copy of the trial distribution agreement for the 1934 season is attached as an appendix to this report.

## DISTRIBUTION OF WATER

### 1. Functions of Water Master.

The duties of the water master included supervision of the distribution of the waters of Cottonwood Creek in accordance with the schedule of water allotments and priorities for the 1934 season, as set forth in the appendix to this report, and the collection of hydrographic and other data pertinent to the matter under litigation. The authority of the water master was provided in said agreement.

The duties of the water master were assumed in the field on March 30, 1934, by J. W. McPartland, Water Master. The creek, on March 30, was near the peak flow of the year as a heavy rain had occurred during the few days just prior to that date. It was necessary to make immediate adjustments of the various diversions due to poor prospects for later run-off. It appeared that any delivery to the secondary rights must be accomplished while the flow was being supplemented by the rain. The run-off that occurred during the course of the season was very inadequate and very little of the land outside of that irrigated during the first two weeks in April received any water during the remainder of the season.

In order to obtain information concerning the net water supply available for delivery, for the purpose of observing the priorities set forth in the agreement, an automatic water stage recorder was installed in Cottonwood Creek near the mouth of the canyon above all diversions.

Records were kept of the water supply of Cottonwood Creek and of its distribution amoung the various diversions from March 31st to July 31, 1934.

## 2. Allotments Compared with Water Supply.

There was sufficient water in Cottonwood Creek to continuously satisfy all first priority allotments from March 31st to April 25th, except for three days, from April 6 to 8, inclusive, when a small shortage occurred. An amount slightly less than the allotments was actually diverted however, as the first priority users recognized the probable shortage of water and did not attempt to irrigate all of their land included under the agreement.

There was insufficient water to fill the second priority allotment at any time although there was some water available from March 31 to April 25 except for three days, from April 6 to 8, inclusive.

Table 2 at the end of this report indicates an average water supply of 11.1 per cent of the total allotments on Cottonwood Creek for the period from March 31st to July 28th. The maximum ten day delivery during this period was 28 per cent of the total allotments and the minimum ten day delivery was 1 per cent.

It was observed that the creek became completely dry at the mouth of the canyon after August 10th.

## 3. Efficiency of Distribution.

The efficiency of distribution, in accordance with the provisions of the agreement for distributing the water during the 1934 season, was good. Although the low flows permitted accurate diversion of the water, the channel and conveyance losses consumed about 30 per cent of the gross water supply measured above all diversions. The water users thus actually utilized only about seventy per cent of the gross flow of the creek.

The cooperation obtained from the various water users was an important factor in applying the schedule of use.

## RUN-OFF RECORDS

The standard method of collecting run-off records, as described in a previous report, was used in the investigation in 1934.

An automatic water stage recorder was installed on Cottonwood Creek near the mouth of the canyon above the Larkin Garden Ditch on April 1, 1934. Continuous records were kept of the water supply at this point from April 1st to July 31st, 1934. The record of stream discharge for this station has been tabulated in Table 3 as the water supply above all diversions.

The net water supply available for diversion from Cottonwood Creek, after all channel losses have been deducted, has been tabulated in Table 9. The hydrographs on Plate 1 show graphically the net water supply in 1933 and 1934. The extent of the various allotments of water compared with the net available water supply is shown by the horizontal lines on the hydrograph.

## PRECIPITATION

The precipitation at Lakeview, Oregon, records of which are kept by the United States Weather Bureau, for the seasonal year commencing September 1, 1933, and terminating on August 31, 1934, has been compared with the mean precipitation in Table 1 of this report.

The total precipitation for the seasonal year 1933-34, as shown in Table 1, was 82 per cent of the mean annual precipitation.

There have been other seasons with a greater deficiency in precipitation than 1933-34, namely, 1930-31 and 1932-33, but the relation of amount of snowfall to total precipitation in 1933-34 was small as compared with the usual ratio.

## USE OF WATER

Continuous records were kept of the disposition made of the flow of Cottonwood Creek during the period between March 31st and July 31, 1934. The estimated daily diversions of the various ditches have been tabulated in Tables 4 to 8, inclusive.

The areas adequately irrigated under the various diversion systems was not determined in 1934 due to the fact that very little of the land received sufficient water by direct diversion from the creek to mature the crops.

No computations of use of water were made due to the inadequacy of the water supply.

## CROPS

The crop yields on typical ranches irrigated from Cottonwood Creek in 1934 as estimated by the owners thereof, have been tabulated in Table 10.

The crops grown in 1934 were below normal in all cases with almost a total failure in the meadow crops due to the shortness of the season of available water.

The yields of grain were fair due to the occurrence of rains during the growing season. Very little of the grain was irrigated.

Very little alfalfa has been grown on Cottonwood Creek since the winter of 1932-33 when it was nearly all winter killed. The succeeding dry seasons have prevented replanting.

The yield of meadow hay was considerably less than one ton to the acre except in locations where natural seepage supplemented the creek water.

## DISCUSSION OF RESULTS IN 1934

The run-off on Cottonwood Creek during the irrigation season in 1934 was approximately 540 acre feet. The run-off for the same period in 1933 was 1340 acre feet. These figures indicate a shortage in 1934 of 60 per cent compared with 1933 which was itself not over 50 per cent of normal according to the comparisons made on page 14 of the "Report on Investigation and Water Master Service on Cottonwood Creek During Season of 1933".

The water supply was inadequate to supply the requirements on Cottonwood Creek at any time during the 1934 season. The delivery of water to the riparian lands was very unsatisfactory due to the fact that channel and conveyance losses consumed much of the water available for that class of rights. The losses in delivery to the Robnett and Larkin Ditches were small so that they were able to utilize the low flow to good advantage.

The channel and conveyance losses of various channel and ditch sections as measured in 1934 were as follows:

| Date | Name of Stream or Ditch | Point of Upper Measurement | Point of Lower Measurement | Loss Cubic Feet per Second |
|---|---|---|---|---|
| 4/ 2/34 | Channel | Above Larkin Garden Ditch | Head of Owens-Perry Ditch | 2.29 |
| 4/ 2/34 | Channel | Head of Owens-Perry Ditch | 300 ft. below Owens-Perry Ditch | .75 |
| 4/ 4/34 | Channel | Above Larkin Garden Ditch | Head of Bissell Ditch | 1.29 |
| 4/ 6/34 | Bissell | Head of Ditch | State Highway | .50 |
| 4/ 6/34 | Bissell | Head of Ditch | Oliver Meadow | .76 |
| 4/26/34 | Bissell | Head of Ditch | State Highway | .58 |
| 5/11/34 | Channel | Above Larkin Garden Ditch | Head of Robnett Ditch | .48 |
| 5/19/34 | Channel | Above Larkin Garden Ditch | Head of Robnett Ditch | .35 |

Observations were made of the occurrence of waste from the Robnett and Dick Ranches in 1934. The waste from these sources was negligible at all times during the season.

Considering the shortness of the water supply and the high percentage of losses the maximum possible utilization of the water was made during the season. This was accomplished by holding the prior rights under the agreement to an extreme minimum and by placing the other rights on a rotation basis to eliminate all possible losses.

A four foot concrete Parshall Measuring Flume was installed in the creek above the Larkin Garden Ditch to make direct measurements of the total water supply. A two foot wooden Parshall Measuring Flume was also installed in the Robnett Ditch.

Due to the shortness of water in 1934 no conclusive results could be obtained in administering the schedule of trial distribution.

## FINANCIAL STATEMENT

The cost of continuing the investigation and conducting water master service on Cottonwood Creek in 1934 was met partly by contribution by the state and partly by contribution by the water users.

The amount assessed against the water users for the investigation and water master service in 1934 was $200.00.

# TABLES

TABLE 1

Precipitation for Seasonal Year 1933-1934 Compared with Mean Precipitation at Lakeview, Oregon - 1884 to 1934

| Month | Mean Precipitation at Lakeview | Precipitation for Seasonal Year 1933 - 1934 | |
|---|---|---|---|
| | | Lakeview | Per cent of Total Mean |
| September | 0.65 | 0.24 | 1.7 |
| October | .86 | 1.48 | 10.7 |
| November | 1.65 | .01 | .1 |
| December | 1.72 | 1.14 | 8.2 |
| January | 1.88 | 1.31 | 9.5 |
| February | 1.76 | 1.60 | 11.5 |
| March | 1.43 | 1.50 | 10.8 |
| April | 1.12 | 1.06 | 7.7 |
| May | 1.26 | 1.81 | 13.1 |
| June | .94 | 1.20 | 8.7 |
| July | .34 | .00 | .0 |
| August | .25 | T | .0 |
| Total | 13.86 | 11.35 | 82.0 |

TABLE 2

WATER ALLOTMENTS ON COTTONWOOD CREEK COMPARED WITH NET AVAILABLE WATER SUPPLY DURING 1934 SEASON

| Period | Average Water Available - Cubic feet per second | Per cent of Allotment |
|---|---|---|
| 3/31 to 4/ 9 | 3.76 | 28.0 |
| 4/10 to 4/19 | 3.32 | 25.0 |
| 4/20 to 4/29 | 3.05 | 23.0 |
| 4/30 to 5/ 9 | 2.24 | 17.0 |
| 5/10 to 5/19 | 1.50 | 11.0 |
| 5/20 to 5/29 | .95 | 7.0 |
| 5/30 to 6/ 8 | 1.07 | 8.0 |
| 6/ 9 to 6/18 | .80 | 6.0 |
| 6/19 to 6/28 | .54 | 4.0 |
| 6/29 to 7/ 8 | .30 | 2.0 |
| 7/ 9 to 7/18 | .18 | 1.0 |
| 7/19 to 7/28 | .09 | 1.0 |
| Average for Period | 1.48 | 11.1 |

Total Allotment - 13.35 Cubic Feet per Second

TABLE 3

CONTINUOUS RECORDS OF DAILY DISCHARGE IN CUBIC FEET PER SECOND OF COTTONWOOD CREEK ABOVE ALL DIVERSIONS FOR THE PERIOD FROM MARCH 31ST TO JULY 31, 1934

| Day | March | April | May | June | July | |
|---|---|---|---|---|---|---|
| 1 | | 9.50 | 3.20 | 1.80 | .60 | |
| 2 | | 8.40 | 3.20 | 1.65 | .60 | |
| 3 | | 6.50 | 3.20 | 1.55 | .55 | |
| 4 | | 5.00 | 2.90 | 1.50 | .55 | |
| 5 | | 4.40 | 2.90 | 1.45 | .50 | |
| 6 | | 4.00 | 2.90 | 1.60 | .45 | |
| 7 | | 4.20 | 3.20 | 1.60 | .45 | |
| 8 | | 4.40 | 3.60 | 1.50 | .40 | |
| 9 | | 4.60 | 3.20 | 1.40 | .40 | |
| 10 | | 4.60 | 2.90 | 1.35 | .40 | |
| 11 | | 4.70 | 2.60 | 1.35 | .40 | |
| 12 | | 5.40 | 2.50 | 1.30 | .40 | |
| 13 | | 5.40 | 2.30 | 1.30 | .40 | |
| 14 | | 5.40 | 2.10 | 1.30 | .35 | |
| 15 | | 5.40 | 2.00 | 1.25 | .35 | |
| 16 | | 5.40 | 1.90 | 1.25 | .35 | |
| 17 | | 5.20 | 1.80 | 1.20 | .35 | |
| 18 | NO RECORD | 4.80 | 1.70 | 1.20 | .35 | |
| 19 | | 4.80 | 1.60 | 1.15 | .35 | |
| 20 | | 4.60 | 1.50 | 1.10 | .35 | |
| 21 | | 4.20 | 1.50 | 1.05 | .30 | |
| 22 | | 4.00 | 1.45 | 1.00 | .30 | |
| 23 | | 4.60 | 1.45 | .95 | .30 | |
| 24 | | 4.60 | 1.40 | .90 | .30 | |
| 25 | | 4.40 | 1.50 | .85 | .25 | |
| 26 | | 4.00 | 1.45 | .80 | .25 | |
| 27 | | 3.60 | 1.45 | .75 | .25 | |
| 28 | | 3.20 | 1.40 | .75 | .25 | |
| 29 | | 2.90 | 1.45 | .70 | .20 | |
| 30 | | 3.20 | 1.45 | .70 | .20 | |
| 31 | *10.50 | | 1.60 | | .20 | |
| Total Sec. Feet Days | 10.50 | 145.40 | 67.30 | 36.25 | 11.35 | 123 Day Period |
| Mean Sec. Feet | | 4.85 | 2.17 | 1.21 | .37 | 2.20 |
| Maximum Sec. Feet | | 9.50 | 3.20 | 1.80 | .60 | 9.50 |
| Minimum Sec. Feet | | 2.90 | 1.40 | .70 | .20 | .20 |
| Total Acre-feet | 20.8 | 288 | 134 | 71.9 | 22.5 | 537 |

* Estimated

Gage heights from automatic water stage recorder.

TABLE 4

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF LARKIN GARDEN DITCH ON COTTONWOOD CREEK AT HEAD - 1934

| Day | March | April | May | June | July | |
|---|---|---|---|---|---|---|
| 1 | | 0.30 | 0.40 | 0.30 | 0.05 | |
| 2 | | .30 | .40 | .25 | .05 | |
| 3 | | .30 | .40 | .25 | .05 | |
| 4 | | .15 | .30 | .25 | .05 | |
| 5 | | .15 | .30 | .25 | .35 | |
| 6 | | .10 | .30 | .25 | .25 | |
| 7 | | .10 | .40 | .20 | .25 | |
| 8 | | .10 | .40 | .20 | .20 | |
| 9 | | .10 | .30 | .20 | .20 | |
| 10 | | .10 | .30 | .20 | .20 | |
| 11 | | .10 | .25 | .20 | .20 | |
| 12 | | .10 | .20 | .20 | .20 | |
| 13 | | .10 | .20 | .20 | .20 | |
| 14 | | .10 | .20 | .20 | .15 | |
| 15 | | .10 | .20 | .20 | .15 | |
| 16 | | .15 | .20 | .20 | .15 | |
| 17 | | .15 | .20 | .20 | .15 | |
| 18 | | .15 | .20 | .20 | .15 | |
| 19 | | .15 | .20 | .20 | .15 | |
| 20 | | .15 | .15 | .15 | .15 | |
| 21 | | .30 | .15 | .15 | .10 | |
| 22 | | .35 | .10 | .15 | .10 | |
| 23 | | .35 | .05 | .15 | .10 | |
| 24 | | .35 | .05 | .15 | .10 | |
| 25 | | .35 | .20 | .10 | .05 | |
| 26 | | .30 | .15 | .05 | .05 | |
| 27 | | .40 | .15 | .05 | .05 | |
| 28 | | .35 | .15 | .05 | .05 | |
| 29 | | .35 | .15 | .05 | .05 | |
| 30 | | .35 | .15 | .05 | .05 | |
| 31 | 0.30 | | .20 | | .05 | |
| Total Sec: feet Days: | *0.30 | 6.40 | 7.00 | 5.25 | 4.05 | 123 Day Period |
| Mean Sec. Feet: | | .21 | .23 | .18 | .13 | 1.87 |
| Maximum Sec. Feet: | | .40 | .40 | .30 | .35 | .40 |
| Minimum Sec. Feet: | | .10 | .05 | .05 | .05 | .05 |
| Total Acre-feet: | 0.59 | 12.7 | 13.9 | 10.4 | 8.03 | 45.6 |

* 1 Day Period

TABLE 5

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF LARKIN MAIN DITCH ON COTTONWOOD CREEK AT HEAD - 1934

| Day | March | April | May | June | July | |
|---|---|---|---|---|---|---|
| 1 | | 0.50 | | | | |
| 2 | | 1.00 | | | | |
| 3 | | .95 | | | | |
| 4 | | .90 | | | | |
| 5 | | .70 | | | | |
| 6 | | .50 | | | | |
| 7 | | .45 | | | | |
| 8 | | .40 | | | | |
| 9 | | .00 | | | | |
| 10 | | .00 | | | | |
| 11 | | .00 | | | | |
| 12 | | .00 | | | | |
| 13 | | .00 | | | | |
| 14 | | .00 | | | | |
| 15 | NO RECORD | .00 | | | | |
| 16 | | .00 | NO DIVERSION | NO DIVERSION | NO DIVERSION | |
| 17 | | .00 | | | | |
| 18 | | .00 | | | | |
| 19 | | .00 | | | | |
| 20 | | 1.65 | | | | |
| 21 | | 1.40 | | | | |
| 22 | | 1.00 | | | | |
| 23 | | 1.40 | | | | |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | NO DIVERSION | NO DIVERSION | NO DIVERSION | NO DIVERSION | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | 0.50 | | | | | |
| Total Sec: Feet Days: | * .50 | **10.85 | | | | 24 Day Period |
| Mean Sec. Feet: | | .47 | | | | 0.47 |
| Maximum Sec. Feet: | | 1.65 | | | | 1.65 |
| Minimum Sec. Feet: | | .00 | | | | .00 |
| Total Acre-feet: | .99 | 21.5 | | | | 22.5 |

* 1 Day Period.
**23 Day Period.

TABLE 6

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF ROBNETT DITCH ON COTTONWOOD CREEK AT HEAD - 1934

| Day | March | April | May | June | July | |
|---|---|---|---|---|---|---|
| 1 | | 1.70 | 1.90 | 1.00 | 0.25 | |
| 2 | | 1.50 | 1.90 | .90 | .25 | |
| 3 | | 1.50 | 1.90 | .80 | .20 | |
| 4 | | 1.50 | 1.70 | .75 | .20 | |
| 5 | | 1.40 | 1.70 | .70 | | |
| 6 | | 1.40 | 1.70 | .85 | | |
| 7 | | 1.40 | 1.90 | .90 | | |
| 8 | | 1.40 | 2.30 | .80 | | |
| 9 | | 2.00 | 2.00 | .70 | | |
| 10 | | 2.00 | 1.80 | .65 | | |
| 11 | | 2.10 | 1.60 | .65 | | |
| 12 | | 2.10 | 1.50 | .60 | | |
| 13 | | 2.20 | 1.40 | .60 | | |
| 14 | | 2.10 | 1.30 | .60 | | |
| 15 | | 2.10 | 1.20 | .55 | | |
| 16 | NO RECORD | 2.00 | 1.10 | .55 | NO DIVERSION | |
| 17 | | 2.00 | 1.10 | .55 | | |
| 18 | | 2.00 | 1.00 | .55 | | |
| 19 | | 2.00 | .90 | .50 | | |
| 20 | | 1.80 | .83 | .50 | | |
| 21 | | 1.80 | .85 | .50 | | |
| 22 | | 1.80 | .80 | .45 | | |
| 23 | | 2.00 | .85 | .40 | | |
| 24 | | 2.10 | .90 | .35 | | |
| 25 | | 1.90 | .80 | .35 | | |
| 26 | | 1.75 | .80 | .40 | | |
| 27 | | 2.40 | .80 | .40 | | |
| 28 | | 1.90 | .75 | .40 | | |
| 29 | | 1.70 | .80 | .35 | | |
| 30 | | 1.90 | .80 | .35 | | |
| 31 | 1.50 | | .90 | | | |
| Total Sec. Feet Days | *1.50 | 55.45 | 39.80 | 17.65 | .90 | 96 Day Period |
| Mean Sec. Feet | | 1.85 | 1.28 | .59 | .22 | 1.20 |
| Maximum Sec. Feet | | 2.20 | 2.30 | 1.00 | .25 | 2.30 |
| Minimum Sec. Feet | | 1.40 | .75 | .35 | .20 | .20 |
| Total Acre-feet | 2.97 | 110 | 78.9 | 35.0 | 1.78 | 229 |

* 1 Day Period.

TABLE 7

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF BISSELL DITCH ON COTTONWOOD CREEK AT HEAD - 1934

| Day | March | April | May | June | July | |
|---|---|---|---|---|---|---|
| 1 | | NO DIVERSION | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | 1.40 | | | | |
| 5 | | .90 | | | | |
| 6 | | 1.00 | | | | |
| 7 | | .90 | | | | |
| 8 | | 1.10 | | | | |
| 9 | | 1.10 | | | | |
| 10 | | 1.20 | | | | |
| 11 | | 1.30 | | | | |
| 12 | | 1.80 | | | | |
| 13 | | 1.70 | NO DIVERSION | NO DIVERSION | NO DIVERSION | |
| 14 | | 1.80 | | | | |
| 15 | | 1.80 | | | | |
| 16 | NO RECORD | 1.80 | | | | |
| 17 | | 1.65 | | | | |
| 18 | | 1.40 | | | | |
| 19 | | 1.40 | | | | |
| 20 | | .00 | | | | |
| 21 | | .00 | NO DIVERSION | NO DIVERSION | NO DIVERSION | |
| 22 | | .00 | | | | |
| 23 | | .00 | | | | |
| 24 | | .95 | | | | |
| 25 | | .90 | | | | |
| 26 | | .75 | | | | |
| 27 | | NO DIVERSION | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |
| Total Sec. Feet Days | | *24.85 | | | | 23 Day Period |
| Mean Sec. Feet | | 1.08 | | | | 1.08 |
| Maximum Sec. Feet | | 1.80 | | | | 1.80 |
| Minimum Sec. Feet | | .00 | | | | .00 |
| Total Acre-feet | | 45.5 | | | | 45.5 |

* 23 Day Period.

TABLE 8

ESTIMATED DAILY DISCHARGE IN CUBIC FEET PER SECOND OF OWENS-PERRY DITCH ON COTTONWOOD CREEK AT HEAD - 1934

| Day | March | April | May | June | July | |
|---|---|---|---|---|---|---|
| 1 | | 2.25 | | | | |
| 2 | | 2.00 | | | | |
| 3 | | 1.60 | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | NO DIVERSION | NO DIVERSION | NO DIVERSION | NO DIVERSION | NO DIVERSION | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | NO | NO | NO | NO | NO | |
| 22 | | | | | | |
| 23 | | | | | | |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | 2.25 | | | | | |
| Total Sec. Feet Days | *2.25 | **5.85 | | | | 4 Day Period |
| Mean Sec. Feet | | 1.95 | | | | 2.04 |
| Maximum Sec. Feet | | 2.25 | | | | 2.25 |
| Minimum Sec. Feet | | 1.60 | | | | 1.60 |
| Total Acre-feet | 4.46 | 11.6 | | | | 16.1 |

* 1 Day Period.
** 3 Day Period.

TABLE 9

ESTIMATED NET AVAILABLE WATER SUPPLY IN CUBIC FEET PER SECOND OF COTTONWOOD CREEK FOR THE PERIOD MARCH 31 TO JULY 31, 1934

| Day | March | April | May | June | July | |
|---|---|---|---|---|---|---|
| 1 | | 4.75 | 2.30 | 1.30 | 0.30 | |
| 2 | | 4.80 | 2.30 | 1.15 | .30 | |
| 3 | | 4.35 | 2.30 | 1.05 | .25 | |
| 4 | | 3.95 | 2.00 | 1.00 | .25 | |
| 5 | | 3.15 | 2.00 | .95 | .35 | |
| 6 | | 3.00 | 2.00 | 1.10 | .25 | |
| 7 | | 2.85 | 2.30 | 1.10 | .25 | |
| 8 | | 3.00 | 2.70 | 1.00 | .20 | |
| 9 | | 3.20 | 2.30 | .90 | .20 | |
| 10 | | 3.30 | 2.10 | .85 | .20 | |
| 11 | | 3.50 | 1.85 | .85 | .20 | |
| 12 | | 4.00 | 1.70 | .80 | .20 | |
| 13 | | 4.00 | 1.60 | .80 | .20 | |
| 14 | | 4.00 | 1.50 | .80 | .15 | |
| 15 | | 4.00 | 1.40 | .75 | .15 | |
| 16 | | 3.95 | 1.30 | .75 | .15 | |
| 17 | | 3.80 | 1.30 | .75 | .15 | |
| 18 | | 3.55 | 1.20 | .75 | .15 | |
| 19 | | 3.55 | 1.10 | .70 | .15 | |
| 20 | | 3.60 | 1.00 | .65 | .15 | |
| 21 | | 3.50 | 1.00 | .65 | .10 | |
| 22 | | 3.15 | .90 | .60 | .10 | |
| 23 | | 3.75 | .90 | .55 | .10 | |
| 24 | | 3.40 | .95 | .50 | .10 | |
| 25 | | 3.15 | 1.00 | .45 | .05 | |
| 26 | | 2.80 | .95 | .45 | .05 | |
| 27 | | 2.80 | .95 | .45 | .05 | |
| 28 | | 2.25 | .90 | .45 | .05 | |
| 29 | | 2.05 | .95 | .40 | .05 | |
| 30 | | 2.25 | .95 | .40 | .05 | |
| 31 | 4.55 | | 1.10 | | .05 | |
| Total Sec. Feet Days | *4.55 | 103.40 | 46.80 | 22.90 | 4.95 | 123 Day Period |
| Mean Sec. Feet | | 3.45 | 1.51 | .76 | .16 | 1.48 |
| Maximum Sec. Feet | | 4.80 | 2.70 | 1.30 | .35 | 4.80 |
| Minimum Sec. Feet | | 2.05 | .90 | .40 | .05 | .05 |
| Total Acre-feet | 9.02 | 205 | 92.8 | 45.4 | 9.82 | 362 |

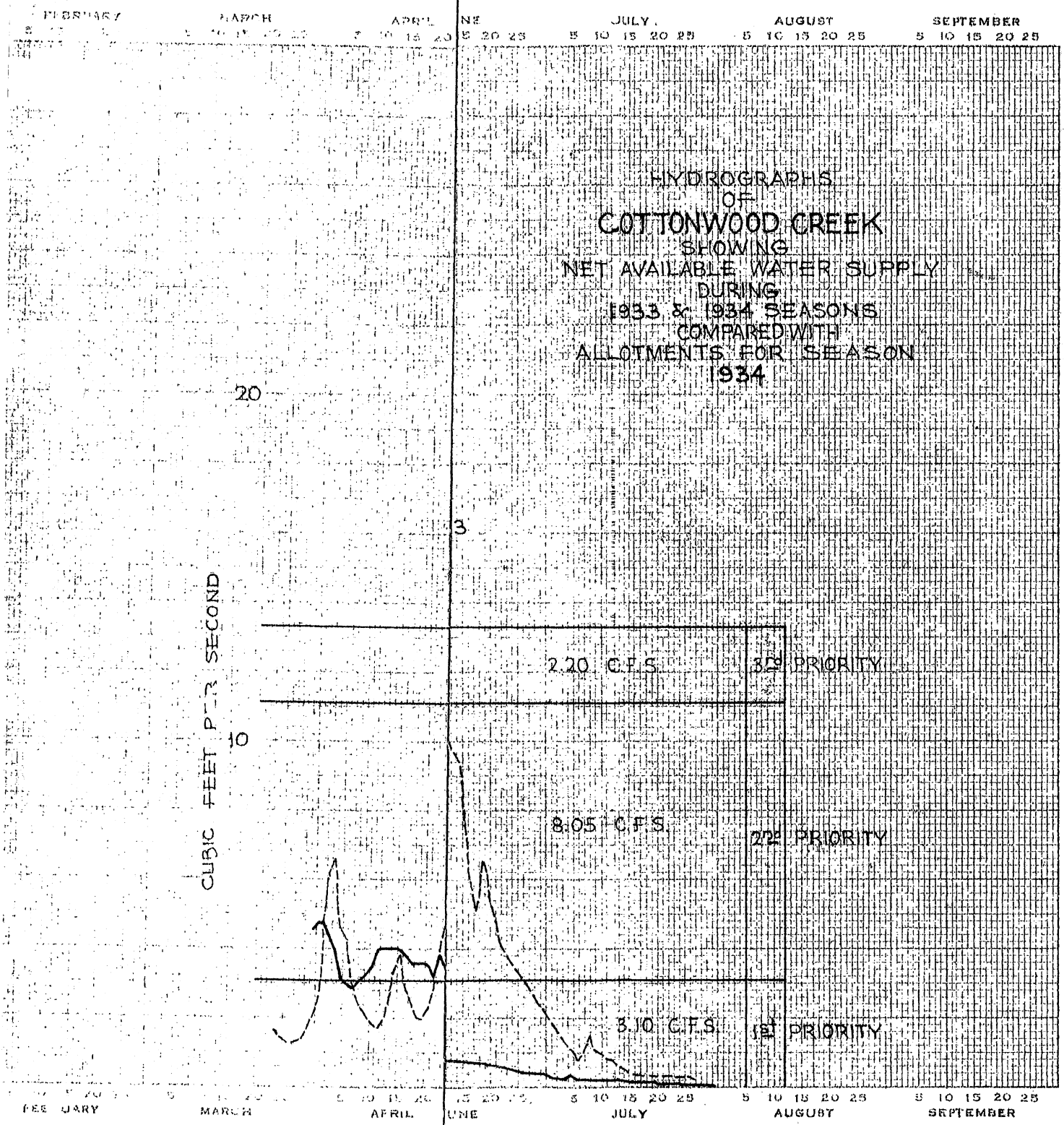
* 1 Day Period.

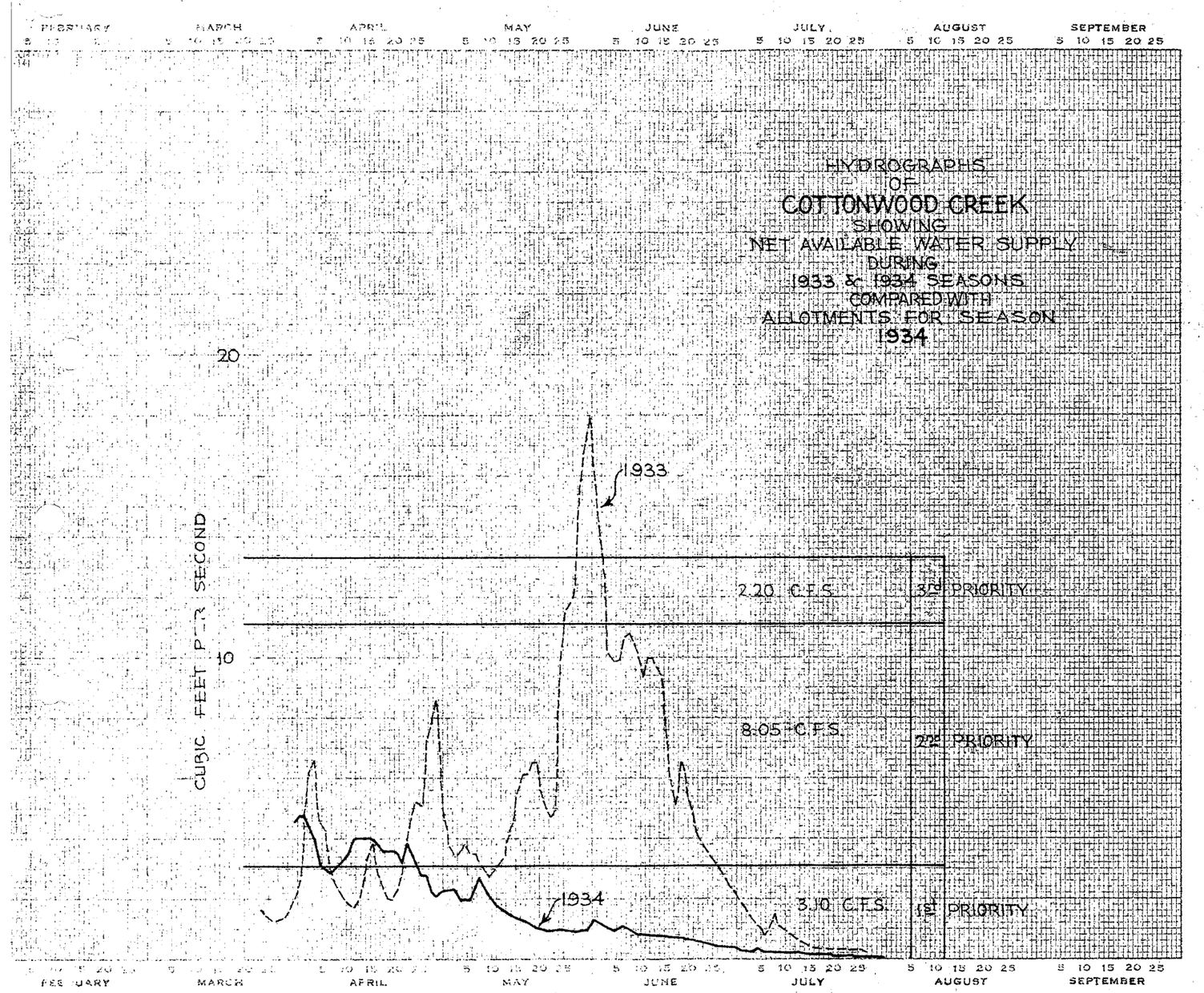
TABLE 10

ESTIMATED CROP YIELDS ON TYPICAL LANDS
IRRIGATED FROM COTTONWOOD CREEK - 1934

| Owner | Crop | Acres | Total Yield | | Yield per Acre | |
|---|---|---|---|---|---|---|
| | | | Sacks | Tons | Sacks | Tons |
| Grover C. Dick, et al. | Alfalfa Hay | 9.5 | | 20 | | 2.1 |
| | Meadow Hay | 19.8 | | 20 | | 1.0 |
| | Pasture | 8.3 | | Poor | | |
| Charley C. Larkin | Alfalfa Hay | 20.0 | | 15 | | .7 |
| | Orchard and Garden | 7.8 | | Fair | | |
| | Barley | 7.0 | 60 | | 9 | |
| Charles M. Oliver | Meadow Hay | 33.1 | | 35 | | 1.1 |
| | Grain Hay | 100.0 | | 40 | | .4 |
| | Wheat and Rye | 30.0 | 180 | | 6 | |
| Geo. H. Owens, et al. | Grain Hay | 60.0 | | 65 | | 1.1 |
| | Meadow Hay | 30.0 | | 10 | | .3 |
| | Barley | 14.0 | 100 | | 7 | |
| | Rye | 20.0 | 100 | | 5 | |
| Thomas E. and Mabel E. Perry | Meadow Hay | 40.0 | | 20 | | .5 |
| | Pasture | 17.0 | | Poor | | |
| Marvin C. Hunt | Meadow Hay | 100.0 | | 74 | | .7 |
| | Wheat | 28.0 | 126 | | 5 | |
| | Pasture | 11.3 | | Fair | | |

# PLATES


HYDROGRAPHS
OF
COTTONWOOD CREEK
SHOWING
NET AVAILABLE WATER SUPPLY
DURING
1933 & 1934 SEASONS
COMPARED WITH
ALLOTMENTS FOR SEASON
1934
CUBIC FEET PER SECOND
20
10
2.20 C.F.S.
3rd PRIORITY
8.05 C.F.S.
2nd PRIORITY
3.10 C.F.S.
1st PRIORITY
FEBRUARY
MARCH
APRIL
JUNE
JULY
AUGUST
SEPTEMBER


HYDROGRAPHS
OF
COTTONWOOD CREEK
SHOWING
NET AVAILABLE WATER SUPPLY
DURING
1933 & 1934 SEASONS
COMPARED WITH
ALLOTMENTS FOR SEASON
1934
CUBIC FEET PER SECOND
20
10
1933
1934
2.20 C.F.S.
8.05 C.F.S.
3.10 C.F.S.
3rd PRIORITY
2nd PRIORITY
1st PRIORITY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER

# APPENDIX

# A G R E E M E N T

Re Distribution of Waters of Cottonwood Creek During
the 1934 Irrigation Season

WHEREAS there is a suit entitled, "Charles M. Oliver vs. Isaac Robnett, et al.," pending in the Superior Court of California, in and for the County of Modoc, in which the rights to water, from Cottonwood Creek in said county and state, of all the parties hereunto subscribed are involved, and

WHEREAS the Division of Water Resources of the Department of Public Works of the State of California as referee for said Court has made an investigation and report on the water supply and use of water from said creek, and

WHEREAS It appears from the data collected by said Division that it may be possible to work out an allocation of the waters of Cottonwood Creek among the parties hereto that will be acceptable to all of said parties and afford the basis for a consent judgment in said proceedings, and

WHEREAS the parties hereto desire that a tentative allocation of the waters of said stream system be administered by said Division of Water Resources during the 1934 season as a demonstration of what may be accomplished,

NOW THEREFORE IT IS HEREBY STIPULATED AND AGREED by and between each and every party hereunto subscribed and among all of said parties, that said Division of Water Resources may undertake to distribute the waters of Cottonwood Creek among the various parties hereunto subscribed as hereinafter set forth, it being understood and agreed that the following plan of distribution and apportionment of water shall be for the period from March 23rd to September 30th, in 1934, only, and subject to such provisions as are hereinafter contained, to-wit:

1. The waters of Cottonwood Creek shall be distributed to the various diversions of the parties hereunto subscribed, in accordance with the priorities and quantities of water allotted, as set forth in Schedule 1, hereunto annexed and made a part hereof; provided, however, that at all times when the quantity of water available for proration among allotments of second priority class provided in said Schedule 1 is equal to or less than twenty per cent of the combined allotments of said second priority class, then the total flow available for said allotments of second priority class shall be prorated between Marvin C. Hunt, and C. C. Larkin in accordance with their respective allotments of said second priority class; provided further, that Grover C. Dick, et al., may use the allotment to T. E. Perry and Mabel E. Perry of second priority class provided in said Schedule 1 upon the Dick Ranch involved in said action, and said Grover C. Dick, et al., shall allow all drainage and waste water from said Dick Ranch to flow onto the lands of said T. E. Perry and Mabel E. Perry; provided further, that C. C. Larkin shall suffer a shortage of only fifty per cent in his allotment of first priority class provided in said Schedule 1, and at all times when the total available flow of Cottonwood Creek measured above all diversions is equal to or less than 0.40 cubic foot per second then said C. C. Larkin shall be entitled to divert and use the entire flow of said creek; and provided further, that said Division of Water Resources shall have power and authority to deviate from said schedule if in its opinion any changes are necessary or convenient in order to expedite the accomplishment of the purpose of the trial distribution herein provided.

2. All allotments hereinabove provided, which are within the same priority class, are equal in priority and correlative in right and at all

times when the water supply available for rights within a priority class is inadequate to supply all rights and allotments within said class, then during the continuance of such shortage, the owners of such allotments shall prorate the available water supply, if any, in excess of the quantity required for prior rights, in accordance with their respective allotments for that class, except as otherwise hereinabove provided.

3. Nothing in this agreement shall be construed to entitle any party to divert, at any time, a quantity of water in excess of that necessary and being put to beneficial use.

4. The points of measurement of all allotments hereinabove provided shall be at the respective points of diversion from Cottonwood Creek.

5. Nothing herein contained shall be construed as an admission by any party that his legal rights or the rights of any other party are as herein provided; and that the distribution of water in accordance with this agreement shall not in any manner prejudice the rights which are now claimed or may hereafter be asserted by any of the parties hereto.

6. Said Division of Water Resources may appoint a water master to distribute the waters of Cottonwood Creek, as hereinabove provided for, during the 1933 season and that said water master shall have power and authority to inspect and regulate the diversions of all the parties hereto in accordance with this agreement, and in the exercise of such authority may enter upon the lands of said parties for the purpose of such inspection and regulation, and may establish and maintain such gaging stations and measuring devices and require such diversion works, headgates, and measuring devices in said stream and diversion ditches as may be necessary or convenient. The several ditch owners shall furnish the necessary labor and material for the construction and installation of said diversion works, headgates, and measuring devices for

their respective ditches.

7. In order to meet the costs of such distribution by the water master during the 1934 season, the parties hereto agree to pay to the Division of Water Resources on or before April 1, 1934, their respective assessments as set forth in Schedule 2, hereunto annexed and made a part hereof.

IN WITNESS WHEREOF the parties hereto have affixed their hands and seals this 21st day of March 1934.

C. C. Larkin

T. E. Perry

Morris Dick

Geo. H. Owens

Ethyl D. Gundiff

Marvin C. Hunt

## SCHEDULE 1

### PRIORITIES AND ALLOTMENTS TO DITCHES FROM COTTONWOOD CREEK DURING THE 1934 SEASON

| Diversion Number on Division of Water Resources Map | Name of Ditch | Priority Class | Allotment Cubic feet per Second | Acreage to be Supplied | Name of Owner |
|---|---|---|---|---|---|
| 3 | Robnett | First | 0.85 | 50.8 | Grover C. Dick, et al |
| | | First | 2.00 | 120.3 | Marvin C. Hunt |
| 1 | Larkin Garden | First | 0.25 | 12.8 | C. C. Larkin |
| 3 | Robnett | Second | 1.00 | 51.6 | Marvin C. Hunt |
| | | Second | .10 | 4.0 | C. C. Larkin |
| 3 and/or 6 | Robnett and/or Perry | Second | 0.35 | 21.1 | T. E. and Mabel E. Perry |
| 5 | Robnett Field | Second | 0.75 | 36.9 | Marvin C. Hunt |
| 1 and/or 2 | Larkin Garden and/or Larkin Main | Second | 1.25 | 61.8 | C. C. Larkin |
| 4 and/or 7 | Bissell and/or Oliver North | Second | 2.85 | 142.9 | Charles M. Oliver |
| 6 | Owens-Perry | Second | 0.50 | 25.9 | Geo. H. Owens, et al. |
| 8,9,10 and/or 11 | Oliver South, Oliver Dam Oliver Meadow and/or Oliver Lower | Second | 1.25 | 63.9 | Charles M. Oliver |
| 6 | Owens-Perry | Third | 1.10 | 60.7 | Geo. H. Owens, et al. |
| | | Third | 1.10 | 57.2 | T. E. & Mabel E. Perry |
| | Totals | | 13.35 | 709.9 | |

## SCHEDULE 2

APPORTIONMENT OF COST OF WATER MASTER SERVICE TO WATER USERS
FROM COTTONWOOD CREEK DURING 1934 SEASON

| Name of Owner | Allotment cubic feet per second | Equal Apportionment of 1/10 | Apportionment of 9/10 in accordance with Allotments | Totals of Apportionment |
|---|---|---|---|---|
| Grover C. Dick, et al. | 0.85 | $ 2.86 | $ 11.46 | $ 14.32 |
| C. C. Larkin | 1.60 | 2.86 | 21.58 | 24.44 |
| Charles M. Oliver | 4.10 | 2.85 | 55.28 | 58.13 |
| Geo. H. Owens, et al. | .50 | 2.86 | 6.74 | 9.60 |
| Geo. H. and Ida L. Owens | 1.10 | 2.86 | 14.83 | 17.69 |
| T. E. and Mabel E. Perry | 1.45 | 2.86 | 19.55 | 22.41 |
| Marvin C. Hunt | 3.75 | 2.85 | 50.56 | 53.41 |
| Totals | 13.35 | $20.00 | $180.00 | $200.00 |